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UNIVERSIDAD CATÓLICA
SAN ANTONIO

FACULTAD DE CIENCIAS JURÍDICAS Y DE LA
EMPRESA

Departamento de Ciencias Sociales, Jurídicas y de la
Empresa

Intellect-Based, Intangible Sources of
German Small and Medium Sized Enterprises'
Success

– The Impact of Intellectual Capital on
Lasting Competitive Business Performance

Autor:

Sabrina Aschenbrenner, M.Sc., B.Sc. (hons.)

Directors:

Dra. M^a Mercedes Carmona-Martínez

Prof. Dr. Thomas Heupel

Cologne, July 2015



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AUTHORIZATION OF THE DIRECTOR OF THE THESIS
FOR SUBMISSION

Dra. M^a Mercedes Carmona Martínez and Prof. Dr. Thomas Heupel Directors⁽¹⁾ of the Doctoral Thesis “Intellect-based, intangible sources of German small and medium sized enterprises' success – the impact of intellectual capital on lasting competitive business performance” by Mrs. Sabrina Aschenbrenner in the *Departamento de Ciencias Sociales, Jurídicas y de la Empresa*, **authorizes for submission since it has the conditions necessary for his defense.**

SIGN, TO COMPLY WITH THE ROYAL DECREES 99/2011, 1393/2007, 56/2005 Y 778/98, IN MURCIA, 19.07.2015.

Dra. M^a Mercedes Carmona Martínez
(Murcia, Spain, 19.07.2015)

A handwritten signature in black ink, consisting of several loops and a long vertical stroke.

Prof. Dr. Thomas Heupel
(Essen, Germany, 19.07.2015)

PREFACE

“It is not the tangible capital which determines the value of an enterprise
but the intangible that rules it”¹

(Claude Honoré Desiré Dornier, 1884 - 1969)

Building on the aforementioned quote, one may wonder if the success of German small and medium sized enterprises (SME) is also based on intangible (re)sources which are mostly not accounted for on a company's balance sheet? And if so, to what extent and which intangibles are particularly important for German SME and their performance? It is the key objective of this dissertation to discover answers to these questions. To do so, this doctoral thesis looks into the soft issues which determine German SME' performance and which are difficult for competitors to copy or even substitute because of their latent structure.

The idea to write this dissertation was born during my employment at the Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany. I worked on a project concerning the reporting of intellectual capital (IC) in German SME which was financed by the BMWi (German Federal Ministry of Economics and Technology) and led by Prof. Dr. Thomas Fischer as well as Prof. Dr. Inge Wulf. After the project I was motivated to build on the acquired knowledge and continued researching on German SME' IC at the Universidad Católica San Antonio de Murcia, Spain in cooperation with the FOM - Hochschule für Ökonomie & Management, Germany.

I would like to take the opportunity to express thanks to my two supervisors Prof. Dr. Thomas Heupel and Prof. Dr. Mercedes Carmona-Martinez who agreed to pursue my already started dissertation and welcomed me with warmth after my change in careers. Prof. Heupel and Prof. Carmona-Martinez majorly supported

¹ Own translation – original quote (German): „Nicht das Kapital bestimmt den Wert eines Unternehmens, sondern der Geist der in ihm herrscht.“

PREFACE

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Lastly and most importantly, I am extremely grateful to my parents and need to thank them simply for everything. Their backing, optimism, permanent emotional and moral support, encouragement as well as love made me not give up, especially in hard and exhausting times. Hence, I can say - even without any empirical analysis - that my parents represent an essential source of this dissertation' success.

To my parents – a critical source of this doctoral thesis' success

Disclaimer

Various publications in the field of German SME' and young German enterprises' IC were produced during the course of this dissertation (Aschenbrenner 2014: 13-15; Aschenbrenner, Heupel, Carmona-Martínez 2014a; Aschenbrenner, Heupel, Carmona-Martínez 2014b: 53-63; Aschenbrenner, Heupel, Carmona-Martínez 2015). The contents of these published research works and the doctoral thesis at hand overlap to a certain degree

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LIST OF ABBREVIATIONS

AKIW	Arbeitskreis "Immaterielle Werte im Rechnungswesen" der Schmalenbach Gesellschaft für Betriebswirtschaft = working group specialized on intangible issues in accounting
ANOVA	Analysis of variance
approx.	Approximately
AVE	Average variance extracted
BDA	Bundesvereinigung der Deutschen Arbeitgeberverbände (German) = Confederation of German employers' associations
BMWi	Bundesministeriums für Wirtschaft und Technologie (German) = German Federal Ministry of Economics and Technology
B/S	Balance Sheet
CBV	Capability-based view
CBSEM	Covariance-based structural equation modeling
CEO	Chief executive officer
Cf.	Confer (Latin) = to compare or bring together
CR	Composite reliability
CSF	Critical success factors
c_{sv}	Substantive-validity coefficient
DCBV	Dynamic capability-based view
df	Degree(s) of freedom
DKRA	Dynamic (knowledge) resource approach
Ebs	European Business School, Oestrich-Winkel
EC	European Commission
e.g.	Exempli gratia (Latin) = for example
EM	Expectation maximization
et al.	Et alii (Latin) = and others

excl.	Exclusive
€	Euros (currency)
f ²	Effect size
GER SME	German small and medium sized enterprises
HC	Human capital
HCA	Hierarchical component approach
HGB	Handelsgesetzbuch (German) = German commercial code/law
IA	Intellectual assets
i.a.	Inter alia (Latin) = among others
IAS	International accounting standard
IASB	International accounting standards board
Ibid.	Ibidem (Latin) = the same place or something that has been mentioned previously
IC	Intellectual capital
ICT	Information communication technologies
i.e.	Id est (Latin) = that is
IfM	Institut für Mittelstandsforschung, Bonn (German) = Institute for small and medium sized business research, Bonn
InCaS	Intellectual Capital Statement
incl.	Including and inclusive
IP	Intellectual property
IT	Information technologies
KAS	Käte Ahlmann Stiftung – foundation
KBV	Knowledge-based view
KM	Knowledge management
KMU	Kleine und mittlere or kleine und mittelständische Unternehmen (German) = small and medium sized enterprises
LISREL	Linear structural relationships
LV	Latent Variable
m.	Million

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MBV	Market-based view
MCAR	Missing completely at random
MERITUM	Measuring intangibles to understand and improve innovation management
METI	Ministry of economy trade and industry of Japan
MGA	Multi-group analysis
MIMIC	Multiple indicators and multiple causes
Min.	Minuten (German) = Minutes
ML	Maximum likelihood
n.k.	Not known
No.	Number
NPO	Non-profit-organization
OL	Organizational learning
OLS	Ordinal least squares
p	Probability
p.a.	Per anno (Latin) = each year
P/L	Profit and loss (account)
PLS	Partial least squares
PR	Public relations
p _{sa}	Proportion of substantive agreement
Q ²	Predictive relevance
q ²	Effect size q ²
Q1	First Quartile
Q3	Third Quartile
R ²	Coefficient of determination
RBV	Resource-based view
RC	Relational/relationship capital
RICARDIS	Reporting intellectual capital to augment research, development and innovation in SMEs

ROA	Return on assets
ROE	Return on equity
ROI	Return on investments
ROS	Return on sales
RWI	Rheinisch-Westfälisches Institut für Wirtschaftsforschung (German) = Rhineland-Westphalia institute for economic research
R&D	Research and development
SC	Structural capital
SCA	Sustained competitive advantage
SCP	Structure conduct performance
SEM	Structural equation model(ling)
SIE	Small innovation enterprises
SKE	Society for knowledge economics
SME	Small and medium sized enterprises or small to medium sized enterprises
TAC	Transaction costs
VDU	Verband deutscher Unternehmerinnen (German) = Association of female entrepreneurs
VIF	Variance inflation factor
ZEW	Zentrum für Europäische Wirtschaftsforschung (German) = Centre for European economic research
%	Percent(age)

1 INTRODUCTION

1.1 MOTIVATION: RELEVANCE OF INTELLECTUAL CAPITAL IN TODAY'S KNOWLEDGE ECONOMY

“(…) in the modern business world, the business imperative is to manage intellectual capital or to die”

(Roos et al. 1997: 5).

Internally developed and thus, firm-specific intangible resources are an increasingly essential strategic source of companies' lasting competitive advantage, (future) business performance as well as ultimately firm survival in today's advanced business environment (Drucker 1993: 4; Edvinsson, Sullivan 1996: 363; Guthrie 2001: 29; MERITUM 2001: 1; Juma, Payne 2004: 297; Hayton 2005: 137; Albers, Hildebrandt 2006: 10; Marr 2006: xv; Martinez-Torres 2006: 617 et seq.; RICARDIS 2006: 10; Durst 2008: 411; Will 2008: 2; Sonnier, Carson, Carson 2009: 1; Wuscher, Will 2010: 12; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 72 et seq.; Martin Castro et al. 2011: 649). Precisely, the unprecedented significance of intellect-based and knowledge-intensive intangibles can be seen in the fact that they are progressively taking on – respectively replacing – the role which traditional physical and financial tangible assets like machinery, tools, property, land as well as (financial) capital play in business² (Drucker 1993: 4; Bontis et al. 1999: 392; Ponzi 2002: 259; Daum 2003: 3, Daum 2004: 53; Marr, Schiuma, Neely 2004: 312; Alwert 2005: 1; Wong, Aspinwall 2005: 64; Durst, Gueldenberg 2009: 182; BMWi 2010b: 5; Kamukama, Ahiauzu, Ntayi 2010: 554; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 72; Martin Castro et al. 2011: 649). In other words:

² “Although this cannot be generalised for all companies, there seems to be some kind of agreement in the literature (...) that intangible (...) resources are more relevant to creating a competitive advantage than tangible (physical and financial) resources” (Cater, Cater 2009: 187).

“(...) organizational intelligence (...) has moved from a supporting role to a starring one”

(Stewart 1997: 56).³

This business world transformation from a production-based economy toward a (service and) knowledge-driven economy (Bontis 1998: 64; Daum 2004: 52; Alwert 2005: 1; Martinez-Torres 2006: 617; BMWi 2007: 10; Makki, Lodhi 2008: 82; Huang, Wu 2010: 2) is primarily characterized by the fact that knowledge- or intellect-based resources currently represent, although being intangible, the key commodity (Matos, Lopes 2009: 347 et seq.) – whether as the main object of a transaction or as a crucial ingredient of economic activities (Roos et al. 1997: 8; Stewart 1997: 12; Grant 2002: 134). Moreover, it can be noticed that up to 80% of a company’s resources are intangible (Makki, Lodhi 2008: 82). Thus, knowledge- and intellect-driven resources as well as action determine (to large parts) the life or death of products and companies (Bontis et al. 1999: 392).

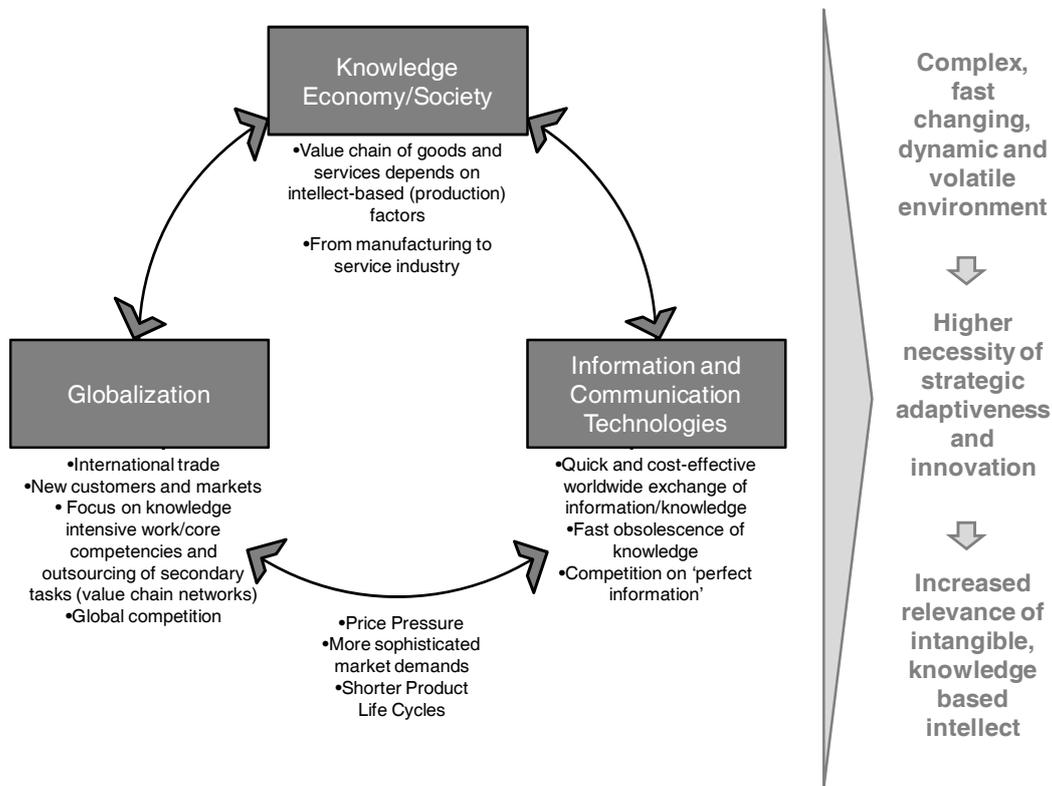
These circumstances are primarily caused by two key trends which are visualized in figure 1: globalization and information technologies (Durst, Gueldenberg 2009: 182; Sundac, Krmpotic 2009: 279). In terms of *globalization* one can notice that lower international tariffs (Sundac, Krmpotic 2009: 279), liberalized markets and cost-effective transportation possibilities (Teece 1998: 56) constitute increased worldwide trade (Sundac, Krmpotic 2009: 279). This continuous globalization (Will 2008: 2) offers, on the one hand, benefits such as creating and entering new markets as well as business segments (including new customers) or engaging in new forms for business setups (Stewart 1997: 8; Durst, Gueldenberg 2009: 182; Sundac, Krmpotic 2009: 279). Especially concerning the

³ “(...) knowledge-based intangibles (...) are not new in the sense that they did not exist within organisations before, rather they have taken on a new and unprecedented importance in a business world defined by global competition, the need for constant strategic adaptation, ever-increasing customer demands and an explosion of service-based industries” (Guthrie 2001: 29); “(...) the traditional 'factors of production' – land, labor and capital – have not disappeared, but they have become secondary” (Drucker 1993: 42).

latter, one has to acknowledge the gained access to developing countries which provide the potential of cheap(er) labor as well as production facilities and thus, the opportunity to focus on knowledge intensive work (core competencies) in the Western nations (North 2011: 14). This in turn is one of the main forces which facilitated the shift away from the *manufacturing towards the service industry* (Kloth, Maurer, Schimmelpfenning 1997: 4) and consequential new levels of value added (Quinn 1992: 3 et seq.; Geißler 2011: 25 et seq.; North 2011: 14). On the other hand, globalization is responsible for opening up national markets (Sundac, Krmpotic 2009: 279) and thus, sharpened competition (Teece 1998: 56). Moreover, this rivalry is further intensified because the new competitors became and still become increasingly stronger due to accelerated international learning (processes) (North 2011: 14) as well as available *information and communication technologies* which diminish competitive knowledge leads – i.e. competitive advantages (Staiger 2008: 2). Precisely, the recent information and communication technology revolution (Petty, Guthrie 2000: 157), which electronically connects people and businesses (Teece 1998: 59), enables the fast as well as cost-effective worldwide spread (flow and collection) of information and knowledge (Roos et al. 1997: 9; Stewart 1997: 8; Deking 2003: 6; North 2011: 15). This increases global information transparency and consequently, advances competition on perfect information (North 2011: 15).

Figure 1 summarizes this discussion: the knowledge economy and its drivers – globalization and IT – result in the fact that companies encounter less control over information, lower bargaining power (Teece 1998: 59) and a deterioration of prices. Moreover, firms are faced with more individualized, quickly changing and leading customer-needs, -preferences as well as -expectations, and constantly shortening product lifecycles (Roos et al. 1997: 9; Rodriguez 2003: 127; Jaspers 2008b: 1; Schiuma, Lerro 2008: 3; Will 2008: 2; Durst, Gueldenberg 2009: 182; Kamukama, Ahiauzu, Ntayi 2010: 554; North 2011: 15).

Figure 1: Current Uncertain Environment



Source: adopted from Müller-Steinfahrt 2006: 3 and North 2011: 15

Overall, the enduring globalization of markets and information technologies cause a complex, dynamic, volatile and thus, uncertain (knowledge-based) business world (cf. figure 1) (Nonaka 1991: 96; Helm, Meiler 2004: 389; Chirico, Salvato 2008: 169; Durst 2008: 411; Heidenbauer 2008: 1; Will 2008: 2; Durst, Gueldenberg 2009: 182; Sundac, Krmpotic 2009: 279; North 2011: 14 et seq.). This challenging competitive environment, which is also referred to as buyers' market⁴ (Daum 2004: 53), requires enterprises – regardless of sector – to increase

⁴ The epoch of the sellers' market which was characterized by excess demands over supplies, mass production, efficiency- and product-orientated processes (Daum 2004: 52 et seq.) as well as natural resources and physical labor (Stewart 1997: 6) got replaced by a buyers' market: intensive competition over customers due to an oversupply of goods and services requires market- and service-orientated business models which are flexible

their *organizational adaptiveness* and thus, to identify trends fast, to predict the future and to adjust accordingly (Roos et al. 1997: 14; Teece, Pisano, Shuen 1997: 515; Guthrie 2001: 29; SKE 2005: 4; Chirico, Salvato 2008: 169). To do so and (also) to constantly satisfy market demands via original, differentiated, high(er) value products, services as well as processes (Prahalad, Hamel 1990: 80; Schiuma, Lerro 2008: 3 et seq.; F-Jardon, Martos 2009: 602) close *stakeholder relationships*⁵ (Daum 2004: 52 et seq.) and *innovations* (Peters, Waterman 2000: 34; Petty, Guthrie 2000: 157; Hermans, Kauranen 2005: 171) are vital.⁶ Yet, for companies to create, exploit as well as uphold their sensitivity towards stakeholders and their innovation potential (SKE 2005: 4) – and thus, to leverage as well as sustain competitive advantages, lasting organizational performance and permanent survival (Edvinsson, Sullivan 1996: 363; Petty, Guthrie 2000: 165; Alwert, Vorsatz 2005: 323; Jaspers 2008b: 1; Schiuma, Lerro 2008: 4) – they need to *shift their management focus from tangible to intangible, intellect-based resources* (Bontis et al. 1999: 392; Durst, Gueldenberg 2009: 182):

“Businesses that can efficiently capture the knowledge embedded in their organisations and deploy it into their operations, productions and services will have an edge over their competitors”

(Wong, Aspinwall 2005: 64).

The just mentioned organizational knowledge- and intellect-based intangibles, respectively (Bontis 1998: 72), which progressively determine the lasting competitive business performance of firms, are also referred to as *intellectual capital* (IC). In detail, this term symbolizes a bundle of intellect-based

enough to quickly adapt to external forces/changes (Daum 2004: 52 et seq.).

⁵ Close relationships are necessary to either acquire and analyze knowledge about the stakeholders’ expectations, perspectives and needs (Ittner, Larcker 2002: 82; SKE 2005: 19) and/or to compensate for limited own resources and thus, to secure their supply (St-Pierre, Audet 2011: 204; Bischof 2012: 10 et seq.).

⁶ “Winners in the global marketplace have been firms that can demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competences” (Teece, Pisano, Shuen 1997: 515).

attributes (Reed, Lubatkin, Srinivasan 2006: 867; Schiuma, Lerro 2008: 4) which (or whose activities) are strategically vital for sustainable, above-average success (Riahi-Belkaoui 2003: 215) – especially because they are idiosyncratic, undepreciable, intransferable, inimitable and non-substitutable (Bamberger, Wrona 1996: 135 et seq.). Intellect-based components can be grouped into categories of IC. Examples include the knowledge, skills, experiences and abilities of employees as well as managers for the category *human capital* (people related issue); R&D activities, organizational routines, procedures, systems and databases for *structural capital* (internal organizational subjects); and all intangibles that relate to a firm's relationships with customers, suppliers or other partners for the IC-category *relationship capital* (external stakeholder matters) (MERITUM 2001: 3; RICARDIS 2006: 17).

In recent years, large corporations and multinationals have acknowledged the necessity to manage their IC-based sources of success (Nunes et al. 2006: 102; Schauerte 2009: vii; Voigt, Seidel 2009: 1) in order to create value for stakeholders, to design effective business models, to execute valuable innovation processes, to launch new products and services, and to improve organizational competences as well as above-average business performance (Schiuma, Lerro 2008: 3 et seq.). Yet, it has been recognized by practitioners and academics that small and medium sized enterprises (SME) might as well be required to effectively manage their IC in order to maximize their competitiveness and business performance in today's economic environment (Nunes et al. 2006: 116; Voigt, Seidel 2009: 1).

1.2 RESEARCH-GOAL AND -QUESTIONS OF THIS DISSERTATION

It can be argued that small and medium sized enterprises (SME) exist and thus, are able to prosper in the long run because they have particular (superior) advantages which allow them to successfully compete against large corporations (Eichhorn 2009: 230; Reinemann 2011: 90). If this argument is true, then is it important to investigate which strategic sources are responsible for SME' competitive edge (over big firms) and success, respectively (Becker, Staffel, Ulrich

2008: 32; Reinemann 2011: 90). Building on this argumentation as well as the above drawn conclusion that intellectual capital (IC) is at present a major source of competitive advantages and (future) business performance (Edvinsson, Sullivan 1996: 363; Bontis 1998: 72; Alwert, Vorsatz 2005: 323; Viedma Marti 2007: 246; Schiuma, Lerro 2008: 3) in big- as well as small- and medium-sized firms (Nunes et al. 2006: 116), it is important to empirically elaborate on aspects of IC and particularly IC-driven sources of success in SME (cf. figure 2 – top).

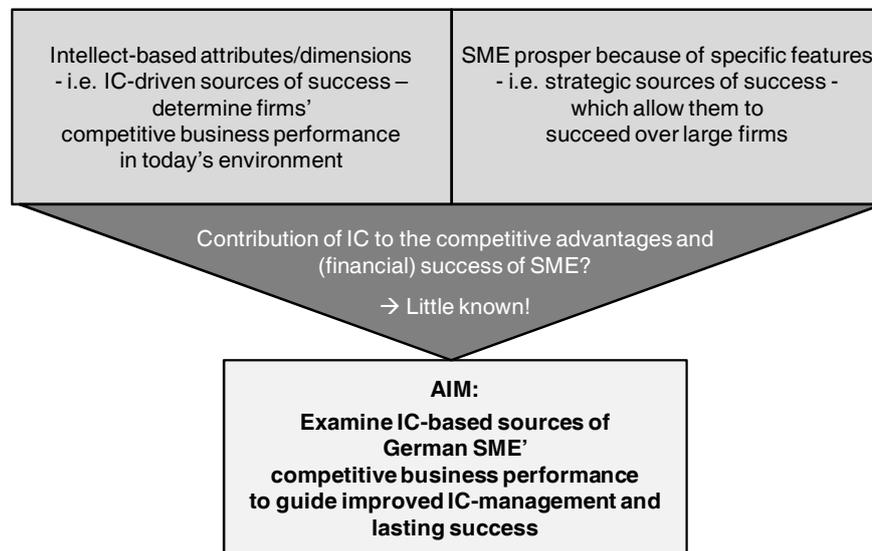
In detail, one can even argue that SME' lasting competitive business performance (i.e. their competitive advantages as well as lasting supernormal financial success) is more dependent on intangibles such as knowledge, capabilities, the ability to innovate or stakeholder relationships (Khan 2011: 133) than material resources (BMW 2010b: 9 et seqq.). This is, firstly, because SME' sources of success are mainly company-based (internal) as opposed to environmental conditions (external) (Küpper 1994: 122). Secondly, SME have relatively scarce (internal) tangible resources (Tangkittipaporn n.k.: 1), especially compared to, for instance, multinational companies. Thus, SME are unlikely to compete with large firms on tangibles such as capital, equipment and physical commodities but instead on intangibles (Wong, Aspinwall 2004: 47) which offer the potential to be valuable, rare, imperfectly imitable and not substitutable (Barney 1991: 105 et seq.). Accordingly, it can be reasoned that (successful) SME' strategic sources of sustainable competitive advantage and thus, lasting above-average business performance rest on their (efficient and effective) leverage of IC (Will 2008: 2).

However, little research evidence is available concerning SME' IC (management) and its impact on performance (Wong, Aspinwall 2005: 65; Cohen, Kaimenakis 2007: 241 et seq. & 245; Tovstiga, Tulugurova 2007: 695; Hutchinson, Quintas 2008: 132; F-Jardon, Martos 2009: 601; Kamaluddin, Rahman 2009: 14; Tovstiga, Tulugurova 2009: 70; Steenkamp, Kashyap 2010: 369; St-Pierre, Audet 2011: 202 et seqq.) (cf. figure 2 – middle). In particular, very few studies examine the IC of German SME since research focus is rather placed on exogenous, market driven sources of success (Rasche 2003: 225 et seq.). Furthermore, the investigations which look into German SME' IC are not very specific as the following examples show:

- they focus only or majorly on knowledge management instead of IC and its categories as well as dimensions and attributes (Pawlowsky et al. 2006; Staiger 2008; Pawlowsky, Gözalan, Schmid 2011),
- they evaluate only managers' perceived relevance of IC instead of asking for actual hard facts (BMW 2007: 49 et seqq.; Mertins, Will, Wuscher 2007: 197 et seqq.; Mertins, Will, Orth Ronald 2009: 111 et seqq.; BMW 2010b: 6; Vanini 2011: 7),
- they question firm-externals instead of SME-internals (Durst 2008: 410 et seqq.; Durst, Gueldenberg 2009: 181 et seqq.; Vanini 2011: 11 et seqq.),
- they are case-study-based rather than collecting large empirical data sets (BMW 2007: 49 et seqq.; Mertins, Will, Wuscher 2007: 197 et seqq.; Mertins, Will, Orth Ronald 2009: 111 et seqq.),
- they have limited cases (Voigt, Finke, Orth 2009: 271 et seqq.), and
- they do not statistically investigate the relationship between the IC-categories, their dimensions as well as business performance (BMW 2007: 49 et seqq.; Mertins, Will, Wuscher 2007: 197 et seqq.; Mertins, Will, Orth Ronald 2009: 111 et seqq.).

Consequently, it is the *main objective* of this doctoral thesis to close this literature gap in the German SME context by *empirically examining the hard-fact-based IC-driven source of German SME' success with a (relatively) large data sample*. Specifically, the identification of strategically relevant IC-categories, -dimensions, and -attributes, whose management positively contributes to sustainable competitive advantages and long-term performance superiority, is intended to guide and improve German SME' internal management regarding IC (cf. figure 2 - bottom).

Figure 2: Construction of Research Goal



This research objective can be further specified: Most importantly this dissertation aspires to generally *enhance the knowledge about the intellectual capital discipline of German SME*. In order to better understand the 'intellectual capital mix' (Kamukama, Ahiauzu, Ntayi 2010: 556) of German SME this dissertation aims to empirically establish the most relevant (real) IC-attributes and -dimensions of German SME. Additionally, the extent to which the IC-categories – i.e. groupings of IC dimensions into human capital, structural capital and relationship capital – of German SME interact as well as influence business performance shall be determined. Furthermore, this doctoral work strives to *advance (the implementation of) intellectual capital management (Wong, Aspinwall 2005: 459) of German SME via useful guidance*.⁷ This shall be achieved by providing a checklist (as a management tool) (Daschmann 1993: VI) of the identified significantly contributing (categorized) IC characteristics which should be (come) subject of management. This is required since SME have – due to their relatively small size and (personnel as well as financial) resource constraints (Desouza, Awazu 2006: 32; Völker, Sauer, Simon 2007: 148 et seq.) – a “(...) less “ready

⁷ So far, the IC of German SME is predominantly (unsystematically) managed based on entrepreneurs’ intuition (BMW 2008: 7; BMW 2013c: 7).

made" infrastructure for the measurement, management and development of knowledge and other intangible assets" (Watters, Jackson, Russell 2006: 551) and thus, need assistance (ibid.: 555).⁸

To further specify the above mentioned research goals, one *key research question* is addressed within the course of this dissertation:

Which categories, dimensions, and attributes of German small and medium sized enterprises' intellectual capital represent strategic sources of lasting competitive business performance and thus, should receive management attention?

This query can be further broken down into the following *five sub-research-questions*:

(1) Which attributes and dimensions of intellectual capital are relevant in the context of German small and medium sized enterprises?

This question concerns the identification of IC characteristics which specify the complex constructs of IC and its categories. Examples include knowledge, experience and creativity of employees for the IC-category *human capital*; efficient processes and communication settings for the IC-category *structural capital*; and relations as well as cooperations with customers, suppliers or the public for the IC-category *relationship capital* (Wuscher, Will 2010: 12).

The establishment of the IC-attributes and -dimensions which are particularly relevant for German SME is necessary because it promotes the understanding of the nature of German SME' IC. However, there is, so far, no consensus concerning a widespread, accepted set of components and indicators, respectably, to

⁸ "SME have understandable resource constraints, and hence have to be creative in working around these limitations in order to manage knowledge" (Desouza, Awazu 2006: 32) as well as IC.

concretize as well as measure the IC (-categories) (F-Jardon, Martos 2009: 601) of German SME. Hence, this doctoral thesis approaches the vital identification of the most relevant IC-aspects of German SME which are expected to positively impact business performance.⁹ This task is performed by comparing and combining the general and international IC-literature with the proven results of research on German SME' IC and German SME' success factor. Furthermore, validity is established via expert interviews which judge the transformation of the basic, international IC-concept into the German SME context.

Overall, this serves as a starting point for subsequent (empirical) research in the field of German SME' IC and as the basis for an IC-management framework (Daum 2003: xvii; Watters, Jackson, Russell 2006: 561; Reinemann 2011: 91).

(2) Which of the identified relevant attributes and dimensions of German small and medium sized enterprises' intellectual capital are the most important?

This question aims to establish evidence that the identified relevant IC-attributes and -dimensions of German SME (results of research question one) have differently strong influences on IC and the IC-categories in particular.

The discovery of the extent to which the IC-aspects contribute to German SME' IC is important since SME can (in most cases) not manage all relevant components of their IC simultaneously (Wong, Aspinwall 2005: 64). This is, especially, because of time and financial restrictions (Wong, Aspinwall 2004: 56; Huggins, Weir 2007: 718). Instead, SME need directions on which (strategically) critical IC-initiatives they need to focus on (Wong, Aspinwall 2004: 56).¹⁰ However, in the current literature there is no agreement about the most important IC-attributes and

⁹ It is possible to establish a set of generally contributing components (Hoffmann 1986: 832; Adenäuer 2007: 17) because "key success factors are quite general, and in most cases refer to most companies" (Bontis et al. 1999: 399).

¹⁰ "(...) it is critical for managers to know which intangible asset components are important to their businesses so that they can gather information about them that will assist them in utilising and managing them effectively to create value and secure sustainable competitive advantages for the firm" (Steenkamp, Kashyap 2010: 370).

-dimensions of SME.¹¹ Yet, as indicated by Ellen Walther-Klaus and Frieder Zimmermann (2007: 44) it would already be of great benefit for German SME if only a small amount of significant IC-factors (including indicators), whose management offers the potential to influence success in a predictable manner, is provided for. The research study at hand, therefore, pursues the target to establish a prioritized list of the most impacting dimensions of German SME' IC – i.e. IC-based sources of success. This objective is achieved via statistical tests which measure the impact of the individual attributes and dimensions on IC. The operationalization of these statistical mechanisms is as well validated by experts and pretested in a field study.

(3) How do the individual categories of intellectual capital (human capital, structural capital and relationship capital) influence the success of German small and medium sized enterprises? Which of these categories has the strongest direct impact on lasting competitive business performance?

¹¹ For example, the BMWI discovered in an analysis of 42 IC-statements of German SME the following orders of IC-factors: 1) professional competencies (HC), 2) employee motivation (HC), 3) internal cooperation and knowledge transfer (SC) (for the industry segment) (BMW 2007: 59; Mertins, Will, Wuscher 2007: 201, Mertins, Wang, Will 2009: 119), and 1) employee motivation (HC), 2) professional competencies (HC), 3) leadership style (HC) (for the service sector) (Mertins, Wang, Will 2009: 119). Based upon 15 case studies on knowledge management of German SME it can be concluded that 1) customer knowledge (RC), 2) knowledge about products (SC), 3) professional and method competencies (HC) are the most important success factors (Voigt, Finke, Orth 2009: 275). A survey among 947 German companies – of which about ¾ are SME – provides evidence that 1) professional competencies (HC), 2) customer relationships (RC), 3) motivation (HC) are perceived as relevant by managers (BMW 2010a: 14). Another German study with 381 SME claims the following ranking: 1) employee experience (HC), 2) employee soft-skills (HC), 3) relationships with cooperation partners (RC) (Vanini 2011: 6). Lastly, Natasja Steenkamp and Varsha Kashyap (2010: 380) come to different result for SME in New Zealand (perceptions of managers): 1) customer satisfaction (RC), 2) customer loyalty (RC), 3) product reputation (RC).

After having identified the core attributes and dimensions of German SME' IC or better of the IC-categories, the latter's relationship to business outcomes can be explored (Martin Castro et al. 2011: 652; Reinemann 2011: 91). In particular, it is advised to first study if each category of IC – i.e. human capital, structural capital and relationship capital – directly contributes to German SME' success (F-Jardon, Martos 2009: 602 et seq.). Especially, the establishment of the extent to which the IC-categories impact lasting competitive business performance (Wong, Aspinwall 2004: 46) is necessary¹² because not all categories of IC are equally important (Kamukama, Ahiauzu, Ntayi 2010: 556 et seq.).

Such an investigation is important because it helps to validate the prevailing assumptions and findings, which state that IC represents a significant strategic source of success, in the context of SME (Steenkamp, Kashyap 2010: 369) in German. Furthermore, this examination is relevant since German SME need to understand the benefits of managing their IC-factors; or put differently, the cause-and-effect relationships (Kivikas, Wulf 2006: 52 et seq.). Thus, the results of this study strengthen the effectiveness and suitability of German SME' IC-management (Mertins, Kohl, Krebs 2008: 56 et seq.). However, existing research on SME does not provide for consistent results.¹³ Therefore, this dissertation addresses the direct impact – including its extent – of the IC-categories on business performance via statistical calculations. The resulting findings are illustrated in a ranked list which complements the previous established IC dimensions (research question two) to strengthen their contribution to success.

¹² "It's no longer a matter of debate that non-financial measures are important. The questions - how important and in what ways - have triggered an explosion of interest" (Blitz, Siesfeld, Bierbusse 1997: 2).

¹³ For example: Identified literature in the German context, which studies SME-managers' perceptions, reveals the following ranking: 1) human capital, 2) structural capital, 3) relationship capital (Mertins, Will, Wuscher 2007: 201; BMWi 2010a: 13; BMWi 2010b: 9) vs. 1) structural capital, 2) relationship capital, 3) human capital (Vanini 2011: 7). Yet, another research project, looking into SME-managers' perceptions on IC in New Zealand, concludes the following order: 1) relationship capital, 2) human capital, 3) structural capital (Steenkamp, Kashyap 2010: 377). Although these different results can be partly attributed to country specifics (Kamukama, Ahiauzu, Ntayi 2010: 557), it arguably still calls for more empirical evidence.

(4) How do the intellectual capital categories of German small and medium sized enterprises influence each other?

It has been shown that the evaluation of the direct impact of the individual IC-categories on firms' success is too simplistic since the IC-categories interact with each other (Bontis 1998: 70 et seq.). Thus, it is important to look into the relationships between the IC-categories and to evaluate how their combination impacts lasting competitive business performance. Eventually, this helps to (further) improve IC-management and resource allocation in particular (Kamukama, Ahiauzu, Ntayi 2010: 556). However, none of the identified literature, to date, deals with this topic in the context of German SME. Consequently, this doctoral thesis is devoted to the issue of German SME' IC-categories' interaction-effects via a newly develop statistical model which is approved by experts via interviews, too.

(5) How do company-age and the company generation of German small and medium sized enterprises influence IC as well as its impact on lasting competitive business performance?

Lastly, it is suspenseful to examine, if the company-age and the company generation, respectively, of German SME influence the way their IC is structured; and whether the impact of IC on competitive performance changes as SME grow older.¹⁴

This is an interesting question since, to the best knowledge of the researcher, no empirical multi-group study, which empirically investigates the impact of

¹⁴ If, for example, the relationship between HC and performance displays a value XYZ one cannot be sure whether XYZ is actually high or not. Thus, it is advisable to compare the relation between HC and performance among certain groups in order to gain more insights (Kuß, Eisend 2010: 84)/to benchmark between organizations (Mertins, Wang, Will 2009: 121) – or in this case: age segments.

company-age on German SME' IC, has, until this day, been performed.¹⁵

So far, research studies have predominantly investigated the impact of firms' *strategy* and partly *industry* (-branch) as well as *size* on IC (Wong, Aspinwall 2005: 76 et seqq.; Mertins, Wang, Will 2009: 121; BMWi 2010b: 9 et seqq.; Pawlowsky, Gözalan, Schmid 2010: 9, Pawlowsky, Gözalan, Schmid 2011: 9, 13 & 22; St-Pierre, Audet 2011: 213 et seqq.). Yet, rather little is empirically known about the impact of company-age and company-generation on German SME' IC and its influence on performance although it has been mentioned that the age of the company can affect IC-matters in various ways (cf. Pennings, Lee, van Witteloostuijn 1998: 439; Shih, Chen, Morrison 2010: 7. Discussion; BMWi 2010b: 5 & 14 et seqq.; Delgado-Verde, Martin-de Castro, Navas-Lopez 2011: 14 et seqq.; Huang, Wu 2010: 13 & 16; Rodriguez 2003: 125 & 128; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 72 et seqq. & 75; Macerinskiene, Aleknaviute 2011: 560 et seqq.; Hayton 2005: 141 et seqq.; Juma, Payne 2004: 303 et seqq.; Hormiga, Batista-Canino, Sanchez-Medina 2011a: 618 et seqq.; and Hermans, Kauranen 2005: 175). For example, it can be argued that older SME have more experience and are closer related to their stakeholders (Pennings, Lee, van Witteloostuijn 1998: 439; Wang, Chang 2005: 225).

In order to clarify this matter, an exploratory multi-group analysis is conducted which compares the (previously established) research models and their statistical results among German SME of varying ages and company generation.

1.3 COURSE OF INVESTIGATION AND METHODOLOGY

Following this first chapter, *chapter two* starts with a general introduction to the raise of intellectual capital (IC). Moreover, chapter two establishes why this

¹⁵ Amrizah Kamaluddin and Rashidah Abdul Rahman (2009: 9), for example, correlate age to HC, SC and RC but do not integrate age in a full SEM. Simultaneously, the BMWI (2010b: 5 & 14 et seqq.) compares the importance of IC among young and old enterprises via ANOVA but the results are 'only' based on perceptions as opposed to hard company facts.

dissertation follows the *strategic stream of IC-research*¹⁶ in sub-chapter 2.1. Because of this strategic literature focus, an overview of relevant strategic management terminology (section 2.2) is subsequently given. The next passage 2.3 presents the most fundamental economic and business theories which suggest diverse sources of success – i.e. sources of competitive advantages as well as lasting supernormal business performance. After substantiating the exclusion of externally-orientated approaches, attention is paid to the – by strategic management literature – currently more favored internally-directed schools. In particular, the *resource-based view* and the *knowledge-based view* are presented since they particularly contribute to theoretically explain *why IC represents a strategically critical (intangible) source of lasting competitive business performance* in the current knowledge economy. The second chapter of this doctoral thesis closes with section 2.4 which first introduces intellectual capital and its three underlying categories (human capital, structural capital and relationship capital) as a success potential concept of intangibles that is suitable for empirical testing. Secondly, 2.4 incorporates an IC-literature review in order to identify (general) research trends as well as gaps.

Chapter three continues the theoretical foundation by defining the term *small and medium sized enterprises* (SME) according to the German comprehension. Additionally, passage 3.2 outlines the importance of SME for the German economy to promote the interest of dealing with their (intangible) sources of success.

Building on this motivation, **chapter four** extends the relevance of engaging in the topic of German SME' sources of success but with special focus on IC. Specifically, the in section 2.4 explained global concept of IC is transferred to the German SME context by building on i.a. German SME' IC as well as success factor research. More to it, literature-based *hypotheses* (Kornmeier 2011: 122) are formulated in 4.1 as well as 4.2 and summarized in two research models. Lastly, the fourth chapter closes with a review of publications concerning IC and company-age in order to build hypotheses that support research question number

¹⁶ The other IC-school focuses on the measurement of IC and its reporting (Petty, Guthrie 2000: 157; Roos et al. 1997: 15) as opposed to strategy formulation based on sources of success.

four (passage 4.3). In detail, the in chapter four deductively derived hypotheses (ibid.: 122) are necessary for the subsequent explicative, quantitative empirical testing (Forsmann et al. 2011: 7; Homburg 2012: 252).

The doctoral thesis at hand uses a statistical research method called *structural equation modeling* (specifically, partial least square), which is a multivariate statistical technique which combines and extends factor analysis as well as multiple regression (Hair, JR. et al. 2010: 629), for its empirical examination. The precise methodological research design, whose operationalization is pretested with experts, is clarified in *chapter five*. At first, passage 5.1 gives a general introduction concerning structural equation modeling (SEM). Specifically, SEM fits well in the context of this dissertation because it can handle latent – i.e. invisible, directly unmeasurable – variables which are, however, specified via various observed values (indicators) (ibid.: 632 & 634 et seq.). Consequently, SEM can capture the intangible constructs human capital (HC), structural capital (SC) and relationship capital (RC) via indicators which measure and concretize them. In particular, section 5.2 specifies the measurement model with its chosen set of indicators to measure the IC-categories, -dimensions as well as business performance figures. These measures are initially based on a literature review in various fields including IC-studies, investigations on German SME' IC, German SME' success factor research, (German SME') IC-reporting and young enterprises, and are subsequently validated via pretests in the form of expert interviews and interviews with German SME. Furthermore, SEM is qualified to answer research questions three and four because it also allows testing a series of dependence relationships as well as interrelationships (ibid.: 629 et seq. & 634). It is therefore suitable to measure the impact of HC, SC and RC on business performance (research question three – section 5.3.1 represents the precise structural research model) as well as the interaction between the IC-categories (research question four – the exact structural research design is illustrated in passage 5.3.2). Lastly, section 5.4 deals with research question five. Specifically, the moderating effect *company-age and generation* is tested via a multi-group analysis which is a special form of SEM analysis (ibid.: 688 & 758 et seqq.).

However, to execute statistical tests, data is required beyond the scope of the

pretests.¹⁷ The large-scale *data ascertainment* of this doctoral study is described in *chapter six*. In line with common research practice in the area of IC, a survey is applied to gather insights (Serenko et al. 2010: 16). The survey's questionnaire is pretested (on a small sample of 16 German SME) before the actual large scale distribution in order to ensure its quality. Details on the survey, its field pretest as well as its execution are provided in section 6.1 to 6.3. Specifically, the data is collected with the help of various organizations and associations which are introduced in section 6.2.

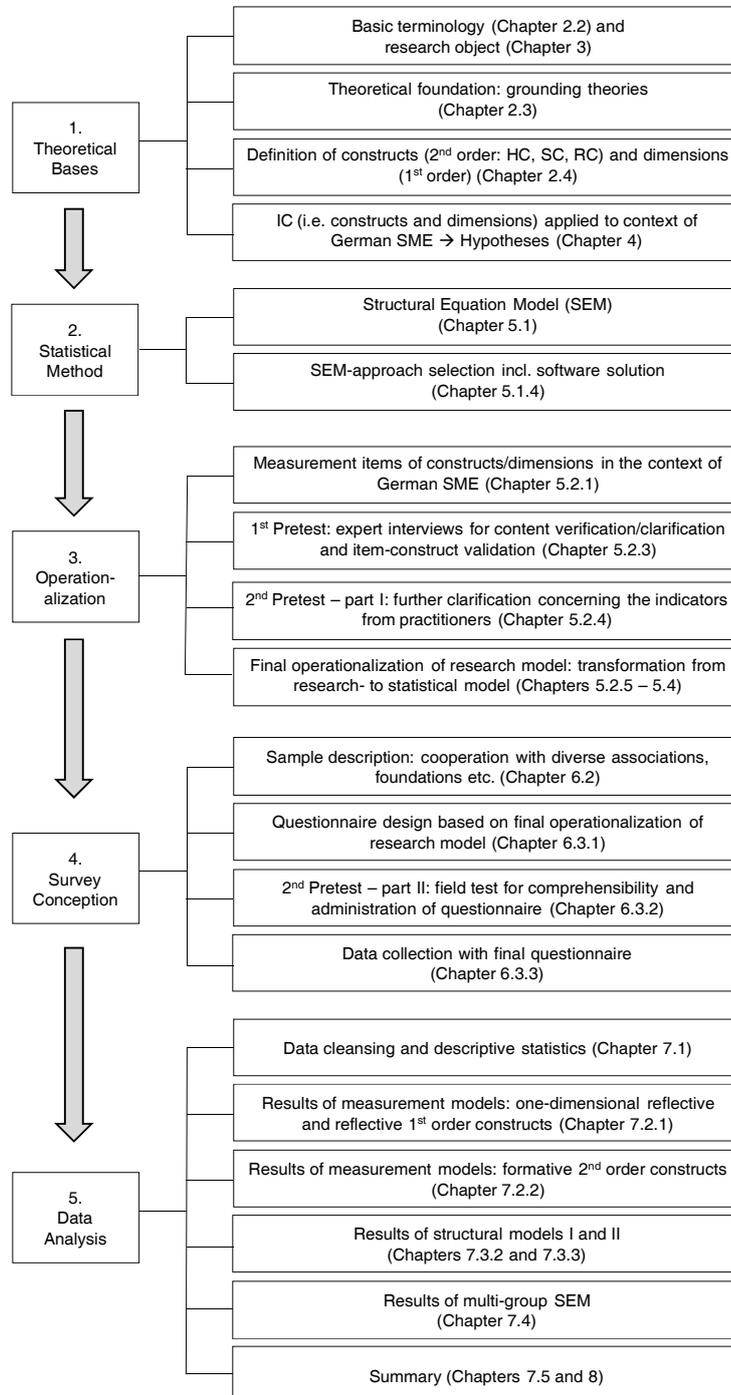
On the basis of the collected data, *chapter seven* reveals the *results of the statistical tests*. After a general overview of the acquired data and its cleansing in 7.1, section 7.2 exhibits the findings of the measurement models which clarify the (extent of the) IC-attributes and -dimensions which are relevant in the German SME context. The next passage 7.3 provides evidence for the impact of the IC-categories on business performance as well as their interrelation. The results of the multi-group analysis, which distinguishes between different age-segments of German SME, are presented in 7.4. To finish, the accumulated empirical observations and their interpretations are summarized in section 7.5.

Finally, this doctoral thesis closes with *chapter eight*. After a *résumé* in passage 8.1, sections 8.2.1 and 8.2.2 clarify this dissertation's implications for practice as well as research, respectively. Concerning the former mentioned practical contribution, it is important to highlight that it includes a *prioritized list* of strategic IC-based sources of lasting competitive business performance as well as indications (i.e. rearranged findings of chapter 7). This checklist is intended to help SME to improve their IC-management and thus, is an essential management tool to bridge the presently prevailing gap between theory and practice (ibid.: 19). Ultimately, the illustration of this dissertation's limitations and future research recommendations are presented in passage 8.3.

A graphical summary of the course of investigation is provided for in figure 3.

¹⁷ The multi-method approach indicates an advancement in the research field of IC which is (so far) mainly investigated with one method only (Serenko et al. 2010: 14). Besides, mixed method approaches are generally recommended since they increase reliability and validity (Horn 2009: 7).

Figure 3: Course of Investigation



2 STRATEGIC MANAGEMENT AND INTELLECTUAL CAPITAL

The second chapter of this dissertation starts with a general overview which shows, based on the Kondratiev waves, that the environment has changed and correspondingly requires new business study explanation-approaches. In this respect, the historical rise of intellectual capital (IC) and its current research streams are presented as an introduction in chapter 2.1. This first part also specifies that this dissertation follows the strategic schools of IC-research because it aims to (theoretically) establish the impact of IC on success – i.e. IC as an intangible, strategic source of a firm's lasting competitive advantage and supernormal business performance. Because of this focus, part 2.2 clarifies the basic terminology concerning strategic sources of success. This basis is important to subsequently follow the discussion. Afterwards, selected theories which propose different sources to achieve competitive business performance are reviewed in passage 2.3. Once the externally-orientated approaches are justifiably and systematically excluded for the reasoning of this dissertation, since they are unable to theoretically establish IC as a strategically relevant (intangible) source of success, focus is placed on the *resource-based view (RBV)* and its advancement, namely the *knowledge-based view (KBV)*. Building on this theoretical foundation, sub-chapter 2.4 comes back to the in 2.1 introduced *intellectual capital*. Specifically, part 2.4 defines the IC-concept as an empirically testable framework which emphasizes the strategic role of different intellect-based intangibles for gaining as well as sustaining competitive advantages (Martin Castro et al. 2011: 649) and hence, lasting above-average business performance. Lastly, section 2.4 closes chapter two with a literature review on IC which reveals research gaps that bridge to the subsequent chapters.

2.1 THE HISTORICAL MOVE TOWARDS INTELLECTUAL CAPITAL AND ITS CURRENT RESEARCH SCHOOLS

“Pope John Paul II recognized (...):

'Whereas at one time the decisive factor of production was the land, and later the capital (...)

today the decisive factor is increasingly man himself, that is, his knowledge.' (...)

Every country, company, and individual depends increasingly on knowledge (...)"

(Stewart 1997: 12).

Nikolai Kondratiev's *theory of dynamic economic waves* (Kondratiev 1922) describes the (historical) fluctuation of economic cycles and related developments of other societal activities (Medhi 1992: 335; Yakovets 2006: 3 et seq.) which are (usually) fostered by innovation diffusions (Schumpeter 1961; Hirooka 2005: 313; Sammerl 2006: 1; North 2011: 16) (cf. figure 4):

The *first Kondratiev wave*, which shaped the economy at the end of the 18th and the first half of the 19th century (North 2011: 16), was brought about by the invention of steam engines that promoted production (Runte 2004: 9). In detail, this first wave of economic transition is responsible for the *industrial revolution* which drove the shift *from agriculture to industry* (Stiller 2005: 76 et seq.). Before the revolution the majority of people lived in rural areas, worked on farms, the fields or in sheds, and made their living from the land as well as its fruits. Yet, the industrial revolution reorganized the society: Large amounts of people moved to the cities to work in factories or offices. Associated public progresses of the industrial age are the eight o'clock whistle, the nine-to-five job, the custom of kids at school, the fashion of wives at home and novel societal characters like entrepreneurs, managers as well as employees (Stewart 1997: 7 et seq.). Towards the middle of the 19th century companies started to aspire access to globally available resources (Runte 2004: 9) but were unable to enter international markets due to transportation cost constrains (Stiller 2005: 76 et seq.). As a consequence, the objective to improve transportation as well as infrastructure was set and soon achieved via innovative developments like railways and steam powered ships. This led to the origination of a new economy era, namely the *second Kondratiev wave* (North 2011: 16). Following its initial success, additional railroad lines and

harbors were built, which further reduced transportation costs, enlarged domestic and global markets, and expanded the industry. Accordingly, this caused an increased demand of labor and originated urban growth in industrial centers and seaports (Stiller 2005: 87). The following economic cycle (*third Kondratiev wave*), which lasted from the beginning of the 20th century until the Second World War (North 2011: 16), aimed to improve this urban life. This goal was accomplished via chemistry and electrical engineering related innovations which also advanced the assembling of energy networks (Runte 2004: 9). Moreover, the third Kondratiev wave is characterized by the rise of mass production, higher purchasing power, and the discovery of the automotive innovation (North 2011: 16). These advancements also originated the fourth economic period (*fourth Kondratiev wave*) which promoted highway networks (Runte 2004: 9) as well as individual mobility (Bechmann 2010: 13). Likewise, it allowed broad access to the global economy with innovations such as aviation, radio, TV, electricity, petrochemicals, and nuclear power (North 2011: 16 et seq.). Building on these innovations, the currently prevailing *fifth Kondratiev wave*, which is principally shaped by the importance and management of information and knowledge-based resources (Guthrie 2001: 28) came about in the last two decades of the 20th and the beginning of the 21st century (Daum 2003: 3). This fifth change of economic and social activities heralded a new economic paradigm which is also referred to as *knowledge economy or society*¹⁸ (Martin Castro et al. 2011: 649). In detail,

“(...) an almost unnoticed (by the public) *revolution* in the corporate world took place: the transition *from industrial capitalism*, where business was based on tangible physical assets, *to* a new economy, where the production of goods and services and value creation in general depends and relies on invisible *intangible assets*”

(Daum 2003: 3).¹⁹

Hence, economic prosperity²⁰ (Teece 1998: 55) is now increasingly generated by

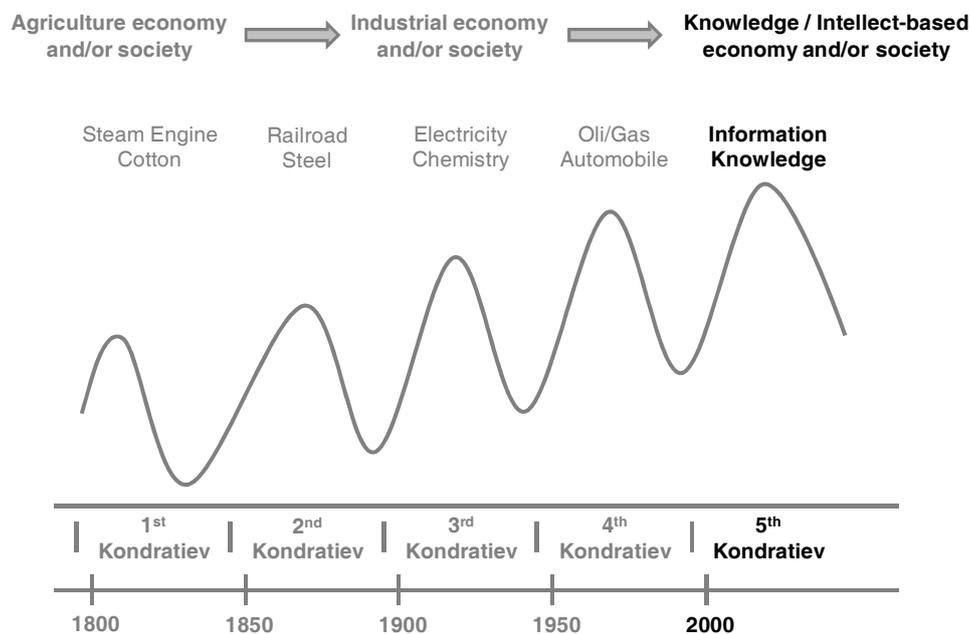
¹⁸ Peter Drucker introduced the term “knowledge society” (Drucker 1993: 84 cited by Nonaka, Takeuchi 1995: 6).

¹⁹ For the purpose of stressing key terms, specific words are highlighted in bold and/or italic by the author of this dissertation. These emphases cannot be found in the original text.

²⁰ Economic success can relate to a country, industry or company (Drucker 1993: 4).

the creation, stock or extension of (intangible) individual workers' and organizations' knowledge as well as intellect (Teece 1998: 55; Bontis 2001: 41; Durst 2008: 411; Martin Castro et al. 2011: 649); and its constructive application (Teece 1998: 55; Durst 2008: 411; Martin Castro et al. 2011: 649) as well as exploitation (Matos, Lopes 2009: 347 et seq.).²¹ In other words, success depends increasingly on intellectual capital-based (IC-based) factors and consequently, IC becomes center of (business) research-attention, too.

Figure 4: Kondratiev Waves



Source: adopted from Nefiodow 1990: 27 and Bechmann 2010: 13

Two different streams of *intellectual capital* (IC) research can be contemporarily observed: The first – historically older – schools can be regarded as the *measurement* stream of IC-research (Martin Castro et al. 2011: 649). It is

²¹ More to it, the extent to which knowledge-based intellect impacts the value chain (even) of industrial products and services has and will be further enlarged (Roos et al. 1997: 10; Bontis et al. 1999: 392; Bosma et al. 2004: 234; Bullinger 2008: V; Bea, Haas 2009: 33; Steenkamp, Kashyap 2010: 375).

concerned with information systems of IC – like scorecards or IC-statements – which aim to measure and report knowledge-based intangibles on top of traditional, quantifiable, financial data (Roos et al. 1997: 15; Petty, Guthrie 2000: 157). The second – more modern (Martin Castro et al. 2011: 649) – IC-research-school is rooted in *strategic* lines of thought: It predominantly investigates the creation and usage of IC as well as its impact on success (or value creation) (Roos et al. 1997: 15; Petty, Guthrie 2000: 157). Specifically, the latter mentioned focus of the strategic stream of IC-research belongs to the *content approach of strategic management research* which is not only interested in strategy formulation or planning (as opposed to implementation) but also and particularly in examining sources of success (Hungenberg 2011: 59 et seqq.).²² When taking into account this key notion as well as the in chapter 1.2 introduced research objective(s) as well as research questions of *this dissertation* – i.e. to discover the contribution of IC-categories, -dimensions and -attributes to the lasting competitive business performance of German SME –, it becomes inevitable that this research follows the *strategic school of the IC-literature*.²³ Henceforth, the focus of this dissertation lays on IC as a strategically relevant intangible source of a firm's sustainable competitive advantage and thus, lasting supernormal business performance (Day, Wensley 1988: 1 et seqq.).

2.2 TERMINOLOGY – STRATEGIC SOURCE OF SUCCESS

After the general introduction concerning the relevance of IC in today's business environment as well as this dissertation's focus on the strategic stream of the IC-literature (cf. chapter 2.1), this chapter of the theoretical foundation clarifies the basic meaning of fundamental vocabulary. It is important to define

²² "The key to (...) strategy formulation is to understand the relationship between [success impacting factors], competitive advantage and profitability" (Marr, Gray 2004: 105).

²³ "The search for success factors is what the enterprise of strategy has largely been about ever since" (Ghemawat 1991: 2 cited by Nicolai, Kieser 2002: 580).

common grounds of the relevant terms which underlie this doctoral thesis – e.g. *strategic sources of success* and *lasting competitive business performance* – in order to avoid misunderstandings in the subsequent chapters.

2.2.1 Success: Lasting Competitive Business Performance

Practically, one would assume that the term 'success' is relatively easy to define because it is one of the most central expressions in economics and business studies. Yet, when taking a closer look, the word *success* is rather complicated to describe (Reinemann 2011: 92):

“Success can be complex especially if we examine each facet of its diamond beauty”
(Certo 2006: 1).

In its most *general form*, success is viewed as “the *accomplishment of an aim or purpose*” (Oxford Dictionaries 2010b)²⁴ or “the good or bad outcome of an undertaking” (ibid). “These simple definitions become more complicated, however, when they are applied to a firm” (Barney 2007: 17). That is, for example, because different enterprises have widely varying (contents of) aims or purposes (Steers 1975: 555 cited by Bachmann 2009: 90; Gruber 2000: 30; Hienerth, Kessler 2006: 115; Welge, Al-Laham 2012: 210) and evaluation levels spanning individuals, organizational units or entire businesses (Venkatraman, Vasudevan 1986: 801). Consequently, there is no clear consensus in the literature (Welge, Al-Laham 2012: 210).

Nevertheless, it is commonly accepted²⁵ that it is the *ultimate purpose* of companies to secure their permanent existence as well as (future) development (Pümpin 1982: 29 et seq.; Hahn 1999: 4; Kunert 2006: 48; Macharzina, Wolf 2010:

²⁴ Cf. footnote 19.

²⁵ This assumption is especially predominant in the strategic management literature.

262; Becker 2011b: 149; Dillerup, Stoi 2011: 38)(Hentze, Brose, Kammel 1993: 134, Al-Laham 1997: 401 and Barney 1997: 34 et seq. all three cited by Jung, Bruck, Quarg 2011: 284). Hence, organizational success is achieved when a firm survives – i.e. *going concern*.

Moreover, various business and economic theories suggest *lower hierarchy* (Becker 2011b: 150) *goal-content-criteria* or indicators (Bachmann 2009: 90; Reinemann 2011: 92) whose changes allow assessing success (Marr 2006: 7; Heidenbauer 2008: 122).²⁶ Although there is no generally accepted set of these measures (Bachmann 2009: 90), they can – roughly – be divided into *strategic and financial/operational* ones (Welge, Al-Laham 2012: 210 et seq.).

The principal of these lower hierarchy goal-content-criteria (Becker 2011b: 150) is the *strategic interpretation of success* which has taken on an especially rising importance in the current uncertain business environment (Wöhe, Döring 2010: 85 et seq.). This is because future predictions concerning, for instance, financial figures like sales development or profit growth are increasingly more imprecise (Pümpin 1982: 30 et seq.) while the ability to recognize and act upon opportunities and threats such as future demands, changing market conditions, strategies of competitors and technological developments become vital (Wöhe, Döring 2010: 85). Thus, a contemporary (Cater, Cater 2009: 189), broad(er) success concept (Venkatraman, Vasudevan 1986: 804) whose objectives focus on *effective*²⁷ *preconditions for future financial success* becomes center of attention (Pümpin 1982: 30 et seq.). Examples of qualitative, soft-fact-orientated (Bea, Haas 2009: 128), strategic (goal-content) criteria to measure success relate to the strengthening or safeguarding of *success potentials* (Gälweiler 1987: 23 et seq.; Wöhe, Döring 2010: 86), the leverage of competitive positions and advantages, the maximization of opportunities or the minimization of risks (Wöhe, Döring 2010: 86). The

²⁶ Indicators are required because *success* is per se not directly observable (Reinemann 2011: 92) – i.e. it depends on the (non-)achievement of its underlying objectives. Which specific indicators are chosen depends on the precise objectives of a firm (Gabler Wirtschaftslexikon 2004a: 916).

²⁷ The strategic success interpretation emphasizes the suitability – i.e. effectiveness: 'doing the right things' (Gladen 2011: 358; Fischer, Möller, Schultze 2012: 7) - of actions which are required to achieve targets (Bachmann 2009: 90).

importance of the previously mentioned *sustainable competitive advantages*, which are advantages over competitors that can be continuously upheld²⁸, needs to be especially stressed. That is because competitive advantages have “(...) long occupied a central place in strategic thinking” (Coyne 1986: 54), represent the ultimate objective of strategic management (Barney 2007: 17; Barney, Hesterly 2012: 28) and are required for (financial) performance superiority (Day, Wensley 1988: 1 et seq.)²⁹.

Traditionally – in the business (studies) context –, however, success is reflected in the *financial outcomes of efficient operational management*³⁰ and is (mainly) measured by the profit and loss (P/L) calculation and liquidity, respectively – e.g. return on investment (ROI), return on sales (ROS) or return on equity (ROE) (Venkatraman, Vasudevan 1986: 803; Gälweiler 1987: 23; Gabler Wirtschaftslexikon 2004b: 915; Heidenbauer 2008: 303; Wöhe, Döring 2010: 713; Bea, Schweitzer 2011: 778; Dillerup, Stoi 2011: 139; Jung, Bruck, Quarg 2011: 287). Other outcome-based, financially orientated success indicators (Venkatraman, Vasudevan 1986: 803) include turnover, sales growth, contribution margin or earnings per share (Venkatraman, Vasudevan 1986: 803; Becker 2011a: 37). All of these traditional economic criteria have in common that they are (principally) short-term orientated (Pümpin 1982: 30; Gälweiler 1987: 28), quantitative (Wöhe, Döring 2010: 86), monetary (Gabler Wirtschaftslexikon 2004b) and hard-fact-based (Bea, Haas 2009: 128).

Overall, figure 5 summarizes that the term *success* comprises the achievement of three principle objectives: a) the permanent, economically feasible survival of a firm; b) its long-term, systematic development and leverage of

²⁸ Jay Barney (1991: 102) specifies that sustained competitive advantages are achieved if a firm’s superior value creating position/condition - compared to *current* as well as *potential* competitors – can neither be duplicated by other rivals now, nor in the future.

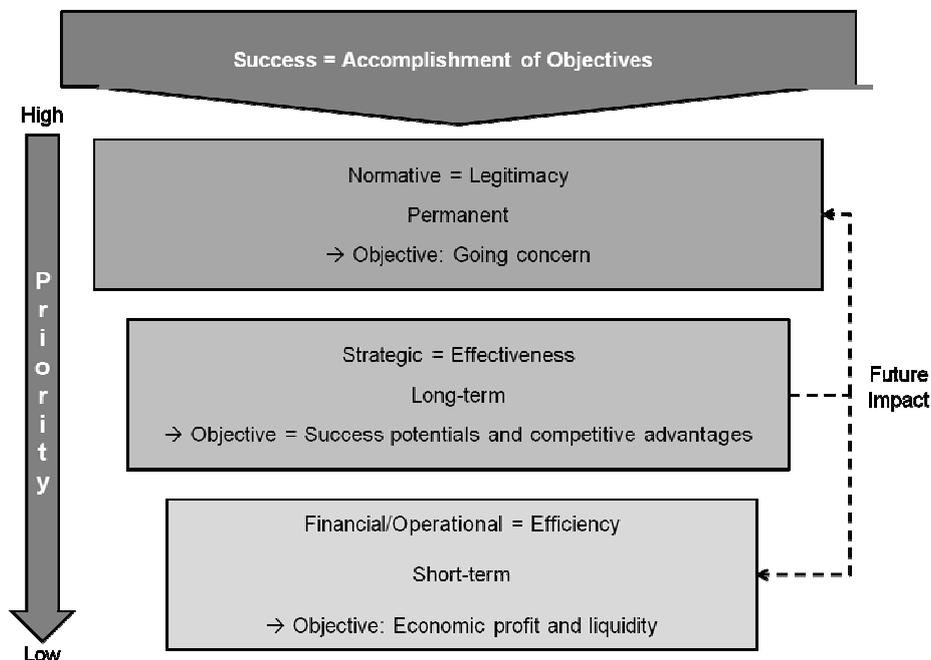
²⁹ Competitive advantages are “(...) at the heart of a firm’s performance in competitive markets” (Porter 1985: XV).

³⁰ In other words, focus is placed on the efficiency of actions - 'doing things right' (Gladden 2011: 358; Fischer, Möller, Schultze 2012: 7) – that are required to fulfill predefined objectives in relation to necessary efforts/expenses (Bachmann 2009: 90).

success potentials as well as (sustainable) competitive advantages; and c) short-term, positive financial performance. Eventually, the third and traditional conception of economic firm-success (Venkatraman, Vasudevan 1986: 803) is and will most likely continue to be the basis of the fundamental objectives of entrepreneurial spirit – no matter which concrete indicators are underlying (Cater, Cater 2009: 189; Hungenberg, Wulf 2011: 12 et seq.; Reinemann 2011: 92). Lasting and especially sustained above-average or supernormal operational performance and hence, permanent survival can, however, only be achieved if strategic sources of success – i.e. success potentials and sustainable competitive advantage – are exploited in the first place (Peteraf 1993: 185; Bamberger, Wrona 1996: 132; Rumelt 2003: 1; Will 2008: 4). Because of that the arrows in figure 5 point from strategic goal accomplishments to financial success as well as going concern.

What specifically constitutes strategic sources of success, which lead to such circumstances, is described in the chapter 2.2.2.

Figure 5: Hierarchy of Objectives' Contents to Determine Success



Own source inspired by Dillerup, Stoi 2011: 38 & 137 and
 Welge, Al-Laham 2012: 220

Lastly, it is important to recap that *this dissertation* follows a strategic focus (cf. chapter 2.1). As such, it is particularly interested in *long-term success*. Therefore, special attention is paid to *sustainable competitive advantages* which, in turn, are believed to manifest themselves in and/or are measurable via *sustained supernormal returns* (Peteraf 1993: 185; Bamberger, Wrona 1996: 132; Rumelt 2003: 1; Barney 2007: 20; Cater, Cater 2009: 189).

On the basis of this as well as George Day's and Robin Wensley's (1988: 1 et seqq.) sequential framework of competitive superiority, which is – in a slightly adjusted version - presented in figure 6, it is henceforth assumed that *strategic sources of success* contribute to *lasting competitive business performance*. Figure 6 also illustrates that the term *lasting competitive business performance is understood as a combination of competitive advantages and above-average financial performance*, which is, however, predominantly measured via economic figures.³¹ Moreover, figure 6 shows that firms cannot survive in the long-term – go concern – unless they achieve lasting competitive business performance in the first place.

Figure 6: Conceptualization of (Lasting) Competitive Business Performance



Own source inspired by Day, Wensley 1988: 3

³¹ In detail: One approach to measure competitive advantages is to examine simple accounting measures (Barney 2007: 20). Because of this combination of competitive factors and financial performance measures, the term competitive business performance is applied in the scope of this dissertation.

2.2.2 Sources of Success

The following two sub-chapters define sources of success, namely *success potentials* and *success factors*.

2.2.2.1 Success Potential

Elaborating on the above mentioned, firms ultimately aim to secure their enduring survival (Becker 2011a: 37; Becker 2011b: 146; Jung, Bruck, Quarg 2011: 154 & 284; Ungericht 2012: 42; Welge, Al-Laham 2012: 213) or in monetary terms the insurance of their financial values (Baum, Coenenberg, Günther 2007: 30). The realization of these targets is, according to the *German literature*, operationalized via the strategic management concept of *success potentials*³² (Becker 2011b: 146; Jung, Bruck, Quarg 2011: 284; Ungericht 2012: 42; Welge, Al-Laham 2012: 213).

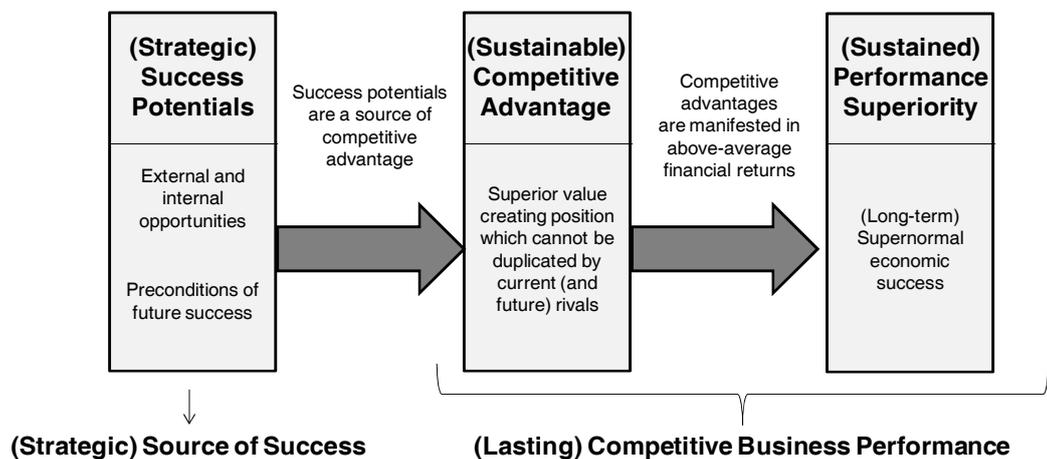
*Success potentials*³³ can be defined as the (entire pool of) *preconditions of future success* (Gälweiler 1974: 246; Gälweiler 1987: 24, 26 & 29; Bamberger, Wrona 1996: 130; Macharzina, Wolf 2010: 263; Becker 2011b: 146; Dillerup, Stoi 2011: 137 et seq.; Gladen 2011: 358; Jung, Bruck, Quarg 2011: 284) whose supernormal management and leverages (can) lead to competitive advantages (Hoffmann Linhard 2001: 50; Jung, Bruck, Quarg 2011: 284 et seq.; Welge, Al-Laham 2012: 213). In detail, success potentials can be broken down into *external* and internal potentials. The former refer to *environmental* or market opportunities (Gälweiler 1987: 24; Kaulich 2004: 4; Becker 2011b: 146; Jung, Bruck, Quarg 2011: 285) – such as customers' specific demands (Gladen 2011: 49) – which determine managements' scope of action (Knop 2009: 45). *Internal* potentials are, conversely, represented by a *firm's* (operation) opportunities (Kaulich 2004: 5; Becker 2011b:

³² Aloys Gälweiler (1979: 3) was the first author who mentioned the term *success potential* (Bea, Haas 2009: 122) which he formerly called *earnings potential* (Gälweiler 1974: 246).

³³ *Potential* is generally defined as "latent qualities or abilities that may be developed and lead to future success or usefulness" (Oxford Dictionaries 2010a).

146; Dillerup, Stoi 2011: 137; Jung, Bruck, Quarg 2011: 285). These are (especially) required to exploit the external potentials because internal settings allow, for instance, the production of the demanded products and services (Gladen 2011: 50). Lastly, it is worth stressing that potentials do not per se ensure success³⁴ (Gälweiler 1987: 29; Dillerup, Stoi 2011: 138 & 751) and can remain unused (Dillerup, Stoi 2011: 138).

Figure 7: Sequential Determinism of Strategic Success Potentials, Sustainable Competitive Advantages and Sustained Performance Superiority



Own source inspired by Day, Wensley 1988: 3 and
Bamberger, Wrona 1996: 132

It is the task of strategic management to identify, create, organize, (re-) develop and maintain³⁵ (Gälweiler 1974: 149; Gälweiler 1987: 28; Baum, Coenberg, Günther 2007: 30; Becker 2011b: 37; Ungericht 2012: 42; Welge, Al-Laham 2012: 213) current and future (Becker 2011b: 45), as well as high and secure (Gälweiler 1974: 29) success potentials. Special attention shall, indeed, be paid to

³⁴ Success potentials 'only' offer chances for future success instead of full security (Gälweiler 1987: 29).

³⁵ These actions are expensive and result in short-term expenses – i.e. less liquidity. Yet, they are expected to result in long-term (financial) success (Dillerup, Stoi 2011: 138).

strategic success potentials which can – e.g. via (value-adding) strategic decisions – be turned into *long-term advantages over competitors* and therefore, lasting supernormal business performance (Pümpin 1982: 32 et seq.; Pümpin 1992: 29 et seq. cited by Gruber 2000: 39; Hoffmann Linhard 2001: 50) (cf. figure 7).

However, the practical suitability of the concept of (strategic) success potentials for strategic management has been *criticized* for various issues. First, the *definition* of success potential is very *limited* (Dillerup, Stoi 2011: 139; Jung, Bruck, Quarg 2011: 285; Welge, Al-Laham 2012: 216). Specifically, this means that there is no concrete description of characteristics, schemes or activities (Mandorf 2008: 4) which constitute a potential. Secondly, the notion of success potentials *lacks* conceptual distinctiveness concerning the *measurement* of success potentials. Consequently, success potentials are operationalized via (more) specific parameters which allow a company's management to govern them (Jung, Bruck, Quarg 2011: 285; Welge, Al-Laham 2012: 216). These determinants are also referred to as *success factors*.

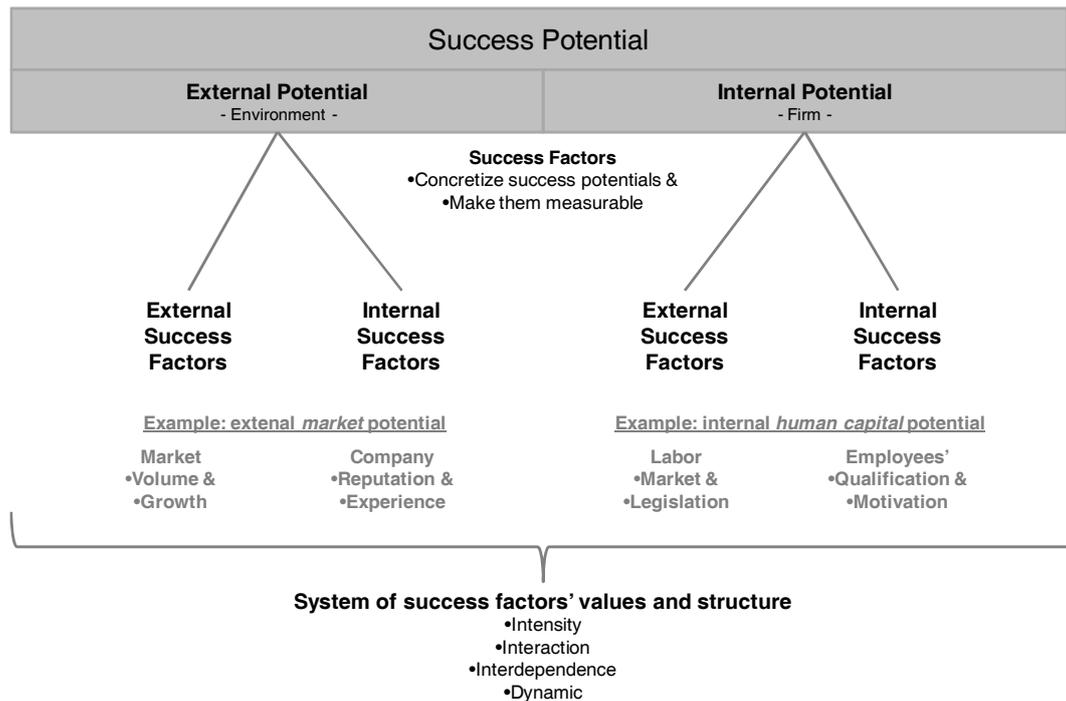
2.2.2.2 Success Factor

Success factors can on the one hand be understood as all internal and external parameters (Gälweiler 1974: 149; Becker 2011b: 150; Dillerup, Stoi 2011: 139) which *underlie* (Bea, Schweitzer 2011: 299) long-term *success potentials* (Gladden 2011: 14) and allow *concretizing* (Jung, Bruck, Quarg 2011: 285) as well as *measuring* them (Gälweiler 1987: 23 et seq.; Dillerup, Stoi 2011: 139; Welge, Al-Laham 2012: 216).

The following example, which is also displayed in figure 8 (right side) shall clarify this line of thought: *internal success factors* which specify, for instance, the firm's *success potential 'human capital'* include employees' qualification and staff motivation since these company-inside aspects allow leveraging human capital. Exemplary *external success factors* which trigger the potential *'human capital'* are labor market demand and supply structures or employment legislations. That is because these factors, which are located outside a firm, also contribute to the

success or failure of the success potential human capital (Welge, Al-Laham 2012: 217).

Figure 8: Internal as well as External Success Factors and Success Potentials



Conversely, a *success potential* can therefore be more specifically defined as a *system of its determining success factors' values and structure* (Daschmann 1993: 5). The latter mentioned *structure* especially refers to the *intensity* of the individual factors' contribution to the potential, the factors' *interaction* and *interdependence* as well as their *dynamic* (Welge, Al-Laham 2012: 218). The better a firm is aware of its success factors' system, the higher the quality of its managerial activities (Gälweiler 1974: 149) concerning success potentials' creation as well as maintenance, and thus, the greater its chance of accomplishing aspired objectives (Gälweiler 1974: 246 et seq.; Dillerup, Stoi 2011: 139; Welge, Al-Laham 2012: 216 et seq.).

On the other hand, success factors can be defined as the few factors which impact the success or failure of firms (Dillerup, Stoi 2011: 139).

The McKinsey & Company management consultant Ronald Daniel (1961) was the first author who shaped this idea in his article 'Management information crisis' (Daschmann 1993: 12; Baum, Coenenberg, Günther 2007: 31). Ronald Daniel proposes that a company's system of management information should be organized in a manner that it provides insights on *factors* which *determine success* and thus, require high management consideration. Moreover, Ronald Daniel states that there are usually three to six important success factors for each *industry* (Daniel 1961: 113 et seq. & 116).

John Rockart (1979: 81 et seqq.) specified Daniel's notion in 1979 (Daschmann 1993: 12; Baum, Coenenberg, Günther 2007: 31). He adopts the position that the previous approaches of providing information to top management cause information overload (Rockart 1979: 81 et seqq.) instead of being tailored to a *particular company's* managerial needs³⁶ – i.e. its *critical success factors* (ibid.: 85 et seqq.). Rockart (1979: 85) defines these critical success factors as

“(...) the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where "things must go right" for the business to flourish. If results in these areas are not adequate, the organization's efforts for the period will be less than desired. As a result, the critical success factors are areas of activity that should receive constant and careful attention from management.”³⁷

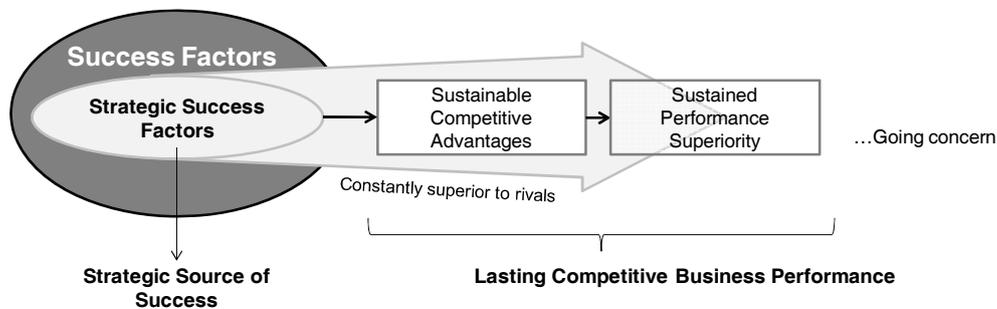
In view of the above it can be argued that success factors include all determinants which can (potentially) impact success. Because of this, they are displayed as the large, dark cycle in figure 9 (left side). (Strategic) Management focus should, however, be especially paid to the more precise, limited number of critical success

³⁶ As opposed to “Daniel [who] focused on those critical success factors that are relevant for any company in a particular industry” (Rockart 1979: 85).

³⁷ One needs to consider, however, that strategic success factors differ from key factors, whose existence is crucial for the success of a company per se. Examples for key factors include an academic degree of a lawyer or an alcohol license of a liquor store (Baum, Coenenberg, Günther 2007: 31).

factors, which are also referred to as *strategic success factors*³⁸ (Bea, Haas 2009: 123) (cf. figure 9 small cycle inside the large, dark one). That is because of their high relevance for competition and competitive success, respectively. Precisely, figure 9 highlights that a company achieves a sustainable competitive advantage and hence, lasting above-average performance as well as permanent survival if a strategic success factor is superior to rivals and can be upheld in the long-run (Knop 2009: 45; Hungenberg 2011: 159 et seq.; Hungenberg, Wulf 2011: 196 et seq.; Ungericht 2012: 113 et seq.).

Figure 9: Strategic Success Factors



To summarize, *strategic success factors* include, on the one hand, all elements, determinants and conditions (Kreilkamp 1987: 176) which are expected to *considerably substantiate a (strategic) success potential* and thus, should give direction for long-term strategy. On the other hand, they comprise all factors which are believed to have a *primary impact on competitive business performance* (Rockart 1979: 85)(Fischer 1993: 18 and Breid 1994: 37 both cited by Jung, Bruck, Quarg 2011: 285).³⁹ Accordingly, strategic success factors represent the origin of the positive or negative long-term development of corporate activities and thus, a firm's sustainable success or failure, respectively.

³⁸ *Critical success factors* are also referred to as *strategic success factors* (Bea, Haas 2009: 123). In the context of value-based-management they are also named value drivers (Dillerup, Stoi 2011: 139).

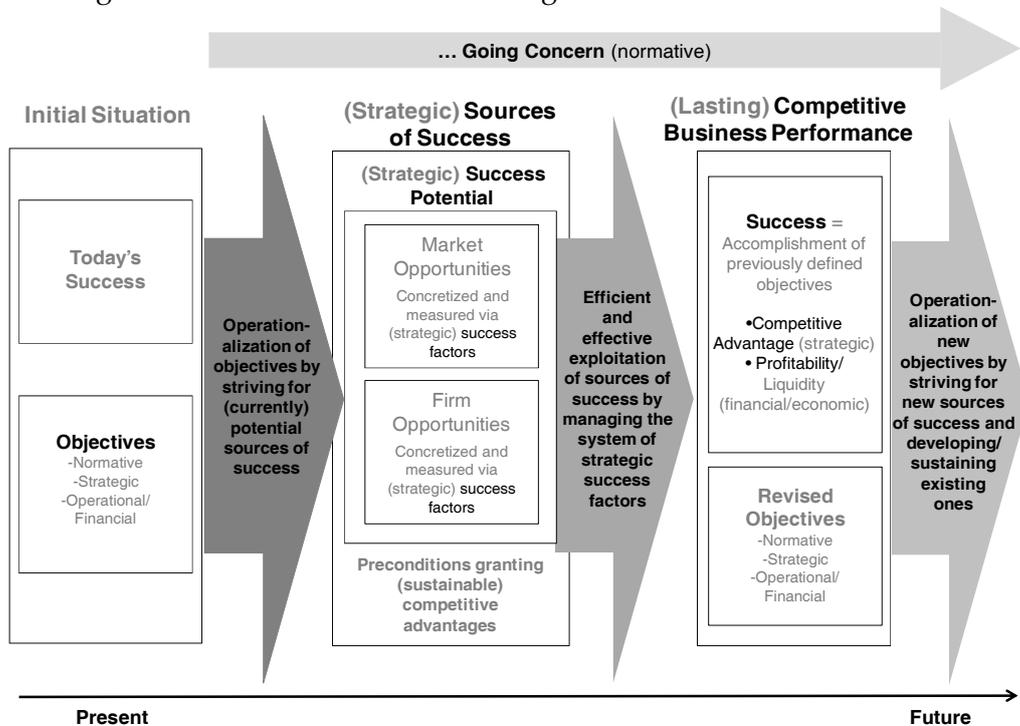
³⁹ More precise: Success factors are parameters which are highly correlated to success (Dillerup, Stoi 2011: 139). Thus, they allow formulating "if ... then ...hypothesis" which shall explain (financial) success (Baum, Coenenberg, Günther 2007: 31).

2.2.3 Summary of Definitions and their Interrelation

Figure 10 summarizes and links together sub-chapters 2.2.1, 2.2.2.1 and 2.2.2.2. Specifically, figure 10 visualizes that companies firstly define objectives – ranking from going concern (normative) over competitive advantages (strategic) to financial performance (operational) – whose accomplishments determine whether a firm succeeds or not. In order to realize these objectives, firms should pay special attention to the management of their *strategic sources of success*. This means, in particular, that firms need to leverage their long-term *success potentials* which then drive continuing performance and thereby build the basis for permanent survival. Yet, to do so, focus needs to be placed on the efficient and effective management of the respective internal or external *strategic success factors*, which specify the former mentioned potentials and allow to govern them. It is especially important that firms center their attention to strategic sources of success since they are highly likely to lead to sustainable competitive advantages which subsequently drive financial business performance as well as company survival. Only if a company's management is able to successfully deal with strategic sources of success in the long-term, it can generate lasting leads over competitors. Otherwise, it 'only' embraces sources of success – as opposed to *strategic* sources of success – and predominantly offers the potential to succeed in terms of short-run economic success. This also explains why the terms 'strategic' and 'lasting' are put in brackets in figure 10. Lastly, it is important to note that companies need to regularly revise their objectives in order to adjust them to their current situations. Hence, the management of sources of success requires corresponding alternation, too.

Overall, it can be concluded that only if enterprises exploit their strategic sources of success, they are able to achieve *sustained competitive advantages*. These, in turn, generate *enduring above-average financial success* which, in combination with long-term competitive advantages, is also known as *lasting competitive business performance*.

Figure 10: Success Factors as the Origin of Future Success



2.3 THEORETICAL GROUNDING: (STRATEGIC) SOURCES OF SUCCESS DERIVED FROM ECONOMIC AND BUSINESS LITERATURE

After the general introduction into the current importance of IC (cf. chapter 2.1) as well as the definition of the relevant terms (cf. chapter 2.2), the following part of this doctoral thesis forms its *conceptual framework* which aims to *theoretically ground why IC represents a strategic source of success*. In detail, this chapter presents the most common economic and business *theories* which suggest competing as well as complementing (strategic) sources of success (Bamberger, Wrona 1996: 130; Grant 1996: 109) – i.e. sources of (lasting) competitive business

performance.⁴⁰ All of the illustrated theories have in *common* that they assume that every firm's *main objective* is to *maximize its performance*. Yet, they propose diverse means which shall support firms in achieving this (Conner 1991: 123). These *different sources of success* can be broadly divided into externally- and internally-orientated ones (Hoskisson et al. 1999: 421; Cater, Cater 2009: 187) which align with the historical development of the strategic research frontier as well as workplace practice (Grant 1991: 114; Collis 1994: 143; Spender, Grant 1996: 6; Hoskisson et al. 1999: 421). Precisely, focus to leverage success was, in the *past*, placed on products, markets, and tangible investments (Gladen 2011: 358 et seq.) and thus, a rather *external* emphasis (Grant 1991: 114; Hoskisson et al. 1999: 418 et seq.; Cater, Cater 2009: 187). *Today*, however, superior performance is predominantly achieved by paying attention to *firm-internal* (Grant 1991: 114; Hoskisson et al. 1999: 418 et seq.; Marr 2006: 4), *intangible sources of success* – e.g. success factors like R&D, reputation, or personnel development which rest upon knowledge-based intangibles (Albers, Hildebrandt 2006: 4 et seq.; Gladen 2011: 358 et seq.).⁴¹ This current focus is justified, among others, because of the external approaches' dissatisfactory static framework (Grant 1991: 114); and because internal resources provide a better basis for sustainable business performance than the inconsistent external factors which are continuously altered by today's

⁴⁰ The doctoral theses at hand focuses on the most common, main stream theoretical/research branches in the field of strategic management literature. Hence, this dissertation's theoretical foundation does not incorporate the *contingency theory* which points to corporate/organizational structures that are dependent on internal and external variables (Höhne 2009: 83 et seq.), the *theory of the entrepreneurial role* (Palupski n.k.: 61) which provides for the preconditions to actually handle (knowledge) resources well (Freiling 2001: 97 et seq.), the *diffusion theory* which looks into the spread of innovations (Mann 2009: 99), the *prospect theory* which studies individuals' decisions under the consideration of risk (Wenig 2009: 195 et seq.), and *motivational theories* which analyze the factors that impact human behavior (Mayer 2009: 227 et seq.). This exemption is substantiated by the fact that these approaches only fractionally contribute to the explanation of IC as a strategic source of success. Furthermore, *logic theory* and *mathematics* are disregarded in this research work because IC is neither a solely logical nor a mathematical construct (Palupski n.k.: 43).

⁴¹ Although both, external and internal factors, impact success (Andrews 1980: 47 et seq.), it is supposed that the latter are strategically more relevant in recent times (Cater, Cater 2009: 187).

dynamic environment (Marr 2006: 4).

Nevertheless, in order to *verify* the focus on the latter mentioned current approaches and research streams as well as to provide a solid theoretical foundation in favor of IC as an intangible strategic source of success⁴², this doctoral thesis illustrates a *review* of selected externally- and internally-orientated theories and research schools. These approaches are *evaluated* against the background of the *strategic theory of the firm* (Al-Laham 2003: 178; Barney, Clark 2007: 15 et seq.). In other words, the strategic theory of the firm represents, within the scope of this dissertation, the evaluation tool of the conceptual framework which addresses all issues required to achieve lasting competitive business performance in today's business world. More precisely, it is used to identify conceptual approaches which focus on strategic and thus, long-term sources of success.

The origin of the *theory of the firm* goes back to Frank Knight (1921) and Ronald Coase (1937) who describe *why firms exist*⁴³ and *what limits their size*⁴⁴ (i.e. their boundaries relative to the market).⁴⁵ However, these notions were neglected until the 1960's and particularly the 1970's when authors like Oliver Williamson (1971) as well as Armen Alchian and Harold Demsetz (1972) advanced the theory (Williamson 1988: 65 et seq.; Foss, Lando, Thomsen 2000: 632 et seq.). In the course of this development, the theory of the firm was also expanded to

⁴² A missing solid theoretical foundation has often been criticized in the field of IC (Kaufmann, Schneider 2004: 366; Choong 2008: 632) and success factor research, respectively (Küpper 1994: 116; Mandorf 2008: 18; Hungenberg 2011: 61).

⁴³ "Looking at the question of existence Coase (...) pose[s] an important test: for the existence of a firm to make sense in some business activity, the firm, with its internal network of relationships, must outperform the alternative, in which all such relationships are external, arms-length, market transactions" (Conner 1991: 139).

⁴⁴ In other words: "(...) why all transactions are not organized within a single firm [?]" (Holmstrom, Tirole 1989: 65 cited by Conner 1991: 123).

⁴⁵ "A firm ... [has] a role to play in the economic system if ... transactions [can] be organized within the firm at less cost than if the same transactions were carried out through the market. The limit to the size of the firm ... [is reached] when the costs of organizing additional transactions within the firm [exceed] the costs of carrying out the same transactions through the market" (Coase 1932: 341 cited by Williamson 1988: 65).

incorporate a third facet, namely a firm's *internal organization* (Grant 1996: 109 et seq.; Foss, Lando, Thomsen 2000: 632; Freiling, Gersch, Goeke 2008: 1155). Building on the works of i.a. Birger Wernerfeld⁴⁶ (1984) and Jay Barney (1986), as well as Richard Rumelt's (1984) focus on efficient ways of establishing competitive advantages and in doing so generating persistent above-average business performance (also known as economic rents⁴⁷), the theory of the firm is further enhanced and turned into a strategic theory of the firm. Specifically, the strategic theory of the firm draws on economic and organizational theories but particularly focuses on drivers of strategic decisions and success (Grant 1996: 109 et seq.; Barney, Clark 2007: 14 et seqq.).⁴⁸ As such, the strategic theory of the firm is primarily concerned with *a firm's source of competitive advantages* (Al-Laham 2003: 173) which are added as a fourth component to the theory of the firm.

Based upon the answers to the four, above introduced, central issues of the currently prevailing strategic theory of the firm - namely, existence, boundaries, internal organization and competitive advantages -, one can understand the *strategic source of a firm's above-average lasting business performance*.⁴⁹

Figure 11 displays the above described, chronological development from no theory of a firm, over a theory of the firm which looks into a firm's *existence* and *boundaries*, its advancement with respect to *internal matters* and lastly, the strategic theory of the firm including *competitive advantages*. The specific theories which correspond to the diverse stages of this evolution are briefly presented in the

⁴⁶ And Birger Wernerfeld's "theory of competitive advantages based on resources" (Barney, Clark 2007: 14).

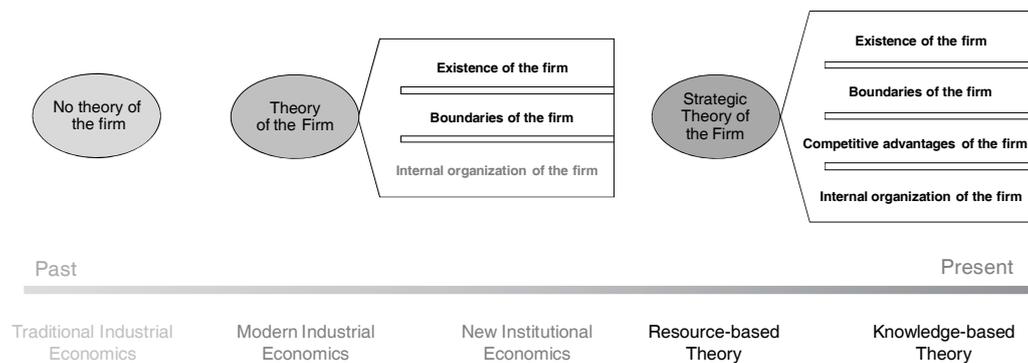
⁴⁷ In simple term, rents can be understood as long-term super-normal returns (Al-Laham 2003: 122). More precisely, rents refer to the income that exceeds the opportunity costs [i.e. opportunity costs represent the value of the resource's next best use (Parkin, Powell, Matthews 2008: 398)] of using a resource (Foss, Knudsen 2003: 296) without attracting new competitors (Müller-Stewens, Lechner 2011: 346 et seq.).

⁴⁸ "Although strategic management has drawn its theories of the firm from both economics and organization theory, its area of interest is different from both. Its primary goals are to explain firm performance and the determinants of strategic choice. The result has been new contributions to the theory of the firm" (Grant 1996: 109 et seq.).

⁴⁹ Jörg Freiling (2004: 28) mentions five questions which are more specifically tailored to intangible competencies rather than the universal basics of the strategic theory of the firm which are presented in this doctoral thesis.

following paragraph and described in detail in the next chapters.

Figure 11: Evolution of the (Strategic) Theory of the Firm and its Elements



The following chapter 2.3.1 starts by illustrating the historically older, predominantly *externally-directed approaches*. According to the reasoning of Robert Hoskisson et al.⁵⁰ (1999: 421 et seqq.) as well as Günther Müller-Stewens and Christoph Lechner (2011: X et seqq. & 128), attention is paid to 1) the *industrial economic theory*⁵¹ which views the firm as a black box, 2) its advanced version known as the *market-based view* which starts to explain firms' existence and boundaries, and 3) *new institutional economics*⁵² which can be regarded as a response to the formers' shortcomings and which also bridge towards a strategic theory of the firm⁵³ (cf. left-hand-side of figure 11). The last externally-orientated theory suggested by Günther Müller-Stewens and Christoph Lechner (2011: X et

⁵⁰ Robert Hoskisson et al. (1999: 417 et seqq.) explain the shift from early, inside-orientated works in the strategic management literature – such as from Igor Ansoff (1965) and Alfred Chandler (1962) – over outside-focused (modern) industrial economics as well as organizational economics – i.e. new institutional economics – to internally-orientated approaches such as the resource based view.

⁵¹ Industrial economics represent a part of the neo-classical research stream (Palupski n.k.: 52; Teece et al. 1994: 10).

⁵² Institutional economics are described as a theory which links *neo-classical-* and *behavioral research schools*. Moreover, it considers the contributions of *information economics* which themselves build upon *uncertainty theory* (Palupski n.k.: 44, 48 & 54).

⁵³ Martin Welge and Andreas Al-Laham (2012: 42 et seqq.) classify these three theories in the category 'economic perspective'.

seqq. & 128), namely the *evolution theory*⁵⁴, is, however, not discussed in this doctoral thesis. This is because it assumes that success depends on evolution instead of precisely projectable strategic arrangements (Bea, Haas 2009: 28 & 33 et seqq.; Ungericht 2012: 354). Thus, it is less suitable to extract accurate recommendations for strategic IC-management (Müller-Stewens, Lechner 2011: 139) which this doctoral thesis aims for⁵⁵.

After discussing the three above introduced externally-orientated strategic management approaches and justifiably concluding them as of minor contribution to address the four issues of a strategic theory of the firm⁵⁶ (cf. first half of figure 11), the *internally-directed schools* are illustrated. In line with Günther Müller-Stewens and Christoph Lechner (2011: X et seqq. & 128), Martin Welge and Andreas Al-Laham⁵⁷ (2012: 42 et seqq.), as well as many publications

⁵⁴ The evolution theory includes, among others, (Bea, Haas 2009: 28 & 33 et seqq.; Dillerup, Stoi 2011: 32) *Kirsch's leadership theory* (Kirsch 1997) and the *St. Gallen management model* (Malik 1984; Probst 1987; Bleicher 2004; Rüegg-Stürm 2005). Sometimes these two approaches are also listed among the *system theory* (Dillerup, Stoi 2011: 30; Palupski n.k.: 43). This is because both theories focus on systems but from different angles: while the system theory concentrates on the management and the creation of systems, the evaluation theory highlights the imperfect controllability of systems (Dillerup, Stoi 2011: 32).

⁵⁵ Nevertheless, it has to be acknowledged that the evolution theory points to the relevance of dynamic processes (Müller-Stewens, Lechner 2011: 139) as well as capabilities of corporate organization and learning. Therefore, it contributes to the resource-based view (Bea, Haas 2009: 35 et seqq.) and the knowledge-based view, respectively. Arguably, this also explains why the resource-based theory and the knowledge-based approach are sometimes classified as part of the evolution-orientated research stream (Palupski n.k.: 49).

⁵⁶ Since the *game-theory*, which is concerned with "the (...) interaction between rivals with certain expectations about how each other will behave" (Teece, Pisano, Shuen 1997: 516), is often used as a methodical foundation in (modern) industrial economic researches (Müller-Stewens, Lechner 2011: 132), which are considered as less relevant for this doctoral thesis, game-theory is also excluded from this review.

⁵⁷ Martin Welge and Andreas Al-Laham (2012: 42 et seqq.) classify these theories in the category 'resource- and knowledge-orientated approaches'.

in the field of IC⁵⁸, the *resource-based view* and its enhancement the *knowledge-based view* – including its diverse sub-schools (Al-Laham 2003: 132 et seq.; Welge, Al-Laham 2012: 100 et seqq.) – are reviewed. These approaches are particularly important since they highly promote internal (intangible) sources of a firm's lasting competitive business performance and directly address the four aspect of the strategic theory of the firm (Conner 1991: 132 et seqq.; Al-Laham 2003: 172 et seqq.) as can be seen on the right-hand-side of figure 11.

2.3.1 Externally-orientated Approaches

In line with the previous outline, chapter 2.3.1 is divided into three parts which clarify the contents and theoretical contributions of

- 1) *traditional industrial economics*,
- 2) *modern industrial economics*, which are commonly known as the market-based view, and
- 3) *new institutional economics*

to the intended research on IC as a source of success (Hoskisson et al. 1999: 421 et seqq.; Müller-Stewens, Lechner 2011: X et seqq. & 128).

⁵⁸ Cf. Robert Grant (1996: 109 et seqq.), Jay Barney, Mike Wright and David Ketchen (2001: 630), Sarah Kaplan et al. (2001: 3), Karl Sveiby (2001: 344 et seqq.), Jörg Freiling (2004: 27 et seqq.), Bernard Marr and Dina Gray (2004: 105), Bernard Marr, Giovanni Schiuma and Andy Neely (2004: 312 et seqq.), Göran Roos, Stephen Pike and Lisa Fernström (2004: 127 et seqq.), Stephen Pike, Göran Roos and Bernard Marr (2005: 112 et seqq.), Chun-Yao Tsenga and Yeong-Jia Goo (2005: 187 et seqq.), Kira Reed, Michael Lubatkin and Narasimhan Srinivasan (2006: 867 et seqq.), Georg Tovstiga and Ekaterina Tulugurova (2007: 695 et seqq.), Meng-Yuh Cheng et al. (2008: 639 et seqq.), Blaise Sonnier (2008: 705 et seqq.), Amrizah Kamaluddin and Rashidah Rahman (2009: 1 et seqq.), Salina Daud and Wan Yusoff (2010: 137 et seqq.), Gregorio Martin de Castro et al. (2011: 659 et seqq.), as well as Ahmed Seleim and Omar Khalil (2011: 586 et seqq.).

2.3.1.1 Traditional Industrial Economics: The Firm as a Black Box

Following the worldwide economic depression of 1929 – 1933, the theory of *traditional industrial economics* originated (Dillerup, Stoi 2011: 12; Müller-Stewens, Lechner 2011: 129) with the intent to clarify questions regarding competitive policies (Bester 2010: 2 et seq.) via an analysis of markets⁵⁹ (Bühler, Jaeger 2002: 4).

The main reference framework of the traditional industrial approach is Joe Bain’s (1956) *structural performance conduct* (SPC): It points out that the exogenous (Rothfuss 2009: 43), central *structures of a market* influence the *behavior of an enterprises* within a specific industry, while the (joint) conduct of firms determines the *market’s performance* (Bühler, Jaeger 2002: 4 et seq.; Al-Laham 2003: 106; Stoll 2007: 11; Dillerup, Stoi 2011: 12; Müller-Stewens, Lechner 2011: 129) (for examples cf. table 1).

Table 1: Examples of the Structural Performance Conduct Categories

Market Structure - exogenous factors -	Company Conduct - endogenous factors -	Market Performance
<ul style="list-style-type: none"> • Economic characteristics of products (e.g. quality and differentiation) • Amount of sellers and buyers, seller concentration, distribution of market shares, degree of vertical integration • Production- and cost structures (e.g. economies of scale or scope) • Information level and market power of buyers, demand conditions • Market entry and exit barriers 	<ul style="list-style-type: none"> • Price-, quality- and quantity restrictions • Investment behavior • Marketing expenses • Research and development efforts • Alliances- and diversification strategies 	<ul style="list-style-type: none"> • Profit margin • Resource and factor productivity • Product variation • Static market efficiency • Dynamic market efficiency (e.g. product or process innovation rate)

Source: adopted from Bühler, Jaeger 2002: 5

⁵⁹ Examples of such questions include: What is the impact of sellers’ concentration on competition? What is the impact of competition on prices, innovation and so on? (Müller-Stewens, Lechner 2011: 129).

According to Joe Bain's proposal, companies have the freedom to adopt their conducts – including business policies and strategies – over time.⁶⁰ Yet, because they do so in line with market developments, firms' *behavioral scope* is automatically reduced (ibid.: 6 et seq.).⁶¹ Moreover, industrial economics rest on the assumption of *relatively perfect competition* (Hungenberg 2011: 64) and certain *other restrictions* (Foss, Lando, Thomsen 2000: 632). Examples include that all firms exhibit the same (level of) mobile resources⁶² which are required to pursue their strategy (Dillerup, Stoi 2011: 12 et seq.), that all actors (buyer and seller) are perfectly informed and make rational decisions (Bühler, Jaeger 2002: 56), and that managers in particular act rationally in the interest of the firm (Hungenberg 2011: 64). Thus, apart from size, all enterprises are considered homogenous (Al-Laham 2003: 106). Altogether, all companies therefore adopt the *same strategy*⁶³ (Dillerup, Stoi 2011: 12; Hungenberg 2011: 64; Müller-Stewens, Lechner 2011: 129) (cf. figure 12).

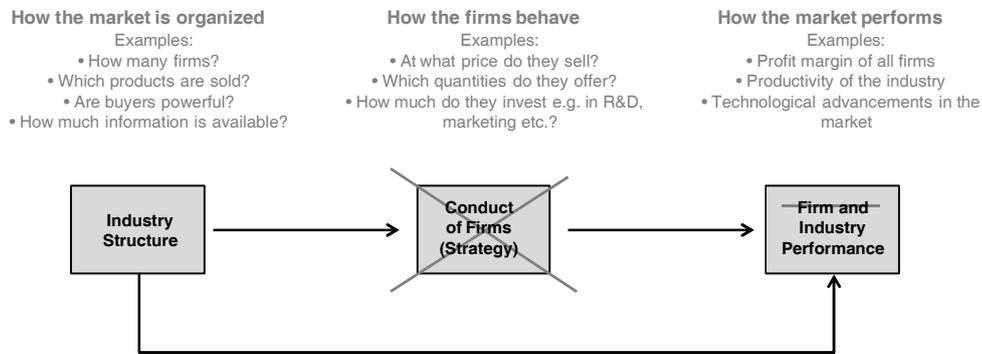
⁶⁰ Traditional industrial economics inform about the behavior of a firm when, for example, production technologies and/or inputs- and output prices change (Bühler, Jaeger 2002: 27).

⁶¹ "(...) the 'behavior' of the firm is like the behavior of the market" (Mäntysaari 2012: 42).

⁶² "If firm resources are perfectly mobile, then any resource that allows some firms to implement a strategy protected by entry or mobility barriers can easily be acquired by firms seeking to enter into this industry (...)" (Barney 1991: 105).

⁶³ „That one firm in an industry populated by identical firms has the resources to conceive of and implement a strategy means that these other firms, because they possess the same resources, can also conceive of and implement this strategy. Because these firms all implement the same strategies, they all will improve their efficiency and effectiveness in the same way, and to the same extent" (Barney 1991: 104).

Figure 12: Industry Determines Performance



Source: adopted from Bühler, Jaeger 2002: 5 et seq.

As such, it can be concluded that the traditional industrial economics' *core unit of analysis* – i.e. source of success – focuses on the *structure of an individual industry* (Stoll 2007: 11; Schneider 2008: 13) which ultimately determines the performance or efficiency of its markets (Foss, Lando, Thomsen 2000: 632; Barca 2003: 87). Within this theory "(...) the firm as such does not exist. The firm is regarded as a production function and a means of transforming inputs into outputs" (Mäntysaari 2012: 10). By treating the firm as a *black box* (Bühler, Jaeger 2002: 28), traditional industrial economics do not address any of the four issues of the *strategic theory of the firm*: they neither specify a firm's *existence*, nor its *boundaries*, *internal organizational matters*, *precise behavior*, or *performance differences* between companies (DeCarolis, Deeds 1999: 953) (cf. figure 13). Consequently, *traditional industrial economics do not help to build a theoretical model that supports the relationship between intellectual capital and lasting competitive business performance*.

Figure 13: Traditional Industrial Economics: No Theory of the Firm

<u>Traditional Industrial Economics</u>	
Existence of the firm	Not addressed / not explained
Boundaries of the firm	Not addressed / not explained
Competitive advantages of the firm	Not addressed / not explained
Internal organization of the firm	Not addressed / not explained

Strategic
Theory of
the Firm

2.3.1.2 Modern Industrial Economics: The Market-based View of Firm Competition

Building on the limitations of traditional industrial economics – in particular the given exogenous market structures (Al-Laham 2003: 107), the one-dimensional causal chain (Bühler, Jaeger 2002: 7) as well as the restricted consideration of firms' behavioral options (Hungenberg 2011: 62; Müller-Stewens, Lechner 2011: 129) – a renaissance of industrial economic theory (Dillerup, Stoi 2011: 12; Müller-Stewens, Lechner 2011: 130) and thus, the birth of the *market-based view*⁶⁴ (MBV) took place towards the late 1970's (Welge, Al-Laham 2012: 78). In particular, Michael Porter (1980) refines traditional industrial economics

⁶⁴ The market-based view is also referred to as *new or modern industrial economics* (Bühler, Jaeger 2002: 7 et seq.; Al-Laham 2003: 108; Rothfuss 2009: 44 et seq.; Dillerup, Stoi 2011: 13; Welge, Al-Laham 2012: 78 et seq.).

for strategic management purposes in the 1980's (Hungenberg 2011: 61) and thereby accomplishes the transition from an economic perspective of markets to a business angle (Welge, Al-Laham 2012: 80).⁶⁵

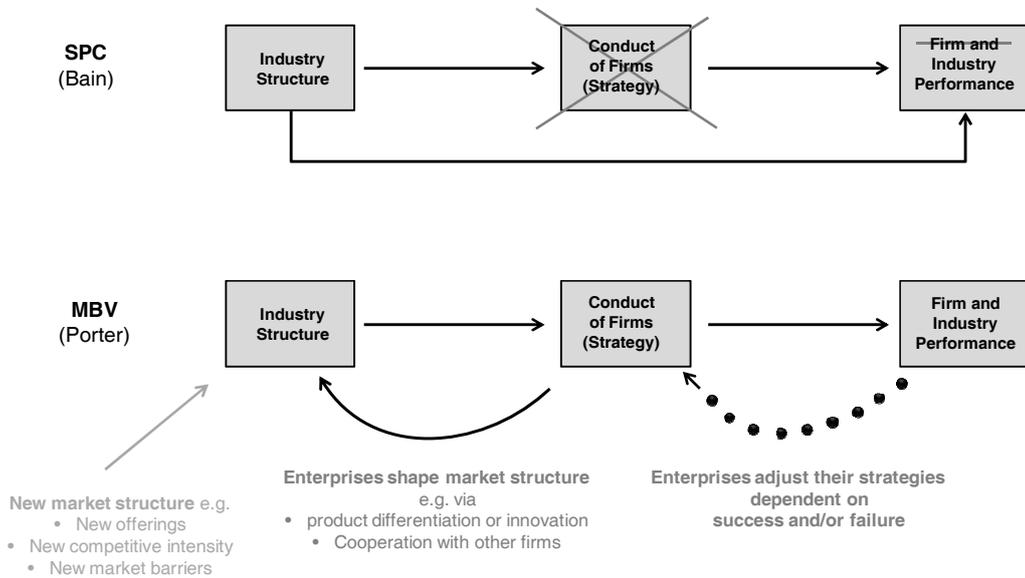
Precisely, the MBV places, based upon empirical observations (Rumelt 1997: 132; Al-Laham 2003: 105), its focus of sources of success (or its core unit of analysis) closer to the company level (Porter 1981: 617; Müller-Stewens, Lechner 2011: 132): the MBV looks into the *behavioral aspects* of firms which are, nonetheless, still influenced by the structure and the development of a specific market (Dillerup, Stoi 2011: 13). At the same time, the MBV does, however, not treat the latter mentioned industry environment as simply exogenous but instead regards it as the target of enterprises' strategies. Hence, *market structures* are '*endogenized*' (Al-Laham 2003: 107; Welge, Al-Laham 2012: 78) and become *dynamic* (Müller-Stewens, Lechner 2011: 129 et seq.). In other words:

"The Bain view that strategic choices do not have an important influence on industry structure is nearly dead. It is now recognized that there are feedback effects of firm conduct (strategy) on market structure (...). For example, firm innovations can enhance or diminish entry and mobility barrier. Some authors have gone a step further to propose and test models in which past performance affects the strategic options available to firms – hence the dotted line in [figure 14] (...)"

(Porter 1981: 615 et seq.).

⁶⁵ "(...) what was missing until the 1970s was an *economics of firms*" (Foss, Lando, Thomsen 2000: 632).

Figure 14: Comparison of the Traditional Industrial Organizational Paradigm (Bain) and the Market-based View (Porter)



Source: adopted from Porter 1981: 611 & 616; supplemented by Al-Laham 2003: 108 and Welge, Al-Laham 2012: 80

This dynamic model which is characterized by interactions between the market, firms, their conduct, and performance (Bühler, Jaeger 2002: 8; Müller-Stewens, Lechner 2011: 129 et seq.) enables differently successful company policies (Müller-Stewens, Lechner 2011: 130).⁶⁶ Yet, in order to make market-oriented, competitive strategic choices, firms need to analyze and understand (better than competitors) the attractiveness of the environment (ibid.: 130 et seq.) as well as the market's competitive structure (Al-Laham 2003: 109; Welge, Al-Laham 2012: 80) in a *first step*. Michael Porter (1985: 4 et seqq.) proposes, in that regard, a supporting tool also known as *Porter's five forces* (cf. figure 14):

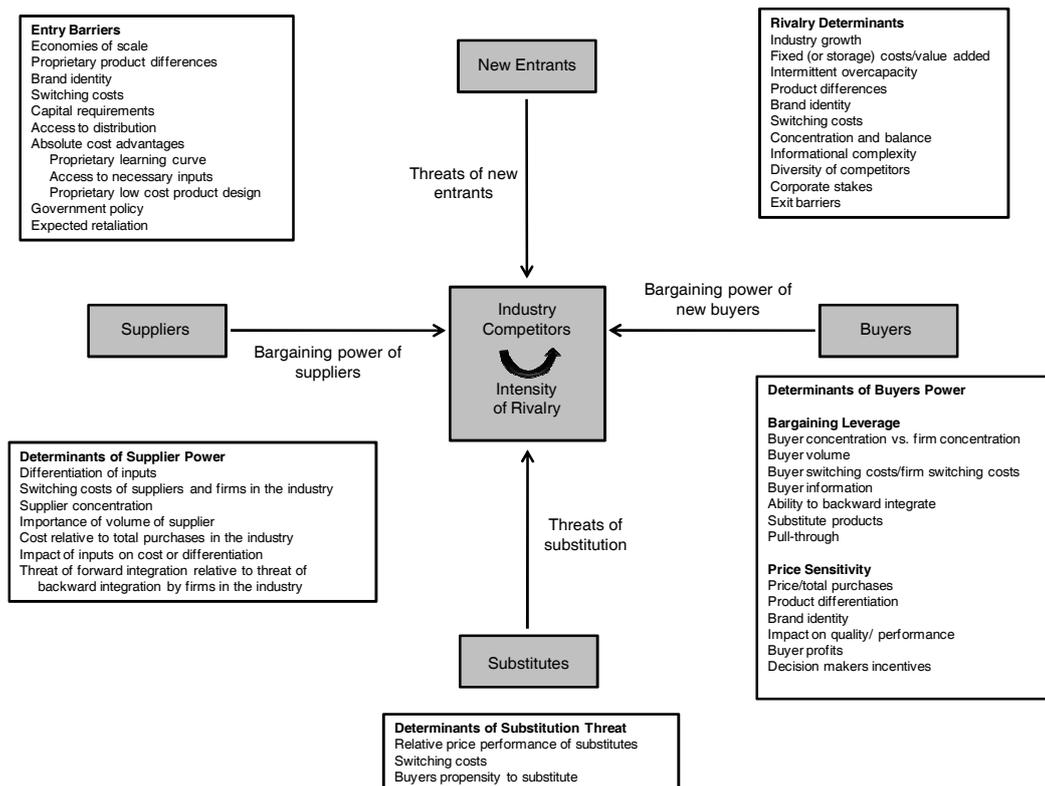
⁶⁶ This model is supported by the construct of 'contestable markets' (Baumol, Panzar, Willig 1982) which allows for interaction between market participants. Thus, it enhances modern industrial economics.

“In any industry (...) the rules of competition are embodied in five competitive forces: the entry of new competitors, the threat of substitutes, the bargaining power of buyers, the bargaining power of suppliers, and the rivalry among the existing competitors”

(ibid.: 4).

Specifically, these five forces as well as their characteristics (cf. the boxes in figure 15) and influences on competition (cf. the arrows in figure 15) help to determine strategic innovations which are expected to generate improved success (ibid.: 4 et seqq.).⁶⁷

Figure 15: Porter’s Five Forces and the Elements of Industry Structure which Determine Industry Profitability



Source: Porter 1985: 6

⁶⁷ Precisely, the higher the threat of the forces, the lower the market’s attractiveness and the harder to gain competitive advantages (Bea, Haas 2009: 29; Hungenberg 2011: 62).

Michael Porter (1985: 4 et seqq.) further suggests that after evaluating these five forces and their interplay (Porter 1985: 4; Müller-Stewens, Lechner 2011: 130) firms need – in a *second step* – to (actually) cope with their environment in order to generate above-average performance in an industry (Porter 1985: 11). To finally derive at such firm policies which strive for a position in the market (Al-Laham 2003: 109; Schneider 2008: 17) that fosters the achievement and maintenance of supernormal business performance⁶⁸ (Welge, Al-Laham 2012: 80), Michael Porter (1985) points to two main *sources of competitive advantages*: *low costs* and *differentiation*. These can be *leveraged via* one of the three *generic strategies*, namely “(...) cost leadership, differentiation, and focus. The focus strategy has two variants, cost focus and differentiation focus” (ibid.: 11) (cf. figure 16).

Figure 16: Porter’s Three Generic Strategies

		Competitive Advantage	
		Low Cost	Differentiation
Competitive Scope	Broad Target	1. Cost Leadership	2. Differentiation
	Narrow Target	3A. Cost Focus	3B. Differentiation Focus

Source: Porter 1985: 12

So far it can be summarized that *modern industrial economics* are also known as the *market-based view* because this theory *still* grounds in the *analysis of markets* and their structure (Makhija 2003: 437; Baum, Coenenberg, Günther 2007: 245): enterprises should aim to position themselves in attractive markets – e.g. with high market barriers (Welge, Al-Laham 2012: 82) – and to distinguish themselves from rivals via their competitive (generic) strategy (Porter 1985: 1 et

⁶⁸ In other words: high market power (Rothfuss 2009: 55).

seq. & 11 et seqq.; Porter 1990 cited by Al-Laham 2003: 109 et seq.; Bamberger, Wrona 1996: 130; Schneider 2008: 13).⁶⁹ Yet, the sustainability of company-based and idiosyncratic competitive advantages is ultimately dependent on the market (Enders 2004: 11).

Although the MBV attempts to overcome the treatment of a firm as a *black box* (Foss, Lando, Thomsen 2000: 62) by defining generic strategies to achieve competitive advantages within a specific industry⁷⁰ (Porter 1985: 11; Hungenberg 2011: 61 et seq.), it can, however, be *criticized*. At first, it is still based on some *assumptions of industrial economics*: Most importantly, it focuses on homogenous and mobile resources (Al-Laham 2003: 110) as well as rational strategic choices (Dillerup, Stoi 2011: 237) – in favor of one of the generic strategies – which lead to an elimination or imitability of first mover advantages because all firm follow the same or very similar strategies in the long run. Thus, *sources of competitive success* are, as already indicated above, *not sustainable* (Al-Laham 2003: 110; Barney, Clark 2007: 16 et seq.; Will 2008: 4; Welge, Al-Laham 2012: 82 et seq.)⁷¹; or in other words of no strategic significance.

Moreover, the MBV's principal *outside-in-perspective* is adversely judged (Müller-Stewens, Lechner 2011: 133). This is because it locates strategic sources of supernormal business performance – predominantly external to the firm (Dillerup, Stoi 2011: 237; Hungenberg 2011: 61 et seq.; Ungericht 2012: 152 et seq.)⁷² and thus, disregards success potentials derived from company internal aspects such as organizational resources, structures, and processes (Al-Laham 2003: 106 & 110 et seq.; Hungenberg 2011: 62 et seq.; Müller-Stewens, Lechner 2011: 133; Welge, Al-Laham 2012: 83).

⁶⁹ “As the MBV delineates competitive advantages from existing market structures it is sometimes judged as being defensive (...)” (Will 2008: 4).

⁷⁰ “(...) [it] has largely ignored the theory and evidence of intra-industry differences among firms” (Rumelt 1997: 133).

⁷¹ Cf. Klaus North (2011: 62) who discusses the issue of unsustainable competitive advantages in the context of the knowledge-based society.

⁷² “This perspective, which we refer to as the market-based view of the firm (MBV), typically stresses privileged end-product market positions as a basis for above-normal future returns” (Makhija 2003: 433).

In the context of the *strategic theory of the firm* it can be concluded that the MBV does – similar to traditional industrial economics – neither explicitly point to firms' *boundaries* nor its *internal structure*. Moreover, its focus on low costs and differentiation may help to explain a firm's *existence* and sources of *competitive advantages* but they are not sustainable (cf. figure 17). Altogether, the MBV does therefore *not support explaining why intellectual capital represents a strategic source of lasting above-average performance and thus, going concern*.

Figure 17: Modern Industrial Economics: No Real Theory of the Firm

Modern Industrial Economics	
Existence of the firm	Firms are successful if they exploit market opportunities and/or leverage their position in the market
Boundaries of the firm	Not addressed / not explained
Competitive advantages of the firm	Sources of competitive success (low costs or differentiation) are not sustainable because of the MBV's assumptions
Internal organization of the firm	Not addressed / not explained

**Strategic
Theory of
the Firm**

2.3.1.3 *New Institutional Economics: Toward a Strategic Theory of the Firm*

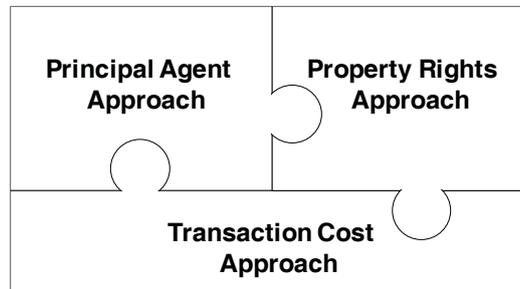
New institutional economics represent another theory from the 1980's which tries to overcome the shortcomings of traditional industrial economics (Höll 2009: 149; Müller-Stewens, Lechner 2011: 12 & 133) and in particular the limitations caused by the idealistic assumption of (relatively) perfect markets (Hungenberg 2011: 64; Welge, Al-Laham 2012: 43). As such, the new institutional economy critically scrutinizes these notions and gradually abolishes them in order to account for real life considerations such as transaction costs (TAC), information asymmetries (Cezanne, Mayer 1998: 1345 cited by Welge, Al-Laham 2012: 43), constrains of resource mobility, bounded rationality (Hungenberg 2011: 64), and individuals' maximization of benefits (Höll 2009: 149 et seq.).

Precisely, new institutional economics are concerned with *institutions*⁷³, which are of high relevance for economic processes (Wiegandt 2009: 117; Welge, Al-Laham 2012: 43), instead of ideal market conditions (Dillerup, Stoi 2011: 16). As such, they *shed increasing light on the theory of the firm* (Bühler, Jaeger 2002: 13 et seqq.; Bester 2010: 5 et seqq.).

In detail, new institutional economics enhance the former industrial economy theory by incorporating behavioral science approaches such as decision-, legal, and organizational theories (Dillerup, Stoi 2011: 12 & 16). This leads to the fact that new institutional economics cannot be viewed as a coherent or overreaching theoretical paradigm (Wiegandt 2009: 117) but rather as a *set of related theories* which intertwine, overlap or supplement each other (Welge, Al-Laham 2012: 43). These theories include the *principal agent approach* (Jensen, Meckling 1976: 305 et seqq.), the *transaction cost approach* (Coase 1937: 386 et seqq.; Williamson 1975), and the *property rights approach* (Grossman, Hart 1986: 691 et seqq.; Hart, Moore 1990: 1119 et seqq.) (cf. figure 18), which are discussed in the following chapters.

⁷³ Institutions, such as multi-person firms (Foss, Lando, Thomsen 2000: 632) or justice systems, constitute systems of (in)formal rules, norms, laws, rights (Welge, Al-Laham 2012: 43 et seq.), and contracts which aim to structure (contracting) relationships between (market) participants (Jensen, Meckling 1976: 310 cited by Hochhold, Rudolph 2009: 133).

Figure 18: Overview of New Institutional Economics



2.3.1.3.1 Principal Agent Approach

Traditional economic theories neither consider issues related to the firm-internal coordination of corporate activities nor the fact that participating actors might have different interests (Bester 2010: 7 et seq.) or opportunistic behavior (Welge, Al-Laham 2012: 50 et seq.) as well as unequal information (Bester 2010: 7 et seq.) and related information asymmetries (Welge, Al-Laham 2012: 51). But especially these differences between diverse participants cause (agency) costs (Hochhold, Rudolph 2009: 131) and can result in losses of efficiency (Bester 2010: 8). To minimize such risks, it is the aim to structure firm-internal arrangements or contracts – i.e. institutions – in a manner so that involved individuals are either controlled – which, however, results in control costs – or incentivized to strive for common objectives (Jensen, Meckling 1976: 309; Eisenhardt 1989: 59 et seq.; Bester 2010: 8; Müller-Stewens, Lechner 2011: 136). The optimal arrangement and structure of such (institutional or contractual) incentives is the core of the principal agency theory (Bühler, Jaeger 2002: 36; Bester 2010: 8).

Specifically, the principal agent approach analyzes the complex construct of *relationships and incentive issues between* diverse economic actors (Bühler, Jaeger 2002: 29). The following example shall clarify this: the owner of a firm (*principal*) delegates, based upon a contract, certain duties and decision-competencies to a manager (*agent*) who is supposed to realize the principal's aims (Dillerup, Stoi 2011: 20). This manager (now a principal) is, in turn, likely to further assign responsibilities to value adding *internal or external* units (new agents) (Bühler, Jaeger 2002: 29 et seqq.). Yet, the principal is not perfectly informed whether the

agents act in his/her interests or if they strive for their own goals. Thus, the principal needs to create, for example, contractual incentives which align both parties' objectives and thereby motivate the agent to voluntarily act towards these common aims – i.e. without control (Bühler, Jaeger 2002: 30; Dillerup, Stoi 2011: 20; Welge, Al-Laham 2012: 51).

The agency theory contributes to a *strategic theory of the firm* and in particular firms' *existence* (Hochhold, Rudolph 2009: 142) because it points to the inner life of firms by analyzing the relationship between diverse economic actors (Bühler, Jaeger 2002: 13). However, firm-internal and external agents, who enter contractual incentives, are assumed to have the same level of exogenous information. As such, the theory does not explain a firm's *boundaries* (ibid.: 36) and specifically its scale and scope (Al-Laham 2003: 123). Neither does the agency theory explain the *sources of a firm's competitive advantages*. Moreover, the principal agent approach's contribution to explaining *internal organizational matters* is limited because it only concentrates on "(...) the analytical action on the incentive alignment stage of contracting. Differences among governance structures with respect to adaptation in the contract implementation interval are thus suppressed" (Makhija 2003).

2.3.1.3.2 Transaction Cost Approach

The *transaction cost (TAC) approach* is the core of new institutional economics (Dillerup, Stoi 2011: 22). This is because it centers the relative efficiency of authority-based organizations: firms and hierarchies instead of contract-based organizations or the market (Grant 1996: 109; Müller-Stewens, Lechner 2011: 134). As such, it considerably addresses the central question of the *theory of the firm* (Bühler, Jaeger 2002: 13 et seq.; Bester 2010: 6; Dillerup, Stoi 2011: 22): '*why are certain economic activities and decisions administratively organized inside the firm instead of being coordinated via the market and prices?*' (Coase 1937: 388).

Ronald Coase (ibid.: 392) suggests an answer to this issue based upon *TAC*⁷⁴ which determine where to draw the line between internal firm settings and its limits. He establishes that transactions are internally performed when the costs of doing so are below the costs of external processing (Grossman, Hart 1986: 692; Bühler, Jaeger 2002: 37; Wiegandt 2009: 118; Bester 2010: 6).

Oliver Williamson (1975) further shapes this notion by analyzing the *characteristics of particular transactions* – such as their *specificity, frequency* and *disturbance* (Bühler, Jaeger 2002: 37; Williamson 2002: 175) – and the different forms of efficient coordination – like governance via the firm, the market or contractual rules (Wiegandt 2009: 119 et seq.). He proposes, while assuming that market transactions cannot be perfectly governed because of incomplete contracts⁷⁵ (Bester 2010: 6; Dillerup, Stoi 2011: 23), that each of the three aforementioned characteristics militates in favor of internal coordination rather than market transactions (Williamson 1989: 136 cited by Wiegandt 2009: 119; Bühler, Jaeger 2002: 37). For example,

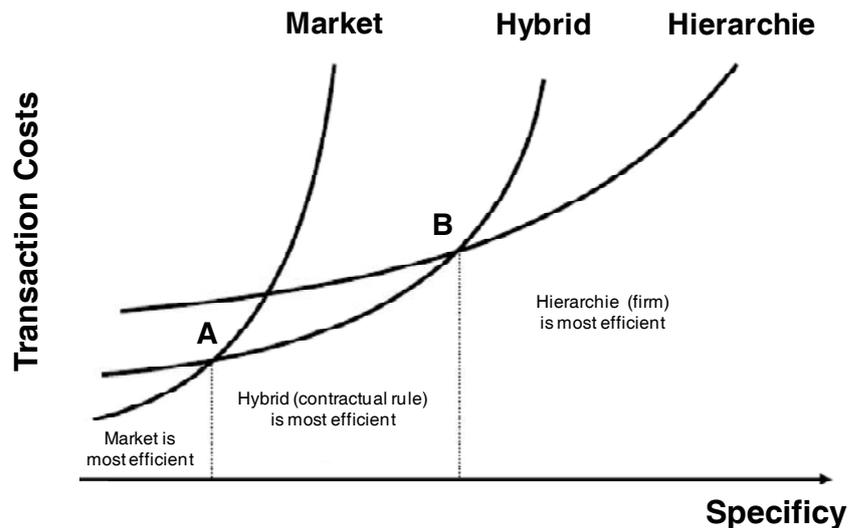
“the higher the asset specificity involved, the higher the cost of its market monitoring. Thus the governance mode can be altered towards a hybridmode, as seen at point (A), at which monitoring costs by the market are higher than in the hybrid mode. In the mixed or hybrid mode the existence of contracts enabling the system to be 'almost verticalised' is verified. If the monitoring costs become so high as to make this governance mode inviable, the transaction then forces the system to be managed under the hierarchic mode, as seen at point (B), necessarily using internal organization to coordinate it”

(Da Silva, Saes 2007: 449) (cf. figure 19).

⁷⁴ TAC refer to monetary costs which occur during transactions. Examples include costs that result from discovering relevant prices, negotiating and concluding contracts, controlling transactions/contracts, or revising them (Coase 1937: 390 et seq.; Wiegandt 2009: 115 & 118).

⁷⁵ “(...) complex contracts are unavoidable incomplete” (Williamson 2002: 175) because one cannot unambiguously specify each and every potential state of nature of a transaction in a contract (Grossman, Hart 1986; Wiegandt 2009: 119) – i.e. *unforeseen contingencies*. Furthermore, complete complex contracts are costly – i.e. *cost of writing contracts* – and very difficult to monitor – i.e. *costs of enforcing contracts* (Bühler, Jaeger 2002: 38 et seq.).

Figure 19: Transaction Costs, Transaction Characteristics and Institutional Forms



Source: Williamson 1975: 284 and Picot, Dietl, Franck 2002: 84 both cited by Wiegandt 2009: 125; adopted by Da Silva, Saes 2007: 449

Although Ronald Coase's TAC theory contributes to the destruction of the firm as a *black box* (Bühler, Jaeger 2002: 13), it can be criticized because it 'only' explains the *existence* of firms with regard to the avoidance of TAC (Conner 1991: 133; Grant 1996: 113). As such, it still represents "(...) [a theory] of markets in which firms are important actors (...) but [it does] not explain under what terms the firm is the superior form of organization" (Mäntysaari 2012: 6). Moreover, Oliver Williamson's advanced notion of the transaction cost approach only points to the advantages of firm *internal coordination* of economic activities while not paying attention to its disadvantages. Additionally, the transaction cost theory ignores organizational *boundaries*, such as size constraints, by assuming that a firm can be endlessly large (Bühler, Jaeger 2002: 41 et seq.). Lastly, it can be argued that the TAC approach fails to accommodate the central notion about the strategic theory of the firm – i.e. "(...) firms' principal purpose is to generate rents through

creating and sustaining sources of *competitive advantages*" (Porter Liebeskind 1996: 93).⁷⁶

2.3.1.3.3 Property Rights Approach

To further analyze "(...) when transactions should be carried out within a firm and when through the market" (Hart, Moore 1990: 1119) one can turn to the framework provided for by the *property rights theory* (Müller-Stewens, Lechner 2011: 136). The property rights approach is, also similar to the transaction cost theory, based on the assumption of incomplete contracts (Grossman, Hart 1986: 718; Bühler, Jaeger 2002: 42) and of high significance for management theory because "(...) prior to [it], the very idea that incomplete contracts could be formally modeled was scorned" (Williamson 2002: 188).

Precisely, the property rights approach assumes that a company consists of the sum of all assets which it owns or controls (Grossman, Hart 1986: 693 et seq.; Hart, Moore 1990: 1119; Bester 2010: 7).⁷⁷ These *assets' property rights* – e.g. "the right to decide how these assets are to be used (...)"⁷⁸ (Hart, Moore 1990: 1120) – determine the economic efficiency of an enterprise (Welge, Al-Laham 2012: 45) and thus, explain its existence (Höll 2009: 156)⁷⁹.

Additionally, the property rights theory addresses – because property rights can, for instance, in the hybrid governance structure be shared by individuals (Hochhold, Rudolph 2009: 134) – "(...) when one firm will desire to acquire the assets of another [party]" (Grossman, Hart 1986: 693). More specifically:

⁷⁶ Cf. footnote 19.

⁷⁷ The value of an assets is determined by its tangible characteristics and intangible property rights which are executed by an individual (Hochhold, Rudolph 2009: 134).

⁷⁸ Specifically, property rights include the rights to use assets (*usus*), to change them (*abusus*), to *claim* their *yields*, and to *sell* them (Höll 2009: 150). Consequently, owners/firms can contractually rule out partners from using these assets (Bühler, Jaeger 2002: 43).

⁷⁹ Precisely, a firm exists because its foundation reduces the amount of required contracts to gain access to property rights of market participants and thus, reduces transaction costs (Höll 2009: 156).

“When it is too costly for one party to specify a long list of the particular rights it desires over another party’s assets, it may be optimal for that party to purchase all the rights except those specifically mentioned in the contract”

(ibid.: 692).

Altogether, the property rights approach specifies, on the one hand, the *efficient allocation of tangible and intangible resources’ property rights* (Hart, Moore 1990: 1150; Bühler, Jaeger 2002: 42; Höll 2009: 158; Welge, Al-Laham 2012: 47 et seq.). On the other hand, it establishes the *effective limits of a firm* via incentives for relationship specific investments (Hart, Moore 1990: 1149; Bühler, Jaeger 2002: 14 & 42). Consequently, the property rights theory contributes significantly to the *theory of the firm* (Palupski n.k.: 56; Bühler, Jaeger 2002: 42). However, it does not compellingly clarify the *internal organization* of firms (Hart, Moore 1990: 1153; Bühler, Jaeger 2002: 46; Makhija 2003): “(...) the model (...) cannot explain (...) the determination of hierarchical structure within a firm” (Hart, Moore 1990: 1153). Lastly, the property rights approach does not address the *sources of competitive advantages* and thus, is less suitable to explain a strategic theory of the firm.

2.3.1.3.4 Preliminary Conclusion: The Contributions of New Institutional Economics

To summarize, the new institutional economy theory supports the move from the black box treatment of a firm towards a (strategic) theory of the firm. However, new institutional economics are made up of three different, co-existing approaches of which each only fractionally contributes aspects and important elements to a (strategic) theory of the firm (Bühler, Jaeger 2002: 46) as can be seen in figure 20. Moreover, figure 20, which summarizes the conclusions of the principal agent approach, the transaction cost approach and the property rights approach, shows that even when taking the three approaches together, they do not present an ultimate answer to the existence, limits, precise organizational structure as well as behavior of a company. Furthermore, none of the three illustrated theories suggest specific strategic sources of a firm’s sustainable competitive performance and thus, fail to address the core of a strategic theory of the firm. Consequently, new institutional economics are of *minor importance for*

theoretically constructing the relationship between intellectual capital and lasting competitive business performance.

Figure 20: New Institutional Economics: Towards a (Strategic) Theory of the Firm

	<u>Modern Industrial Economics</u>
Existence of the firm	Principal Agent: Firms can handle relationships between actors (well) TAC: Firms avoid TAC Property Rights: Firms own and/or control assets and particularly property rights
Boundaries of the firm	Principal Agent: No difference between internal and external actors TAC: No size constraints since firm can be endlessly large Property Rights: Incentives for relationship specific investments
Competitive advantages of the firm	Not addressed / not explained
Internal organization of the firm	TAC: Only advantages but no disadvantages of firm internal coordination of economic activities

Having said this, it needs to be considered, however, that the new institutional economy's assumptions and their resulting imperfect market conditions positively advance organizational research. The *transaction cost approach*, for instance, specifically contributes to the essence of the *resource-based theory* of the firm (Al-Laham 2003: 124 et seq.; Hungenberg 2011: 62) – which is presented in chapter 2.3.2.1 – because it fosters that the internal coordination of (specific) resources can be more efficient than market transactions (Conner 1991: 133; Bühler, Jaeger 2002: 13 et seq.; Mäntysaari 2012: 6). Alternatively, the *property rights approach* can be applied to highlight the protection of intangible assets' property rights. Hence, it supports the *knowledge-based view* (Welge, Al-Laham 2012: 48) which is displayed in section 2.3.2.2.

2.3.1.4 *Summary of Externally-orientated Approaches*

Based upon the above it can be concluded that *traditional industrial economics* and the *market-based view*, which point to external sources of success, do not theoretically refine firm-specific IC as a strategic source of sustained competitive business performance. Neither do *new institutional economics* although it has been shown that they fractionally suggest relevant aspects which shall be elaborated on the in following part of this dissertation's theoretical foundation.

2.3.2 Internally-orientated Approaches

As an alternative to part 2.3.1, chapter 2.3.2 demonstrates two theoretical approaches which focus on strategic sources of competitive advantages and thus, sustainable business performance from a company internal perspective. These are the *resource-based view* as well as its advanced version, namely the *knowledge-based view*.

2.3.2.1 *The Resource-based Theory of the Firm: a Strategic Theory of Lasting Competitive Firm Performance*

"In the last two decades of the twentieth century the resource based view of the firm has received attention as an alternative to the traditional product-based or competitive advantage (Porter 1980) view (...)"

(Sveiby 2001: 334).

In detail, *resource-based view* (RBV) literature came about as a reaction to market or economic changes such as shorter product- and technology-life-cycles as well as more individualized customer demands which lead to a highly dynamic and volatile environment (cf. figure 1). As a result of these developments, it is increasingly difficult for companies to forecast their external conditions. This threatens firms' stability as well as their market-based competitive advantages (cf. chapter 2.3.1.1 *traditional industrial economics* and

chapter 2.3.1.2 *MBV*). Correspondingly, an alternative orientation to ensure sustainable competitive business performance and a focus on factors which underlie market-based competitive advantages becomes central (Baum, Coenenberg, Günther 2007: 246).

On this basis, authors and researchers⁸⁰ representing the resource-based theory of the firm argue that firms exist and generate lasting supernormal business performance because of the quality of their *firm-specific, strategically relevant resources* – instead of their market position (*MBV*) (Al-Laham 2003: 112; Ungericht 2012: 234; Welge, Al-Laham 2012: 87).⁸¹ As such, the *whole firm*⁸² (Penrose 1959: 15 et seq.) and in particular its *unique accumulation and utilization of resources* becomes the core unit of analysis – i.e. the key strategic sources of success (Penrose 1959: 5, 31, 78 et seqq. & 113 et seq.; Wernerfelt 1984: 171 et seqq.; Conner 1991: 132 et seq.; Bamberger, Wrona 1996: 131; Spender 1996: 46; Rumelt 1997: 132; Al-Laham 2003: 112; Helfat, Peteraf 2003: 997; Curando 2006: 4; Kieser, Walgenbach 2007: 3; Cater, Cater 2009: 187).

Economic theories define resources in terms of a) *land* (e.g. natural resources like water, energy sources, and territory), b) *capital* (real capital and capital equipment), and c) *work* (human actions to generate income) (Al-Laham 2003: 113; Edling 2008: 12 et seq.). A similar trichotomy is also adapted by *business studies* whereas they substitute the expression *land* with (basic) raw or additive *materials* (Wildmann 2010: 7). Yet, *strategic management* literature and the *RBV* in particular enhance these traditional definitions of resources (Curando 2006: 3) since the mid 1980's (Müller-Stewens, Lechner 2011: 346) by describing resources as "(...) anything which could be thought of as a *strength* or weakness of a given

⁸⁰ Most notably Edith T. Penrose (1959), Birger Wernerfelt (1984), Jay B. Barney (1991), Robert M. Grant (Grant 1991), and Margaret A. Peteraf (1993).

⁸¹ Remark: The *RBV* focuses on the *inside-out-perspective* perspective (Bea, Haas 2009: 30; Cater, Cater 2009: 187) as opposed to the *MBV*'s outside-in focus; by viewing the firm as a bundle of unique resources, the neoclassic (industrial economic) perception of the firm as a production function is rejected as well (Müller-Stewens, Lechner 2011: 346).

⁸² Recap: the unit of analysis in industrial economics is (individual) markets and in new institutional economics it is transactions and/or individual actors (Stoll 2007: 16).

firm" (Wernerfelt 1984: 172).⁸³ This initial definitional concept is, however, again specified by later authors who emphasize the strategic nature of resources (Al-Laham 2003: 114).⁸⁴ Jay Barney (1991: 101), for example, regards resources as

"all assets, capabilities, organizational processes, firm attributes, information, knowledge etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness (...)".

This description of resources particularly highlights that the RBV regards *tangible and intangible resources* which are internalized and thus, acquired, owned as well as *controlled* by a firm (Amit, Schoemaker 1993: 35; Schneider 2008: 22; Kraaijenbrink, Spender, Groen 2010: 350) as potential strategic sources of success (Wernerfelt 1984: 172; Barney, Wright, Ketchen, JR. 2001: 625; Riahi-Belkaoui 2003: 215 et seqq.; Barney, Ketchen, JR., Wright 2011: 1300). Especially concerning the intangible resources, some authors⁸⁵ of the *RBV of the firm* (Curando 2006: 5) stress the importance of *static capabilities*⁸⁶ – e.g. management skills, organizational processes, and routines (Barney, Wright, Ketchen, JR. 2001: 625). This is, firstly, because these capabilities point to the fact that firms do not (only) exist because they possess strategically valuable resources but (also) because of their unique capabilities to *cooperate* and *coordinate* them (Penrose 1959: 25 et seqq.; Conner 1991: 135 et seqq.; Grant 1991: 115 et seq.; Al-Laham 2003: 124 et seq.; Helfat, Peteraf 2003: 997 et seqq.; Curando 2006: 2; Schneider 2008: 20; Welge, Al-Laham

⁸³ Cf. footnote 19.

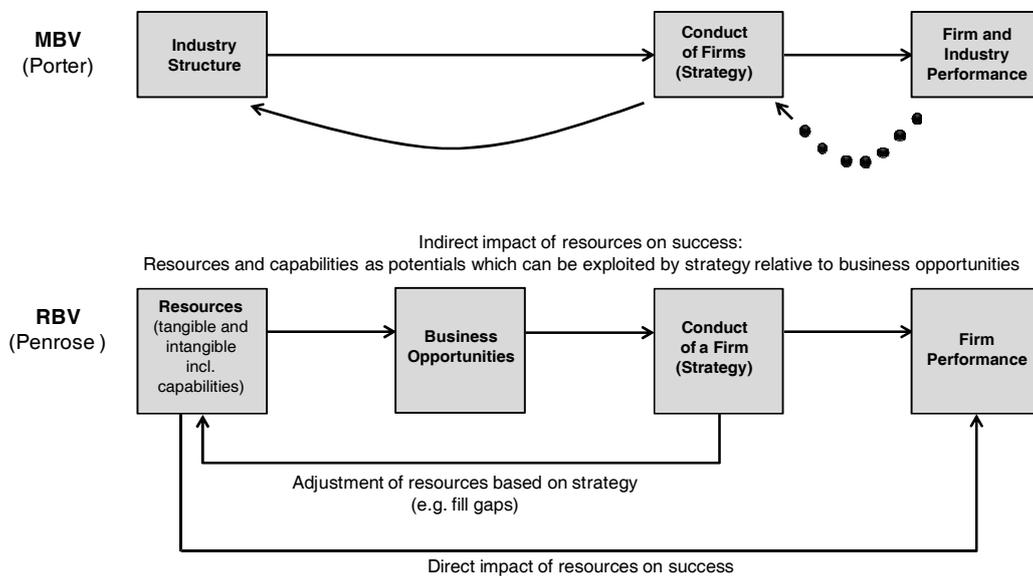
⁸⁴ "A consensus on a generally accepted definition has not yet been reached" (Müller-Christ 2011: 167).

⁸⁵ For example, Edith Penrose's (1959) and Robert Grant's (1996) notions also contribute to the capability-based view which is presented in the subsequent chapter (2.3.2.2).

⁸⁶ There are three lines of thoughts regarding capabilities – which are also referred to as competencies: static, dynamic, or creative which "(...) all concern the ability of firms to perform an activity (...) more effectively than competitors (...)" (Collis 1994: 145): 1) *Static* capabilities represent an enterprises ability to conduct its basic activities more efficiently than competitors (Collis 1994: 145) or as Robert Grant (1991: 119) puts it: "A capability is the capacity for a team of resources to perform some task or activity". 2) *Dynamic* capabilities are dynamic improvements of activities and include e.g. changing or adapting. 3) *Creative* capabilities are closely related to the dynamic capabilities and enable firms to conduct new strategies before their competitors (Collis 1994: 145).

2012: 88).⁸⁷ Secondly, intangibles and capabilities contribute to a firm's conduct because they "(...) can be used by firms to help *choose and implement strategies*" (Barney, Ketchen, JR., Wright 2011: 1300).⁸⁸ On the whole, this means that various companies might have (very) similar resources but still exhibit different (strategic) sources of success because of their unique capabilities to use them (Grant 1991: 119; Bamberger, Wrona 1996: 135 cited by Helm, Meiler 2004: 390).

Figure 21: Comparison of the Market-based View and the Resource-based View



Source: adopted from Grant 1991: 115, Collis, Montgomery 1997: 88, Al-Laham 2003: 112 et seq. and Bea, Haas 2009: 30

Building on the aforementioned, it can be summarized that resources do not just *directly influence business performance* – e.g. the direct impact of technological equipment on production and productivity – but also *indirectly* (Al-Laham 2003: 112 et seq.) via a firm's conduct (Hitt et al. 1999: 1). This means that it is the task of

⁸⁷ For example, a firm has "(...) the organization (...) in place that can absorb and apply them" (Kraaijenbrink, Spender, Groen 2010: 350).

⁸⁸ Cf. footnote 19.

a firm's (strategic) management to acquire, integrate, combine, exploit, and hold⁸⁹ (Riahi-Belkaoui 2003: 215; Reed, Lubatkin, Srinivasan 2006: 867; Barney 2007: 134) tangible and intangible resources in line with business opportunities to generate supernormal performance (Grant 1991: 115; Grant 1996: 110; Hitt et al. 1999: 1; Hungenberg 2011: 63) (cf. figure 21).

However, "(...) not all firm resources hold the potential of sustained competitive advantages" (Barney 1991: 105); or in other words the potential to attain above-average business performance and to particularly protect and sustain it in the long-run. To do so, resources must fulfill all of the following *four conditions*⁹⁰ *simultaneously* (Peteraf 1993: 180 et seqq.; Al-Laham 2003: 115 et seqq.; Müller-Stewens, Lechner 2011: 347 et seq.; Welge, Al-Laham 2012: 88 et seq.) (cf. figure 22):

- **Heterogeneity:** The first and most fundamental assumption concerning strategic sources of lasting competitive business performance postulates (Welge, Al-Laham 2012: 91) – as mentioned above – that resources have to be heterogeneous (cf. top left of figure 22).⁹¹ This condition indicates that each company holds idiosyncratic resource bundles and capabilities which allow "(...) produc[ing] more economically and/or better satisfy[ing] customer wants" (Peteraf 1993: 180) and thus, generating rents (ibid.: 180) – i.e. long-term supernormal

⁸⁹ Remark: Focus is placed on the acquisition, usage, and sustainability of tangible and intangible resources (Riahi-Belkaoui 2003: 215; Hungenberg 2011: 63).

⁹⁰ Alternatively, Jay Barney (1991: 105 et seq.) suggest four different criteria: "To have [a potential of sustained competitive advantage], a firm resource must have four attributes: (a) it must be *valuable*, in the sense that it exploit opportunities and/or neutralizes threats in a firm's environment, (b) it must be *rare* among a firm's current and potential competition, (c) it must be *imperfectly imitable*, and (d) there *cannot* be strategically equivalent *substitutes* for this resource that are valuable but neither rare or imperfectly imitable".

⁹¹ "While heterogeneity is not precisely defined in Peteraf (1993), indications of its meaning are given by arguing that resource bundles differ across firms in terms of efficiencies and that these different efficiencies give rise to different levels of value creation. These efficiency differences may translate into differences in rents, or, if you like, differential profits" (Foss, Knudsen 2003: 294).

returns (Al-Laham 2003: 122). In detail, resource heterogeneity can be theoretically conceptualized (Al-Laham 2003: 116 et seq.; Welge, Al-Laham 2012: 91) by Richard Rumelt's approach (1984: 560 et seqq.; 1997: 140 et seq.) of *isolating mechanisms*⁹² and *causal ambiguities*⁹³: Firms have inimitable resource advantages because of the uncertainty related to the resources' historical development – e.g. unique accumulation – within a firm (Al-Laham 2003: 116 et seq.; Welge, Al-Laham 2012: 91 et seq.).

- ***Imperfect mobility***: Secondly, resources are required to be imperfectly mobile in order to be regarded as strategic sources of lasting competitive business performance since it ensures that rents remain with the firm (cf. top right of figure 22). In particular, immobility refers to the fact that resources are either non-tradable or worthless to other market participants (Peteraf 1993: 183 et seq.) due to two main reasons. Firstly, there may be *no markets* for resources which are particularly tailored to the needs of a specific company and possibly even related to property rights. Secondly, their *specificity* causes vast *transaction costs* which are especially high if the resources require the combination with other input factors in order to be economically feasible (Peteraf 1993: 183 et seq.; Al-Laham 2003: 118 et seq.; Müller-Stewens, Lechner 2011: 347; Welge, Al-Laham 2012: 93).
- ***Ex ante limits to competition***: Thirdly, there must be ex ante limits to competition. This criterion illuminates that competitive business performance is sustainable because of *time leads* – such as an early identification and/or consumption of resources in imperfect strategic

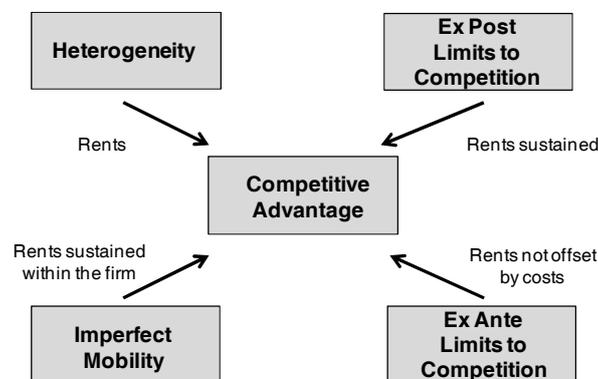
⁹² *Isolating mechanisms* are company-specific factors which explain resources' inimitability – i.e. imitability-barriers (Welge, Al-Laham 2012: 91 et seq.). Examples of isolating mechanisms include specialized assets or unique resources such as locally evolved patents and brand image (Rumelt 1984: 560 et seqq.; Rumelt 1997: 140 et seq.).

⁹³ *Causal ambiguity* protects the source of resources' competitive edge - i.e. the source of isolating mechanisms. This is because resources'/isolating mechanisms' composition, interaction as well as cause-and-effect relationships are unknown (Rumelt 1984: 560 et seqq.). Causal ambiguity is often closely related to path dependency, which means that (strategic) resources are historically grown in firms over the years (Dierickx, Cool 1989: 1506; Winkler 2004: 75).

factor markets – which allow implementing a strategy earlier and at lower resource costs than later-acting competitors who need to pay higher prices for the same (necessary) resources (Wernerfelt 1984: 173 et seq.; Barney 1986: 1232; Conner 1991: 136 et seq.; Peteraf 1993: 185; Al-Laham 2003: 119 et seq.; Müller-Stewens, Lechner 2011: 347) (cf. bottom left of figure 22).⁹⁴

- ***Ex post limits to competition:*** The last condition which resources have to meet in order to ensure long-term supernormal performance is ex post limits to competition. It highlights that it is the (main) aim of a firm to secure and stabilize its resource bases' heterogeneity (Rumelt 1984: 182) in order to uphold its competitive advantages and above-average returns in the long run (cf. bottom right of figure 22). This can be achieved by concentrating on imperfect *substitutability* and *imitability* (Al-Laham 2003: 120 et seq.; Welge, Al-Laham 2012: 94 et seq.).

Figure 22: The Resource-based View's Cornerstones of Competitive Advantage



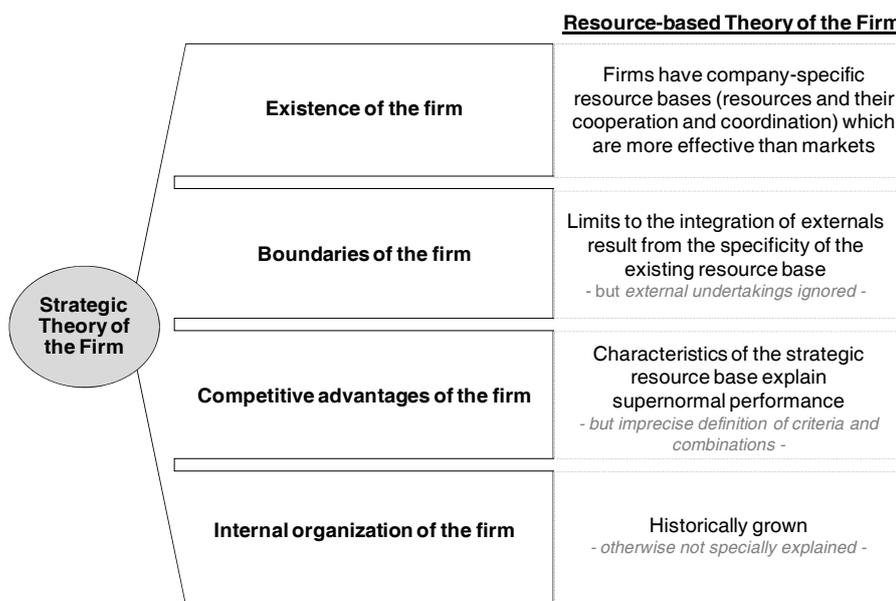
Source: Peteraf 1993: 186

On the whole it can be summarized that the RBV is "(...) perhaps the most influential framework for understanding strategic management" (Barney, Wright,

⁹⁴ "If the firm's managers can estimate the future value of a resource better than their competitors - or when they are simply lucky - this provides their firm with ex ante sources of SCA" (Kraaijenbrink, Spender, Groen 2010: 351).

Ketchen, JR. 2001: 625) and "(...) preferred when theory is applied to the management of intangibles" (Kaufmann, Schneider 2004: 385). This is, among others, because it represents important contributions to the *strategic theory of the firm* (Conner 1991: 121 et seqq.). Specifically, the RBV does, as mentioned above, explain a firm's *existence* and *boundaries* based on its unique, *historically grown* tangible and intangible resource bundle whose company-specificity *limits*, for example, cooperations between firms. Moreover, it states that *competitive advantages* rest upon those resources which fulfill, for instance, the presented criteria of Margaret Peteraf (1993: 186) (cf. figure 23).

Figure 23: The Resource-based View as a Strategic Theory of the Firm



Source: adopted from Al-Laham 2003: 178 and specified via Conner 1991: 121 et seqq.

Nevertheless, the RBV's foundation arguably bears some conceptual *crevices* (Foss, Knudsen 2003: 291) (cf. grey, bottom parts of figure 23) which are caused by its lack of specificity (Reed, Lubatkin, Srinivasan 2006: 868).

"Among the possible concerns, Reed et al. (2006: 868) remark the following ones: RBV is not prescriptive; it suffers a lack of clear definition of competitive advantage; it has a

tautology problem⁹⁵; it is ambiguous as to its relevant domain; and it is too general”

(Martin Castro et al. 2011: 659).

Specifically, the RBV and in particular its *definitions of resources* as well as *competitive advantages* are too broad to specify which resources – as well as their combination – lead to sustained above-average success and which do not (Al-Laham 2003: 129 et seq.; Reed, Lubatkin, Srinivasan 2006: 868; Viedma Marti 2007: 248; Müller-Stewens, Lechner 2011: 348; Welge, Al-Laham 2012: 96). In detail, concerning its definitions of resources it can be noted that

“(…) they do not sufficiently acknowledge the distinction between those resources that are inputs to the firm and the capabilities that enable the firm to select, deploy, and organize such inputs”

(Kraaijenbrink, Spender, Groen 2010: 358).

With respect to *competitive advantages* Nicolai Foss and Thorbjorn Knudsen (2003: 292) criticize that the RBV’s logical structure does not precisely clarify the underlying assumptions of when a resource is a competitive advantage.⁹⁶ Thus, its theoretical underpinning, upon which testable assertions about the relationship between IC and lasting competitive business performance can be built, is attacked. Furthermore, the RBV neglects a clear conceptualization of the causal *relationship between customer value, competitive market position and resources* (Al-Laham 2003: 130; Welge, Al-Laham 2012: 96). In line with this it can be argued that the RBV focuses too much on firm internal resources as well as capabilities and thereby (predominantly) ignores cross company *boundaries* in order to get access to the specific resources of other external participants (Conner 1991: 140 et seq.; Zaheer, Bell 2005: 809). The last crucial remark of the RBV concerns its

⁹⁵ “The underlying problem in the statement 'that valuable and rare organizational resources can be a source of competitive advantage' (Barney 1991: 107) is that competitive advantage is defined in terms of value and rarity, and the resource characteristics argued to lead to competitive advantage are value and rarity” (Priem, Butler 2001: 28 cited by Welge, Al-Laham 2012: 96).

⁹⁶ “(…) the RBV literature provides a number of lists of conditions for SCA (...). However, it is not entirely clear what in these lists are necessary and what are only additional assumptions for SCA to obtain - partly a manifestation of the basic explanandum of the RBV not being unambiguously defined” (Foss, Knudsen 2003: 292).

predominant *static* nature – at least in the short run⁹⁷ – (Teece 2009: 53 et seq.) instead of considering the role of (dynamic) resources in different (future) phases of corporate development (Al-Laham 2003: 131; Welge, Al-Laham 2012: 97).

Overall the above mentioned shortcomings establish why “it could be quite fruitful to *investigate* whether *other* organizational *theories* could also offer explanations” (Kaufmann, Schneider 2004: 385)⁹⁸ of IC as a strategic source of sustained above-average competitive performance. This is done in the next sub-chapters which look at a strategic theory of the firm beyond the RBV.

2.3.2.2 *The Knowledge-based Theory of the Firm: a Strategic Theory of Lasting Competitive Firm Performance in the 21st Century*

The *resource-based view* (RBV) and in particular its (over)emphasis on the possession of superior traditional, tangible resources arguably falls short of the challenges of today’s knowledge economy (Cater, Cater 2009: 201).⁹⁹ Yet, the RBV’s consideration of company specific intangible resources constitutes the basis of its *extended version* (DeCarolis, Deeds 1999: 954; Al-Laham 2003: 131; Curando 2006: 5): the *knowledge-based view* (KBV) (Conner, Prahalad 1996: 447; Tovstiga, Tulugurova 2007: 697; Dillerup, Stoi 2011: 16; Welge, Al-Laham 2012: 98).

The KBV postulates that a firm exists because of its heterogeneous, unique resource base, which increasingly consist of *strategically relevant (internally and*

⁹⁷ “(...) resource endowments are 'sticky': at least in the short run, firms are to some degree stuck with what they have and may have to live with what they lack” (Teece, Pisano, Shuen 1997: 514).

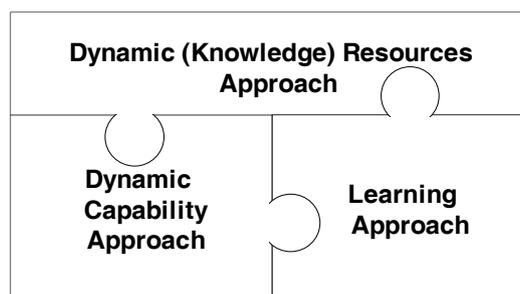
⁹⁸ Cf. footnote 19.

⁹⁹ “Although the resource-based view recognizes the importance and role of knowledge in firms achieving a competitive advantage, knowledge-based theorists argue that the RBV does not go far enough. Specifically, the RBV treats knowledge as a generic resource, rather than having special properties, and subsequently, does not make any distinction between different types of knowledge-based capabilities” (Kaplan et al. 2001: 8).

externally gained) *knowledge-based, intangible resources* (Marr, Gray 2004: 105; Curando 2006: 5), “(...) *and the manner in which they are [dynamically] deployed*” (Teece 1998: 62 et seq.).¹⁰⁰ In other words, dynamic knowledge-based intangibles represent the key source of lasting competitive business performance since they allow generating, adding value to, and sustaining products and/or services whose features appeal to the market (Eisenhardt, Santos 2002: 139; Carlucci, Marr, Schiuma 2004: 576; Tovstiga, Tulugurova 2007: 697).¹⁰¹

In detail, the KBV is, similar to the new institutional theory, multi-paradigmatic (Al-Laham 2003: 138) and hence, divided into different lines of thought (Al-Laham 2003: 132 et seq.; Welge, Al-Laham 2012: 98 et seqq.) (cf. figure 24) which are presented in the following sub-chapters.

Figure 24: Overview of Approaches of the Knowledge-based View



2.3.2.2.1 Dynamic (Knowledge) Resource Approach

The *dynamic (knowledge) resource approach* (DKRA) can be regarded as

¹⁰⁰ „While dynamics (innovation, organizational learning, resource accumulation, competence building, the development of the mental models of the management team etc.) comes first in recent work on core competencies and dynamic capabilities, statics come first in the traditional resource-based approach” (Foss 1997: 15); cf. also footnote 19.

¹⁰¹ “A knowledge-based theory of the firm can yield insights beyond the production-function and resource-based theories of the firm. It is a platform for a new view of the firm as a dynamic, evolving, quasi-autonomous system of knowledge production and application” (Spender 1996: 59).

the explicit refinement of the RBV (Al-Laham 2003: 132; Welge, Al-Laham 2012: 100) since it does not view knowledge as an equally essential element of a firm's resource mix but instead as its most central component (Dillerup, Stoi 2011: 16; Müller-Stewens, Lechner 2011: 351 et seq.). Precisely, the *strategic stream* of the DKRA views firm-specific *knowledge as the most important strategic resource* and as the true source of lasting competitive business performance. Alternatively, the *process-orientated school* of the DKRA focuses on the *creation, acquisition, usage, and control of knowledge as the key strategic source of sustained competitive success* (Nonaka 1991: 96; Grant 1996: 110 et seq.; DeCarolis, Deeds 1999: 954; Grant 2002: 136; Al-Laham 2003: 132 & 170; Carlucci, Marr, Schiuma 2004: 576; Sonnier 2008: 707; Müller-Stewens, Lechner 2011: 351 et seq.; Welge, Al-Laham 2012: 100). Both streams are discussed in this chapter.

Since *knowledge* is the core units of analysis, the question of 'what is knowledge?' needs to be dealt with first (Grant 1996: 110; Vera, Crossman 2000: 2; Müller-Stewens, Lechner 2011: 351). However, it can be noted that there is no commonly accepted definition of the term knowledge (Fischer, Becker 2005: 4).¹⁰²

Simply speaking, knowledge is firstly, "viewed as a type of commodity – something 'out' there (...)" (Harrison 2009: xxvii) or put differently an *intangible resource* of individuals or organizations. Secondly, knowledge is defined as a *dynamic activity* – i.e. the *process of knowing or understanding* an issue. This is, on the one hand, because knowing implies that people or firms can do something¹⁰³ (Vera, Crossman 2000: 3; Oxford Dictionaries 2015) and on the other hand, because knowledge changes in new situations (Harrison 2009: xxvii).

The *strategic-orientated school* of the DKRA, which is concerned with "understanding what knowledge is and how it can become a source of sustainable competitive advantage" (Vera, Crossman 2000: 3), (often) categorizes knowledge into various *types and forms* (ibid.: 3). A very common way of

¹⁰² Robert Grant (1996: 110) points out that some of the world's most famous philosophers like Plato or Popper have been eager to define it, yet, without establishing a consensus.

¹⁰³ In that respect, Karl Sveiby (2001: 345) "(...) defines knowledge as a capability-to-act (which may or may not be conscious) (...) [and which] can only be shown in action."

defining knowledge in this context is to differentiate it from its commonly used synonyms, namely data, information, and wisdom (Nonaka 1994: 15; Saint-Onge 1996: 12; Sveiby 2001: 345; Nonaka, Peltokorpi 2006: 75). In basic terms, “*data* can be classified as raw numbers, images, words, and sounds derived from observation or measurement” (Nonaka, Peltokorpi 2006: 75).¹⁰⁴ *Information*, contrarily, describes objective data compiled into a meaningful manner (Saint-Onge 1996: 12; Roos et al. 1997: 25; Nonaka, Peltokorpi 2006: 75). Only when “(...) information is converted into a valid basis for action, it becomes *knowledge*” (Saint-Onge 1996: 12).¹⁰⁵ Inversely, knowledge represents information which is organized and used by people with respect to, among others, their commitment, beliefs, perspectives, intention, experience, and action (Nonaka 1994: 15; Nonaka, Peltokorpi 2006: 75; O'Dell, Hubert 2011: 2). As such, knowledge is dynamic, subjective (Roos et al. 1997: 25), and related to human action (Nonaka 1994: 15; Sveiby 2001: 345). Lastly, *wisdom* can be defined as “(...) implicitly know[ing] how to generate, access, and integrate knowledge as a guide for action” (Saint-Onge 1996: 12).

Another widespread way of classifying knowledge is to distinguish between tacit and explicit knowledge (Dierkes et al. 2003: 494; Nonaka, Peltokorpi 2006: 76) – as first suggested by Michael Polanyi (1967: 4 et seqq.).¹⁰⁶ *Tacit* knowledge is the personal knowledge of an *individual* (North 2011: 47) including skills and know-how (Grant 2002: 136). It is subjective, context specific, difficult to observe, and relatively intransparent since it is rooted, for example, in peoples’ actions, routines, experience, commitment, ideals, values, and emotions (Grant 1996: 111; Al-Laham 2003: 141 et seq.; Dierkes et al. 2003: 494; Matsuo 2005: 13; North 2011: 37 & 47; Welge, Al-Laham 2012: 99). Thus, tacit knowledge is difficult as well as slow, costly, uncertain, and sometimes even impossible to verbalize, formalize,

¹⁰⁴ Cf. footnote 19.

¹⁰⁵ “For example, the number 5,551,687 would be considered data. However, adding the context of a phone number turns the data into information. The continued use and understanding of this information will turn it into knowledge” (Jones, Leonard 2009: 28); cf. also footnote 19.

¹⁰⁶ “While Polanyi articulates the contents of tacit knowledge in a philosophical context, it is also possible to expand his idea in a more practical direction” (Nonaka 1994: 16).

document or communicate (Grant 1996: 111; McLean 2004: 2; Matsuo 2005: 13; North 2011: 47).¹⁰⁷ Consequently, tacit knowledge is characterized by *restricted shareability and transferability* which makes it a sustainable strategic resource – i.e. a strategic source of lasting competitive performance (Subba-Narasimha 2001: 218; Al-Laham 2003: 139 et seq.; Hüttenegger 2009: 17).¹⁰⁸ At the same time, however, the limited transferability of tacit knowledge burdens its supernormal success and rent-generating potential because a) „(...) it can be *appropriated*¹⁰⁹ only through its application to productive activity” (Grant 1991: 111)¹¹⁰ and b) because people can threaten to leave a company and thus, withdraw their rent-creating inputs while applying them to generate income for another firm (Collis 1996: 147 and Antlitz 1999: 45 both cited by Al-Laham 2003: 143)(Jones, Leonard 2009: 27). Contrarily, *explicit* knowledge is methodical as well as *formal* and can be articulated in systematic language – such as words or numbers (Dierkes et al. 2003: 494; Matsuo 2005: 13; North 2011: 47). Precisely, “explicit knowledge is the knowledge that can be written down and relatively easily *transferred* from one person to the next” (McLean 2004: 2).¹¹¹ Thus, it is, for example, available to the entire enterprise (North 2011: 47) and can be *aggregated* and shared in various formats such as databases, manuals, process descriptions, quality documents, or standards as well as product specifications (Nonaka 1991: 98; Grant 1996: 111; Teece 1998: 64; North 2011: 47).¹¹² However,

¹⁰⁷ "We know more that we can tell" (Polanyi 1966: 4).

¹⁰⁸ „(...) if a firm’s competitive advantage is based upon (...) tacit knowledge, then that competitive advantage is likely to be sustainable because of problems with imitating something which cannot be explained in words or documents” (Steen, Hanson, White 1999: 3 cited by Al-Laham 2003: 140); “‘Tacitness’ makes (...) knowledge a strategic asset because rivals are unable to understand, absorb and use crucial knowledge” (Subba-Narasimha 2001: 218).

¹⁰⁹ “Appropriability refers to the ability of the owner of a resource to receive a return equal to the value created by that resource” (Grant 1996: 111).

¹¹⁰ Cf. footnote 19.

¹¹¹ Cf. footnote 19.

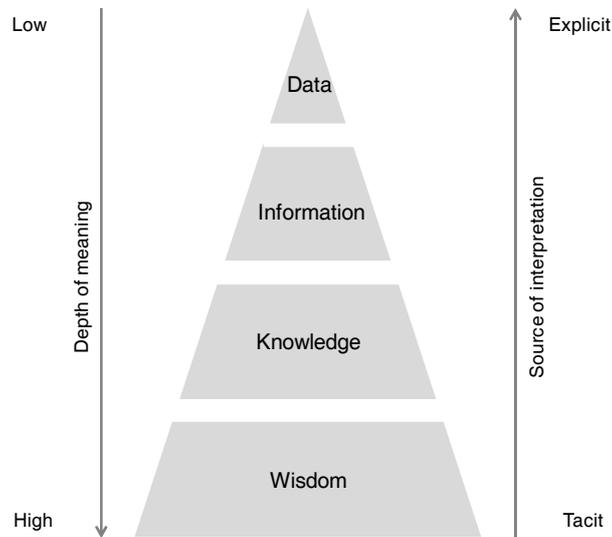
¹¹² „Once codified, explicit knowledge assets can be reused to solve many similar types of problems or connect people with valuable, reusable knowledge” (Smith 2001: 314).

“explicit knowledge suffers from two key problems of *appropriability*: first, as a public or nonrivalrous good¹¹³, any one who acquires it can resell without losing it (...); second, the mere act of marketing knowledge makes it available to potential buyers (...). Thus, except for patents and copyrights where knowledge owners are protected by legally established property rights, knowledge is generally inappropriable by means of market transactions”

(Grant 1996: 111).¹¹⁴

And even the latter mentioned property rights and trade secrets cannot fully protect knowledge due to the fact that they are only fractionally covered by law and/or often expensive to implement. Hence, the expropriation, illegal use, and imitation of explicit knowledge are highly difficult to detect (Porter Liebeskind 1996: 95 et seq.).

Figure 25: From Data to Wisdom



Source: adopted from Saint-Onge 1996: 11

¹¹³ “One item of knowledge can be used by many individuals or organizations at the same time, without diminishing its productivity for any one user” (Porter Liebeskind 1996: 96).

¹¹⁴ Cf. footnote 19.

Ultimately, when bringing the two former illustrated sets of definition together (cf. figure 25), it can be noticed that

“as individuals and organizations move through the constructs from data to wisdom, their depth of meaning increases and their interpretation shifts from being highly explicit at the data stage to entirely tacit at the point of wisdom”

(Saint-Onge 1996: 12).

The *knowledge of organizations*, in particular, can be conceptualized by knowledge-*stocks* and *-flows* which both represent strategic sources of lasting competitive business performance (Dierickx, Cool 1989: 1506; DeCarolis, Deeds 1999: 954; Reed, Lubatkin, Srinivasan 2006: 869).

The *knowledge stock*, which characterizes the heart of the above introduced *strategic-orientated stream*, consists of *tacit and explicit* internal firm-knowledge (O'Dell, Hubert 2011: 2) which is *accumulated over years* via knowledge flows (Dierickx, Cool 1989: 1506; DeCarolis, Deeds 1999: 954).¹¹⁵ Organizational knowledge stocks are important because they allow that the knowledge of stakeholders – and employees in particular – is not just shared but also remained in the firm even if they leave (Grant 2002: 138 et seqq.; Jones, Leonard 2009: 29; Daud, Yusoff 2010: 138). Specifically, it can be noticed that although the majority of organizational knowledge rests in people (Grant 1996: 111 & 121), knowledge stocks are also embedded in internal organizational structures such as (data processing) tools, routines, processes or organizational culture (Saint-Onge 1996: 10; Spender 1996: 52) and external structures like stakeholder relationships. Since most of the latter mentioned are predominantly tacit, social, and path dependent, they are not separable from organizational settings and thus, represent strategic sources of lasting competitive business performance (Foss 1996: 471 et seq.; Spender 1996: 52; Eisenhardt, Santos 2002: 140 et seq.; Curando 2006: 8). Precisely, the *broader*, the more *firm-specific*, the more *causal ambiguous*, and the more *complex* a firm's knowledge stock, the more difficult it is to trade – i.e. immobility – as

¹¹⁵ “(...) while flows can be adjusted instantaneously, stocks cannot. It takes a consistent pattern of resource flows to accumulate a desired change in strategic asset stocks” (Dierickx, Cool 1989: 1506).

well as to imitate it (Foss 1996: 471 et seq.; Grant 1996: 117; DeCarolis, Deeds 1999: 954; Al-Laham 2003: 170 et seq.; Curando 2006: 8). Thus, it can be summarized that *the larger the organizational knowledge stock asymmetries between firms, the higher the source of sustainable competitive advantage and thus, lasting above-average performance* (Curando 2006: 5 et seqq.).

Knowledge flows are a construct of the newer, *process-orientated research branch* (Eisenhardt, Santos 2002: 141; Müller-Stewens, Lechner 2011: 351 et seq.). The construct of knowledge flows draws back from the focus on knowledge types and forms and is rather concerned with the knowledge which streams into the company and which can be turned into knowledge stocks (DeCarolis, Deeds 1999: 954; Vera, Crossman 2000: 3). In detail, the process-orientated school is firstly concerned with the *generation and exploration* of knowledge (March 1991: 71 et seqq. and Spender 1992: 389 et seqq. both cited by Grant, Baden-Fuller 2004: 61 & 64)(Grant, Baden-Fuller 2004: 61 & 64). This includes, on the one hand, to *identify and gain access* to relevant (new) *internal and external* knowledge (Eisenhardt, Santos 2002: 145 & 158) – on top of exploiting already existing knowledge (Nickerson, Zenger 2004: 617). On the other hand, the construct of generation and exploration focuses on the fact that this knowledge must be effectively *transferred and internalized* (Sveiby 2001: 347 et seq.; Daud, Yusoff 2010: 141).¹¹⁶ This can be done via internal and/or external linkages as can be seen in figure 26 (Sveiby 2001: 348 et seqq.; Eisenhardt, Santos 2002: 145 et seqq.; Grant 2002: 141). Specifically, figure 26 illustrates that knowledge can be transferred in nine different ways (Sveiby 2001: 348 et seqq.):

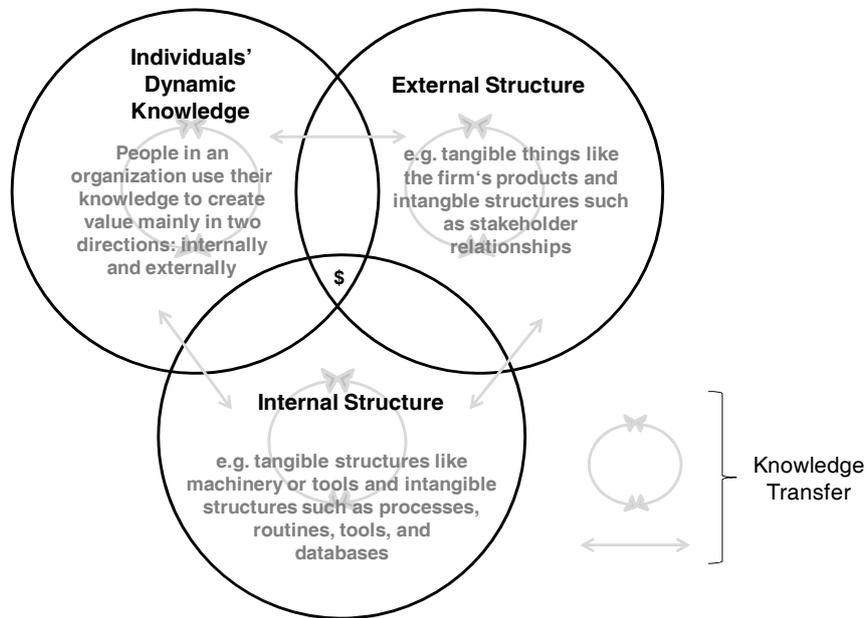
- 1) between individuals – e.g. between employees and managers of a firm,
- 2) from individuals to external structure – e.g. between employees/managers and external stakeholders,
- 3) from external structure to individuals,

¹¹⁶ The entire knowledge flow process incorporates the constant development, acquisition, transfer, sharing, integration, accumulation/coordination, structuring, application/usage, leverage, and protection of organizational knowledge (Roos et al. 1997: 16 et seq.; van der Spek, Spijkervet 1997: 43; Chakravarthy et al. 2003: 305; Carlucci, Marr, Schiuma 2004: 576; Nickerson, Zenger 2004: 617; Silvi, Cuganesan 2006: 310; Daud, Yusoff 2010: 141; Seleim, Khalil 2011: 588).

- 4) from individual competence into internal structure – e.g. between employees/managers and data repositories,
- 5) from internal structure to individual competence,
- 6) within external structure – e.g. among external stakeholders,
- 7) from external to internal structure – e.g. between external stakeholders as well as organization's systems, tools, processes and/or products,
- 8) from internal to external structure, and
- 9) within internal structure – e.g. the effective integration of internal structures.

Moreover, the efficiency of internally-orientated transfers of knowledge depends – in line with the above explained – on the tacitness, causal ambiguity, and complexity of the knowledge which is to be transferred. As a rule of thumb it can be stated that *the more dynamic and complex the knowledge which is to be shared, the more important are good as well as close relationships instead of top-down enforcements or incentive-based motivation* (Eisenhardt, Santos 2002: 151 et seq.). Similar notions can also be noticed for externally-orientated transfer processes (ibid.: 158) whereas the external linkages are especially important for innovation-related outcomes such as patents, R&D, or new product launches (ibid.: 148). In the light of the above discussion, it is especially important to emphasize that the DKRA broadens a firm's *boundaries* by particularly promoting the integration of external knowledge – as opposed to the RBV's position. Furthermore, the DKRA points to *internal, organizational matters*. Apart from stressing the importance of friendly relationships, it also recommends the consideration of alliances. In detail the DKRA states that the efficiency of knowledge transfer and internalization decreases as the range and diversity of firm's knowledge increase. The efficiency of the knowledge generation can, however, be maximized by splitting it among separate loosely-linked modules and a subsequent, overall integration – e.g. through a (strategic) alliance as a vehicle of learning (Grant 2002: 140; Grant, Baden-Fuller 2004: 64).

Figure 26: Knowledge Transfers



Source: adopted from Sveiby 2001: 347

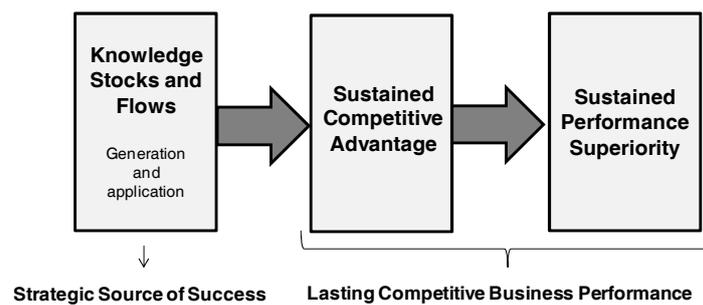
Secondly, and *after* the above described *generation and exploration* of knowledge is accomplished – i.e. internal and/or external specialists' knowledge is absorbed and the firm's knowledge stock is increased –, the *application and exploitation* of knowledge takes place. Particularly, this means that a firm combines, cooperates and/or coordinates the specialist knowledge from various sources and individuals in order to produce, for example, innovative or demanded goods and services (Grant 1996: 109 et seqq.; Sveiby 2001: 344 et seqq.; Grant 2002: 136; Grant, Baden-Fuller 2004: 64; Curando 2006: 8 et seq.) (March 1991: 71 et seqq. and Spender 1992: 389 et seqq. both cited by Grant 2002: 136). By doing so, the firm creates new knowledge which is different from competitors (Nickerson, Zenger 2004: 617; Curando 2006: 9) – even if the rivals have sourced the same knowledge – and thus, gives them (again) a competitive edge.

Altogether, *lasting competitive business performance is, therefore, influenced by a firm's capability to (continuously) identify, transfer, integrate, and apply (relevant) knowledge* (Curando 2006: 11).

Overall it can be concluded that the DKRA enlightens a new strategic theory of the firm by paying attention to knowledge stocks and flows as dynamic resources and thus, strategic sources of success (cf. figure 27). Additionally, it broadens firms' boundaries to access external knowledge, highlights the importance of tacit knowledge because of its intransferable and non-sharable nature, and lastly points to flexible company structures and the relevance of good relations.

Because of its focus on difficult to copy dynamics, the DKRA rests on a similar argumentation line than the dynamic capability approach (Müller-Stewens, Lechner 2011: 352) which is presented in the following chapter.

Figure 27: Dynamic (Knowledge) Resource Approach: Knowledge and Lasting Competitive Business Performance

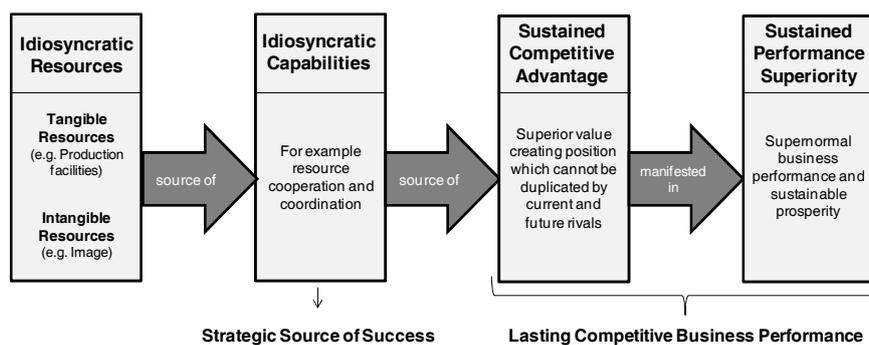


2.3.2.2.2 Dynamic Capability Approach

The *dynamic capability approach* establishes a *capability-orientated meta-level over the RBV* (Müller-Stewens, Lechner 2011: 350). Specifically, it does not focus on a firm's resource and ordinary or static capability endowment (Teece 2009: 53) as the key strategic source of lasting competitive business performance but instead on a firm's intangible, knowledge-based core dynamic capabilities: how resources and (ordinary) capabilities are continuously utilized, (re-)configured, and (re-)combined in order to achieve objectives – e.g. solve problems and/or generate value in innovative ways (Teece 2009: 53 et seq.; Müller-Stewens, Lechner 2011: 349 et seq.; Seleim, Khalil 2011: 558; Welge, Al-Laham 2012: 101 et seq.).

In detail, the dynamic capabilities approach can be regarded as an *outgrowth* or revision (Hungenberg 2011: 65; Müller-Stewens, Lechner 2011: 349) of the original *capability-based view*¹¹⁷ (CBV). The *capabilities approach* agrees with the RBV to the extent that resources are the starting point of value creation. Yet, the CBV attributes sustainable above-average success to a firm's *capabilities* (Penrose 1959: 25; Freiling 2004: 31): "While resources are the source of a firm's capability, capabilities are the main source of its competitive advantage" (Grant 1991: 119). This chain from resources over capabilities to lasting competitive performance is demonstrated in figure 28.

Figure 28: Capabilities Approach: Resources, Capabilities and Lasting Competitive Business Performance



Own source inspired by Grant 1991: 115 and Hungenberg 2004: 136

(Static) *capabilities* (Collis 1994: 145) – as they are also understood in the context of the RBV – "(...) refer to a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end" (Amit, Schoemaker 1993: 35). David Teece et al. (1997: 516) specify the former definition by describing capabilities, which they call *organizational routines or competences*, in

¹¹⁷ The capability view is sometimes also referred to as the competence approach (Al-Laham 2003: 134; Welge, Al-Laham 2012: 101 et seq.): "Whether one uses the term competence or capability, the starting premise (...) is the same" (Hamel, Prahalad 1994: 203); "A competence based view consists of at least the core competence debate (Prahalad and Hamel 1990), the dynamic capabilities approach (Teece et al. 1997) and competence-based strategic management (Sanchez et al. 1996)" (Freiling, Gersch, Goeke 2008: 1145).

the following manner:

“When firm-specific assets¹¹⁸ are assembled in integrated clusters spanning individuals and groups so that they enable distinctive activities to be performed, these activities constitute organizational routines and processes”

(ibid.: 516).

David Teece et al.'s definition (1997: 516) is particularly important for the KBV because it directs attention to firm's *routines* which represent *carriers of organizational knowledge*¹¹⁹ (Nelson, Winter 1982 cited by Al-Laham 2003: 146 and by Tsoukas 1996: 21).

Dynamic capabilities are, contrarily, defined

“(...) as the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions (...)”

(Teece, Pisano, Shuen 1997: 516).

As such, the *dynamic-capabilities-based view* (DCBV) extends the focus of key strategic source of success from existing, static firm-specific capabilities to how companies *renew resources* (configurations) *and ordinary capabilities* to respond to shifts in business conditions (Teece, Pisano, Shuen 1997: 515; Barney, Wright, Ketchen, JR. 2001: 631; Helfat, Peteraf 2003: 998; Cegarra-Navarro 2005: 3; Teece 2009: 53 et seq.).

Additionally, the DCBV *broadens* – just like the DKRA – the perspective from an internal focus to also consider *external* strategic sources of success¹²⁰ and provides insights on *internal organizational matters*. Precisely, after sensing new

¹¹⁸ To clarify: “Resources are firm-specific assets that are difficult if not impossible to imitate” (Teece, Pisano, Shuen 1997: 516).

¹¹⁹ “The firm is a repository of knowledge – the knowledge being embedded in business routines and processes” (Teece 1998: 75).

¹²⁰ “David Teece (...) in particular has detailed how considerations of appropriability of rent-yielding knowledge resources may influence the firm's boundary choice” (Foss 1996: 474).

opportunities and/or competitive threats and the necessity to change, a firm needs to develop – considering its knowledge and experience – an action plan (Teece 1998: 73 et seq.). This includes to decide “(...) what assets to build inside the firm versus accessing externally; as well as how to organize internally” (ibid.: 76).¹²¹ Concerning the former *boundaries* decision, firms need to pay attention not only to transaction costs but especially to the *replicability* and *imitability* of resources and tacit knowledge in particular (Teece 1998: 75 et seq.; Kaplan et al. 2001: 13). With respect to decisions concerning the design of *internal* matters two key aspects can be noted: a) managerial and organizational processes are shaped by current (specific) internal endowments (Teece et al. 1994: 19 et seq.; Teece, Pisano, Shuen 1997: 518 et seq.); and b) when it comes to organizational structure, the *entrepreneurial* side seems to be more important than the administrative one. This particularly means that flexible set-ups and less bureaucratic decision making is required in order to quickly respond to the environment (Teece 1998: 75 et seq.).

Moreover, the DCBV points to the fact that dynamic capabilities are crucial for *sustaining* (the RBV's and CBV's) above-average returns in the long-run:

“If an enterprise possesses resources/competences but lacks dynamic capabilities, it has a chance to make a competitive return (and possibly even a supra-competitive return) for a short period; but it cannot sustain supra-competitive returns for the long term expect due to chance”

(Teece 2009: 54).

This is, on the one hand, because of the necessity to constantly (strategically) respond to today's dynamic business environment (Teece, Pisano, Shuen 1997: 515). On the other hand, the sustainability of dynamic-capability-based competitive business performance is founded on competitors' difficulty to *imitate* and/*replicate* dynamic capabilities (Teece, Pisano, Shuen 1997: 524 et seq.; Barney, Wright, Ketchen, JR. 2001: 631) which are “(...) *causally ambiguous, path dependent, and socially complex*” (Reed, Lubatkin, Srinivasan 2006: 867)¹²² and thus, immobile.

¹²¹ This focus is in line with Coimbatore Prahalad and Gary Hamel's core competency approach: “Core competence is communication, involvement, and a deep commitment to working across organizational boundaries. It involves many levels of people and all functions” (Prahalad, Hamel 1990: 82).

¹²² Cf. footnote 19.

Overall it can be concluded that the DCBV also contributes to a new strategic theory of the firm. In particular, it is important to highlight that the DCBV's main focus is placed on dynamic capabilities – as opposed to former static ones – which encompass, among others, flexible action programs which alter and innovate accumulated, interacting tangible as well as intangible resources in response to environmental conditions (Knaese 1996: 17 cited by Al-Laham 2003: 146; Al-Laham 2003: 147 & 159 et seqq.; Enders 2004: 16 et seq.). These dynamic knowledge-based intangibles (Al-Laham 2003: 160) are regarded as strategically important sources of lasting competitive business performance because they are idiosyncratic, (company-) unique, (temporarily) immobile, valuable to customers, extendable, not substitutable, and difficult to imitate. This is because they evolve over time through a firm's ability to create and manage knowledge as well as to learn internally and externally – i.e. path dependent (Prahalad, Hamel 1990: 82; Hamel, Prahalad 1994: 204 et seqq.; Sanchez, Heene 1997: 12 & 37 cited by Al-Laham 2003: 160; Teece, Pisano, Shuen 1997: 518 et seqq.; Enders 2004: 16; Curando 2006: 8; Barney, Clark 2007: 23). Lastly, this is best achieved via a flexible company set-up with little bureaucracy.

Based on the above it can be acknowledged that the DCBV connects knowledge (represented in the previous section) with learning. The learning aspect is in detail elaborated in the next section.

2.3.2.2.3 Learning Approach

José Viedma Martí (2007: 248) argues that if knowledge is a key strategic source of success than improving existing and creating new knowledge via organizational learning (capabilities) is essential for achieving lasting competitive business performance as well. This line of thought is in accordance with the *learning approach* which views *learning (processes) as a strategically relevant source of sustainable competitive advantage and thus, competitive business performance* (Al-Laham 2003: 136; Curando 2006: 12; Welge, Al-Laham 2012: 103).

In line with the previous chapters, it is vital to first establish a definition of

the term *learning*. In general, learning can be defined as gaining, acquiring, and/or incorporating new knowledge and/or skills (Vera, Crossman 2000: 3; Eisenhardt, Santos 2002: 141; Kim 2004: 30; Reid, Barrington, Brown 2004: 1; Oxford Dictionaries 2010c). Especially the process-orientated feature needs to be stressed (Al-Laham 2003: 136; Harrison 2009: xxvii; Welge, Al-Laham 2012: 103) since “it seems to be that 'learning' must involve the ability to do something that was not previously within the learner’s capabilities” (Reid, Barrington, Brown 2004: 1). More to it, learning can change the learner’s (pattern of) behavior as well as cognition and may lead to better performance (Vera, Crossman 2000: 3; Eisenhardt, Santos 2002: 141; Huizing 2002: 5; Harrison 2009: xxvii).

The expression *organizational learning* builds on the former but is affected by and embedded in a firm. Specifically, it calls attention to the formal and informal process of acquiring, changing, improving and/or preserving individual – e.g. employees and managers – and shared, organizational tacit and explicit knowledge as well as actions (Fiol, Lyles 1985: 803; Vera, Crossman 2000: 2; Curando 2006: 7; Viedma Marti 2007: 248; Martin Castro et al. 2011: 653). As such, organizational learning takes, on the one hand, place in the heads of current as well as new organizational members whose integration and accumulation enable access to previously non-existing knowledge. On the other hand, organizational learning encompasses a firm’s memory and non-human repository – including routines, systems, structure, behavior, and culture. Precisely, the latter aspect of organizational learning is especially important considering the current high fluctuation as well as mobility of stakeholders (Vera, Crossman 2000: 2 & 6).

When discussing the *learning approach* in the context of the KBV, it is important to mention that it *supplements* the previously discussed DCBV. Specifically, this supplementation can be seen in the fact that both approaches follow a similar change- and adaptation-orientated reasoning (Vera, Crossman 2000: 2 & 5; Eisenhardt, Santos 2002: 141; Al-Laham 2003: 136; Welge, Al-Laham 2012: 103):

“Learning is at the heart of a company's ability to adapt to a rapidly changing environment. It is the key to being able both to identify opportunities that others might not see and to exploit those opportunities rapidly and fully. This means that in order to generate extraordinary value (...), a company has to learn better than its competitors

and apply that knowledge throughout its businesses faster and more widely than they do”

(Prokesch 1997: 148).

Furthermore, the learning approach aligns with the DCBV because it is also “(...) influenced by past experience, focused on developing and modifying routines, and supported by organizational memory (...)” (Eisenhardt, Santos 2002: 141). Consequently, similar conclusions – including a new strategic theory of the firm – to the above discusses DCBV can be drawn for the learning approach.

Nevertheless, it is worth highlighting that the learning approach particularly emphasizes firms’ *boundaries* and *internal organizational matters* by stating that companies might suffer difficulties obtaining all relevant knowledge and learning capabilities by themselves (Huizing 2002: 5 et seq. & 23 et seqq.). Thus, the participation in partnerships to learn knowledge and capabilities from partners or alliances becomes a considerable alternative (Kale, Singh, Perlmutter 2000: 217).¹²³ As such, the learning approach also amends and further expands the DKRA by pointing to inter-firm or external partners’ learning activities.

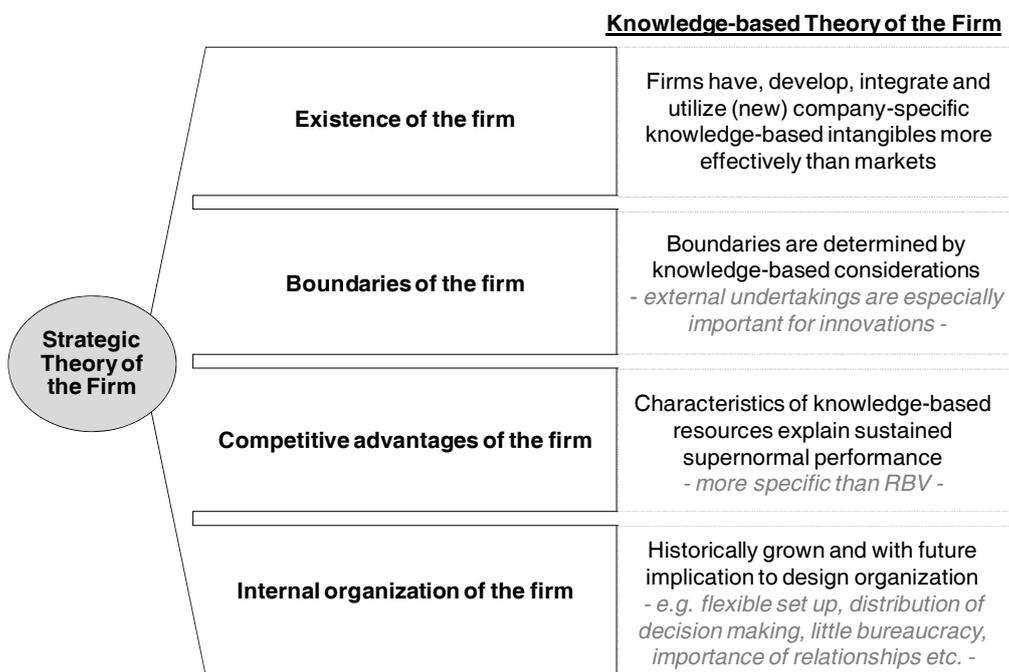
To summarize, the learning approach highlights – similar to the DCBV’s argumentation – the necessity to advance knowledge and capabilities via learning in order to keep up with environmental changes. At the same time it particularly stresses – and thereby, broadens aspects of the DKRA – that the current external conditions call for new organizational forms such as inter-firm partnerships which help to secure the sustained success factor learning.

¹²³ “From a learning perspective, therefore, both markets and firms are needed. Markets exist, because they embody an enormous variety of organizational forms and sizes offering plentiful contexts facilitating all kinds of learning, which helps in discovering and evaluating new ways of creating and realizing value in manners that single firms cannot. On the other hand, firms exist, because they act as formative beacons on these markets guiding the imagination and creativity of their members, and provide institutional contexts for realizing the potential value of their ideas and understandings in ways that markets cannot. They are the institutions in which the global knowledge embedded in economies of meaning can be efficiently combined with the firm’s local knowledge, and in which the planned and emergent learning structures can productively interact, to economize on individual and collective learning” (Huizing 2002: 5 et seq.).

2.3.2.2.4 Preliminary Conclusion: The Importance of Knowledge-based Intangibles

The former sections discuss *three approaches* which build the theoretical groundwork of the *KBV*. They have in common that they point to the fundamental importance of *using, creating and leveraging knowledge as an intangible and dynamic resource* which is either formally owned or informally deployed and mobilized by a firm in order to gain lasting competitive business performance (Roos et al. 1997: 16; MERITUM 2001: 11; Cegarra-Navarro 2005: 3; Curando 2006: 12). As such, the three approaches constitute a new *strategic theory of the firm*; one which pays special attention to knowledge-bearing aspects to explain a company’s existence, boundaries, competitive advantages, and internal organizational structure (Foss 1996: 471; Kraaijenbrink, Spender, Groen 2010: 355; Seleim, Khalil 2011: 588) (cf. figure 29).

Figure 29: The Knowledge-based View as a Strategic Theory of the Firm



Own source inspired by Al-Laham 2003: 178

Figure 29 highlights that the *knowledge-based strategic theory of the firm* attributes an entity's *existence* to its dynamic as well as continuous ownership, development, transfer, and application of knowledge-based, intangible resources which exceed the market's mechanisms and efficiency for performing these tasks (DeCarolis, Deeds 1999: 954; Phelan, Lewin 2000: 314 et seq.; Eisenhardt, Santos 2002: 152; Grant 2002: 140; Huizing 2002: 5; Nickerson, Zenger 2004: 617; Tovstiga, Tulugurova 2009: 71). With special focus on knowledge this means, for example, that

"(...) firms exist as institutions for producing goods and services because they can create conditions under which multiple individuals can integrate¹²⁴ their specialist knowledge" (Grant 1996: 112). Conversely, "(...) markets are unable to undertake this coordinating role because of their failure in the face of (a) the immobility of tacit knowledge and (b) the risk of expropriation of explicit knowledge by the potential buyer"

(ibid.: 112).

In terms of *boundaries*, the three schools of the KBV emphasize that knowledge-based, dynamic intangible resources are present at various levels spanning internal as well as external individuals, groups or teams, networks and inter-firm organizations such as alliances, joint ventures and strategic groups (Vera, Crossman 2000: 5 et seq.; Möller, Gamerschlag 2009: 7). The decisions for or against opening a company's borders are, however, less based on transaction costs and instead should consider other issues such as replicability and imitability, too (Teece 1998: 75 et seq.; Kaplan et al. 2001: 13). As such, it can be stated that

"the importance is placed on how effective the value creation is in the whole system, thus the issue of whether an individual is a formal employee or a customer or a contractor is not important as long as the relationship generates value"

(Sveiby 2001: 347 et seq.).¹²⁵

¹²⁴ "By internalizing valuable knowledge or keeping this knowledge internal, the firm positions itself to both exploit and protect knowledge" (Nickerson, Zenger 2004: 617).

¹²⁵ In that respect it is worth mentioning that different firms "(...) have differential access to externally generated knowledge" (DeCarolis, Deeds 1999: 954). This again contributes to the source of a firm's competitive business performance.

Such relationships are especially important in order to innovate and adapt to the environment. Moreover they are crucial because firms can only efficiently integrate knowledge-based resources to a certain limit (Grant 2002: 146). Thus, the imperfect congruence (Foss 1996: 474) between partners offers the potential to trade knowledge-bearing resources via, for example, strategic alliances in order to acquire necessary inputs (Grant 1996: 120; Grant 2002: 146).

Turning to the KBV's *competitive advantages* it can be stated that the three approaches share that firms have heterogeneous, idiosyncratic, intangible resource bases which are sustainable since they are tacit, historically grown, continuously dynamic, difficult to share, etc. (Bamberger, Wrona 1996: 131; Teece 1998: 76; DeCarolis, Deeds 1999: 954; Al-Laham 2003: 173 et seq.). In more detail, the approaches of the KBV specify differing but still slightly similar *conditions* for achieving sustainable supernormal business performance which advance the RBV's criteria (Barney, Clark 2007: 23). These can be systematically clustered into four categories (Bamberger, Wrona 1996)¹²⁶:

- **Undepreciation** refers to the fact that the *value* of intangibles *increases each time they are used* and depreciates if unapplied (Bamberger, Wrona 1996: 135; SKE 2005: 17; Curando 2006: 12; Dillerup, Stoi 2011: 743). Moreover, intangibles can be used simultaneously at no extra or low costs – i.e. non-rivalry of usage or non-limited capacity (Stoi 2004: 181; Möller, Gamerschlag 2009: 7; Dillerup, Stoi 2011: 743). Although undepreciation is not a sufficient criterion for a knowledge-based intangible to represent a strategic source of success, it constitutes a strengthening character (Bamberger, Wrona 1996: 135; Kaplan et al. 2001: 17 et seq.).
- **Intransferability** is a highly crucial criterion because it highlights that strategically relevant intangibles cannot be traded on factor markets (Bamberger, Wrona 1996: 136 et seq.; Teece 1998: 67; Möller, Gamerschlag 2009: 8). This is, firstly, because idiosyncratic knowledge-based intangibles are *immobile* since they lose value outside the firm. Secondly, intangibles are not tradable because they are *intransparent*.

¹²⁶ Ingolf Bamberger und Thomas Wrona (1996) apply/compare these criteria to/among tangible and intangible resources.

This refers to the fact intangibles are latent and thus, neither observable nor easily identifiable (SKE 2005: 17). Consequently, it is also difficult to estimate the intangibles' value (Bamberger, Wrona 1996: 137).

- **Inimitability** is a very important condition because knowledge-based intangibles, which cannot be easily replicated by competitors, are of long-term strategic value (ibid.: 138). In detail, since strategically relevant intangibles cannot be traded on factor markets, competitors have to develop them by themselves (ibid.: 138). This is, however, very difficult because of intangibles' imitation barriers, known as *isolating mechanisms*, (Rumelt 1984: 560 et seqq.; Rumelt 1997: 140 et seq.; Welge, Al-Laham 2012: 91 et seq.) which are determined by two main sources. Firstly, *path dependencies* which point to the fact that it is (almost) impossible for other companies to reconstruct firm-specific (uncertain) investments in as well as the combination and deployment of intangibles (Bamberger, Wrona 1996: 138; Sveiby 2001: 347; Danish Ministry of Science, Technology and Innovation 2003: 1; Stoi 2004: 193; Curando 2006: 12; Möller, Gamerschlag 2009: 8; Wulf, Pfeifer, Kivikas 2009: 146). Secondly, imitation barriers encompass *causal ambiguities* which make it hard for rivals to identify the cause-and-effect relationships between intangibles and their competitive edge (Rumelt 1984: 560 et seqq.; Bamberger, Wrona 1996: 138; Curando 2006: 12).¹²⁷
- **Non-Substitutability** means that knowledge-based intangibles cannot be exchanged with other intangibles even if competitors develop similar ones. This is in particular because of the above illustrated *immobility* as well as *non-tradability* (Bamberger, Wrona 1996: 139).

Regarding *internal organization* matters, Robert Grant (2002: 142) declares that they are "some of the most potentially interesting applications of knowledge-based approaches to the theory of the firm (...)". He establishes that the above mentioned assumptions concerning knowledge-based intangibles influence internal structure in mainly two ways: the design of hierarchy and the

¹²⁷ "Imitating a part of what a competitor does may not enhance performance at all. Understanding the overall logic of organization and superior performance is often critical to successful imitation" (Teece 1998: 65).

distribution or location of decision making (Grant 1996: 117; Grant 2002: 142) which both follow an entrepreneurial rational (Teece 1998: 75 et seq.). In terms of *hierarchical structure* the KBV suggests that the integration of knowledge-based intangibles is most efficiently conducted when it is based on modularity and loose coupling. In detail, a loosely-linked, flexible (ibid.: 75 et seq.) modular organizational structure refers to the fact that individuals and/or individual business units, departments or teams act independently of other modules. Thus, each module is – as a specialist – able to integrate and apply module-specific and -relevant knowledge-based factors in order to innovate and adapt to its specific environment or local circumstances. At the same time it is recommended that these modules are somehow connected to allow them working together as well as to exchange and integrate each other's intangibles (Grant 1996: 118 et seq.; Grant 2002: 143).¹²⁸ Altogether this allows various modules to simultaneously adapt to different – maybe even conflicting – demands and that a broad range of different knowledge bases is integrated in(to) the firm at minimal costs (Grant 2002: 143). Although Grant's view predominantly refers to intra-firm issues (Huizing 2002: 24), it can – in the light of the entire above presented discussion – be fairly expanded to the entire KBV embracing inter-firm issues, too. Concerning *decision making* the KBV advises that decisions should be made less bureaucratic (Teece 1998: 75 et seq.): either where the decision-relevant knowledge resides or at a decision making authority if the decision-relevant knowledge can be transferred and aggregated at a single point in the organization. Hence, if the crucial intangible is (highly) tacit and thus, cannot be codified and is difficult to be transferred, then it is recommended to delegate the decision making right to where it is located (Grant 1996: 119; Grant 2002: 143).

Finally it can be concluded that *knowledge-based intangibles* are *highly relevant strategic sources of lasting competitive performance* which fully satisfy the strategic theory of the firm's claims. Consequently, these intangibles should be a

¹²⁸ Examples of such standardized interference include common language and goals, the opportunity of specialists to be a member of multiple modules/teams, personnel rotation, and stand-up coffee bars or dialog rooms to promote spontaneous communication/meetings (Grant 1996: 118 et seq.; Sveiby 2001: 349; Grant 2002: 143).

central consideration in strategic management (Marr, Gray 2004: 105; Cegarra-Navarro 2005: 3) and are subsequently further elaborated.

2.4 INTELLECTUAL CAPITAL: A CONCEPT TO SPECIFY KNOWLEDGE-BASED INTANGIBLES FOR EMPIRICAL TESTING

The *knowledge-based theory of the firm* represents the *most contributing* approach of this *dissertation's conceptual framework*. This is, firstly, because it connects internal as well as external knowledge-based intangibles with lasting competitive business performance; and secondly, because it deals with the strategic theory of the firm – e.g. with coordination issues within as well as among firms, management's role or managerial matters, the allocation of decision-making rights and innovations (Grant 1996: 110). However, the knowledge-based view is, similar to the resource-based view, not able to answer the following question:

“How do we conceptualize and then measure a concept that is based on some firm-specific interaction of resources, which themselves are intangible, and therefore, unobservable?”

(Reed, Lubatkin, Srinivasan 2006: 868).

As a consequence and in accordance with the recommendations laid out by Kira Reed et al. (2006), the *intellectual capital (IC) framework of intangibles* is applied for developing hypotheses and empirical testing. This decision is also grounded in the fact that the IC-framework considers three, strategically relevant, identifiable as well as measurable knowledge-based resources classes which can (theoretically) be linked to lasting competitive business performance. Specifically, the three intellect-based capital categories of the IC-framework, namely *human capital*, *structural capital* and *relationship capital*, can be closely related to the theoretical foundation of knowledge-based intangibles presented in the KBV – e.g. *individual competencies*, *external structure*, *internal structure* – as shall be seen in the following chapter; and thus, clarifies why they are regarded as (sustained) strategic sources of success (Hermans, Kauranen 2005: 172; Reed, Lubatkin, Srinivasan 2006: 868; Delgado-Verde, Martin-de Castro, Navas-Lopez 2011: 6 et seq.; Martin Castro et

al. 2011: 661).¹²⁹

2.4.1 Intellectual Capital: Definition and Current State of Empirical Findings

The expression intellectual capital (IC) was first mentioned by Morris Kronfeld and Arthur Rock in 1958 who applied the term to explain the “(...) difference in net worth appraisals and price/earnings ratios between (...) companies (...)” (Kronfeld, Rock 1958: 90 cited by Edvinsson 2009: 1). The economist John Kenneth Galbraith¹³⁰ further shaped this market-to-book-value-gap-construct in 1969 (Edvinsson 2009: 1; Khan 2011: 131). He proposed that IC refers to more than just knowledge or intellect but instead represents the invisible resources and actions that offer the potential to generate future value (Roos et al. 1997: 4; Bontis 1998: 67). Put differently, IC is presented as a strategic source of success.

However, the interest on IC has (only) *increasingly popularized in recent years* (Serenko et al. 2010: 3 et seq.). Especially Tom Stewart¹³¹ (1991), Peter Drucker¹³² (1993), Leif Edvinsson¹³³ (1996: 357; 1997), and Karl-Erik Sveiby¹³⁴ (1997; 2001) are regarded as the godfathers of and significant contributions to the IC-movement, respectively (Bontis 2001: 42; Ponzi 2002: 259; Serenko, Bontis 2004: 185; Will 2008: 3; Serenko et al. 2010: 3 et seq.).

¹²⁹ “OL focuses on learning as a process of change, KM stresses knowledge as a resource towards competitive advantage and studies the processes associated with it, and IC’s goal is to measure the value of intangibles and to leverage them” (Vera, Crossman 2000: 5).

¹³⁰ John Kenneth Galbraith is mentioned by George Feiwel (1975) who is cited by Nick Bontis (1998: 68).

¹³¹ Tom Stewart’s (1991) *Fortune* magazine article 'Brain power: how intellectual capital is becoming America’s most valuable asset'.

¹³² Peter Drucker’s (1993) book 'The Post-Capitalist Society'.

¹³³ Leif Edvinsson’s (1996: 357, 1997) very first IC-statement at Skandia.

¹³⁴ Karl-Erik Sveiby’s (1997; 2001) 'Intangible Asset Monitor'.

Despite the high interest in the topic of intellectual capital (IC), *no commonly agreed definition* exists – neither in the German nor the international context. That is arguably because the research field of IC is, even after almost ten years, still immature; and because the construct of IC is by nature multidimensional (Vera, Crossman 2000: 4; Juma, Payne 2004: 298; Kaufmann, Schneider 2004: 366 et seqq.; AKIW 2005: 67; Alwert, Heisig, Mertins 2005: 2; Cohen, Kaimenakis 2007: 259; Choong 2008: 610 et seqq.; Matos, Lopes 2009: 344; Steenkamp, Kashyap 2010: 368 et seq.; Khan 2011: 131). Consequently, this dissertation provides an *overview of selected key definitions* of IC as well as its frequently applied synonym (intellect-based) intangibles¹³⁵ (cf. table 2 & table 3) and *extracts common aspects* for its own definition. This procedure is especially intended to avoid the misunderstanding of the term intellectual capital whose two components – i.e. intellect¹³⁶ and capital¹³⁷ – can be misleading by their nature.

Table 2: Selection of Intellectual Capital Definitions

Kronfeld, Rock 1958	“Successful management means the ability to select the few profitable and worthwhile ideas from the many without cramping the individualistic intellectual energies that may
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¹³⁵ Because “a variety of disciplines (such as economics, organisation, strategy, management, finance and accounting) and participants (including academics, standard setters, professional bodies, government agencies, and consultants) are interested in intangible assets (...)” (Steenkamp, Kashyap 2010: 368), many different, competing terminologies – which are often used as synonyms for intellectual capital – exist. Examples include intangibles, intangible assets, intangible capital, intangible resources, knowledge assets, knowledge-based assets, knowledge capital, knowledge resources, intellectual knowledge, intellectual property, intellect-based resources and immaterial values (Kaufmann, Schneider 2004: 374; AKIW 2005: 67; Alwert, Heisig, Mertins 2005: 2; Choong 2008: 613; Martin Castro, Lopez Saez 2008: 26; Möller, Gamerschlag 2009: 5; Steenkamp, Kashyap 2010: 368 et seq.).

¹³⁶ Intellect is an attribute that is mainly associated with humans. Yet, human intellect – i.e. human capital – is only one aspect of IC which stands next to structural and relationship capital (Alwert, Heisig, Mertins 2005: 3).

¹³⁷ Capital is, within the IC-framework, to be understood as a resource – i.e. an asset. Yet, the B/S-associating character of the term capital – i.e. owners' equity and/or liabilities – can be misleading (Alwert, Heisig, Mertins 2005: 3; Martin Castro et al. 2011: 649).

	<p>eventually produce a genuine bread-and-butter product.” (p. 88), and “Further, the consensus of market opinion, especially as reflected in price/earnings ratios, is that the intellectual capital of such companies is perhaps their single most important element.” (p. 90)</p>
<p>Edvinsson, Sullivan 1996</p>	<p>“What is intellectual capital? Is it, as one company has defined it, 'what walks out the door at the end of the business day?' Is it the people? A firm's know-how?” (p. 356), “Intellectual capital is a stock of focused, organized information (knowledge) that the organization can use for some productive purpose. But the existence of a stock of knowledge (intellectual capital) is not enough to account for the high value the marketplace puts on many knowledge companies. Indeed, it is the ability of companies to leverage their intellectual capital that is perhaps a greater key to profitability.” (p. 357), and “We prefer to define intellectual capital as knowledge that can be converted into value. This definition is very broad, encompassing inventions, ideas, general knowledge, designs, computer programs, data processes, and publications. It is not limited to technological innovations, or to just those forms of intellectual property identified by the law (e.g., patents, trademarks, trade secrets).” (p. 358)</p>
<p>Brooking 1997</p>	<p>“The intellectual capital of an enterprise can be split into four categories: market assets, intellectual property assets, human-centered assets, and infrastructure assets.” (p. 13)</p>
<p>Roos et al. 1997</p>	<p>“For us, intellectual capital will include all the processes and the assets which are not shown on the balance sheet, as well as all the intangible assets which modern accounting methods consider (...). While knowledge is part of IC, IC is much more than just knowledge. Brands and trademarks as well as the management of relations with external parties (...) are all dimensions of value creation.” (p. 24), and “The positive [definition] suggests that the intellectual capital of a</p>

	<p>company is the sum of the knowledge of its members and the practical translation of this knowledge, that is brands, trademarks and processes. The negative definition suggests that intellectual capital is anything that can create value but cannot drop on your foot – in other words, it is intangible; that is it is the difference between the total value of the company and its financial value.” (p. 27)</p>
Stewart 1997	<p>“Intellectual capital is intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth” (p. x), and “(...) the talent of (...) people, the efficacy of (...) management systems, the characters of its relationship to (...) customers – that together are (...) intellectual capital.” (p. 55)</p>
Bontis et al. 1999	<p>“Under the name of intellectual capital, we can classify all intangible resources (...) as well as their interconnections (...). Thus, for this tradition, intellectual capital is quite simply the collection of intangible resources and their flows.” (p. 397)</p>
MERITUM 2001	<p>“(...) the concept of “intellectual capital” and intangibles are embracing all forms intangibles, either formally owned or used, or informally deployed and mobilized. Intellectual Capital is more than simply the sum of the human, structural and relational resources of the firm, it is about how to let the knowledge of a firm work for it and have it create value (...).” (p. 21)</p>
Riahi-Belkaoui 2003	<p>“While most intangible assets do not qualify as strategic assets, intellectual capital is generally considered to be a vital strategic asset (...). By intellectual capital, it is meant the specific and valuable knowledge that belongs to the organization. This qualification of intellectual capital as a strategic asset rests on a potential link between intellectual capital on one hand and firm performance on the other hand.” (p. 215)</p>

Marr, Gray 2004	“(…) a group of knowledge assets that are attributed to an organization and most significantly contribute to an improved competitive position of the organization by adding value to defined key stakeholders.” (p. 102 et seq.)
Roos, Pike, Fernström 2004	“Intellectual capital is the science and art dealing with how to extract maximum value from the resources you have and the way you have chosen to deploy them.” (p. 129)
RICARDIS 2006	“Intellectual Capital is a key element in an organisation’s future earning potential.” (p. 10)
Kujansivu, Lönnqvist 2007	“Intellectual capital (IC) consists of the non-physical sources of value related to employees’ capabilities, organisations’ resources and way of operating and the relationships with their stakeholders.” (p. 272)
InCaS 2008	“Market-oriented innovation, transparent structures as well as a strategic development of core competencies are therefore essential preconditions for sustainable growth and future competitiveness. Intellectual Capital (IC) forms the basis for high quality products and services as well as for organizational innovations.” (p. 4), and “Intellectual Capital (IC) is divided into three categories: Human Capital (HC), Structural Capital (SC), and Relational Capital (RC). It describes the intangible resources of an organisation.” (p. 7)
Sonnier 2008	“(…) a firm’s knowledge-based assets, otherwise known as IC.” (p. 707)
Sundac, Krmptic 2009	“Knowledge that can be used in the company for creating value represents the intellectual capital.” (p. 279), and “Intellectual capital represents the sum of everything that everybody within the company knows and that enables the company to create a competitive advantage in the market.” (p. 280).
Martin Castro et al. 2011	“The term IC is used as a synonym for intangible or knowledge assets (…).” (p. 649), and “IC includes the stocks or funds of knowledge, intangible assets, and ultimately

	intangible resources and capabilities, which allow for the development of basic business processes of organizations, enabling (...) competitive advantages." (p. 650)
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Table 3: Selection of Intangibles Definitions

Hall 1992	<p>"Intangible resources range from the intellectual property rights of patents, trademarks, copyright and registered design; through contracts; trade secrets; public knowledge such as scientific works; to the people dependent, or subjective resources of know-how; networks; organizational culture, and the reputation of product and company." (p. 135)</p> <p>"Intangible resources may be classified as 'assets' or 'skills'. Assets, which are obviously things which one owns, (...). Skills, or competencies, include the know-how of employees (as well as suppliers and advisers), and the collective aptitudes which add up to organizational culture." (p. 136)</p>
Lev 2001	"(...) intangible assets are nonphysical sources of value (claims to future benefit) generated by innovation (discovery), unique organizational design, or human practices. Intangibles often interact with tangible and financial assets to create corporate value and economic growth." (p. 7)
Sveiby 2001	"These assets are invisible because they are not accounted for. They are intangible because they are neither brick nor mortar nor money." (p. 8)
IASB 2002	"An intangible asset is an identifiable non-monetary asset without physical substance." (IAS 38)
Daum 2003	"Intangible assets – nonfinancial, immaterial, 'invisible' production factors – and their value-creation potential and inherent risk (p. xv), and "(...) everything that is not physical or investment, but of value to the company. (...) company's intangible resources (...) [are] also called intellectual capital" (p. 16)

Marr 2006	“(...) non-tangible resources that are attributed to an organization and which support an organization’s competencies and therefore contribute to the delivery of the organizational value proposition (...)” (p. 42)
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The above summary highlights that many different definitions have emerged in the field of IC. They all “(...) – regardless of the term used – include knowledge in some way and refer to some form of economic value that is attached to intangible assets” (Kaufmann, Schneider 2004: 374). However, there are also substantial differences (Delgado-Verde, Martin-de Castro, Navas-Lopez 2011: 6). It can, for example, be noticed that some authors define IC as an equivalent to knowledge, while others argue that it encompasses much more than this (Vera, Crossman 2000: 2). Regarding this issue, this dissertation views, in line with Johan Roos et al. (1997: 24 et seqq.), IC as more comprehensive than any of the previously discussed concepts – e.g. knowledge, capabilities or learning. Yet, it still focuses on mainly tacit knowledge- or intellect-based, firm-specific intangibles and their strategic importance for gaining and sustaining competitive business performance (Stewart 1997: 68; Chen, Cheng, Hwang 2005: 161; Cohen, Kaimenakis 2007: 243; Martin Castro, Lopez Saez 2008: 26; Sonnier 2008: 707; Delgado-Verde, Martin-de Castro, Navas-Lopez 2011: 6; Martin Castro et al. 2011: 649). Precisely, *this doctoral thesis defines IC* consistent with the consensus in the above illustrated literature:

- IC is intangible, invisible, and non-physical – i.e. *latent*,
- IC is a firm-specific intangible resource but *not necessarily owned by the company* – e.g. it can be informally deployed,
- IC represents the collection of intangible resources and their flows which are *not* accounted for *on the balance sheet*,
- IC is a strategic *source of lasting competitive business performance* because it is *idiosyncratic, undepreciable, intransferable, inimitable and non-substitutable*,
- IC consists of a (wide) range of attributes and dimensions which can be clustered in categories of intangibles.

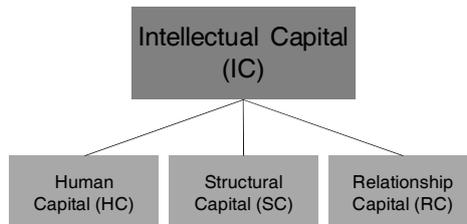
Nevertheless, this way of determining IC is still *quite vague* (Bontis et al. 1999: 397). Thus, – and in order to compensate for a fully agreed comprehensive definition – *numerous authors advice to categorize IC* and hence, to establish its content in the form of *IC-repository classes* (Roos et al. 1997: 32 et seq.; Vera, Crossman 2000: 4; Roos, Pike, Fernström 2004: 129; AKIW 2005: 68; Choong 2008: 609 & 622 et seq.; Do Rosario Cabrita, Bontis 2008: 215; Durst, Gueldenberg 2009: 183; Möller, Gamerschlag 2009: 5). Such a taxonomy offers the potential to better explain, systematically identify, organize and comprehend the IC (-attributes) of many different companies – each with unique IC (Marr, Gray 2004: 103; Roos, Pike, Fernström 2004: 129; Choong 2008: 609 & 622 et seq.; Durst, Gueldenberg 2009: 183).

Similar to the definition issue of the term IC, there is, however, *no agreed model of IC-categories* (Choong 2008: 622; Kamukama, Ahiauzu, Ntayi 2011: 153 et seq.). The suggested frameworks do, for example, differ in terminology, classes and dimensions (Vera, Crossman 2000: 4; Choong 2008: 622 et seq.; Steenkamp, Kashyap 2010: 375 et seq.). Nevertheless, Nick Bontis (2001: 57) indicates that many of these models consist of comparable constructs as well as indicators to measure the IC-component and are 'just' differently named. Accordingly, it can be argued that today's *practice and literature has converged* towards a three-way distinction. Globally (Lynn 1998: 13; Vera, Crossman 2000: 5; Seleim, Ashour, Bontis 2004: 332; SKE 2005: 16 et seq.; Choong 2008: 609 & 632; Do Rosario Cabrita, Bontis 2008: 215; Martin Castro, Lopez Saez 2008: 25 et seq.; Durst, Gueldenberg 2009: 183; Halim 2010: 61 et seq.; Steenkamp, Kashyap 2010: 375) as well as with special focus on SME (MERITUM 2001: 1 et seqq.; BMWi 2005: 11; Hermans, Kauranen 2005: 171 et seqq.; RICARDIS 2006: 10 et seqq.; Thorleifsdottir, Claessen 2006: 14; BMWi 2008: 18 et seq.; InCaS 2008: 7 et seq.; Will 2008: 3 et seqq.; F-Jardon, Martos 2009: 600 et seqq.; BMWi 2013c: 18) there is broad consensus that IC contains the following *three IC-categories*.¹³⁸ *Human*

¹³⁸ Each dimension consists of a coherent number of measurable items/success factors (Choong 2008: 609).

capital, structural capital, and relationship capital (cf. figure 30).¹³⁹

Figure 30: Intellectual Capital and its Categories



This trichotomy which forms IC (cf. figure 30) is, as mentioned before, similar to the (in the KBV illustrated) framework of Karl Sveiby (2001: 344 et seq.); but it covers a wider spectrum. The human capital dimension, for example, is broader than Karl Sveiby's suggestion (2001: 344 et seq.) since it comprises more than just individual knowledge as well as capabilities; it includes, for example, health issues (Hussi 2003: 2 & 5) and motivation. To clarify this matter, human capital as well as the other two IC-dimensions are extensively defined in the following sub-chapters.

2.4.1.1 Human Capital

The first category of IC is *human capital* (HC). The term human capital is, similar to the definition of IC, difficult to describe because it suffers from a *missing, generally accepted definition*. Consequently, a *review of key definitions* is presented in the following table 4. In line with the above executed procedure, common aspects of these illustrated definitions are determined and subsequently presented in an accumulated format.

¹³⁹ Alternative IC-typologies include, for example, human-centred assets, intellectual property assets, infrastructure assets and market assets (Brooking 1997: 12 et seq.); human capital, structural capital and customer capital (Bontis, Keow, Richardson 2000: 85 et seq.); human capital, internal capital and external capital (Guthrie et al. 2004: 286); or human capital, innovation capital, process capital and customer capital (Wang, Chang 2005: 223 et seq.).

Table 4: Selection of Human Capital Definitions

Edvinsson, Sullivan 1996	„(...) collective capabilities of employees to solve customer problems. The firm-wide human resource is the knowhow and institutional memory about topics of importance to the company. This resource includes the collective experience, skills, and general know-how of all of the firm's employees.“ (p. 358)
Saint-Onge 1996	“The capabilities of the individuals required to provide solutions to customers.” (p. 10)
Brooking 1997	“Human-centered assets comprise the collective expertise, creative and problem solving capability, leadership, entrepreneurial and managerial skills embodied by the employees of the organization. They also include psychometric data and indicators on how individuals may perform in given situations (...). But the knowledge in the head of the individual belongs to the person – not the company.” (p. 15)
Roos et al. 1997	“(...) the value of human capital originates from competence, attitude and intellectual agility. (...) Competence generates value through the knowledge, skills, talents and know-how of employees.” (p. 35), and “Attitude (...) covers the value generated by the behavior of the employees on the workplace. Three factors primarily influence attitude: motivation, behavior and conduct.” (P. 37)
Stewart 1997	“(...) human capital: It’s a corporate asset, but people cannot be owned. (...) We’re used to thinking of employees in terms of their pay – their cost. But what is their value?” (p. 84), and “Human capital is (...) the place where all the ladders start: the wellspring of innovation, the home page of insight.” (p. 86)
Sveiby 1997	“(...) people in an organization direct their efforts in two directions primarily: outward (...) or inward maintaining and

	building the organization (...) when their efforts are directed inward they create an internal structure, which in management literature is also called the organization." (p. 9)
Bontis 1998	"The essence of human capital is the sheer intelligence of the organizational member. The scope of human capital is limited to the knowledge node (i.e. internal to the mind of the employee)." (p. 65)
Lynn 1998	"Human capital is the stock of usable knowledge, skills and competence residing in organizational members." (p. 13)
MERITUM 2001	"Human capital is defined as the knowledge that employees take with them when they leave the firm. It includes the knowledge, skills, experiences and abilities of people. Some of this knowledge is unique to the individual, some may be generic." (p. 3)
Daum 2003	"The human capital of a company includes the individual capability of people who are working for this company, both employees and managers: their knowledge, skills, competencies and experience. But not all these personal assets and not all employees and managers count as human capital. Only those individuals whose capabilities are of great value for the company, which can be used and incorporated in its (...) value-creating process, are of strategic importance." (p. 18)
Seleim, Ashour, Bontis 2004	"Human capital refers to a combination of indicators that reflect the individual talent in the firm and the renewal and development of its human resources. Human capital is the sum of the workers' skills, experience, capabilities, and innate knowledge (...). Moreover, (...) human capital [is described] as the firm's collective capability to extract the best solutions from the knowledge of its individuals." (p. 333)
AKIW 2005	"Intangible values that relate to the people working in an entity, such as the employees' level of education, knowledge, and know-how, leading management's competence (...)." (p. 68)

Hermans, Kauranen 2005	"(...) HC (...) is composed of the skills and competencies of the company's personnel." (p. 173)
SKE 2005	"Human Capital includes, but is not limited to, employee demographics, employees' innovative capacity, employee diversity, learning and development abilities, educational and work-related qualifications, leadership and top management quality." (p. 17)
Marr 2006	"These resources (...) walk out at night when people leave; (...). Human capital includes the skills and knowledge of employees, as well as know-how in certain fields that are important to the success of the enterprise, plus the aptitudes and attributes of its staff. Employees loyalty, motivation and flexibility will often be a significant factor too since a firm's 'expertise and experience pool' is developed over time; (...)." (p. 43)
Martinez-Torres 2006	"(...) the knowledge, skills, etc of individuals" (p. 617)
Cohen, Kaimenakis 2007	"Human capital includes employees' capabilities, skills, knowledge, technical expertise, etc. that are currently used (or can potentially be used) in order to create value for the firm." (p. 243)
Thorleifsdottir, Claessen 2006	"(...) human capital is that part of IC which is possessed by the employees and leaves the company by the end of a day." (p. 14)
InCaS 2008	"Human Capital (HC) is defined as 'what the single employee brings into the value adding processes'." (p. 7)
Martin Castro et al. 2011	"Human capital makes reference to tacit or explicit knowledge which employees possess, as well as their ability to generate it, which is useful for the firm, and includes values and attitudes, aptitudes and know-how." (p. 653)

Based upon the above shown definitions it can be summarized that most authors agree that “the essence of human capital is the sheer *intelligence of the organizational member*” (Bontis 1998: 65)¹⁴⁰ and its related aspects such as behavior. As such, HC manifests a high degree of tacitness (Tovstiga, Tulugurova 2007: 699), undepreciation, uniqueness, intransferability, inimitability and non-substitution. Consequently, it is regarded a strategically relevant source of sustainable competitive advantage and hence, lasting business performance.

Nonetheless, the sum as well as combination of the *attributes* which constitute the intangible value (AKIW 2005: 68) and the competitive potential (Tovstiga, Tulugurova 2007: 699) of employees and managers (Daum 2003: 18; AKIW 2005; SKE 2005: 17) are *rather dispersed*.

Among the most common HC-attributes one can find peoples’ knowledge, (formal) education, expertise, vocational qualifications, (specific) training, experience, skills, and know-how or capabilities¹⁴¹ – especially the capabilities to satisfy customers and to solve diverse other issues (Hudson 1993 cited by Do Rosario Cabrita, Bontis 2008: 216; Edvinsson, Sullivan 1996: 358; Saint-Onge 1996: 10; Brooking 1997: 15; Roos et al. 1997: 35; Lynn 1998: 13; MERITUM 2001: 3; Daum 2003: 18; Seleim, Ashour, Bontis 2004: 333; AKIW 2005: 68; Chen, Cheng, Hwang 2005: 161; SKE 2005: 17; Marr 2006: 43; Cohen, Kaimenakis 2007: 243; Wu, Chou 2007: 44; Kamukama, Ahiauzu, Ntayi 2010: 560; Kamukama, Ahiauzu, Ntayi 2011: 154 & 156; St-Pierre, Audet 2011: 203 et seq.). Johan Roos et al. (1997: 35 et seqq.) accumulate all these HC-elements under the HC-subcategory – i.e. dimension – *competencies* which predominantly consists of (technical and/or academic) *knowledge and* (practical) *skills*. Similar to that, Gregorio Martín de Castro et al. (2011: 655) distinguish between the HC-subclasses *knowledge* and *abilities/capabilities* which are both *created by and stored in* (Reed, Lubatkin, Srinivasan 2006: 869) *employees as well as managers* (Daum 2003: 18). Precisely, Gregorio Martín de Castro et al. (2011: 655) specify that both, people’s *knowledge* about things as well as their *know-how/capability* of doing things are required to

¹⁴⁰ Cf. footnote 19.

¹⁴¹ Some of firms’ HC is unique while some of it is generic (MERITUM 2001: 3). Generic HC, which is transferable across companies, include, for example, levels of formal education or years of work/managerial experience (Swart 2006: 141).

productively execute (work) tasks (ibid.: 655).¹⁴²

Another HC-dimension which is mentioned in the literature is employees' (life and/or professional) *attitude* (Roos et al. 1997: 37; Marr 2006: 43; Do Rosario Cabrita, Bontis 2008: 216; Tovstiga, Tulugurova 2009: 71 et seq.; Martin Castro et al. 2011: 653). People's behavior, including i.a. *loyalty, satisfaction, motivation, commitment, and mindset*, is especially important because it has an impact on their willingness to generate, use, and share knowledge or know-how as well as on staff retention.¹⁴³ This, in turn, is required to develop and sustain firms' IC stock over time - i.e. causally ambiguous (Roos et al. 1997: 37; Marr 2006: 43; Wu, Chou 2007: 51; Do Rosario Cabrita, Bontis 2008: 216; Martin Castro et al. 2011: 655). Precisely, since (this kind of) IC-building and -maintenance can only be done voluntarily, it requires certain levels of as well as balance between intrinsic and extrinsic motivation (Do Rosario Cabrita, Bontis 2008: 216).

The last HC-subcategory which is frequently found in the literature is *intellectual agility* (Roos et al. 1997: 39; Tovstiga, Tulugurova 2007: 698 et seq.; Tovstiga, Tulugurova 2009: 71 et seq.). It is essential since it represents a *mix of individual's competencies and behavior* (Roos et al. 1997: 32). In detail, it comprises, among others, people's

“(...) ability to innovate and change practice, to think laterally about problems (...)”(ibid.: 32), “(...) to transfer knowledge from one context to another, (...) to see common factors in two distinct pieces of information and like them together, (...) to improve both knowledge and company output through innovation and adaptation”
(ibid.: 39).

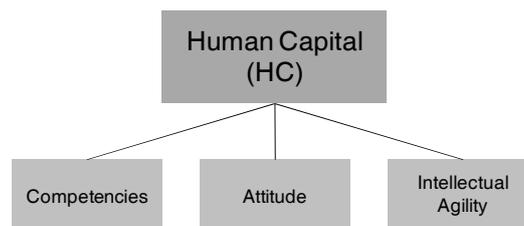
¹⁴² “An organization must also support and nurture bright individuals into sharing their human capital through organizational learning. Unlike normal inventory that can be found in traditional manufacturing settings, individual knowledge stocks that reside in human capital become obsolete. This obsolescence is not necessarily due to outdated knowledge. There is a behavioural explanation instead. Human beings become unmotivated when they feel they are not being utilized or challenged. That is why a stock of human capital will deteriorate if not constantly supported and nurtured” (Bontis 1998: 71).

¹⁴³ “Holtom et al. indicate that voluntary employee turnover is expensive. In addition, firms that successfully retain the productive workers save money and have less difficulty in protecting their IC” (Wu, Chou 2007: 51).

Georg Tovstiga and Ekaterina Tulugurova (2009: 71 et seq.) embrace these examples and define intellectual agility as “the firm’s predisposition to move quickly and flexibly, to imitate and to adapt in the face of changing competitive environments (...).” As such, intellectual agility reflects organizational members’ openness and ability to change (Cohen, Kaimenakis 2007: 244) as well as to contribute (their knowledge/IC) to new or different tasks – e.g. to solve problems (Brooking 1997: 15). In more detail, intellectual agility can be specified via attributes such as *innovation, creativity, flexibility, adaptability, changeability, and imitation* (Roos et al. 1997: 40; Cohen, Kaimenakis 2007: 244; Tovstiga, Tulugurova 2007: 698 et seq.; Tovstiga, Tulugurova 2009: 71 et seq.; Kamukama, Ahiauzu, Ntayi 2011: 156) which can be accounted for as strategically relevant sources of lasting business performance since they are (predominantly) undepreciable, intransferable, inimitable and non-substitutable.

Overall, the above discussion highlights – in accordance with Kira Reed et al.’s (2006: 870) and Ahmed Seleim et al.’s (2004: 332 et seqq.) line of thought – that HC comprises more than just (knowledge) *stocks* like educated employees. Instead, it also incorporates (knowledge) *flows* such as the development and renewal of HC. The previously defined subcategories – also called dimensions – of HC are summarized in figure 31.

Figure 31: Human Capital and its Dimensions



Source: Roos et al. 1997: 35

Nevertheless, it is important to mention that although HC is a source of firms’ lasting competitive business performance, it is *owned by the employees and*

managers instead of being a company's property¹⁴⁴ (Brooking 1997: 15; Stewart 1997: 84; Sveiby 2001: 10; Thorleifsdottir, Claessen 2006: 14; Cohen, Kaimenakis 2007: 243; Brooking, Ruskin 2010: 138; St-Pierre, Audet 2011: 204): "These resources (...) walk out at night when people leave" (Marr 2006: 43). Thus, it is highly risky (St-Pierre, Audet 2011: 204).

Taking all of the above into account, it can be summarized that HC is important for a firm because people can use their HC – i.e. competencies, attitude and intellectual agility – in various situations to create value (including tangible and intangibles resources and structures) (Sveiby 1997: 8 et seq.; Sveiby 2001: 345). Specifically, human-based IC positively impacts i.a. (speedy) innovations as well as strategic adjustments and hence, competitive advantages. Thus, it is a *strategic source of firms' competitive business performance* (Stewart 1997: 86 et seq.; Bontis 1998: 65; Reed, Lubatkin, Srinivasan 2006: 870; Tovstiga, Tulugurova 2007: 701 et seq.; Wu, Chou 2007: 46; Sonnier 2008: 710; St-Pierre, Audet 2011: 204).

For many authors (Bontis 1998: 70 et seq. & 76; Bontis, Keow, Richardson 2000: 96 et seq.; Sveiby 2001: 345; Wang, Chang 2005: 222 et seq.; Do Rosario Cabrita, Bontis 2008: 216 et seq.; Sundac, Krmpotic 2009: 281; Kamukama, Ahiauzu, Ntayi 2010: 562 et seq.) – also in the research field of IC in SME (Hermans, Kauranen 2005: 174; Tovstiga, Tulugurova 2007: 701 et seq.; F-Jardon, Martos 2009: 604; St-Pierre, Audet 2011: 204 & 209) – HC is, however, not just an important category of IC but the *most fundamental* one. That is, as they argue, because HC is the driving force of IC and the key source to gain sustainable competitive advantages. Thus, HC is very essential to (financially) succeed in the long run.

Lastly it is worth mentioning that the latter mentioned extension of the (traditional) IC and HC research field also points to the fact that *HC is not only (or necessarily) directly related to competitive business performance but instead through structural capital and/or relationship capital* (Bontis 1998: 70 et seq.; Bontis, Keow, Richardson 2000: 94 et seq.; Wang, Chang 2005: 223; Do Rosario Cabrita, Bontis

¹⁴⁴ "Human Centered Assets (...) do not belong to the company but are contracted to the company by way of employee contracts, unless they can be made explicit, thus becoming Infrastructure assets" (Brooking, Ruskin 2010: 138).

2008: 229; F-Jardon, Martos 2009: 611; St-Pierre, Audet 2011: 204, 209 & 215 et seq.): neither the implementation nor the development, maintenance, renewal or expansion of internal organization settings (structural capital) as well as external networks (relationship capital) are possible without human actions.¹⁴⁵

2.4.1.2 *Structural Capital*

The second IC-category is *structural capital* (SC). Similar to the above, there is *no commonly agreed definition* of the term structural capital. Therefore and in accordance with the previously introduced procedure, the following shows a *review of definitions* and a subsequent summary of key aspects (cf. table 5).

Table 5: Selection of Structural Capital Definitions

<p>Edvinsson, Sullivan 1996</p>	<p>“Human resources by themselves are of little value. Picture, for a moment, a group of skilled people, huddled together on a hillside, thinking great business thoughts. But without the supporting resources of a firm they have no ability to do anything with their ideas. They have no paper with which to write things down; there is no production staff or manufacturing facility; there is no telephone to call potential customers. In short, the human capital lacks the firm's supporting infrastructure, called structural capital. Structural capital is the infrastructure that firms develop to commercialize their human capital.” (p. 360), and “All that</p>
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¹⁴⁵ “People in an organization can use their competence to create value in mainly two directions: externally and internally. If the managers of a car or soap company direct the efforts of their people internally, they may create tangible structures such as machinery and tools and intangible structures such as better processes and new designs for products. When they direct their attention outwards, they create, in addition to tangible things, such as cars or soap, intangible structures, such as customer relationships and new experience” (Sveiby 2001: 346).

	<p>is left when the human resources go home, i.e. organizational capability. Structural Capital includes both tangible and intangible elements. Intangible elements are such things as the firm's information technology, customer data bases, business and industrial procedures, strategic plans, etc. Tangible elements of the firm's structural capital include financial assets, facilities, and the range of assets that are valued on the company's balance sheet." (p. 363)</p>
Brooking 1997	<p>"Infrastructure assets are those technologies, methodologies and processes which enable the organization to function. (...) Basically, the elements which make up the way the organization works. (...) Infrastructure assets are important because they bring order, safety, correctness and quality to the organization. They also provide a context for the employees of the organization to work and communicate with each other." (p. 16)</p>
Roos et al. 1997	<p>"In general, structural capital includes all databases, organizational charts, process manuals and intellectual property, and anything whose value to the company is higher than its material value. (...) structural capital can be, and usually is, owned by the company, as opposed, as we have seen above, to human capital. (...) At the same time, (...), the fact that structural capital is not in anybody's head necessarily implies that its evolution will be much slower than that of human capital. People increase or modify their capital just by living their lives: structural capital in most cases needs to be updated by the employees themselves." (p. 42), and "Organizational value includes all the physical and non-physical manifests of intellectual capital related to the internal structure or the day-to-day operations. Databases, process manuals, invisible assets, culture and management style are all sources of organizational value." (p. 46 et seq.)</p>

<p>Stewart 1997</p>	<p>“What leaders need to do (...) is contain and retain knowledge, so that it becomes company property. That’s structural capital. Simply put, it is knowledge that doesn’t go home at night.” (p. 108), and “Structural capital belongs to the organization as a whole. It can be reproduced and shared. Some of what comes into the category of structural capital is entitled to legal rights of ownership: technologies, inventions, data, publications, and processes can be patented, copyrighted, or shielded by trade-secret laws (...) But also among the elements of structural capital are strategy and culture, structures and systems, organizational routines and procedures – assets that are often far more extensive and valuable than codified ones.” (p. 109)</p>
<p>Sveiby 1997</p>	<p>“(...) people in an organization direct their efforts in two directions primarily: outward (...) or inward maintaining and building the organization (...) when their efforts are directed inward they create an internal structure, which in management literature is also called the organization.” (p. 9), and “The internal structure includes patents, concepts, models, and computer and administrative systems. These are created by employees and are generally owned by the organization. Sometimes they can be acquired elsewhere.” (p. 10)</p>
<p>Bontis 1998</p>	<p>“This construct deals with the mechanisms and structures of the organization that can help support employees in their quest for optimum intellectual performance and therefore overall business performance. An individual can have a high level of intellect, but if the organization has poor systems and procedures by which to track his or her actions, the overall intellectual capital will not reach its fullest potential. (...) In effect, without structural capital, intellectual capital would just be human capital. This construct therefore contains elements of efficiency, transaction times, procedural innovativeness and access to</p>

	information for codification into knowledge. It also supports elements of cost minimization and profit maximization per employee. Structural capital is the critical link that allows intellectual capital to be measured at an organizational level." (p. 66)
MERITUM 2001	"Structural capital is defined as the pool of knowledge that stays with the firm at the end of the working day. It comprises the organizational routines, procedures, systems, cultures, databases, etc. Some of them may be legally protected and become Intellectual Property Rights, legally owned by the firm under separate title." (p. 3)
Daum 2003	"(...) real leading-edge knowledge and innovation comes from interaction between knowledge workers, from the sharing of ideas and experience. To make this happen, a company needs the right organizational infrastructure, an innovative and stimulating culture and, the procedures and working schemes which support smooth and efficient knowledge and information flows within the entire organization and between internal and external experts. Also, an appropriate IT infrastructure is required to support this and one that helps knowledge workers to work in a productive way. Processes and techniques are required that help increase the effectiveness of knowledge-based value creation (...) or that help deploy very efficient manufacturing or sales methods. (...). Structural capital (...) permits individual human capital, individual knowledge, to be used again and again to create value." (p. 20)
SKE 2005	"Structural (Internal) Capital includes, but is not limited to, corporate culture, management philosophy, organisational structure, management processes, information systems and networks, intellectual property, contracts, research and development and new product development." (p. 16 et seq.)

Marr 2006	<p>“A firm’s structural resources cover a broad range of vital factors. Foremost among these factors are usually the organization’s essential operating processes, the way it is structured, its policies, its information flows and the content of its databases, its leadership and management style, its culture and its incentive schemes, but they also include the intangible resources that are legally protected. (...) Shared knowledge in organizations is expressed in routines and practices. Practices and routines include internal practices, virtual networks and review processes; these can be formalized or informal procedures and tacit rules. Formalized routines include process manuals providing codified procedures and rules; informal routines could be codes of behavior or understood (but unstated) workflows. Practices and routines determine how processes are being handled and how work flows through the organization.” (p. 45)</p>
Martinez-Torres 2006	<p>“(...) the property of the organization, such as processes, information in a database, etc.” (p. 617)</p>
Thorleifsdottir, Claessen 2006	<p>“Structural capital is knowledge transformed to information, embedded in internal systems, processes and information systems. These assets still remain within the organisation after daily closure and secure work procedures, quality and to some extent traditions available to new employees upon their arrival, as well as market assets.” (p. 14)</p>
InCaS 2008	<p>“Structural Capital (SC) is defined as 'what happens between people, how people are connected within the company, and what remains when the employee leaves the company'. ” (p. 7)</p>
Wu, Chang, Chen 2008	<p>“In terms of structural capital, it includes all non-human storehouses of knowledge in organizations, including databases, organizational charts, process manuals,</p>

	strategies, routines and anything whose value to the firm is higher than its material value." (p. 266)
Hormiga, Batista-Canino, Sanchez-Medina 2011b	"(...) structural capital, which refers to the knowledge that the firm has been able to internalise and that remains in the organisation, be in its structure, its processes or in its culture, even when employees leave (...)" (p. 77)

Broadly speaking, the above illustrated definitions are harmonized to the extent that SC encompasses the *intellect of an organization* (Winter 1987: 159 et seq. cited by Swart 2006: 148; Martin Castro et al. 2011: 661) and in particular the *non-human storehouses of knowledge* (Bontis, Keow, Richardson 2000: 88; Wu, Chang, Chen 2008: 266) and infrastructure which an enterprise has *created over time* (Kamukama, Ahiauzu, Ntayi 2010: 556) – i.e. causal ambiguous. Furthermore, various authors agree that the IC at organizational level (Bontis 1998: 66; Bontis, Keow, Richardson 2000: 88) includes not just shared (dynamic) knowledge and capabilities created by, stored and expressed in firms' *formal* structure, processes, routines, as well as IT systems but also *informal* procedures and culture (Reed, Lubatkin, Srinivasan 2006: 869 & 872).¹⁴⁶

In detail, the above listed definitions offer a broad range of vital tangible and primarily intangible *SC-attributes* which are related to a firm's internal organizational structure and the day-to-day operations, respectively (Roos et al. 1997: 46). Among the most mentioned SC-elements one can find enterprise structure, business processes (manuals), organizational routines, concepts, administration systems, distribution networks, quality management, communication, databases, information (communication) technologies (IT/ICT), technology, inventions, innovations, patents and intellectual property (Edvinsson, Sullivan 1996: 363; Roos et al. 1997: 42 & 46 et seq.; Stewart 1997: 109; Sveiby 1997: 10; MERITUM 2001: 3; Daum 2003: 20; AKIW 2005: 69; SKE 2005: 16 et seq.; Marr 2006: 45; Thorleifsdottir, Claessen 2006: 14; Wu, Chang, Chen 2008: 266).

¹⁴⁶ "It is the skeleton and the glue of an organisation because it provides the tools and architecture for retaining, packaging and moving knowledge along the value chain" (Do Rosario Cabrita, Bontis 2008: 217).

Johan Roos et al. (1997: 46 et seqq.) suggest to categorize these SC-attributes in two dimensions: The first SC-subclass is '*internal efficiency: organization*' and incorporates three aspects. These three items, namely infrastructure, processes and culture¹⁴⁷, are important because they symbolize a firm's efforts of turning HC into proprietary IC (ibid.: 48) and a firm's efforts of supporting HC to perform optimally (Bontis 1998: 66). The first of these three factors, namely *infrastructure*, is strategically relevant because "(...) it represents the *hardware* part, the tools and enablers the company uses in this daily operations to produce results" (Roos et al. 1997: 48).¹⁴⁸ As such, it supports knowledge and information flows as well as connections within the firm and between (internal and external) specialists (Roos et al. 1997: 46 et seqq.; Daum 2003: 20) – i.e. it helps to convert individual knowledge and know-how into organizational resources (Bontis 1998: 66). Lastly, infrastructure is recommended to "(...) be flexible enough to co-evolve with its environment" (Roos et al. 1997: 48). The second aspect of the SC-subcategory 'organization' is *processes*. As opposed to the hard infrastructure, processes and working schemes put this structure into work and thus, symbolize *software* (ibid.: 48). Specifically, such operations are important because they allow effectively and efficiently performing value chain tasks like manufacturing and selling (Roos et al. 1997: 46 et seqq.; Daum 2003: 20). In general, most of a company's procedures are informal (tacit) such as understood workflows or oral practice. Yet, usually there are also (some) formalized (explicit) schemes like process manuals (Marr 2006: 45). The third organization-subclass, which stands for *wetware*, is *culture* (Roos et al. 1997: 49 et seq.). An innovative, stimulating and historically grown cultural framework is strategically required because it defines a company via, for instance, the sharing of common values and attitudes (Roos et al. 1997: 46 et seqq.; Daum 2003: 20). Thus, it "(...) is the glue that holds together the firm" (Do Rosario Cabrita, Bontis 2008: 219). Moreover, Nick Bontis recommends "(...) a supportive culture that allows individuals to try things, to fail, to learn, and to try again. If the culture unduly penalizes failure, its success will be minimal" (Bontis 1998: 66). The second dimension of SC, which Johan Roos et al. (1997: 46 et seqq.) recommend, is '*the future: renewal and development value*'. It encompasses all

¹⁴⁷ Cf. Jürgen Daum (2003: 20), who agrees to these three.

¹⁴⁸ Cf. footnote 19.

mechanisms to sustain and improve a firm's IC as well as its substance. As such, it represents a strategic source of (production, service, or process) innovations as well as general (success) potentials of a company. Examples of an enterprise's development capital include *research and development*, *new product development*, *restructuring*, and *organizational learning* (Roos et al. 1997: 46 et seqq.; AKIW 2005: 68; Hermans, Kauranen 2005: 175; Tovstiga, Tulugurova 2007: 699 et seq.; Tovstiga, Tulugurova 2009: 72).

Gregorio Martín de Castro et al. (2011: 656 et seqq.) as well as Carlos F-Jardon and Maria Martos (2009: 603) propose a different sub-categorization of SC. They divide SC into a technological/innovation and an organizational dimension. The *technological or innovation* sub-class

"(...) refers to the combination of organizational knowledge directly linked to the development of the activities and functions of the operations technical system, responsible of obtaining new products and services, the development of efficient production processes, as well as the advancement of the organizational knowledge base necessary to develop future technological innovations. Technological capital includes the following elements: Efforts in *research and development* (...), *technological infrastructure* (...), [and] *intellectual and industrial property* (...)"

(Martin Castro et al. 2011: 656).¹⁴⁹

The second SC-subcategory, namely the *organizational* one,

"(...) is linked to the organizational infrastructure (...) [and] results from the combination of intangible assets (...) which in an effective and efficient way, give structure and organizational cohesion to the different activities and business processes developed into the firm (...). Organizational capital includes the following main elements: *Organizational culture, values and attitudes* (...), *information and telecommunications capability* (...), [and] *organizational structure*"

(ibid.: 656 et seqq.).¹⁵⁰

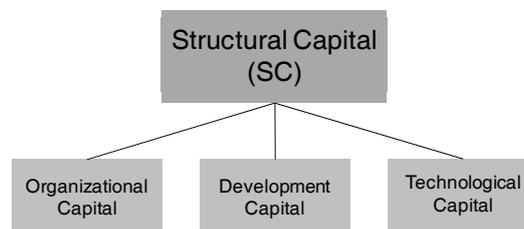
When combining the recommendations of Johan Roos et al. (1997: 46 et seqq.) and Gregorio Martín de Castro et al. (2011: 656 et seqq.) one can derive at the following three key dimension which make up SC: 1) *organizational capital*

¹⁴⁹ Cf. footnote 19.

¹⁵⁰ Cf. footnote 19.

including, among others, company culture, ICT usage, structure (design), and processes; 2) *Development capital* which encompasses, for instance, innovations, research and development, and intellectual property; and 3) *technological capital* embracing a firm's technological- as well as information- and telecommunication- infrastructure (cf. figure 32).

Figure 32: Structural Capital and its Dimensions



Lastly, it is worth highlighting that SC is – as opposed to HC – *firms' property* (Edvinsson, Sullivan 1996: 363; Roos et al. 1997: 42; Stewart 1997: 108 et seq.; Sveiby 1997: 10; MERITUM 2001: 3; InCaS 2008: 7) because it encompasses “all that is left when the human resources go home” (Edvinsson, Sullivan 1996: 363).

Overall it needs to be stressed, again, that SC is an important strategic source of supernormal business performance because it represents, according to Leif Edvinsson and Michael S. Malone (1997a), the “embodiment, empowerment, and supportive infrastructure of human capital” (ibid.: 34 cited by Cater, Cater 2009: 191 et seq.).¹⁵¹ Thus, it provides the backbone which *enables employees and managers to leverage their HC* and thus, to generate lasting competitive business

¹⁵¹ Remark: Leif Edvinsson and Michael S. Malone (1997a), divide structural capital into organizational capital and customer capital (Reed, Lubatkin, Srinivasan 2006: 869). Thus, their definition also relates to what is, within the scope of this doctoral thesis, defined as relationship capital.

performance (Brooking 1997: 16; Bontis 1998: 66)¹⁵².

At the same time, it has to be noted that SC is *created by a firm's* (internal and external) *members* (Sveiby 1997: 10; Khan 2011: 131 et seq.; St-Pierre, Audet 2011: 204) and needs to be regularly updated by them and their IC (Roos et al. 1997: 42).

2.4.1.3 Relationship Capital

Relationship capital (RC)¹⁵³ is the third category of IC. In line with the above conducted method, an *overview of key definitions* is presented in the following table 6. Subsequently, common contents of these definitions are extracted and summarized.

Table 6: Selection of Relationship Capital Definitions

Roos et al. 1997	“The importance of relationships with outside parties is forcing companies to lengthen their time horizon: relationships are not built through spot transactions, but through long-term exchanges of information and goods.” (p. 43)
Sveiby 1997	“(…) people in an organization direct their efforts in two directions primarily: outward working with customers or inward (…) when they work with customers they create customer relationships and an image in the market place that is partly “owned” by the corporation.” (p. 9), and “The external structure includes relationships with customers

¹⁵² Various studies confirm the positive and significant impact of SC on business performance (Bontis 1998: 70 et seq.; Bontis, Keow, Richardson 2000: 97; Ordonez Pablos 2004 cited by F-Jardon, Martos 2009: 604; Wang, Chang 2005: 229; Kamaluddin, Rahman 2009: 5 & 10; Kamukama, Ahiauzu, Ntayi 2010: 563).

¹⁵³ In the literature RC is also referred to as relation or relational capital. Another common expression is social capital which is, for example, applied by Niels Bosma et al. (2004), Salina Daud and Wan Fadzilah Yusoff Wan (2010), and Shaniz Khan (2011).

	and suppliers. It also encompasses brand names, trademarks, and the company's reputation or image. Some of these can be considered legal property, but investments in external structure cannot be made with the same degree of confidence as investments in internal structure." (p. 11)
Lynn 1998	"Relational capital is the organizational value derived from reliable, quality-driven supplies, and from loyal, satisfied customers. Relational capital arises from any party or area, external to the organization, which can create added value for the organization." (p. 12)
Sanchez, Chaminade, Olea 2000	"(...) relational capital is defined as all the intellectual capital linked with the external relationships of the firm, as, for example, the relation with customers." (p. 320)
MERITUM 2001	"Relational capital is defined as all resources linked to the external relationships of the firm such as customers, suppliers or R&D partners. It comprises that part of Human and Structural Capital dealing with the company's relations with stakeholders (investors, creditors, customers, suppliers, etc.), plus the perceptions that they hold about the company." (p. 3)
Ordenez Pablos 2003	"It is the knowledge embedded in organizational relationships with customers, suppliers, stakeholders, strategic alliance partners, etc." (P. 65)
Kivikas 2004	"(...) relational capital is the easiest one to measure through market share, customer retention, defection rate and per-customer profitability. Relational capital also includes connections outside the organization such as customer loyalty, goodwill, supplier relations and other stakeholders. The recent developments around Customer Relationship Management (CRS) belong to this area." (p. 475 et seq.)
Hermans, Kauranen 2005	"(...) relational capital (RC) (...) stresses the importance of external networks, for example, with customers and other partners." (p. 173)

SKE 2005	"Relational (External) Capital includes, but is not limited to, corporate name and brands, alliances and partnerships, licensing and franchising agreements, supplier and distribution channels and relations, community relations, government relations, industrial relations, customer relations, and financial relations." (p. 17)
Marr 2006	"Relational resources are the relationships that exist between an organization and any outside party, both with key individuals and other organizations. These can include customers, intermediaries, (...) suppliers, alliance partners, regulators, pressure groups, communities, creditors or investors. Relationships tend to fall into two categories – those that are formalized through, for example, contractual obligations with major customers and partners, and those that are more informal. (...) Other factors that fall into this category are brand image, corporate reputation, and product/service reputation." (p. 44)
Martinez-Torres 2006	"(...) the relationships that an organization has with its clients/customers and environment" (p. 617)
Thorleifsdottir, Claessen 2006	"(...) relational capital, sometimes referred to as customer capital (...) describes networks and alliances and assets such as goodwill/image, factors related to the market (...)." (p. 14)
Cohen, Kaimenakis 2007	"(...) relational capital (RC) (...) embraces all the relations the firm has established with its stakeholder groups (such as customers, suppliers, the community, the government, etc.)." (p. 243)
Do Rosario Cabrita, Bontis 2008	"Relational capital is the knowledge embedded in relationships with customers, suppliers, industry associations or any other stakeholder that influence the organisation's life." (p. 217)
Choong 2008	"Relational capital relates to the organizational relationships with all its stakeholders." (p. 621)

InCaS 2008	"Relational Capital (RC) is defined as 'the relations of the company to external stakeholders'." (p. 7)
Welbourne, del Val Pardo 2008	"Relational capital is defined as the set of all relationships – market relationships, power relationships and cooperation – established between firms, institutions and people that stem from a strong sense of belonging and a highly developed capacity of cooperation typical of culturally similar people and institutions." (p. 4)
F-Jardon, Martos 2009	"Relational capital: set of relations of the company with the outside (...). It includes the relations with the environment, and more specifically with the economic agents who participate in the different phases from the value chain of the product: the suppliers, the competitors and the clients. Perhaps these last ones have been the most studied until the point that many models speak of client capital instead of relational capital." (p. 603)
Kamukama, Ahiauzu, Ntayi 2010	"(...) relational capital as an invisible asset based on developing, maintaining and nurturing high-quality relationships with any organization, individuals or group that influences business performance." (p. 556)
Hormiga, Batista-Canino, Sanchez-Medina 2011b	"(...) relational capital is based on the idea that firms are considered not to be isolated systems but as systems that are, to a great extent, dependent on their relations with their environment. (...) In other words, it is the knowledge that is found in the relationships between the organisation and its reference groups." (p. 79)
Martin Castro et al. 2011	"Relational capital makes reference to the value to the organization of the relationships which it maintains with the main agents connected with its basic business processes – customers, suppliers, allies, etc., as well as the value to the organization of the relationships which it maintains with other social agents and its surroundings." (p. 654)

St-Pierre, Audet 2011	“Relational capital includes all the resources involved in the relationships between the firm and its stakeholders (customers, investors, suppliers, etc.) and all knowledge embedded in these external relationships (...). This concept also includes perceptions of external actors of the firm itself (image, reputation, brand, etc.)” (p. 204)
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The lowest common denominator of the above definitions is the fact that RC represents the *knowledge and IC which is embedded and exchanged in formal as well as informal long-term relationships with firm-externals*. Furthermore, they mainly agree that the most important RC-attributes encompass the following stakeholders: customers, suppliers, research and development partners, alliance partners, (industry) associations, investors, shareholders, creditors, pressure groups, communities, and regulators. Moreover, the externals' perceptions of the company and its products – including brand names, trademarks, reputation and image – are mentioned in the literature various times (Roos et al. 1997: 43 et seqq.; Sveiby 1997: 11; Lynn 1998: 12; Sanchez, Chaminade, Olea 2000: 320; MERITUM 2001: 3; Ordonez Pablos 2003: 65; Kivikas 2004: 475 et seq.; Hermans, Kauranen 2005: 173; SKE 2005: 17; Marr 2006: 44; Thorleifsdottir, Claessen 2006: 14; Cohen, Kaimenakis 2007: 243; Do Rosario Cabrita, Bontis 2008: 217; F-Jardon, Martos 2009: 603; Martin Castro et al. 2011: 654).

Since relationships to the environment as well as its perceptions of a firm are a result of long-term efforts (Roos et al. 1997: 43) and thus, require time to be build, they are expected to be path dependent – i.e. causally ambiguous. Furthermore, such relationships are assumed to be highly company specific and – as a result of the former mentioned – mainly tacit, undepreciable, intransferable, inimitable and non-substitutable. For these reasons, RC is viewed as a strategically relevant source of lasting competitive business performance.

Specifically, Johan Roos et al. (1997: 43 et seqq.) put forward a subclassification of RC. Precisely, they divide the RC-stakeholders into five subclasses. The first RC-dimension, namely *customers*, represents IC related to the *sales side* of a firm. It is the most obvious, strategically *highly valuable* and mainly studied subclass of RC (Stewart 1997: 143; AKIW 2005: 68; Hermans, Kauranen 2005: 176; Cohen,

Kaimenakis 2007: 244; Martin Castro, Lopez Saez 2008: 658; F-Jardon, Martos 2009: 603; BMWi 2010b: 5; St-Pierre, Audet 2011: 204). That is, in particular, because “(...) gaining a sale with a new customer is much more expensive (...) than gaining the same sale with an existing client” (Roos et al. 1997: 44). Thus, generating a loyal customer base with retaining customers and communicating with them to meet their needs – e.g. their time-, quality-, performance- and service-concerns – is essential for sustained competitive business performance (Kaplan, Norton 1992: 73; Brooking 1997: 26 et seq.; Roos et al. 1997: 44; Bontis 1998: 67; Wang, Chang 2005: 225; Daud, Yusoff 2010: 143; Martin Castro et al. 2011: 658).¹⁵⁴ Especially the latter mentioned knowledge and IC exchange between an enterprise and its customers needs to be stressed since customers are the *main source for gaining innovation relevant information* (RICARDIS 2006: 33). The second RC-subcategory relates to the IC of a company’s *supply side* (AKIW 2005: 69): **Supplier** relationships are the second RC-dimension. They are a relevant IC-based strategic sources of success – especially for manufacturing firms (BMWi 2010b: 5) – because close, long-term interactions with suppliers are important, for instance, *to save costs, to perform just-in-time, and to generate high quality outputs through good quality inputs* (Roos et al. 1997: 47). Thirdly, Johan Roos et al. (1997: 44 et seq.) also point attention towards the RC-subgroup **alliances**. These vary from formal joint ventures to informal handshake agreements. Such inter-firm linkages are strategically necessary because they allow, for example, *exchanging best practices or undertaking business opportunities which are individually difficult to pursue* – e.g. developing products together or sharing risks and costs. Especially idiosyncratic alliances are of high strategic value because they are historically developed and thus, hard to imitate (Brooking 1997: 31; Roos et al. 1997: 44 et seq.; RICARDIS 2006: 33; Welbourne, del Val Pardo 2008: 4). **Creditors and shareholders** make up the fourth RC-subclass which expresses the IC embedded in the financing activities of a firm. Good relationships with external financiers are important to

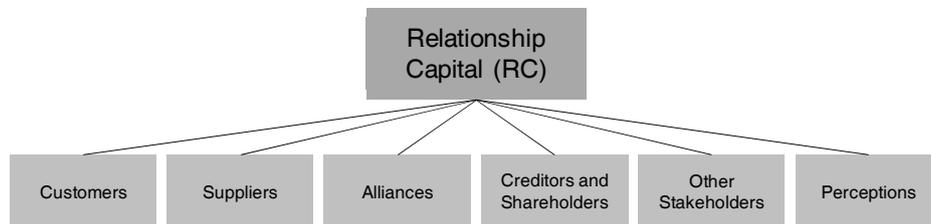
¹⁵⁴ Because of this, RC is originally referred to as customer capital (CC) (Kaplan, Norton 1992: 73 et seq.; Edvinsson, Malone 1997b; Stewart 1997: 142 et seq.; Bontis 1998: 67; Kaplan, Norton 2004: 54; AKIW 2005: 68). Yet, especially more recent categorizations broadened this narrow class towards relationship capital (Bontis, Keow, Richardson 2000: 88; Do Rosario Cabrita, Bontis 2008: 217).

uphold access to financial aid as well as to their experience, to establish trust, or to promote favorable terms and credit ratings. Furthermore, they contribute to a smooth approval of management decisions (without conflicts) (Roos et al. 1997: 45; AKIW 2005: 69; Hermans, Kauranen 2005: 176 et seq.). The last RC-dimension of Johan Roos et al. (1997: 43 et seqq.) includes *other stakeholders* such as locals or the government. Relationships with them are the *hardest to build* because a firm cannot please the interest of each stakeholder group simultaneously (Roos et al. 1997: 45; Do Rosario Cabrita, Bontis 2008: 218). Thus, it is the task of an enterprise to identify the most contributing and/or threatening stakeholders and to guide actions towards their requests (Do Rosario Cabrita, Bontis 2008: 218).

However, Johan Roos et al.'s (1997: 43 et seqq.) sub-classification does not incorporate stakeholders' *perceptions* of a firm and its products and services. Especially *brands, image* and *reputation* are, however, of high significance for sustained competitive business performance (Brooking 1997: 20 et seqq.; Daum 2003: 27 & 111). That is, for example, because they allow a firm to charge prices above competitors. Furthermore, they can lead to advantages, for example, with respect to labor and business partner markets (Daum 2003: 27) since they "(...) communicate to stakeholders what the company stands for" (ibid.: 159) and because it takes time to build as well as to constantly nourish them (Brooking 1997: 22) – i.e. they are difficult to copy, transfer etc. Moreover, brands, in particular, are "(...) powerful reminders to customers to buy the products and services of one company in preference to another" (ibid.: 20). Because of the impact of externals' perceptions on above-average performance, a sixth RC-category is advisable.

The entire RC construct, including its above defined dimensions, is presented in figure 33.

Figure 33: Relationship Capital and its Dimensions



Source: adopted from Roos et al. 1997: 43

Before wrapping up the RC section of this chapter, it needs to be mentioned that RC is – similar to HC – *only* “(...) a productive resource *enjoyed* by the organization *as long as the relationship exists* but disappears when the relationship ceases to exist (...)” (Khan 2011: 131).¹⁵⁵

Taken as a whole, RC is of high relevance for companies because it highlights the (success) potential to explore, integrate, and exploit the IC embedded in external structures as well as networks with stakeholders. Furthermore, it allows an enterprise to evaluate its IC-base against an external background. In detail, RC is necessary because it allows to learn from external stakeholders, to gain inputs relevant for innovations, to satisfy the market’s expectations and wishes, to identify market opportunities as well as competitive dynamics, to leverage (other) external potentials, and ultimately to sustain competitive business performance (Lynn 1998: 12; MERITUM 2001: 80; Daum 2004: 54 et seq.; Hermans, Kauranen 2005: 173 & 176 et seqq.; SKE 2005: 17; Thorleifsdottir, Claessen 2006: 14; Tovstiga, Tulugurova 2007: 700 et seqq.; Do Rosario Cabrita, Bontis 2008: 217 et seq.; Daud, Yusoff 2010: 140 et seqq.; Kamukama, Ahiauzu, Ntayi 2010: 556 & 563; Kamukama, Ahiauzu, Ntayi 2011: 154; Martin Castro et al. 2011: 658).

However, RC is less investigated than HC and SC because its IC-attributes are highly complex, heterogeneous and less certain. This is, firstly, due to the fact that RC depends on the combination of different partners’ or stakeholders’ IC and

¹⁵⁵ Cf. footnote 19.

secondly because such external relationships as well as perceptions may eventually change (Sveiby 1997: 11; Daud, Yusoff 2010: 140; Martin Castro et al. 2011: 658). As such, it is the furthest away from a firm's core (Bontis 1998: 67). "Nevertheless, an additional effort must be done, because, as Acedo et al. (2006) remark, one of the most fruitful developments (...) will be the 'relational one'" (Martin Castro et al. 2011: 658).

2.4.2 Summary of Literature Review on Intellectual Capital

In the 1980's and the beginning of the 1990's much research was conducted on the relation between customer capital (or market orientation) and economic performance¹⁵⁶ instead of the above introduced IC-framework (Cohen, Kaimenakis 2007: 245). However, especially since the end of the 1990's this focus has shifted towards an overarching view of IC at an accelerated rate (Serenko, Bontis, Grant 2009: 9; Martin Castro et al. 2011: 650).¹⁵⁷

The *first stage* of the development of an IC-discipline was predominantly *practitioner orientated* and focused on *defining IC as well as its categories*. Moreover, it was concerned with raising awareness of the potential of IC for gaining, sustaining as well as managing competitive advantages and thus, lasting business performance (Bontis et al. 1999: 397; Petty, Guthrie 2000: 156 et seqq.; Reed, Lubatkin, Srinivasan 2006: 887 et seq.; Serenko et al. 2010: 4; Martin Castro et al. 2011: 649). The *second stage* of the IC-movement started to establish the *research field* of IC by *gathering robust evidence*. Furthermore, it constituted IC as a

¹⁵⁶ Examples include John Narver and Stanley Slater (1990: 20 et seqq.), Bernard Jaworski and Ajay Kohli (1993: 61 et seqq.), Adamantios Diamantopoulos and Susan Hart (1993), Gordon Greenly (1995: 1 et seqq.), and Leyland Pitt et al. (1996: 5 et seqq.).

¹⁵⁷ For example, one can find about 20 special (scientific) journals on the topic of IC (Serenko, Bontis, Grant 2009: 9) – such as journal of intellectual capital, journal of knowledge management, knowledge and process management (Serenko, Bontis 2004: 185) –, many special issues in other publications have been released, various research associations were founded (Martin Castro et al. 2011: 650) and multiple conferences are held (Serenko, Bontis, Grant 2009: 9).

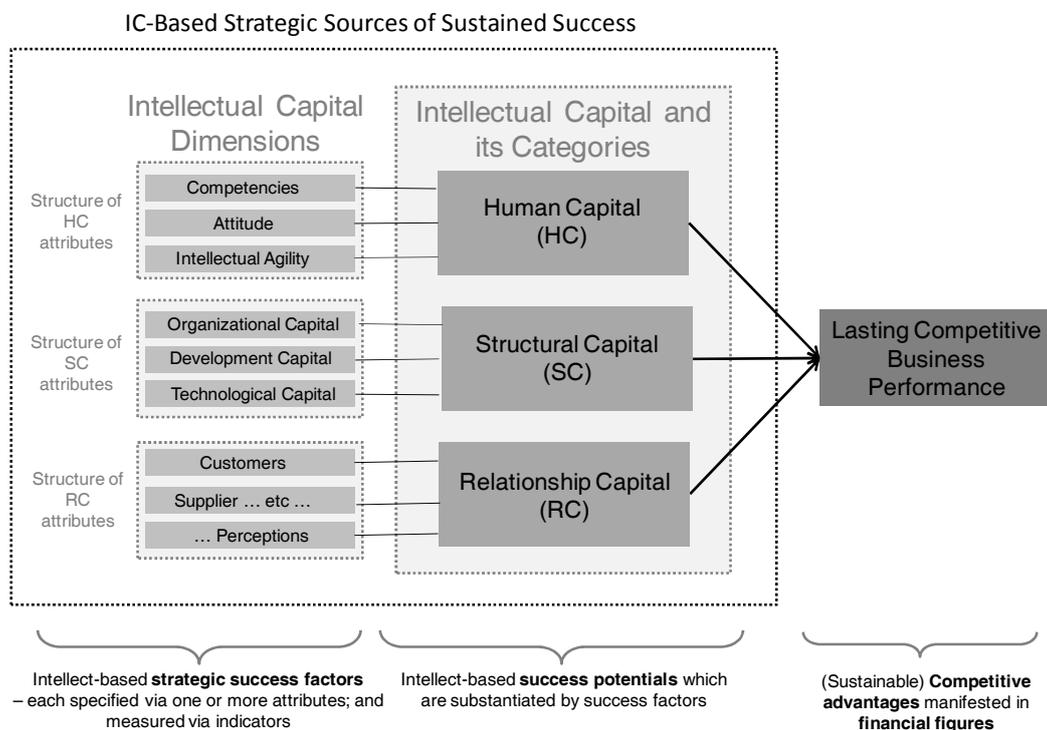
scholarly discipline recognized by the scientific community (Petty, Guthrie 2000: 156; Serenko, Bontis, Grant 2009: 9; Martin Castro et al. 2011: 649).

Despite the difficulties of evaluating and measuring IC (Tovstiga, Tulugurova 2007: 695; F-Jardon, Martos 2009: 601) and dozens of different measurement models or techniques (Ittner 2008: 261), many studies have verified to date that *one or more categories of IC are critically important for creating as well as sustaining competitive advantages and (economic) business performance* (F-Jardon, Martos 2009: 603; Matos, Lopes 2009: 344; Steenkamp, Kashyap 2010: 369 et seq.; St-Pierre, Audet 2011: 202 et seq.) – no matter which country (F-Jardon, Martos 2009: 603), industry (Bontis, Keow, Richardson 2000: 85 et seqq.), scientific or practical focus (Matos, Lopes 2009: 344) or performance indicators.¹⁵⁸ These findings can also be applied to the general IC-model underlying this doctoral thesis – as defined in chapter 2.4.1. Specifically this means that it is assumed that HC, SC and RC either all or at least one of them positively impact(s) a firm's lasting competitive business performance (if the IC-based strategic sources of success are managed well). This also explains why the arrows of figure 34 point from HC, SC and RC to lasting competitive performance. Moreover, figure 34 connects the insights of chapter 2.2 with the topic of IC. In detail, it highlights that

¹⁵⁸ Ahmed Riahi-Belkaoui (2003: 220 et seqq.), Belen Villalonga (2004: 205 et seqq.), Chun-Yao Tseng and Yeong-Jia Goo (2005: 197), Day-Yang Liu et al. (2009: 260), William S. Chang (2010: 121 et seqq.), and Daniel Zeghal and Anis Maaloul (2010: 54), for example, provide evidence for a positive relationship between IC and (corporate) *value creation/market value*. Likewise, Nick Bontis et al. (2000: 91 et seqq.), Maria de Rosario Cabrita and Nick Bontis (2008: 220 et seqq.), Muhammad Makki and Suleman Lodhi (2008: 86 et seqq.), Tomaz Cater and Barbara Cater (2009: 186), and Jose Diez et al. (2010: 348 et seqq.) prove that IC positively impacts (business) *performance*. Furthermore, Ming-Chin Chen (2005: 159 et seqq.), Wen-Ying Wang and Chingfu Chang (2005: 228 et seqq.), Hong Tan et al. (2007: 77 et seqq.), Amrizah Kamaluddin and Rashidah Rahman (2009: 8 et seqq.), Meng-Yuh Cheng et al. (2010: 442 et seqq.), and Samuel Chu et al. (2011: 249 et seqq.) demonstrate a positive link between IC and (corporate) *value creation/market value as well as (business) performance* – i.e. mixed performance measures. Lastly, it is worth mentioning that 'only' Steven Firer and Mitchell Williams (2003: 251 et seqq.), Bharathi Kamath (2008: 691 et seqq.), and Dimitrios Maditinos et al. (2011: 140 et seqq.), and do *not find* a positive relationship between IC and success.

HC, SC and RC represent success potentials, which are further specified via the HC-, SC- and RC-dimensions, which symbolize in combination with their defining attributes strategic success factors. Together, the IC-categories, -dimensions and attributes serve as IC-based strategic sources of success.

Figure 34: Intellectual Capital, its Categories, Dimensions and Relation to Lasting Competitive Business Performance



Own source inspired by MERITUM 2001: 95

Nevertheless, the majority of IC-studies is, till now, based on case studies or constitutes frameworks and literature reviews instead of (large scale) *empirical tests*. As such, (large scale) *empirical* examinations are highly *recommended* for future research (Wong, Aspinwall 2005: 65; Liu, Tseng, Yen 2009: 262; Serenko, Bontis, Grant 2009: 18; Serenko et al. 2010: 16; Martin Castro et al. 2011: 660). Moreover, reliable *objective measurements* are advised for empirical studies because they reveal the actual practice of IC – i.e. what firms really do – as opposed to subjective perceptions which often tend to be overestimated (Bontis

2001: 57; Wong, Aspinwall 2005: 77; St-Pierre, Audet 2011: 210 et seq.).¹⁵⁹ In addition, 57% of all research outputs on IC are produced in the USA, the UK, Australia, Spain, and Canada while Germany only represents the sixth place in the ranking (Serenko et al. 2010: 17).¹⁶⁰ Consequently, it can be argued that more objectively measured, empirical research in the academic field of IC is required in general and in particular *from Germany* to (even) better understand IC, its interaction as well as management practice (Schiuma, Lerro 2008: 8; Serenko et al. 2010: 3; Martin Castro et al. 2011: 660 et seq.; St-Pierre, Audet 2011: 602 et seq.).

Lastly, it is worth mentioning that various authors (e.g. Wong, Aspinwall 2005: 65; Cohen, Kaimenakis 2007: 241 et seq. & 245; Tovstiga, Tulugurova 2007: 695; Hutchinson, Quintas 2008: 132; F-Jardon, Martos 2009: 601; Kamaluddin, Rahman 2009: 14; Tovstiga, Tulugurova 2009: 70; Steenkamp, Kashyap 2010: 369; St-Pierre, Audet 2011: 202 et seqq.) indicate that *mainly large companies' IC is studied* whereas rather *little* is known about the IC of *small and medium sized enterprises* (SME). Yet, since SME differ significantly from large firms (Pfohl 2006a:

¹⁵⁹ "In order to make any significant claims, IC researchers must now move from perceptual measures in isolated cases to large-scale studies with objective measures. This task is daunting, since the challenges are enormous but the potential benefits are far-reaching across many management disciplines including accounting, human resources, finance, training and development and strategy, to name a few" (Bontis 2001: 57). Nick Bontis' recommendation is in line with Kuan Wong and Elaine Aspinwall's (2005: 77) findings: "Another limitation was that the survey was aimed at exploring the perception of the respondents with respect to the importance of the CSFs. It would be interesting to expand this study in the future by investigating the practice of these factors. Hence, the emphasis would shift from 'perceived importance' to what organisations do in practice in order to make their KM initiative successful". Besides, "although studies using perceptual outcome measures provide preliminary evidence on the benefits from intangible asset measurement and useful insights into some of the factors influencing its effectiveness, they suffer from (...) limitations (...). First, (...) 'common method bias' (...). Second, the perceptual outcome scales often leave considerable room for interpretation" (Ittner 2008: 263 et seq.).

¹⁶⁰ This is one of the results of Alexander Serenko et al.'s (2010) study - "(...) the most comprehensive scientometric analysis of the KM/IC field ever conducted (...)" (ibid.: 3 et seqq.) - which reviews 2,175 articles published in 11 major KM/IC peer-reviewed journals between 1994 und 2008.

18 et seqq.), it has to be investigated if the positive impact of IC's categories (and dimensions) on business performance also holds for them (Cohen, Kaimenakis 2007: 241 et seq.).

Because of this, the above presented model of IC (cf. figure 34) is to be examined against the background of (German) SME. This is done in chapter four – after the term SME is generally defined in chapter three.

3 SMALL AND MEDIUM SIZED ENTERPRISE (SME)

At first, chapter three of this dissertation defines the term *small and medium sized enterprises* (SME). In detail, section 3.1 concentrates on the *specific qualitative and quantitative characteristics* of SME which need to be understood since they influence SME' IC (management) (Wong, Aspinwall 2004: 45). Chapter 3.1.3 closes with a definition of SME for the scope of this doctoral thesis. Following this, the *importance* of SME for the *global and German economy* is highlighted in section 3.2. This is important in order to acknowledge the relevance of dealing with (IC-based) strategic sources of success of German SME.

3.1 DEFINITION OF SME

“A small business is not a little big business”

(Welsh, White 1981: 18).

John Welsh and Jerry White (1981: 18) indicate that *small and medium sized enterprises* (SME) are confronted with unique conditions and specific attributes which differ from large businesses (settings). As such, SME are viewed as an independent class of companies which *clearly distinguishes* itself from *big corporations* (Pfohl 2006a: 2 & 18 et seqq.; Behringer 2009: 30; Krol 2009: 12). However, since the individual enterprises within the group of SME are still heterogeneous, it is highly difficult to establish a distinct, comprehensive definition (Daschmann 1993: 51; Gruber 2000: 16; Pfohl 2006a: 3 et seqq.; Vogelsang 2008: 12 et seq.; Reinemann 2011: 4). As a result, one can find various explanations of what constitutes SME and a large variety of determining criteria. Yet, there is *no universally accepted definition* of the term SME (Daschmann 1993: 51; Gruber 2000: 16; Pichler, Pleitner, Schmidt 2000: 11; Wong, Aspinwall 2004: 45; Stroeder 2008: 29; Vogelsang 2008: 12; Behringer 2009: 31; Gonschorek 2009: 37; Holland-Letz 2009: 13; Wolf, Paul, Zipse 2009: 14; Steenkamp, Kashyap 2010: 372)

– neither nationally nor internationally (Wolter, Hauser 2001: 29; Mertins, Kohl, Krebs 2008: 7; Altman, Sabato, Wilson 2010: 99). Nevertheless, in the *German literature* it is common to define SME in terms of *quantitative* and *qualitative criteria* (Becker, Staffel, Ulrich 2008: 5 & 7; Gonschorek 2009: 38; Krol 2009: 11).¹⁶¹

3.1.1 Quantitative Criteria

Quantitative criteria allow defining SME according to *measurable indicators* which are represented by *objective firm-size/economic benchmarks* (Sombart 1927: 539 et seq. cited by Gruber 2000: 16 et seq.; Zimmermann 1960: 159 cited by Pfohl 2006b: 3; Colbe 1964: 31 et seqq.). Examples include number of employees, working hours, amount or value of applied input factors, capacity, capital employed, working capital, equity, profits or sales (Wolter, Hauser 2001: 29; Kayser 2006: 37; Pfohl 2006b: 3 et seqq.; Krol 2009: 12 et seq.; Dillerup, Stoi 2011: 5 et seq.)(Kamp 1959: 5, Günzel 1975: 8 et seqq., Naujoks 1975: 32 et seq. and Reske, Mortsiefer 1978: 39 & 56 all four cited by Daschmann 1993: 50). The advantage of such figures is, among others, that they are fairly easy to apply and that they can be traced back over time (Kayser 2006: 37). The challenge is, however, to decide upon the *selection* of appropriate *benchmarks* and to determine the *threshold values* which differentiate between the levels of micro, small, medium and large enterprises (Gruber 2000: 17 et seq.; Wallau 2005: 2 et seqq.; Holland-Letz 2009: 13; Krol 2009: 12 et seq.).

In the *German literature*, there are *three predominantly applied quantitative definition-schemes* for SME (cf. table 7).

¹⁶¹ The following authors do, for examples, define SME in terms of quantitative and qualitative criteria: Hans-Achim Daschmann (1993: 50), Marc Gruber (2000: 16 et seqq.), Johann Pichler (2000: 11 et seqq.), Frank Wallau (2005: 2 et seqq.), Gunter Kayser (2006: 37), Kai Mertins et al. (2008: 7), Mark Staiger (2008: 12 et seqq.), Dirk Stroeder (2008: 29 et seqq.), Till Vogelsang (2008: 13), Stefan Behringer (2009: 30 et seqq.), Malcolm Schauf (2009b: V), Jochen Wolf et al. (2009: 14 et seqq.), the Ifm Bonn (2011), Holger Reinemann (2011: 2), and Sebastian Stütz (2011: 14 et seqq.).

Table 7: SME Definition: Quantitative Aspects

	IFM Bonn	EC	§267 HGB
Micro		≤ 9 Employees and ≤ € 2 m. Turnover p.a. or ≤ € 2 m. B/S Total p.a.	
Small	≤ 9 Employees and ≤ € 1 m. Turnover p.a.	≤ 49 Employees and ≤ € 10 m. Turnover p.a. or ≤ € 10 m. B/S Total p.a.	2 out of 3: • ≤ 50 Employees • ≤ € 9.68 m. Turnover p.a. • ≤ € 4.84 m. B/S Total p.a.
Medium	≤ 499 Employees and ≤ € 50 m. Turnover p.a.	≤ 249 Employees and ≤ € 50 m. Turnover p.a. or ≤ € 43 m. B/S Total p.a.	2 out of 3: • ≤ 250 Employees • ≤ € 38.5 m. Turnover p.a. • ≤ € 19.25 m. B/S Total p.a.
Large	> 500 Employees and > € 50 m. Turnover p.a.	> 250 Employees and > € 50 m. Turnover p.a. or > € 43 m. B/S Total p.a.	2 out of 3: • > 250 Employees • > € 38.5 m. Turnover p.a. • > € 19.25 m. B/S Total p.a.

Source: adopted from European Commission 2005: 14,
HGB 2009: § 267 and IfM 2011

The most popular quantitative SME definition in the German literature is the one from the *institute for small and medium sized business research*, Bonn (*IfM*) (Kayser 2006: 38; Pfohl 2006a: 15; Becker, Staffel, Ulrich 2008: 10; Holland-Letz 2009: 13; Krol 2009: 13; Reinemann 2011: 3). According to the IfM's definition (2011), the term SME comprises all enterprises whose *number of employees* does not exceed 499 and whose *turnover* is below Euros (€) 50 million (m.) per year.

Jochen Wolf et al. (2009: 15), Mark Staiger (Staiger 2008: 13) and Dirk Stroeder (2008: 30) state that the SME definition of the *European Commission* (*EC*) is also often used in the German context and establishes itself more and more. This is, among others, because this definition has been widely applied (Kayser 2006: 35) in Europe since 1996 – especially for public subsidy schemes and other funding programs – and was modified in 2003 (effective since 1st of January 2005) to better match the current environment (European Commission 2005: 6; Staiger 2008: 13; Reinemann 2011: 3). Specifically, the EC (2005: 5 et seqq.) digresses from the IfM's definition in the sense that it distinguishes not only between small, medium, and large scale firms but also *incorporates micro enterprises* which are enterprises with a staff headcount of smaller than 10 and a turnover or balance sheet (B/S) total below € 2 m. Furthermore, the EC's definition differs from the IfM's because it

specifies SME as all those firms which employ less than 250 employees. Thus, the SME *cutoff-limit* is 249 people lower. The threshold of the second compulsory criteria of the EC is, however, in accordance with the IfM's definition: € 50 m. *turnover* per year. This turnover attribute *can, however, be substituted by a B/S total* of less than € 43 m. This optional exchange serves the purpose to treat firms with different economic activities – e.g. trade or manufacturing – equally (ibid.: 12 et seq.). Lastly, the EC's definition also declares that SME have to be *autonomous*. Precisely, they need to be either completely independent or have a minority partner which holds less than 25% of their shares (ibid.: 11 & 16 et seq.).

Although the EC's definition clearly differs from the one of the IfM, it is, however, similar to the threshold criteria of the *German commercial code (HGB)*. The HGB (2009: § 267) states that a firm is a SME if two of the following three benchmarks are not surpassed: 249 *employees*, € 38.5 m. *turnover* and € 19.25 m. *B/S total*. Nevertheless, it has to be born in mind that this definition does legally only apply to limited and corporate companies.

Based upon the above it can be summarized that the three definitions, which are common in the German literature, all determine SME in terms of two compulsory criteria: staff headcount and a financial indicator (annual turnover and/or B/S-figures). But the three definitions differ regarding the measurement scales between the individual groups of enterprises and the amount of these categories. As such, there is *no consensus*.

Lastly, it needs to be stated that quantitative criteria suffer from their *limited scope*. In detail, they do, for example, not constantly hold – i.e. firms grow and transcend threshold criteria¹⁶² – and do not consider psychological as well as social aspects. Thus, they are *not sufficient to precisely define SME* (Becker, Staffel, Ulrich 2008: 5; Stroeder 2008: 31; Staiger 2008: 13 et seq.; Gonschorek 2009: 39; Holland-Letz 2009: 13; Wolf, Paul, Zipse 2009: 16; Reinemann 2011: 2).

¹⁶² For example, an enterprise grows from 499 to 600 employees within a year. Moreover, its turnover increases to €60m in the same year. According to these figures, the firm is not considered a SME anymore. However, its (management) characteristics and policies may still be the same than in the previous year. Thus, according to qualitative criteria, the firm is still a SME (Wolf, Paul, Zipse 2009).

3.1.2 Qualitative Criteria

On top of defining SME with respect to hard, numerical facts, it is necessary to consider their soft *qualitative characteristics* which are often classified into a *catalogue of SME attributes* (Gantzel 1962: 280 et seqq. cited by Stroeder 2008: 32 and by Daschmann 1993: 50 et seqq.)(Staiger 2008: 14; Krol 2009: 15). It is relevant to discuss these qualitative attributes because they *provide broader insights* into the nature, specifics, values and the (daily) business of SME – i.e. their socio-economic context (Gruber 2000: 21; Staiger 2008: 13 et seqq.; Schauf 2009a: 7; Reinemann 2011: 2 & 4). However, similar to the quantitative definition, there is *no commonly accepted set of qualitative criteria* which distinguish SME from other kinds of companies.

Hans-Christian Pfohl (2006a: 18 et seqq.) suggests *one of the most comprehensive catalogues* which qualitatively distinguishes SME from large firms.¹⁶³ He proposes – based upon empirical results and plausible assumptions – ten qualitative criteria of SME.

- *Corporate management*: SME are generally managed by their owners. These entrepreneurs are often professionally educated but not in terms of business studies or management. As such, they regularly improvise and act intuitively (ibid.: 18).
- *Operations*: SME' operation is shaped by specialties like scarce business divisions and short as well as direct communication flows. Moreover, SME give directions, guide and control via direct personal contact. Furthermore, they favor limited delegation and minor formalization. Because of that, they do not usually suffer from coordination problems but instead are highly flexible (ibid.: 19).

¹⁶³ Likewise, various national and international authors such as Josef Mugler (1999: 19 et seqq.), Johann Pichler et al. (2000: 12), Kuan Wong and Elaine Aspinwall (2004: 50), Kerstin Hausch (2004: 14 cited by Becker, Staffel, Ulrich 2008: 15), IfM (2007 cited by Mertins, Kohl, Krebs 2008: 7), Kai Mertins et al. (2008: 7 et seqq.), Malcolm Schauf (2009a: 8 et seqq.), Stefan Holland-Letz (2009: 15 et seqq.), Reinhard Schulte (2010: VIII et seqq.), Anette von Ahsen (2010: 4), and Holger Reinemann (2011: 5 et seqq.) present similar/alternative sets of qualitative SME criteria.

- *Procurement*: SME are generally confronted with low(er) bargaining power over suppliers. The latter are, however, highly important because SME purchase supplies driven by orders (ibid.: 19).
- *Production*: SME' production is usually highly work-intensive. Moreover, it is characterized by little division of labor, mainly universal equipment and machines, small economies of scale as well as a long-term dependence on a single basic innovation (ibid.: 19).
- *Sales*: In general, SME sell relatively small scales. These sales are usually driven by individual demands and thus, are custom-tailored. Moreover, SME' customers are either (regional) locals or purchase SME' offerings because of their specificity. Thus, their market segments are rather limited (ibid.: 19).
- *Logistics*: Many SME lack systematic logistic-concepts and institutionalized departments which are in charge of logistics. Instead, they focus on operational logistic tasks (ibid.: 20).
- *Financing*: Because SME do not have access to anonymous capital markets and are predominantly financed by the owner ('s family), they are usually faced with constrained financial opportunities (ibid.: 20).
- *Research and development (R&D)*: Similar to logistics, SME do not have special departments for R&D. Moreover, SME' R&D is rather short-term orientated, intuitive and mainly concerned with product- and process innovations instead of basic matters. Nevertheless, SME need little time between inventing and using their innovations (ibid.: 20).
- *Human resource*: As seen in the quantitative definition, SME comprise no more than 499 employees and thus, are relatively small. Besides, most of their workforce is usually well professionally trained (in terms of a broad scope of expertise) but not academically. Lastly, it is important to note that SME' staff is generally highly satisfied (ibid.: 20).
- *Waste*: In general, the public is less concerned about the waste management of SME (ibid.: 21).

Although Hans-Christian Pfohl's (2006a: 18 et seqq.) and his peers' catalogues are very comprehensive and helpful to understand the nature of SME, they are, however, *less suitable to accurately define SME*.¹⁶⁴ This is because many of the suggested characteristics only hold for a small group of SME (Mugler 1998: 20 cited by Staiger 2008: 15; Gonschorek 2009: 41). Consequently, a more simple qualitative definition which holds for the majority of SME is advisable. Wolfgang Becker et al. (2008: 15 et seqq.) declare that the *smallest common denominator of the range of catalogues* rests on the following three criteria: Firstly, *economic and legal independence* (ibid.: 16). This criterion is in accordance with the above discussed definition of the EC (2005). In detail, it points to the fact that SME are firms which are mainly private and autonomous and thus, make strategic decisions independently (Wolter, Hauser 2001: 33; Stroeder 2008: 32; Vogelsang 2008: 14; Krol 2009: 16; Reinemann 2011: 6). The second and most important qualitative characteristic of SME is the *unity of ownership, control and management* (Daschmann 1993: 46; Pichler, Pleitner, Schmidt 2000: 12; Becker, Staffel, Ulrich 2008: 16; Stroeder 2008: 32; Krol 2009: 15; Reinemann 2011: 5; Stütz 2011: 16). Specifically, this means that the owner of the firm – who provides the enterprise's capital – does not only bear the full risk but is also in direct charge of its (operational and strategic) management, including all relevant decision making and monitoring. As such, the existence of the firm and of the entrepreneur are closely related (Daschmann 1993: 56; Wolter, Hauser 2001: 32 et seq.; Behringer 2009: 35; Gonschorek 2009: 40; Krol 2009: 16 et seqq.; Schauf 2009a: 7 et seq.; Reinemann 2011: 5).¹⁶⁵ The last criterion to qualitatively define SME is their *personally orientated management*. It points to the fact that the owner or manager and his/her personality are central for the way the firm functions (Becker, Staffel, Ulrich 2008: 17). As a result, it is usually impossible and/or very difficult to replace the entrepreneur (Holland-Letz 2009: 15). The characteristics of SME' personally orientated management are also often associated with the close and

¹⁶⁴ These characteristics of SME can, in a wider sense, be interpreted as their strength and weaknesses and thus, as a competitive edge (or failure) over large firms (Daschmann 1993: V; Kunert 2006: 64).

¹⁶⁵ "In small (and medium-sized) business the owner is the business" (Glueck 1980: 46 cited by Daschmann 1993: 56).

trust-orientated relationship between the entrepreneur and the staff (Holland-Letz 2009: 15; Wolf, Paul, Zipse 2009: 9) as well as with business partners and other stakeholders (Schauf 2009a: 7).

Overall, it can be concluded from the above that the *entrepreneur* takes on the *most crucial role in qualitatively defining SME*.

3.1.3 Definition Underlying this Research Work

The focus of *this doctoral thesis'* SME definition is *quantitative*. This is the case because an objective, statistical definition offers the benefit that it can be relatively easy applied to determine SME (Daschmann 1993: 50; Kayser 2006: 37; Stroeder 2008: 30; Staiger 2008: 13; Behringer 2009: 30; Krol 2009: 12; Ahsen, Heesen, Kuchenbuch 2010: 3).¹⁶⁶ With respect to the precise criteria as well as thresholds, this research work *adopts* the *IfM recommendation* (2011) which is also the most frequently applied definition in the German context. Specifically, this means that *this dissertation defines SME as all enterprises with less than 500 employees and € 50 m. turnover per year*.

3.2 ECONOMIC IMPORTANCE OF SME

It is *worldwide* acknowledged that *SME* and in particular young *SME* (Baumol 2009: 71) are *highly important for their respective economy* – whether developed and high-income or developing and low-income. That is because *SME* largely contribute not only to economic prosperity but also and specifically to employment, gross domestic product, innovations, technological advances, or development (Baumol 2009: 71; Savlovski, Robu 2011: 278 et seqq.; Edinburgh

¹⁶⁶ Because of its practicability the qualitative definition is also predominantly applied in empirical research – cf. Wolfgang Becker, Michaela Staffel and Patrick Ulrich (2008: 9), Florian Krol (2009: 17), Holger Reinemann (2011: 2), and Sebastian Stütz (2011: 19).

Group 2012/2013: 4 & 6 et seq.; European Commission 2013). In detail, the statistics among the countries vary only little. They mainly agree that SME represent the majority of firms and supply up to two out of three jobs (Savlovschi, Robu 2011: 278 et seqq.). The same applies to *European SME*. They...

- represent 99% of all European businesses (2013),
- provide 66.5% of all European jobs (2012), and
- accomplish over 57% of European value added (2012)

(European Commission 2013; Gagliardi et al. 2013: 11 et seqq.).

Likewise, SME play a *significant role in the German economy* and its competitive structure, productivity, innovation power, employment, wealth generation, success as well as growth, too (Staiger 2008: 16 et seq.; Schulte 2010: VII; Reinemann 2011: 13; Hoch, Heupel 2013: 418). This importance is doubtlessly recognizable by the following quantitative data: SME ...

- account for 99.6% of all firms in Germany (2010),
- generate 36.9% of all taxable turnover (2010),
- employ 60% of all workers who are subject to insurance contributions (2010),
- vocationally educate 83.2% of the all apprentices (2010),
- undertake 46% of all investments (2008),
- develop 75% of all patents (2008), and
- contribute 57% of all gross value added

(IfM 2012a; IfM 2012b; Mittelstands - Akademie 2012; IfM 2013a).

In more detail, SME are of great importance for realizing the objectives of *German regulatory policies* (Staiger 2008: 17). That is because SME contribute to healthier competition – especially against more powerful large corporations – and provide a check to monopolies/cartels. This, in turn, is required to support an efficient market economy. Hence, SME are a highly critical element of the German *market-economy-oriented democracy* (Wong, Aspinwall 2004: 46; Hamer 2006: 33 et seq.; Kayser 2006: 34; Krüger 2006: 14; Staiger 2008: 17; Behringer 2009: 50; Stütz 2011: 31 & 33).

Secondly, SME help to leverage the aims of *German economic policies* (Staiger 2008: 17). Precisely, SME offer a broad range of products as well as services which are in large parts custom-tailored and different from large companies' standardized products. Because of this differentiation, SME are very often positioned in niche markets which are little or even not advantageous for big firms. As a result, SME foster the economy by *covering differentiated markets and closing market gaps* (Wong, Aspinwall 2004: 46; Staiger 2008: 17). SME' specification as well as related cost advantages and flexibility also explain why SME are well-liked suppliers to large corporations (Hamer 2006: 36; Staiger 2008: 17). Hence, SME significantly account for their economic success, too (Wong, Aspinwall 2004: 46). Additionally, SME' focus on individualized customer solutions and their ability to fast respond to economic or market changes – arguably faster than big corporations – is vital to *uphold the innovative response* of the German economy (Wong, Aspinwall 2004: 46; Hamer 2006: 36; Staiger 2008: 17). Besides, the latter mentioned innovation power of Germany is further strengthened by the fact that many SME are continuously founded and that those enterprises are often settled in innovative industries like high-tech, satisfy new demands or modify established structures (Kayser 2006: 42; Reinemann 2011: 13).

Thirdly, the fulfillment of *German social policy* targets depends majorly on SME since they act – as seen in the above illustrated statistics – as the backbone of the German *labor market* (Staiger 2008: 17; IfM 2012a; BMWi 2013a: 10). This is, on the one hand, because of SME' focus on specialization and services which requires flexibility and thus, skilled humans instead of machinery (Hamer 2006: 35).¹⁶⁷ On the other hand, SME significantly support the labor market because of their *location-loyalty*: while large firms continue to perform their business activities (increasingly) in foreign countries, SME stay national or even local (ibid.: 35). Apart from this, SME contribute essentially to the *apprenticeship market* as seen in the above stated hard facts (IfM 2012a). These high rates of trainees are mainly rooted in the reasoning that SME require experts who are able to perform various (firm and/or job) specific as well as general tasks in order to uphold their enterprises' flexibility. Opposite to this, large firms conduct less vocational

¹⁶⁷ This is also one of the reasons why SME tend to keep their staff headcount during crisis (Günterberg 2012: 4; Reinemann 2011: 12; Staiger 2008: 17).

education because they require less of this kind of expertise (Hamer 2006: 35). Altogether, SME' vital role for the labor and apprenticeship market is also relevant in terms of *social security payments*. Precisely, SME represent the major source of social security payments and thus, the German household budget and social system (ibid.: 38).

Lastly, it is worth mentioning that SME positively shape *other social areas*, too. About 80% of them engage, for instance, in corporate citizenship activities such as the sponsoring of social, cultural, educational or sports-orientated institutions (Wallau 2005: 12; Krüger 2006: 20).

Overall it can be summarized that the competitive, productive, flexible, innovative and reliable SME sector – which represents 99.6% of the German firms – is a highly critical element of the German nation and its wealth. Thus, it is obvious that *research in the field of IC in SME is relevant not only for improving SME' competitive business performance via an optimized IC-management but is also of major significance for the success of the German economy.*

4 INTELLECTUAL CAPITAL OF GERMAN SMALL AND MEDIUM SIZED ENTERPRISES: HYPOTHESES AND CONCEPTUAL RESEARCH MODELS

This dissertation combines the previously illustrated growing relevance of intellectual capital (IC) and the increasing research-interest on German small and medium sized enterprises (SME) (Pfohl 2006b: V; Schauf 2009a: 3; Schulte 2010: VII; Meyer 2010: V; Reinemann 2011: 1) by investigating the extent to which IC impacts the lasting competitive business performance of German SME. To do so, the following chapter puts the in section 2.4 presented (general) concept of IC into the context of the in chapter 3 defined German SME. Such a transformation-approach is necessary because of two reasons: Firstly, the IC-management instruments and concepts created for and based on large firms are not applicable to SME since they have majorly differing (management-) needs (Schulte 2010: VII et seq.; Reinemann 2011: 1). Secondly, no generally accepted SME-IC-model – especially for the German context – exists. This is because only little literature and, in particular, empirical research is available on SME' IC in general/internationally¹⁶⁸; and the sources which are accessible are arguably only partially applicable to German SME since German SME are assumed to be unique and thus, considerably differ from SME in other countries (Simon 2007: 39 et seq.; Malshe 2012: 14; Malshe, Eckhoff 2012: 6; Ibbeken 2013: 2). Moreover, there are even fewer literature sources and research studies which look into the IC of

¹⁶⁸ The identified international sources of SME' IC primarily include: Niels Bosma et al. (2004: 227 et seqq.), CEN (2004a, 2004b), Sandra Cohen and Nikolaos Kaimenakis (2007: 241 et seqq.), Kevin Desouza and Yukika Awazu (2006: 32 et seqq.), Carlos F-Jardon and Maria Martos (2009: 600 et seqq.), Raine Hermans and Ilkka Kauranen (2005: 171 et seqq.), InCaS (2008), Miguel Nunes et al. (2006: 101 et seqq.), RICARDIS (2006), Natasja Steenkamp and Varsha Kashyap (2010: 368 et seqq.), Asta Thorleifsdottir and Eggert Claessen (2006), Georg Tovstiga and Ekaterina Tulugurova (2007: 695 et seqq, 2009: 70 et seqq.), Kuan Wong and Elaine Aspinwall (2004: 44 et seqq., 2005: 64 et seqq.), and Josee St-Pierre and Josee Audet (2011: 202 et seqq.).

German SME¹⁶⁹.

This doctoral thesis follows a rather unconventional procedure and evaluates the internationally tested and (mainly) agreed IC-framework (cf. chapter 2.4) in the light of the identified sources and studies on the IC of German SME in order to identify commonalities (and differences, respectively). Furthermore, this evaluation scope is expanded by also incorporating the results of German SME' success factor research¹⁷⁰ as well as literature on young German firms and startups¹⁷¹ which exposes various (individual) IC-attributes and -dimension. In accordance to the outcomes of this alignment, a modified IC-model, which fits the context of German SME among various age segments and their confirmed sources of success, is established. Likewise, hypotheses are derived based on the illustrated literature review, past studies in the German and international (SME) context, and other theoretical as well as logical grounds (Hübler 2005: 22).

¹⁶⁹ The literature review revealed various sources covering the IC of German SME. These include: Kay Alwert (2005), Kay Alwert, Peter Heisig and Kai Mertins (2005: 1 et seqq.), Kay Alwert and Nadine Vorsatz (2005: 323 et seqq.), Kai Mertins, Kay Alwert and Peter Heisig (2005), Peter Pawlowsky et al. (2006), BMWi (2007), Kai Mertins, Markus Will and Sven Wuscher (2007: 197 et seqq.), Ellen Walther-Klaus and Frieder Zimmermann (2007: 43 et seqq.), BMWi (2008), Susanne Durst (2008: 410 et seqq.), Kay Alwert, Manfred Bornemann and Markus Will (2009: 354 et seqq.), Susanne Durst and Stefan Gueldenberg (2009: 181 et seqq.), Kai Mertins and Holger Seidel (2009), Kai Mertins, Wen-Huan Wang and Markus Will (2009: 111 et seqq.), Kai Mertins, Markus Will and Ronald Orth (2009: 91 et seqq.), Peter Pawlowsky, Aylin Gözalan and Simone Schmid (2010), Peter Pawlowsky, Aylin Gözalan and Simone Schmid (2011), and BMWi (2010a, 2010b, 2013c). Yet, it has to be mentioned that many of these publications are based on one study – i.e. various publications refer to the same examination/dataset.

¹⁷⁰ Examples of German SME' success factor research incorporate, among others, Hans-Achim Daschmann (1993), Hans-Ulrich Küpper (1994), Hermann Simon (1996), Marc Gruber (2000), Stephan Schleef (2001: 1 et seqq.), Matthias J. Kunert (2006), Hermann Simon (2006), Claus Adenäuer (2007: 15 et seqq.), Hermann Simon (2007), Roger Tinner (2007), Marlis Heidenbauer (2008), Christine R. Schneider (2008), BDA (2009), Peter Eichhorn (2009: 229 et seqq.), Marlis Heidenbauer (2009), and Marc Witte (2011).

¹⁷¹ Examples are: Joachim Wagner (2005), Wolfgang Becker (2005), Jan Brinckmann, Sören Salomo and Hans G. Gemünden (2006), Jörg Freiling and Maria-José Estevão (2006), Liv K. Jacobsen (2006), Malte Brettel et al. (2008), Sandra Gottschalk (2008), Jürgen Egelin et al. (2010), Kirsti Dautzenberg et al. (2012), Helmut Fryges et al. (2012), Urs Fueglistaller et al. (2012), and Joachim Schoss (2013).

Specifically, section 4.1 focuses on establishing the contents (and in particular the dimensions and attributes) of the IC-categories, namely human capital, structural capital and relationship capital, in the German SME context. Moreover, the relevance of managing these issues is discussed against the background of the current German environment. Building on this, hypotheses, which relate to the direct (passage 4.1) as well as indirect (part 4.2) impact of the IC-categories on competitive business performance, are formulated. Altogether, the transformation of the general IC-framework into the German SME context is summarized in two conceptual research models (section 4.1.4 und 4.2.4). Lastly, chapter four closes with part 4.3 which outlines hypotheses focusing on company-age and IC.

4.1 THE DIRECT IMPACT OF GERMAN SME' INTELLECTUAL CAPITAL CATEGORIES ON LASTING COMPETITIVE BUSINESS PERFORMANCE

Drawing on the theoretical conclusions of the knowledge-based view and its conceptual IC-framework (chapter 2), one can deduce that *German SME' lasting competitive business performance increasingly rests on their idiosyncratic, undepreciable, intransferable, inimitable, non-substitutable* (Bamberger, Wrona 1996: 139), *intellect-based intangibles* – i.e. their human capital, structural capital and relationship capital – as well.¹⁷² In detail, it can be argued, for example, that German SME' company-specific and thus, unique *knowledge* (BMWi 2008: 7 et seq.; Durst 2008: 417; BMWi 2013c: 7) which is closely related to their specialization focus (Jaspers 2008b: 4), *dynamic capabilities* to quickly, flexibly as well as innovatively adapt to (new) environmental conditions (Simon 1996: 199; Gruber 2000: 260 et seq. & 295 et seq.; Schleef 2001: 25; Kunert 2006: 64; Heidenbauer 2008: 308 & 312; Heidenbauer 2009: 162; Schlömer-Laufen, Maaß 2012: 1), and close as well as long-term *stakeholder relations* (Bischof 2012: 10) are highly relevant to succeed in today's complex as well as volatile business world (cf. chapter 1.1 and figure 1); especially because they are internally driven and cannot be externally bought

¹⁷² It is argued that IC is already and will become further important for German SME (BMWi 2007: 9; Durst 2008: 417).

(Wolf, Paul, Zipse 2009: 30). Precisely, these and other intangible factors (further) help SME, among others, to compensate for their shortcomings – e.g. due to their relatively small size compared to large firms (St-Pierre, Audet 2011: 208; Bischof 2012: 10) and related insufficient economies of scale (St-Pierre, Audet 2011: 208) or limited (financial) resources (Thorleifsdottir, Claessen 2006: 23).¹⁷³

Apart from these *pull factors*, which promote the potential of successfully dealing with the current environment, there are also *push factors* which urge German SME to manage their IC in order to improve and (further) leverage their lasting competitive business performance (Wong, Aspinwall 2004: 46 et seq.). An example includes the fact that German SME' IC is often tied to or predominantly embodied in a small number of (elder) key people whose withdrawal from the firm can seriously harm business (*human capital*) (Wong, Aspinwall 2004: 56; Jaspers 2008b: 4). An additional exemplary issue, which threatens German SME' intellect-based strategic sources of success, is that German SME commonly fail to engage with all relevant stakeholders, who provide for externally gained IC, because of related investments (*relationship capital*) (Hügens, Peters, Zelewski 2007: 443; Mertins, Kohl, Krebs 2008: 50; Bischof 2012: 12). With respect to the avoidance of these two as well as other thrusts, it is therefore significant to establish a) all relevant and b) the most important attributes and dimensions of German SME' IC in order to devote management actions towards them.

To do so as well as to strengthen the introductory remark of this section and to address research questions number one and partly number three (cf. chapter 1.2), the following parts (4.1.1 – 4.1.3) substantiate the three IC-categories, namely human capital, structural capital and relationship capital, with (IC and success factor) research-results of German SME. Specifically, this chapter places its focus on establishing the contents of German SME' IC-categories as well as the *simple IC-model* (Bontis 1998: 76; F-Jardon, Martos 2009: 603). Likewise, hypotheses

¹⁷³ In general, mass production is, for example, not a promising business opportunity for (most) SME because they can neither compete with large corporations in terms of their (constrained) tangible assets nor can they easily escape price pressure via outsourcing in low-labor-cost counties. Instead, the majority of SME focuses on specialization (often in niche markets) and hence, competes on difficult-to-copy intangibles (Wong, Aspinwall 2004; Simon 2007: 115 et seq., Hutchinson, Quintas 2008: 133)

are raised in order to theoretically justify the simple IC-model which is concerned with the direct impact of the IC-categories on business performance.

4.1.1 German SME' Human Capital, its Dimensions (incl. Attributes) and its Direct Impact on Lasting Competitive Business Performance

The knowledge-based theory of the firm and the conceptual IC-framework – both introduced in chapter 2 – proposes that human capital (HC) is a heterogeneous, undepreciable, intransferable, inimitable as well as non-substitutable (Bamberger, Wrona 1996: 139) intangible resource which considerably contributes to sustained competitive advantages and thus, lasting above-average business performance (cf. chapters 2.4.1.1 and 2.4.2). This argument can also be transferred to and substantiated in the German SME context.

At first it can be stated that various international empirical studies in the field of SME' IC reveal that HC has a positive and significant direct impact on company success (Hermans, Kauranen 2005: 183; Tovstiga, Tulugurova 2007: 704 et seq.; F-Jardon, Martos 2009: 604). In particular, HC is regarded as an or sometimes even the most important IC-based strategic source of SME' competitive success (Tovstiga, Tulugurova 2007: 701; St-Pierre, Audet 2011: 209) since it helps SME to compensate i.a. for their small(er) size (Wang, Chang 2005 cited by St-Pierre, Audet 2011: 209). More specifically, the great influence of HC on SME' business performance can be attributed to the people who work in SME because they are the "(...) enablers of other corporate resources (...)" (Steenkamp, Kashyap 2010: 381) such as tangible physical products or intangible relationships (Sveiby 2001: 345).

Similar patterns seem to hold for German SME, too. In detail, different research projects, which unfortunately predominantly investigate German SME' impressions of their HC instead of actual HC-practice (Küpper 1994: 121; BMWi 2007: 49 et seqq. & 58; Durst 2008: 418; Mertins, Wang, Will 2009: 119; Tovstiga,

Tulugurova 2009: 76; BMWi 2010b: 5 et seq. & 14; Pawlowsky, Gözalan, Schmid 2011: 22; Vanini 2011: 7)¹⁷⁴, show that the intellect-based intangibles of German SME' employees and owners are perceived as relevant for their business performance. Furthermore, the majority of these studies exposes that German SME' HC is even more important than SC or RC (BMWi 2007: 58; Mertins, Will, Wuscher 2007: 201; Durst 2008: 418 & 424; BMWi 2010a: 5; BMWi 2010b: 16; Pawlowsky, Gözalan, Schmid 2011: 22) since the relevance of SC or RC (only) increases with growing company size (BMWi 2010b: 5 & 14).

The reason for the critical role of HC can be seen in the fact that (most of) the IC of German SME' internal members rests in their heads and brains (Voigt, Finke, Orth 2009: 280).¹⁷⁵ As such, German SME' HC is highly tacit and thus, difficult to buy or imitate by other firms. Consequently, this explains why German SME' HC can be regarded as a strategic source of lasting competitive business performance (Wolf, Paul, Zipse 2009: 30).

Besides it is worth highlighting that insights have been gained which confirm that the contributions of German SME' employees and the contributions of the entrepreneurs to the success of a firm are almost equal (Küpper 1994: 121; Durst 2008: 418). This emphasizes that HC-examinations in the German SME context need to incorporate employees' intellect-based intangibles as well as the entrepreneurs' IC.

The above discussion suggests that the IC of German SME' employees and entrepreneurs is perceived to have a positive impact on lasting competitive business performance. Whether the HC of SME is, however, actually and

¹⁷⁴ International studies on HC do as well mainly focus on the perceived importance instead of objective hard facts – cf. Joris Meijaard, Maryse Brand and Marco Mosselman (2005: 83), Sandra Cohen and Nikolaos Kaimenakis (2007: 250), Georg Tovstiga and Ekaterina Tulugurova (2007: 701), Carlos F-Jardon and Maria Martos (2009: 602), Salina Daud and Wan Yusoff (2010: 143), Natasja Steenkamp and Varsha Kashyap (2010: 381), Shaniz Khan (2011: 133), and Josee St-Pierre and Josee Audet (2011: 209).

¹⁷⁵ This IC includes, for example, a) knowledge concerning e.g. markets, competitors and product features, b) people-based know-how (Voigt, Finke, Orth 2009: 280) which is required i.a. to perform daily tasks in the first place, to come up with innovations and finally to succeed (F-Jardon, Martos 2009: 602), and c) the motivation to use these resources towards a company's advantage.

objectively associated with success – in a positive way – and thus, represents a strategic source of success shall be investigated in this dissertation. Consequently, the following hypothesis is brought forward and requires empirical testing within the scope of this doctoral thesis:

Hypothesis 1:

The human capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.

To further specify and strengthen this hypothesis, this chapter also circumstantiates the HC-dimensions of part 2.4.1.1 – i.e. competencies, attitude and intellectual agility – in terms of German SME.¹⁷⁶ This is done by splitting the line of thought into an employees' level and an entrepreneurs' level – as already indicated above. Precisely, such a division is necessary since German SME' entrepreneurs take on an especially strategically significant position (Schleef 2001: 9; Simon 2007: 334; Schneider 2008: 63, 135 et seqq. & 170; Durst, Gueldenberg 2009: 183) which shall not be mixed with the intellect-based intangibles of German SME' workforce.¹⁷⁷

¹⁷⁶ This transfer is important because the HC of SME significantly differs from that of large firms (Desouza, Awazu 2006: 33 et seqq. & 36 et seq.).

¹⁷⁷ Such a distinction between employees and management/leadership is especially common in the area of IC-reporting. The German (BMWi 2008: 18 & 20; BMWi 2013c: 18, 20 & 24) and European reporting guidelines (InCaS 2008: 25; Mertins, Wang, Will 2009: 118), for example, divide human capital in four dimensions – i.e. a) employees professional competence, b) social competence, c) employee motivation, d) leadership ability – of which one focuses on executives. A similar setting holds true for the Nordic guidelines: a) employees, b) staff turnover and recruiting, c) skills and competence, d) employee satisfaction and attitude, e) executive competency (Thorleifsdottir, Claessen 2006: 15 & 53). Besides, international studies on the impact of IC on firm's success – e.g. corporate value – adopt a 3:1 HC-separation between employees and entrepreneurs as well: a) leadership and management ability, b) training and development of human resource, c) workforce attitudes, d) employee knowledge and skills (Tseng, Goo 2005: 194 et seq.).

4.1.1.1 *Competencies of German SME' Employees*

The first dimension of German SME' HC looks into employees' (professional) competencies. It comprises the deep and specific (Tinner 2007: 191) as well as broad and general(istic) (Völker, Sauer, Simon 2007: 145 et seq.), application-orientated *knowledge* of German SME' workers and the *know-how* (Mertins, Kohl, Krebs 2008: 43) which they have acquired during their career (Mertins, Wang, Will 2009: 118). Such knowledge and capabilities are regarded as relevant strategic sources of the lasting competitive success of German SME (Daschmann 1993: 165 et seq. & 173; BMWi 2007: 17; Walther-Klaus, Zimmermann 2007: 50; Becker, Staffel, Ulrich 2008: 36; Bindrim 2010: 6; BMWi 2010b: 10; Hoch, Heupel 2013: 421) because they are important to perform German SME' daily (Mertins, Seidel 2009: 290) multi-functional and interdisciplinary (Simon 1996: 165; Völker, Sauer, Simon 2007: 145 et seq.) work-tasks which are (often) influenced by as well as tough because of SME' differentiation – incl. specification and niche-market focus (Adenäuer 2007: 26, 35 et seq. & 41 et seq.; Tinner 2007: 191).

In detail, *formal education* is a specific attribute of German SME' employees' competencies since it builds the basis to actually perform (work-related) tasks (Mertins, Seidel 2009: 290) and thus, to succeed. In particular, it has been discovered in the international (Bosma et al. 2004: 232; Wong, Aspinwall 2005: 66 & 72) as well as the German (Daschmann 1993: 149; Walther-Klaus, Zimmermann 2007: 80; Mertins, Kohl, Krebs 2008: 46; IfM 2013b) SME context that highly qualified personnel is very much required to perform well – e.g. to produce high quality products, services or customized product-solutions (Simon 2007: 303 & 318). In terms of German SME, specifically, the high level of employees' qualifications and therefore, performance can, on the one hand, be traced back to the *dual apprenticeship system* (Tinner 2007: 191; Kay, Kranzusch, Suprinovic 2008: 103; Eichhorn 2009: 232; IfM 2013b). Concretely, German SME vocationally educated 83.2% of all German apprentices in 2010 (IfM 2012b, IfM 2013a). By doing so, German SME are given an (competitive) edge in mainly to areas: Firstly, they are able to compensate for the limited number of directly available skilled workers – especially in rural locations. Secondly, it helps them to secure their flow of qualified employees (Simon 1996: 173; Simon 2007: 319 et seq.) and it increases their internal recruitment possibilities (Kay, Kranzusch, Suprinovic 2008: 92). Both of these two issues are especially noteworthy in the light of the current

demographic changes¹⁷⁸ and their consequences like labor shortage and the tough *war for talent* that SME have to fight against large companies (RICARDIS 2006: 41; Kay, Kranzusch, Suprinovic 2008: 1 et seq.; Fuchs, Zika 2010: 8; Küpper, Zoch 2010: 333; Wallau 2011: 43; Heupel 2012: 12; Hoch, Heupel 2013: 421 et seq.). On the other hand, it has also been noticed that the number of *academics* increases in German SME, too. This, in turn, supports German SME in leveraging their concentration of knowledge (Simon 2007: 318).

It is also highlighted in chapter 2.4.1.1 that HC comprises not only knowledge- and IC-stocks such as educated personnel but also knowledge- and IC-flows such as the development of HC. The latter aspect is closely linked to *specifically targeted (advanced) training* which offers SME the potential to strengthen their employees' knowledge as well as capabilities, to uphold their actuality standards and thus, to succeed in the long-run (Adenäuer 2007: 26, 35 et seq., 41 et seq.; Frai, Thiehoff 2007: 35; BDA 2009: 29; Pawlowsky, Gözalan, Schmid 2011: 6 et seq.)¹⁷⁹. It is discovered that approx. 75% (Pawlowsky et al. 2006: 10 et seq.; Döring, Turnwald 2007: 2) of German SME offer continuous advanced education and internal training to their staff while quite a few of these firms plan to further increase their actions (Pawlowsky et al. 2006: 11). Additionally, it is revealed that employees' chances to receive further professional training do not depend on the size of the SME (Landsberg, Wehling 2006: 6) and that all German SME seem to conduct advanced education to a certain degree. Altogether, the discussion above highlights that German SME emphasize *more* training possibilities *than large firms* (Graf 2007: 116 et seq. cited by Döring, Turnwald 2007: 2). Moreover, the training issue can be further strengthened by the fact that German SME' *employees* are generally *highly willing to learn* (Simon 1996: 223). Consequently, it can be argued that employees' advanced education is key to German SME' competitive advantage – especially over big firms – and hence, lasting supernormal business

¹⁷⁸ The most influencing demographic challenges are the generally increased life expectancy (Wallau 2011: 43) and the decrease of the German population by 16.6% until 2050 (Statistisches Bundesamt 2006; Kay, Kranzusch, Suprinovic 2008: 3) - especially the working age population (Kay, Kranzusch, Suprinovic 2008: 6) – i.a. due to a decline in the birth rate (Wallau 2011: 43).

¹⁷⁹ About 70% of German SME place the focus of their training on knowledge and capabilities (Witte 2011: Appendix 16 & VII et seq.).

performance (Simon 1996: 165; Kunert 2006: 203; Tinner 2007: 191; Heidenbauer 2008: 312 et seq.).¹⁸⁰ On top of this, it is important to state that German SME' training is to most parts *informal, less systematic and in-house conducted* (Simon 1996: 174; Hamel 2006: 251 et seq.) – e.g. learning by doing, learning from others and learning-on-the-job (RICARDIS 2006: 41). “This type of training practices result in tacit competencies and skills, which contribute to the competence base of SMEs and are difficult to imitate by competitors” (ibid.: 41). Moreover, such internal training helps SME to build as well as strengthen common knowledge and thus, to reduce knowledge losses when employees withdraw from the firm (Desouza, Awazu 2006: 36 et seq.; St-Pierre, Audet 2011: 205). Therefore, informal education arguably again contributes to German SME' lasting competitive business performance. Lastly, it is important to highlight that advanced training – including lifelong learning – is a specifically relevant IC-based strategic resource of German SME because of the current demographic change: it is required for the older workforce to uphold its workableness (Without author 2006: 41; Kay, Kranzusch, Suprinovic 2008: 58 & 84; Wallau 2011: 45) and for less qualified personnel – due to labor shortage – to be taught how to perform its tasks well (Kay, Kranzusch, Suprinovic 2008: 92).

Building on the established primary and advanced education, employees do further collect supporting knowledge and know-know during their career: that is in the form of (work) *experience* (Mertins, Seidel 2009: 290). Employees' experiences are, according to international research, a critical IC-based source of SME' success (Stenkamp, Kashyap 2010: 376, 379 & 390). In the German SME context employees' wealth of experience is expected to be particularly high as well as majorly contributing to business performance because of the staff's *heterogeneous, interdisciplinary* experience within a firm or across different companies (including come-backers) (Simon 2007: 308 & 327) which are inimitable and not easily substitutable (Bamberger, Wrona 1996: 139).

Overall, the above discussion highlights that the competencies of German SME' workers are highly important for German SME' HC, their sustainable competitive

¹⁸⁰ International studies do as well prove that employees' training is a success factor of SME (Wong, Aspinwall 2005: 66; Stenkamp, Kashyap 2010: 376, 379 & 390).

advantages and hence, long-term success. Consequently, the following hypothesis can be formulated:

Hypothesis 1a:

The competencies of German SME' employees are a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.

4.1.1.2 *Attitude of German SME' Employees*

Knowledge and skills of the workforce solely are not enough to succeed in the long-term (cf. chapter 2.4.1.1). Employees' positive and contributing behavior – e.g. loyalty, high identification with the organization as well as (intrinsic) motivation – is also an IC-based strategic source of German SME' lasting competitive business performance (Küpper 1994: 121; Simon 1996: 222 et seq.) because it promotes that people i.a. take on responsibilities, commit to their work, are willing to use and exchange knowledge as well as skills in order to contribute to corporate success, etc. (Mertins, Wang, Will 2009: 118; Pawlowsky, Gözalan, Schmid 2010: 17; Pawlowsky, Gözalan, Schmid 2011: 17).

Generally speaking, employees' *loyalty* is an important attribute of SME' HC (Steenkamp, Kashyap 2010: 376, 379 & 390) and particularly of the HC-dimension 'personnel's attitude' because it illustrates the extent to which SME' HC remains within the firm and can contribute to business performance in the long run. Staff's loyalty is also relevant in the context of German SME as can be seen in the following: German SME are usually characterized by a high level of *seniority* (Tinner 2007: 191) which averages to approx. 37 years (Simon 1996: 169; Simon 2007: 306). The fact that German SME' workers tend to stay in a particular company for many years and thus, are less mobile than workers in large firms with an average seniority of 15 years (Scholz, Stein, Müller 2007: 18) goes also hand-in-hand with low *fluctuation* rates of round 2.5% to 5% in German SME (Simon 1996: 165 et seq.; Simon 2006: 58 & 60; Simon 2007: 305). Furthermore, high company-loyalty can be seen in the fact that sometimes various generations

of a family were or are employed at the same SME (Simon 1996: 173; Simon 2007: 315) and hence, that company-devotion is transferred to the staff's private life, too. Lastly, it is interesting to point out that German SME' low *sick-leave rates* of around 4% (Simon 1996: 167; Simon 2006: 58; Simon, Huber 2006: 69; Simon 2007: 304) cannot only be interpreted as an indication of employees' loyalty but also as a sign of SME' increasingly recognized or encouraged health promotion which indicates prevention concerning demographic challenges (Without author 2006: 41; Frai, Thiehoff 2007: 33).¹⁸¹ In total, the discussion highlights that the loyalty of German SME' workers is fairly high and arguably even higher than in large companies (Fueglistaller, Halter, Müller 2004: 13). Hence, it gives German SME a competitive edge and offers potentials to competitively succeed over big firms in the long-run. In particular, employees' loyalty helps German SME to tie their peoples' IC to the firm, to reduce their efforts – e.g. time and money – to recruit and/or train new staff (Simon, Huber 2006: 69; Simon 2007: 306) as well as to decrease the need to transfer tacit knowledge into organizational IC so that it can be used even after a worker's withdrawal (Jones, Leonard 2009: 27). Consequently, it is important for SME' lasting competitive business performance. On top of this, loyalty is also remarkably relevant in the light of the current demographic changes. In detail, German SME' high loyalty and thus, the subordinated need to constantly hire new staff, positions them reasonably well concerning the demographic changes and related issues such as employment gaps and labor shortages (Kay, Kranzusch, Suprinovic 2008: 84; Wallau 2011: 48). The reason why German SME' employees are reasonably loyal is not necessarily materially shaped but arguably grounded in intangibles such as *trust in or towards the entrepreneur*, who is personally known by most of the workers (Fueglistaller, Halter, Müller 2004: 13). German SME' good, personal, trust-worthy as well as *close relationships* between the employees and the entrepreneurs¹⁸², for example,

¹⁸¹ Same seems to hold for big German companies (Sterzel 2011: 142).

¹⁸² These relationships may be particularly strong in rural locations: e.g. the entrepreneur and his/her employees went to school together or are neighbors (Simon 1996: 173; Simon 2007: 315); or because there are limited employment possibilities and thus, good relationships are required in order not to be unemployed (Reinemann 2011: 70).

(Daschmann 1993: 61; Simon 1996: 173; Gruber 2000: 262; Simon 2007: 315; Tinner 2007: 194; BMWi 2010b: 16, BMWi 2010b: 16) are not only one-sided but rather *mutual*: the employees are trusted and *given (high) responsibilities*, too (Simon 1996: 176) – e.g. to self-organize their work (Kunert 2006: 195).¹⁸³ Because of these circumstances as well as the related shorter communication- and feedback-streams, the fact that the personnel more frequently sees the outcomes of its working efforts due to the firm's small(er) size, and since the workforce often knows that the success of their company depends (to a large extent) on them and their contribution (Wong, Aspinwall 2004: 55), German SME' staff exhibits also a *high identification with the firm* (Daschmann 1993: 61; Simon 2006: 58). Other results of these *non-financial and intrinsic drivers* are that German SME' personnel are generally also very much *motivated* (Daschmann 1993: 61 & 173; Küpper 1994: 121; Simon 1996: 176; Leitner 2001: 174 & 204), *satisfied, committed* to fulfill their duties and *willing to openly exchange knowledge* (InCaS 2008: 25; Mertins, Kohl, Krebs 2008: 46; Mertins, Wang, Will 2009: 118). Altogether these SME- and workforce-specific, difficult to transfer, hardly imitable as well as non-substitutable facets of German SME' HC lead, in turn, to lasting competitive business performance (Daschmann 1993: 165 et seq.; Leitner 2001: 174; BMWi 2007: 17, BMWi 2010b: 10). Overall, the above presented literature review can be concluded by saying that German SME' lasting competitive success seems to be dependent on the unique, intangible attitude of their employees. To elaborate on this, the following hypothesis is to be empirically tested:

Hypothesis 1b:

The attitude of German SME' employees is a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.

¹⁸³ "The close social ties between the members of the SME act as a deterrence against employees leaving the business" (Desouza, Awazu 2006: 39).

4.1.1.3 Intellectual Agility of German SME' Employees

The intellectual agility of German SME' employees – as the mix of competencies and behavior (cf. chapter 2.4.1.1) – is also regarded as a strategically relevant dimension of German SME' HC and thus, an IC-based strategic source of German SME' lasting competitive performance which helps, for instance, to compensate for limited (physical) resources. This is because German SME' employees are, i.a. due to their multiple or even multifunctional tasks (Simon 1996: 165; Völker, Sauer, Simon 2007: 145 et seq.) and common as well as generally-oriented knowledge¹⁸⁴ (Völker, Sauer, Simon 2007: 145 et seq.), particularly characterized by the following intellectual agility-attributes:

First of all, it can be noted that German SME' staff is able to effectively transfer its knowledge from one context to another – e.g. to facilitate interdisciplinary (cooperation) projects – and to link different (kinds of) knowledge in order to allow constructive communication, for example, in cross-departmental meeting (broadly adapted from Mertins, Wang, Will 2009: 118).¹⁸⁵ In depth, it is assumed that the competencies of German SME' employees (including common knowledge) are distinctive enough so that the workforce can, for example, a) be *flexibly delegated and deployed* within the firm, among projects, between locations, along with functions or time wise – e.g. depending on demand (Simon 1996: 171; Simon 2007: 303, 313, 327)¹⁸⁶; b) *understand each other's* issues and challenges; and c) help another out or *pitch in for each other*¹⁸⁷. Moreover, it is believed that German SME' workers are not just able and willing to accomplish the previously mentioned abilities or functions because of the above mentioned multifunctional duties (Simon 1996: 165; Völker, Sauer, Simon 2007: 145 et seq.) and their common

¹⁸⁴ The common as well as generally-oriented knowledge is arguably advantageous because it provides room for mutual interpretation, communication and cooperation (Desouza, Awazu 2006: 36 et seq.).

¹⁸⁵ Same holds for European SME – cf. RICARDIS (2006: 41) and InCaS (2008: 25).

¹⁸⁶ This is offered/conducted by the majority of German SME (Kay, Kranzusch, Suprinovic 2008: 127).

¹⁸⁷ Although this argument is established based on international SME literature (cf. Kevin Desouza and Yukika Awazu 2006: 36 et seq.) it can still be justified in the German context because of employees strong social ties (Simon 2007: 305) and intolerance with respect to non-/under-performing employees (ibid.: 310).

knowledge (Völker, Sauer, Simon 2007: 145 et seq.) but also because of their high social qualifications, social ties¹⁸⁸ (Simon 2007: 305), social controls (Simon 1996: 169, Simon 2007: 327 & 356) as well as intolerance with respect to non- or under-performing employees – since such colleagues threaten the firm's success and thus, their jobs (Simon 2007: 310). Taken together, it can be reasoned that the *flexibility, adaptability* and *changeability* of German SME' employee are strategically relevant intangible source of competitive success because they are not only company-specific but also predominantly causally ambiguous, undepreciable, intransferable, inimitable and non-substitutable.

Another intellectual agility attribute which is closely related to SME' high social competencies is their *creativity* (InCaS 2008: 25) and thus, the source which creates *innovations* (Daum 2003: 17). Specifically, international studies discover that the innovativeness of SME' employees is a critical factor which contributes to their success (Steenkamp, Kashyap 2010: 376, 379 & 390). In the German context, this is expected to be the case, too. This is because German SME' workers are a strategically important source for continuous improvements since they are the *carriers of innovation-relevant competencies* (Simon 1996: 175; Simon 2007: 321 et seq.; Tinner 2007: 194; Mertins, Kohl, Krebs 2008: 46).

The last attribute of the intellectual agility of German SME' is the *personal development* of the workers – e.g. to identify aspects to improve individuals' potentials (BDA 2009: 29 et seqq.). This attribute is regarded as an important intangible source of German SME' success (Daschmann 1993: 153) because it strengthens a company's HC in the long-run (BDA 2009: 29 et seqq.). Moreover, it needs to be stressed that the relevance of this strategic source of competitive performance is expected to increase in the future due to demographic changes – e.g. to acquire and maintain skilled staff is becoming more important (Döring, Turnwald 2007: 1).

Summing up, the above discussion reinforces the opening statement of this dimension and thus, supports the claim that the intellectual agility of German

¹⁸⁸ "People tend to work better when they feel part of a group and teams achieve more than a collection of individuals. Whilst different departments may have different ways of working, it remains essential that they work together, united by a spirit of co-operation and shared purpose" (RICARDIS 2006: 41).

SME' staff is a critical dimension of HC and hence, an IC-based strategic source of their success. To further examine this, the following hypothesis is proposed:

Hypothesis 1c:

The intellectual agility of German SME' employees is a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.

4.1.1.4 *German SME' Leader(ship) and Management Ability*

The last dimension of German SME' HC, namely leader(ship) and management¹⁸⁹ ability, deals with the HC embodied in the entrepreneurs and (top) managers, respectively.¹⁹⁰ Specifically, it is concerned with the leaders' competencies – e.g. knowledge, education and (work) experience –, their self development, their motivation as well as ability to motivate others, their capabilities to administer and communicate their firm's strategies, vision etc. (InCaS 2008: 25; Mertins, Wang, Will 2009: 118; Ramos-Rodriguez et al. 2010: 569). These and other personality-based attributes of German SME' entrepreneurs or managers do not only have a powerful as well as influential role (Simon 1996: 179; Simon, Huber 2006: 70) and represent a strategically relevant intangible source of

¹⁸⁹ This dimension incorporates entrepreneurs and non-family managers because of the increasing number of the latter. Yet, it has to be considered that many of these external managers are (part-) owners, too (Simon 2007: 329 et seqq.).

¹⁹⁰ This dimension has been named differently depending on the author. In the German SME context, for example, it is called "leadership competencies" by Kay Alwert and Nadine Vorsatz (2005: 325) and "leadership ability" by Kai Mertins et al. (2009: 118). In the international literature on IC in SME this issues is labelled as "leadership and support" by Kuan Yew Wong and Elaine Aspinwall (2005: 66) and "executive competency" by Asta Thorleifsdottir et al. (2006: 15). Lastly it is important to stress that Chun-Yao Tseng and Yeong-Jia James Goo (2005: 194 et seqq.), who refer to Annie Brooking (1996) and Johan Roos, Göran Roos and Leif Edvinsson (1998), title this HC-dimension "leadership and management ability". The latter option is chosen for the scope of this dissertation because it relies on prime literature in the field of IC.

success (BMWi 2007: 17 & 52; BMWi 2010b: 10)¹⁹¹ but are arguably the most important cause of German SME' competitive business performance (Pleitner 1995: 121 & 371 et seq. cited by Kunert 2006: 153; Gruber 2000: 315 et seq.). Specifically, SME' leaders are sometimes argued to be more important than the above discussed qualified and loyal employees (Simon 2007: 334). On top of this, it is essential to highlight that the leaders' attitudes and conduct concerning knowledge- and IC-management are central strategic sources of success in today's knowledge economy, too (Staiger 2008: 274).¹⁹²

The first attribute of German SME' leader(ship) and management ability which is relevant for German SME' competitive business performance is the leadership's high *competencies* (including qualifications) (Kunert 2006: 152 et seq., 191, 193, 199 & 204; Durst 2008: 424 et seq.). In line with the above presented paragraph on employees' knowledge and capabilities, the aspect of *formal education* is initially discussed. Some authors argue that the education of German SME' leaders is important for success (Schneider 2008: 63 & 170).¹⁹³ In detail, it can be noticed that German SME which have a high amount of *academics* in leadership are more successful (Heidenbauer 2008: 312 et seq.). Moreover, it is highlighted that newly founded German SME and later company generations are more likely to have a higher degree of academically educated entrepreneurs and managers, respectively (Simon 2007: 331 et seq. & 354 et seq.). Hence, they are assumed to professionalize and perfect management (*ibid.*: 354 et seq.) which in turn may impact success. For similar reasons – e.g. better use of leadership instruments and tools due to higher education (Pohl, Rehkugler 1989: 6 cited by Kunert 2006: 154)

¹⁹¹ Same holds for international SME, too (Matejun 2011: 2; Wong, Aspinwall 2005: 66 & 72 et seq.).

¹⁹² "Top management or leaders should devote themselves to promoting a corporate mindset that emphasises co-operation and knowledge sharing across the organisation. They should also contribute to the creation of an environment in which knowledge creation and cross-boundary learning can flourish. More essentially is for them to provide continual support and commitment to initiate and sustain the KM effort" (Wong, Aspinwall 2005: 75).

¹⁹³ Christine Schneider (2008: 63 & 170) refers to two literature sources which specifically mention entrepreneurs' education: Per Davidsson (1991) and Patricia Greene and Brown Terrence (1997).

– it is discovered that German SME which are led by (family-) external managers are more successful, too (Pohl, Rehkugler 1986: 169 et seq. and Pohl, Rehkugler 1989: 11 both cited by Kunert 2006: 154)(Daschmann 1993: 168). The second characteristic of the competencies of German SME' leaders is (*advanced*) *training*. Further education of German SME' entrepreneurs and managers is regarded to be important for German SME' success (Schneider 2008: 63 & 170) and thus, explains why about 40% of German SME offer it to their leaders (Witte 2011: Appendix 16, VII et seqq.) In depth, (advanced) training does, on the one hand, improve the competencies and qualifications of the leaders which is especially important considering the short half-life of knowledge in today's economy. Furthermore, enlarged competencies improve entrepreneurs' professional activities which are, in turn, reflected in business performance (Klöffel 2008: 63 & 89).¹⁹⁴ On the other hand, additional training at the top management level is relevant since German SME often initiate such programs in order for these top managers to internally train the employees afterwards (Hamel 2006: 252). The third and last feature of the attribute 'leadership's competencies' – which is also discussed above in the context of employees' competencies – is *experience*. The experience of German SME' entrepreneurs and managers are also confirmed to be strategic sources of German SME' success (Küpper 1994: 121 et seq.; Schneider 2008: 63, 135 et seq. & 170). Specifically, it can be said that the *practical experience* of German SME' leaders – e.g. their duration in a leading position – are principally important for lasting competitive business performance since they help to compensate for lower levels of education (Daschmann 1993: 160 et seq.).¹⁹⁵ More to it, the experience of German SME' leaders are fairly large because of the low division of labor at the top management level. As such, entrepreneurs and top managers, respectively, are often experienced in various cross-disciplinary areas such as technical issues

¹⁹⁴ "Training is, of course, also important for managers and entrepreneurs! Differing from managers in bigger companies, those in SMEs rarely have an initial training period in management schools. Often, after a takeover, former employees are driven into the leadership of the business. Upskilling is often necessary in order to meet the changing demands of the clientele, to develop the company, to adapt the organisation and processes, etc" (Maack et al. 2009: 50).

¹⁹⁵ Specifically, the highest impact on success can be noticed when education and experience are combined (Daschmann 1993: 160 et seq.).

and business tasks (Breidenbach et al. 2006: 8; Simon 2007: 332). The resulting diversity of experience is, in response, expected to positively impact competitive business performance since it is historically grown – i.e. causally ambiguous – and thus, unique, undepreciable, intransferable, inimitable and non-substitutable. Altogether this paragraph highlights that the competencies of German SME' leadership are strategically important for German SME' competitive business performance.

Leaders' *attitude* is the second attribute of German SME' leader(ship) and management ability which is expected to positively support HC and thus, company success. Specifically, the entrepreneurs and managers of German SME are generally highly *motivated* (Adenäuer 2007: 27, 34, 36) whereas the entrepreneurs are usually characterized by a higher level of performance-motivation compared to external managers (Stahl 2003b: 11). This is because of the entrepreneurs' full *identification* with the firm (Simon 1996: 179; Adenäuer 2007: 27, 34 & 36; Simon 2007: 351 et seq.). Put differently, due to the fact that entrepreneurs are completely obsessed with their idea and entirely passionate for their work, they are portrayed as highly (intrinsically) motivated (Simon 1996: 179; Simon 2007: 351 et seq.). Because of this as well as the fact that most of the leaders in German SME are typically also the owners, there is usually also a high consistency of leadership – with an average of over 20 years (Simon 1996: 179; Simon 2006: 49 & 59; Simon, Huber 2006: 51 et seqq.; Simon 2007: 329 & 333 et seq., 335; Höhner 2005: 13 cited by Pawlowsky et al. 2006: 3). This *loyalty* is also observed in German SME' low fluctuation rates at top management level. In detail, there is only a high fluctuation on top management level at the beginning of a work relationship because of successful SME' intolerance with respect to underperformers (Simon 2007: 333). In line with the above used arguments (cf. chapter 4.1.1.2), the discussion at hand shows that the attitude of German SME' leadership is important to German SME' lasting competitive business performance. This is, specifically, because it highlights that entrepreneurs as well as managers are willing to perform for the good of their firm and are likely to contribute their IC to their enterprise in the long-run. This, in turn, leads to reduced efforts concerning recruiting and training new leaders as well as transferring tacit knowledge into organizational IC and thus, promotes success.

The third attribute of German SME' leader(ship) and management ability focuses

on the entrepreneurs' and managers' *intellectual agility*. With respect to German SME' leaders' capability and/or openness to quickly and flexibly innovate as well as adjust in the light of changing business environments, to improve performance via innovations and adaptation, to change practice, to think laterally about problems, to transfer knowledge among different context etc. (Roos et al. 1997: 32 & 39; Tovstiga, Tulugurova 2009: 71 et seq.), the following can be said: first of all, German SME' leaders aim for a very specific goal. That is to perform better, faster and more resource-optimizing than their competitors (Stahl 2003b: 11 et seq.). In this respect, they also strive for achieving knowledge leads over their rivals in order to outperform them (ibid.: 3). Yet, to achieve this, SME' top managers need to collect knowledge in order to *identify* potential *threats* as well as *opportunities* and to subsequently *respond* in a timely and appropriate manner (RICARDIS 2006: 41). This, in turn, explains why German entrepreneurs often *communicate* with employees and conduct *internal meeting* to consult their workforce (Daschmann 1993: 60) concerning, for instance, work-processes, work place arrangements, the work environment etc. (BDA 2009: 17 et seqq.). Furthermore, these activities are expected to be important for lasting competitive business performance because reflections on successful, bungled and missed decisions build the basis to learn (Stahl 2003a: 68). On top of this, it can be argued that German SME' leaders have a special *intuition* concerning i.a. changing markets. Hence, they are often able to quickly recognize chances as well as risks and are able to adopt accordingly (Gruber 2000: 315). Because of this, entrepreneurs and top managers are also often able to give *impulse for innovations* (Simon 2007: 213) – e.g. up to 60% of all innovations are submitted by the top management of German SME (Witte 2011: 53). Additionally, leaders of German SME have a high capability to *solve problems* which further contributes to reaching their above mentioned objective. Specifically, successful entrepreneurs and top managers of German SME, respectively, usually develop a repertoire of reactions to potential challenges – already at the beginning of their career (Stahl 2003b: 22). This again supports them in reacting faster than competitors may do. Lastly, it is interesting to highlight that German SME' leaders are expected to be capable of transferring their knowledge and IC among different contexts because of their broad competencies – e.g. because they collect vast experience by getting involved in the majority of decisions (Daschmann 1993: 60) and because they usually perform

various tasks simultaneously (Dömötör 2011: 10). On the whole, this paragraph can be concluded by stating that the intellectual agility of German SME' leader – including their flexibility, adaptability and innovativeness – is fairly high and especially contributes to HC and hence, lasting competitive business performance because it is very much tacit, undepreciable, intransferable, inimitable and non-substitutable.

A fourth aspect of the dimension 'German SME' leader(ship) and management ability' deals with the *leadership task* itself. At first, it is worth highlighting that the *leading competencies* of German SME' entrepreneurs and top managers are regarded as a strategic intangible source of German SME' success (Schleef 2001: 9; Durst 2008: 424 et seq.). This is because the leaders often act as *role models* which enables them to *convince*, *inspire* as well as *motivate* others; and in particular employees (Simon 1996: 189; Simon 2007: 329; Tinner 2007: 194; Völker, Sauer, Simon 2007: 128 & 157 et seqq.). Furthermore, these aspects can be strengthened by the fact that good leaders of German SME are generally able to *communicate* task and expectations well (BDA 2009: 17 et seqq.). This, in turn, allows them to practice a participatory leadership style concerning daily operations (Simon 1996: 179 & 190; Simon 2006: 60; Simon, Huber 2006: 51 et seqq.; Simon 2007: 329 & 355)¹⁹⁶ which is expected to motivate employees even more. All of these leadership issues do, of course, go hand-in-hand with the above mentioned high level of staff-integration and -consultation which further reinforces the leadership competencies of German SME' entrepreneur and managers. Thus, it becomes clear why the leadership itself is regarded as an important issue of entrepreneurs' and top management's IC. Besides, it is arguably critical for sustainable competitive success because it is mainly tacit, undepreciable, intransferable, inimitable and non-substitutable.

To finish this section on German SME' leader(ship) and management ability, the attribute called '*visionary*' is presented. Generally, a visionary can be defined as "a person with original ideas about what the future will or could be like" (Oxford Dictionaries 2013). The leaders of successful German SME are regarded to be

¹⁹⁶ As opposed to authoritarian leadership style which is preferably applied when it comes to basic values, objectives and core competencies (Simon 1996: 179 & 195; Simon 2006: 60; Simon, Huber 2006: 51 et seqq.; Simon 2007: 329 & 355;).

personalities who envision as well as ambitiously plan the future (Gruber 2000: 262 et seq.; Becker, Staffel, Ulrich 2008: 36; Oxford Dictionaries 2013) and may even imagine or strive for things which seem unrealistic based on today's perspective. This is, firstly, because the entrepreneurs and managers of German SME do usually not live and think in a duplicate of reality but instead orientate themselves on their own perceptions as well as internal pictures. Based upon this, they are able to develop their company's (often aspiring) vision (Stahl 2003b: 18). Secondly, German SME' leaders are arguably visionaries because of their optimistic mental attitude. Specifically, German SME' entrepreneurs are able to focus more on opportunities than on risks, more on strength than on weaknesses, and more on success than failure. Because of this skill to rather exploit "windows of opportunities" (ibid.: 17) German SME' leaders are expected to have higher chances to perform well, too. Lastly, it is interesting to point out that German SME' leaders are usually goal-orientated, full of energy, and enthusiastic (Simon 1996: 188 et seq.; Simon 2006: 58 et seq.; Simon 2007: 329) – especially during their early years (Simon 2007: 339 et seq.). This again underlines their characteristic of being visionary, which is tacit as well as difficult to transfer, imitate and substitute. For these reasons, the visionary-characteristic of German SME' leaders is viewed as a strategically relevant IC-based strategic source of lasting competitive business performance (Gruber 2000: 263).

In total, the above section on German SME' leader(ship) and management ability presents five key attributes whose specifications are argued to be positively contributing to the HC of German SME' entrepreneurs and top management, respectively. Hence, they can be regarded as strategic sources of German SME' HC and thus, competitive success and lead to the following hypothesis:

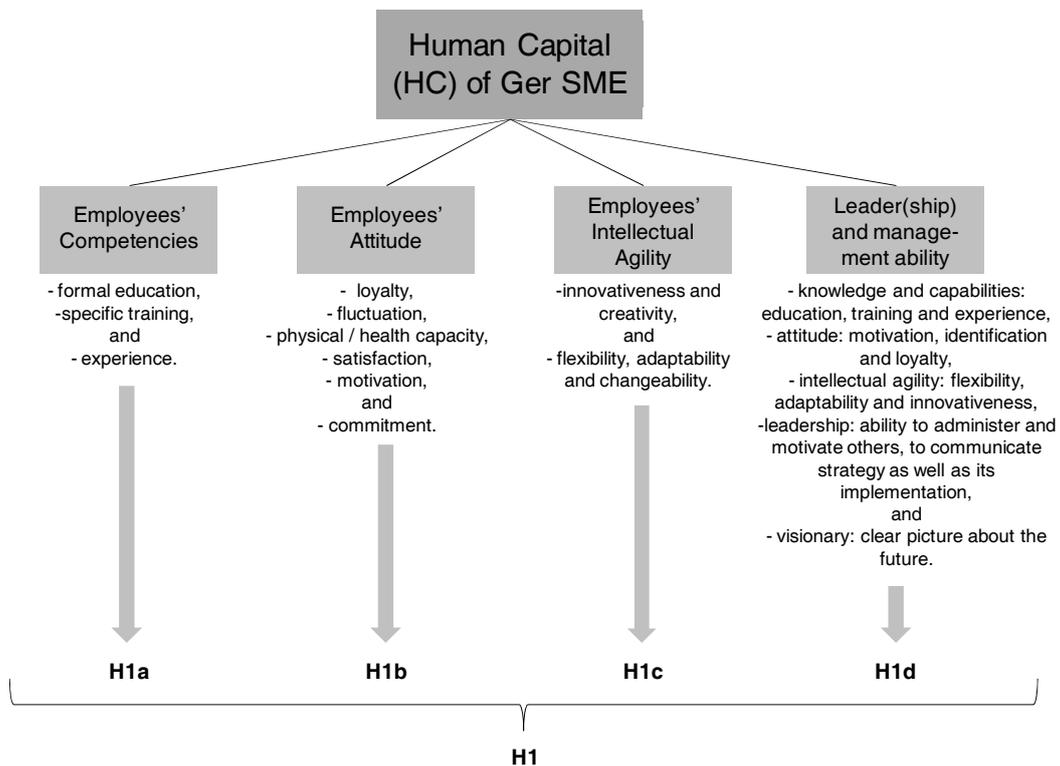
Hypothesis 1d:

German SME' leader(ship) and management ability is a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.

4.1.1.5 Summary of German SME' Human Capital

To finish the discussion on German SME' HC, its dimensions including their particular attributes and its direct impact on lasting competitive business performance, it can be stated that the various above presented text passages confirm that German SME' HC consists of four key dimensions (cf. figure 35). In total these four dimensions and their respective (sub-)hypotheses (H1a, H1b, H1c and H1d) strengthen the key hypothesis (H1) of this chapter, namely that the HC of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.

Figure 35: The Dimensions and Attributes of German SME' HC



4.1.2 German SME' Structural Capital, its Dimensions (incl. Attributes) and its Direct Impact on Lasting Competitive Business Performance

In line with chapter 4.1.1, this section also argues that the general conclusions of parts 2.4.1.2 and 2.4.2 – i.e. that structural capital (SC) represents a heterogeneous, undepreciable, intransferable, inimitable, non-substitutable intangible resource which has a positive direct impact on lasting competitive business performance – apply to German SME.

To start off with, it can be noticed that international studies on SME' IC reveal that SME' SC is, if managed wisely, positively (and directly) associated with success (Hermans, Kauranen 2005: 183; Tovstiga, Tulugurova 2007: 700 & 704 et seq.; F-Jardon, Martos 2009: 604). The reason for this is, firstly, seen in the fact that SC consists of HC which is converted into a more 'company-owned' format (Huggins, Weir 2007: 711) and thus, represents IC which remains with the SME and is able to contribute to performance even if employees leave their firm (InCaS 2008: 7). Furthermore, SC enables SME to internalize as well as combine the diverse intellect-based intangibles of their business units and hence, promotes the flow of tacit IC among the involved individuals. This, in turn, is expected to lead to SME' high success (Daud, Yusoff 2010: 143).¹⁹⁷ Moreover, SC's impact on SME' business performance can be attributed to the structures and processes of SC which allow SME' staff to work productively and innovatively. As such, it leverages their HC (Will 2008: 6). Lastly, it is interesting to point out that global research projects on SME highlight that SME' SC is predominantly informal because of their lack of automated mechanism – e.g. no IT/ICT designed for knowledge management activities due to SME' unwillingness or inability to invest in such efforts (Nunes et al. 2006: 101, 103 & 115; Daud, Yusoff 2010: 141). Hence, it is tacit and difficult to copy by others.

In the German SME-IC-literature a comparable line of argumentation is used to justify why SC is (perceived to be) important for German SME' lasting competitive business performance (Mertins, Will, Wuscher 2007: 201; Mertins, Wang, Will 2009: 120; Tovstiga, Tulugurova 2009: 76; BMWi 2010b: 9; Vanini 2011:

¹⁹⁷ "(...) organizational capital is central to all other firm resources by enabling them to work together for the benefit of the firm" (Sonnier 2008: 710).

7). Specifically, it is argued that knowledge, for example, about products, norms and laws, patents as well as the organization is not only manifested in the brains of people but also embedded in organizational/structural issues (Voigt, Finke, Orth 2009: 273) which are owned by the firm (Alwert 2005: 14). Furthermore, German SME-studies view the relevance of SC in its substance – including company set-up, process organization, formal as well as informal communication streams, and corporate culture – which allows the employees of German SME to actually perform their duties (Alwert 2005: 14; Will, Wuscher 2010: 22).

To conclude, the German literature on SME' IC, supported by the international SME perspective, allows formulating the following hypothesis:

Hypothesis 2:

The structural capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.

In order to enhance and argumentatively refine hypothesis 2, the same procedure as described above (cf. chapter 4.1.1) is applied: the dimensions of the general SC-model (cf. chapter 2.4.1.2) – i.e. organizational capital, development capital and technological capital – are evaluated in the light of the German SME context. Specifically, the global SC-model's dimensions and their respective attributes are compared to the literature on German SME' IC, the outcomes of general success factor research on German SME as well as universal sources on German SME and modified accordingly.

4.1.2.1 German SME' Organizational Capital

German SME' first SC-dimension is organizational capital. It comprises the predominantly intangible structure of German SME' operations – e.g. what makes a firm tick and its wetware (Roos et al. 1997: 46 et seqq.; Martin Castro et al. 2011: 656 et seqq.) (cf. chapter 2.4.1.2). In depth, the organizational capital of German SME consists of four key attributes which are expected to positively contribute to

German SME' organizational capital and thus, SC as well as competitive success.

The first of these four attributes focuses on *organizational culture, values and attributes*. In general, the corporate culture of (German) SME consists of, for example, diverse values, norms and working manners which have an impact on how individuals feel respected, are confident about the future, commonly interact, transfer knowledge, comply to rules, handle failures etc. (international SME literature: RICARDIS 2006: 41 and InCaS 2008: 25; German SME literature: Alwert 2005: 71 and Mertins, Wang, Will 2009: 118).¹⁹⁸ Specifically, a company culture is considered as 'high-quality' if it is jointly shared and accepted. This is because it is expected that employees as well as managers are (more) dedicated to contribute to their firm's competitive strategy (RICARDIS 2006: 41) and hence, its lasting above-average business performance in such a case. Internationally, SME' business culture is regarded as appropriate and thus, as one of their strategic sources of success (Steenkamp, Kashyap 2010: 376 & 390). The same is true for German SME (Schleef 2001: 9; Alwert, Vorsatz 2005: 325; BMWi 2007: 53; BMWi 2010b: 10). In detail, it can be argued that the corporate culture of German SME is especially important for their business performance because German SME' workers are highly motivated by non-financial factors – such as common aims, values, openness, trust or the allowance to make mistakes (Simon 1996: 165; Simon 2007: 301 et seq.; Völker, Sauer, Simon 2007: 129 & 157 et seqq.) – which (further) support them in (fully) identifying with their firm (Tinner 2007: 191). A particularly interesting aspect of German SME' business culture is the fact that it is frequently very much performance-orientated (Simon 1996: 169 et seq.; Simon 2007: 309; IfM 2013b). It can, for example, be noticed that German SME' have quite often more work-assignments than labor-capacity but still manage to successfully complete their tasks since the employees are motivated by such challenges and pull together (Simon 1996: 169 et seq.; Simon 2007: 309). As such,

¹⁹⁸ "The second most important factor, culture, indicates that a knowledge-friendly cultural foundation is certainly more important than the deployment of information technology in KM. In fact, it has been asserted that the success of KM is 90 per cent dependent on building a supportive culture (...). Important facets of a knowledge-oriented culture include such attributes as trust, collaboration and openness, to name but a few" (Wong, Aspinwall 2005: 75 et seq.).

corporate culture clearly contributes to above-average business performance. Besides, it is noticed that the corporate culture of German SME is highly important concerning knowledge (management) issues. Specifically, a common language or the ability to learn from mistakes are important cultural aspects to successfully deal with knowledge (Voigt, Finke, Orth 2009: 279) and hence, to increasingly perform well. Lastly, one can reason that German SME' corporate culture is particularly relevant for their long-term competitive business performance because it is mostly not fixed in written format but commonly accepted and practiced (e.g. team culture) (Simon 1996: 166 & 169). Thus, German SME' business culture is not only unique but also highly tacit and therefore almost impossible for other firms to copy or transfer – which explains its contribution to lasting competitive performance.

Communication structure, knowledge documentation and decision making paths represent the content of the second attribute of the German SME' SC-dimension 'organizational capital'. In particular, this attribute is concerned with how information and knowledge are exchanged, stored or saved for later application, and effectively used in German SME (Alwert 2005: 71; Alwert, Vorsatz 2005: 325; Mertins, Wang, Will 2009: 118). Such issues are important since SME' workers as well as managers need suitable and up-to-date knowledge to perform successfully (Daum 2003: 20; Wong, Aspinwall 2004: 45) – e.g. older employees inform newer ones or knowledge acquired at exhibitions is spread in the firm (Voigt, Finke, Orth 2009: 277). In depth, it is essential to highlight, at first, that the majority of this attribute's aspects are casually handled in German SME (Voigt, Finke, Orth 2009: 273; Pawlowsky, Gözalan, Schmid 2011: 5 et seq.) – which is possible because of their relatively small size (Simon 2007: 269). One finds, for example, many personal actions among employees as well as between the staff and their supervisors¹⁹⁹ (Dömötör 2011: 16; Nollens 2012: 29) – such as direct verbal communication, face-to-face meetings or regular get-togethers – in German SME and comparably few formal meetings (Simon 1996: 184 et seq.; Pawlowsky et al. 2006: 5 et seq.; Staiger 2008: 273; Offensive Mittelstand 2010: 13). Accordingly,

¹⁹⁹ About 61% of German SME' employees informally exchange experience among colleagues and approx. 59% with their boss, too (Pawlowsky, Gözalan, Schmid 2010: 5 et seq.; Pawlowsky, Gözalan, Schmid 2011: 5 et seq.).

SME differentiate themselves from large firms which rather focus on formal mechanism like IT-systems and -processes (Cohen, Kaimenakis 2007: 245; Hutchinson, Quintas 2008: 135; Daud, Yusoff 2010: 139 et seq.). Specifically, only one third of German SME uses IT/ICT and even less (approx. 7%) the web 2.0 to *exchange knowledge* (Pawlowsky, Gözalan, Schmid 2011: 5 et seq.); which also explains the absence of fixed rules and standards for information transfer in German SME (Dömötör 2011: 10). Consequently, it can be stated that German SME' *communication structure* is rather informal, people-based, direct, short, straightforward as well as socially-driven (Simon 1996: 184 et seq.; Pawlowsky et al. 2006: 5) and thus, contributing to lasting competitive business performance since it is tacit, heterogeneous undepreciable, intransferable, non-substitutable and difficult to imitate.²⁰⁰ Because of this exceptional "informal communication culture" (Daud, Yusoff 2010: 139) of German SME as well as their limited resources – e.g. personnel (Simon 1996: 190), money (Voigt, Finke, Orth 2009: 273) and time²⁰¹ –, it is not surprising that they *document* little of their knowledge and thus, are less interested in keeping data bases as well as conducting *systematic filings* (Völker, Sauer, Simon 2007: 145; Voigt, Finke, Orth 2009: 275 & 277). In particular, only approx. 40% of German SME do, for instance, record projects and experience, 30 to 35% of German SME have data bases on their employees' expert knowledge and even less than 20% document the expertise of the employees who leave the firm (Pawlowsky et al. 2006: 11; Mertins, Kohl, Krebs 2008: 40; Pawlowsky, Gözalan, Schmid 2011: 5 et seq.). Thus, Germans SME' company-

²⁰⁰ "At SMEs, employees are always in close contact with the owner/manager; as a result the flow of knowledge up and down hierarchical ranks is smooth and normally occurs via personalized meetings between individuals. Employees working in SMEs are in close proximity to each other. The result of being in close quarters is employees are in conversation and communication with one another on a daily basis. Granted that much of the conversation has nothing to do with the business at-hand, and is more social in nature, it nonetheless helps build a friendly environment in which knowledge sharing becomes easier and more effective" (Desouza, Awazu 2006: 35).

²⁰¹ "SMEs have less resources and capacity to maintain a knowledge repository (...). Compounded with their limited financial budget, they may ignore (...) organizing and storing knowledge" (Wong, Aspinwall 2004: 54); cf. also Salina Daud and Wan Yusoff (2010: 139 & 41).

knowledge rests predominantly in the heads of their employees and managers²⁰² (Pawlowsky et al. 2006: 5; Voigt, Finke, Orth 2009: 280) who can identify as well as realize market opportunities more easily and faster than large firms and their IT solutions. Because of this – and particularly because SME' knowledge repository is predominantly tacit – it contributes to German SME' competitive advantages (Pawlowsky et al. 2006: 5) and lasting above-average success. At the same time it has to be considered, however, that German SME' "lack of explicit knowledge repositories" (Desouza, Awazu 2006: 36) bears some disadvantages or even dangers. On the one hand, there is a potential threat that SME' employees – and owner-managers in particular – withdraw from the firm and take their company-knowledge with them (Wong, Aspinwall 2004: 54 et seq.; Watters, Jackson, Russell 2006: 558). But as (already) discussed in terms of employees' loyalty (cf. chapter 4.1.1) this is less likely the case. However, it may become an issue for German SME considering the increasing amount of workers as well as entrepreneurs who are going to retire in the (near) future²⁰³ (Baden-Württembergische Bank 2010: 3) and who take lots of their knowledge with them when they leave (Without author 2006: 41). Hence, some sort of process-orientated knowledge management and documentation like WiKis or other IT-solutions to increase transparency might be advisable to German SME (Voigt, Finke, Orth 2009: 276 & 278). On the other hand, the rare existence of knowledge in retrievable format reduces, as previously mentioned, general transparency which does not only contribute to tacitness but may also lead to internal confusion or even disorientation such as delays (Dömötör 2011: 10). Yet, as it is internationally argued, this concern is less likely to threaten SME because of their small(er) size and thus, their lower amount of knowledge which is to be managed (Wong, Aspinwall 2004: 54). To conclude this debate on German SME' knowledge documentation, it can be stated that their informal actions and networks compensate for structural deficits such as explicit knowledge repositories in

²⁰² "(...) [SME] have fewer employees and most of them know each other well. Individuals have a better idea of the level of expertise and know-how of their colleagues, and who to consult if they need certain information. Therefore, it is simpler for small firms to organize tacit knowledge" (Wong, Aspinwall 2004: 54).

²⁰³ In particular, approx. 100,000 German SME go through succession between 2010 and 2014 (Hauser, Kay, Boerger 2010: 20).

retrievable format (Finke 2009: 101; Voigt, Finke, Orth 2009: 276). Besides, it is not only interesting to look into the availability of knowledge but also its evaluation (Walther-Klaus, Zimmermann 2007: 48). This leads to the next discussion-point, namely *decision making*. The decision making chains of German SME are short – since key tasks are often concentrated in few people or (predominantly) the entrepreneur (Dömötör 2011: 16) (cf. next paragraph on organizational set-up) – and hence regarded as strategic sources of German SME' success (Daschmann 1993: 181; Gruber 2000: 260 & 312; Pawlowsky et al. 2006: 5). Specifically, short decision-making procedures make it easier, for example, to evaluate market signs and thus, to quickly adopt accordingly. This particular holds compared to large firms which need longer to adjust (Gruber 2000: 260; Pawlowsky et al. 2006: 5).²⁰⁴ Hence, SME' decision-making structures facilitate their dynamic capabilities and thereby contribute to their lasting competitive business performance. Altogether, the above discussion confirms that German SME' communication structure, knowledge documentation and decision making paths are strategically critical for their company success.²⁰⁵

The third attribute of German SME' organizational capital is *organizational structure and operational processes*. This attribute encompasses aspects of how a firm is structured (Martin Castro et al. 2011: 657) such as work division and coordination mechanisms which matter for SME' competitive performance (Meijaard, Brand, Mosselman 2005: 83 & 85; Matejun 2011: 2). German SME' organizational structure and operational processes, in particular, can be regarded as strategic sources of their above-average success, too. This is, firstly, because

²⁰⁴ “Decision-making is generally centralized and the ultimate power of control lies in their [managers of SMEs] hands. There are also fewer layers of management and decision makers in small firms, implying that the decision making chain is often shorter (...)” (Wong, Aspinwall 2004: 49).

²⁰⁵ In general, the discussion on SME' communication structure, knowledge documentation and decision making paths is very much alike in various countries – cf. Kuan Wong and Elaine Aspinwall (2004: 45 et seqq.), Kevin Desouza and Yukika Awazu (2006: 35 et seqq.), Miguel Nunes et al. (2006: 101 et seqq.), Sandra Cohen and Nikolaos Kaimenakis (2007: 245), Vicky Hutchinson and Paul Quintas (2008: 135 & 139), Salina Daud and Wan Yusoff (2010: 139 et seqq.), and Josee St-Pierre and Josee Audet (2011: 205 & 214).

German SME' *simple and flexible organization* allows them to quickly adopt to environmental changes – e.g. to learn or to recognize opportunities (dynamic capabilities – cf. chapter 2.3.2.2) (Daschmann 1993: 181; Simon 1996: 220; Schleef 2001: 9; Walther-Klaus, Zimmermann 2007: 48; Becker, Staffel, Ulrich 2008: 36; Heidenbauer 2008: 308 et seqq. & 312; Eichhorn 2009: 232; Dömötör 2011: 10) – which, in turn, increases their chances to succeed in today's dynamic and complex business world (cf. figure 1). More to it, it can be argued that German SME' operations are especially flexible because of their *little bureaucracy* which again promotes less complicated adjustment to new situations (Gruber 2000: 260 & 312; Eichhorn 2009: 232).²⁰⁶ In particular, it is noticed that many German SME prefer informal and thus, tacit working systems (Simon 2007: 269) – e.g. understood but unstated workflows (Marr 2006: 45). This means that it is not necessarily organizational structure which adapts to environmental changes but instead it is individual people who alter their work processes (Voigt, Finke, Orth 2009: 276). Put differently, German SME' organizational structures and their flexibility are highly tacit, idiosyncratic, undepreciable, mainly intransferable, inimitable as well as non-substitutable and therefore, important for lasting competitive business performance. Nevertheless, it is important to also stress that a little less than half of German SME' processes are still formalized, too (Simon 2007: 269). The reason for this formalization is, as it is internationally argued, that, for instance, formalized routines in the form of process manuals or rules (Marr 2006: 45) help to "(...) secure work procedures, quality and to some extend traditions available to new employees upon their arrival" (Thorleifsdottir, Claessen 2006: 14) and hence, contribute to long-term success. Another aspect which is closely related to German SME' simple organizational structure is their *little division of work* (Lanninger 2009: 68). In detail, it is put forth that little work division of German SME leads to less complexity and fosters to think in a more overall context (Dömötör 2011: 11 & 16) – especially since brain and manual work are often not split (Nollens 2011; Nollens 2012: 29) – which, in response,

²⁰⁶ Besides, it is worth mentioning that lower bureaucracy – and in particular if supported by low hierarchy levels - leads to the fact that SME' top management is closer related to operational functions and thus, has a better overview of its firm and the business' intangibles (Wong, Aspinwall 2004: 49).

contributes to competitive business performance (particularly over large firms) (Pawlowsky et al. 2006: 5). The latter can be further strengthened by two key arguments: Firstly, the little work division means that a lot of (key) functions are aggregated in one person – mainly the entrepreneur – which facilitates i.a. faster decision making as well as broader or more generalistic competencies and their development (Breidenbach et al. 2006: 8 et seq. & 14; Lanninger 2009: 68; Dömötör 2011: 16). Since these issues are tacit as well as hard to copy, substitute etc., they are viewed as relevant for German SME' lasting above-average success. Secondly, a low division of work promotes that employees do not only cover a wider work-spectrum but are also more likely to see the end-results of their efforts – e.g. a final product. As such, they are expected to be more motivated to learn, develop their competencies as well as perform well (Simon 1996: 170; Breidenbach et al. 2006: 8 & 14; Pawlowsky et al. 2006: 5; Simon 2007: 311 et seq.; Lanninger 2009: 68). In a nutshell, the above paragraph highlights that German SME' organizational structure and operational processes are crucial determinants of their competitive business performance. Especially in the light of the current demographical development it is important that German SME' organizational structure is suited for an aging workforce, too. Thus, apart from flexibility, little bureaucracy as well as work division, it is recommended to also consider ergonomically work stations and safety stands (Frai, Thiehoff 2007: 38; Kay, Kranzusch, Suprinovic 2008: 108 et seq.).

The fourth and last relevant attribute of organizational capital which demands discussion in the German SME context is *quality* (AKIW 2003: 1238). The product and service quality of German SME is highly important for their competitive advantages and thus, a critical IC-based source of their success (Küpper 1994: 120 & 122; Simon 1996: 223; Gruber 2000: 296; Simon 2007: 177, 224 & 232 et seqq.; Heidenbauer 2008: 315; Witte 2011: Appendix 11, VII et seqq.). This is, among others, because customers have high demands and are likely to switch to competitors – of whom there are more and more (cf. chapter 1.1) – if their quality-expectations are not met; alternatively, customers' loyalty increases with high

quality standards.²⁰⁷ As such, quality (in particular quality orientated on customers' wishes) is a basic prerequisite of German SME' success (Gruber 2000: 264 et seq. & 296; Schröder 2006: Vorwort; Heidenbauer 2008: 313; Mertins, Kohl, Krebs 2008: 43b & 46). In depth, German SME' quality is very high and constant because they value quality over price-issues (Simon 1996: 92; Heidenbauer 2008: 311 & 315); especially since quality helps SME to compensate for their cost/price-disadvantages compared to large firms (Kaluza, Winkler 2009: 262). Put differently, quality (assurance) represents a critical part of German SME' self-image which is, not only daily practiced but also important to encourage German SME' openness to change (Schleef 2001: 21 & 23; Simon 2007: 231 et seq.). Besides, German SME are able to deliver high quality because of their above mentioned characteristics such as little work division, employees' high identification with their tasks etc. (Daschmann 1993: 61) which again highlight the potential to positively impact success.

To conclude this section on German SME' organizational capital, it can be summarized that all four of its above illustrated attributes – i.e. organizational culture, values and attributes; communication structure, knowledge documentation and decision making paths; organizational structure and operational processes; and quality – theoretically represent contributing aspects of German SME' SC as well as corporate success. Because of that, organizational capital is regarded as a strategically relevant source of lasting competitive business performance and hence, supports the subsequent hypothesis:

Hypothesis 2a:

*The organizational capital of German SME is
a strategically relevant dimension of German SME' structural capital and
thus, important for lasting competitive business performance.*

²⁰⁷ Since German SME are located in Germany, they are faced with relatively high labor costs which can predominantly be counterbalanced via quality and relating superior prices (IfM-Bonn 2013b).

4.1.2.2 German SME' Development Capital

Development capital, the second dimension of German SME' SC, is concerned with intangible aspects which relate to the future (value) of a firm (Roos et al. 1997: 51) (cf. chapter 2.4.1.2). In the German SME context, especially two attributes of development capital require discussion since they are assumed to positively contribute to German SME' prospective development and thus, lasting competitive success. These two are product, process and structural development; and intellectual property.

The former mentioned attribute encompasses the *development as well as the continuous improvement* of German SME' *products, processes and structures*. These issues play a relevant role concerning German SME' future and are regarded as critical intangible source of success (Küpper 1994: 120 & 122; Simon 1996: 223; Gruber 2000: 296; Schleef 2001: 23 & 25; Alwert 2005: 71 & 144; Alwert, Vorsatz 2005: 325; Adenäuer 2007: 27 & 34; Tinner 2007: 195; Becker, Staffel, Ulrich 2008: 36; Heidenbauer 2008: 310 & 315; Mertins, Wang, Will 2009: 118; BMWi 2010b: 10; Dömötör 2011: 103; Witte 2011: 45 et seq. & 54 et seq.) because they help German SME to compensate for their size-related disadvantages over large companies (Dömötör 2011: 6). Specifically, innovation-issues are strategically important since they represent the outcomes of SME' *absorptive capacity* (Hayton 2005: 141) and thus, their ability to adjust to as well as survive in the current complex and fast changing business world – in the long-run (Schlömer-Laufen, Maaß 2012: 1) (cf. chapter 1.1 and figure 1). In depth, it can be argued that German SME' product innovations are particularly relevant for their competitiveness and success because of today's saturated markets, shorter life cycles, quickly changing customer demands, dynamic technological modifications and increasing competition (Pawlowsky et al. 2006: 1; BDA 2009: 37 et seqq.; Witte 2011: 45).²⁰⁸ Process innovations such as shorter production time (Simon 2007: 220), contrarily, are required in order to improve German SME' effectiveness and creativity (BDA 2009: 37 et seqq.). German SME seem to handle these two innovation-facets quite well since they complete, according to Rainer Völker et al.

²⁰⁸ New products are viewed to have a stronger impact on success than old product improvements (Leitner 2001: 173 & 203).

(2007: 154), more innovation projects than large firms – e.g. because of their high degree of custom-tailored products and services – and thus, have higher potentials to succeed.²⁰⁹ A particular interesting aspect of German SME' innovativeness, which requires to be stressed, is the fact that innovations are mostly *not systematically managed*. German SME do, for example, little systematic research and development (management) (Simon 2007: 321 et seq.; Spielkamp, Rammer 2007: 308; Völker, Sauer, Simon 2007: 145; Witte 2011: 45 et seq., 54 et seq.) since they do not have sufficient resources such as staff and technical means for such activities (OECD 2002: 108 et seqq. cited by Maaß, Führmann 2012: 14; Spielkamp, Rammer 2007: 308). Instead innovations are created on top of daily operations via routine jobs, production experience works etc. (Dömötör 2011: 18). Only 26% of German SME, for example, have a R&D department²¹⁰ while 53% spread it over other departments (Leitner 2001: 141).²¹¹ As such, one can reason that German SME' innovativeness is rather tacit – e.g. based on employees' improvement suggestions (Simon 1996: 175; Leitner 2001: 173 & 203) – and thus, idiosyncratic, path dependent, intransferably, difficult to imitate and non-substitutable. In view of that, it is considered as a strategically relevant IC-based source of lasting above-average business performance.

The second attribute of the German SME SC-dimension 'innovation/development capital' is *intellectual property* (IP) (AKIW 2003: 1237). Specifically, it deals with SME' legally protected intangible competitive bases (RICARDIS 2006: 40) which are manifested in, for example, patents, trade secrets and design rights (Martin Castro et al. 2011: 656) and offers the potential to contribute to long-term success. In the German SME context, IP is also not to be scoffed at (Weissenberger-Eibl, Bierwisch 2007: 389 & 406). Yet, it is regarded as a less relevant IC-source of

²⁰⁹ Because of that German SME are also argued to represent the backbone of the German economy – i.e. their innovation capabilities are believed to contribute to Germany's growth, competitiveness and the protection of the labor market (Bullinger 2009: V; Schauerte 2009: VII).

²¹⁰ Peter Pawlowsky et al. (2011: 4 et seq.) mention even less – i.e. less than 20% of German SME conduct internal R&D activities.

²¹¹ A similar line of argumentation is used in international SME studies – cf. Kuan Wong and Elaine Aspinwall (2004: 54), Jane Watters, Fiona Jackson and Iain Russell (2006: 565), Marek Matejun (2011: 2), and Josee St-Pierre and Josee Audet (2011: 214).

German SME' competitive success (Pawlowsky et al. 2006: 15) because German SME are less likely to have and register, for example, many patents compared to large firms (Dömötör 2011: 8 & 100).²¹² This is, as seen above, not because German SME are not innovative but because of the high costs, the long waiting time (up to 2.5 years), the large bureaucracy and administrative burden, as well as the limited security which comes with patents (Simon 1996: 98 et seqq.; Simon 2007: 198 et seqq.). However, this does not hold true for all German SME. Hermann Simon (1996: 105), for example, states exemplary cases of German SME which have up to 234 patents per 100 employees. As such, IP is to be incorporated in studies on German SME' intangible sources of success, too.

The last two paragraphs highlight the strategic importance of German SME' legally secured as well as unsecured innovations. Specifically, the two attributes of development capital, namely product, process and structural developments as well as intellectual property, are perceived to have a positive impact on German SME' long-term corporate performance. Hence, they serve as strategically relevant sources of *development capital* and allow proposing hypothesis 2b:

Hypothesis 2b:

*The development capital of German SME is
a strategically relevant dimension of German SME' structural capital and
thus, important for lasting competitive business performance.*

4.1.2.3 *German SME' Technological Capital*

The third and last dimension of German SME' SC concentrates on their *technical infrastructure*. Generally speaking, it includes issues such as the acquisition as well as the usage of technology, information technology (IT) and information and communications technology (ICT) (Martin Castro et al. 2011: 656). Special attention is usually, and particularly internationally, paid to IT-based

²¹² Same is argued internationally – cf. Robert Huggins and Maria Weir (2007: 711), and Josee St-Pierre and Josee Audet (2011: 214).

technical aspects like software, hardware and its application which support a firm's day to day operation (Danish Ministry of Science, Technology and Innovation 2003: 11). In the German SME context, the focus is placed on (production) technologies and equipment as well as IT/ICT – including their technical status – which play an important role to perform German SME' daily task, too. This is because technology and IT/ICT offer German SME diverse strategic advantages such as flexibility – e.g. the possibility to produce non-standardized products –, higher levels of efficiency as well as productivity, enlarged production-capacities, improved throughput times, the opportunity to better integrate or combine diverse business areas as well as systems, and to reduce redundant data storage (Küpper 1994: 122; Schneider 2006: 162 et seq.; Abrahamczik 2012: 88 et seq.). These issues, in turn, lead to increased business performance. With respect to IT/ICT as a strategically critical source of German SME' success (Becker, Staffel, Ulrich 2008: 36), in particular, it shall be highlighted that German SME' IT-infrastructure is reasonably well: about 75% of them did, for instance, provide their employees with internet access in 2006 already (Pawlowsky et al. 2006: 10). Besides, it is interesting to point out that some authors consider not only the actual technological infrastructure as part of German SME' production-technological resources and thus, their competitiveness, but also incorporate SME' tacit and explicit knowledge to solve or handle technological challenges (Abrahamczik 2012: 88 et seq.). This is an especially important issue when taking into account that many of such investments – e.g. investments in state-of-the-art technologies to produce innovative, high quality and new products or services – need to be carefully deliberated since they are relatively expensive and have medium- to long(er)-term consequences (Schneider 2006: 162 et seq.; Volery 2006: 250 & 255). Moreover, the latter are strategically relevant for German SME' lasting competitive business performance since they are highly company-specific, path dependent, intransferable, inimitable as well as non-substitutable. Lastly, it is worth mentioning, however, that especially successful German SME (and their innovations) are not only technology-driven but value technology and markets equally (Simon 1996: 107 et seq.; Simon 2006: 52 & 55).

Overall it can be summarized that technological aspects take on an important role in German SME context and allow proposing the following hypothesis:

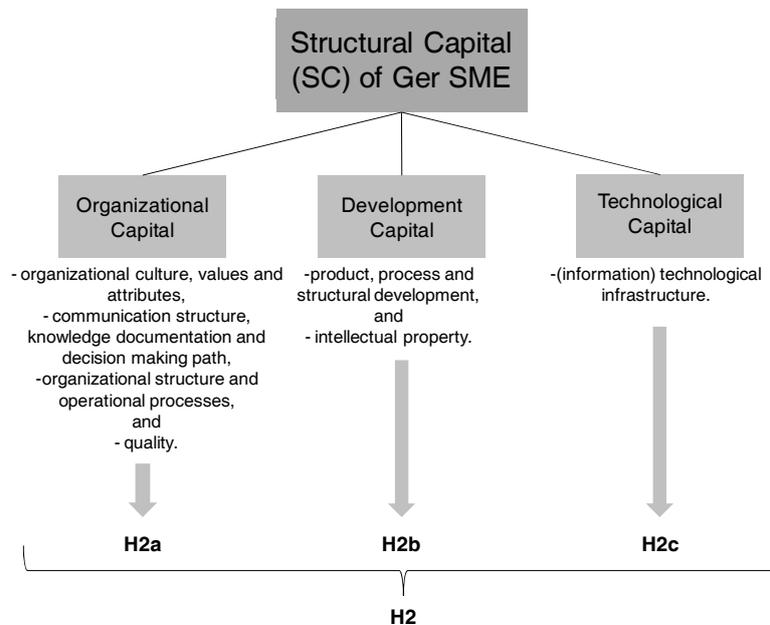
Hypothesis 2c:

The technological capital of German SME is a strategically relevant dimension of German SME' structural capital and thus, important for lasting competitive business performance.

4.1.2.4 Summary of German SME' Structural Capital

Three dimensions – including their respective attributes – of German SME' SC are discussed in this chapter. All of them – i.e. organizational capital, development capital and technological capital – are argued to represent strategically relevant intangible sources of German SME' sustainable above-average success since they give German SME a competitive edge – in particular over large firms (cf. figure 36). Accordingly, the three sub-hypotheses (H2a, H2b and H2c) intensify the initially established hypothesis H2 which predicts that German SME' SC positively impacts their lasting competitive business performance.

Figure 36: The Dimensions and Attributes of German SME' SC



4.1.3 German SME' Relationship Capital, its Dimensions (incl. Attributes) and its Direct Impact on Lasting Competitive Business Performance

Building on the line of reasoning of parts 2.4.1.3 and 2.4.2 as well as the structure of the previous two chapters (cf. chapters 4.1.1 and 4.1.2), this section establishes the third category of IC – relationship capital (RC) – as a strategically relevant IC-based source of German SME' lasting competitive business performance.

Firstly, it is interesting to point out that it is internationally disclosed that SME' RC is directly and positively associated with business performance (Hermans, Kauranen 2005: 183; Tovstiga, Tulugurova 2007: 704 et seq.; Welbourne, del Val Pardo 2008: 9; F-Jardon, Martos 2009: 604; Daud, Yusoff 2010: 143 & 148 et seq.; St-Pierre, Audet 2011: 205). This is, as it is contemplated, because relations with firm-external stakeholders allow the access to and the interaction of intellect-based intangibles (Matos, Lopes 2009: 347) which are highly required, for instance, to recognize business opportunities (Ramos-Rodriguez et al. 2010: 566 & 577). Furthermore, the capability to absorb IC from external sources is regarded as a strategically important source of SME' success because of their restricted internal resources (Desouza, Awazu 2006: 39; Hutchinson, Quintas 2008: 133 et seq.). Put differently, SME are argued to compensate for their own deficits by working closely with diverse stakeholders (Huggins, Weir 2007: 711) and by acquiring as well as applying their intellect-based inputs – e.g. exchanged knowledge, environmental knowledge, production capacities and technology (know-how) – to their operations (Desouza, Awazu 2006: 39; Durst 2008: 427; Daud, Yusoff 2010: 141). Most importantly, it is argued that SME' RC excels large companies' RC (Huggins, Weir 2007: 711) because of SME' easiness to enter beneficial relations due to their direct proximity to stakeholders (Wong, Aspinwall 2004: 53; Cohen, Kaimenakis 2007: 245; Daud, Yusoff 2010: 141; Matejun 2011: 2).²¹³ This in turn, reduces, among others, distrust, fear as well as dissatisfaction, fosters (organizational) learning (Daud, Yusoff 2010: 140 et seq. & 149 et seq.), and contributes to long-term performance.

²¹³ SME' simple and flexible organizational structure enables close as well as direct stakeholder contact and relationships (Daud, Yusoff 2010: 149 et seq.).

The German SME literature claims similar conditions: German SME' RC is perceived to positively impact their enterprise performance (Mertins, Will, Wuscher 2007: 201; Mertins, Wang, Will 2009: 120; Tovstiga, Tulugurova 2009: 76; BMWi 2010b: 9; Vanini 2011: 7). In depth, RC is reasoned to be a strategic source of German SME' success since SME are unable to survive and are worthless without customer contact, supplier relationships, capital providers and cooperations. Yet, it is important to highlight that it is not so much the stakeholders per se which matter for long-term competitive performance but German SME' direct, consensus-orientated, and intensive relationships to their external partners (Simon, Huber 2006: 60 et seqq. cited by Bischof 2012: 10; Bischof 2012: 10 et seq. & 20; IfM 2013b). This is, as mentioned above, grounded in the fact that such external relations enable the acquisition of knowledge (Mertins, Kohl, Krebs 2008: 31) and arguably other relevant – tacit, undepreciable, untransferable, rather inimitable and non-substitutable – intellect-based intangibles.

Based on the previously presented international as well as German lines of argumentation in favor of RC as a strategic source of German SME' success, hypothesis three, which requires empirical support to hold true, is raised:

Hypothesis 3:

The relationship capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.

Following the above described scheme (cf. chapters 4.1.1 and 4.1.2), the next sections discuss the RC's dimensions – i.e. relationships with customers, suppliers, alliance partners, creditors and shareholders, other stakeholders, as well as public perceptions (cf. chapter 2.4.1.3) – against the background of German SME. In detail, the order of the dimensions is changed in the German SME context since German SME' creditors and shareholders (cf. chapter 4.1.3.3) are assumed to be more important than their alliances (cf. chapter 4.1.3.4). Furthermore, it is important to highlight that the dimension named 'other stakeholder' is replaced by 'informal network relationships' because 'other

stakeholder' is fairly imprecise, especially if one assumes that different SME have differing stakeholders. Thus, the dimension's content range would be very broad as well as little exact; and as such, unlikely to allow formulating a precise hypothesis. Altogether, chapters 4.1.3.1 to 4.1.3.6 intent to further support and legitimize hypothesis 3 in the context of German SME.

4.1.3.1 *German SME' Customer Relationships*

The relationships to former, current, and potential customers, as well as their management, represent the center of German SME' first RC-dimensions (Alwert 2005: 73; Mertins, Wang, Will 2009: 118). Such a focus is justified because close and intensive customer relationships are agreed to be a relevant strategic sources of German SME' lasting competitive business performance since they help to overcome disadvantages concerning market power and physical resources (Küpper 1994: 120; Gruber 2000: 275 et seqq., 306 & 309; Alwert, Vorsatz 2005: 325; Simon, Huber 2006: 60 et seqq.; BMWi 2007: 17, 54 & 54; Simon 2007: 160; Eichhorn 2009: 232; BMWi 2010b: 10; Reinemann 2011: 109).

In depth, a first attribute of German SME' customer relationship, which deserves discussion to confirm the above illustrated intangible source of success, is *dependence*. Dependence refers to the fact that German SME and their customers do often have good and interactive relationships because of their *reciprocal dependence*. Specifically, it can be argued that many German SME have fairly small amounts of customers due to their specialization and/or niche market offerings which means that their *turnover* may depend on these limited clients, too.²¹⁴ At the same time, these customers do, however, rely on their supplies as well because of German SME' specific product-/service-solutions with little alternatives. As a

²¹⁴ The percentage of turnover generated by the top five customers in Germany is distributed in the following manner: approx. 10% of German SME generate more than 50% of their turnover with their largest five customers, about 28% of German SME generate 20-50% turnover with their largest five customers, circa 37% of them generate 5-20% of their turnover with the top five customers and the rest generates less than 5% of turnover with its largest five customers (Simon 2007: 166).

consequence, both parties are interested in *close, long-term, trustful, and respective* business relations. Because of the previously mentioned particular, complex, and sometimes even custom-tailored products or services, German SME and their customers also foster a *high level of reconciliation*. This further clarifies why the majority of German SME tend to promote *direct communication and knowledge exchange*²¹⁵ between their customers and firm-internal individuals at all hierarchy levels (Simon 1996: 81 et seqq., 86 et seq. & 90; Simon 2006: 53 et seq.; Simon, Huber 2006: 60 et seqq.; Simon 2007: 159 et seq., 162, 166 et seq. & 172; Wolf, Paul, Zipse 2009: 61 et seq.). 25 to 50% of German SME' employees, for example, have regular contact to customers which is much higher than the approx. 5 to 10% in large companies (Simon 2007: 161) and hence, supports competitive leads. Additionally, it is worth highlighting that the personal direct communication and knowledge exchange is tacit, undepreciable, intransferable, inimitable and non-substitutable and thus, represents a strategic IC-based source of German SME' lasting success. Moreover, the close and direct dialogue decreases German SME' necessity to invest (heavily) in formal or systematic marketing and compensates for missing market research. As such, it further contributes to success by saving costs (Simon 1996: 84 et seqq.; Rasche 2003: 228; Simon, Huber 2006: 60 et seqq.; Simon 2007: 161 et seq.; Wolf, Paul, Zipse 2009: 61; Dömötör 2011: 23).

The former mentioned *customer proximity* is also argued to be a critical intangible source of German SME' lasting above-average performance because it allows German SME to quickly *adopt to customer's needs*, to please their demands, and also to escape price pressure via competitive solutions (Daschmann 1993: 152 et seq. & 166; Schirrmann 2006: 371 et seqq.; Simon 2007: 162; Tinner 2007: 191; Wolf, Paul, Zipse 2009: 61; Witte 2011: Appendix 11, VII et seqq.). Going one step further, customers are (even) viewed as the most important sources of and the preferred partner for German SME' *innovations* (Simon 2007: 217 et seq.; Simon, Huber 2007: 48; Dömötör 2011: 14 & 18 et seq.; Maaß, Führmann 2012: 15). More to this second attribute of German SME' customer relationship dimension, it is extremely interesting to point out that especially successful German SME prefer to *work with highly demanding and sophisticated customers* because they 'push' them

²¹⁵ 89% of German SME use direct contact with their customers to identify knowledge (Pawlowsky, Gözalan, Schmid 2011: 4 et seq.).

towards innovative solutions as well as high performance (Simon, Huber 2006: 62; Simon 2007: 174 et seq.; Wolf, Paul, Zipse 2009: 61). Again, the joint work with (such) customers is undepreciable, unique, intransferable, inimitable and non-substitutable and consequently, regarded as a strategically relevant IC-based source of sustainable competitive advantage and hence, lasting business performance.

A third attribute of German SME' relationships to customers is their *satisfaction*. Customer satisfaction is highly important because it influences whether customers purchase from German SME (again) or not (Alwert 2005: 19; Schallmo 2007: 16) and thus, impacts business success (Mödrischer 2009: 320). Specifically, customers are only satisfied *if* German SME' products/services *meet* their *expectations* (Weissman 2011: 72). In this context it is revealed that German SME' customers are particularly concerned about product quality, economic feasibility, cost effectiveness and punctuality of delivery; at the same time, they care reasonably little about price (Simon 2007: 164). If the former mentioned factors are fulfilled, German SME' customers are expected to purchase SME' goods as well as services and thus, contribute to their performance. Additionally, customer satisfaction is often manifested in positive *word of mouth communication*. Specifically, satisfied customers recommend their SME' products and services to others and thus, conduct free of charge marketing (Schallmo 2007: 17 et seq.; Wolf, Paul, Zipse 2009: 67). Since satisfaction as well as word of mouth recommendation are rather tacit, they are also expected to be unique, intransferable, inimitable, and non-substitutable. Hence, they are viewed as a strategically relevant intangible source of German SME' long-term business performance.

The fourth attribute in the context of German SME' customer relationships, which is closely linked to the above introduced mutual dependence as well as customer satisfaction, is *customer loyalty* (Zanger 2006: 185; Schallmo 2007: 18 et seq.). In detail, customers' loyalty represents an intangible strategic source of German SME' success which is particularly important in terms of their future

(Heidenbauer 2008: 310 & 315; Mertins, Kohl, Krebs 2008: 43).²¹⁶ This is because loyal customers allow German SME to establish long-term relationships which may (in the medium- to long-term) result in trust which is, in turn, important to convince customers to repeatedly buy a firm's products and not from (comparable) competitors (Alwert, Heisig, Mertins 2005: 8).

Together the four attributes of German SME' customer relationships – i.e. customer dependence, innovations through customer proximity, customer satisfaction, and customer loyalty – as well as their above presented discussions lead to the following hypothesis:

Hypothesis 3a:

*German SME' customer relationship is
a strategically relevant dimension of German SME' relationship capital and
thus, important for lasting competitive business performance.*

Lastly, it is worth mentioning that many German SME believe that mainly their customer affairs – and knowledge about customers – are important for their success and thus, often neglect (investments in) other stakeholder relationships (Mertins, Kohl, Krebs 2008: 50; Voigt, Finke, Orth 2009: 274; BMWi 2010a: 14 et seq.; Bischof 2012: 12).²¹⁷ Yet, good associations with other stakeholders are relevant, too, as shall be seen the following text passages – starting with the case of suppliers (Eichler 2006: 330).

²¹⁶ Same holds true in the international SME context (Steenkamp, Kashyap 2010: 368, 376, 380 & 390); “It is common knowledge that gaining a sale with a new customer is much more expensive (...) than gaining the same sale with an existing client” (Roos et al. 1997: 44).

²¹⁷ 75% of SME believe that customers are their most important partners (Mertins, Kohl, Krebs 2008: 50).

4.1.3.2 *German SME' Supplier Relationships*

The second dimension of German SME' RC looks into German SME' relations to former, current and potential suppliers (Alwert 2005: 73; Mertins, Wang, Will 2009: 118). It is important to analyze this subject since German SME' close supplier relationships are a relevant intangible strategic source of success (Alwert, Vorsatz 2005: 325; BMWi 2007: 17, 54 & 57; Eichhorn 2009: 232; BMWi 2010b: 10; Bischof 2012: 11 & 17)²¹⁸ which helps to compensate for their disadvantages concerning market power and physical resources (Gruber 2000: 309). This is especially assumed to be the case for manufacturing firms (compared to service providers) (Mertins, Wang, Will 2009: 119 et seqq.; BMWi 2010b: 5) which require inputs to produce output (Arnold 2006: 116).

Firstly, supplier relations are viewed as a strategic intangible source of success because suppliers and their deliveries have a major – arguably increasing – impact on German SME' product quality, purchasing and manufacturing costs, as well as ability to supply (on time) (Arnold 2006: 123 & 127; Bischof 2012: 11) and thus, overall business performance. In particular, it is claimed that German SME' relationships to their supplier are especially successful if they are intensive but not threatening due to too much *dependence* (Bischof 2012: 14 & 17) – e.g. large price/cost pressure (Simon 1996: 121) or high risk of losing an important partner. Yet, this issue seems to be handled well by German SME as can be seen in Hermann Simon's (1996: 121; 2007: 229) Porter's five forces (cf. chapter 2.3.1.2) analysis: suppliers are usually no dominating force. A potential explanation for the latter may be that German SME' suppliers are often SME as well (Krüger 2006: 20) and thus, the above described *reciprocal dependence* between customers and suppliers comes into play (Wolf, Paul, Zipse 2009: 76) (cf. chapter 4.1.3.1).²¹⁹ Therefore as well as in line with the previous discussion (cf. chapter 4.1.3.1), it can be reasoned that *close personal communication* (further) improves German SME' relationship to their suppliers (Hügens, Peters, Zelewski 2007: 453) and in turn long-term enterprise success.

²¹⁸ The same is argued in the international SME context (Steenkamp, Kashyap 2010: 376, 380 & 390).

²¹⁹ It is assumed that German SME have generally small amounts of suppliers (Stütz 2011: 43) which impacts their interdependence.

The second attribute of German SME' supplier relationships concentrates on *cooperations* with suppliers concerning *innovations*. It can be argued that supplier collaborations may be generally entered in order to create value via mutually enlarged knowledge (data basis), experience, and other intellect-based intangibles (Seifert 2003: 264 et seq. & 276) such as problem solutions which (may) result in competitive leads (Arnold 2006: 128). In particular, it can be noted that *innovations activities* with suppliers are often entered since they help to overcome missing specific knowledge and limited financial resources by combining resources and sharing risk (Maaß, Führmann 2012: 15). 70% of German SME, for instance, believe that their suppliers are relevant for innovations (Mertins, Kohl, Krebs 2008: 51). However, innovation-based cooperations with suppliers are not very common (Dömötör 2011: 14) – especially compared to large firms who favor them (Maaß, Führmann 2012: 15): just about 40% of German SME do, for example, learn from contact with their suppliers (Pawlowsky, Gözalan, Schmid 2011: 4 et seq.) and only 30% of German SME engage in cooperations with suppliers (around 40% of these with focus on R&D or innovations) (Witte 2011: 51 et seqq.). As such, it can be assumed that SME decide upon these cooperations carefully and only engage in the ones with high prospects of success.

A third attribute of German SME' supplier relationships, which supports the assumption that these relations are regarded as strategic sources of success, focuses on German SME' *satisfaction* with their suppliers. In line with the previous chapter (cf. chapter 4.1.3.1) it can be argued that German SME' satisfaction depends on their expectations. In this regard, German SME' focus seems to lie – similar to their customers' preferences – on quality issues, too (BMWi 2008: 26; BDA 2009: 36; Bischof 2012: 17). Thus, it can be reasoned that German SME' relationships to their suppliers are especially well and contributing to lasting competitive business performance if German SME' suppliers deliver appropriate quality.

Apart from the above mentioned dependence and satisfaction, it can be argued that German SME' relations to their suppliers are *long-lasting* and thus, adding to German SME' sustainable performance for another reason: There seems to be a high level of *loyalty* since supplier-loyalty reduces supply-planning-complexity and routinizes procurement (Arnold 2006: 120; Stütz 2011: 43). Furthermore, the loyalty between German SME and their suppliers is mutually reinforced because

of German SME' good payment morality (Krüger 2006: 20) and thus, the suppliers' interest in long-term business relationships.

Supplier-dependence, -innovations, -satisfaction, and -loyalty are the four attributes discussed in terms of German SME' RC-dimension 'supplier relationships'. Together they promote German SME' supplier relations as strategically relevant sources of lasting above-average success as it is summarized in hypothesis 3b:

Hypothesis 3b:

German SME' supplier relationship is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.

4.1.3.3 German SME' Creditor and Shareholder Relationships

Creditor and shareholder relations characterize the third dimension of German SME' RC. Specifically, this dimension is concerned with German SME' relationships to capital providers such as banks or stockholders (Alwert 2005: 73; Mertins, Wang, Will 2009: 118). Intensive relationships with capital providers are regarded as strategic sources of success (Alwert, Vorsatz 2005: 325; BMWi 2010b: 10) because they provide German SME with a flexible financial basis (Becker, Staffel, Ulrich 2008: 36) and help to compensate for disadvantages concerning market power, resources and low equity ratios (Gruber 2000: 309).

Nevertheless, it can be noted that German SME do not judge creditor and shareholder relationships as relevant for success (BMWi 2010a: 14 et seq.; BMWi 2010b: 10). Instead they generally prefer to finance (their investments) themselves – e.g. via retained earnings – and thereby keep *autonomy* (Börner 2006: 298 & 301; Simon 2007: 259 et seq.; Dömötör 2011: 12; Reinemann 2011: 129; Englisch et al. 2012: 21; BMWi 2013a: 13). The reason for this can be seen in the fact that own fundings provide German SME with more flexibility (Börner 2006: 298; Reinemann 2011: 129) and greater *management effectiveness* – e.g. due to little restrictions and covenants – and lower *risk*. Specifically, the issue of self-financing is closely related to equity capital. High *equity ratios* indicate not only financial

stability but also provide German SME with a general risk-buffer which, for instance, allows more innovations and leads to less difficulties to get access to bank loans (Netzel 2007: 225 et seq.; Reinemann 2011: 131; Investitionsbank Berlin, Creditreform Berlin Wolfram KG 2012: 22). However, the equity ratios of German SME are commonly low²²⁰ and also lower than internationally (Börner 2006: 302; Kinne, Kottmann 2006: 262) which would generally lead to the assumption that German SME have little creditworthiness, high probability of default, bad credit ratings, and limited access to external capital; and even if they get access, then most likely with great cost of (external) capital (Kinne, Kottmann 2006: 261). Yet, this is not the case for German SME since their good relationships to external capital providers help them to compensate for their limited equity foundation (Börner 2006: 302).

Only if the internal potentials are (fully) exploited, German SME consider to take on *outside (depth) capital* (Reinemann 2011: 129). If so, German SME are, however, faced with limited available financial instruments. *Capital markets*, for example, are only *restrictively* accessible (Börner 2006: 299; BMWi 2007: 20 et seq.; Dömötör 2011: 12; Reinemann 2011: 128). Consequently, bank credits – usually of five years and longer (Kinne, Kottmann 2006: 262) – are the preferred option (Krüger 2006: 20; Simon 2007: 259 et seq.). In particular, German SME prefer to handle their capital issues with their *house bank*.²²¹ The advantage of the house bank relationship lies in the fact that such a relation is usually *close, strong, stable, and long-term* orientated. This, in turn, results in less ex ante *information asymmetries* since the bank knows its SME well. Moreover, it leads to lower *transaction costs*, more *trust* and better reputation – which makes opportunistic behavior less likely – (cf. chapter 2.3.1.3), greater certainty of (re)payment, as well as a higher weight of *qualitative aspects* – arguably especially on rainy days – which positively influence a bank's decision including (lower) cost of debt (Börner 2006: 307; Netzel 2007: 224; Wolf, Paul, Zipse 2009: 95; Reinemann 2011:

²²⁰ 31.1% of German SME have an equity ration below 10%. 24.4% of German SME have up to 20% of equity and 17.7% up to 30% equity. Only 26.8% of German SME have an equity ratio over 30% (Creditreform Wirtschaftsforschung 2013: 20).

²²¹ Bank credits are the second mostly used financial source of German SME (BmwI 2013a: 13).

131 et seq.). Put differently, a *satisfactory*, sometimes even better than necessarily required (Alwert 2005: 150) as well as *loyal* relationships between German SME and their bank improves fruitful mutual interaction and thus, makes it relatively easy to receive (reasonably cheap) credits (Börner 2006: 302; Netzel 2007: 224; IfM 2013b) – even if the German SME' equity ratio is low. These good and loyal capital provider relationships are highly company specific and predominantly tacit, undepreciable, intransferable, inimitable as well as non-substitutable and thus, judged as a strategically relevant intangible source of German SME' lasting competitive business performance. Additionally, it can be argued that German SME and their house bank are *mutually dependent* (Börner 2006: 307) and thus, cooperate on equal terms. This is, potentially, because some German banks – e.g. saving banks (Sparkassen) – feature SME characteristics, too (Theilacker 2007: 35). As such, it can be reasoned that the above explained reciprocal dependence (cf. chapters 4.1.3.1 and 4.1.3.2) applies for credit provider relationships, too and therefore, further strengthens the above argument concerning strategically relevant sources of success.

Lastly, it is worth mentioning that working *only* with *one banking partner* bears some *risk* (Wolf, Paul, Zipse 2009: 94).²²² Hence, it is recommended to prematurely establish and maintain at least two bank-relationships in order to a) gain from their differing expertise and b) ensure a constant supply of liquidity (ibid.: 94). The problem is, however, that many German SME do not believe that relationships with creditors, investors and external equity owners etc. are relevant for their success (Alwert 2005: 146 & 152 et seq.; BMWi 2007: 54 & 57 et seq.; BMWi 2010a: 14 et seq.; BMWi 2010b: 10).²²³ Consequently, many German SME are assumed to pay little attention to these relationships which is especially problematic when taking into account that banks regard these relationships among the most critical intangibles (Arbeitskreis Wissensbilanz 2006: 21) and thus, an arguably important element of their credit-decisions.

²²² 75% of German SME' debenture capital comes from solely one bank. Similarly, 40% of German SME transact their banking affairs with only one bank (Börner 2006: 307 et seq.).

²²³ The reasons for this view are diverse – cf. Kay Alwert (2005: 146) and the BMWi (2010a: 14 et seq., 2010b: 11).

Apart from the lastly mentioned threat of working with one bank only and the fact that most German SME generally prefer financial independence, the contents of this chapter allow establishing creditor and shareholder relationships as a strategically relevant facet of RC. In detail, the discussed aspects and specifically the ones concerning the advantages of close, trustworthy and long-term relationships with financial institutions or other capital providers support the third sub-hypothesis of relationship capital:

Hypothesis 3c:

German SME' shareholder relationship is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.

4.1.3.4 German SME' Alliance/Cooperation Relationships

Alliance and cooperation relationships with diverse partners symbolize the fourth dimension of German SME' RC. Especially in today's business environment (cf. chapter 1.1) cooperations and strategic partnerships form an important dimension and are regarded as an IC-based strategic source of German SME' competitive advantages and thus, success (Rissbacher, Stahl 2003: 131 et seq.; Alwert 2005: 19; Alwert, Heisig, Mertins 2005: 7; BMWi 2010b: 10; Bischof 2012: 20; Koschatzky 2012: 8). According to international SME sources, such collaborations help to compensate for missing resources and are therefore a critical component of business (Welbourne, del Val Pardo 2008: 3). Moreover, the international literature puts forward that cooperation relationships represent an essential way of accessing as well as transferring explicit and in the long-run also tacit knowledge (Wong, Aspinwall 2004: 55). This, in response, facilitates organizational learning and thus, long-term survival (Cegarra-Navarro 2005: 3 & 12). Lastly, it is argued that alliance networks are relevant for SME in order to focus on their core competencies (Huggins, Weir 2007: 710) as well as to build new ones (Wong, Aspinwall 2004: 55). These and additional *pull factors* promoting cooperations are further strengthened by the German *push factors*: In the light of the current demographic changes, alliances are increasingly important to make up

for the shortage of (young) labor and thus, (innovative) knowledge (Verworn 2007: 16). In the German context, authors also suggest that mainly successful SME engage in cooperations because of two key reasons: firstly, they can handle the additional efforts of collaborations; secondly, they can contribute more (high quality) resources and capabilities which in turn motivates others to engage with them (Rautenstrauch, Generotzky, Bigalke 2003: 69 et seq. cited by Knop 2009: 38; *ibid.*: 40 et seq. & 193). On top of this, it is also highlighted against the German SME background that (the abilities to engage in) cooperations are company specific intangibles which are undepreciable, intransferable, non-transferable, inimitable as well as non-substitutable and thus, highly relevant for lasting competitive business performance (Rissbacher, Stahl 2003: 131 et seq.) – i.a. because of a high level of informal knowledge exchange (Schöne, Freitag 2000: 15 et seq.). In detail, this dissertation splits, based upon a literature review, the discussion on German SME' cooperations into three perspectives: alliances with other (large as well as small- and medium-sized) companies, collaborations with educational and/or research institutions (BMWi 2013b), and outsourcing.

The first and most common attribute of German SME' alliance or cooperations relationships, which is to be reviewed in detail, is the joint work with other enterprises (Kayser 2006: 46; Kropfberger 2009: V). *Intercompany cooperations*, for example, in the field of R&D, distribution and marketing become increasingly important for German SME and arguably their competitive success since German SME are reliant on them (Bischof 2012: 11). This is, on the one hand and as mentioned before, because collaborations between firms help to counterbalance German SME' little *financial* capital, limited *resources* and low *market power* by pooling the partners' *stakes*, splitting *risk* as well as *costs* etc. (Maaß, Suprinovic, Werner 2006: 1; Zanger 2006: 188; Mieke 2007: 339; Kropfberger 2009: V; BMWi 2013b). On the other hand, inter-firm cooperations facilitate mutual advanced *education*, promote joint *learning*, encourage *experience- as well as best practice* exchange, increase the *competencies* of the involved people via *knowledge transmission*, enlarge *technological knowledge and know-how*, enhance *innovation potentials*, and may even endorse the *transfer of personnel* (Fuchs 2003: 64; Alwert 2005: 73; Spielkamp, Rammer 2007: 302; Kropfberger 2009: V); thus, they enlarge German SME' IC. It is also worth mentioning that intercompany partnerships are especially common and recommended in terms of *innovations* (management)

(Maaß, Suprinovic, Werner 2006: 1 et seq.; Meyer 2006: 218; Mieke 2007: 337 et seq.; Spielkamp, Rammer 2007: 302 et seq.; Wolf, Paul, Zipse 2009: 49 et seq.; Bischof 2012: 11). However, the majority of German SME favors to work independently and thus, ignores the potential of cooperations concerning competitiveness and thus, sustainable success (Durst 2008: 418 & 424). Less than 30% of German SME, for example, use best practice transfers in order to learn from other firms (Mertins, Kohl, Krebs 2008: 50; Pawlowsky, Gözalan, Schmid 2011: 7) and just about 11% engage in R&D cooperations with other companies (Pawlowsky, Gözalan, Schmid 2011: 4 et seq.). The reasons for the limited engagement in inter-firm collaborations include, among others, the fear of giving up autonomy, binding resources, revealing company-secrets, knowledge or know-how, being faced with longer decision-making processes, having to divide returns, and loosing employees' motivation via decreasing company identification (Pfohl 2006c: 270; Simon, Huber 2006: 68; Mieke 2007: 339; BMWi 2013b). If German SME do, nonetheless, enter cooperations then they are usually *project-orientated* as opposed to capital participations (Pfohl 2006c: 270) and *long-term* (three to five years) (Knop 2009: 36; Czaplok 2013: 11). Furthermore, German SME' intercompany cooperations are most likely if the partners *trust* each other (Maaß, Suprinovic, Werner 2006: 6; Meyer 2006: 218; Wagner 2008: 20), are *no direct competitors* (Meyer 2006: 218; Wagner 2008: 9), have *complementary* financial and intangible *resources* (Meyer 2006: 218), and share similar *corporate cultures* as well as *objectives* (Alwert 2005: 19; Alwert, Heisig, Mertins 2005: 7). Since the majority of these aspects is tacit, undepreciable, unique, intransferable, inimitable and non-substitutable, cooperation relationships are regarded a strategically relevant intangible sources of sustainable competitive advantage and hence, lasting business performance. Lastly, it can be summarized that German SME *only join cooperations if* the alliances are highly (success) *promising, carefully chosen and well thought through* (Simon 2007: 281).²²⁴

Collaborations with educational and research institutions represent the second attribute of German SME' RC-dimension 'alliance relationships' which offers divers advantages (Verworn 2007: 16; IfM 2013b) and prospects of success

²²⁴ Only approx. 8% of German SME have no interest in external cooperations at all (Witte 2011: 51 et seq.).

(Herstatt, Raasch, Buse 2007: Zusammenfassung). In line with the aforementioned, these alliances are usually entered in order to e.g. compensate for limited *resources* (Wolf, Paul, Zipse 2009: 50), to concentrate on their *core competencies*, to minimize *risk* (Verworn 2007: 16 et seq.), to acquire *knowledge*, and to improve *internal education and learning* (Pawlowsky et al. 2006: 11; Back, Fürst 2011: 5).²²⁵ It is further highlighted that cooperations with universities or other educational institutions offer a large *pool of potential staff* and thus, help to counterbalance labor shortage as well as promote the *people-based transfer of knowledge* in the long-run. Specifically, German SME can, for example, employ *working students* and *trainees* or supervise (final) *thesis* and thereby test as well as tie people to their company in early years (Verworn 2007: 17; Markowski, Grosser, Kuhl 2008: 14; Back, Fürst 2011: 39; Lüdecke 2012: 37 et seqq.). Additionally, alliances with educational and research institutions are debatably important for German SME concerning *innovations* as well as R&D assignments (Pawlowsky et al. 2006: 18; Spielkamp, Rammer 2007: 302; Markowski, Grosser, Kuhl 2008: 14; Wolf, Paul, Zipse 2009: 49 et seq.; Back, Fürst 2011: 21; Koschatzky 2012: 14)²²⁶ – e.g. new product development, product improvements and process optimizations (Markowski, Grosser, Kuhl 2008: 13). It is, for example, revealed that approx. 60% of German SME enjoy good relationships with R&D partners like universities or other research institutions (Mertins, Kohl, Krebs 2008: 50) while about 19% of them cooperate with universities and approx. 11% with research institutions (Witte 2011: 51 et seq.).²²⁷ Thus, cooperations with universities and research institutes are not very common (Pawlowsky et al. 2006: 10 et seq.) – especially not in terms of innovations (Markowski, Grosser, Kuhl

²²⁵ In the international SME context, relationships to universities and other educational institutions are viewed as relevant, too (Danish Ministry of Science, Technology and Innovation 2003: 41, 69 & 72; SKE 2005: 34; RICARDIS 2006: 40) – especially in science-based industries (Hermans, Kauranen 2005: 177).

²²⁶ Cf. global SME discussion (RICARDIS 2006: 18 & 31).

²²⁷ The larger the SME, the more likely are cooperations with universities etc. (Thum-Kraft et al. 2007: 85).

2008: 1, 9).²²⁸ This is, as it is nationally (Herstatt, Raasch, Buse 2007: 2 et seq. & 11 et seq.; Thum-Kraft et al. 2007: 100; Markowski, Grosser, Kuhl 2008: 1; Back, Fürst 2011: 27) and internationally (RICARDIS 2006: 40) argued, not necessarily because such collaborations are not contributing to SME' success but because of SME' limited resources – e.g. time and money –, inadequate experience, insufficient management competence, as well as scarce information or knowledge of possible partners and (research) subjects; and the universities' high level of bureaucracy. Conforming to the above line of argumentation, it can therefore be reasoned that especially *successful German SME realize the potential of good relationships with carefully chosen and well thought through universities and other research as well as educational institutions.*

The last attribute of German SME' alliance relationships focuses on German SME' *outsourcing activities*. Outsourcing belongs, in line with the above discussed strategic alliances, to the popular issues in management literature (Simon 1996: 145 & 153; Simon 2006: 57; Simon, Huber 2006: 68; Simon 2007: 273) since it offers (German) SME, for example, the possibility to integrate external *know-how*, to develop *knowledge*, to access new *technologies and technological innovations* or to focus on *core-competencies* (van Bonn 2007: 105; Specht 2008: 51; Matejun 2011: 1).²²⁹ However, German SME do not seem to believe in these managerial concepts very much. As a consequence, their competitive advantage(s) and thus, long-lasting business performance are rather grounded in the fact that they *outsource fairly little* (Simon 2006: 57; Simon, Huber 2006: 68; Adenäuer 2007: 27, 34 et seq., 37, 41 et seq.; Simon 2007: 256 & 273). This is because it helps them, for example, to *prevent the imitation* of their unique *competencies*, products' and services' *quality*, employees' *motivation* and *differentiation* (Simon 1996: 145 et seq. & 153 et seq.; Simon, Huber 2006: 68; Adenäuer 2007: 27; Simon 2007: 273). Some German SME go even one step further and build their own production-machines in order to generate company-specific competitive advantages (Simon 1996: 149; Simon,

²²⁸ Other German SME studies show similar results – cf. Cornelius Herstatt, Christina Raasch and Stephan Buse (2007: 9). Yet, German SME seem to cooperate more with university and other research partners than international SME (RICARDIS 2006: 40).

²²⁹ For more advantages on outsourcing, especially with focus on R&D cf. Dieter Specht (2008: 35).

Huber 2006: 68; Simon 2007: 275 et seqq.) and thus, sustain their financial performance. Nevertheless, it is recommended that German SME shall still engage in outsourcing; yet, with focus on non-core competencies in order to *prevent dependence* as well as to maintain as well as leverage competitive advantages and thus, business performance (Specht 2008: 51). In this regard, it is noticeable that German SME prefer to outsource legal or tax related services because of cost advantages and the latter's specific qualities (Simon 1996: 154; Simon 2006: 57; Simon 2007: 273 & 293). To conclude the discussion on outsourcing it can be stated, just like above, that German SME realize competitive advantages and thus, lasting competitive business performance because of their *careful selection of outsourcing activities as well as partners*.

Taken together, the three discussed key attributes of German SME' cooperation relationships – i.e. inter-company alliances, cooperations with educational institutions and outsourcing activities – highlight that alliances present strategic sources of success if they are wisely handled. Since most German SME are expected to do so, this dissertation proposes the following hypothesis:

Hypothesis 3d:

German SME' alliance/cooperations relationship is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.

4.1.3.5 German SME' Informal Network Relationships

The fifth dimension of German SME' RC replaces the rather imprecise general IC-dimension called 'other stakeholder' (cf. chapter 2.4.1.3) and instead looks into informal network relationships. In detail, this dimension is concerned with German SME' associations to diverse *family* members, *friends* and *other social networks* (like personal contact networks) who/which play not only a considerable role in private life (Fueglistaller, Fust 2010: 25) but also as supporters of business – especially during the company foundation, in young and in very small enterprises (Welter, Höhmann, et al 2004: 30; Ruda, Martin, Danko 2009: 41; Baldegger, Julien 2011: 127).

In depth, the entrepreneurs' family members and friends are, as it is nationally (Baldegger, Julien 2011: 127) and internationally (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 79 et seq.) declared, highly important for (German) SME and their success because they provide a) *psychological support* such as trust, enthusiasm as well as confidence, and b) *active aid*. Concerning the latter mentioned direct help, various authors state that family, friends and fools are important *capital providers* – especially for micro and (very) young firms (Welter, Höhmann, et al 2004: 29; Hering, Vincenti 2006: 383; Kraus, Fink 2008: 160; Kühn 2010: 10; Baldegger, Julien 2011: 170) – because they help to compensate for financial restrictions (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 79 et seq.). On top of this, German SME' capital from personal contacts frequently offers the advantage that these individuals ask for none or relatively little collateral compared to bank credit requirements (Welter, Höhmann, et al 2004: 29), evaluate company information less professionally and rely on trust instead of written agreements. As such, they only marginally influence the entrepreneur's power (Kraus, Fink 2008: 160) and arguably allow the flexibility which is required to succeed in today's business environment (cf. chapter 1.1 and figure 1). Another kind of active help which is mentioned in the German (Baldegger, Julien 2011: 127) as well as global (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 79 et seq.) SME context is *labor* of personal contacts. Unremunerated or low paid work is important for SME' success because it decreases staff overheads and thus, saves money. More to it, Esther Hormiga et al. (2011b: 79 et seq.) mention in terms of international SME that family members and friends are more *loyal* and need to be *less controlled* – e.g. because of their personal, intrinsic incentives – which again increases chances of success and reduces efforts. Closely related to the pervious point of cost-savings is also the families' direct support in the form of *minimized household expenditure* (Baldegger, Julien 2011: 127) and potentially resulting more funds for the business. Besides, German sources indicate that informal network relations are strategic sources of lasting competitive success because they are relevant for *innovations*. It is, for example, argued that family members, friends and other social contacts (can) provide inputs for the development of a firm's strategy (ibid.: 127), and actively support the testing, reorganization, completion as well as consolidation of ideas (ibid.: 139). Moreover, they transmit a general mindset required to identify environmental opportunities as well as to translate

them into innovations (ibid.: 110 et seq.) – especially because they interpret opportunities in a similar manner than the entrepreneur (Fueglistaller et al. 2012: 29). An additional relevant form of active aid, which cannot only be found in the international (Cardon, Tolchinsky 2006: 72) but also the German literature, is families' and friends' *word-of-mouth recommendation as well as (viral) marketing* which is helpful in order to acquire new customers (Welter, Höhmann, et al 2004: 25; Kraus, Fink 2008: 101) as well as other stakeholders such as employees. Lastly, the global literature puts forth that personal and other social networks support *transitioning a firm from the start-up stage towards growth and beyond* (Peltier, Naidu 2012: 56). This is, according to German literature, arguably the case because dynamic relations with family and friends continually provide firms with relevant, comprehensive and presorted²³⁰ information as well as knowledge which are required in order to learn and adopt to new situations (Baldegger, Julien 2011: 26 et seq., 215 and 218), and motivate via trust (ibid.: 215).

Before wrapping up this paragraph, it is interesting to point out that German SME do not only focus on family and friends but also incorporate the *memberships in business associations and chambers* (Welter, Höhmann, et al 2004: 27; BMWi 2007: 54) in the context of informal networking relationships. This is potentially the case because such informal networks establish as well as strengthen i.a. collective trust which, in turn, supports entrepreneurs in building personal trust in their own firms (Welter, Höhmann, et al 2004: 27).

To conclude, it is worth highlighting that personal networks – especially with family and friends – are (predominantly) long-term orientated (Baldegger, Julien 2011: 127) and also enterprise- or entrepreneur-specific, causally ambiguous, tacit, undepreciable, intransferable, inimitable, and non-substitutable as can be seen above. Hence, they are argued to represent an important intangible strategic source of lasting above-average business success and allow raising another sub-hypothesis auf RC:

²³⁰ Inputs from social networks are pre-sorted because the involved people usually know each other as well as their needs well (Baldegger, Julien 2011: 218).

Hypothesis 3e:

German SME' informal network relationship is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.

4.1.3.6 German SME' Public Perceptions

The last dimension of German SME' RC focuses on German SME' relationship to the public in general, former as well as potential stakeholders such as prospective employees (Mertins, Wang, Will 2009: 118), and the enterprises' corporate image as well as reputation (Hall 1992: 143; Daum 2003: 27) (cf. also chapter 2.4.1.3). These and further issues related to German SME' public perceptions represent strategic sources of lasting above-average performance (Alwert 2005: 146; Schneider 2008: 59, 135 et seqq. & 170; IfM 2013b; Zenker 2013: 36 et seq.). That is, as it is argued in the general IC-context, because they require time to be built, cannot be bought, easily replaced or damaged, and lose value unless they are taken care of – e.g. via advertising or promotion (Hall 1992: 143; Brooking 1997: 22).

In depth it can be noticed that German SME' *relationships to the public* are perceived to be increasingly relevant for success (BMW 2007: 54 & 57; BMW 2010b: 10; Englisch et al. 2012: 20). This is because SME have a special relationship to their local public societies because of various reasons. They are, for example, often important *tax payers* (in their region) and are committed to local activities – e.g. from *supplying jobs or vocational training opportunities* to other *public relations (PR) activities* such as sponsoring clubs, cultural activities etc. (Simon 2007: & 299 315 et seq.; Tänzler, Keese, Hauer 2011: 166 et seq.). Especially the former mentioned focus on prospective employees seems not only reasonable but is also highly important concerning the labor shortage conditions which German SME are faced with (Englisch et al. 2012: 21).

Yet, it has to be noted that the broader public is often not aware of German SME or their existence – especially because many German SME do not produce products and services for the end consumer (Simon 2007: 161; Grothe, Marke 2012: 26). German SME are, nevertheless, *well known by their customers* and enjoy a

good *reputation* (Simon 2007: 161) – e.g. are well perceived in their market / business environment (Volery 2006: 256). This good reputation, in turn, represents an IC-based strategic source of their lasting success²³¹ (Alwert, Vorsatz 2005: 325; Schneider 2008: 59, 135 et seqq. & 170; Tänzler, Keese, Hauer 2011: 165; Zenker 2013: 36 et seq.) because it enables German SME i.a. to *acquire new stakeholders* such as new customers (Schneider 2008: 59) as well as to maintain previous ones via an increased “attractiveness of an exchange relationship” (Hayton 2005: 141). Furthermore, it is stated that once established, a positive reputation helps German SME especially in times of bad public perception to limit the losses of reputation and other capital (Tänzler, Keese, Hauer 2011: 169). More to it, the whole reputation issue is generally *sustainably-orientated* (Volery 2006: 256; Tänzler, Keese, Hauer 2011: 179) and therefore, provides the potential to promote long-term competitive success. Besides, reputation is, as previously stated, based on – peoples’ or the enterprise-environment’s – perception (Volery 2006: 256) and hence, is highly company specific, causally ambiguous, tacit, undepreciable, intransferable, inimitable, and non-substitutable. For these reasons, the above mentioned statement that reputation is viewed as a strategically relevant intangible source of lasting competitive business performance is further supported.

Another interesting perceptual aspect which helps German SME to differentiate from competitors and to build loyalty (Gruber 2000: 308) is *brands*. In particular, brands represent important intangible strategic sources of German SME’ competitive business performance (Gruber 2000: 308; Alwert, Vorsatz 2005: 325) because they are highly difficult for competitors to copy (Gruber 2000: 308) and thus, further strengthen the long-term earning potential.

Lastly, it is worth mentioning that reputation, brand, and other public perceptions can be promoted via various *marketing and PR instruments* such as published *media reports* in (relevant and professional) journals and magazines, other press quotations, newsletters, the company-website, or (public) *events* which highlight i.a. best-practice examples and thus, let the enterprise stand in a good

²³¹ Vice versa it is argued that a diminishing reputation may cause serious economical harm because such reputational issues can mostly not be solved in the short- or medium-term (Tänzler, Keese, Hauer 2011: 165).

light (Danish Ministry of Science, Technology and Innovation 2003: 71; RICARDIS 2006: 19 & 89; Thorleifsdottir, Claessen 2006: 60; Herstatt et al. 2007: 44).

Overall it can be summarized that the above mentioned attributes of the RC-dimension 'German SME' public perceptions' highlight that German SME, for instance, enjoy good relationships with their (local) public and have a good reputation and brand status particularly among their customers. Since all of these aspects are tacit and fulfill the other criteria of sustainable sources of success (cf. chapter 2.3.2.2.4), they support the formulation of the following hypothesis:

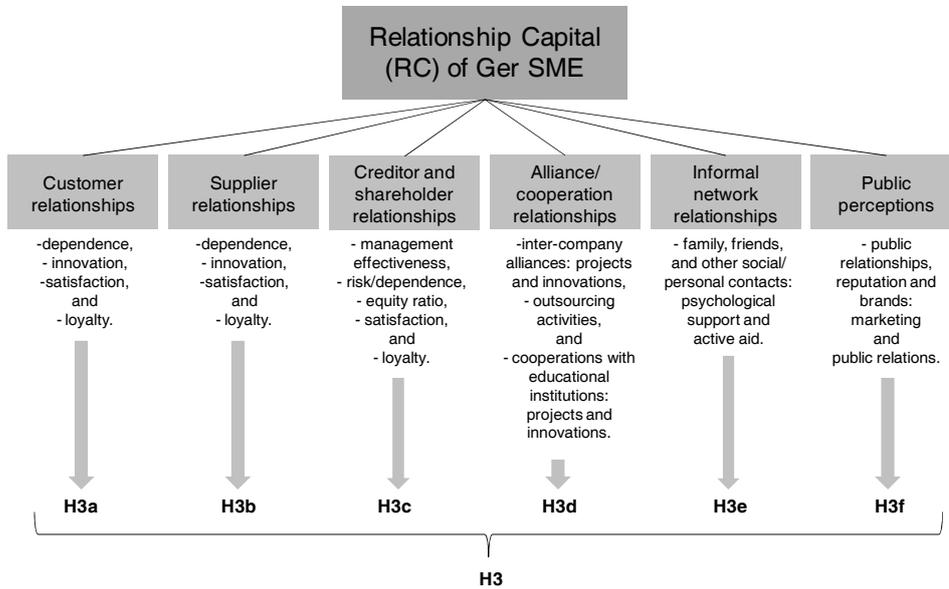
Hypothesis 3f:

*German SME' public perceptions is
a strategically relevant dimension of German SME' relationship capital and
thus, important for lasting competitive business performance.*

4.1.3.7 Summary of German SME' Relationship Capital

The above discussion on German SME' RC-dimensions, namely customer relationships (cf. chapter 4.1.3.1 and sub-hypothesis H3a), supplier relationships (cf. chapter 4.1.3.2 and sub-hypothesis H3b), creditor and shareholder relationships (cf. chapter 4.1.3.3 and sub-hypothesis H3c), alliance/cooperation relationships (cf. chapter 4.1.3.4 and sub-hypothesis H3d), informal networking relationships (cf. chapter 4.1.3.5 and sub-hypothesis H3e) and public perception (cf. chapter 4.1.3.6 and sub-hypothesis H3f), supports the initial hypothesis (H3) that German SME' RC represents an IC-based strategic source of lasting competitive business performance. This is because each dimension is argued to represent an important facet of German SME' RC which positively contributes to long-term above-average success (cf. figure 37).

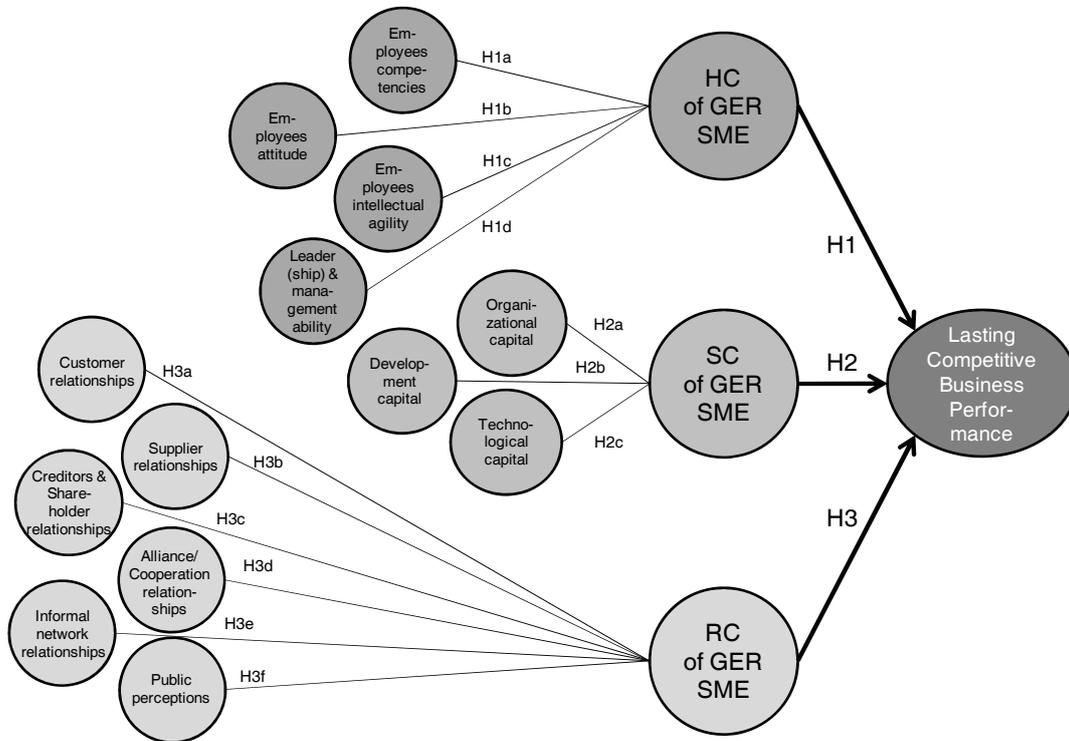
Figure 37: The Dimensions and Attributes of German SME' RC



4.1.4 Summary of Hypotheses 1-3 in Conceptual Research Model I

This chapter summarizes the hypotheses of sections 4.1.1 (including 4.1.1.1, 4.1.1.2, 4.1.1.3 and 4.1.1.4), 4.1.2 (including 4.1.2.1, 4.1.2.2 and 4.1.2.3), and 4.1.3 (including 4.1.3.1, 4.1.3.2, 4.1.3.3, 4.1.3.4, 4.1.3.5 and 4.1.3.6) which indicate a positive, direct impact of German SME' IC-categories and their dimensions on lasting competitive business performance. Specifically, the raised hypotheses as well as their respective sub-hypotheses are shown in figure 38. The three key hypotheses – i.e. H1, H2 and H3 – which propose that German SME' HC, SC and RC are positively and directly correlated with corporate success are represented by the bold arrows in figure 38. The thin lines, in contrast, show the sub-hypotheses which link diverse IC-based dimensions to their particular IC-category.

Figure 38: Research Model I: Direct Impact of German SME' IC-categories on Lasting Competitive Business Performance



Such a model has, to the best knowledge of the researcher, so far not been tested for German SME based on a large scale empirical investigation. Yet, similar simple models – i.e. only including H1, H2, and H3 – have been examined and certified internally (Bontis 1998: 65 et seqq.; Wang, Chang 2005: 224 et seqq.; Wu, Chou 2007: 51 et seqq.; Kamaluddin, Rahman 2009: 5 et seqq.) as well as with focus on global SME (Hermans, Kauranen 2005: 171 et seqq.; Tovstiga, Tulugurova 2007: 699 et seqq.; F-Jardon, Martos 2009: 604 et seqq.; Tovstiga, Tulugurova 2009: 72 et seqq.). Thus, the relevance of hypotheses 1 to 3 'only' requires empirical support from German SME. More interesting, however, is the investigation of the newly developed sub-hypotheses – i.e. H1a to H1d, H2a to H2c, and H3a to H3f – especially for the German SME context.

4.2 THE INTERACTION EFFECT OF GERMAN SME' INTELLECTUAL CAPITAL CATEGORIES AND LASTING COMPETITIVE BUSINESS PERFORMANCE

Beside the simple IC-model discussed in 4.1, it is advised that researchers further investigate more *complex models* where *HC*, *SC* and *RC* do not only directly impact lasting competitive business performance but (also) *influence and depend on each other* (Bosma et al. 2004: 234) and thereby create additional value (Kivikas 2004: 476) – e.g. the qualifications of German SME' employees may impact customer relationship management, or German SME' leadership competencies may alter communication systems (Kivikas, Wulf 2006: 47).²³² Kira Reed, Michael Lubatkin and Narasimhan Srinivasan (2006: 870 et seqq.) with regard to US banks, Sandra Cohen and Nikolaos Kaimenakis (2007: 247 et seqq.) in the context of Greek knowledge-intensive SME²³³, Meng-Yuh Cheng et al. (2010: 438 et seqq.) with focus on the US healthcare industry, Nixon Kamukama, Augustine Ahiauzu and Joseph Ntayi (2010: 558 et seqq.) for microfinance institutions in Uganda, as well as Kuang-Hsun Shih, Chia-Jung Chang and Binshan Lin (2010: 80 et seqq.) on the banking industry, for example, examine interaction models and confirm relationships among IC-categories.

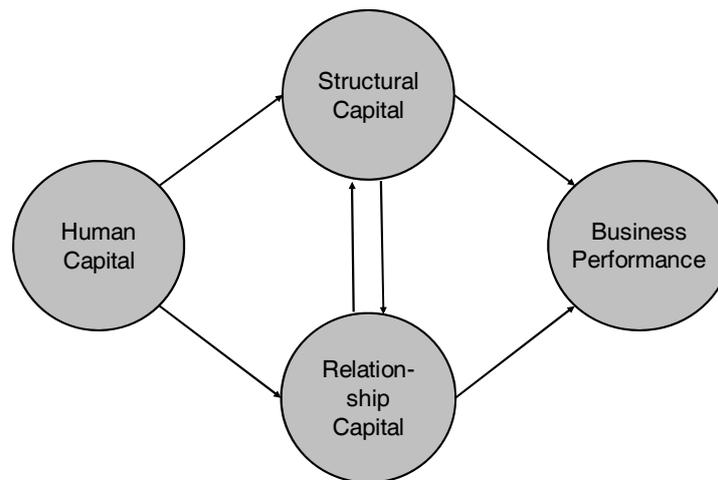
The *mostly applied interaction model* is the so called *diamond model*, in which *HC* represents the source of *SC* as well as *RC* while *SC* and *RC* impact lasting competitive business performance (Bontis 1998: 70 & 76). This diamond model was first recommended as 'the optimum' by Nick Bontis (1998: 70 & 76), who surveyed Canadian MBS students. Ever since the diamond model has –

²³² „The strength of the interrelationships among the IC sub-domains may provide managers with a useful tool; it seems that it is possible to affect various aspects of the firm by tweaking only one category of intellectual assets. Therefore, a firm can enhance its IC without having to invest in every sub-domain; for example an investment on human capital is expected to lead to the simultaneous improvement of its organizational and customer capital. This becomes even more significant if we take into consideration that our sample consisted of SMEs which are inherently characterized by the scarcity of their resources. Thus, it is even more important to be able to bring about the desired results with the least possible use of resources“ (Cohen, Kaimenakis 2007: 258).

²³³ In the following business segment: advertising, information technologies and consultancy (Cohen, Kaimenakis 2007: 250).

sometimes slightly modified – been tested and (partially) confirmed by various authors such as Nick Bontis, William Keow and Stanley Richardson (2000: 90 et seqq.) on service and non-service firms in Malaysia, Chun-Yao Tseng and Yeong-Jia James Goo (2005: 187 et seqq.) on Taiwanese manufacturers, Wen-Ying Wang and Chingfu Chang (2005: 227 et seqq.) on the high-tech IT industry in Taiwan, Maria de Rosario Cabrita and Nick Bontis (2008: 219 et seqq.) on the Portuguese banking industry, Carlos Maria F-Jardon and Maria Susana Martos (2009: 604 et seqq.) on wood manufacturer SME in Argentina, Cheng-Ping Shih and Wen-Chih Morrison Melton Chen (2010: 6.4 et seqq.) on the Taiwanese design industry, and Josee St-Pierre and Josee Audet (2011: 209 et seqq.) on Canadian and French manufacturing SME. These studies' most common connections between the IC-categories are presented in figure 39.

Figure 39: Modified Diamond Model Specification



Source: adopted from Bontis 1998: 76, Bontis, Keow, Richardson 2000: 97, Wang, Chang 2005: 224, Do Rosario Cabrita, Bontis 2008: 229, F-Jardon, Martos 2009: 606, Shih, Chen, Morrison 2010 and St-Pierre, Audet 2011: 215

However, neither the (general) interaction of the IC-categories nor the common diamond model has, as far as the researcher of this doctoral thesis is aware, been studied in the German SME context. As a consequence, it is important to fill this research gap. Yet, to do so and also to raise corresponding

hypotheses, the following chapters (4.2.1 – 4.2.3) rely on international IC-literature as well as global literature on IC in SME and use logical reasoning (building on the fundamentals of German SME – cf. chapter 3 and chapter 4.1) to transfer the universal arguments into the context of German SME. The outcomes of this conceptual transformation are summarized in a final German SME model (chapter 4.2.4). Lastly, it is important to highlight that the contents of the IC-categories – specifically the dimensions and attributes – which are established in chapters 4.1.1.1 to 4.1.1.4, 4.1.2.1 to 4.1.2.3, and 4.1.3.1 to 4.1.3.6 hold in this chapter, too. This is because the IC (definition) of German SME does not change just because the sequence of impacts (on performance) is modified.

4.2.1 Interaction of German SME' Human Capital, Structural Capital, and Lasting Competitive Business Performance

“People increase or modify their capital just by living their lives: structural capital, in most cases, needs to be updated by the employees themselves”

(Roos et al. 1997: 42).

Although the interaction between German SME' human capital (HC) and structural capital (SC) is, to the best awareness of this thesis' author, not empirically investigated, one finds indications of the connection in the literature on German SME' IC. Kay Alwert (2005: 14), for example, who refers to Karl Sveiby (1998), states that SC is (to large parts) made up of employees' interactions. Thus, SC would only represent a latent structure without the right people who know how to make it work. Furthermore, Kay Alwert (2005: 14) implies that the loss of a single employee can (therefore) harm SC. Consequently, one can assume that he regards *HC as a precondition of SC*. On top of this, Kay Alwert (2005: 14) claims, this time relying on Leif Edvinsson and Michael Malone (1997b), that people need SC in order to leverage their HC and that people's IC would only be latent without SC. This latter view can be interpreted to the following extent: *HC is unable to directly impact success* and instead needs to be linked to SC.

The international IC-literature confirms Kay Alwert's (2005: 14) reasoning, yet is

more precise. Various general IC sources (Bontis 1998: 71; Bontis, Keow, Richardson 2000: 94 et seqq.; Ordonez Pablos 2004 cited by F-Jardon, Martos 2009: 605; Tseng, Goo 2005: 193 & 197; Wang, Chang 2005: 231 et seqq.; Martinez-Torres 2006: 618 & 624; Reed, Lubatkin, Srinivasan 2006: 881 et seqq. & 884; Do Rosario Cabrita, Bontis 2008: 228; Shih, Chen, Morrison 2010) as well as studies with focus on SME (Cohen, Kaimenakis 2007: 245 & 252 et seq.; F-Jardon, Martos 2009: 604 & 611; St-Pierre, Audet 2011: 205 & 215), for instance, evidence that *HC has a significant positive impact on SC*. Such research outcomes are not surprising when taking into account that various authors (Bontis 1998: 70 et seqq.; Bontis, Keow, Richardson 2000: 94 et seqq.; Wang, Chang 2005: 223; Do Rosario Cabrita, Bontis 2008: 229), also in the research field of SME (F-Jardon, Martos 2009: 604 & 611; St-Pierre, Audet 2011: 204 et seqq.), claim that HC is *the source of IC* (cf. chapter 2.4.1.1). Specifically, it is argued that intellectual employees as well as leaders – e.g. competent, with a positive attitude towards the enterprise, high intellectual agility and suitable leadership, respectively – have the required knowledge, know-how, and mindset in order to build and maintain company owned SC – e.g. organizational processes, routines, ICT (investments), quality standards, corporate culture, and innovations – and are capable as well as eager of sharing and using it (Tseng, Goo 2005: 193; Wang, Chang 2005: 226 et seq.; Martinez-Torres 2006: 618; Cohen, Kaimenakis 2007: 245 & 252 et seq.; Do Rosario Cabrita, Bontis 2008: 217; F-Jardon, Martos 2009: 604; Khan 2011: 132). This point of view can be transferred to *German SME*, too. This is, for instance, because German SME' employees are willing to exchange knowledge for the sake of the firm (cf. chapter 4.1.1.2), are highly loyal and thus, reduce the need to document knowledge (cf. chapters 4.1.1.2 and 4.1.2.1), exhibit a high identification with the firm which is required to produce high quality (cf. chapter 4.1.2.1), are motivated by non-financial incentives which shape corporate culture (cf. chapter 4.1.2.1), and provide inputs for innovations (cf. chapter 4.1.2.2).

Additionally, it is internationally claimed that HC and SC require connection since *HC is, on its own, only little worth*. HC requires a firm's supportive infrastructure including, for example, SC-aspects like corporate culture, processes or innovations to use as well as boost its potentials and thus, contribute to performance (Bontis 1998: 70 et seq.; Wang, Chang 2005: 231; Reed, Lubatkin, Srinivasan 2006: 872; F-Jardon, Martos 2009: 604 et seq. & 611; Kamukama,

Ahiauзу, Ntayi 2010: 558 et seq.).²³⁴ In the *German context*, there is nothing to argue against this finding. Rather the opposite case is true. In line with the above it can, for instance, be reasoned that German SME' staff requires a supportive culture to experiment with, communicate and implement innovative ideas (cf. chapters 4.1.1.3, 4.1.2.1 and 4.1.2.2), or that it requires little work division and related higher responsibilities in order to demonstrate highly advantageous attitudes and thus, add to performance (cf. chapters 4.1.1.2 and 4.1.2.1).

Altogether, the international literature and logical reasoning – based upon the awareness of German SME' IC from the previous chapters (cf. chapters 4.1.1.1 to 4.1.3.7) – allow adopting the following, originally globally raised, hypothesis in the context of German SME:

Hypothesis 4a:

German SME' human capital is the origin of IC because it has a positive impact on their structural capital, which, in turn, determines German SME' lasting competitive business performance. Consequently, human capital has an indirect impact on German SME' corporate success.

4.2.2 Interaction of German SME' Human Capital, Relationship Capital, and Lasting Competitive Business Performance

“But human capital is not just the human beings, their backgrounds, education, knowledge or abilities. Far more important are the relationships employees develop in the name of the organization (...)”

(Welbourne, del Val Pardo 2008: 4).

²³⁴ “Isolated stocks of knowledge that reside in the employees' minds that are never codified into organizational knowledge will never positively affect business performance. In other words, it is not enough for an organization to hire and promote the brightest individuals it can find” (Bontis 1998: 71).

In consonance with the previous section (chapter 4.2.1), remarks concerning the (inter)dependence between human capital (HC) and relationship capital (RC) can be found in Kay Alwert's (2005: 14) work on German SME, too. Specifically, he declares that a firm's relationships between its staff and stakeholder are frequently closely tied together. An employee who leaves his/her firm may, for example, take stakeholder-relationships with him/her and thus, withdraws the respective business relation from the enterprise. Conversely, the stakeholder may, however, remain loyal to the company and 'only' executes business with a different member of the staff (ibid.: 14). In both cases, *HC* can be (widely) interpreted as *a precondition of RC*.

However, the German literature is, as previously mentioned, rather imprecise. Thus, it is worth turning to international sources. In this regard it is important to stress that diverse researchers such as Nick Bontis (1998: 71), Nick Bontis, William Keow and Stanley Richardson (2000: 96), Kira Reed, Michael Lubatkin and Narasimhan Srinivasan (2006: 881 et seq. & 884), Maria de Rosario Cabrita and Nick Bontis (2008: 228), Cheng-Ping Shih, Wen-Chih Chen and Melton Morrison (2010), Chun-Yao Tseng and Yeong-Jia James Goo (2005: 197), and Wen-Ying Wang and Chingfu Chang (2005: 231 et seq.) as well as Sandra Cohen and Nikolaos Kaimenakis (2007: 252 et seq.), Carlos Maria F-Jardon and Maria Susana Martos (2009: 612), and Shaniz Khan (2011: 133) for SME exposed that *HC has a significant positive impact on RC*. First of all, this discovery can be attributed to the fact that *HC* is regarded to be the *origin of IC* (cf. chapters 2.4.1.1 and 4.2.1). Secondly, this finding is justified by the argument that an enterprise's employees represent the heart which is required to establish and sustain relationships with externals (F-Jardon, Martos 2009: 605; Kamukama, Ahiauzu, Ntayi 2010: 558; Khan 2011: 132). In more depth, it is declared that the more competent, motivated, intellectually agile etc. the employees and managers, the better they are at understanding the demands of their stakeholders – like customers –, building loyal relationships with them, and satisfying their needs (Bontis, Keow, Richardson 2000: 96 et seq.; Bosma et al. 2004: 229; Tseng, Goo 2005: 193; Wang, Chang 2005: 226; Cohen, Kaimenakis 2007: 253; Do Rosario Cabrita, Bontis 2008: 216 & 218; Kamaluddin, Rahman 2009: 4; Shih, Chang, Lin 2010: 81; St-Pierre, Audet 2011: 205). In the *German SME context*, this international (general as well as SME-focused) line of argumentation can be accepted, as well. This is, for example,

because German SME have a competitive edge since their employees foster close and regular communication with stakeholders like customers or suppliers (this is necessary because of the high level of specification or even customized solutions). This, in turn, facilitates the implementation as well as maintenance of relationships (cf. chapters 4.1.3.1. and 4.1.3.2). On top of this, sections 4.1.1.1 to 4.1.1.4 argue that German SME' employees as well as leaders are highly competent, motivated, loyal, intellectual agile and so forth. As such, they are assumed to be able to perform the above mentioned specifications like identifying and meeting stakeholders' wishes which, again, help to build good relationships.

Furthermore, it is highlighted that the interaction between HC and RC especially impacts long-term competitive performance (Wang, Chang 2005: 231; Reed, Lubatkin, Srinivasan 2006: 870; Do Rosario Cabrita, Bontis 2008: 229 et seqq.; Kamukama, Ahiauzu, Ntayi 2010: 565; Khan 2011: 132). This is because *HC is of little value without RC* and thus, *only indirectly impacts business success*. Employees' IC, for example, influences, as mentioned before, stakeholders' satisfaction, loyalty, and retention which, in turn, has an impact on company success (Do Rosario Cabrita, Bontis 2008: 218). Alternatively, a firm's staff requires RC-inputs such as market information in order to develop successful goods/services (Bontis 1998: 70). In accordance to chapter 4.2.1, there are no reasonable indications which prevent transferring the international rationale into the *German SME context*. Specifically, the introduction of chapter 4.1.3 (cf. particularly Jürgen Bischof 2012: 10) exposes, for example, that German SME are almost worthless and unable to survive without external contacts and relationships with, for instance, customers, supplier, or capital providers. Thus, it can be assumed that HC cannot be leveraged without customers who buy the firm's products/services, suppliers who deliver required inputs, etc.

Overall, the following hypothesis is formulated based upon this chapter's international reasoning in favor for a connection between HC and RC and its transfer into the German SME context:

Hypothesis 4b:

German SME' human capital is the origin of IC because it has a positive impact on their relationship capital, which, in turn, determines German SME' lasting competitive business performance. Consequently, human capital has an indirect impact on German SME' corporate success.

4.2.3 Interaction of German SME' Structural Capital, Relationship Capital, and Lasting Competitive Business Performance

Apart from human capital (HC) being the origin of IC by influencing structural capital (SC) and relationship capital (RC), various authors provide evidence that SC and RC influence each other as well (Do Rosario Cabrita, Bontis 2008: 219 et seq. & 229; F-Jardon, Martos 2009: 605 & 612; St-Pierre, Audet 2011: 209 & 215). Specifically, the literature shows that one can either claim that SC impacts RC (Wang, Chang 2005: 233; Do Rosario Cabrita, Bontis 2008: 229; St-Pierre, Audet 2011: 215) or that RC influences SC (Bontis, Keow, Richardson 2000: 97; F-Jardon, Martos 2009: 612; Shih, Chang, Lin 2010: 85).

Concerning the former line of argumentation – i.e. *SC impacts RC* –, it is important to highlight that international studies argue that organizational settings such as communication structures, information systems, operational processes, or high quality are the basis for creating, maintaining and improving external relationships because they allow exchanging knowledge, identifying external demands, meeting needs, and lastly facilitating transactions (Tseng, Goo 2005: 193; F-Jardon, Martos 2008 cited by F-Jardon, Martos 2009: 606; Kamaluddin, Rahman 2009: 4; Cheng et al. 2010: 438; Khan 2011: 132). In more depth, the literature particularly emphasizes the relevance of innovations as a precondition to maximize stakeholders' and especially customers' benefits, to achieve their satisfaction and thus, to contribute to good as well as potentially long-term relationships (Tseng, Goo 2005: 193; Cheng et al. 2010: 438 & 446; Daud, Yusoff 2010: 143).

Building on the knowledge of German SME and their IC (cf. chapters 3 and 4.1), this research work believes that the international argumentations fit the *German context*, too: On top of the aforementioned reason regarding innovation, one can also note in the German SME context that structural aspects such as product quality or punctuality of delivery influence, among others, customers' satisfaction (cf. chapter 4.1.3.1). Likewise, it can be argued that SC impacts RC because German SME' 'easy' organizational structure – e.g. decentralization, little work division, small size – allows them to intensify their relationship (Simon 2007: 187, 163 & 170 et seq.) as well as to quickly respond to stakeholders' wishes and thus, to increase their satisfaction, too. Furthermore, chapter 4.1.3.4 highlights that SME' corporate culture influences the choice of external relations – e.g. with cooperation partners. An additional argument supporting the positive impact of SC on RC concerns the fact that technological issues like state-of-the art machinery may incentivize stakeholders and in particular (potential) cooperation partners to engage in joint work.

Contrarily, the literature also puts forth arguments concerning the *influence of RC on SC*. It is, for instance, mentioned that external stakeholders and their (formal as well as informal) relations to a firm as well as loyalty and satisfaction shape corporate culture, organizational structure, processes, routines, or manuals and contribute to the creation of knowledge stocks via, among others, knowledge flows or sharing (Bontis, Keow, Richardson 2000: 98; F-Jardon, Martos 2009: 605 & 613; Shih, Chang, Lin 2010: 87; Khan 2011: 132). Furthermore, diverse authors believe that external relations are prerequisites to develop innovations which have a positive impact on business performance – especially in today's business environment (Daud, Yusoff 2010: 143; Khan 2011: 132).

In line with the former paragraph, the above illustrated global reasoning can be applied to the *German SME context* as well. In detail, the previous chapters on customers, suppliers, alliance partners and informal networks (e.g. chapters 4.1.3.1, 4.1.3.2, 4.1.3.4 and 4.1.3.5) highlight, for example, the importance of external inputs for innovations. In detail, these external partners provide information and knowledge relevant for innovations or present their issues (or even problems) and thereby push German SME to be innovative. Furthermore, the discussion on suppliers, in particular, indicates that their performance and

their deliveries (including their quality) impact German SME' internal success potentials (cf. chapter 4.1.3.2). Additionally, the positive impact of RC on SC can be attributed to the fact that alliance partners give impulse for new ideas such as new organizational structures or technologies via the exchange of knowledge and expertise (cf. chapter 4.1.3.4). Lastly, RC may influence SC because German SME' close stakeholder relationships facilitate easy and quick communication which, in turn, reduced the need for (extensive) communication structures and/or knowledge documentation.

After the above presented discussion about the two conceivable linkages between SC and RC, this dissertation decides in favor of the argument that RC has an in impact on SC. That is firstly because of the in chapter 1.1 introduced and in chapter 2.3.2.2 deepened importance to adopt to external circumstances in order to succeed in today's business environment. Secondly, expert interviews on this matter are conducted within the scope of this dissertation (cf. chapter 5.2.3). The outcomes of this qualitative research show that the majority of interviewees – i.e. experts of German SME believes that the impact of RC on SC is stronger than the other way around (cf. chapter 5.2.3.5). Thus, the following hypothesis is proposed:

Hypothesis 5:

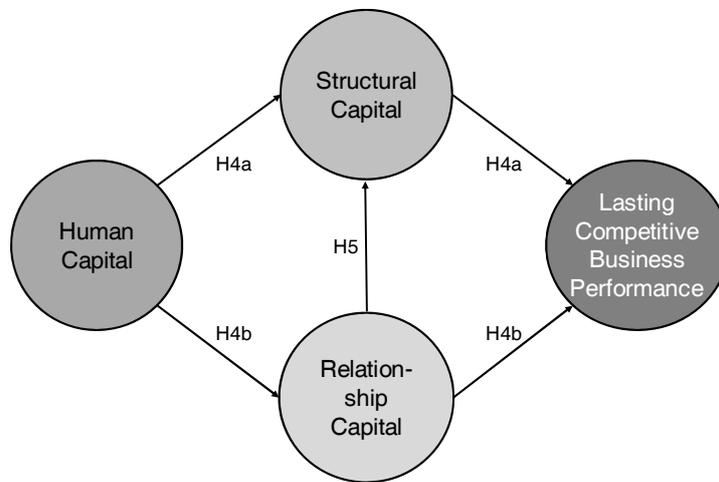
*German SME' structural capital and relationship capital interact.
Specifically, German SME' relationship capital has a positive impact on
their structural capital.*

4.2.4 Summary of Hypotheses 4 and 5 in Conceptual Research Model II

Based on the hypothesized links between the IC-categories, which are elaborated in the above illustrated chapters 4.2.1, 4.2.2 and 4.2.3, a second conceptual research model is proposed. Specifically, figure 40 displays hypotheses 4a and 4b and hypothesis 5 and thus, a modified diamond model (cf.

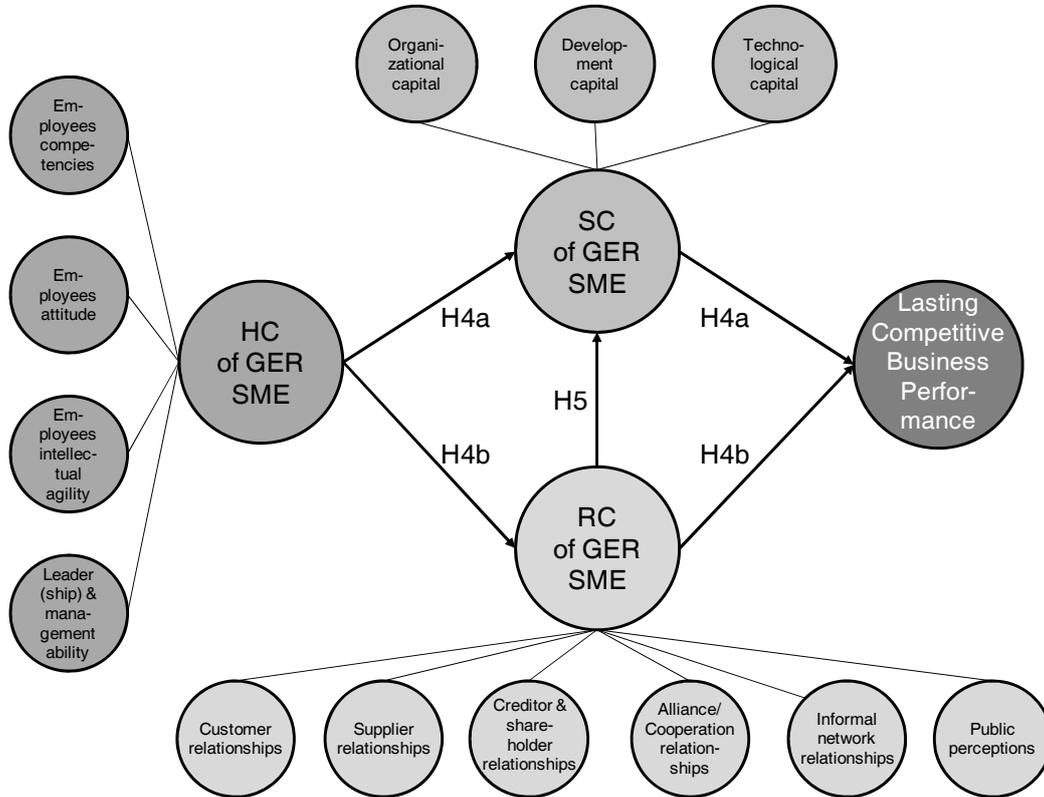
chapter 4.2 introduction) adjusted to the German context. In line with international argumentations, it is claimed that human capital (HC) is the source of structural capital (SC) and relationship capital (RC) whereas the latter two determine competitive business performance. Additionally, there is an assumed interaction between RC and SC.

Figure 40: Research Model II (slim version): Interaction of German SME' IC-categories and Lasting Competitive Business Performance



On top of this, it has to be considered that HC, SC and RC are still made up of diverse dimensions which specify the individual constructs contents (cf. chapters 4.1.1.1 to 4.1.1.4, 4.1.2.1 to 4.1.2.3, and 4.1.3.1 to 4.1.3.6). If these dimensions are incorporated in the visualization of hypotheses 4a and 4b as well as hypothesis 5, then research model II inflates towards a theoretically more complete model as can be seen in figure 41.

Figure 41: Research Model II (full version): Interaction of German SME' IC-categories and Lasting Competitive Business Performance



4.3 THE INFLUENCES OF COMPANY-AGE AND -GENERATION ON GERMAN SME' INTELLECTUAL CAPITAL AS WELL AS ITS IMPACT ON LASTING COMPETITIVE BUSINESS PERFORMANCE

Previous research studies confirmed that diverse disruptive factors can influence the result of examinations. Hence, it is important to oversee them by incorporating control variables into empirical investigations (Schneider 2008: 114 et seq.).

Among the control variables which are evaluated in the research field of (German) SME' IC one can find industry (sectors) (Mertins, Wang, Will 2009: 119; BMWi 2010b: 12; Pawlowsky, Gözalan, Schmid 2010: 9; Pawlowsky, Gözalan,

Schmid 2011: 9) and company size (BMWi 2010b: 14; Pawlowsky, Gözalan, Schmid 2010: 9; Pawlowsky, Gözalan, Schmid 2011: 9) which have either been proven not to (majorly) influence German SME' IC (Pawlowsky, Gözalan, Schmid 2010: 9; Pawlowsky, Gözalan, Schmid 2011: 9 et seqq.)²³⁵ or to do (Mertins, Wang, Will 2009: 119; BMWi 2010b: 12).²³⁶ Furthermore, it is acknowledged for German (Pawlowsky, Gözalan, Schmid 2010: 9 et seqq.; Pawlowsky, Gözalan, Schmid 2011: 9 et seqq.) as well as international (Wong, Aspinwall 2005: 76; St-Pierre, Audet 2011: 202 et seqq.) SME that different (corporate) strategies cause variations in IC (management).

Beyond this, it is suggested that it is of high interest to look into firms' maturity level to get a deeper understanding of SME' IC (Mertins, Wang, Will 2009: 121); especially since young and established firms vary in many ways (Schoss 2013: 60). Yet, little is known about the impact of German SME' age on their IC and specifically, if IC changes over German SME' life cycle (Hutchinson, Quintas 2008: 147). In detail, only one study, which is conducted by the BMWi (German Federal Ministry of Economics and Technology) (2010b: 5 & 15), reveals that young German SME – i.e. founded after 2000 – perceive the contribution of their IC on business performance different than older SME: young German SME believe that their IC is more important to their business (success). However, this study is based on perception. It may, therefore, not necessarily correspond to actual practice.

Nevertheless, German literature on young firms supports this line of argumentation. Kirsti Dautzenberg et al. (2012: 105), for example, identify evidence that young firms' growth and success is mainly attributable to company-internal causes rather than external drivers. Moreover, the German SME finding can be supplemented by international literature. Blanca Rodriguez (2003: 125) and Esther Hormiga et al. (2011a: 618 et seq.), for instance, put forth that young firms are generally highly dependent on their IC and thus, that intangibles are more

²³⁵ Similar results are also found in the international SME context. Cf. Amrizah Kamaluddin and Rashidah Rahman (2009: 13) and Natasja Steenkamp and Varsha Kashyap (2010: 380).

²³⁶ Nick Bontis, William Keow and Stanley Richardson (2000: 97) confirm these findings in the general, international IC-context.

critical than tangible assets. Likewise, Irena Macerinskiene and Giedre Aleknavičiute (2011: 560 et seqq.) discover that IC is particularly important for entrepreneurship. However, a different example of Johannes Pennings et al. (1998: 439) shows that the more firms mature, the more they accumulate IC and thus, the larger are their chances of survival. Contrarily, Cheng-Ping Shih et al. (2010: 7. Discussion) reveal that the impact of IC on business performance decreases as firm age. Lastly, it is interesting to point out that diverse authors acknowledge that IC-development (Kamaluddin, Rahman 2009: 7, 9 & 13) and the combination of firms' IC-categories (Youndt, Subramaniam, Snell 2004: 350 & 354) do not depend on their age and that age does not support the IC-transformation into business performance (Molodchik, Shakina, Bykova 2012: 444 & 452), respectively.

In total, the above discussion highlights that the available findings on German SME' IC and age are rather imprecise and that the international discoveries vary (to large extents). Therefore, it is necessary to clarify this matter for the German SME context via a large scale empirical investigation based on objective questions. For this matter, the following hypothesis is raised and to be tested:

Hypothesis 6:

The age and company generation of German SME influences the extent of their IC and its impact on lasting competitive business performance.

Similar to the previous hypotheses deducing, it can be noticed that the above presented line of argumentation concerning the impact of age on German SME' IC as well as performance is relatively weak. To strengthen it, the individual IC-categories, namely human capital, structural capital and relationship capital, are discussed against the background of age. In this regard it has to be considered though that there is hardly any German IC-literature to rely on. Hence, the following part of this chapter transfers – based upon logical reasoning building on the previous chapters – international research on IC and age, studies on SME' IC and age as well as other subject-related literature such as on young German firms or startups into the German SME context.

4.3.1 German SME' Human Capital and Company-Age / -Generation

Hypothesis 1 (cf. chapter 4.1.1) proposes that HC is important for German SME' business performance. However, this hypothesis is rather generally framed and does not distinguish between the HC of young²³⁷ and old German SME. For this matter, the following text passage deals with age differences and their influence of German SME' HC.

The above mentioned BMWi study (2010b: 15) indicates that *young* German SME perceive their HC and especially their *employees' motivation* and *social competencies* as significantly better than older German SME. The reason for this could be that the individual employees in young and often relatively small firms are regarded as more important²³⁸ (Egeln et al. 2010: 48) and thus, are required to be motivated for the company to succeed. Furthermore, national (Brinckmann, Salomo, Gemünden 2006: 15, 17 & 27; Jacobsen 2006: 9 et seqq., 49 et seqq. & 68 et seqq.; Egeln et al. 2010: 50; Fryges et al. 2012: III; Fueglistaller et al. 2012: 28) as well as international (Rodriguez 2003: 125; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 75) researches highlight the importance of the *entrepreneur* as well as his/her (leadership) skills for young (German) SME and their success.²³⁹ Most of these works argue that the entrepreneur is more important for young (German) SME and their performance than for older, more established firms. This is, among others, because the entrepreneurs of young firms and their *competencies* – e.g. *knowledge, education* and *experience* –, *personal traits, commitment* and *attitudes* are predominantly responsible for evaluating *chances*, making *decisions*, initiating *innovations*, developing *plans*, *combining resources* and *implementing* the latter (Rodriguez 2003: 125; Hayton 2005: 140 et seq. & 148; Brinckmann, Salomo, Gemünden 2006: 16; Jacobsen 2006: 49 et seqq. & 68 et seqq.; Gottschalk et al.

²³⁷ Young SME are, within the scope of this doctoral work, defined as all firms which are younger than or equal to ten years. This threshold is based on previous research studies – cf. Joachim Wagner (2005: 4), Marianne Kulicke, Susanne Bühner and Vivien Lo (2004: 16), and BMWi (2010b: 5).

²³⁸ In young firms, a single employee may represent half or a third of the entire workforce. Thus, (s)he significantly contributes to business success (Egeln et al. 2010: 48).

²³⁹ "The very nature of new ventures means that a fundamental part of this human capital lies in the entrepreneur or entrepreneurial team" (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 75).

2008: 26; Egehn et al. 2010: 50; Fryges et al. 2012: III; Fueglistaller et al. 2012: 28 & 154) – which is especially important since (many) routines and processes might not yet be established (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 75). It is even argued that young firms with *academic leaders* are more successful than young firms without academic leaders (Jacobsen 2006: 69; Gottschalk et al. 2008: II); arguably because they lack required competencies. Likewise, it is mentioned that the founders of a firm and thus, its *first generation* are *intrinsically highly motivated*, *fully identify with their firm*, are *very passionate for work* (Simon 1996: 179, Simon 2007: 351 et seq.) and thus, arguably fight for success more than older firms' leaders.

However, other sources argue that HC is larger and thus, has more potential to positively impact success in *old* German SME. This is, firstly, because older firms have had more time to accumulate their HC (Pennings, Lee, van Witteloostuijn 1998: 439). Moreover, it is recorded that established firms have more *apprentices* and have more room for *personal developments* because i.a. of their available resources (Demgenski, Icks 2002: 1, 12, 104). Thus, they have higher chances to ensure their flow of qualified labor (Simon 1996: 173; Simon 2007: 319 et seq.) and consequently higher potentials concerning sustainable business performance. Older German SME may also find it easier to *acquire new staff* (Fryges et al. 2012: 43) and generally have more *motivated employees* because of their enlarged opportunities with respect to, for example, paying higher wages or additional monetary contributions (Wagner 2005: 12 & 15; Block et al. 2009: 8). This may also be the reason why young firms (majorly) suffer from high fluctuation rates (Gottschalk et al. 2008: II; Fryges et al. 2012: I) while established German SME do not really face these issues (cf. chapter 4.1.1.2): older German SME are more likely to develop their company specific HC with loyal employees (Wagner 2005: 11). Additionally, it is argued in the German SME literature that the *leaders of later company generations* are often better *educated* and more (internationally- as well as) *goal-orientated* than first generation entrepreneurs. As such, the later generations are able to professionalize and perfect management (Simon 2007: 354 et seq.) and thus, enlarge success potentials.

Overall, the above discussion highlights that it is not particularly clear whether young or old – and particularly later generation – German SME possess higher levels of HC and which of these have a higher impact on business performance.

Consequently, this issue requires an answer which is to be gained via the following hypothesis:

Hypothesis 6a:

The human capital of German SME and its impact on lasting competitive business performance vary with age and among company generations.

4.3.2 German SME' Structural Capital and Company-Age / -Generation

In line with chapter 4.3.1, it can be argued that hypothesis 2, which looks into the positive impact of SC on German SME' business performance (cf. chapter 4.1.2), can be advanced by discussing its differences among young and old German SME.

Generally speaking, the BMWi study (2010b: 14 et seqq.) discovers that *young* German SME believe that their SC and in particular their *knowledge transfer*, *company culture* as well as *IT infrastructure* are more important for their business than for older German SME. The positive impact of corporate *culture* on young German SME' performance is as well supported by research on young German companies and can, among others, be attributed to the strong involvement of the entrepreneur in small company-settings as well as his/her personality and values (Brettel et al. 2008: 1197 et seq. & 1200 et seq.). It is also argued in the German context that young firms particularly aim for high *quality* which shall distinguish them from competitors (including established firms) and which positively impacts business performance (Gottschalk et al. 2008: 77 et seq.; Dautzenberg et al. 2012: 18 & 105 et seqq.). Furthermore, the German literature highlights that young German SME are mostly very *flexible* and thus, able to quickly respond to customer wishes. This, in turn, allows them to again differentiate themselves from more established firms (Gottschalk et al. 2008: 77 et seq.). The latter issue goes hand-in-hand with the suggestions of international (Huang, Wu 2010: 13 et seq. & 17; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 78 & 85) as well as national (Fallgatter 2005: 61 et seq.; Brettel et al. 2008: 1199; Gottschalk et al. 2008: 77 et seq.; Dautzenberg et al. 2012: 17 et seq. & 88; Fueglistaller et al. 2012: 186) studies

which state that young firms are more *innovative* than 'normal' SME²⁴⁰ – since they do, for instance, not yet suffer from organizational inertia (Huang, Wu 2010: 13 et seq. & 17) – and thus, have higher chances in terms of success.²⁴¹ Lastly, it is worth mentioning that the impact of SC is shown to generally decrease as firms grow older (Shih, Chen, Morrison 2010: 7. Discussion).

However, one can also argue the other way around: German SME' SC and its impact on competitive business performance increase with *enlarged* company-age. Organizational *culture* and especially corporate culture towards innovations are believed to take time to be established. Hence, the older the firm, the stronger its culture (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 78). Moreover, the literature puts forth that young (German) SME have disadvantages over older firms with respect to general *internal structures* (Demgenski, Icks 2002: 1; Jacobsen 2006: 98; Schoss 2013: 55), the development of *internal routines* (Egelin et al. 2010: 1; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 75), the organization of *production processes* (Fryges et al. 2012: 43), as well as *knowledge of production technologies* (Egelin et al. 2010: 1). This is because these aspects are either not yet (fully) instituted or still call for improvements – possibly via experiences (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 77; Fryges et al. 2012: 43).

Taken together, one cannot argue in favor for or against the advantage of company-age with respect to German SME' SC and its influence on business performance. Therefore, this matter needs to be investigated in detail – for which the following hypothesis is raised:

Hypothesis 6b:

The structural capital of German SME and its impact on lasting competitive business performance vary with age and among company generations.

²⁴⁰ Young German firms are also believed to invest more in research and development compared to all German SME (Dautzenberg et al. 2012: 94).

²⁴¹ New ventures are an innovation by nature, too (Hormiga, Batista-Canino, Sanchez-Medina 2011b: 78).

4.3.3 German SME' Relationship Capital and Company-Age / -Generation

As already indicated in the previous two chapters, the argumentation of chapter 4.1.3 and its hypothesis 3, which states that German SME' RC has a positive impact on business performance, cannot necessarily be applied to German SME of diverse age segments. Specifically, the age of German SME might have an impact on the scope and strength of German SME' RC and is therefore discussed in detail in the following text passage.

As aforementioned, the BMWi study (2010b: 15) reveals that *young* German firms perceive their RC and particularly their *customer* relationships to be more significant for company performance than older SME. This is arguably the case because young German SME have a more direct and closer contact to their arguably still limited number of customers (Wagner 2005: 9) and thus, are able to gather key information for their business (Hormiga, Batista-Canino, Sanchez-Medina 2011a: 623). With respects to *cooperations* – especially with focus on innovations – it can be noticed that the majority of (successful) young German SME likes to enter alliances with other firms or institutions²⁴² (Dautzenberg et al. 2012: 89) since it has a positive impact on business performance (Becker 2005: 299 et seq.; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 80; Hormiga, Batista-Canino, Sanchez-Medina 2011a: 624). This is because alliances facilitate not only the mutual development of innovations but also help to establish the young business in the market (Brinckmann, Salomo, Gemünden 2006: 27) – e.g. allow access to new (market) information, knowledge as well as additional resources (Hormiga, Batista-Canino, Sanchez-Medina 2011a: 624; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 80), increase legitimacy, and help to launch a good reputation (Juma, Payne 2004: 303 et seq. & 314). More to the latter mentioned *public perception*, it can be stated that a good *reputation* of young SME positively impacts the attractiveness of engaging in business with them. Specifically, it helps, among others, to acquire new customers, to convince customers of product quality, to reduce investors' risk and thus, to gain financial access, as well as to motivate suppliers to enter contracts (Hayton 2005: 142 & 148; Hormiga, Batista-

²⁴² Only about 35% refuse to enter cooperations and thus, develop innovations internally only (Dautzenberg et al. 2012: 89).

Canino, Sanchez-Medina 2011a: 624). Besides it is argued that the reputation of young firms is often closely related to the reputation of the entrepreneur (Hormiga, Batista-Canino, Sanchez-Medina 2011a: 624) which again differs for established German SME. A particularly interesting aspect of young German SME' RC are also their *informal networks* – e.g. the entrepreneurs' personal networks – which contribute emotional support, devote active help, promote raising funds, and make up for potentially missing other (external) relationships (cf. chapter 4.1.3.5). As such, they are important for corporate performance, too (Hormiga, Batista-Canino, Sanchez-Medina 2011a: 622 et seq. & 628; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 79 et seqq.; Dautzenberg et al. 2012: 102 et seqq.; Fueglistaller et al. 2012: 29).

On the other hand, it can be argued that young German SME have not yet established (good) *relationships* with their *environment* and *stakeholders* (Rodriguez 2003: 128; Egelin et al. 2010: 1; Hormiga, Batista-Canino, Sanchez-Medina 2011a: 618; Fryges et al. 2012: 43; Schoss 2013: 55) and thus, have little experience as well as opportunities to perform well (Hormiga, Batista-Canino, Sanchez-Medina 2011a: 618). Specifically, it is noticeable, for instance, that young German SME often suffer difficulties acquiring (new) *customers* (Block et al. 2009: 9). Moreover, young German SME might find it difficult to gain access to (external) *financial resources* since they are not only missing (long-term) relationships but also because they may not have achieved break-even in many cases (Block et al. 2009: 5 & 7; Dautzenberg et al. 2012: 27; Fryges et al. 2012: 43). Put differently, *older* German SME may find it easier to source external funds because of e.g. their company history, established relationships to banks or investors, and reduced information asymmetries (KfW Bankengruppe et al. 2010: 154 et seq.). Besides, it is shown that older firms have advantages over young firms concerning *reputation*, possibly because they have had more time to shape it (Freiling, Estevao 2006: 264; Block et al. 2009: 9; Schoss 2013: 55).

The discussion on German SME' RC and age highlights that there is no clear line of argumentation which explains whether young or old German SME' RC is more important – especially with respect to corporate success. Consequently, it is important to elaborate on this subject via the following hypothesis:

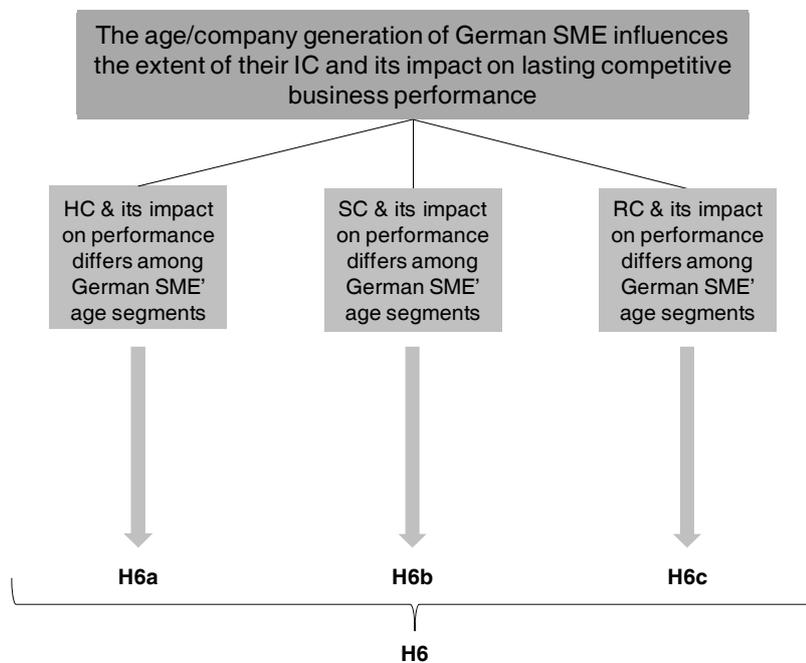
Hypothesis 6c:

The relationship capital of German SME and its impact on lasting competitive business performance vary with age and among company generations.

4.3.4 Summary of SME' IC and Company-Age / -Generation

Altogether the discussions of chapters 4.3.1, 4.3.2 and 4.3.3 provide evidence that there are differences in the scope of HC, SC and RC as well as their respective impact on business performance among young, old and particularly later generation German SME. However, the existing argumentations as well as empirical findings differ significantly – regardless whether the focus is placed on German or international literature. This justifies why it is important to further investigate this issue via the raised hypotheses which are summarized in figure 42.

Figure 42: German SME' IC and Company-age: Summary of Hypotheses



5 STATISTICAL RESEARCH DESIGN

Chapter five describes how this dissertation transfers the previously illustrated theoretical, conceptual research models – including the hypotheses which are to be examined – into a statistically testable concept. In detail, an introduction to the chosen statistical method and its suitability for the scope of this research work is first provided. Following this, the process of driving an operative statistical model of German SME' IC-based sources of success is presented. This is a critical part concerning the value of this dissertation since studies on sources of success have been criticized, for example, by Alexander Nicolai and Alfred Kieser (2002: 584) for i.a. inappropriate statistical procedures and invalid or non-reliable operationalization.

5.1 STRUCTURAL EQUATION MODEL – INTRODUCTION

This dissertation uses the statistical technique called *structural equation model(ing)* (SEM) since it is able to test the hypothesized relationships between human capital (HC), structural capital (SC), relationship capital (RC), their dimensions, and lasting competitive business performance in young as well as old SME; and to measure HC, SC, RC, their dimensions and performance. SEM is also chosen because it is common practice in (business study) research which conducts path analytic modeling with latent – i.e. unobservable, directly unmeasurable – constructs such as the here investigated (intangible) IC-based strategic sources of success (Chin 1998b: 296; Rigdon 1998: 251; Eberl 2006: 651; Ringle et al. 2006: 81; Huber et al. 2007: 1; Ringle, Spreen 2007: 211; Raithel 2009: 541; Schloderer, Ringle, Sarstedt 2009: 573 et seq.).

More specifically, SEM belongs to the methods of the second generation of multivariate analysis (Fornell 1985: 1) and has the advantage – over first generation statistical methodologies like principal components analysis, factor

analysis, discriminant analysis or multiple regression – (Raithel 2009: 543; Backhaus, Erichson, Weiber 2011: 65; Bagozzi, Yi 2012: 10) of providing more flexibility to test complex theoretical models against empirical data (Fornell 1985: 4; Chin 1998b: 296; Chin 1998a: 7; Chin 2010b: 18; Hair, JR. et al. 2010: 688).²⁴³ Precisely, SEM enables the simultaneous modeling and analysis of a) a series of (separate but interdependent) causal relationships among numerous unobservable latent constructs such as between the IC-based strategic sources of success and lasting competitive business performance; as well as b) the measurement of these unobservable constructs via one or more directly measureable indicators while considering measurement errors (Chin 1998b: 297; Chin 1998a: 7; Huber et al. 2007: 3; Raithel 2009: 541; Hair, JR. et al. 2010: 630 & 634 et seq.; Vinzi et al. 2010: 2). As such, it allows analyzing both, the conceptualized theoretical linkage among as well as the (quality of the) measurement of latent concepts in one technique – specifically via the combination of aspects of multiple regression and factor analysis (Hair, JR. et al. 2010: 630, 634 & 688). Besides, SEM is able to incorporate the evaluation of additionally impacting variables such as company-age (cf. chapter 5.4).

SEM composes of three primary components (Chin 2010b: 19): latent constructs, indicators and path relationships. *Latent constructs*²⁴⁴ represent SEM-components which can be conceptually defined but can neither directly nor perfectly be observed or measured (Huber et al. 2007: 1; Christophersen, Grape 2009: 103; Chin 2010b: 19; Hair, JR. et al. 2010: 631 et seq.). As indicated above, this dissertation's intangible strategic sources of lasting competitive business performance are regarded as such latent concepts (Ringle, Spreen 2007: 211) since, for example, the value of human capital is per se not determinable. Because of the

²⁴³ Cf. Richard Bagozzi and Youjae Yi (2012: 10 et seqq.) who provide a detailed catalogue of SEM's advantages compared to first-generation statistical techniques.

²⁴⁴ They are also called latent variables, latent concepts, latent factors, theoretical constructs, theoretical variables, theoretical concepts, theoretical factors, unobservable constructs, unobservable variables, unobservable concepts, unobservable factors, traits, or simply constructs or concepts (Chin 2010b: 19; Hair, JR. et al. 2010: 634; Bagozzi, Yi 2012: 9).

constructs' missing direct observation, latent variables are operationalized – i.e. approximately measured – via *indicators*²⁴⁵ (Hair, JR. et al. 2010: 631 et seq.) which can be empirically gathered. In research based on surveys, for instance, each question of a questionnaire stands for a specific item (Chin 2010b: 20). Lastly, *path relationships* represent correlational, one-way or two-way paths (ibid.: 19) between latent constructs and/or indicators.

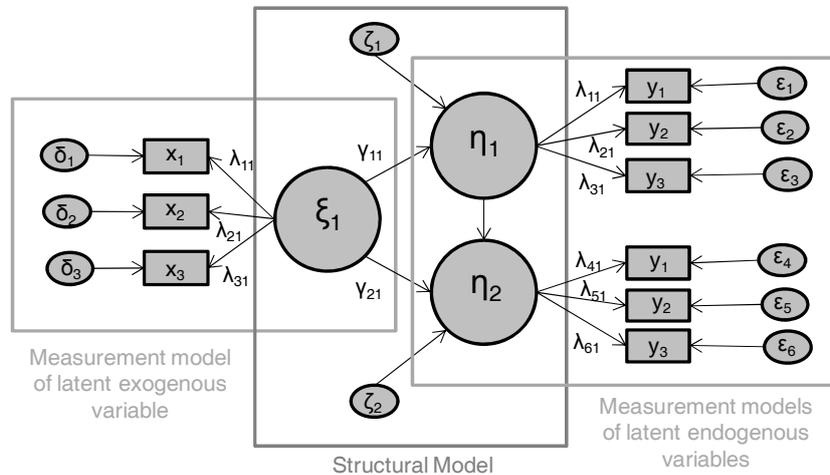
These main components of SEM build the basis for SEM's two subparts (Hair, JR. et al. 2010: 633 & 687) and formal equation systems (Panten, Boßow-Thies 2007: 313): the *structural model*, also known as inner model, which specifies the relationship/dependence-structure between latent constructs and thus, represents the (main) hypotheses (cf. chapter 5.1.1); and the *measurement model*, as well referred to as outer model, which links the latent constructs to their associated measuring indicators (cf. chapter 5.1.2) (Lohmöller 1988: 125; Chin 1998a: 8; Chin 1998b: 312 et seq.; Chin 1998b: 299; Jarvis, MacKenzie, Podsakoff 2003: 199; Panten, Boßow-Thies 2007: 311 et seqq.; Götz, Liehr-Gobbers, Krafft 2010: 693).

This conventional setup is presented in the path diagram given below²⁴⁶ (cf. figure 43): the *latent constructs*, which are related to each other via (one-headed) arrows in the structural model, are visualized as ellipses, ovals or *circles*. Each of these constructs is – also via arrows – connected to at least one *indicator* in the measurement model. The indicators are portrayed as *rectangles*, squares or boxes (Ringle, Spreen 2007: 211; Chin 2010b: 20; Hair, JR. et al. 2010: 638; Bagozzi, Yi 2012: 9).

²⁴⁵ They are also termed manifest variables, empirical variables, observed variables, observed measures, observed value, items or simply measurements or measures (Chin 2010b: 19; Hair, JR. et al. 2010: 632; Bagozzi, Yi 2012: 9).

²⁴⁶ “The researcher should avoid the use of statistical jargon or mathematical/Greek symbols in describing these relationships. Furthermore, there is no need for a rehash of the mathematical models underlying the SEM approach. While this was common for the initial set of articles that applied SEM analysis, a simple citation at most should suffice” (Chin 1998a: 8).

Figure 43: Structural Equation Model: Path Diagram

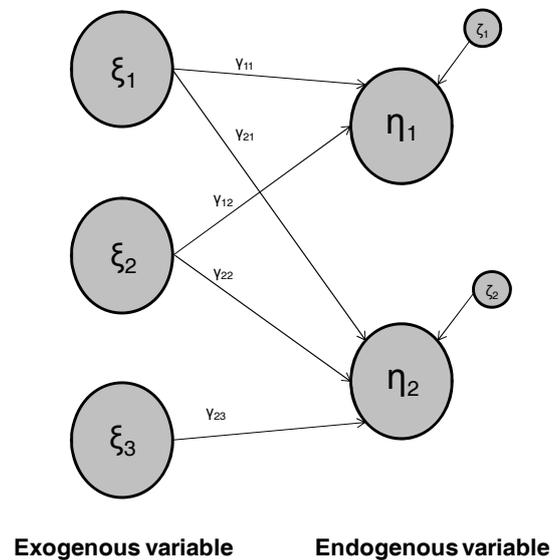


Source: adopted from Weiber, Mühlhaus 2010: 39

5.1.1 Structural Model: Exogenous and Endogenous Constructs

The *structural model* focuses, as mentioned above, on the theoretically grounded, hypothetical relationship between latent constructs (Ringle et al. 2006: 82; Götz, Liehr-Gobbers, Krafft 2010: 701; Hair, JR. et al. 2010: 688) – a linear equation system (Lohmöller 1988: 125). Within the inner model, it is important to distinguish between exogenous and endogenous latent variables because it allows testing theory and specifically, whether independent variables cause the dependent ones (Hair, JR. et al. 2010: 637 & 729). In detail, *exogenous* latent constructs represent the concepts which are *independent* of other latent variables in the model and thus, determined by factors outside the model (Diamantopoulos, Siguaw 2009: 2; Hair, JR. et al. 2010: 631 & 637; Weiber, Mühlhaus 2010: 18; Backhaus et al. 2011: 518). Contrarily, *endogenous* constructs are the *dependent* latent variables which are predicted by the exogenous factors (Götz, Liehr-Gobbers, Krafft 2010: 701; Hair, JR. et al. 2010: 631 & 637; Weiber, Mühlhaus 2010: 18; Backhaus et al. 2011: 518). In the path diagram displayed in figure 44, endogenous latent variables are therefore the cycles into which one or more arrows lead (Hair, JR. et al. 2010: 637).

Figure 44: Exogenous and Endogenous Latent Constructs

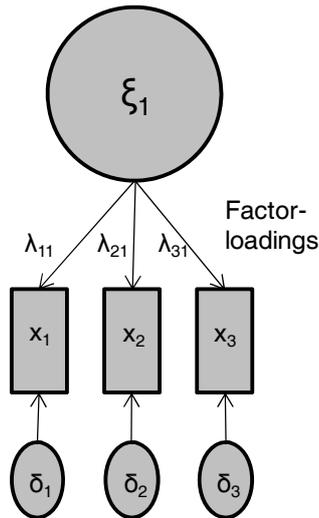
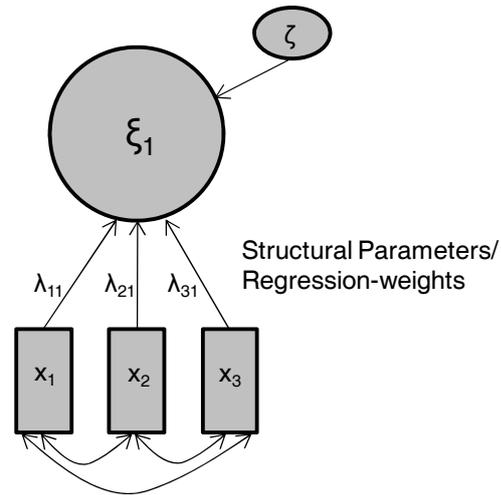


Source: adopted from Backhaus et al. 2011: 518

5.1.2 Measurement Model: Reflective vs. Formative

The key task of the *measurement model* is to operationalize the theoretically contrivable but directly unmeasurable latent constructs (Panten, Boßow-Thies 2007: 311). This includes determining the indicators which shall measure a construct as well as to decide upon the measurement approach (Hair, JR. et al. 2010: 633 & 701). The latter refers to the fact that two different measurement model specifications, a *reflective* and a *formative* one, exist (Jarvis, MacKenzie, Podsakoff 2003: 200). Figure 45 clarifies this matter: The arrows between a construct and its respective set of indicators can either point from the latent variable to its measures (reflective) or the other way around (formative) (Jarvis, MacKenzie, Podsakoff 2003: 200; Ping, JR. 2004: 133; Ringle et al. 2006: 83; Götz, Liehr-Gobbers, Krafft 2010: 693). A detailed discussion on the similarities and differences of the two kinds of measurement options is presented in the following (Jarvis, MacKenzie, Podsakoff 2003: 202).

Figure 45: Path Diagram of Reflective and Formative Measurement Models

Reflective Measurement Model**Formative Measurement Model**

Source: adopted from Bollen, Lennox 1991: 306

The *reflective measurement model*, which is also known as the factor analysis model (Fornell, Bookstein 1982: 441; Vinzi, Trinchera, Amato 2010: 50) or the principal factor model (Jarvis, MacKenzie, Podsakoff 2003: 200), is typical of classical test theory (Fornell, Bookstein 1982: 441; Hair, JR. et al. 2010: 701). This is because it assumes that the latent construct affects all indicators (Bollen 1984: 378; Bollen, Lennox 1991: 306)²⁴⁷ or in other words that a change in the latent concept drives a change in and the covariation among its measurement items (Jarvis, MacKenzie, Podsakoff 2003: 200 & 203) (cf. figure 45 – left-hand-side). Since *all indicators* in a reflective measurement model are *caused by the same underlying latent variable*, they are believed to be positively *correlated* with each other (Bollen, Lennox 1991: 307; Chin 2010b: 36; Hair, JR. et al. 2010: 750; Henseler, Fassott 2010: 722). Due to this internal consistency view, the indicators are also assumed to be

²⁴⁷ This also explains why reflective measures are sometimes referred to as *effect indicators* (Bollen 1984: 378 et seq.; Bollen, Lennox 1991: 306).

similarly important and reliable and thus, *interchangeable* (Bollen, Lennox 1991: 307; Rossiter 2002: 317; Jarvis, MacKenzie, Podsakoff 2003: 200; Hair, JR. et al. 2010: 750). Correspondingly, a measure can, for example, if it has a low factor loading, be *eliminated* without changing the actual content or nature of the construct (Diamantopoulos, Winklhofer 2001: 271; Hair, JR. et al. 2010: 749 et seq.).²⁴⁸ It is, however, unsure whether the dropped item is in fact an essential facet of the construct – i.e. a latent intangible source of success (Albers, Hildebrandt 2006: 7). Lastly, it is worth mentioning that each reflective indicator has its *own measurement error* (Götz, Liehr-Gobbers, Krafft 2010: 694). As such, it can be noted that a change of a measure is not only determined by the latent variable but also a random error term (Bagozzi, Yi 2012: 10).

The reverse direction of causality is assumed by the *formative measurement model*, which is also named composite latent variable model (Jarvis, MacKenzie, Podsakoff 2003: 200) since it relies on multiple regressions (Eberl 2004: 5 & 8; Eberl 2006: 652; Schloderer, Ringle, Sarstedt 2009: 577): (the combinations of) formative *indicators* (Fornell, Bookstein 1982: 441) create as well as *cause* changes in their corresponding *latent concept*. Put differently, the latent construct is a function of its measures (Bollen, Lennox 1991: 306; Chin 1998a: 9; Chin 1998b: 306 et seq.; Jarvis, MacKenzie, Podsakoff 2003: 201; Ping, JR. 2004: 133; Christophersen, Grape 2009: 105 et seq.; Chin 2010a: 664; Hair, JR. et al. 2010: 689; Bagozzi, Yi 2012: 10) (cf. figure 45 – right-hand-side).²⁴⁹ As such, it is crucial to incorporate all facets of a latent construct, which are relevant with regard to its content, in the measurement model (Bollen, Lennox 1991: 308; Eberl 2004: 9; Albers, Hildebrandt 2006: 7; Ringle, Spreen 2007: 213). Furthermore, it is believed that the diverse indicators, which define a construct, vary not only in terms of their contents or meanings but also in terms of their influence and thus, their (regression) weights (Fornell, Bookstein 1982: 442; Edwards, Bagozzi 2000: 162;

²⁴⁸ It is recommended to delete items only, if the removal does not harm the construct's reliability (Hair, JR. et al. 2014: 43).

²⁴⁹ This is the reason why formative indicators are also called causes, cause indicators or causal indicators (Blalock 1964: 162 – 169; Bollen 1984: 380; Bollen 1989: 65; Bollen, Lennox 1991: 306).

Edwards 2001: 155; Petter, Straub, Rai 2007: 627; Christophersen, Grape 2009: 106; Schloderer, Ringle, Sarstedt 2009: 577; Henseler, Fassott 2010: 722). Specifically, these differing (regression) weights allow determining a *ranking* of the items' contributions to the construct (Christophersen, Grape 2009: 106). In line with the fact that all indicators mutually form the latent concept it is also presumed that indicators *cannot be interchanged* since removing (adding) an indicator omits a facet (changes the meaning) of the latent concept (Bollen, Lennox 1991: 308; Jarvis, MacKenzie, Podsakoff 2003: 202; Christophersen, Grape 2009: 110; Hair, JR. et al. 2010: 750). Because of the above explained it is also expected that a change in one single measure does not necessarily lead to a similar directional modification of another measurement item (Chin 1998a: 9; Eberl 2004: 6 et seq.; Pick 2008: 161). Put differently, the indicators of a latent construct *can* positively or negatively *correlate/covary* but can *also* be completely *independent* (Nunnally, Bernstein 1994: 489 cited by Diamantopoulos, Winklhofer 2001: 271; Bollen, Lennox 1991: 307; Eberl 2004: 7; Eberl 2006: 652; Christophersen, Grape 2009: 106; Chin 2010b: 36; Hair, JR. et al. 2010: 751). Precisely, a high correlation among the indicators of a formative measurement model is not favored. That is because it causes issues concerning *multicollinearity*²⁵⁰ and does, therefore, not allow determining the separate influence of an individual measurement item (Bollen, Lennox 1991: 307; Jarvis, MacKenzie, Podsakoff 2003: 202; Eberl 2006: 652). A last key characteristic of a formative measurement model is that the *error term* is at the *level of the construct* as opposed to the former, individual reflective indicator level. Accordingly, one a) only receives information concerning the overall amount of random measurement error of a set of indicators and b) does not know the precise construct value of the latent factors since indicators can never be perfect (Diamantopoulos, Winklhofer 2001: 271; Jarvis, MacKenzie, Podsakoff 2003: 202;

²⁵⁰ Multicollinearity expresses the extent to which an indicator can be explained by the other indicators in the analysis/of a latent construct. As multicollinearity increases, it makes the interpretation of the relationship between an indicator and its formatively measured construct more complicated because it is more difficult to ascertain the effect of any single indicator, owing to the interrelationship of the construct's measures (Hair, JR. et al. 2010: 2 & 633). Contrarily, multicollinearity is no issue in a reflective measurement model because the indicator coefficients are based on simple regressions (Fornell, Bookstein 1982: 442).

Eberl 2004: 7 et seq.; Christophersen, Grape 2009: 106; Hair, JR. et al. 2010: 689).

The above presented distinction between the two types of measurement models is briefly clarified via an example: A latent concept which can be operationalized in a reflective as well as a formative manner is a hotel's *attractiveness of offerings*. *Reflective* measures of the construct 'attractiveness of offerings' include, among others, the price, the number of stars, and the service level. These represent reflective indicators because they are consequences of attractive offerings. Contrarily, performance assessment, willingness to pay and repeated booking symbolize *formative* measures of a hotel's attractiveness of offerings since they cause the fact of being attractive. But they do not necessarily covary since one might book again although the willingness to pay is low. Nevertheless, deleting the willingness to pay from the measures is not appropriate since it omits actual parts of the constructs content (Weiber, Mühlhaus 2010: 35 et seq.).

Although the option between a reflective and formative operationalization of latent constructs has been known for a long time, economics as well as social sciences have predominantly applied reflective models (Bollen 1984: 380; Eberl 2004: II; Eberl 2006: 652; Christophersen, Grape 2009: 104). Nevertheless, it has been discovered that in many of these cases formative measures would have better suited the (purpose of the) research (Cohen et al. 1990: 185 et seqq.; Eggert, Fassott 2003; Jarvis, MacKenzie, Podsakoff 2003: 206 et seqq.; Eberl 2004: II & 23 et seqq.; Fassott 2006: 67 et seqq.). Hence, formative measures are now increasingly utilized (Hair, JR. et al. 2010: 702 & 753).

To make a *decision* concerning a reflective or formative measurement model specification, researchers need, on the one hand, to consider the *objective of their study* (Naskrent 2010: 96 et seq.; Hair, JR. et al. 2014: 45). Formative measurement models are, for example, particularly advised for management research which aims for identifying actions or factors to leverage corporate success – e.g. IC-based strategic sources of success. This is because it allows proposing concrete management recommendations such as a ranking of factors (Albers, Götz 2006: 669 et seq.; Albers, Hildebrandt 2006: 4; Christophersen, Grape 2009: 104; Albers

2010: 410 et seqq. & 419). On the other hand, researchers are advised to utilize *decision rules* (Chin 1998a: 9; Jarvis, MacKenzie, Podsakoff 2003: 203; Eberl 2004: 15; Eberl 2006: 655) – such as the ones presented in table 8 (on the next page) – which summarize the key characteristics and differences between the measurement model options.

This dissertation discusses the precise operationalization of its constructs in chapter 5.2. An individual decision in favor for a formative or reflective measurement is initially made for each latent concept (cf. chapter 5.2.1) based on theoretical considerations (Chin 1998b: 305 et seq.; Diamantopoulos, Winklhofer 2001: 274; Götz, Liehr-Gobbers, Krafft 2010: 693) and two key decision criteria (Eberl 2006: 657): a) *the direction of causality* between the construct and its measurement items (Jarvis, MacKenzie, Podsakoff 2003: 203; Huber et al. 2007: 18) – “whether a construct causes or is caused by its measures” (Edwards, Bagozzi 2000: 156); and b) *correlation* – “whether the indicators should covary with each other” (Jarvis, MacKenzie, Podsakoff 2003: 203) and along with that their *interchangeability* (ibid.: 203). Above all, the objective of this dissertation (to identify the most contributing intangible sources of success) is of course kept in mind during the decision making process (Chin 1998b: 305 et seq.; Diamantopoulos, Winklhofer 2001: 274).

Table 8: Decision Rules for Determining whether a Construct is Reflective or Formative

	Reflective	Formative
Direction of causality	From latent construct to indicator	From indicator to latent construct
Are the indicators a) defining characteristics or b) manifestations of the latent construct?	Indicators are manifestations of the latent construct	Indicators are defining characteristics of the latent construct
Would changes in the indicators lead to changes in the latent construct?	Changes in the indicators should not cause changes in the latent construct	Changes in the indicators should cause changes in the latent construct
Would changes in the latent construct cause changes in the indicators?	Changes in the latent construct cause changes in the indicators	Changes in the latent construct do not cause changes in the indicators
Interchangeability of the indicators	Indicators should be interchangeable	Indicators do not need to be interchangeable
Should the indicators have the same or similar content?	Indicators should have the same or similar content	Indicators do not need to have the same or similar content
Do the indicators share a common theme?	Indicators should share a common theme	Indicators do not need to share a common theme
Would dropping one of the indicators alter the conceptual domain of the latent construct?	Dropping an indicator should not alter the conceptual domain (meaning) of the latent construct	Dropping an indicator may alter the conceptual domain (meaning) of the latent construct
Covariation among the indicators	Indicators are expected to covary with each other (i.e. to correlate)	It is not necessary for indicators to covary with each other (i.e. to correlate)
Should a change in one of the indicators be associated with changes in the other indicators?	Yes	Not necessarily
Nomological net of the indicators	Nomological net for the indicators should not differ	Nomological net for the indicators may differ
Are the indicators expected to have the same antecedents and consequences?	Indicators are required to have the same antecedents and consequences	Indicators are not required to have the same antecedents and consequences
Measurement error	Measurement errors are taken into account at the indicator level	Measurement errors are taken into account at the latent construct level

Source: adopted from Jarvis, MacKenzie, Podsakoff 2003: 201 & 203, Eberl 2004: 18, Christophersen, Grape 2009: 110 and Hair, JR. et al. 2014: 47

5.1.3 Higher-order Constructs and their Operationalization

The discussion so far has only considered the relationships between first-order latent constructs and their indicators (Jarvis, MacKenzie, Podsakoff 2003: 204). But if one wishes to conceptualize models with a more *sophisticated level of abstraction* (Chin 1998a: 10; Jarvis, MacKenzie, Podsakoff 2003: 204; Albers, Götz 2006: 672; Chin 2010a: 665) or more *complex theoretical phenomena* (Edwards 2001: 145; Giere, Wirtz, Schilke 2006: 678; Hair, JR. et al. 2014: 39) (s)he can turn to *higher-order latent variables* (Chin 2010a: 665) which are increasingly popular in (business study) research²⁵¹ (Albers 2010: 422; Turel, Serenko, Bontis 2010: 55).

Higher-order constructs, which are also referred to as *multidimensional* constructs (Law, Wong, Mobley 1998: 741; Law, Wong 1999: 144), are constructs which have other constructs as their indicators (Ping, JR. 2004: 133). The latter mentioned determining constructs of a *higher- or second-order construct*²⁵² are also called *dimensions* or *first-order constructs*. They are attributed to the higher-order construct because they represent diverse *facets* of it (Law, Wong, Mobley 1998: 741; Law, Wong 1999: 144). As such, a second-order construct does not exist without its dimension(s) (Edwards 2001: 145 et seq.).

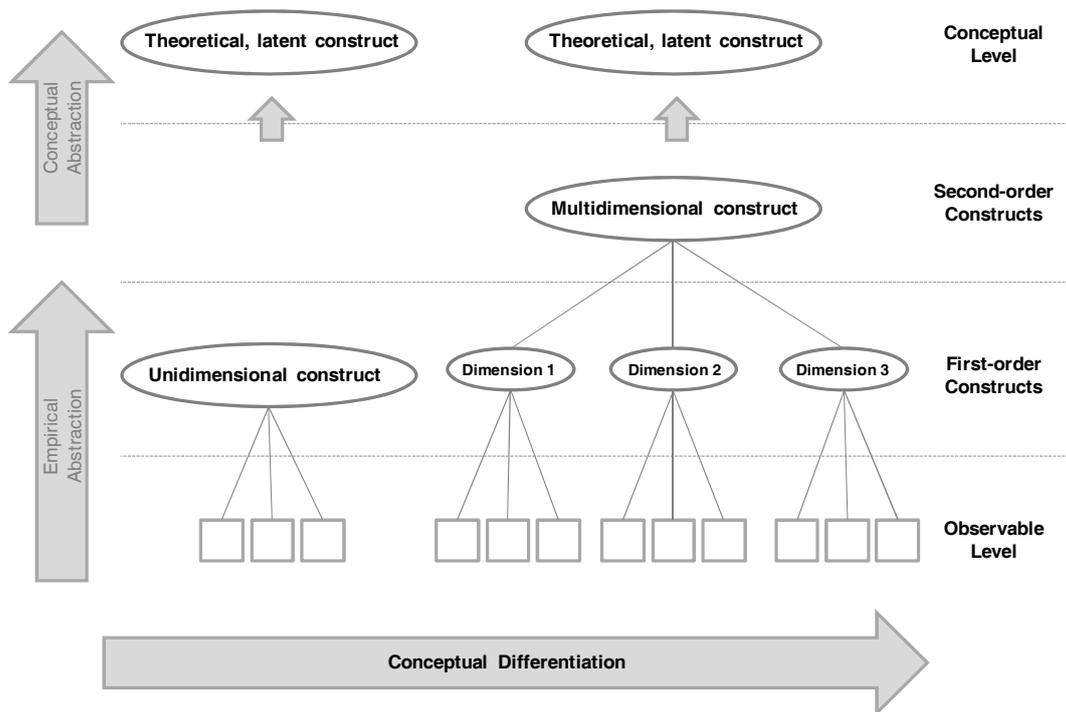
Specifically, the right-hand-side of figure 46 displays that one can view the dimensions as latent indicators of the second-order construct which are

²⁵¹ They have, for example, been applied in the research works of Jeffrey Pfeffer (1994: 116 et seq., 151 et seq. & 173 et seq.), Kenneth Law and Chi-Sum Wong (1999: 143 et seq.), Jeffrey Edwards (2001: 144 et seq.), Mun Yi and Fred Davis (2003: 146 et seq.), Werner Reinartz, Manfred Krafft and Wayne Hoyer (2004: 298 et seq.), Sandy Staples and Peter Seddon (2004: 26 et seq.), Nadine Sammerl (2006: 272 et seq.), Hüseyin Tanriverdi (2006: 63 et seq.), Paul Pavlou and Mendel Fygenson (2006: 115 et seq.), Serge Rijdsdijk, Erik Hultink and Adamantios Diamantopoulos (2007: 342 et seq.), Ofir Turel, Alexander Serenko and Nick Bontis (2007: 65 et seq.), Marco Gießmann (2010: 130 et seq. & 200 et seq.), Julia Naskrent (2010: 98 et seq. & 217 et seq.), and Ofir Turel, Alexander Serenko and Nick Bontis (2010: 54 et seq.). One of the key reasons for the increasing usage of higher-order constructs is that they “(...) allow researchers to match broad predictors with broad outcomes, and increase explained variance” (Edwards 2001: 145).

²⁵² Higher-order constructs are often referred to as second-order constructs because in practice they only seldom go beyond a second-order model (Huber et al. 2007: 27; Hair, JR. et al. 2010: 754; Hair, JR. et al. 2014: 40).

themselves determined by observable and measurable indicators (Edwards 2001: 146; Ping, JR. 2004: 133; Hair, JR. et al. 2010: 688). As such, the higher-order construct is not directly related to the measured indicators (Huber et al. 2007: 27; Bagozzi, Yi 2012: 24).

Figure 46: First-order and Second-order Constructs



Source: adopted from Giere, Wirtz, Schilke 2006: 679

The considerations and decision rules, which apply to the in the previous chapter introduced first-order constructs, need to be applied to second-order constructs as well. This includes, among others, that the decision for or against higher-order constructs should be based on theory and/or logical reasoning (Hair, JR. et al. 2010: 754 et seqq.). Furthermore, it embraces the reflective vs. formative specification between the first-order construct and the indicators as well as between the second-order and the first-order constructs (Chin 1998a: 10; Albers, Götz 2006: 670; Giere, Wirtz, Schilke 2006: 680; Huber et al. 2007: 29). Specifically, when combining the measurement specification possibilities at both levels

(Albers, Götz 2006: 670), one derives at *four potential operationalization* forms (Jarvis, MacKenzie, Podsakoff 2003: 204) which are illustrated in table 9.

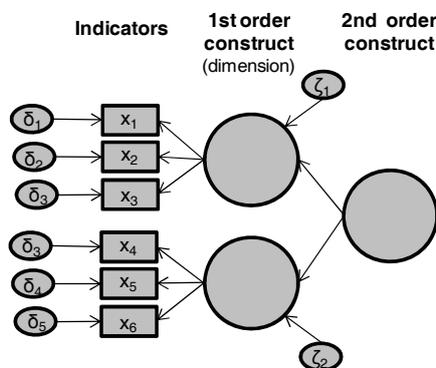
Table 9: Alternative Second-order Construct Specifications

Possible Combinations in Second-order Models		Operationalization of Second-order Constructs	
		Reflective	Formative
Operationalization of First-order Constructs	Reflective	Type I	Type II
	Formative	Type III	Type IV

Source: adopted from Huber et al. 2007: 29

Type I is reflectively operationalized at both levels and also called *total disaggregation second-order factor model* (Jarvis, MacKenzie, Podsakoff 2003: 204) (cf. figure 47). Although it is the *most commonly* applied higher-order model (Albers, Götz 2006: 670), type I has been *criticized* by Sönke Albers and Oliver Götz (2006: 672 et seq.). They argue that it makes no sense to measure a reflective second-order construct with reflectively measured dimensions because it means that all indicators – at both levels – are interchangeable. Besides, it is pointed out that model I is ineffective since it can be simply operationalized with reflective one-dimensional measures without information losses (Huber et al. 2007: 29).

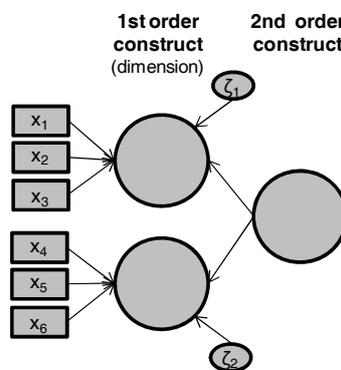
Figure 47: Type I Second-order Construct Model



Source: adopted from Jarvis, MacKenzie, Podsakoff 2003: 205

The *type III* second-order construct model is also operationalized in a reflective manner between the second- and the first-order construct; but the dimensions are formatively measured (ibid.: 204) (cf. figure 48). In line with the critique on model I, Sönke Albers and Oliver Götz (2006: 672) do *not advise* the use of this model since the reflective dimensions are interchangeable and thus, do not represent (fix) diverse facets of the second-order construct.

Figure 48: Type III Second-order Construct Model



Source: adopted from Jarvis, MacKenzie, Podsakoff 2003: 205

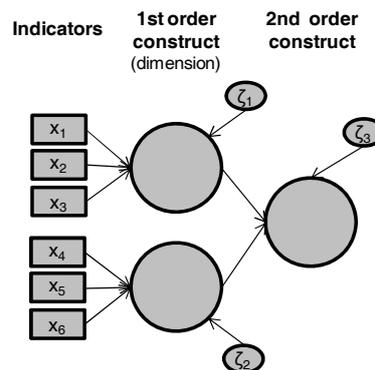
Although *model I and III*, which reflect the *factor view* of multidimensional constructs (Law, Wong 1999: 144)²⁵³, are mainly found in the literature (Jarvis, MacKenzie, Podsakoff 2003: 204), they are *not recommended*. This is because the previous argumentation shows that one should only talk of second-order constructs if the dimensions actually represent facets of its higher-order component. As such, the relationship between the higher- and the lower-order construct needs to be formatively operationalized (Albers, Götz 2006: 672 et seqq.) so that no single dimensions is sufficient to fully represent its construct ('s content) (Giere, Wirtz, Schilke 2006: 681). Consequently, one can turn to *type II and type IV* higher-order constructs which represent the *composite view* of

²⁵³ In the context of model I and model III, the second-order constructs are also called molecular (Chin 2010a: 665) or superordinate higher-order constructs (Edwards 2001: 145 et seqq.).

multidimensional construct models (Law, Wong 1999: 146).²⁵⁴

Type IV is a kind of second-order construct specification which is rather *new* to business study research (Albers, Götz 2006: 671). This type measures both the first- as well as the second-order constructs in a formative manner (Jarvis, MacKenzie, Podsakoff 2003: 204) (cf. figure 49). As such, type IV is especially suitable to identify, for example, *drivers of success* (Albers, Götz 2006: 673) since one can rank the indicators' importance or contribution (Christophersen, Grape 2009: 106) at both levels. However, pursuant to the *critical* view of model I, Sönke Albers and Oliver Götz (2006: 673) argue that one might be better off simply applying the formative indicators directly to the construct and thus, without the intermediating dimensions.

Figure 49: Type IV Second-order Construct Model



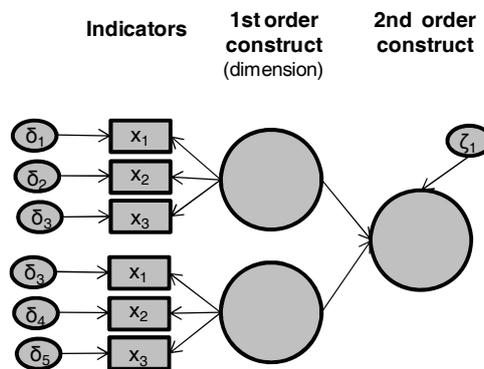
Source: adopted from Jarvis, MacKenzie, Podsakoff 2003: 205

The last second-order construct specification is *type II* where the linkage between the higher- and the first-order construct is formative, while the dimensions are reflectively measured (ibid.: 204) (cf. figure 50). In other words, this means that the dimensions cause its higher-order construct and thus, that all relevant first-order constructs need to be included, that none of them is allowed

²⁵⁴ In the context of model II and model IV, the second-order constructs are also called molar (Chin 2010a: 665) or aggregate higher-order constructs (Edwards 2001: 145 et seqq.).

to be eliminated, and that they are not correlated. At the same time, the indicators which operationalize the dimension are, however, highly correlated and thus inter- and exchangeable (cf. chapter 5.1.2). Because of this type II is *advised* if one operationalizes a *complex model* which consists of *various facets* and if one simultaneously wishes to consider measurement error (Albers, Götz 2006: 673).

Figure 50: Type II Second-order Construct Model



Source: adopted from Jarvis, MacKenzie, Podsakoff 2003: 205

Since *this dissertation* aims to operationalize *complex and abstract constructs* – i.e. human capital (HC), structural capital (SC) and relationship capital (RC) as well as their dimensions (cf. chapters 2.4.1.1 – 2.4.1.3 in general and 4.1.1 – 4.1.3 in the German SME context, respectively) – the use of *second-order constructs* seems *appropriate*. However, so far, the three investigated latent IC-concepts (HC, SC and RC) have only been operationalized in a one-dimensional manner.²⁵⁵ Yet, as theory evolves, it can require conceptualizing previously simple, one-dimensional constructs as complex, multidimensional constructs (Bagozzi 1984: 11 et seq.;

²⁵⁵ Cf., for example, the studies of Nick Bontis (1998: 69 et seqq.), Nick Bontis, William C. C. Keow and Stanley Richardson (2000: 89 et seqq.), Wen-Ying Wang and Chingfu Chang (2005: 228 et seqq.), Maria do Rosario Cabrita and Nick Bontis (2008: 220 et seqq.), Carlos M. F-Jardon and Maria S. Martos (2009: 605 et seqq.), and Josee St-Pierre and Josee Audet (2011: 210 et seqq.). Only Rocio M. Martinez-Torres (2006: 619 et seqq.) operationalizes IC via second-order constructs; yet, in the context of universities as learning organizations.

Edwards 2001: 148; Giere, Wirtz, Schilke 2006: 678 et seq.). Accordingly, the utilization of higher-order constructs is applied in chapter 5.2 which develops the measurement models of this dissertation's latent constructs. Similar to the previous recommendations, *decisions between* the advised models – *type II and IV* which advantageously also match this dissertation's purpose of establishing a ranked list of IC-based strategic sources of success because of their formative consideration – are initially based on a literature review and two key criteria: the direction of causality as well as correlation/interchangeability (Albers, Götz 2006: 672).

Three predominant methods are available to *operationalize* type II und IV second-order constructs in SEM (ibid.: 673 et seq.)²⁵⁶: the *direct measurement approach* (ibid.: 674), the *hierarchical component approach* (HCA) (Wold 1982: 39 et seq. cited by Albers, Götz 2006: 674, by Giere, Wirtz, Schilke 2006: 688 and by Huber et al. 2007: 32), and the *factor value approach* which is also referred to as composite score (Giere, Wirtz, Schilke 2006: 689).²⁵⁷

The first of these approaches, namely the direct measurement approach, suggests determining the higher-order constructs via manifest, reflective variables which are collected before the data evaluation. Specifically, this approach is similar to the *multiple effect indicators for multiple causes* (MIMIC) model²⁵⁸ and allows easily evaluating formative constructs: if the first-order constructs do, for example, insufficiently explain the higher-order construct's variance then it indicates that relevant facets of the second-order construct are missed out. Likewise, this means that all important dimension are included in the higher-order model if one reaches a high explanation of the higher-order construct's variance (Hauser, Goldberger 1971: 81 et seq.; Albers, Götz 2006: 674; Huber et al. 2007: 33 et seq.; Pfennig 2009: 152). Moreover, this approach allows assessing the relative

²⁵⁶ Unfortunately, there is no function to directly calculate second-order constructs in smartPLS version 2.0 which is the chosen SEM-approach/software of this doctoral thesis (cf. chapter 5.1.4).

²⁵⁷ Especially the latter two approaches are expected to lead to almost similar results (Gießmann 2010: 278 & 363).

²⁵⁸ Cf. footnote 265.

importance of individual dimensions on the higher-order construct (Pfennig 2009: 152).

The second approach, the *HCA* is the most commonly applied approach (Giere, Wirtz, Schilke 2006: 688). It is also known as the *repeated indicators approach* because it uses all indicators of the lower-order constructs to measure the higher-order model. However, it limits the creation of the measurement model since it requires equal amounts of items per construct to ensure that indicator weights do not differ (Albers, Götz 2006: 674; Giere, Wirtz, Schilke 2006: 688; Huber et al. 2007: 32 et seqq.; Chin 2010b: 53; Lowry, Gaskin 2014: 25 online version).²⁵⁹

The third approach erases a construct level. Specifically it uses, for example for type II constructs, the *factor values* as formative indicators instead of the first-order constructs. Put differently, the factor values are applied as formative indicators to measure the second-order construct (Albers, Götz 2006: 674; Giere, Wirtz, Schilke 2006: 688; Huber et al. 2007: 34).²⁶⁰ However, in order to gain factor values, it is recommended to use the *HCA* in a preliminary SEM-run (Becker, Klein, Wetzels Martin 2012: 365; Ringle, Sarstedt, Straub 2012: 8 (Appendix B); Lowry, Gaskin 2014: online version, 25) which again implies an equal amount of indicators per construct.

Based on the above descriptions of the three available operationalization options, the *direct measurement approach* is chosen in order to deal with higher-order constructs in the scope of *this dissertation*. That is firstly, because of its relatively easy evaluation and secondly, because it provides more flexibility when designing the measurement model than the other two available alternatives. Nevertheless, it has to be considered that the direct measurement approach has the disadvantage that it lengthens the questionnaire by including direct measures for higher-order constructs (Albers, Götz 2006: 674). Yet, this issue can be avoided by using a single-item to measure each higher-order construct as recommended

²⁵⁹ Besides, this procedure only works well for solely formative constructs and thus, type IV higher-order constructs (Albers, Götz 2006: 674; Huber et al. 2007: 34).

²⁶⁰ Alternatively, one can also apply the mean value which is, however, less often recommended because it can distort parameter estimates - i.e. it ignores the impact of error variance (Albers, Götz 2006: 674; Giere, Wirtz, Schilke 2006: 688; Huber et al. 2007: 34).

by Joseph Hair, JR. et al. (2014: 42, 46 & 48).²⁶¹

5.1.4 Structural Equation Modeling Approaches and Programs: Covariance-based vs. Variance-based

Two different methodological approaches can be applied to model SEM (Eberl 2004: 11; Temme, Kreis, Hildebrandt 2006: 1): *Covariance-based structural equation modeling* (CBSEM) and *partial least square* (PLS) path modeling (Fornell 1985: 24). Since PLS is less often used in research (articles) as well as less well known (Chin 2010a: 657), and because it is important to understand the differences – e.g. application possibilities, strength and weaknesses (Rigdon 1998: 252 et seq.) – between the two procedures (Hair, JR. et al. 2010: 778), it is recommended to provide a methodological discussion (Chin 2010a: 657). After all, such a discussion is especially important since different outcomes result from the application of CBSEM and PLS, respectively (Fornell, Bookstein 1982: 449; Chin 2010b: 27 et seq.).

The *covariance-based structural equation modeling* (CBSEM) method, which was developed by Karl Jöreskog (1978; 1982), includes statistical computer programs such as LISREL, AMOS and EQS (Eberl 2004: 11; Giere, Wirtz, Schilke 2006: 684; Christophersen, Grape 2009: 108). It is the *most widely used* approach for estimating SEM (Fornell 1985: 23; Eberl 2004: 11; Panten, Boßow-Thies 2007: 311; Götz, Liehr-Gobbers, Krafft 2010: 692). This is, potentially, because it is the more *exact, parametric statistical approach* to test the (theoretical) relationship between latent variables (Anderson, Gerbing 1988: 412; Ringle et al. 2006: 81; Scholderer,

²⁶¹ Single item constructs can be easily and unrestrictedly applied in SmartPLS (Ringle, Sarstedt, Straub 2012: vii; Hair, JR. et al. 2014: 42), which is the software applied in this dissertation (cf. chapter 5.1.4), which is why they are commonly applied (Ringle, Sarstedt, Straub 2012: vii). They are especially recommended when the sample size is expected to be fairly low (Hair, JR. et al. 2014: 48) which is the case in this doctoral thesis due to resource restrictions.

Balderjahn 2006: 57; Schloderer, Ringle, Sarstedt 2009: 575) and because it provides various tests to evaluate the *overall model fit* (Anderson, Gerbing 1988: 412; Albers 2010: 411).

In particular, the CBSEM estimation process "(...) seeks to find the "best" set of parameters estimates for a given model" (Chin 2010a: 657) by aiming "(...) to recover the structure (as measured by covariation) of the observed data in terms of parameter matrices" (Fornell 1985: 24).²⁶² Because of this focus on *explaining the covariance between items* (Hair, JR. et al. 2010: 775 et seq.), CBSEM can be viewed as confirmatory in nature (Chin 2010a: 658 et seq.) and thus, particularly useful for *testing theory* (Huber et al. 2007: V; Hair, JR. et al. 2010: 776).

However, in order to obtain parameter estimates, CBSEM assumes "(...) that the observed variables follow a specific multivariate *distribution* (normality in case of the ML function) and that observations are independent of each other" (Chin 1998b: 297).²⁶³ Moreover, CBSEM's full information estimation approach (Anderson, Gerbing 1988: 412) requires *strong* theoretical *inputs* (Chin 2010a: 658 et seq.). Specifically, it demands, for example, a priori knowledge to impose constraints on parameters since the model is generally not *identified*²⁶⁴ (Fornell 1985: 24). Furthermore, a CBSEM can only be calculated with fairly *large samples* sizing a minimum of 150 to 400 (Götz, Liehr-Gobbers, Krafft 2010: 692) or even 200 to 800 data sets (Akter, Hani 2011: 3). Additionally, all indicators need to be of *reflective nature* (Chin 1998b: 301) because of CBSEM's fundamental factorial-analytic assumptions (Eberl 2006: 653) and corresponding identification problems

²⁶² In this context, different estimation techniques can be applied. Examples include the mainly applied and most efficient maximum likelihood (ML) technique, the generalized least square (GLS) technique, the weighted least square (WLS) technique and the unweighted least square technique (Huber et al. 2007: 6; Hair, JR. et al. 2010: 663).

²⁶³ Cf. footnote 19.

²⁶⁴ "Identification [expresses] whether enough information exists to identify a solution for a set of structural equations. An identification problem leads to an inability of the proposed model to generate unique estimates and can prevent SEM program from producing results" (Hair, JR. et al. 2010: 690).

(Temme, Kreis, Hildebrandt 2006: 1 et seq.).²⁶⁵ In this regard it is also worth indicating that CBSEM has also difficulties to handle complex models – e.g. type II to IV *higher-order constructs* (Chin 1998a: 10; Law, Wong 1999: 153; Albers 2010: 414; Chin 2010a: 665) because of their formative component.

Overall, it can therefore be summarized that CBSEM is useful if certain, strict requirements regarding the operationalization of latent variables, theory and data are met (Götz, Liehr-Gobbers, Krafft 2010: 692). However, its restrictive procedural assumptions limit the modeling as well as measurement of diverse practical relationships (Ringle et al. 2006: 81).

The component-/variance-based *partial least square* (PLS) approach was initially established by Herman Wold (1966a: 391 et seqq.; 1966b cited by Raithel 2009: 543), further elaborated by Fred Bookstein (1982: 348 et seqq.), and finally fully programmed by Jan-Bernd Lohmöller (1984, 1988: 125, 1989: 27 et seqq.). Although the PLS approach exists since the 1960's, it has only in recent years been increasingly adopted in (business) research (Chin, Marcolin, Newsted 1996: 25; Huber et al. 2007: V; Raithel 2009: 543; Götz, Liehr-Gobbers, Krafft 2010: 692; Hair, JR. et al. 2010: 775). One of the key reasons for this rise is that PLS produces *stable statistical results* based upon more general and *softer* (distribution, sample size and measurement scale) *standards* than CMSEM (Fornell, Bookstein 1982: 449; Ringle et al. 2006: 81; Schloderer, Ringle, Sarstedt 2009: 575; Chin 2010a: 659; Götz, Liehr-Gobbers, Krafft 2010: 691; Vinzi et al. 2010: 2; Vinzi, Trinchera, Amato 2010: 48). This is, in turn, grounded in the fact that PLS changes the focus from using the model to explain the covariation of the indicators (Chin 1998b: 301) to generate a *prediction/reconstruction* forecast of the raw data matrix (Lohmöller 1988: 126) – i.e. to *minimize the residual variance* of all dependent variables; no matter if latent

²⁶⁵ Formative indicators in CBSEM can only be operationalized in multiple indicators and multiple causes (MIMIC) models in which formative measures of a construct are complemented by reflective items which are required for model identification (MacCallum, Browne 1993: 540; Diamantopoulos, Winklhofer 2001: 272; Jarvis, MacKenzie, Podsakoff 2003: 213).

or measurable (Chin 1998b: 301).²⁶⁶

In detail, the conceptual core of PLS rests, as already indicated by its name, on a *regression*-based method as opposed to covariance (Ringle et al. 2006: 81; Hair, JR. et al. 2010: 775): contrary to CBSEM's simultaneous estimations, PLS consists of a multistage estimation procedure (algorithm) (Eberl 2004: 12) which first generates estimates for the latent constructs in order to subsequently determine the relationship among the latent concepts as well as between the constructs and their indicators (Ringle et al. 2006: 83 et seq.; Schloderer, Ringle, Sarstedt 2009: 578).²⁶⁷ Thereby PLS aims to maximize explained variances (Anderson, Gerbing 1988: 412; Bontis 1998: 69) and to leverage the prediction of the construct (Huber et al. 2007: 6; Hair, JR. et al. 2010: 775 et seq.) – specifically to maximize the R^2 of endogenous constructs (Hair, JR. et al. 2014: 14). Consequently, PLS is, unlike CBSEM, rather regarded as a soft modeling approach which is applied in an exploratory or causal-predictive manner and if little theory and/or no previously established scales are available (Jöreskog, Wold 1982: 270 cited by Anderson, Gerbing 1988: 412; Ringle et al. 2006: 81; Panten, Boßow-Thies 2007: 317; Chin

²⁶⁶ “For PLS, as a component based approach with explicit estimation via indicator weights, a researcher only needs to specify the block of indicator representing each construct in question and the structural paths among all constructs. For CBSEM analysis, additional considerations such as model identification, measurement scale adequacy for the discrepancy estimator, setting the metric for each construct, and other SEM constraints need to be addressed” (Chin 2010a: 668).

²⁶⁷ PLS estimates weights, loadings and path estimates via a three-stage estimation algorithm. Firstly, an iterative four-step process of simple and/or multiple regressions determines values of each latent variable based upon its relationships to its indicators as well as the connection to other latent concepts in the model. Once the estimates of the latent constructs are obtained, they are entered as independent and dependent variables into simple noniterative applications of OLS regression in order to obtain path- and loading coefficients. Lastly, location parameters for the latent constructs as well as the indicators are estimated (Chin 1998b: 302; Chin 2010b: 32; Henseler, Fassott 2010: 717; Huber et al. 2007: 7; Ringle et al. 2006: 84 et seq.; Schloderer, Ringle, Sarstedt 2009: 578). “Until stage 3, the LV and indicators are treated as deviations from their means” (Chin 1998b: 302). “The procedure is partial in a least square sense because each step of the procedure minimizes a residual variance with respect to a subset of the parameters being estimated” (Chin 1998b: 303).

2010a: 660; Chin 2010b: 4; Vinzi et al. 2010: 2).²⁶⁸

Because of the partial nature of its algorithm (Chin 2010a: 662), PLS has various advantages over CBSEM. Firstly, it has less restricted requirements concerning the *input data*. Specifically, PLS can handle nonmetric and metric data (Hair, JR. et al. 2010: 775; Hair, JR. et al. 2014: 22) which does not have to be distributional/parametric (Lohmöller 1988: 126; Yi, Davis 2003: 157; Albers, Hildebrandt 2006: 15; Huber et al. 2007: 10; Hair, JR. et al. 2014: 10 & 22).²⁶⁹ On top of this, different types of measurement-scales can be applied simultaneously (Hair, JR. et al. 2014: 18). Secondly, PLS can estimate (even complex) models with *small data samples* (Yi, Davis 2003: 157; Albers, Hildebrandt 2006: 15; Giere, Wirtz, Schilke 2006: 685; Huber et al. 2007: V; Schloderer, Ringle, Sarstedt 2009: 575; Chin 2010a: 662; Chin 2010b: 4; Hair, JR. et al. 2010: 776) of only 20 (Akter, Hani 2011: 3) or 30 data sets (Hair, JR. et al. 2010: 776). In detail, PLS follows a relatively simple rule of thumb to determine the required sample size: ten times the number of estimated parameters (i.e. independent variables) of the greater of the following two possibilities – a) the largest measurement equation and thus, the construct with the largest number of formative indicators or dimensions; or b) the largest structural equation which means the construct with the greatest number of exogenous latent constructs impacting it (Chin 1998b: 311; Chin, Newsted 1999: 326 et seqq.; Ringle et al. 2006: 81; Chin 2010b: 62; Bagozzi, Yi 2012: 29).²⁷⁰ Thirdly, *reflective and formative* – simple as well as *higher-order* (Chin 2010a: 665) – measurement models are applicable (Fornell 1985: 20; Chin 1998a: 10; Diamantopoulos, Winklhofer 2001: 274; Yi, Davis 2003: 157; Giere, Wirtz, Schilke

²⁶⁸ “PLS (...) is argued as more deeply rooted in the observed data set” (Chin 1998b: 303).

²⁶⁹ “Because the iterative algorithm performed in a PLS analysis generally consists of a series of ordinal least squares (OLS) analyses, identification is not a problem for recursive models nor does it presume any distributional form of measured variables” (Chin 1998b: 295); “Because PLS estimation involves no assumptions about the population or scale of measurement, there are no distributional requirements” (Fornell, Bookstein 1982: 443).

²⁷⁰ Richard Bagozzi and Youjue Yi (2012: 29), although not specifically referring to PLS, state that this 10:1 ratio is a conservative advice and that, especially in practice, ratios of 5:1, 3:1 and even close to 2:1 can contribute to satisfactory models, too. This is in line with the PLS study of Mun Yi and Fred Davis (2003: 163) who also apply the 5:1 ratio.

2006: 685; Huber et al. 2007: 1 et seq.; Chin 2010b: 4; Götz, Liehr-Gobbers, Krafft 2010: 691; Hair, JR. et al. 2010: 775 et seq.) because PLS “(...) explicitly estimates the outer weights to form construct scores” (Chin 2010a: 664).

However, PLS does not provide measures of overall model fit because of its distribution-free variance assumption (Götz, Liehr-Gobbers, Krafft 2010: 701; Henseler, Fassott 2010: 730); and the proposed goodness-of-fit measure for PLS is neither useful nor recommended (Hair, JR. et al. 2014: 78). However, this is no severe issue since overall goodness measures “(...) only relate to how well the parameter estimates are able to match the sample covariances. They do not relate to how well the latent variables or item measures are predicted” (Chin 2010a: 657). Thus, even “(...) models with good fit indices may still be considered poor based on other measures such as the R-square and factor loadings” (Chin 1998a: 13). As such, it can be argued that PLS’s non-parametrical tests such as bootstrapping to estimate the standard errors of model parameters (Henseler, Fassott 2010: 730) are appropriately sufficient to evaluate a SEM’s quality (Götz, Liehr-Gobbers, Krafft 2010: 701; Hair, JR. et al. 2014: 96). Lastly, it is worth taking into account that PLS’s values of the latent constructs

“(...) are “inconsistent” due to the fact that they are aggregates of the observed variables, which in part include measurement error. This bias tends to manifest itself in higher estimates for component loadings (outer model relations) and lower estimates at the structural level (inner model relations).” (Chin 1998b: 329)

“The estimates will approach the “true” parameter values when both the number of indicators per construct and sample size increase. This limiting case has been termed “consistency at large” (...)” (Chin 2010a: 663).²⁷¹

Nevertheless, the bias as a result of *consistence at large* is usually fairly low (Hair, JR. et al. 2014: 79) and hence, does not require attention within the scope of this thesis' work.

²⁷¹ Cf. footnote 19.

Table 10: Differences between CBSEM and PLS

Criterion	CBSEM	PLS
(Research) Objective	Parameter/theory-orientated	Prediction-orientated
SEM Approach	Covariance-based - simultaneous estimation	Variance-based - partial estimation
(Distributional) Assumption	Parametric/normal distribution assumptions	Nonparametric/no distributional assumptions
Minimum sample size	200 - 800	20 - 100
Measurement model	Typically only reflective (except MIMIC)	Reflective and formative
Model complexity	Low complexity	High complexity
Parameter estimates	Consistent	Consistent at large

Source: adopted from Eberl 2004: 12, Chin 2010b: 66 et seq. and Akter, Hani 2011: 3

The discussion above highlights that CBSEM and PLS are *not competing* SEM procedures. Instead, they are two approaches which have dissimilar features concerning the development, estimation as well as interpretation of models (cf. table 10 for a summary). Hence, they are *adequate in different situations and research settings*, respectively (Anderson, Gerbing 1988: 412; Huber et al. 2007: V; Panten, Boßow-Thies 2007: 317; Hair, JR. et al. 2010: 775).

This dissertation applies PLS because of the following, context specific reasons: Firstly, the topic of German SME' IC is rather a *novel research phenomenon* (Giere, Wirtz, Schilke 2006: 685) and thus, theoretically only intermediately defined (Chin 2010b: 56 et seqq.) (cf. chapter 4 which rests on highly diversified international and national literature sources as well as logical reasoning). Therefore, it makes sense to predictably determine the relationship between the latent IC-based strategic sources of success as well as between them and their dimensions or indicators instead of testing (fixed) theory (Huber et al. 2007: 14; Chin 2010b: 56 et seqq.). Secondly, there are *no approved measurement scales* for German SME' IC (simply) because no such studies have been performed so far. This motivates, again, the usage of soft-modeling PLS as opposed to hard-modeling CBSEM (Giere, Wirtz, Schilke 2006: 685). Thirdly, PLS is the preferred option for this

doctoral thesis because of its possibility to handle *formative constructs*, too (Chin 2010b: 56 et seqq.). This is an especially important criterion because success factor research is recommended to operationalize its constructs formatively (Albers, Hildebrandt 2006: 2; Albers 2010: 424) and because the higher-order model decisions are made between the recommended types II and IV (cf. chapter 5.1.3). Besides, complex models call for PLS either way (Akter, Hani 2011: 3). Lastly, it is worth highlighting that various studies in the field of IC favor the PLS approach²⁷² and that it is generally recommended for studies on sources of success (Hair, JR. et al. 2014: 78).

To finish the discussion on this thesis' SEM approach – and to follow the advice of Wynne Chin (1998a: 8; 2010a: 669) – it is important to state which software applications is chosen. This is relevant since many software packages emerged with the increasing interest in PLS – e.g. LVPLS, PLS-Graph, PLS-GUI, SmartPLS or SPAD-PLS (Temme, Kreis, Hildebrandt 2006: 2; Götz, Liehr-Gobbers, Krafft 2010: 692). Based on the comprehensive software review of Dirk Temme, Henning Kreis and Lutz Hildebrandt (2006: 1 et seqq.) as well as an assessment of research studies with second-order latent constructs²⁷³ this dissertation conducts its SEM via SmartPLS version 2.0 (Ringle, Wende, Will 2005).²⁷⁴

5.2 MEASUREMENT MODEL OF BOTH STRUCTURAL MODELS

The chapter at hand is concerned with the measurement of this thesis' unobservable, directly unmeasurable latent constructs, namely human capital,

²⁷² Cf., for example, Hong Tan, David Plowman and Phil Hancock (2007), Carlos F-Jardon and Maria Martos (2009: 609), Kuang-Hsun Shih, Chia-Jung Chang and Binshan Lin (2010), and Josee St-Pierre and Josee Audet (2011).

²⁷³ Cf., for example, the studies of Christian Pfennig (2009), Julia Naskrent (2010), and Marco Gießmann (2010); Alternatively, various studies measure their higher-order models with PLS Graph (Yi, Davis 2003; Sammerl 2006; Turel, Serenko, Bontis 2007; Turel, Serenko, Bontis 2010). Yet, it has been shown that SmartPLS and PLS Graph produce almost identical results (Gießmann 2010: 280).

²⁷⁴ It can be downloaded free of charge from the following website: www.smartpls.de.

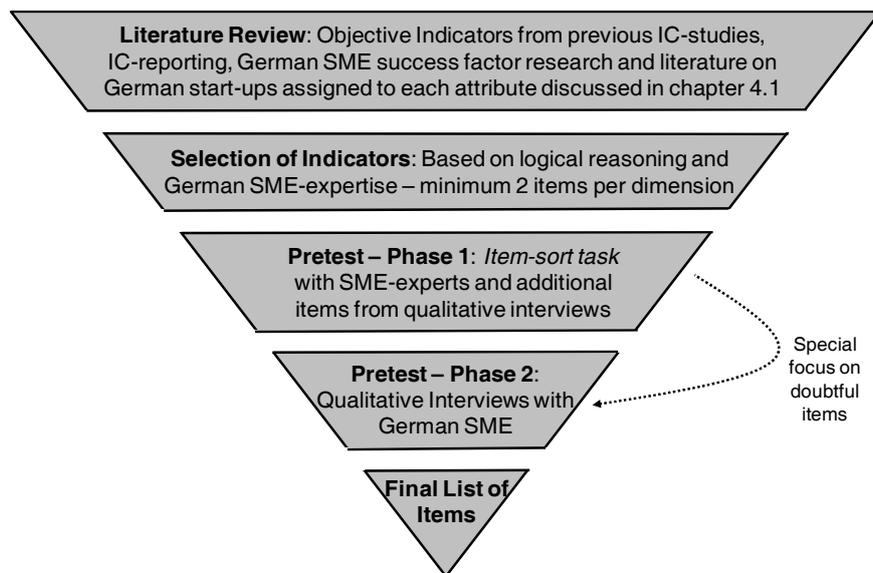
structural capital, relationship capital and competitive business performance. Since these four constructs are conceptually equal in research model I (cf. chapter 4.1.4) and research model II (cf. chapter 4.2.4), it is only necessary to develop one measurement model for each construct which can then be applied for calculating both models. However, since *no previously utilized sets of indicators* are available to measure this dissertation's latent constructs – i.e. German SME' IC-based strategic sources of success which are newly specified by lower-order constructs/dimensions (cf. chapter 4.1) – a new measurement model for each construct has to be developed (Hair, JR. et al. 2010: 696; Hair, JR. et al. 2014: 41). Chapters 5.2.1 and 5.2.2 show the initial operationalization of this thesis's constructs. This operationalization is based on the construct's definition to ensure *content validity* (Hair, JR. et al. 2010: 696) (cf. chapters 4.1.1, 4.1.2 and 4.1.3), previously applied measures, IC-reporting-indicators and general operational requests (cf. chapter 5.2.1) (ibid.: 696). However, such an initial operationalization is highly depended on the researcher's subjectivity (Huber et al. 2007: 40) and may not provide a sound measurement model which is required to perform PLS-SEM well and particularly to test hypotheses (Hair, JR. et al. 2014: 41). Hence, this doctoral thesis follows the literature recommendations (Diamantopoulos, Winklhofer 2001: 271 et seq.; Rossiter 2002: 306; Diamantopoulos, Riefler 2008: 1188; Hair, JR. et al. 2014: 120) and further consults experts for advices. Hence, a *multiple-method item-generation-process* is applied (Kuß, Eisend 2010: 97 et seq.).²⁷⁵ Such a double-check is firstly performed via expert-pretests and especially important since "(...) measurement model misspecification severely biases structural parameter estimates and can lead to inappropriate conclusions about hypothesized relationships between constructs" (Jarvis, MacKenzie, Podsakoff 2003: 216). Details on the expert pretests and the models' corresponding

²⁷⁵ Oral expert interviews and an item-sort-task with specialist on German SME as well as interviews with statistical experts and German SME are applied as the pretest methods because the alternative – i.e. factor analysis – cannot be used in the scope of this thesis because of two key reasons: Firstly, the factor analysis is generally not suitable as a pretest instrument for formative measurement models (Coltman et al. 2008: 10 et seq.). Secondly, a factor analysis requires a fairly large sample group (Hair, JR. et al. 2010: 102). However, such a sample group is not available since the accessible participants are required for the final data collection.

adjustments are provided in chapter 5.2.3. On top of this, the modified measurement models are again pre-tested; but this time in a field test with German SME (cf. section 5.2.4). Overall, it is important to emphasize that the final operationalization of this dissertation's constructs, which is presented in chapter 5.2.5 and 5.2.6, is therefore based on both, the initial theoretical operationalization and the cross-check via pretests with experts and practitioners.

The above explained procedure of arriving at the final operationalization is graphically visualized in figure 51. Details on the individual steps are provided in the next text passages.

Figure 51: Deriving at the Measurement-Models: Course of Action



5.2.1 Initial Operationalization of Intellectual Capital and its Measurement

A *deep theoretical foundation* of the constructs' as well as their dimensions' contents is preconditioned for measurements in order to meet content validity (Churchill, JR. 1979: 67; Jarvis, MacKenzie, Podsakoff 2003: 213; Albers, Hildebrandt 2006: 10; Giere, Wirtz, Schilke 2006: 683). This condition is already largely covered in terms of German SME' IC in chapters 4.1.1 to 4.1.3 which transfer the general IC-framework into the German SME context and hence,

conceptually define this dissertation's intangible constructs. The chapter at hand refines the latter by incorporating a statistical discussion. In depth, it assigns *relevant indicators* and describes the chosen reflective or formative *specification* (Churchill, JR. 1979: 67; Jarvis, MacKenzie, Podsakoff 2003: 213; Ping, JR. 2004: 125; Albers, Hildebrandt 2006: 10 et seq.; Giere, Wirtz, Schilke 2006: 683). This is done based upon a state-of-the-art literature review – including former IC-research, IC-reporting as well as success factor studies of German SME (Churchill, JR. 1979: 67; Giere, Wirtz, Schilke 2006: 683; Diamantopoulos, Riefler 2008: 1188; Albers 2010: 417; Kuß, Eisend 2010: 97 et seq.) –, logical reasoning (Kuß, Eisend 2010: 97 et seq.) to modify previous operationalizations in the context of German SME' IC (Cater, Cater 2009: 194; Kamukama, Ahiauzu, Ntayi 2010: 560) and the in chapter 5.1.2 introduced decision rules for developing a reflective or formative measurement model (Jarvis, MacKenzie, Podsakoff 2003: 203; Eberl 2004: 15; Eberl 2006: 655). Additionally, two general operational measurement model requirements are considered: The first and most relevant condition encompasses *the number of indicators per construct* (Eberl 2006: 654; Bagozzi, Yi 2012: 16). Building on Gilbert Churchill's (1979: 66 et seq.) recommendations, multi-item measures are preferably used to operationalize this thesis's constructs since they improve PLS' estimates and lead to more stable results (Wold 1982: 25 cited by Chin 2010a: 663; Anderson, Gerbing 1988: 412; Bagozzi, Yi 2012: 16; Hair, JR. et al. 2014: 47) – i.e. consistency at large (cf. chapter 5.1.4). Nevertheless, not every potential indicator is applied. Instead, a sample of the key measures is established (Churchill, JR. 1979: 68; Rossiter 2002: 314) because an excessive number of indicators demands a larger data set and extends the questionnaire, which in turn is likely to negatively affect the response rate (Diamantopoulos, Winklhofer 2001: 272; Albers, Hildebrandt 2006: 7; Huber et al. 2007: 23; Jahn 2007: 4; Hair, JR. et al. 2010: 698; Bagozzi, Yi 2012: 16). Generally speaking, the discussion about the appropriate amount of indicators can be wound up by stating that a minimum of *two* measures is favored (Anderson, Gerbing 1988: 415), while *three* (Albers, Hildebrandt 2006: 6; Huber et al. 2007: 23; Bagozzi, Yi 2012: 16) indicators per (first- and second-order) latent construct are regarded as optimal practice. Lastly, it needs to be considered though that single item measures are sometimes economically more feasible since they promote higher response rates due to e.g. shorter questionnaires (Hair, JR. et al. 2014: 46 et

seq.). Hence, they are per se not always 'bad'. The second general condition, which this dissertation takes into account during the scale development, includes the indicators' objectivity (cf. chapter 2.4.2). Specifically, quantitative measures – relative as well as proportional (Hübler 2005: 24) – are preferably applied because they are less subjective than perception-based and thus, respondent-biased rating scales (St-Pierre, Audet 2011: 210 et seq.); and also more meaningful (Arbeitskreis Wissensbilanz 2006: 4). The latter mentioned ordinal rating scales are, consequently, only little utilized since they limit the data's analysis (Rossiter, Percy 1987 cited by Rossiter 2002: 322; Horn 2009: 117).²⁷⁶ Overall, it can be summarized that all of the principles, which are mentioned in the previous paragraph, are considered in the following chapters which develop specific measurement models for German SME' human capital, structural capital, relationship capital and lasting competitive business performance.

5.2.1.1 German SME' Human Capital

German SME' human capital (HC) is, corresponding to the theoretical model of chapter 4.1.1, a *second-order construct* and as such, initially operationalized via *four dimensions* – i.e. employees' competencies, employees' attitude, employees' intellectual agility, as well as leader(ship) and management ability. Because of the fact that HC is made up of *more than two* and even more than *three* determining *first-order constructs* it meets the statistical requirements of good measurement practice (cf. chapter 5.2.1) (Cohen et al. 1990: 187; Chin 1998a: 10; Albers, Hildebrandt 2006: 6; Huber et al. 2007: 23; Bagozzi, Yi 2012: 16).

Each of these four *dimensions* is as well measured via *three or more indicators* and thus, meets the criterion of minimum two items, too. Specifically, at least one indicator is allocated to each attribute which is explained in chapters 4.1.1.1 to 4.1.1.4. These indicators are primarily based on previous research as well as

²⁷⁶ If scales are applied, it is made sure that they do not have a middle point. This is because it requires the participant to chose, if undecided, between better or worse, more or less etc. – i.e. forced choice (Raab-Steiner, Benesch 2008: 55). This does, however, not hold true for nominal scales such as yes/no-answers (ibid.: 24).

IC-reporting, selected carefully and slightly adjusted to meet the German SME context. An overview of the attributes, their indicators as well as literature sources is provided in table 11.

Table 11: German SME' Human Capital – Initial Operationalization: its Dimensions, their Contents and Indicators

HC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Sources - adopted and adjusted to the German SME context
Employees' competencies	Formal education	<ul style="list-style-type: none"> No. of employees with academic degrees (e.g. Bachelor, Master, Diploma, PhD)* No. of employees with advanced professional qualifications (e.g. business administrator/bachelor professional, business manager, master craftsman)* No. of employees currently in apprenticeship* 	<ul style="list-style-type: none"> MERITUM 2001: 19; AKIW 2003: 1237; Ordonez Pablos 2003: 73; Wang, Chang 2005: 229; Thorleifsdottir, Claessen 2006: 58; BMWi 2008: 30; InCaS 2008: 38; Liu, Tseng, Yen 2009: 268; BMWi 2013: 28. NEW – inspired by BMWi 2008: 30; InCaS 2008: 38; BMWi 2013: 28. AKIW 2003: 1237; Geighardt 2005: 12; BMWi 2008: 30; InCaS 2008: 38; BMWi 2013: 28.
	Specific training	<ul style="list-style-type: none"> € invested in advanced education/training of employees** % of training conducted in-house/on-the-job training – as opposed to external advanced education 	<ul style="list-style-type: none"> MERITUM 2001: 19; AKIW 2003: 1237; Danish Ministry of Science, Technology and Innovation 2003: 68; Ordonez Pablos 2003: 74; AKIW 2005: 91; SKE 2005: 34; Arbeitskreis Wissensbilanz 2006: 36; RICARDIS 2006: 89; Thorleifsdottir, Claessen 2006: 58; St-Pierre, Audet 2011: 212. NEW – inspired by Simon 1996: 174; Pawlowsky et al. 2006: 10 et seq.; RICARDIS 2006: 41.
	Experience	<ul style="list-style-type: none"> Average no. of years in business – i.e. work experience - of leading personnel (i.e. employees with direction/leadership responsibilities but not top management) % of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT) 	<ul style="list-style-type: none"> NEW – inspired by Thorleifsdottir, Claessen 2006: 58; Liu, Tseng, Yen 2009: 268. Geighardt 2005: 12.
Employees' attitude	Loyalty	<ul style="list-style-type: none"> Average no. of years in the company of all employees (i.e. seniority) 	<ul style="list-style-type: none"> AKIW 2003: 1237; Danish Ministry of Science, Technology and Innovation 2003: 68; Ordonez Pablos 2003: 73; AKIW 2005: 90; Wang, Chang 2005: 229; Arbeitskreis Wissensbilanz 2006: 36; Thorleifsdottir, Claessen 2006: 58; BMWi 2008: 30, BMWi 2013: 28.
	Fluctuation	<ul style="list-style-type: none"> No. of employees who left the firm* 	<ul style="list-style-type: none"> AKIW 2003: 1237; Danish Ministry of Science, Technology and Innovation 2003: 68; METI 2005: 15; AKIW 2005: 91; Arbeitskreis Wissensbilanz 2006: 36; RICARDIS 2006: 89; Thorleifsdottir, Claessen 2006: 16 & 58.
	Physical / health capacity	<ul style="list-style-type: none"> Average no. of sick days per employee 	<ul style="list-style-type: none"> Ordonez Pablos 2003: 74; Arbeitskreis Wissensbilanz 2006: 36; Thorleifsdottir, Claessen 2006: 61; BMWi 2008: 30.
	Satisfaction	Assumed to be measured via the following two indicators, too	
	Motivation	<ul style="list-style-type: none"> Estimate: No. of employees who are highly motivated* 	<ul style="list-style-type: none"> NEW – inspired i.a. by Simon 1996: 165 et seq. & 223; Geighardt 2005: 30; BMWi 2008: 24.
	Commitment	<ul style="list-style-type: none"> No. of employees who applied via unsolicited application (as opposed to posted/advertised positions)* 	<ul style="list-style-type: none"> Thorleifsdottir, Claessen 2006: 76.

HC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Sources - adopted and adjusted to the German SME context
Employees' intellectual agility	Innovativeness and creativity	• No. of improvement/innovation suggestions made by employees*	• CEN (European Committee for Standardization) 2004: 18; Simon 2007: 321 et seq.; BMWi 2008: 32; BMWi 2013: 29.
	Flexibility, adaptability and changeability	• No. of employees who personally develop themselves after staff progress/performance review* • No. of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.)*	• NEW – inspired i.a. by Danish Ministry of Science, Technology and Innovation 2003: 68; Arbeitskreis Wissensbilanz 2006: 36; BMWi 2008: 31. • Danish Ministry of Science, Technology and Innovation 2003: 68; Geighardt 2005: 12.
Leader(ship) and management ability	Knowledge and capabilities: education, training and experience	• No. of entrepreneurs/managers with academic degrees (e.g. Bachelor, Master, Diploma, PhD)*** • No. of entrepreneurs/managers with dual qualifications (i.e. technical and business)*** • € invested in advanced education/training of entrepreneurs/managers** • Average no. of years in leading position (of entrepreneurs/managers)	• Hayton 2005: 143; Benzing, Chu, Kara 2009: 67; St-Pierre, Audet 2011: 212. • Hayton 2005: 143 and inspired by Simon 2007: 331. • SKE 2005: 34; Arbeitskreis Wissensbilanz 2006: 36. • Hayton 2005: 143; Hermans, Kauranen 2005: 174 et seq.
	Attitude: motivation, identification and loyalty	Assumed to be intrinsic – otherwise the leaders would not have founded / work for the business	
	Intellectual agility: flexibility, adaptability and innovativeness	• No. of improvement/innovation suggestions made by entrepreneurs/managers***	• NEW – inspired i.a. by Simon 2007: 213; Witte 2011: 53.
	Leadership: ability to administer and motivate others, to communicate strategy as well as its implementation.	• No. of employees who regard their entrepreneurs/managers as role models (i.e. someone to follow, someone who motivates, someone who exemplifies actions etc.)*	• NEW – inspired i.a. by Simon 1996: 179 et seqq.; Geighardt 2005: 12; Simon, Huber 2006: 70; Tinner 2007: 194.
	Visionary: clear picture about the future	• Self-assessment: % to which the entrepreneurs/managers are visionary	• NEW – inspired i.a. by Gruber 2000: 263; Stahl 2003: 17 et seq.; Becker, Staffel, Ulrich 2008: 36.

* = in relation to total employees

** = in relation to turnover

*** = in relation to total entrepreneurs/managers²⁷⁷

Specifically, one can see that the majority of the indicators presented in table 11 is *objective*; while three out of the 22 items are *subjective*²⁷⁸ since no other measures could be identified which cover the full content of its dimension and attribute. Additionally, it is interesting to point out that *size effects* are

²⁷⁷ Sometimes the presented indicators differ from their original sources – e.g. the wordings are (slightly) changed, ratios are used instead of rational number or the figures are related to sales instead of profit etc.

²⁷⁸ 1) employees' attitude – motivation, 2) leader(ship) and management ability – leadership: ability to administer/lead & motivate others, and 3) leader(ship) and management ability – visionary.

eliminated.²⁷⁹ All indicators to which one star (*) is attached (10 out of 22), for instance, are divided by the number of employees. The ones with two stars (**) (2 out of 22) are, contrarily, related to turnover and the ones with three stars (***) (3 out of 22) to the number of entrepreneurs.

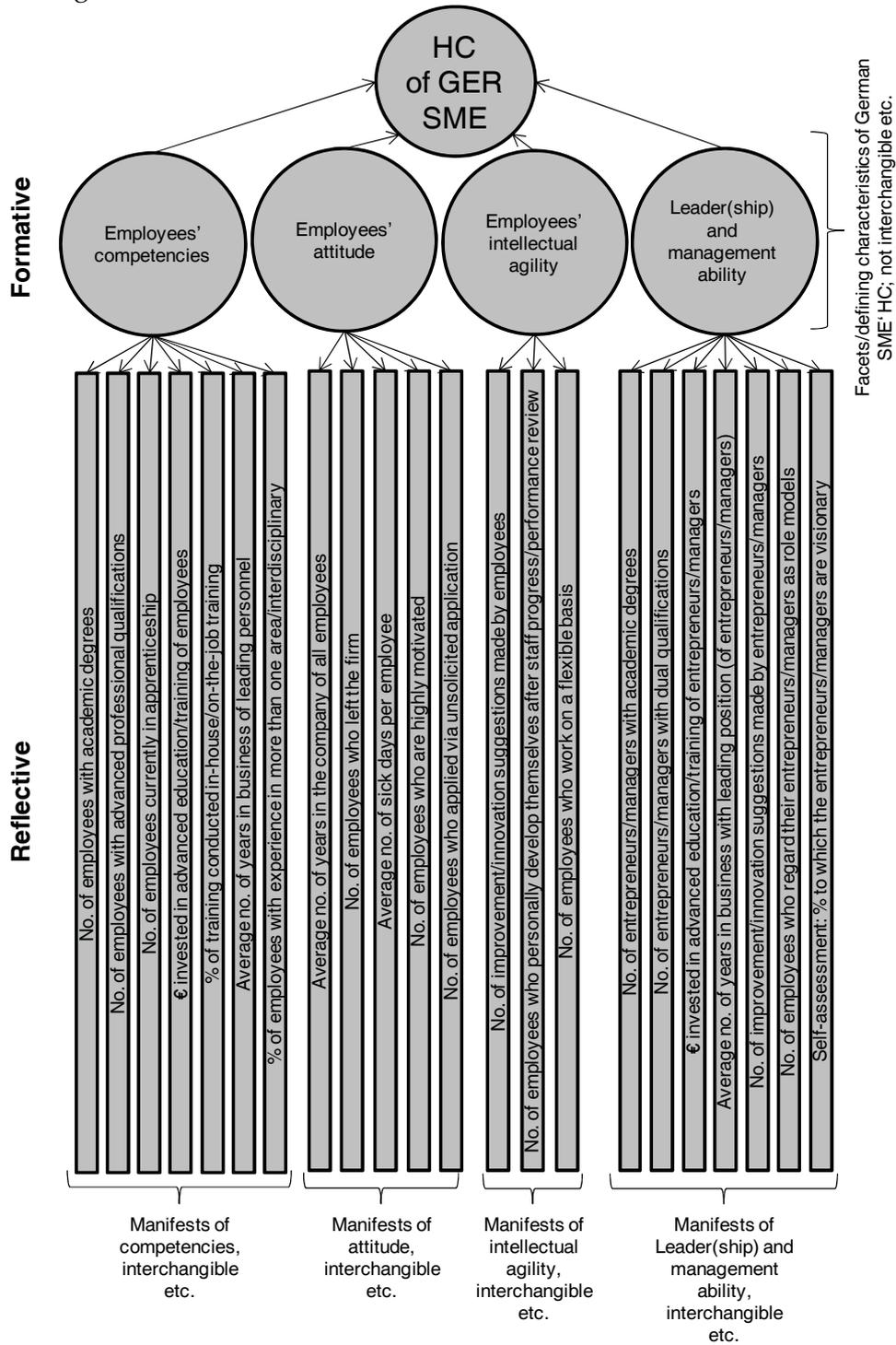
Concerning the *relationship between HC and its four dimensions*, this dissertation decides for a *formative operationalization* because of the following reasons: Firstly, this *doctoral thesis aims* to identify the most significant IC-based sources of success whose measurement is generally recommended to be formative (Albers, Hildebrandt 2006: 4; Christophersen, Grape 2009: 104; Albers 2010: 410 et seqq. & 419). Furthermore, it is the combination of employees' and entrepreneurs' intellect which defines the quality of HC (Eberl 2004: 18; Christophersen, Grape 2009: 110) while neither of the four dimensions is by itself sufficient to completely represent German SME' HC (Giere, Wirtz, Schilke 2006: 681). Put differently, the four dimensions are defining facets of HC. Thus, the *direction of causality* goes from the dimensions to the construct (Jarvis, MacKenzie, Podsakoff 2003: 203; Albers, Götz 2006: 672). This, in turn, implies that a change of, for example, employees' competencies causes a change in HC, too (Jarvis, MacKenzie, Podsakoff 2003: 203). Thirdly, the four dimensions of German SME' HC are *not* judged as *interchangeable* (Albers, Götz 2006: 672) since dropping a dimension changes the conceptual domain and definitorial nature of German SME' HC (Jarvis, MacKenzie, Podsakoff 2003: 203; Christophersen, Grape 2009: 110). Besides, it is assumed that HC's four dimensions do *not* highly *correlate* (Jarvis, MacKenzie, Podsakoff 2003: 203). In depth, it is, for instance, expected that managers' qualities and employees' agility are independent of each other. Precisely, if the entrepreneurs' qualities increase, it does not automatically lead to a change in employees' intellectual agility – or competencies and attitude, respectively. Lastly, it is important to recap on chapter 5.1.3, which – from a methodological viewpoint – pleads for *type II and type IV second-order constructs* which are both operationalized in a formative manner between the constructs and their corresponding dimensions (Albers, Götz 2006: 672 et seqq.).

²⁷⁹ This seems to be common practice – cf., for example, Tomaz Cater and Barbara Cater (2009: 193).

The four HC-*dimensions* of German SME are, however, operationalized in a *reflective* manner. This is because it is assumed that, for example, formal education or work experience are manifests of competencies and not defining characteristics of the construct. Thus, the *direction of causality* goes from the HC-first-order constructs to their respective indicators (Jarvis, MacKenzie, Podsakoff 2003: 203; Eberl 2006: 657 et seq.). Since the indicators do, therefore, share a common theme, they measure – to some extent – the same. Thus, they are also *interchangeable* (Jarvis, MacKenzie, Podsakoff 2003: 203; Eberl 2006: 657; Christophersen, Grape 2009: 110). As such, dropping an indicator – e.g. 'education level' because of poor statistical evidence – does not alter the conceptual domain of the lower-order construct – in this case the dimension 'employee's competencies' (Jarvis, MacKenzie, Podsakoff 2003: 203). Moreover, the indicators of German SME' HC-dimensions are measured reflectively since they are expected to *correlate*. This is because a change in, for instance, employees' education level may also imply a change in another indicator of the same construct such as additional training (Jarvis, MacKenzie, Podsakoff 2003: 203; Christophersen, Grape 2009: 110). To finish, it is also worth highlighting that Sönke Albers and Oliver Götz (2006: 673) generally recommended *type II second-order constructs* – and in particular when measurement error is to be considered, too – and that the majority of IC-studies applies reflective measures as well (Bontis 1998; Bontis, Keow, Richardson 2000; Tseng, Goo 2005; Wang, Chang 2005; Do Rosario Cabrita, Bontis 2008; Cater, Cater 2009; F-Jardon, Martos 2009).²⁸⁰ Figure 52 summarizes the above discussion in a visual format.

²⁸⁰ Only two identified sources in the research field of IC apply formative measures – cf. Hong Tan, David Plowman and Phil Hancock (2007) and Georg Tovstiga and Ekaterina Tulugurova (2007).

Figure 52: German SME' Human Capital – Initial Operationalization: Path Diagram



Lastly, the second-order construct HC needs to be measured, too. That is because the higher-order constructs of this dissertation are operationalized via the *direct measurement approach* (cf. chapter 5.1.3). In line with the procedure described in Sönke Albers' and Oliver Götz's article (2006: 674) a reflective measurement is used. Moreover, a single item which looks into the overall perceived relevance of HC and which is inspired by the work of Joseph Hair, JR. et al. (2014: 122) is applied. That is because the chosen indicator (How do you evaluate the quality of your human capital on a scale from 0 (very bad) to 5 (very good)?) is able to fully cover HC' essence – as it is also measured via the formative dimensions – without majorly expanding the questionnaire (ibid.: 122).

5.2.1.2 German SME' Structural Capital

Just like human capital (HC), structural capital (SC) is also constructed as a *second-order construct* which consists, according to its theoretical background (cf. chapter 4.1.2) of *three dimensions* – i.e. organizational capital, development capital and technological capital. As such, it fulfills the first requirement of a good measurement model – namely, having at least two indicators (cf. chapter 5.2.1).

A minimum of two indicators is also enclosed to each of German SME' SC-dimensions. Specifically, each attribute is given at least one indicator in order to measure the construct's content well. In line with the previous chapter 5.2.1.1, the selection of German SME' SC-indicators, which is displayed in table 12, relies on previous studies and modifications in terms of German SME.

Table 12: German SME' Structural Capital – Initial Operationalization: its Dimensions, their Contents and Indicators

SC dimension	Dimensions ¹ theoretical contents - attributes	Indicators – objective measures	Sources – adopted and adjusted to the German SME context
Organizational capital	Organizational culture, values and attitudes	<ul style="list-style-type: none"> • € invested in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.)** 	<ul style="list-style-type: none"> • NEW – inspired by Thorleifsdottir, Claessen 2006: 58.
	Communication structure, knowledge documentation and decision making path	<ul style="list-style-type: none"> • No. of top management meetings per month • No. of cross-departmental (reconciliation) meetings per month • Average no. of department-internal meetings per month • % of decisions which are substantially based on team inputs/made by teams (i.e. mutual decision-making culture) 	<ul style="list-style-type: none"> • Arbeitskreis Wissensbilanz 2006: 36; BMWi 2008: 31; BMWi 2013: 29. • Arbeitskreis Wissensbilanz 2006: 36; BMWi 2008: 31; InCaS 2008: 38; BMWi 2013: 29. • Arbeitskreis Wissensbilanz 2006: 36. • NEW – inspired i.a. by Simon 1996: 169 & 171; Pawlowsky et al. 2006: 5.
	Organizational structure & operational processes	<ul style="list-style-type: none"> • € invested to set up workplace for demographic changes (e.g. ergonomic workstations, integration of older employees, child care support, company sports etc.)** • No. of cross-departmental projects • % of processes which are formalized (e.g. via manuals, form sheds etc.) 	<ul style="list-style-type: none"> • NEW – inspired i.a. by Frai, Thiehoff 2007: 38; Kay, Kranzusch, Suprinovic 2008: 108 et seq. • MERITUM 2001: 19; Danish Ministry of Science, Technology and Innovation 2003: 69; Arbeitskreis Wissensbilanz 2006: 36; BMWi 2008: 31; InCaS 2008: 38; BMWi 2013: 29. • MERITUM 2001: 19; Danish Ministry of Science, Technology and Innovation 2003: 70 et seq.
	Quality	<ul style="list-style-type: none"> • € invested in quality management (incl. accreditations such as ISO certificates)** • Warranty expenses/costs in €** 	<ul style="list-style-type: none"> • Danish Ministry of Science, Technology and Innovation 2003: 70. • AKIW 2003: 1238; AKIW 2005: 95.
Development capital	Product, process and structural development	<ul style="list-style-type: none"> • Product development = R&D intensity = € invested in R&D** • Process (organization) development = € invested in process improvements** • Structural development = € invested in new organizational structures (e.g. process restructuring, organizational adaptations, cost center modifications etc.)** • Innovation output (and rate) = turnover from innovations (which have been developed in the previous three years)** • Duration (in month) between innovation-cycles (e.g. new product programs) 	<ul style="list-style-type: none"> • Daschmann 1993: 167; Bamberger 1994: 406; MERITUM 2001: 19; AKIW 2003: 1237; Danish Ministry of Science, Technology and Innovation 2003: 72; METI 2005: 15; Wang, Chang 2005: 229; RICARDIS 2006: 89; Thorleifsdottir, Claessen 2006: 59; Simon 2007: 195 et seq.; Liu, Tseng, Yen 2009: 268; Cheng et al. 2010: 442. • Ordonez Pablos 2003: 76; SKE 2005: 34. • NEW - inspired by Simon 1996: 98 et seqq. • Daschmann 1993: 167; AKIW 2003: 1237; AKIW 2005: 88 & 90; Arbeitskreis Wissensbilanz 2006: 22 & 36; RICARDIS 2006: 89; Thorleifsdottir, Claessen 2006: 55 & 59; BMWi 2008: 31; Dömotör 2011: 85; Witte 2011: 53 & 70 et seq.; Maaß, Führmann 2012: 63 et seq.; BMWi 2013: 29. • NEW – inspired i.a. Simon 1996: 116; CEN (European Committee for Standardization) 2004: 18.
	IP	<ul style="list-style-type: none"> • No. of patents • % of innovations converted into patents 	<ul style="list-style-type: none"> • AKIW 2003: 1237; Danish Ministry of Science, Technology and Innovation 2003: 41; CEN (European Committee for Standardization) 2004: 18; AKIW 2005: 89; SKE 2005: 34; Arbeitskreis Wissensbilanz 2006: 36; RICARDIS 2006: 89; Simon 2007: 196 et seqq.; Wu, Chou 2007: 53; BMWi 2008: 31; Dömotör 2011: 85; St-Pierre, Audet 2011: 213; Witte 2011: 71; BMWi 2013: 29. • NEW – inspired i.a. by Simon 1996: 116; MERITUM 2001: 19; Danish Ministry of Science, Technology and Innovation 2003: 72; Thorleifsdottir, Claessen 2006: 59 & 64; Maaß, Führmann 2012: 63.
Technological capital	(Information) technological infrastructure	<ul style="list-style-type: none"> • € invested in IT (i.e. hardware, software and support)** • € invested in ICT (e.g. mobile phones, telephone conference equipment etc.)** • € invested to maintain/guarantee state-of-the-art technological level of machinery as well as process engineering** 	<ul style="list-style-type: none"> • Ordonez Pablos 2003: 76; Arbeitskreis Wissensbilanz 2006: 36; Thorleifsdottir, Claessen 2006: 61; BMWi 2008: 31; BMWi 2013: 29. • SKE 2005: 34. • NEW – inspired i.a. by Ordonez Pablos 2003: 76; Martin Castro et al. 2011: 656.

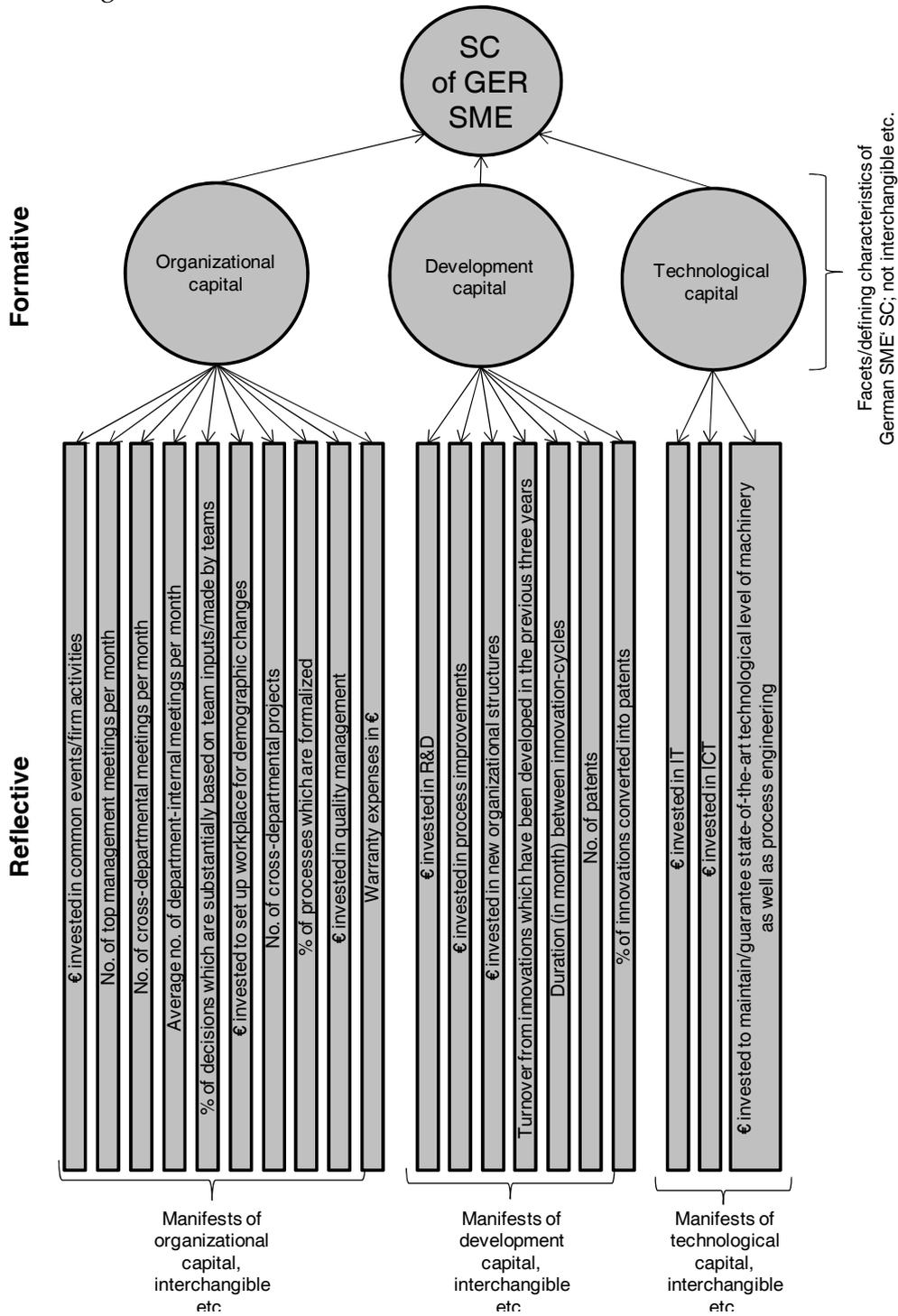
** = in relation to turnover ²⁸¹²⁸¹ Cf. footnote 277.

Contrary to the previous chapter on HC, German SME' indicators of SC are all *objective*. Nevertheless, *size differences* are still accounted for in accordance to HC. In particular, 11 out of 20 indicators – these are marked with two stars (**) – are evened out in terms of turnover.

For the same reasons than in the chapter above on HC (chapter 5.2.1.1), German SME' SC is operationalized as a *type II second-order construct specification* (cf. figure 53): the link *between SC and its three first-order constructs* is *formative* and the *dimensions are reflectively measured* (cf. chapters 5.1.2 and 5.1.3). More specifically this means that German SME' SC is caused by its three dimensions. Furthermore, it implies that all three of these dimensions are relevant and cannot be eliminated since the deletion, for instance, of organizational capital changes the entire nature of German SME' SC. The indicators which operationalize organizational capital, development capital and technological capital, are, however, inter-/exchangeable and correlated. For example, concerning the dimension development capital it can be assumed that new product development and patents are related; or in terms of organizational culture that more cross-departmental communication also increases the chance of interdisciplinary projects.

Corresponding to HC (cf. chapter 5.2.1.1), the higher-order construct SC is also directly measured (cf. chapter 5.1.3) via a single item, namely: 'How do you evaluate the quality of your structural capital on a scale from 0 (very bad) to 5 (very good)?'.

Figure 53: German SME' Structural Capital – Initial Operationalization: Path Diagram



5.2.1.3 German SME' Relationship Capital

In line with human capital (HC) and structural capital (SC) (cf. chapters 5.2.1.1 and 5.2.1.2) as well as the theoretical groundwork of section 4.1.3, German SME' relationship capital (RC) is as well operationalized as a *second-order construct*. Specifically, it is a higher-order construct which consists of six dimensions and hence, meets the prime general 'good measurement' principle of minimum *two indicators* (cf. chapter 5.2.1). Also conforming to the previous two constructs (HC and SC) each of RC's first-order constructs is measured via *multiple indicators* which correspond to the dimensions' attributes and which are mainly based on previous research. For example, the attribute 'joint innovations with customers' is operationalized via the indicator 'percentage of innovations developed with customers'. Table 13 displays the entire overview of indicators assigned to their respective attributes.

Similar to the indicators of HC, 5 out of RC's 29 items are *subjective*²⁸² as opposed to objective measures. These five indicators are applied since no reliable objective indicators could be identified. Besides, RC also incorporates the fact that not every German SME is equally *sized*. Thus, one indicator (i.e. informal networks relationship – number of family members or friends which support the business via active help), which is marked with one star (*) is balanced by putting it into relation to the total number of employees. For the same purpose, the three indicators tagged with two stars (**) are divided by total turnover.

Pursuant to the former two constructs, RC is as well operationalized as a *type II higher-order model* "(...) where the *second-order factor has first-order*

²⁸² 1) customer relationships – satisfaction - estimate: how satisfied are your customers on a scale from 0 (not at all) to 6 (fully), 2) customer relationships – satisfaction - estimate: % customers who would recommend the company to others, 3) supplier relationships – satisfaction - estimate: how satisfied are you with your suppliers on a scale from 0 (not at all) to 6 (fully), 4) supplier relationships – satisfaction - estimate: % suppliers who you would recommend to others, and 5) creditor and shareholder relationships – satisfaction - estimate: how satisfied you are with your key/major bank on a scale from 0 (not at all) to 6 (fully).

factors as formative indicators and the first-order factors themselves have reflective indicators (...)" (Jarvis, MacKenzie, Podsakoff 2003: 204)²⁸³ (cf. figure 54). In other words, RC does not exist without its six defining dimension whose changes lead to a change in RC. At the same time, the dimensions are measured by interchangeable items which are assumed to correlate. A specific example includes that satisfied customers are highly likely to also recommend the company to others.

Table 13: German SME' Relationship Capital – Initial Operationalization: its Dimensions, their Contents and Indicators

RC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Sources - adopted and adjusted to the German SME context
Customer relationships	Dependence	• Turnover generated with top 5 customers**	• Danish Ministry of Science, Technology and Innovation 2003: 72; SKE 2005: 34; Wang, Chang 2005: 230; BMWi 2008: 32; St-Pierre, Audet 2011: 212; Bischof 2012: 17; BMWi 2013: 30.
	Innovation	• % of innovations developed with customers/customer involvement	• Thorleifsdottir, Claessen 2006: 28 & 60.
	Satisfaction	• Estimate: how satisfied are your customers on a scale from 0 (not at all) to 5 (fully)	• NEW – inspired i.a. by AKIW 2003: 1238; Danish Ministry of Science, Technology and Innovation 2003: 72; Ordonez Pablos 2003: 75; Arbeitskreis Wissensbilanz 2006: 36; BMWi 2008: 32.
		• % of customers' complaints (out of all delivered products/services)	
		• Estimate: % of customers who would recommend the company to others	• Danish Ministry of Science, Technology and Innovation 2003: 70; Arbeitskreis Wissensbilanz 2006: 36; BMWi 2008: 32; InCaS 2008: 38; BMWi 2013: 30.
		• Number of personal visits to customers' side (per month)	• Danish Ministry of Science, Technology and Innovation 2003: 72; Ordonez Pablos 2003: 75; Thorleifsdottir, Claessen 2006: 60; Bischof 2012: 17.
	Loyalty	• Average duration of relationship with top 5 customers	• Simon 1996: 90; Simon 2006: 54; Simon 2007: 172.
Supplier relationships	Dependence	• % of value of goods/raw materials/services procured from top 5 suppliers (in relation to total value of goods/raw materials)	• Danish Ministry of Science, Technology and Innovation 2003: 72; Ordonez Pablos 2003: 75; Thorleifsdottir, Claessen 2006: 28; Bischof 2012: 17.
	Innovation	• % of innovations developed with suppliers	• St-Pierre, Audet 2011: 212; Bischof 2012: 17.
	Satisfaction	• Estimate: how satisfied are you with your suppliers on a scale from 0 (not at all) to 5 (fully)	• NEW – inspired by Arnold 2006: 128; Mertins, Kohl, Krebs 2008: 51; Maaß, Führmann 2012: 15.
		• % of received goods/raw materials/services which led to complaints (out of all received goods/raw materials/services)	
		• Estimate: % of suppliers who you would recommend to others	• All three indicators are NEW – inspired by BMWi 2008: 32; Bischof 2012: 17; BMWi 2013: 30.
	Loyalty	• Average duration of relationship with top 5 suppliers	• AKIW 2003: 1237; Bischof 2012: 17.

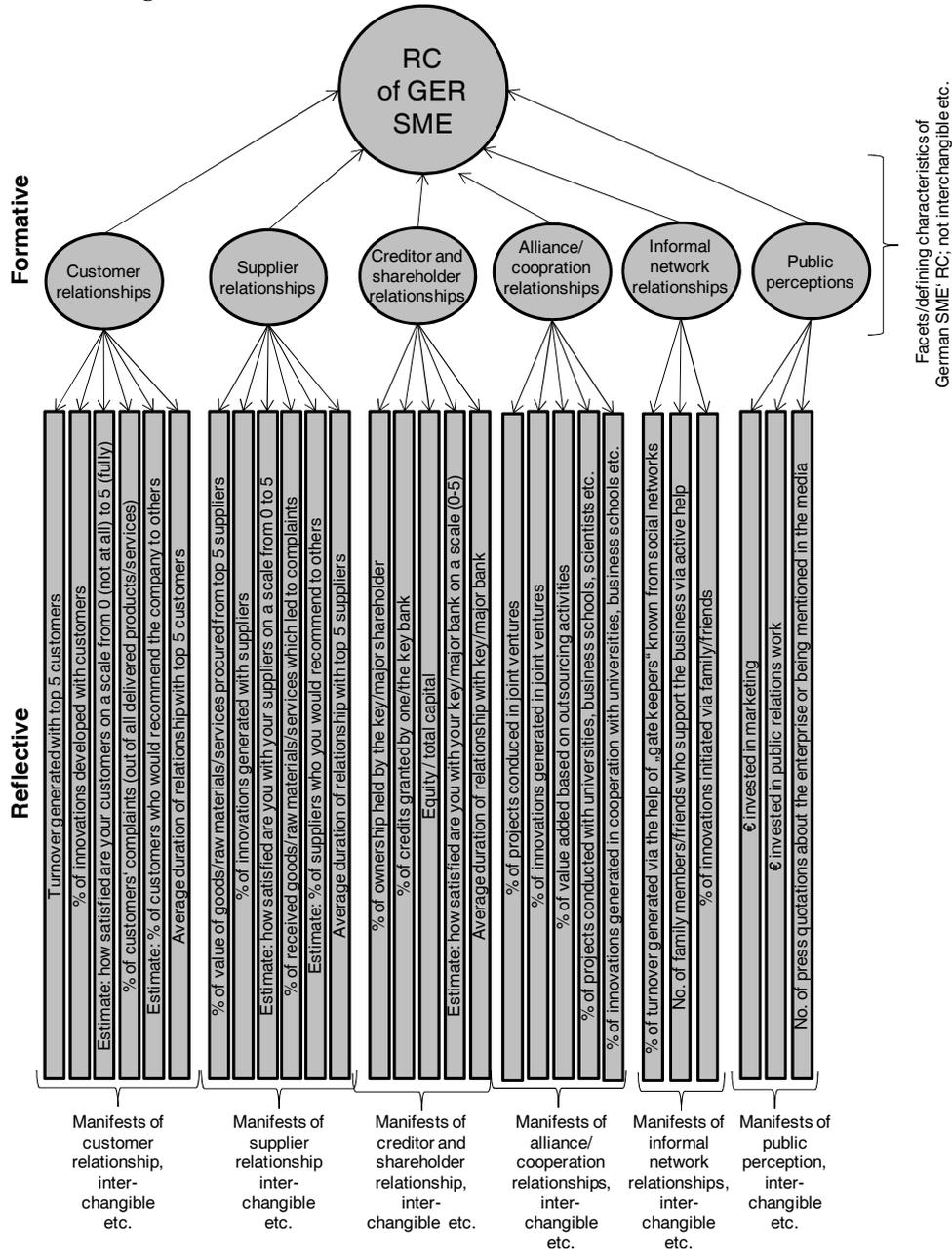
²⁸³ Cf. footnote 19.

RC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Sources - adopted and adjusted to the German SME context
Creditor and shareholder relationships	Management effectiveness	• % of ownership held by the key/major shareholder	• NEW – inspired i.a. Börner 2006: 298 et seqq.; Simon 2007: 259 et seq.
	Risk/dependence	• % of credits granted by one/the key bank	• NEW – inspired i.a. by Börner 2006: 301 et seqq. & 307; Reinemann 2011: 131.
	Equity ratio	• Equity / total capital	• NEW – inspired i.a. by Reinemann 2011: 130 et seq.; Investitionsbank Berlin, Creditreform Berlin Wolfram KG 2012: 22.
	Satisfaction	• Estimate: how satisfied are you with your key/major bank on a scale from 0 (not at all) to 5 (fully)	• NEW - inspired by Alwert 2005: 150.
	Loyalty	• Average duration of relationship with key/major bank	• NEW – inspired i.a. by Börner 2006: 302 & 307; Reinemann 2011: 131.
Alliance // cooperation relationships	Inter-company alliances: projects and innovations	• % of projects conducted in joint ventures – e.g. with other firms • % of innovations generated in joint ventures – e.g. with other firms	• Both NEW – inspired i.a. by Rautenstrauch, Generotzky, Bigalke 2003: 69 et seq. cited by Knop 2009: 38; Knop 2009: 40 et seq. & 193; Alwert 2005: 73; Pfohl 2006: 270 et seq.; Kropfberger 2009: V.
	Outsourcing activities	• % of value added based on outsourcing activities	• NEW - inspired by Simon 2006: 57; Simon, Huber 2006: 68; Adenäuer 2007: 27, 37 & 41 et seq.; Simon 2007: 256 & 273.
	Cooperations with research and/or educational institutions: projects and innovations	• % of projects conducted with universities, business schools, scientists and other educational institutions • % of innovations generated with universities, business schools, scientists and other educational institutions	• NEW – inspired i.a. by Danish Ministry of Science, Technology and Innovation 2003: 41, 69 & 72; SKE 2005: 34; RICARDIS 2006: 89. • NEW – inspired by Hermans, Kauranen 2005: 176.
Informal network relationships	Family and friends and other social/ personal contacts: psychological support and active aid	• % of turnover generated via the help of „gate keepers“ known from social networks • No. of family members/friends who support the business via active help* • % of innovations initiated via family/friends	• All three NEW – inspired by Baldegger, Julien 2011: 127, 139 & 170; Hormiga, Batista-Canino, Sanchez-Medina 2011b: 79 et seq.
Public perceptions	Public relationships, reputation and brands: marketing and public relations	• € invested in marketing** • € invested in public relations work (e.g. local sponsoring)** • No. of press quotations about the enterprise or being mentioned in the media	• MERITUM 2001: 19; SKE 2005: 34; Wang, Chang 2005: 230; RICARDIS 2006: 89; Thorleifsdottir, Claessen 2006: 60; BMWi 2008: 33; BMWi 2013: 30. • NEW – inspired by SKE 2005: 34; BMWi 2008: 33; BMWi 2013: 30. • RICARDIS 2006: 89; Thorleifsdottir, Claessen 2006: 60; BMWi 2008: 33; BMWi 2013: 30.

* = in relation to total employees
** = in relation to turnover ²⁸⁴

²⁸⁴ Footnote 277.

Figure 54: German SME' Relationship Capital – Initial Operationalization: Path Diagram



Last of all, it is important to state that the second-order construct RC is, just like HC and SC (cf. chapters 5.2.1.1 and 5.2.1.2), also operationalized via a single item indicator which allows evaluating the impact of the formatively measured RC-dimensions on RC (cf. chapter 5.1.3). This reflective item is verbally phrased in the following manner: 'How do you evaluate the quality of your relationship capital on a scale from 0 (very bad) to 5 (very good)?'.

5.2.2 Initial Operationalization of Lasting Competitive Business Performance and its Measurement

This chapter applies the same procedure to develop a measurement model for the construct 'lasting competitive business performance' as it is described in the introductory remark of chapter 5.2.1. Specifically, the operationalization of business performance is based on the success definition of chapter 2.2.1 and further specified in statistical terms building on the in section 5.2.1 explained principles such as state-of-the-art literature review to select indicators, at least two items per construct, objectives measures etc.

Chapter 2.2.1 elaborates that the term *lasting competitive business performance* stands for a combination of competitive advantages and above-average financial performance figures. Specifically, it is constituted that competitive advantages are estimated via economic performance which can be measured via financial indicators (Barney 2007: 20). Building on this, the construct 'lasting competitive business performance' is constructed as a one-dimensional construct which is directly related to its items. These items are selected on the basis of a literature review in the IC-research field – in particular past studies that test IC in relation to performance – which shows that a few indicators are frequently used. The most common financial figures (ratios) are implemented as proxy measures for lasting

competitive business performance in this doctoral study (cf. table 14).²⁸⁵ In depth, *profit* is chosen as an indicator of this study because it demonstrates that it is economically worth to run a company (Cohen, Kaimenakis 2007: 255). *Turnover growth*, on the other hand, represents a firm's ability to grow and thus, to increase its profit making opportunities (Chen, Cheng, Hwang 2005: 164; Maditinos et al. 2011: 140). Additionally, *return on sales* (ROS) is applied since it is an important indicator of how much profit is actually been made per Euro of sales and thus, available to the firm (Krause, Arora 2010: 37). As such, it somewhat brings the former two figures together. Furthermore, this dissertation measures lasting competitive business performance via *return on assets* (ROA) because it shows if the invested capital is worked well in order to generate earnings (Chen, Cheng, Hwang 2005: 164; Krause, Arora 2010: 41; Maditinos et al. 2011: 140). Lastly, *return on equity* (ROE) is used to determine lasting competitive business performance since it reveals whether the entrepreneurs' invested money is used well to generate profit (Tan, Plowman, Hancock 2007: 81; Krause, Arora 2010: 39; Maditinos et al. 2011: 140). On top of these five financially based items, an indicator asking for a company's overall financial performance compared to competitors – based on a scale from zero (= financial performance below competitors' performance) to five (= financial performance above-average or higher than competitors) – is included.²⁸⁶ The research at hand is expected to rely on the latter indicator in case the sample group of this doctoral thesis is unwilling to disclose (sensitive) financial performance figures.

Before wrapping up this section, it is interesting to mention that this dissertation

²⁸⁵ Another indicator which can be regularly found in various studies is "market value" (Chen, Cheng, Hwang 2005: 164; Wang, Chang 2005: 229; F-Jardon, Martos 2009: 610; Cheng et al. 2010: 442; Zeghal, Maaloul 2010: 47; Chu, Chan, Wu 2011: 256 et seqq.; Maditinos et al. 2011: 140). However, market value is not incorporated in this doctoral thesis because most German SME are not publicly listed and thus, it is difficult to determine their market value.

²⁸⁶ Indicators looking into the overall business performance of a firm and, in particular, its comparative competitiveness to competitors are also applied in former studies – cf. Nick Bontis (1998: 75), Nick Bontis, William Keow and Stanley Richardson (2000: 91), Georg Tovstiga and Ekaterina Tulugurova (2007: 700), and Carlos F-Jardon and Maria Martos (2009: 610).

does not plan to directly request German SME to provide the above illustrated ratios. Instead it is intended to ask, for example, for total profit and sales figures in order to calculate the ratios within the scope of this dissertation. The reason for this procedure is that such an operation ensures that the same formulas are applied among the entire sample.

Table 14: German SME' Lasting Competitive Business Performance – Initial Operationalization: its Indicators

Performance	Indicators– objective measures	Sources - adopted and adjusted to the German SME context
Profit (3 SME out of total 6)	Profit after tax	Bontis 1998: 75; Bontis, Keow, Richardson 2000: 91; Bosma et al. 2004: 227 & 231; Cohen, Kaimenakis 2007: 246 & 255; Makki, Lodhi 2008: 86; F-Jardon, Martos 2009: 610.
Turnover growth (2 SME out of total 8)	(Current year's turnovers / last year's turnovers) - 1 x 100%	Bontis 1998: 75; Bontis, Keow, Richardson 2000: 91; Chen, Cheng, Hwang 2005: 164; Tovstiga, Tulugurova 2007: 700; Diez et al. 2010: 358 et seq.; Clarke, Seng, Whiting 2011: 514; Maditinos et al. 2011: 140; St-Pierre, Audet 2011: 212.
Return on sales (0 SME out of 4)	Pre-tax profit / turnover	Bontis 1998: 75; Bontis, Keow, Richardson 2000: 91; Wang, Chang 2005: 229; Zeghal, Maaloul 2010: 47.
Returns on assets (1 SME out of total 10)	Pre-tax profit / average total assets	Bontis 1998: 75; Bontis, Keow, Richardson 2000: 91; Firer, Williams 2003: 351 et seq.; Chen, Cheng, Hwang 2005: 164; Wang, Chang 2005: 229; Zeghal, Maaloul 2010: 47; Chu, Chan, Wu 2011: 256 et seqq., Clarke, Seng, Whiting 2011: 514; Maditinos et al. 2011: 140; St-Pierre, Audet 2011: 212.
Returns on equity (0 SME out of total 6)	Pre-tax profit / average total equity	Chen, Cheng, Hwang 2005: 164; Wang, Chang 2005: 229; Tan, Plowman, Hancock 2007: 81; Chu, Chan, Wu 2011: 256 et seqq.; Clarke, Seng, Whiting 2011: 514; Maditinos et al. 2011: 140.
Overall competitive business performance (2 SME out of total 4)	Company's overall financial performance compared to competitors	NEW – inspired i.a. by Bontis 1998: 75; Bontis, Keow, Richardson 2000: 91; Tovstiga, Tulugurova 2007: 700; F-Jardon, Martos 2009: 610.

The brackets specify the amount of identified studies which apply the indicators in a SME context

Last of all, it is also important to constitute the *specification of the construct* 'lasting competitive business performance'. On the basis of the decision rules represented in chapter 5.1.2 (cf. table 8) business performance is operationalized in a *reflective* manner. This is, firstly, because the five items are manifestations of performance and interchangeable since they share the common theme of being successful. As such, individual items can be dropped without changing the meaning of lasting competitive business performance. Besides, the indicators are expected to correlate (Jarvis, MacKenzie, Podsakoff 2003: 203). Specifically, the fact that a change in one indicator leads to the modification of another item, too can be seen in the following example: A company cannot calculate ROS, ROA or ROE without profit figures whereas it cannot make profit unless it generates

turnover.

The overall operationalization of lasting competitive business performance is graphically summarized in figure 55.

Figure 55: German SME' Lasting Competitive Business Performance – Initial Operationalization: Path Diagram



5.2.3 First Pretest: Expert Interviews

To ensure the quality as well as the successful operation of a SEM – and its measurement model in particular –, *expert interviews* are commonly used as a *pretest technique* (Churchill, JR. 1979: 67; Diamantopoulos, Winklhofer 2001: 272 et seq.; Rossiter 2002: 305 et seq.; Eberl 2004: 9 et seq.; Eberl 2006: 651; Giere, Wirtz, Schilke 2006: 683; Huber et al. 2007: 21; Pick 2008: 162; Christophersen, Grape 2009: 111; Albers 2010: 417; Götz, Liehr-Gobbers, Krafft 2010: 697; Hair, JR. et al. 2010: 716; Naskrent 2010: 232). This is, among others, because expert interviews fit well to raise preliminary insights, which are valuable for designing a comprehensive quantitative research (model) (Binnendijk 1996: 1 et seq.; Horn 2009: 134 et seq.). Furthermore, they suit well to validate the statistical models as well as related indicators and thus, the survey questions (Anderson, Gerbing 1991: 732; Huber et al. 2007: 23; Horn 2009: 123; Kuß, Eisend 2010: 112) – e.g. how well the items measure what they set out to measure (Horn 2009: 123).

In detail, expert interviews belong to the *qualitative methods* of data gathering (Aghamanoukjan, Buber, Meyer 2009: 416; Gläser, Laudel 2010: 37) which are primarily advised for collecting meanings, perceptions, understandings, norms, beliefs and values of interviewees (Bryman, Bell 2007: 208; Horn 2009: 123). Since

qualitative research is rather exploratory by nature (Gubrium, Holstein 2001: 57), the expert interview approach is especially appropriate if a research topic is either not well defined or if it is insufficiently substantiated via available literature (Horn 2009: 124). Hence, expert interviews fit well to investigate this dissertation's topic as well as its SEM about which relatively little is known in the German SME context. Besides, expert interviews have the advantage of producing high quality data (Kuß, Eisend 2010: 117) like meaningful texts as opposed to simple facts (Gubrium, Holstein 2001: 57; Aghamanoukjan, Buber, Meyer 2009: 416) and of providing flexibility to explore new ideas (Binnendijk 1996: 2) – i.e. things or measures that the researcher has not thought of.

Nevertheless, qualitative research needs to be well planned and documented to increase its *traceability* and thus, to achieve its *acceptance* in the scientific community (Aghamanoukjan, Buber, Meyer 2009: 432). For this reason, options for the conceptualization, the content and the analysis of expert interviews as well as the chosen procedure of this doctoral thesis are described in the following.

5.2.3.1 Experts

In the light of this dissertation, expert interviews are useful to gather and reconstruct expertise concerning German SME' IC-based strategic sources of success and their measurement (Köhler 1992: 319; Pfadenhauer 2009: 450 et seqq.; Gläser, Laudel 2010: 12). Accordingly, *academic peers* (Horn 2009: 123), who are *specialized in German SME* and thus, represent a source of first-hand knowledge as well as insights on SME in the German context, are appointed as experts (Churchill, JR. 1979: 67; Kuß, Eisend 2010: 112; Mayer 2013: 38 & 41). However, in most cases there is only a limited amount of experts available on a specific topic (Rossiter 2002: 329). Hence, it is not surprising that 'only' five peers specialized in German SME are interviewed in the scope of this doctoral thesis (cf. table 15 which lists their names and positions).

Table 15: Interviewed German SME Experts: Names and Positions

Expert's Name	Expert's Position/Expertise Background	Date and Duration
1. Dr. Helfried Schmidt	Executive board of the Oskar-Patzelt Stiftung, a NPO which aims to nominate successful German SME for their outstanding performance.	08/13/2013 1h 45min
2. Prof. Dr. Dr. h.c. mult. Hermann Simon	Author of the hidden champions books which focus on German SME' success strategies; Chairman and founder of the consulting firm Simon-Kucher & Partners.	09/16/2013 1h 15min
3. Thomas L. Kemmerich	President of Bundesverband Liberaler Mittelstand, an association of liberally orientated SME; CEO of Friseur Masson AG.	09/19/2013 1h 30min
4. Stephanie Bschorr	President of Verband Deutscher Unternehmerinnen (VDU), an association of female entrepreneurs (predominantly SME); CEO of HTG Wirtschaftsprüfung GmbH and HTG Rechtsanwalts-gesellschaft mbH.	09/21/2013 1h 45min
5. Dr. Daniel Kathan	Author of a dissertation and various other publications on German SME; Senior Project Manager at Horváth & Partners Management Consultants.	10/01/2013 1h 45min

To compensate for this limited amount of experts of German SME, three additional expert interviews are conducted with *experts in the field of multivariate statistics* and *SEM*, respectively, to ensure that the statistical operationalization of this thesis is appropriate. Table 16 displays the names and positions of these statistical experts.

Table 16: Interviewed Statistic Experts: Names and Positions

Expert's Name	Expert's Position/Expertise Background	Date and Duration
1. Prof. Dr. Julia Naskrent	Lecturer of various university courses focusing on statistic and empirical research at the FOM university of applied science, Siegen, Germany. Expert on SEM - PLS.	09/12/2013 1h 45min
2. Prof. Dr. Bianca Krol	Academic leader / head of the department of statistic and empirical research, FOM university of applied science, Essen, Germany.	09/18/2013 2h 25min
3. Prof. Dr. Oliver Gansser	Deputy head of the department of statistic and empirical research, FOM university of applied science, Germany. Expert on SEM - CBSEM.	09/18/2013 1h 05min

5.2.3.2 *Design and Content: Interview Guide*

Concerning the design and methodical procedures of expert interviews (Kvale 1996: 88 et seq.) it is worth stating that they can – in general – be *structured* or *unstructured*. The former are generally preferred in business study research because they assure that identical questions are asked and that replies are recorded in the same order. Hence, answers can be well aggregated and reliably evaluated (Bryman, Bell 2007: 8 et seqq.). Conversely, unstructured interviews are recommended when the research topic is wide-ranging and less well defined. This is because the unstandardized interviews allow the interviewees to discuss any area they want to (Horn 2009: 127; Mey, Mruck 2011: 259). The most common option among the unstructured interviews (Gläser, Laudel 2010: 43), which is sometime also specified as semi-structured (Bryman, Bell 2007: 213), is the *guided interview*. It fits well if concrete propositions on a research topic are to be gathered (Mayer 2013: 37) and is especially recommended for expert interviews (Mey, Mruck 2011: 267; Mayer 2013: 38).

Interview guides are advised because they contain all questions, which shall be answered during an interview. As such, they make sure that all respondents comment all relevant aspects. Furthermore, interview guides provide a structure for evaluation and hence, allow comparing the results of various interviews more easily. However, neither the formulation of the questions nor their sequence need to be strictly followed. Moreover, freedom is given to the researcher to decide, when to adapt to the interviewees' information – e.g. ask for more details or to comment on responses (Kassl 2000: 40 et seq.; McNamara 2006: Types of Interviews; Bryman, Bell 2007: 213; Gläser, Laudel 2010: 42 et seq.; Mayer 2013: 37).

Interview guides can be designed with *open* and *closed questions*. Yet, open-ended questions, where interviewees unrestrictedly decide how to answer – i.e. free flow of ideas and information –, are generally preferred (Binnendijk 1996: 1; McNamara 1997: 1; Bryman 2012: 252; Mayer 2013: 37) because they are more likely to establish rapport (Bryman 2012: 252).

Building on the above presented literature recommendations, *this doctoral thesis'* expert interviews with German SME experts as well as statistic experts

each apply an *interview guide* with *predominantly open-ended questions*. But because it is advised that interviews and interview guides are as cautiously planned as written (self-completion) questionnaires (Köhler 1992: 329; Kassl 2000: 39), the following part of this chapter details the construction of the interview guides underlying this dissertation:

5.2.3.2.1 Design of Interview Guide for Interviews with German SME Experts

The *front page* as well as the *introduction* are generally important to initiate the interview, to establish rapport and to motivate the interviewee to participate. Following the literature recommendations, this dissertation's interview guide for German SME experts first informs the interviewee about the institution as well as the researcher, the research matter under investigation, the purpose of the interview and the structure of the pretest (Köhler 1992: 323 et seq.; Binnendijk 1996: 2; Kvale 1996: 81 & 88; Porst 2011: 34). This is kept as brief as possible in order not to frame the interviewees' responses, but specific enough to establish the nature of the dissertation's research (Horn 2009: 127).

A *first ice breaker question* is established to introduce the topic of IC without anticipating central issues of the interview. Specifically, it is asked if the respondent is familiar with the term IC. In this context, the IC-definition underlying this dissertation is represented to ensure that the interview is based on equal terminological grounding. A *second warm up question* is intended to discover if the interviewee has previously dealt with the topic of IC. Both of these questions are relatively easy to answer and thus, intended to foster the respondents to start the conversation (Kassl 2000: 44; Mey, Mruck 2011: 270).

The next passages of the questionnaire display the *key questions* of the interview, which are based on an intensive literature review and grouped in terms of contents (Köhler 1992: 322). The first half of the interview predominantly follows the above established recommendations: a guided, open question conversation. The main part's questions concentrate on the *operationalization of the constructs* (Rossiter 2002: 309 et seq.; Giere, Wirtz, Schilke 2006: 683; Huber et al. 2007: 21; Albers 2010: 417; Götz, Liehr-Gobbers, Krafft 2010: 697 et seq.) and their content

validity. In depth, the IC-categories' operationalization via dimensions and specifically the transformation of the general IC-model (cf. chapter 2.4) into the context of German SME (cf. chapter 4.1) is addressed. Furthermore, focus is placed on critical issues, which cannot be surely answered by literature review only – e.g. whether quality should be part of organizational capital or an individual dimension. This is an important step to assure that all relevant facets of German SME' IC are considered in the model (Christophersen, Grape 2009: 109). Secondly, the *statistical specification of the model* (reflective vs. formative) is validated (Rossiter 2002: 306 & 313 et seqq.; Eberl 2004: 10; Eberl 2006: 651 & 653 et seqq.; Götz, Liehr-Gobbers, Krafft 2010: 697). This is especially important since many models have been misspecified (Cohen et al. 1990: 185 et seqq.; Eggert, Fassott 2003; Jarvis, MacKenzie, Podsakoff 2003: 206 et seqq.; Eberl 2004: 23 et seqq.; Fassott 2006: 67 et seqq.).²⁸⁷ For this matter each interviewee is provided with decision rules as well as theoretical indications to determine whether a (first-order and/or second-order) construct should be formatively or reflectively measured (Jarvis, MacKenzie, Podsakoff 2003: 203; Eberl 2004: 18; Christophersen, Grape 2009: 110).²⁸⁸ The next question of the interview guide's main part focuses not so much on the measurement model of this dissertation's constructs but rather on the *relationship between the constructs* (the structural model) (Rossiter 2002: 306 & 318 et seqq.; Huber et al. 2007: 21). Specifically, the literature of German SME does not precisely clarify whether RC impacts SC or if SC influences RC (*research model II*, chapter 4.2.3). Thus, expertise – including reasons and arguments – is gathered for clarification. The second half of the interview's main body covers a so called *paper-and-pencil item-sort task* (Anderson, Gerbing 1991:

²⁸⁷ About 30% (Jarvis, MacKenzie, Podsakoff 2003: 207); approx. 80% (Eggert, Fassott 2003: 10 cited by Eberl 2004: 23); ca. 11% (Eberl 2004: 23) – “as many as 28% of the latent constructs with multiple indicators published in the top marketing journals were incorrectly specified as reflective when they should have been formative. This misspecification involved not only the relationships between first-order constructs and their indicators but also the relationships between second-order constructs and their first-order indicators” (Jarvis, MacKenzie, Podsakoff 2003: 216).

²⁸⁸ This section of the interview guide was revised after the experience of the first interview. Such a procedure is feasible according to qualitative research/expert interview literature (Gläser, Laudel 2010: 107).

733) and is, as such, designed in the form of a structured questionnaire.²⁸⁹ The purpose of this questionnaire is to *validate the literature-based indicators* (Churchill, JR. 1979: 67; Diamantopoulos, Winklhofer 2001: 272 et seq. & 274; Rossiter 2002: 306 & 318 et seqq.; Eberl 2004: 10; Eberl 2006: 653; Giere, Wirtz, Schilke 2006: 683; Huber et al. 2007: 21; Pick 2008: 162; Christophersen, Grape 2009: 111; Schlegl 2010: 64) and to ensure that each indicator taps into the right latent construct (Anderson, Gerbing 1991: 732). Precisely, the experts are provided with definitions of the 13 IC-dimensions as well as the performance construct and asked to assign the randomly ordered indicators (cf. chapters 5.2.1 and 5.2.2) to one of the 14 options (ibid.: 733). Based on the results it can be evaluated if the previously intended measures of a particular construct and the actually occurring indicator assignments of the experts match (Anderson, Gerbing 1991: 732 et seqq.; Diamantopoulos, Winklhofer 2001: 272 et seq.; Götz, Liehr-Gobbers, Krafft 2010: 697 et seq.).

The *closing remark* of the interview (guide) does not only thank the interviewees for their participation but also asks whether something else needs to be mentioned or added (Mey, Mruck 2011: 274), if the respondent can be contacted for the clarification of issues (Kassl 2000: 46) and if the expert is willing to 'confirm' the interview transcript to increase the quality standards of the interview (Köhler 1992: 324).

Lastly, it is worth mentioning that the design-stage also considers the recommendations of Carol Warren (2001: 86) concerning the amount of questions, Gabriele Köhler's (1992: 22) suggestions regarding the time-frame of the interview, and Alfred Kuß und Martin Eisend's (2010: 117) advice in terms of including illustrations as well as text passages to clarify complex questions or issues.

The full interview guide for interviews with German SME experts is presented in appendix 1.²⁹⁰

²⁸⁹ This is a common procedure – cf. the example-studies of Serge A. Rijdsdijk (2007: 348), Joseph Hair, JR. et al. (2010: 716), and Julia Naskrent (2010: 232 & 283 et seqq.).

²⁹⁰ The interview guide in the appendix is in English. Yet, it was performed in German. The German version is not included in the appendix but can be requested from the author of this thesis.

5.2.3.2.2 Design of Interview Guide for Interviews with Experts of Statistics

The other round of expert interviews is performed with experts of multivariate statistics and SEM. In accordance to the above explained interview guide, the statistically orientated interview guide also contains a *front page* with relevant information concerning the research project as well as the involved institutions, and a short, but precise *introduction* to the research. Furthermore, the same two *ice breaker questions* that are raised in the previous interview guide are included, too. The core part, however, differs from the former. In particular, the conceptual perspective of this dissertation's SEM is judged. Firstly, the methodological establishment of the structural models is presented and checked for comprehension (cf. e.g. chapters 4.1.4 and 4.2.4). The same is subsequently done for the development of the measurement models. Specifically, the experts of statistics are asked to evaluate the course of action taken to derive at the dimensions of each construct as well as the respective sets of indicators (cf. chapters 4.1.1.1 to 4.1.1.4, 4.1.2.1 to 4.1.2.3, 4.1.3.1 to 4.1.3.6, 5.2.1 and 5.2.2). Furthermore, the quality criteria to appraise the indicators are reconciled with the experts' knowledge and know-how. Moreover, the constructs' specification – i.a. this dissertation's choice to apply the type II second-order model – is checked by explaining the decision' development process (cf. chapters 5.1.2, 5.1.3, 5.2.1 and 5.2.2). This includes the assurance that the right operationalization tool for calculating the dimensions is identified. On top of this, the selected SEM-approach is verified by highlighting the reasons for and against PLS and CBSEM, respectively (cf. chapter 5.1.4). Lastly, the methodological procedure to test hypothesis 6 is exhibited and feedback from the experts is asked for. Additionally, it is worth mentioning that open questions are addressed and clarified throughout the entire interview (guide). The *remarks* again correspond to the former interview guide and so does the consideration of general interview principles such as time frame, layout etc.

The full second interview guide is displayed in appendix 2²⁹¹.

²⁹¹ The interview guide in the appendix is in English. Yet, it was performed in German. The German version is not included in the appendix but can be requested from the author of this doctoral thesis.

5.2.3.3 *Interview – Execution*

Following the recommendations of Jochen Gläser and Grit Laudel (2010: 43) individual interviews are performed during August 2013 and October 2013 to concentrate on *one respondent* at a time only. Before the interviews start, the *interview guide* is handed out to the interviewee to provide him/her with a content- and time-orientated structure of the interview (Köhler 1992: 323 et seq.). During the interview the constituting elements demanded by Gabriela Kepper (Kepper 1994: 22) – e.g. *openness and communicativeness* – are followed (ibid.: 22 cited by Naderer 2011: 407). At the end of the interview, the interview guide is skipped through to *ensure that all topics and questions are covered* (Kassl 2000: 46).

5.2.3.4 *Transcript*

Transcribing concerns the preparation of the interview material for analyses (Kvale 1996: 81 & 88). In detail, expert interviews can be documented via *written transcripts* or more precise *audio records* (Aghamanoukjan, Buber, Meyer 2009: 432; Naderer 2011: 412) to ensure accuracy and high (content) quality (Binnendijk 1996: 3; Mayring, Brunner 2009: 673; Naderer 2011: 411). In the case of this dissertation's research, sometimes *both* options are applied successively: the notes taken during the interview are expanded or synchronized with the recorded version. Sometimes, only hand-written interview protocols are taken and revised directly after each interview. Either way, each final summary of the interviews – structured in a standardized way following the line of the interview guide – is, unless explicitly not wanted *by the interviewee*, sent to him/her to perceive his/her *approval* concerning completeness and correctness (Köhler 1992: 324).

5.2.3.5 *Analysis and Results*

5.2.3.5.1 Analysis and Results of Interviews with German SME Experts: Qualitative Part

The analyzing stage of the above mentioned final and agreed summaries includes deciding which theoretically suitable methods of analyses to apply (Kvale 1996: 81 & 88; Naderer 2011: 407). Jochen Gläser and Grit Laudel (2010: 43 et seqq.) suggest the following four mechanisms for the analysis of interviews: a) free interpretation, b) the sequence analytic method, c) coding, and d) *qualitative content analyses*. The latter mentioned tool differs from the former three in two main ways. Firstly, it is not orientated on the original text but on its extracts or summaries. Secondly, the classification scheme to categorize the various contexts is produced *ex ante*: it is determined before the texts are analyzed (ibid.: 46 et seq.). Besides, the qualitative content analysis is especially suitable and recommended for expert interviews with interview guides (Mayring, Brunner 2009: 673 et seq.; Gläser, Laudel 2010: 46 et seq.)²⁹². Nevertheless, Michael Meuser und Ulrike Nagel (1991) specify the former by providing *specific guidelines* on how to evaluate expert interviews: 1) paraphrasing, 2) headlining, 3) thematic comparison, 4) sociological conceptualization, 5) theoretical generalization (Kassl 2000: 56 et seqq.; Mayer 2013: 51 et seqq.). This procedure is, as far as possible, adopted for the *open questions* of this dissertation's expert interview with experts of German SME.

An overview of the interviews' similarities, differences and the drawn conclusions for this dissertation is presented in table 17.

²⁹² For details concerning the qualitative content analysis please refer to Philipp Mayring and Eva Brunner (2009).

Table 17: Results of Interviews with German SME Experts: Qualitative Part

Heading/ category	Similarities	Differences	Conclusion - modifications to model/items
Operationalization of HC in the context of German SME	All agree that the model is comprehensive. The importance of "leader(ship) and management abilities" is highlighted three out of five times.	Suggested for integration: - ability to communicate, - ability to learn, - competencies beyond education and experience, - willingness to take risk (entrepreneur).	Model accepted. Communication ability – included in "employees' competencies" and "leader(ship) and management ability".
Operationalization of SC in the context of German SME	All agree that the model is comprehensive.	The importance of software (solutions) is highlighted once. Suggested for integration: written documentation, resistance of culture during crisis and impact of family on culture, fourth dimension: "communication", - legal structure of firm.	Model accepted. Written documentation and software as well as culture-issues during crisis included in "organizational capital".
Quality as a separate dimension of SC	3 x not separate	2 x separate	Quality as an attribute of the dimension "organizational capital".
Operationalization of RC in the context of German SME	All agree that the model is comprehensive. The importance of alliances is highlighted three out of five times - especially to hire new staff.	Suggested for integration: - informally orientated indicators in the first four dimensions, - informal networking beyond family and friends, - Brands – under public perception	Model accepted. Indicators measuring informal relationships – included in the first four dimensions. Employee-acquisition-indicator – included in alliances. Factors beyond family and friends – included in informal networks.
Specification between 2nd order constructs and dimensions	Formative – Agreed	-	Formative
Specification between dimensions and indicators	Reflective - Agreed	-	Reflective
Relationship between SC and RC	3 x RC --> SC	2 x SC --> RC	RC --> SC is expected to be more important

In particular, the key results of the open questions of this dissertation's interviews with experts of German SME include that they agree that the conceptualization of German SME' HC, SC and RC is comprehensive and thus, generally appropriate. Nevertheless, various improvement suggestions are provided.

Concerning the construct *HC* it is especially important to point out, at first, that the majority of experts emphasizes the significance of the new dimension 'leader(ship) and management abilities'. As such, they support the theoretical argumentation of chapter 4.1.1. Moreover, the expert interviews lead to an expansion of German SME' HC to the extent that an indicator which measures

employees' as well as entrepreneurs' *communication ability* is integrated in the dimensions 'employees' competencies' and 'leader(ship) and management ability', respectively.²⁹³ The other three suggestions made by the experts – i.e. the *ability to learn, competencies beyond formal education and experience*, as well as *risk taking* – are, however, not included in German SME' HC. This is either because they are already considered – e.g. ability to learn as a facet of intellectual agility – or because no suitable objective indicators are identified.

The range of items measuring German SME' SC is also enlarged as a result of the qualitative interviews. In detail, two new indicators are incorporated to cover the aspects *written documentation* and *software*.²⁹⁴ On top of this, one more item which supplements written documentation – specifically with focus on *communication* – is included.²⁹⁵ Furthermore, one new indicator is added to embrace *cultural issues during crisis*.²⁹⁶ The recommendation to consider the *family's impact on culture* is, however, not considered as part of German SME' SC since it conceptually better suits German SME' RC. In a similar way, the proposal regarding *communication as a separate dimension* of German SME' SC is not followed since only one expert pointed to this issue while the other four accepted communication as part of organizational capital. Lastly, it is worth highlighting that the *legal structure* of German SME is conceptually not considered as an element of their SC and instead included in the general section of this dissertation's questionnaire (cf. chapter 6.3). Moreover, the experts are asked to state their opinion on *quality*. Specifically, a decision is desired whether quality should be a facet of the SC-dimension 'organizational capital' (like it is argued in chapter 4.1.2.1) or a separate dimension of German SME' SC. The majority of the five interviewees pledges for the former option since quality is closely linked to operational issues as well as interdisciplinary and shall generally not be overvalued. Besides, the interviewees

²⁹³ Number of employees who share their knowledge for value creation for 'employees' competencies'; Hours spend per month for direct communication with employees for 'leader(ship) and management ability'.

²⁹⁴ Existence of formal knowledge storage and communication tools (yes/no), and Percentage of knowledge documentation in retrievable format when employees leave the firm - both in 'organizational capital'.

²⁹⁵ Number of jour fix meetings per month in 'organizational capital'.

²⁹⁶ How strong is your company culture during crisis (scale) in 'organizational capital'.

recommend *two* new indicators to measure quality which are both incorporated in this doctoral thesis.²⁹⁷

Based on the qualitative interviews, German SME' RC is extended, too. The first four dimensions of German SME' RC – customers, suppliers, creditors and shareholders, and alliances –, for example, each receive an indicator to comprise *informal relationships*.²⁹⁸ A further indicator is assigned to the 'alliance dimension' of RC to broaden its scope towards *employee-acquisition*, too.²⁹⁹ Likewise, the first-order construct 'informal networks' is also increased. Specifically, one item which looks into *associations* is added.³⁰⁰

Concerning the *specification* between the second-order constructs – i.e. HC, SC and RC – and their dimensions (*formative*) as well as between the dimensions and their respective indicators (*reflective*), it can be stated that the experts agree to this dissertation's decision based upon the provided decision rules (cf. chapter 5.1.2) as well as theoretical argumentations.

To finish, the experts of German SME also give an indication concerning the *relationship between SC and RC*. In detail, the majority believes that RC is more likely to impact SC than the other way around (cf. chapter 4.2.3). That is, as the experts in favor of 'RC's impact on SC' argue, since the markets determine internal structures including software, knowledge management and innovations in particular, and since innovations are often developed together with external stakeholders like suppliers.

²⁹⁷ Adherence to delivery dates/schedules; and Percentage of products which pass quality tests during the first run - both in 'organizational capital'.

²⁹⁸ Percentage of customer-/ supplier-/ creditor and shareholder-/ alliance-relationships which are not only formal but also informal (e.g. families are friends, jointly conducted hobbies etc.).

²⁹⁹ Number of employees hired out of an alliance (with another firm as well as educational institution) in 'alliances/cooperation relationships'.

³⁰⁰ Number of memberships in associations or other interest groups.

5.2.3.5.2 Analysis and Results of Interviews with German SME Experts: Quantitative Part

After the qualitative part of the interview, the experts of German SME' are provided with a *standardized questionnaire with closed questions*. It aims, as already mentioned in chapter 5.2.3.2, for the experts' validation of the indicators. Specifically, the tool called *item-sort task* (Anderson, Gerbing 1991: 733) is applied and analyzed³⁰¹; using the *proportion of substantive agreement* (p_{sa}) and the *substantive-validity coefficient* (c_{sv}). These two indices for estimating the *substantive validity* of indicators particularly suite the research at hand. That is because they only require small pretest-samples to distinguish between the measures which enter the subsequent empirical model and the ones which do not (ibid.: 732 et seq.).

In detail, the *proportion of substantive agreement* (p_{sa}) displays "(...) the proportion of respondents who assign an item to its intended construct (...)" (ibid.: 734). It can take on values between zero and one whereas values near one represent grater substantive validity (ibid.: 734). Although any value above 0.5 can be regarded as a good sign, thresholds between 0.6 (Defren 2009: 213) and 0.7 (Naskrent 2010: 233) have been used in previous research studies. The precise p_{sa} -values of this doctoral thesis are displayed in detail for HC in appendix 4, in appendix 5 for SC, in appendix 6 for RC and lastly in appendix 7 for lasting competitive business performance (cf. also appendix 3 for the applied abbreviations in the former mentioned appendices). These appendices highlight that p_{sa} is *below 0.6* in *five* cases for HC, *ten* for SC, *three* of RC and *zero* for *performance*. Yet, these 'bad' values do not automatically mean that all of these 18 indicators need to be deleted right away. Instead it is recommended to also investigate "(...) the extent to which respondents assign an item to its posited construct more than to any other construct (...)" (Anderson, Gerbing 1991: 734). This is done via the *substantive-validity coefficient* (c_{sv}) whose values range from minus one to plus one. Similar to the proportion of substantive agreement, high values are referred to as better whereas every value above 0.5 seems appropriate.

³⁰¹ Cf. other research works which apply it, too. For example, Julia Naskrent (2010: 233) and Christian Rauch (2012: 108).

However, the c_{sv} 's interpretation differs from p_{sa} since high negative values suggest that an indicator accounts for a different than the previously intended construct (ibid.: 734 et seq.). Referring to appendix 4 to appendix 7, this dissertation's c_{sv} -values are as such: *eight HC* c_{sv} -values are below 0.5 and additional *three* ones are negative, *five SC* c_{sv} -values are below 0.5 and additional *nine* ones are negative, *seven RC* c_{sv} -values are below 0.5 and an additional *one* is negative. The other 34 IC-indicators as well as all items for performance are appropriate and thus, not better suited to represent a different than the apriori determined first-order construct (ibid.: 734 et seq.).

When taking together the above mentioned outcomes of p_{sa} and c_{sv} , one can observe that *two HC*-indicators need to be *deleted* since both values fall below the recommended thresholds.³⁰² Additionally, *three HC*-indicators are *moved to other constructs*³⁰³ and *six HC*-items judged as *doubtful* since one of their thresholds signals a bad value while the other value is appropriate.³⁰⁴ The other *nine HC*-indicators as well as the direct measurement item of the higher-order construct HC are regarded as suitable by the quantitative analysis. Furthermore, the experts' majority voted in favor of integrating the *two* uncertain indicators: 1) Percentage of training conducted in-house (on-the-job training – as opposed to external advanced education), and 2) Percentage of employees with experience in more than one area (e.g. tiling and sanitary, or engineering and IT). In total, HC

³⁰² 1) Average number of years in business of leading personnel (i.e. employees with direction/leadership responsibilities but not top management), and 2) Number of employees who personally develop themselves after staff progress/performance review.

³⁰³ 1) Number of employees who applied via unsolicited application (as opposed to posted/advertised positions) is moved to 'RC-public perception'; 2) Number of improvement/innovation suggestions made by employees is moved to 'SC-development capital'; 3) Number of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.) is moved to 'HC-attitude'.

³⁰⁴ 1) Number of employees with academic degrees (e.g. Bachelor, Master, Diploma, PhD); 2) Number of employees with advanced professional qualifications (e.g. business administrator/bachelor professional, business manager, master craftsman); 3) Number of employees currently in apprenticeship; 4) Number of employees who left your firm; 5) Average number of years in leading position (of entrepreneurs/managers); 6) Number of employees who regard their entrepreneurs/managers as role models (i.e. someone to follow, someone who motivates, someone who exemplifies actions etc.).

is, after the expert interviews, operationalized via four dimensions with 25 indicators³⁰⁵ (plus one for the direct measurement of HC) of which six, in particular, are undecided and thus, call for further examination (cf. figure 56).

The overall outcomes of p_{sa} and c_{sv} also illustrate that *one* SC-indicator needs to be erased because neither p_{sa} nor c_{sv} meet the recommended threshold values.³⁰⁶ On top of this, the values of nine SC-items point to the fact that the respective indicators should be transferred to a different constructs. However, out of these nine transfers only *six* are viewed as appropriate by the researcher³⁰⁷. Specifically, the author of this doctoral thesis believes that *three* SC-indicators³⁰⁸ shall not be relocated to a different dimension because of their respective definitions in chapter 4.1. Process improvements and new organizational structures, for example, clearly relate to a firm's development and thus, do not appropriately suite organizational capital. Consequently, these three SC-indicators are deleted, too.³⁰⁹ Besides, *four* SC-indicators are undetermined as they have one good and one bad index for estimating their substantive validity. They therefore require further clarification. Concerning the *two* SC-indicators which are (only) potentially suitable for the scope of this dissertation, the experts of German SME

³⁰⁵ These 25 indicators include the 6 items which are moved to HC from a different construct as a result of the item-sort task.

³⁰⁶ 1) Euro invested to set up workplace for demographic changes (e.g. ergonomic workstations, integration of older employees, child care support, company sports etc.).

³⁰⁷ 1) Euros invested in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.) is moved to 'HC-attitude'; 2) Number of top management meetings per month is moved to 'HC-leader(ship) and management ability'; 3) Number of cross-departmental meetings per month is moved to 'HC-intellectual agility'; 4) Percentage of decision which are substantially based on team inputs/made by teams (i.e. mutual decision-making culture) is also moved to 'HC-attitude'; 5) Number of cross-departmental projects is as well moved to 'HC-intellectual agility'; 6) Warranty expenses in Euro is moved to 'RC-customer relationships'.

³⁰⁸ 1) Number of department-internal meetings per month; 2) Euro invested in process improvements; 3) Euro invested in new organizational structures (e.g. process restructuring, organizational adaptations, cost center modifications etc.).

³⁰⁹ Such a procedure can be applied because constructs need to be operationalized in correspondence to their context. Thus, one does not have to rely solely on the recommendations of a third party and instead is free to adjust models according to their background (Rossiter 2002: 317 et seq.; Huber et al. 2007: 39).

settle for keeping one of them (Percentage of processes which are formalized (e.g. via manuals, form sheds etc.)), while the other one, namely 'Percentage of innovations converted into patents' is removed. On the whole, the measurement of the three SC-dimensions is reduced by four indicators and includes a total of 16 *items* which spread among the three dimensions after the expert interviews.³¹⁰ Moreover, SC is, in order to operationalize the higher-order model, also still directly measured via a single item looking into its overall quality (cf. figure 56).

German SME' RC-indicators are also adjusted in line with the values of p_{sa} and c_{sv} . In detail, *two* RC-items are crossed out in accordance to their unfortunate p_{sa} and c_{sv} values.³¹¹ Furthermore, *one* RC-indicator signals its transfer to another dimension.³¹² However, this move is regarded conceptually doubtful by the researcher of this doctoral thesis and thus, requires further examination – as do *five* more indicators, too.³¹³ Last of all, the experts of German SME are asked to judge whether *three* indicators fit into the context of German SME: 1) Number of personal visits to customers' side (per month), 2) Estimate: percentage of suppliers who you would recommend to others, and 3) Estimate: how satisfied are you with your key bank on a scale from 0 (not at all) to 6 (fully). All three measures are viewed as relevant and thus, are integrated in this doctoral thesis. Altogether, German SME' RC is, after the expert interviews, operationalized via six dimensions and their respective 35 *indicators*³¹⁴ as well as one direct measure of the higher-order construct RC (cf. figure 56).

Before wrapping up this section, it is important to mention that the *performance*

³¹⁰ These 16 indicators include one item which is transferred from (initially) HC to SC.

³¹¹ 1) Percentage of customers' complaints (out of all delivered products/services) and 2) Percentage of ownership held by the key/major shareholder.

³¹² 1) Equity ration = equity / total capital.

³¹³ 1) Percentage of innovations developed with customers; 2) Percentage of received goods/raw materials/services which led to complaints (out of all received goods/raw materials/services); 3) Percentage of projects conducted with universities, business schools, scientists and other educational institutions; 4) Percentage of innovations generated with universities, business schools, scientists and other educational institutions; 5) Percentage of turnover generated via the help of „gate keepers“ known from social networks.

³¹⁴ These 35 indicators include the 2 items of which one is transferred from HC and one from SC as a result of the item-sort task.

indicators seem to be appropriate in *five* out of six cases. Hence, only *one* item is doubtful since its c_{sv} falls below the threshold of 0.5 (cf. figure 56)³¹⁵

The overall results of the first pretest with experts of German SME are displayed in figure 56.

Figure 56: Overall Outcomes of Expert Pretest with German SME Experts

	Initially*:	Pretest – Phase 1: Experts	After*:
Human Capital (HC)	22	<ul style="list-style-type: none"> • Deleted: 2 • Doubtful: 6 • Transferred to other construct: 3 • Transferred from other construct: 6 • New (Qualitative interview): 2 	25
Structural Capital (SC)	20	<ul style="list-style-type: none"> • Deleted: 5 • Doubtful: 4 • Transferred to other construct: 6 • Transferred from other construct: 1 • New (Qualitative interview): 6 	16
Relationship Capital (RC)	29	<ul style="list-style-type: none"> • Deleted: 2 • Doubtful: 5 + 1 • Transferred to other construct: 0 • Transferred from other construct: 2 • New (Qualitative interview): 6 	35
Performance	6	<ul style="list-style-type: none"> • Deleted: 0 • Doubtful: 0 • Transferred to other construct: 0 • Transferred from other construct: 0 • New (Qualitative interview): 0 	6

* Plus 3 questions to directly measure the higher-order constructs HC, SC, and RC

5.2.3.5.3 Analysis and Results of Interviews with Experts of Statistics

Generally speaking, the outcomes of the interviews with the experts of statistics are more straightforward than the above demonstrated discussion. In particular, the three experts of statistics agree to almost all points that are considered in the interview. Only three critical points are raised: 1) the dimensional conceptualization of HC – i.e. why the leader or entrepreneur is presented by only one dimension instead of three lower-order constructs like the

³¹⁵ 1) Turnover growth.

employees – which can be conceptually justified (cf. chapter 4.1.1), 2) the amount of German SME participating in the second phase of the pretest which is increased for the initially intended amount of five to finally 16 (cf. chapter 5.2.4), and 3) the general sample which originally only considered the Oskar-Patzelt Stiftung and which is, after the interviews, broadened in order to avoid bias (cf. chapter 6.2).

For further details on the interviews with the experts of statistics please refer to appendix 8.

5.2.3.6 *Quality Standards: Reliability and Validity*

Lastly, it is important to highlight that the overall quality of the expert interviews and their results is ensured since the following actions are taken: *Objectivity* is provided for as two researchers³¹⁶ looked over the transcripts as well as their evaluation. Moreover, *reliability* is ensured because the materials are checked a second time after the evaluation of the interviews is completed and results are compared. Furthermore, the coding of the transcripts is based on the interview guide and thus, theory. Hence, *validity* is guaranteed (Mayring, Brunner 2009: 678). Also, *interviewer bias*, which is especially high in open-ended interviews (Shapiro 1970: 412), can be ruled out. This is because an interview guide is used to ensure equality as well as comparability of the interviews. Lastly, the transcripts are *validated* via the interviewees' feedback (Binnendijk 1996: 4). Overall, it can therefore be concluded, that the expert interviews are adequately performed and that their above presented results can be used to build the following chapters without concern.

³¹⁶ The doctoral student, Sabrina Aschenbrenner and one of her supervisors, Prof. Dr. Thomas Heupel.

5.2.4 Second Pretest: Field Test (Part I)

After consulting the German SME experts, 16 German SME (cf. table 18 for an overview of the participating companies and the names of the respective interviewees) are interviewed in October 2013 in order to check the remaining indicators for their practical suitability.³¹⁷ These questioned firms are located in five out of the 16 German federal states (cf. figure 57) and operate in diverse industries as can be seen in figure 58.

Table 18: Interviewed German SME: Interviewees' Names and Positions

Interviewee's Name	Company and Position	Date & Duration
1. Rosemarie, Josef and Olaf Discher	DISCHER Technik GmbH; CEOs and founders	10/04/2013 2h
2. Ullrich Eitel	MARBURGER TAPETENFABRIK, J. B. Schaefer GmbH & Co. KG; CEO	10/07/2013 1h 45min
3. Markus Lauer	Aschenbrenner Werkzeug- und Maschinenbau GmbH; CEO	10/07/2013 2h 05min
4. Dr. Olfa Stiller	Formycon AG; Chairman of supervisory board	10/07/2013 1h 30min
5. Manfred Schwarz	Autohaus Nord Hermann Schwarz GmbH; CEO	10/08/2013 1h 25min
6. Hannelore Wachtel	Elektrotechnik Palme; CEO	10/08/2013 1h 55min
7. Florian Holzapfel	iloxx AG; Marketing Manager	10/09/2013 2h 15min
8. Bernd Peter	Peter Backwaren OHG; CEO	10/10/2013 1h 30min
9. Dirk Stein	Companion GmbH & Co. KG; Senior Partner and CEO	10/12/2013 1h 55min
10. Hans-Jürgen Schneider	Elektro-Schneider GmbH; CEO	10/13/2013 2h 30min
11. Ulrich Beckschewe	Wellpott Landtechnik GmbH; CEO	10/13/2013 1h 20min
12. Torsten Bernasco Lisboa	medico-tec GmbH; CEO and founder	10/13/2013 1h 15min
13. Dr. Bernd Hentschel	HENKA Werkzeuge + Werkzeugmaschinen GmbH; CEO	10/14/2013 1h 40min
14. Vera Beckschewe	Hausverwaltung Beckschewe OHG; CEO and founder	10/14/2013 1h 15min
15. David Hasenauer	Ludwigs Bar & Cafe; CEO and founder	10/23/2013 1h 35min
16. Jörg Gerbig	yd. yourdelivery GmbH (Lieferando); CEO and founder	10/23/2013 2h

³¹⁷ Half of the interviews were conducted personally and the other eight interviews were performed via the telephone.

Figure 57: Regional Distribution of Interviewed German SME

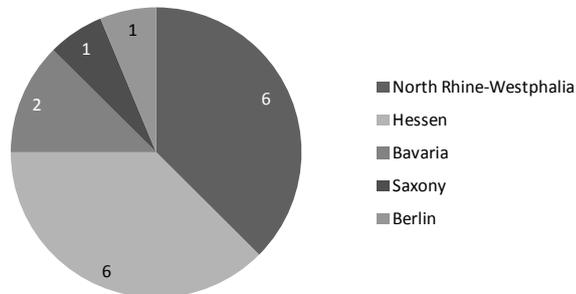
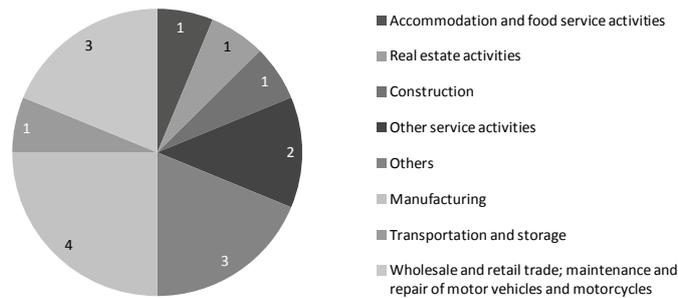


Figure 58: Industry Distribution of Interviewed German SME



It is interesting to mention that all interviewees were provided with a questionnaire draft (printed or in Pdf-format) containing an opening statement, instructions regarding the survey completion (cf. chapter 6.3.1), the in chapter 5.2.3.5 illustrated remaining indicators, introductions to each block of questions (to every secondary construct as well as each dimension) and general company questions – e.g. location, industry branch, company generation, year of foundation, number of employees etc. (cf. chapter 6.3.1). The interviewees were asked to generally comment on the questionnaire draft – e.g. its comprehension – as well as to evaluate the relevance of each given indicator for their company. Besides they are free to mention their opinion concerning the importance of the items for German SME in general. At the end, each interviewee is required to make a decision whether an indicator shall remain in the survey or be deleted. Only if more than one-third of the 16 questioned German SME ($= 1/3 \times 16 = 5.3 =$

6) pledge for a removal of an indicator, the respective item is actually erased.

In terms of German SME' HC the 16 interviews conclude that *five* indicators are deleted³¹⁸ while *eight as well as the question to directly measure the higher-order construct HC* are slightly adjusted³¹⁹. This modification includes, for example, that 'number of xyz' is changed to 'percentage of xyz', that 'euro invested in xyz' is altered to 'number of employees participating in xyz', that more precise descriptions are provided etc. On top of this, the interviewees suggest *two* more HC-items which are incorporated because of their practical relevance. These are 'Percentage of employees who are (intellectually) capable of performing tasks beyond their actual/direct field of competencies – potentially even inter-divisional

³¹⁸ 1) Number of employees who share their knowledge for value creation; 2) Number of employees who left your firm; 3) Percentage of decisions which are substantially based on team inputs/made by teams; 4) Number of improvement/innovation suggestions made by entrepreneurs/managers; 5) Number of employees who regard their entrepreneurs/managers as role models.

³¹⁹ 1) 'Percentage of training conducted in-house/on-the-job training – as opposed to external advanced education' is changed to 'Percentage of training conducted in-house (e.g. on-the-job training via explanation, observation or supervised exercise of another employee, learning by doing etc.)'; 2) 'Percentage of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT)' is changed to 'Number of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT)'; 3) 'Estimate: number of employees who are highly motivated' is changed to 'Estimate: *percentage* of employees who are highly motivated'; 4) 'Euro invested in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.)' is changed to '*Percentage of employees who participate* in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.)'; 5) 'Number of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.)' is changed to '*Percentage* of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.)'; 6) 'Euro invested in advanced education/training of entrepreneurs/managers' is changed to 'Euro invested in advanced education/training of entrepreneurs/managers (*in total*)'; 7) 'Average number of years in leading position (of entrepreneurs/managers)' is changed to 'Average number of years in leading position (of entrepreneurs/managers) (e.g. *with responsibility for employees*)'; 8) 'Hours spend per month for direct communication with employees' is changed to '*Percentage of managerial tasks dedicated to* direct communication with employees'; 9) 'How do you evaluate the quality of your human capital on a scale from 0 (very bad) to 5 (very good)?' is changed to 'How do you evaluate the quality of your human capital (*questions XXX to XXX*) on a scale from 0 (very bad) to 5 (very good)?'.

or cross-departmental' and 'Percentage of employees who can solve (important) problems/issues without consulting their supervisor for advice (i.e. autonomous, self-dependent and responsible)' which are both assigned to intellectual agility.³²⁰

The interviews with German SME also highlight changes to the set of SC-indicators. Specifically, *three* indicators are removed since more than 1/3 of the interviewees regard them as of little relevance.³²¹ Furthermore, the interviewees demand, in line with HC, the adjustment of *ten* items of the SC-dimensions *as well as the direct measurement of the SC-construct*.³²² Interestingly, no new indicator is

³²⁰ Similar indicators can also be found in the literature – cf., for example, Christiane Geighardt (2005: 12), and Asta Thorleifsdottir and Eggert Claessen (2006: 16 & 58).

³²¹ 1) Euro invested in quality management; 2) Percentage of knowledge documentation in retrievable format when employees leave the firm; 3) Duration (in month) between innovation-cycles in the previous three years.

³²² 1) 'How strong is your company culture during crisis (scale)' is changed to 'How strong is your company culture during crisis (scale) - *not only in 2012 but in general?*'; 2) 'Existence of formal knowledge storage and communication tools (yes/no)' is changed to '*Do you document knowledge - i.e. in written format - and/or use specific communication tools to exchange knowledge? (e.g. mutual data basis, wikies, formalized filing systems etc.)*'; 3) 'Number of your fix meetings per month' is changed to 'Number of *firm-internal* your fix meetings - i.e. *number of regular working meetings/sessions* - per month'; 4) 'Percentage of processes which are formalized (e.g. via manuals, form sheds etc.)' is changed to 'Percentage of processes which are formalized (e.g. via manuals, form sheds, *blanks, standardised screen masks etc.*)'; 5) 'Adherence to delivery dates/schedules' is changed to '*Percentage of orders/services which are delivered/performed on time* (adherence to delivery dates/time schedules)'; 6) 'Percentage of products which pass quality tests during the first run' is changed to '*Percentage of products/services/projects which meet quality-standards at the first test*'; 7) 'Turnover from innovations which have been developed in the previous three years' is changed to '*Turnover generated via new products/services which have been launched in the past three years*'; 8) 'Number of patents' is changed to '*Number of patents held by the firm*'; 9) 'Euro invested in ICT (e.g. mobile phones, telephone conference equipment etc.)' is changed to 'Euro invested in *communication technologies* (e.g. mobile phones, telephone conference equipment etc.)'; 10) 'Euro invested to maintain/guarantee state-of-the-art technological level of machinery as well as process engineering' is changed to 'Euro invested to maintain/guarantee state-of-the-art technological level of machinery, process engineering *and equipment*'; 11) 'How do you evaluate the quality of your structural capital on a scale from 0 (very bad) to 5 (very good)?' is changed to 'How do you evaluate the quality of your structural capital (*questions XXX to XXX*) on a scale from 0 (very bad) to 5 (very good)?'.

advised for SC. Yet, a question in order to better evaluate this dissertation's results is added.³²³

RC is adjusted according to the interviewees' judgments, too. *Seven* indicators are, in particular, erased³²⁴ as a response to the interviews while *thirteen* items as well

³²³ In terms of knowledge documentation: If so, please specify the tools which are applied in your firm - exemplary instruments: ...

³²⁴ 1) Number of personal visits to customers' side; 2) Percentage of innovations developed with customers; 3) Percentage of received goods/raw materials/services which led to complaints; 4) Percentage of creditor and shareholder-relationships which are not only formal but also informal; 5) Percentage of projects conducted with universities, business schools, scientists and other educational institutions; 6) Percentage of innovations generated with universities, business schools, scientists and other educational institutions; 7) Percentage of alliance-relationships which are not only formal but also informal.

as *RC's direct measurement* are modified³²⁵. Furthermore, two new questions which are relevant for interpreting this doctoral thesis' results are put forward and included: 'Number of customers (in total)' to better understand customer relationships and 'From which financial institutions do you receive your external capital? e.g. Housebank, capital market, private equity, business angels, employee-shares, others – please specify' for the dimension 'creditor and

³²⁵ 1) 'Warranty expenses in Euro' is changed to '*Percentage of orders/services/projects, which lead to complaints (complaint rate)*'; 2) 'Percentage of credits granted by one/the key bank' is changed to '*Percentage of credit/debt capital granted by the key external capital provider (e.g. financial institution)*'; 3) 'Equity ration = equity / total capital' is changed to '*Percentage of equity in relation to total capital (Equity ration = equity / total capital)*'; 4) 'Average duration of relationship with key/major bank' is changed to '*Average duration of relationship with key external capital provider (e.g. financial institution)* * In case your company does not receive external capital, please answer this question with regard to the general relationship with your key financial institution (e.g. house bank)*'; 5) 'Estimate: how satisfied are you with your key/major bank on a scale from 0 (not at all) to 5 (fully)' is changed to '*Estimate: how satisfied are you with your key external capital provider (e.g. financial institution) on a scale from 0 (not at all) to 5 (fully)*'; 6) 'Percentage of projects conducted in joint ventures – e.g. with other firms' is changed to '*Percentage of projects conducted in cooperation with other firms - e.g. joint ventures*'; 7) 'Percentage of innovations generated in joint ventures – e.g. with other firms' is changed to '*Percentage of innovations generated in cooperation with other firms - e.g. joint ventures*'; 8) 'Percentage of value added based on outsourcing activities' is changed to '*Percentage of value added which is outsourced to third parties (i.e. outsourcing activities)*'; 9) 'Percentage of turnover generated via the help of „gate keepers“ known from social networks' is changed to '*Percentage of turnover generated via the help of „gate keepers“ known from social/private networks*'; 10) 'Number of family members/friends who support the business via active help' is changed to '*Number of family members/close friends who support the business via active help*'; 11) 'Percentage of innovations initiated via family/friends' is changed to '*Percentage of innovations initiated via family/close friends*'; 12) 'Number of press quotations about the enterprise or being mentioned in the media' is changed to '*Number of press quotations about the enterprise and/or number of times being mentioned in the media (online media like google and social media like facebook, twitter etc. are excluded)*'; 13) 'Number of employees who applied via unsolicited application (as opposed to posted/advertised positions)' is changed to '*Number of employees who applied via unsolicited application (i.e. not applied to posted/advertised positions)*'; 14) 'How do you evaluate the quality of your relationship capital on a scale from 0 (very bad) to 5 (very good)?' is changed to '*How do you evaluate the quality of your relationship capital (questions XXX to XXX) on a scale from 0 (very bad) to 5 (very good)?*'.

shareholder relationships'.

Lastly, none of the *performance* measures is removed. However, the measures are adjusted to the extent that only *ratios* are applied and directly requested. Specifically, this means, for instance, that the indicator 'Profit' is changed to 'Profit growth'.³²⁶ Furthermore, the participants are not asked to provide, for example, this year's as well as last year's turnover figures in order to calculate turnover growth within the scope of this thesis; instead they are asked to state their growth rate right away. This modification is, in particular, done because the interviewed German SME feel more confident to disclose ratios instead of rational numbers. Furthermore, the 'backup question' which asks for the perceived financial performance compared to competitors is agreed upon by the interviewees; especially as an aid-option in case the surveyed SME are unwilling to reveal their actual performance figures.

A summary of the above discussed adjustments to the indicators of HC, SC, RC and lasting competitive business performance is provided in figure 59.

Besides, and as it is mentioned above, the interviewees also comment on the questionnaire draft beyond the items' relevance. Specifically, the interviews with German SME point to other, more general adjustments which are illustrated in detail in chapter 6.3.2.

³²⁶ The indicator 'profit growth' is used as a performance proxy in various IC-studies such as the ones of Nick Bontis (1998: 75), and Nick Bontis, Willian Keow and Stanley Richardson (2000: 91).

Figure 59: Overall Outcomes of Field Pretest with German SME

	Initially:	After Pretest – Phase 1: Experts	Pretest – Phase 2: German SME	Finally*:
Human Capital (HC)	22	25	<ul style="list-style-type: none"> • Deleted (1/3 majority → 6): 5 • Modified: 8 • New: 2 	22
Structural Capital (SC)	20	16	<ul style="list-style-type: none"> • Deleted (1/3 majority → 6): 3 • Modified: 10 • New: 1 (but only for interpretation) 	13
Relationship Capital (RC)	29	35	<ul style="list-style-type: none"> • Deleted (1/3 majority → 6): 7 • Modified: 13 • New: 2 (but only for interpretation) 	28
Performance	6	6	<ul style="list-style-type: none"> • Deleted (1/3 majority → 6): 0 • Modified: 5 • New: 0 	6

*Plus 3 questions to directly measure the higher-order constructs HC, SC, and RC
Plus 3 additional questions for contents (1 x SC; 2 x RC)

5.2.5 Final Operationalization of Intellectual Capital and its Measurement

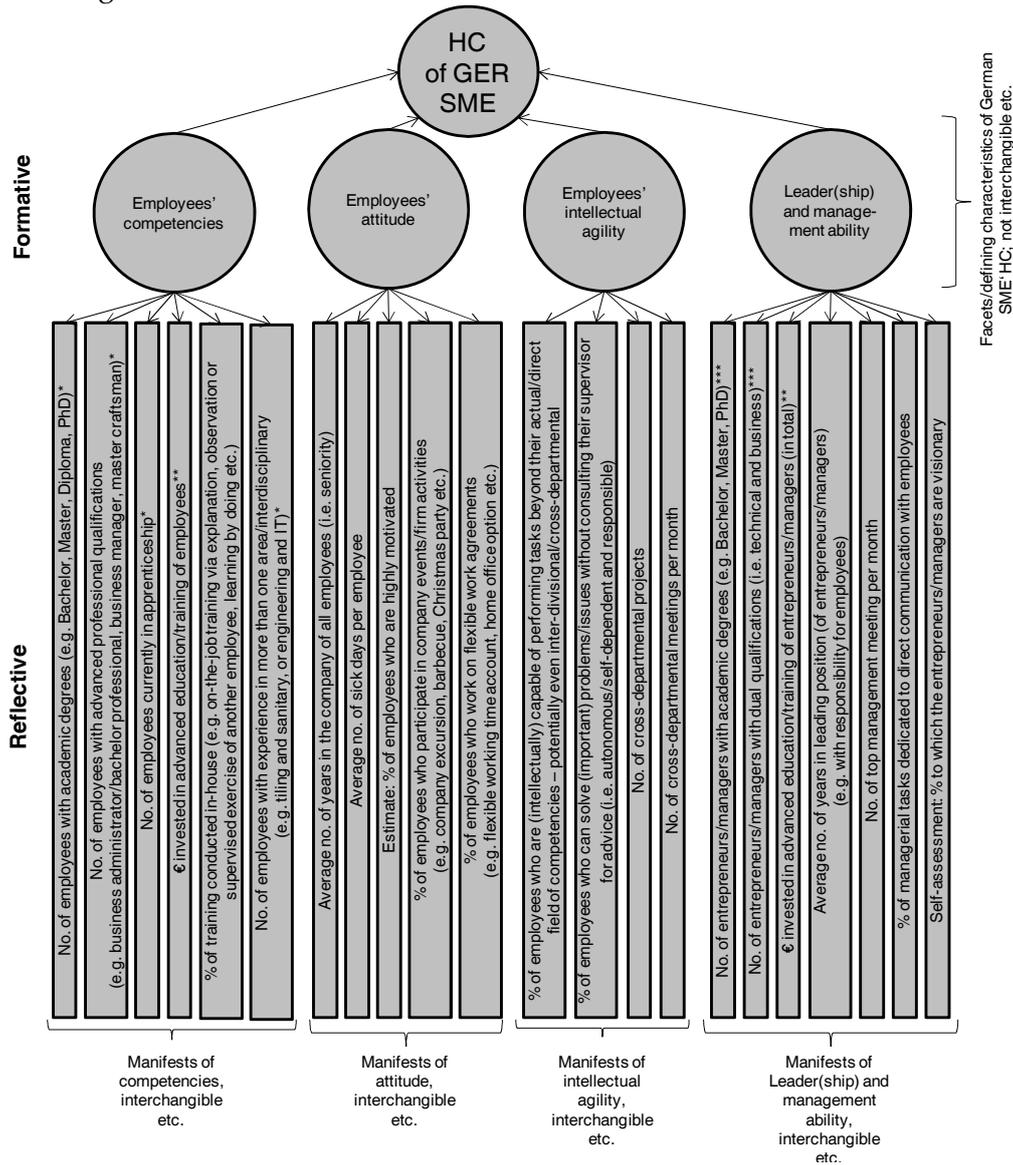
Building on the initial operationalization of chapter 5.2.1 and its adjustments according to the pretests (cf. chapters 5.2.3 and 5.2.4), the following three sections (5.2.5.1 to 5.2.5.3) summarize the final measurement models of this dissertation's IC-based strategic sources of lasting competitive business performance.

5.2.5.1 German SME' Human Capital

As a response to chapter 5.2.3 and 5.2.4, HC is, in total, represented by 22 *reflective indicators* which are spread over *four formative dimensions* (cf. figure 60 and appendix 9). Furthermore, a direct measurement item of HC is included which looks into the overall quality of HC – i.e. 'How do you evaluate the quality of your human capital (question XXX to XXX) on a scale from 0 (very bad) to 5

(very good)?'. This indicator is required to operationalize the higher-order SEM (cf. chapter 5.1.3).

Figure 60: German SME' Human Capital – Final Operationalization: Path Diagram



* = in relation to total employees

** = in relation to turnover

*** = in relation to total entrepreneurs/managers

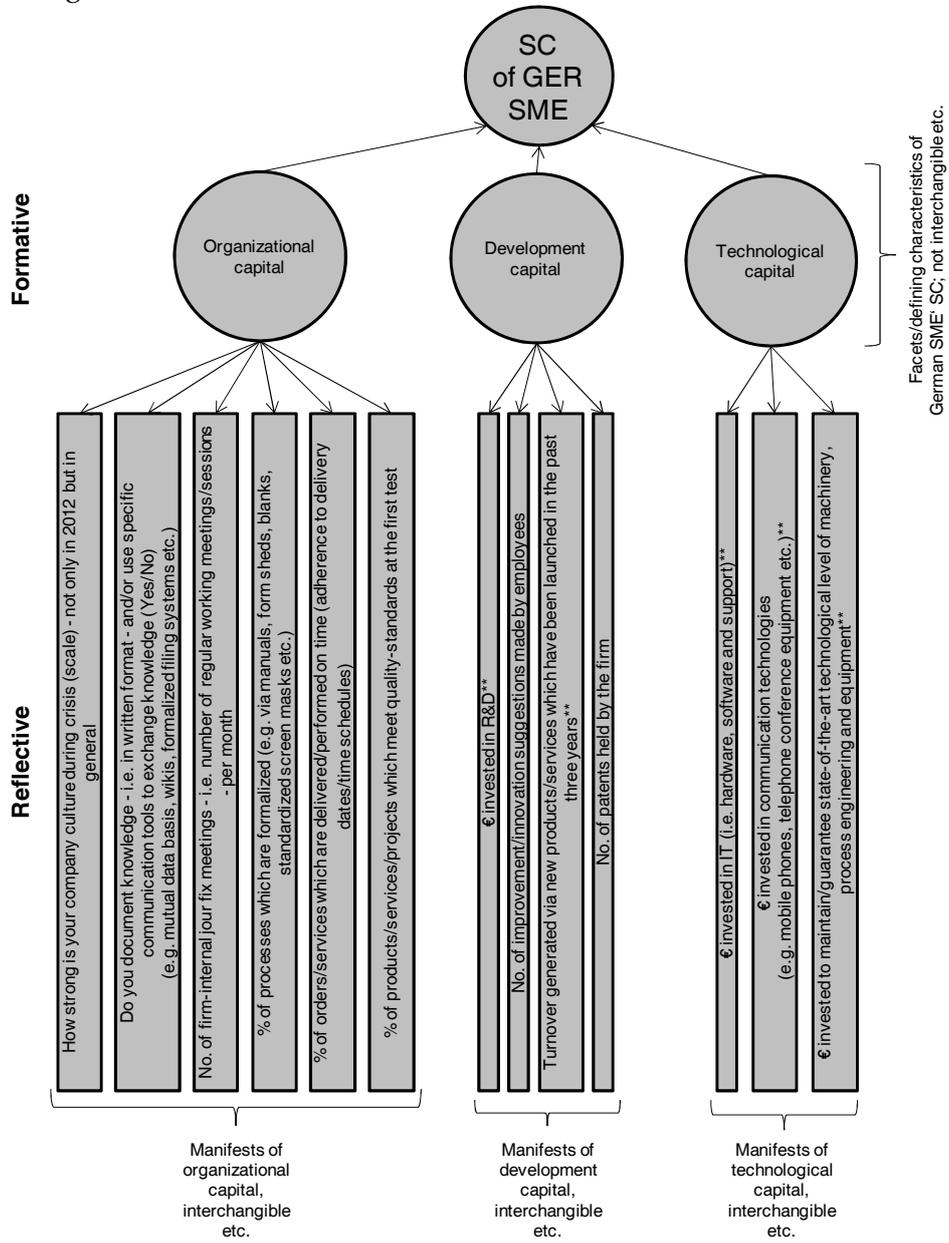
5.2.5.2 *German SME' Structural Capital*

After the first pretest with German SME experts as well as the second field test with diverse German SME, it can be concluded that SC finally consists of 13 *reflective measures*. Specifically, these 13 measures are divided up into *three formative dimensions* as can be seen in figure 61 – cf. also appendix 10 for details and the abbreviations applied in chapter 7. On top of this, SC is supplemented by one direct indicator which asks for the full perceived quality of German SME' SC and is needed to calculate the higher-order SEM (cf. chapter 5.1.3).

5.2.5.3 *German SME' Relationship Capital*

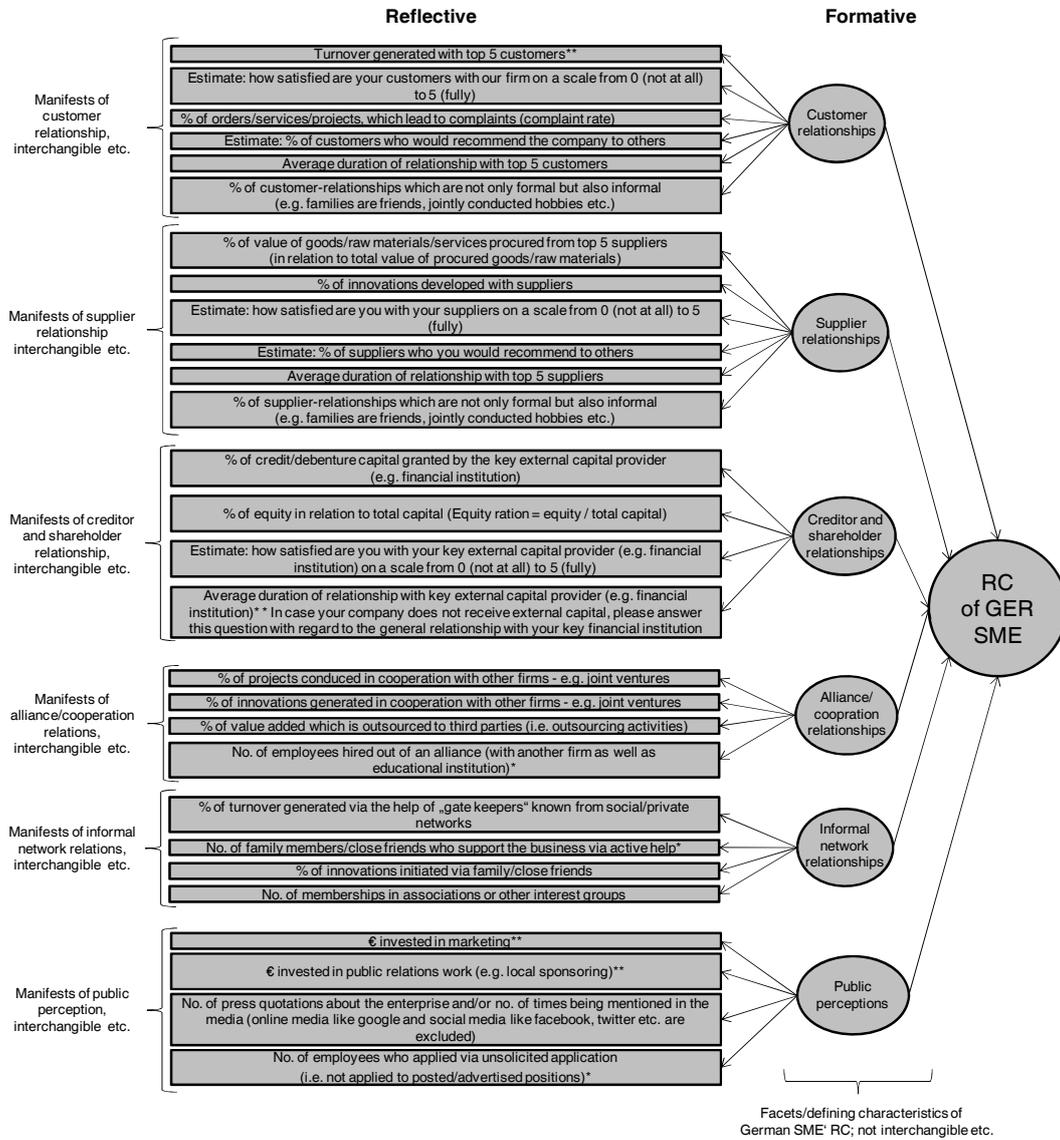
Taking into account the in the previous chapters discussed adjustments to the initial operationalization of RC (cf. chapters 5.2.3 and 5.2.4), one arrives at the following final measurement: RC is determined via *six formative first-order dimensions* of which each is specified via four or six indicators. This sums to a total of 28 items as can be seen in figure 63. In line with HC and SC, the second-order construct RC is also operationalized via a direct question judging its overall quality. Lastly, it is worth mentioning that one finds an alternative illustration to figure 62 as well as the indicators' abbreviations in appendix 11.

Figure 61: German SME' Structural Capital – Final Operationalization: Path Diagram



** = in relation to turnover

Figure 62: German SME' Relationship Capital – Final Operationalization: Path Diagram



* = in relation to total employees
 ** = in relation to turnover

5.2.6 Final Operationalization of Lasting Competitive Business Performance and its Measurement

As outlined in chapters 5.2.3 and 5.2.4, the measurement model of 'lasting competitive business performance' is only little modified. Specifically, only one figure which is initially operationalized in a rational manner is concerted into a ratio: from 'Profit' to 'Profit growth'. Besides, the other five indicators remain the same but are directly requested in the final data collection.

Altogether, performance is operationalized as a *one-dimensional construct* measured via *six reflective indicators* (cf. figure 63 and appendix 12).

Figure 63: German SME' Lasting Competitive Business Performance – Final Operationalization: Path Diagram



5.3 STRUCTURAL MODELS

After having dealt with the measurement (theory) of this dissertations latent (first- and second-order) constructs, attention can be turned towards the *path relationships* between these constructs. This is the tasks of the structural model whose main purpose is to test the hypothesized relationships between latent constructs based on (structural) theory (Hair, JR. et al. 2014: 12 et seq.) (cf. chapter 5.1.1). In the case of this dissertation this refers to the in chapters 4.1.4 and 4.2.4 summarized direct linkages as well as interlinkages between human capital (HC), structural capital (SC), relationship capital (RC) and lasting competitive business performance which are shown in detail in the following two sub-chapters.

5.3.1 Structural Model I: the Direct Impact of German SME' Intellectual Capital Categories on Lasting Competitive Business Performance

The first structural model of this doctoral thesis is based on the in chapter 4.1.4 summarized direct relationships between HC and lasting competitive business performance, SC and business performance, as well as RC and business performance. Since this model is not altered as a response to the qualitative interviews, the graphical illustration of figure 38 still holds. Hence, the following focuses on its statistical description³²⁷. Specifically, it can be stated that HC, SC and RC each represent an exogenous latent variable which predict the endogenous construct lasting competitive business performance.

A sum up of this structural relationship is presented in table 19.

Table 19: Exogenous and Endogenous Variables of Structural Model I

Hypothesis	Exogenous latent constructs	Endogenous latent constructs	Direction of relationship
H1	Human capital	Lasting competitive business performance	Positive
H2	Structural capital	Lasting competitive business performance	Positive
H3	Relationship capital	Lasting competitive business performance	Positive

5.3.2 Structural Model II: the Interaction Effect of German SME' Intellectual Capital Categories and the Impact on Lasting Competitive Business Performance

This dissertation's second structural model also aligns with the conceptual research model II of chapter 4.2.4 and its graphical representation in figures 40 and 41. As such, the structural model examines if the exogenous construct HC is

³²⁷ The literature recommends to illustrate statistical models which are to be tested via visual presentations and wording (Chin 1998a: 8).

actually the source of endogenous SC and RC which, subsequently as exogenous variables, impact performance. Moreover, the model tests whether exogenous RC influences endogenous SC as it is argued in chapter 4.2.3 and supported via the pretest interviews. A summary of this is provided in table 20.

Table 20: Exogenous and Endogenous Variables of Structural Model II

Hypothesis	Exogenous latent constructs	Endogenous latent constructs	Direction of relationship
H4a	Human capital	Structural capital	Positive
H4a	Structural capital	Lasting competitive business performance	Positive
H4b	Human capital	Relationship capital	Positive
H4b	Relationship capital	Lasting competitive business performance	Positive
H5	Relationship capital	Structural capital	Positive

5.4 MODERATING EFFECT: COMPANY-AGE / -GENERATION

The last part of this doctoral thesis’ statistical research design focuses on an advanced and rather novel issue of SEM called *moderating effect*. Moderating effects refer to situations in which (new) variables – i.e. *moderators* – influence the direction and/or strength of the relationship between exogenous and endogenous latent constructs (Sharma, Durand, Gur-Arie 1981: 291; Darrow, Kahl 1982: 35; Baron, Kenny 1986: 1174; Chin, Marcolin, Newsted 1996: 21; Schloderer, Ringle, Sarstedt 2009: 593; Hair, JR. et al. 2010: 770; Henseler, Fassott 2010: 713 & 717; Hair, JR. et al. 2014: 37) – usually within the structural model solely (Henseler, Fassott 2010: 717; Sarstedt, Henseler, Ringle 2011: 199; Hair, JR. et al. 2014: 247). Specifically, the incorporation of such moderating variables into SEM is highly relevant because it allows evaluating if tested relationships hold true if they are put into different circumstances and if the relationships’ strength change in diverse contexts (Chin, Marcolin, Newsted 1996: 21; Henseler, Fassott 2010:

716).³²⁸

In the case of *this dissertation*, a moderating variable symbolizing *company-age and -generation* is employed to test if the age and generation of German SME change the strength as well as direction of the relationship between the IC-based sources of success and lasting competitive business performance (cf. chapter 4.3).

In general, moderators can be divided into *metric* or *nonmetric* variables (Hair, JR. et al. 2010: 770 et seq.). The former are often concerned with psychological constructs like satisfaction. Opposite to this, nonmetric moderators are also referred to as *categorical* variables because they allow grouping characteristics such as respondents' gender, age or race (Hair, JR. et al. 2010: 770 et seq.; Henseler, Fassott 2010: 714; Hair, JR. et al. 2014: 37 et seq.). Building on this description, it can be noted that this doctoral thesis' moderator 'company-age and -generation' is a nonmetric construct.

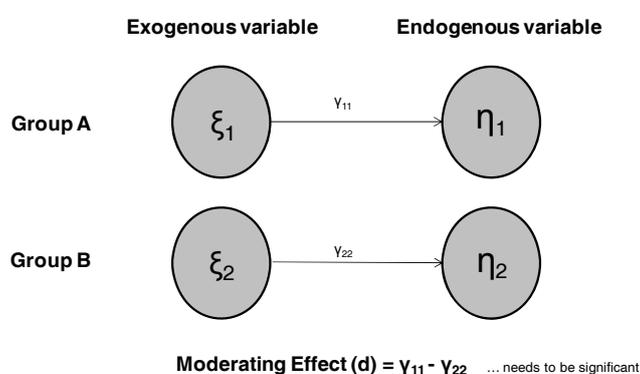
To test moderating effects, two options are available: the *product term* approach and the *group comparison* technique (Huber et al. 2007: 48; Henseler, Fassott 2010: 718).³²⁹ Which of them is used depends on the characteristic of the moderator (Huber et al. 2007: 48). The group comparison technique, which is also known as *multi-sample approach* or *multiple-group analysis* (MGA), is, for example, the preferred choice when relying on categorical variables – as applied in this doctoral thesis (Baron, Kenny 1986: 1175; Hair, JR. et al. 2010: 771; Henseler, Fassott 2010: 715 & 720 et seq.; Hair, JR. et al. 2014: 38 & 244). This is because the nonmetric moderator easily allows splitting the observations into different sample groups and to calculate the SEM separately for each of them. Subsequently, the results – specifically the model estimates and path coefficients –

³²⁸ If one, for example, looks into the impact of gender one may discover that a previously significant positive link between two tested variables only holds true for the female sample while the path coefficients between the same two construct are insignificant and negative in the male sample (Bagozzi, Yi 2012: 31; Hair, JR. et al. 2010: 770).

³²⁹ Joseph Hair, JR. et al. (2014: 37 et seq.) call them differently – i.e. continuous and categorical moderating approaches.

of the individual group models can be compared. If significant differences between the groups' SEM occur, then they can be interpreted as a moderating effect (Schloderer, Ringle, Sarstedt 2009: 594; Hair, JR. et al. 2010: 758 & 763; Henseler, Fassott 2010: 713 et seq. & 720; Bagozzi, Yi 2012: 29 & 31) (cf. figure 64). Lastly, it is interesting to point out that multi-group SEM can be especially well calculated in PLS because of PLS's less restrictive assumptions – particularly in terms of data properties and sample size (Chin, Dibbern 2010: 172).

Figure 64: Moderating Effect: Group Comparison Approach



Source: adapted from Henseler, Fassott 2010: 721

Building on the above illustrated theoretical discussion as well as chapter 4.3, it can be outlined that the examined population of this doctoral thesis is split into three age segments: *group 1* represents all firms which are *not older than ten years* and thus, at the beginning of their company life cycle - i.e. regarded as young.³³⁰ *Group 2* contains the firms which are *older than ten years* and thus, already establish in the market. As opposed to *group 3*, which covers enterprises which are currently in their *second or further company generation*, group 2 focuses on *first generation firms* which are (still) led by their founders (cf. chapter 4.3).

The structural models I and II, which are proposed in chapters 5.3.1 and 5.3.2, are run once for each sub-population and thus, six times in total. Subsequently, the models' outcomes can be analyzed for differences and similarities.

³³⁰ Cf. footnote 237.

6 DATA COLLECTION

After the establishment of hypotheses in chapter 4 and their transformation into statistically testable models in chapter 5, data is needed since it is a precondition for empirical support (Ping, JR. 2004: 125). Accordingly, this chapter shows where, from whom and how the empirical inputs of this dissertation are collected (Hübler 2005: 41). Specifically, chapter 6.1 provides a general introduction on data collection options. Besides, it explains why this doctoral thesis uses a questionnaire. The next section (6.2) illustrates where and from whom, respectively, data is gathered. In this chapter the dissertation's cooperation partner are also introduced and shortly outlined. Lastly, part 6.3 deals first with the initial questionnaire design, its pretest as well as its final version and the latter's distribution among the defined sample.

6.1 INTRODUCTION: PRIMARY DATA COLLECTION

Due to the fact that most German SME are not legally required to disclose their company data (Gruber 2000: 58) and because this doctoral thesis is interested in highly company-specific (to some degree even sensitive) facts – i.e. sources of success and financial figures³³¹ –, it is difficult to rely on secondary data. Thus, data needs to be directly collected from German SME. For this matter, one of the most common data gathering methods (in the area of business studies research) is applied: the written, self-completion questionnaire (Hübler 2005: 42 et seqq.; Raab-Steiner, Benesch 2008: 44; Horn 2009: 113; Kuß, Eisend 2010: 56; Bryman 2012: 233). This instrument allows collecting first-hand information as a response to respective questions (Kuß, Eisend 2010: 55) and hence, can be precisely tailored to this dissertation's hypotheses (Horn 2009: 113).

³³¹ Primary sources are especially beneficial when it comes to financial data (Venkatraman, Vasudevan 1986: 808).

Besides, using a questionnaire bears various advantages; especially over qualitative research such as the formerly performed interviews which are discussed in chapters 5.2.3 and 5.2.4. Firstly, a survey goes along with lower costs than personal interviews and is fast to administer – in particular when using an online-survey which can be easily spread among many people. Secondly, it is not affected by the researchers due to their absence during the completion. Thirdly, it provides the participants with convenience since they can decide on when, where, how etc. they want to fill out the questions (Bryman 2012: 233 et seq.).³³²

6.2 POPULATION AND SAMPLE

A general definition of German SME - i.e. the population of this research - is already provided for in chapters 3.1.1 as well as 3.1.2 and particularly in chapter 3.1.3 for the scope of this doctoral thesis. However, it is neither pragmatic nor economically feasible to question all German SME (Horn 2009: 111). As a consequence, a random sample which reflects the population with respect to key characteristics is used (Horn 2009: 110; Riesenhuber 2009: 8 & 11).

Concerning this dissertation's sample, various issues need to be highlighted. Firstly, success factor research often surveys successful firms in order to identify their sources of success and to gain insights which can (subsequently) be implemented in less successful enterprises (Wolf, Paul, Zipse 2009: 14; Bea, Schweitzer 2011: 299). However, in order to avoid/minimize abnormally distributed data as well as survival bias, this dissertation regards all (successful and less successful) SME, which are still on the market and thus, not insolvent, as relevant (broadly adopted from Krol 2010: 47)(Reinemann 2011: 102 et seq.). Hence, no specific selection is required. Secondly, it is often difficult to find willing participants (Petty, Guthrie 2000: 168), especially from multiple industry branches (Do Rosario Cabrita, Bontis 2008: 220) as well as up-to-date mailing lists (Kaya 2009: 53). To get access to German SME as well as their current contact

³³² For disadvantages of questionnaires – cf. Alan Bryman (2012: 233 et seq.).

details, collaborations with diverse organizations, foundations and networks are entered in order to reach their members. A brief overview of the cooperating institutions is provided in alphabetical order.

Bundesverband Liberaler Mittelstand

The federal association of liberal SME represents an aggregation of German SME as well as executive employees with a liberal orientation which/who are concerned with the interest of German SME. With currently about 1,300 members located all over Germany, the association aims to (co)shape German economic politics in terms of social market tendencies since over 20 years.³³³

eXebs

EXebs, also referred to as ebs alumni, is a network of former students of the European business school (ebs), Oestrich-Winkel, Germany. Its main purpose is to support the networking of its members, to foster their (life-long) education and to financially support current students of the ebs. EXebs was founded in 1977 and has at present about 3,200 members. Since many of these members are chief executive officers or managing directors of German SME, a fraction of them fits the required sample of this dissertation.³³⁴

Käte Ahlmann Stiftung

The Käte Ahlmann foundation (KAS) is a non-profit-organization (NPO) which promotes (professional) education and the equality of opportunities for women and men. Founded in 2001, the foundation especially aims to support start-ups as well as young firms during their launch and initial growth stage via personal, honorary coaching. The cooperation with the KAS is of particular value for this doctoral thesis because it allows access to about 400 young German SME.³³⁵

³³³ For more information please refer to the homepage: www.liberaler-mittelstand.de.

³³⁴ For more information please refer to the homepage: www.ebs-alumni.org.

³³⁵ For more information please refer to the homepage: www.kaete-ahlmann-stiftung.de.

Oskar-Patzelt-Stiftung

The Oskar-Patzelt foundation is a NPO which awards successful SME with the 'Großer Preis des Mittelstands' (Grand Prix of German SME) – one of the most prestige economic awards for German SME – since 1994. Apart from economic criteria, the price also looks into corporate social responsibility issues such as creating as well as securing jobs and engaging in local communities; research and development aspect like innovations; and sustainability.³³⁶ Besides, the foundation publishes a magazine called *P.T. Magazin* which reaches approx. 40,000 German SME six times per year. Overall, the Oskar-Patzelt-Stiftung is of substantial importance concerning German SME and the most contributing partner of this research work.³³⁷

Ratgeber Portal Existenzgründer und Jungunternehmer

The internet portal with special focus on German start-ups and young firms was founded in 2008 and has to date over 1,500 followers on facebook only. It provides motivated entrepreneurs with continuous state-of-the-art information concerning various topics relevant in the first stages of the company life cycle. With the support of this network, this doctoral thesis is able to gain access to young German SME and start ups.³³⁸

Verband deutscher Unternehmerinnen

The association of female entrepreneurs (VDU) is the only German interbranch federation which represents the interest of its approx. 1,600 predominantly SME members. Since its foundation in 1954, the VDU established itself as a highly

³³⁶ The inclusion of these 'fairly successful' SME in the sample is important because of the following recommendation for future research: "When the KM field has matured, research work could then be targeted at best practice organizations. This would mean involving a sample of best practice SMEs to agree on a set of CSFs for successfully implementing KM in their own organizations" (Wong, Aspinwall 2005: 77).

³³⁷ For more information please refer to the homepage: www.mittelstandspreis.com.

³³⁸ For more information please refer to the homepage: www.existensgruender-jungunternehmer.de.

powerful force of the German economy.³³⁹

Others

Furthermore, about half a dozen small organizations mainly with focus on start-ups as well as young SME support the data collection of this dissertation. Among them are regional start-up initiatives, associations, consultants and private networks.

In order to preserve actuality, the chosen sample of this dissertation only contains German SME which are current members of their respective association, networks or organization and which have been nominated for the Grand Prix of German SME in the last maximum eight years. This sums to a total sample of about 5,000 German SME. Yet, it is important to note that this number is estimated because not all cooperation partners are able to enumerate the amount of their addressees. This is especially the case for the internet-based actions which cannot precisely determine the amount of their 'followers'.

6.3 COURSE OF DATA COLLECTION

The following chapter details the design stage of the questionnaire as well as its distribution among the above established sample of German SME. Especially the questionnaire development is an important issue because the researcher of this dissertation is unable to administer the questionnaire-completion with every participant – particularly because of the above presented fairly large settings. Thus, great attention needs to be paid in order to facilitate ease of use, user friendliness and comprehension (Bryman 2012: 233 et seqq.).

³³⁹ For more information please refer to the homepage: www.vdu.de.

6.3.1 Questionnaire Development

In this section, the initial development of the self-completion questionnaire (Bryman, Bell 2007: 240; Bryman 2012: 233) for empirically investigating German SME' IC as well as lasting competitive business performance is described (cf. appendix 13 for the final questionnaire version).

First of all, it is essential to consider that the questionnaire conforms to the objectives of this dissertation, its hypotheses as well as the in chapter 5.2 established measurement model of the empirical test (Porst 2011: 15; Mayer 2013: 58). In this regard, specific *investigative questions*, which are in line with the final measurement models (cf. chapters 5.2.5 and 5.2.6), are raised on top of *general/biographical questions*, which are related to the characteristics of the participating German SME (Horn 2009: 118).

Unfortunately there are, however, no precise rules on how a 'good' questionnaire should look like. Nevertheless, there are various literature recommendations whose observance is supposed to improve quality (Stier 1999: 181 et seq.). Examples of the latter include

- clear writing and simply understandable as well as target-group specific language,
- structured layout,
- questions not stretched over two pages,
- visual aid,
- numbered questions,
- precise instructions on how to answer questions,
- avoidance of biased response patterns (preferred neutrality), and
- length since long questionnaires lead to low response rates³⁴⁰

(Hübler 2005: 301; Raab-Steiner, Benesch 2008: 51; Horn 2009: 120; Kaya 2009: 54 et seq.; Kuß, Eisend 2010: 73 et seqq., 82, 109 et seqq. & 116; Porst 2011: 19 et seqq.; Bryman 2012: 237 & 254 et seqq.).

³⁴⁰ The work at hand with its about 80 questions is below the recommended maximum of 100 questions (Homburg 2012: 303).

Besides, it is generally recommended to carefully think about the sequence of the questions and to use closed questions since provided possible answers facilitate completion by bringing back memories (Raab-Steiner, Benesch 2008: 50; Horn 2009: 122; Kaya 2009: 54 et seq.; Kuß, Eisend 2010: 73 et seq., 83 & 107 et seq.; Bryman 2012: 249 et seq.).

The beginning of this dissertation's questionnaire starts with general information which notify the participants of the title and purpose of the study/survey, the estimated time for completion, the reward for participation, and the researching institution as well as the responsible researchers (including their contact details). Furthermore, the introduction includes a confidentiality- as well as an anonymity-reference which is highly important because this dissertation's survey asks for sensitive company information (Horn 2009: 118; Porst 2011: 34 et seq.).

Following this, the participants get short but explicit instructions on how to administer the questionnaire. They are, for instance, asked to provide company information from the year 2012³⁴¹, to round figures to whole numbers, to only provide one answer per question, and to enter a zero (= 0) if a question does not apply to their business. Furthermore, the respondents are solicited to rarely use the "No comment/not known" answer-option, which is included because of the sensitivity of the questions and to make the disclosure of insightful information compulsory. Moreover, specific guidance is directly provided if required - i.e. if individual answer-patterns vary from the standard design. Likewise, additional information such as question-specific examples are sometimes provided as memory aids (Raab-Steiner, Benesch 2008: 50 et seq.; Horn 2009: 120; Kaya 2009: 51; Kuß, Eisend 2010: 73 et seq. & 83).

The first set of questions is rather generally orientated and looks into things like industry branch (based on public guidelines – cf. Brigitte Günterberg 2012: 7,

³⁴¹ This is done to ensure actually – i.e. participants still remember the previous year (Kuß, Eisend 2010: 73 et seq.) –; and because one can assume that companies have filed their 2012 financial review by Q4 2013/Q1 2014 and thus, should be able to provide full information on questions referring to 2012.

Statistisches Bundesamt 2013: 497 et seqq., and European parliament and council 2006: no. 1893), state of location, whether the location is in a rural or urban area, if standardized or niche-market products/services are offered, and the legal structure of the firm. These questions are intended to 'break the ice' and to originate interest (Raab-Steiner, Benesch 2008: 51; Kuß, Eisend 2010: 110).

Subsequently, the key part of the questionnaire, which is concerned with IC- as well as performance-issues, starts. Beginning with SC³⁴², the first three blocks of questions look into organization capital, followed by development capital and ending with technological capital. After this first section, participants are thanked for providing such specific information on their SC and asked to proceed with HC (such a thank-you-note is left after each set of questions in order to motivate the participant to continue). The order of the HC-questions follows the pattern of the previous chapters – i.e. employees' competencies, attitude and intellectual agility, as well as leadership. The last section of IC-questions deals with RC – also according to the already established sequence: starting with a list of questions on customers, then suppliers, creditors and shareholders, alliance partners, informal relationships and lastly public perception. Only after the IC-issues are dealt with and confidence is established, the highly sensible performance indicators are asked for. Finally, one finds more specific demographically-orientated questions such as turnover, shares held by external shareholders, management's involvement in important decisions etc. which also require trust to be veridically answered. The above explained sequence of the questions is chose because it follows the literature recommendations – including past studies – such as

- general questions before the particular ones,
- sensitive questions not at the beginning,
- related questions grouped into sets,
- and demographic issues towards the end

(Stier 1999: 182 cited by Reuschenbach 2012: 122; Wong, Aspinwall 2005: 67; Pawlowsky et al. 2006: 10; Raab-Steiner, Benesch 2008: 51; Horn 2009: 122; Kuß, Eisend 2010: 107 et seqq.).

³⁴² Questions covering SC are asked before HC (i.e. in a reverse manner to the previous illustrations) since HC issues are regarded as more sensitive/confidential and thus, require some sort of established rapport.

At the very end of the questionnaire, a 'thank you'-note is left (Horn 2009: 122). Moreover, the option is provided to ask for the study's results once they are published.

6.3.2 Second Pretest: Field Test (Part II)

Once the above illustrated self-completion questionnaire is drafted, it is pretested in a small sample of 16 German SME³⁴³ (cf. chapter 5.2.4 and Table 18) to ensure it gathers valid data of high quality (Raab-Steiner, Benesch 2008: 58; Horn 2009: 115; Gläser, Laudel 2010: 107; Bryman 2012: 263). In particular, such a pilot test is important, for example,

- to examine whether the participants understand the questionnaire as well as the individual questions,
- to identify misleading issues,
- to judge the sequence of the questions,
- to recognize highly sensitive questions,
- to improve the layout,
- to estimate the time of completion, and
- to test the introduction text as well as the instructions

(Durst 2008: 412; Horn 2009: 122 et seq.; Kaya 2009: 54; Kuß, Eisend 2010: 72 & 111 et seqq.; Bryman 2012: 263 et seq.).

Apart from the in chapter 5.2.4 explained modifications to this dissertation's indicators, the interviews with the 16 German SME indicate general adjustments to the questionnaire, too. The most important ones are the inclusion of the information that all participants have the same link to as well as password for the online questionnaire, the advice to further stress that each question has only one

³⁴³ Some researchers believe that smaller samples of six to ten pilot firms are sufficient (Horn 2009: 122) - cf. also other studies on German SME' IC with only four pretests (Vanini 2011: 5) or international SME research with just 10 pretests (Meijaard, Brand, Mosselman 2005: 87). Thus, this doctoral thesis exceeds general recommendations.

answer and to bring numerical answers up or down to round figures in ten-, hundred- or thousand-steps. Furthermore, the pretest-interviews point to the fact that the industry branches require further specification via specific examples, and that the descriptions of the capital classes need to be simplified – e.g. explain HC in more simple words. Moreover, the pilot tests show that the rating scales require an explicit explanation since they do not correspond to the German school-grade-system, and that various individual questions need to be linguistically revised (incl. definitions). On top of this, one of the general questions from the beginning is delete ('which production method do you apply?') since it predominantly applies to manufacturing SME and thus, indicates the threat of high missing values.

All of these modifications are revised in the first questionnaire draft (cf. chapter 6.3.1) and further elaborated in the next section 6.3.3.

6.3.3 Final Questionnaire and its Distribution

The final questionnaire (cf. appendix 13 for the specific questionnaire of the *Oskar-Patzelt-Stiftung*³⁴⁴), which is set up as an *e-survey*, is distributed among approx. 5,000 German SME between November 2013 and March 2014. Specifically, the cooperation partners sent an email to their respective members and thereby invited them to participate in the survey.³⁴⁵ Such a set up is chose to overcome potential issues of low response rates and thus, the issue of ungeneralizable results (Steenkamp, Kashyap 2010: 374).

These distributed emails contained the respective link to the web-based

³⁴⁴ The questionnaires are minor adjusted depending on the cooperation partner. Specifically this means that their logo is sometimes included, the names of the 'thank you note' are adjusted to the partners' president(s), the mailing address for paper-based surveys is altered and for the *Oskar-Patzelt-Stiftung* a question asking for the specific price won by the SME is included.

³⁴⁵ The researcher of this dissertation distributed the survey to the members of *eXebs* and the *Verband deutscher Unternehmerinnen* because of the author's private access to these data.

questionnaire³⁴⁶ as well as the questionnaire in pdf-format and a brief research description in the attachment. In detail, the *pdf-version of the questionnaire* is attached for the event that participants prefer to complete the survey offline. In such a case, they are asked to send back their completed questionnaire either via email, fax or post to their respective organization, alliance or network which then passes the data on to the researcher. This is done to allow for robust anonymity arrangements: the independent returning officers ensure anonymity of the questionnaire (Horn 2009: 114). The *content of the emails* is drafted by the researcher and provided to the respective cooperation partners who are free to alter it according to their preferences (cf. an example in appendix 14). In particular, it contains information on the following issues:

- what is being researched,
- why such research is of relevance and what is aimed for,
- why the addressees' support is asked for,
- a confidentiality- and anonymity-note,
- the estimated time for completion (based on the pre-test experience),
- the link to the survey and its password,
- the available timescale for answering the questionnaire (between November 2013 and March 2014),
- the mailing address, email or fax-number for the paper-based questionnaire,
- the incentive for participation – i.e. to receive an exclusive summary of the results which assist them in improving their IC as well as to serve as a benchmark against other German SME –, and

³⁴⁶ Each of the organizations has its own link in order to make it look more professional as well as related to the respective organization/foundation/network – cf.

- Bundesverband Liberaler Mittelstand: www.soscisurvey.de/IC_KMU_LibMit/

- eXebs: www.soscisurvey.de/IC_KMU_eXebs/

- Käte Ahlmann Stiftung: www.soscisurvey.de/IC_KMU_KaeteAhlmann/

- Oskar-Patzelt-Stiftung: www.soscisurvey.de/IC_KMU_OskPat/

-Ratgeber Portal Existenzgründer und Jungunternehmer:

www.soscisurvey.de/IC_KMU_Jungunternehmer/

- Verband deutscher Unternehmerinnen: www.soscisurvey.de/IC_KMU_VDU/.

Yet, the password was equal among them.

- the researcher's contact details

(Petty, Guthrie 2000: 168; Horn 2009: 114 & 118 et seqq.; Kaya 2009: 51; Porst 2011: 34 et seq.). Similar contents are also covered in the *research project description*; yet, in a little more detail (cf. appendix 15).

Because of the circumstances that the data collection was conducted over the Christmas holidays, a reminder email was send to each sub-sample at the beginning of 2014. The purpose of the reminder is to recall the survey as well as its deadline into the non-respondents memory as well as to thank the participants for their support in case they have already answered the survey. Furthermore, telephone reminders were performed among the sample firms for which contact details were available at the beginning of 2014.³⁴⁷

The deadline for completion was extended various times in order to increase the amount of respondents and thus, to allow testing all proposed hypotheses.

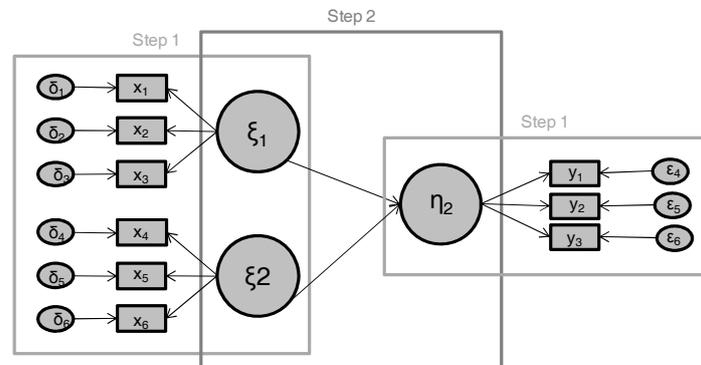
³⁴⁷ I.e. the members of eXebs and the *Verband deutscher Unternehmerinnen*.

7 RESULTS AND INTERPRETATION OF THE EMPIRICAL STUDY

The current chapter shows the results of the empirical study. First of all, the data is evaluated in terms of its suitability for statistical investigations and purified accordingly in section 7.1. General information on the sample and its representativeness are also provided in part 7.1. Following this, the SEMs are calculated and analyzed. Concerning the analysis, one has to look at the measurement model (i.e. the relationship between the indicators and dimensions, and the relationship between the dimensions and the higher-order latent constructs) and the structural model (i.e. the relationship between the latent constructs) independently. This is because there are no global quality-criteria for PLS due to the lacking simultaneous parameter estimation (Ringle et al. 2006: 86; Huber et al. 2007: 43; Ringle, Spreen 2007: 212; Schloderer, Ringle, Sarstedt 2009: 597; Hair, JR. et al. 2014: 113). Specifically and as it is also shown in figure 65, it is advised to first assess the reflective or formative measurement models (cf. chapter 7.2) before dealing with the structural models (cf. chapter 7.3) since a satisfactory and confident measurement – e.g. reliability and validity – is a precondition for a good inner model (Bagozzi 1981: 376; Anderson, Gerbing 1988: 411 & 453; Ping, JR. 2004: 125; Ringle, Spreen 2007: 212; Chin 2010a: 669 et seq.; Hair, JR. et al. 2014: 113).³⁴⁸ The subsequent section 7.4 displays the results of the impact of company-age and -generation on German SME' IC and lasting competitive business performance. Lastly, the results are summarized in chapter 7.5.

³⁴⁸ Such a structure is also highly suitable for research on sources of success because looking into the drivers of success has a high priority – arguably higher than hypotheses testing in the structural model (Albers 2010: 417).

Figure 65: Two-Step Approach to Analyze PLS-SEMs



7.1 DATA EXAMINATION, PURIFICATION AND DESCRIPTIVE STATISTICS

The following sub-chapters exhibit the characteristics of the responding German SME as well as the general quality assessment of the data to ensure that it is well suited for further empirical tests in PLS. Specifically, this chapter starts with all participants and explains why some data sets have to be eliminated. The remaining observations are discussed in detail.

7.1.1 Responses and Response Rate

During November 2013 and March 2014 a total of 266 observations is collected from the above introduced sample group (cf. chapter 6.2).

A definite *response rate* can, however, not be reported for this doctoral thesis. That is firstly because the link to the online survey was distributed by various cooperation partners who are unable to precisely report the exact amount of addressees. Secondly, diverse formats including a post in an online blog were used and do also not allow to accurately specify the amount of followers. Nevertheless, based on the available information a total sample size of 5,000

German SME seems realistic.³⁴⁹ When putting these 5,000 sample-SME into relation to the 266 received responses, one derives at a response rate of almost 5.5%.

Although this response rate is rather low, it seems reasonable compared to other studies on SME and their IC whose responses range between approx. 8% (Wong, Aspinwall 2005: 67 et seq.) and 10% (Steenkamp, Kashyap 2010: 373). Besides, it is assumed that the response rate of this work is not very high because of the relatively long questionnaire with an average completion time of about 25 minutes, the sensitive information which is asked for, the time of the year (just before Christmas and during the holidays), the lack of interest to participate in a novel research field, and the complexity of the topic (Hübler 2005: 301; Horn 2009: 115 & 122; Steenkamp, Kashyap 2010: 373 et seq.).

7.1.1.1 *Valid Observations: German SME*

Out of the 266 total observations, 242 can be used for the scope of this work. This is because 24 cases do not meet the SME definition underlying this thesis (cf. chapter 3.1.3). Specifically, these 24 cases, which are henceforth called *big champions*³⁵⁰, exceed either one (20 cases) or both (6 cases) threshold values which (quantitatively) define German SME: less than 500 employees and a maximum turnover of € 50 m. (cf. chapter 3.1.3). For more details please look at figure 66.

³⁴⁹ *Bundesverband Liberaler Mittelstand* – approx. 1,200; *eXebs* – approx. 150; *Käte Ahlmann Stiftung* – approx. 400; *Oskar-Patzelt-Stiftung* – approx. 3,000; *Ratgeber Portal Existenzgründer und Jungunternehmer* – not known; *Verband deutscher Unternehmerinnen* – approx. 200; and others.

³⁵⁰ This name is inspired by Hermann Simon (2007: 29).

Figure 66: Valid Sample vs. Big Champions

Valid Sample Group		Big Champions	
< 500 employees	< 50 m € turnover p.a.	> 500 employees	> 50 m € turnover p.a.
&			
242		4	14
		6	
Total: 266			

When deleting these 24 cases from the total observations, the *response rate* changes, too. Specifically, the response rate reduces to a little less than 5%.

7.1.2 Nonresponse Bias

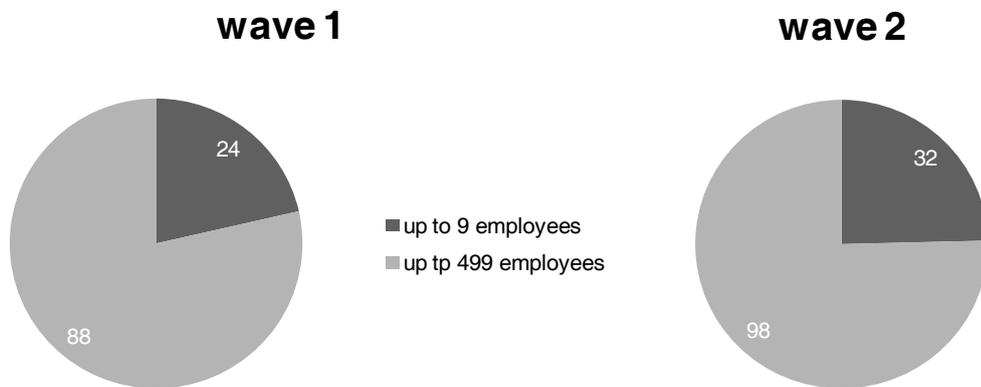
„If persons who respond differ substantially from those who do not, the results do not directly allow one to say how the entire sample would have responded – certainly an important step before the sample is generalized to the population“

(Armstrong, Overton 1977: 396).

Besides the response rate, it is also important to evaluate whether the remaining 242 German SME who participated in the survey systematically differ from the ones who did not respond. Such an evaluation is especially important to determine if the collected data sets are representative for all German SME – i.e. the population (Armstrong, Overton 1977: 396; Hübler 2005: 44; Kuß, Eisend 2010: 115). For this matter, it is common practice to *compare* the *first wave* of observations with the *second wave* of observations since the later participators are

expected to be similar to the nonrespondents (Armstrong, Overton 1977: 397).³⁵¹ In the case of this doctoral thesis this is done by comparing the SME which responded after the first email with the SME which needed the reminder to participate.³⁵² Such a comparison is usually made on additional criterion-data and for the scope of this work on company-specific characteristics including number of employees, turnover, industry branch, location, product offerings and legal structure.

Figure 67: Pie Diagram – Wave 1 vs. Wave 2: Employees



³⁵¹ The *successive waves approach* is the most common extrapolation method (Armstrong, Overton 1977: 397).

³⁵² This examination is only performed with respect to the SME which received emails; rather than e.g. posts in an online blog.

Figure 68: Pie Diagram – Wave 1 vs. Wave 2: Turnover

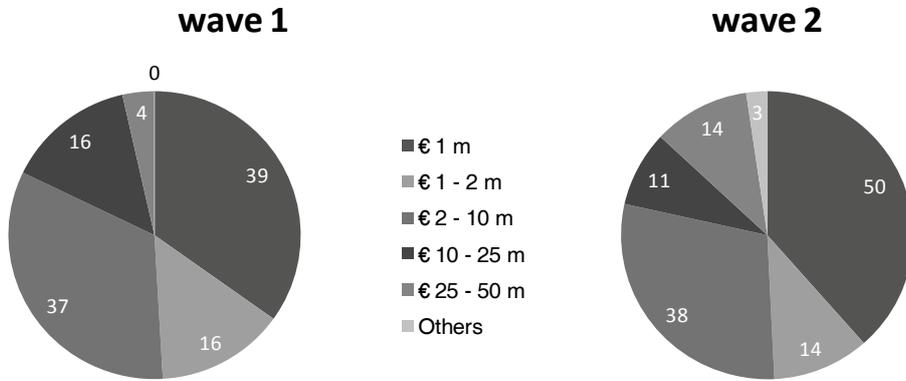


Figure 69: Pie Diagram – Wave 1 vs. Wave 2: Industry

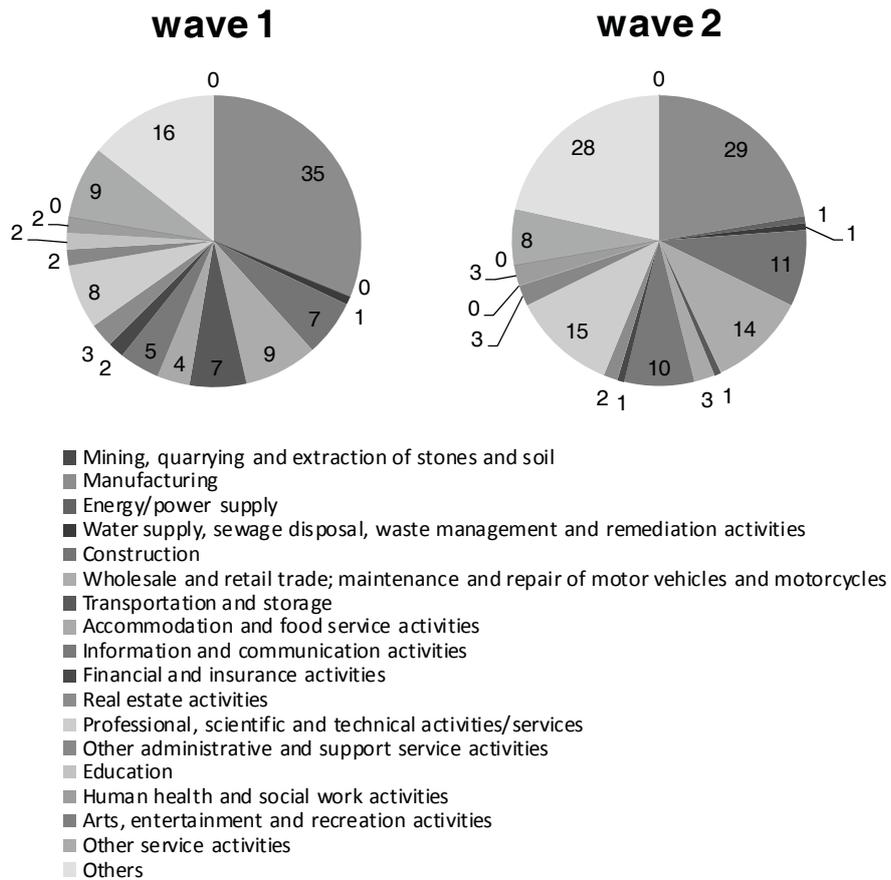


Figure 70: Pie Diagram – Wave 1 vs. Wave 2: Location – State

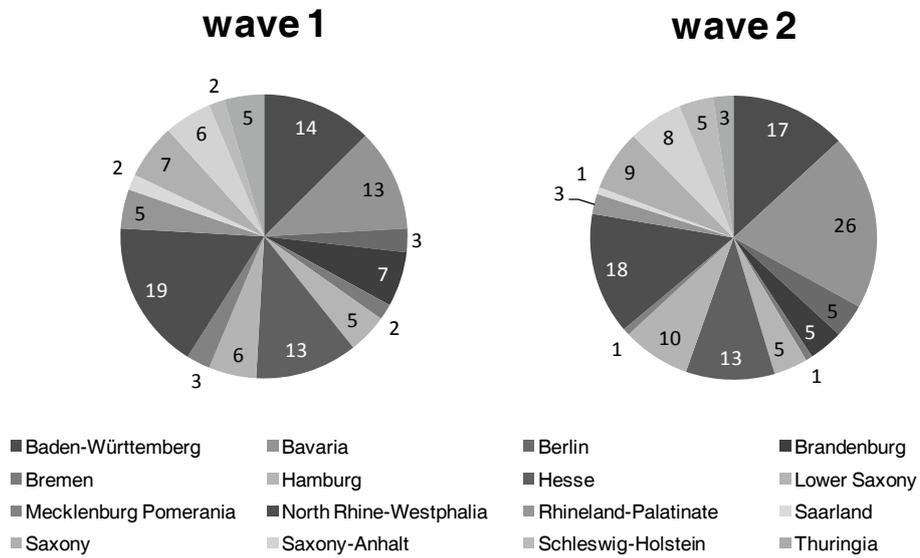


Figure 71: Pie Diagram – Wave 1 vs. Wave 2: Location – Urban or Rural

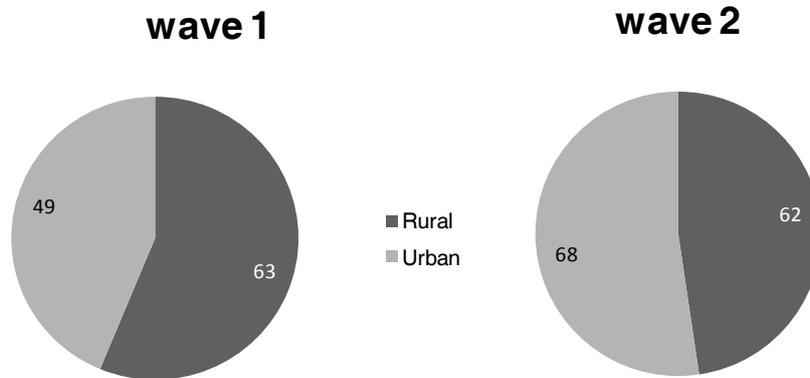


Figure 72: Pie Diagram – Wave 1 vs. Wave 2: Offerings

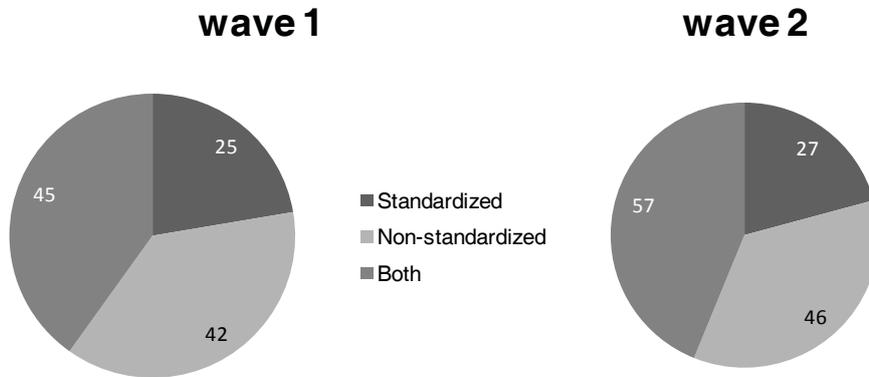
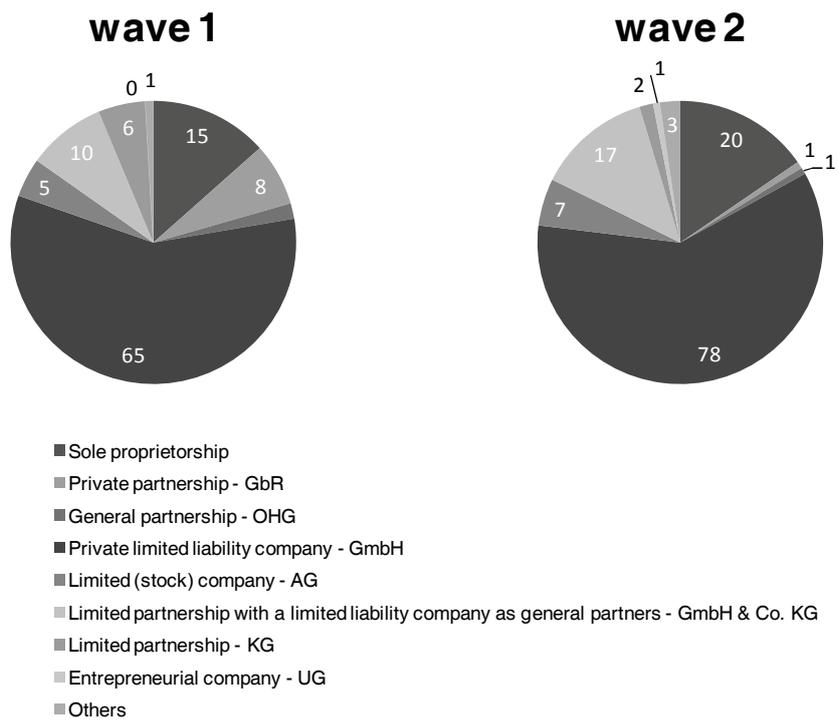


Figure 73: Pie Diagram – Wave 1 vs. Wave 2: Legal Structure



When looking at the above presented pie diagrams (cf. figure 67 - figure 73), one can see that wave 1 and wave 2 (without big champions) differ only minor. With respect to *employees*, for example, wave 1 and wave 2 vary just around 3%. Specifically, wave 1 contains 21.43% SME with less than ten employees and 78.57% SME with more than ten employees, while wave 2 consists of 24.62% and 75.38% respectively. Yet, slight differences appear, too. Exemplary cases of dissimilarities include the *turnover* segments between € 10 m. and € 25 m. as well as between € 25 m. and € 50 m. where wave 1 and wave 2 differ 5.69% and 7.37%, respectively; or the industry *branches* manufacturing, and transportation and storage which vary 8.94% and 5.48% between wave 1 and wave 2.

Nevertheless, it is especially important to test if the *differences* between the first and later respondents are *statistically significant*. This can be done via the *chi-square-test* (Linoff, Berry 2011: 131) which specifies if two groups differ significantly with respect to a specific variable. The chi-square-test does, however, not indicate the strength of the difference (Morgan, Griego, Gloeckner 2001: 90 et seq.; Backhaus et al. 2011: 312 et seq.).

The chi-square-test requires to firstly define the *(null-)hypothesis* which states that there is *no differences of a variable in the two sub-samples* (Backhaus et al. 2011: 313 & 408). Then, one needs to calculate the chi-square-score by comparing the actual frequencies with the expected ones (Vaughan 2001: 77; Bryman, Cramer 2011: 206). Specifically, it can be stated that the smaller the difference – i.e. the closer to zero –, the more the (null-)hypothesis can be supported (Backhaus et al. 2011: 313; Homburg 2012: 342); or in different words: the larger the chi-square score, the larger the probability that the groups differ and thus, do not originate from the same population (Vaughan 2001: 77; Backhaus et al. 2011: 409). But, as mentioned above, the third step, which actually checks if the (null-)hypothesis is true, is the most important one. This is done by investigating if the p-value associated with the respective chi-square-score is above the pre-specified significance-level of usually 0.05; and thus, whether the (null-)hypothesis is not rejected (i.e.

supported) (Vaughan 2001: 77 & 81; Bryman, Cramer 2011: 206).³⁵³

Table 21: Nonrespons Bias: Chi Square Test

Variable	Chi-square	Degrees of Freedom	p-value
Number of Employees	0.344	1	0.558
Turnover	9.703	5	0.840
Industry Branch	16.998	15	0.319
Location – i.e. state	9.687	15	0.839
Location – i.e. rural / urban	1.764	1	0.184
Offerings	0.334	1	0.846
Legal Structure	12.553	8	0.128

Table 21 illustrates the chi-square scores, degrees of freedom (df) and the p-values of the variables under investigation. In depth, the chi-square values of industry branch, legal structure, turnover and location (state) are fairly high, especially compared to the ones of offerings, employees and location (rural or urban). Therefore, it can be assumed that the former mentioned are not supporting the (null-) hypothesis as much as the latter mentioned offerings, employees and location do. Yet, when looking at the p-values it can be seen that all values are larger than 0.05. This means that all (null-) hypotheses are supported.

Overall, it can therefore be concluded that there are no differences between wave 1 and wave 2 with regard to the above illustrated investigated variables. Thus, the sample is expected to represent all German SME well.

³⁵³ P-value < 0.05 (0.01 respectively) → nullhypothesis is rejected/not supported; p-value > 0.05 (0.01 respectively) → nullhypothesis not rejected/supported (Gehring, Weins 2009: 285).

7.1.3 Data Cleansing

The following three sub-chapters identify and handle incomplete, incorrect, and inaccurate data sets as well as constructs in order to ensure that only high quality inputs enter the SEM-calculations. Chapter 7.1.4 finally provides information on the remaining sample size.

7.1.3.1 *Missing Values: Deleted Cases and Variables*

At first, the data is checked for missing values among the case (without the big champions) as well as variables (Hair, JR. et al. 2010: 43). This is done because missing data is a major issue after the data collection (Hair, JR. et al. 2014: 50) since it causes problems concerning model estimation (Bagozzi, Yi 2012: 32).

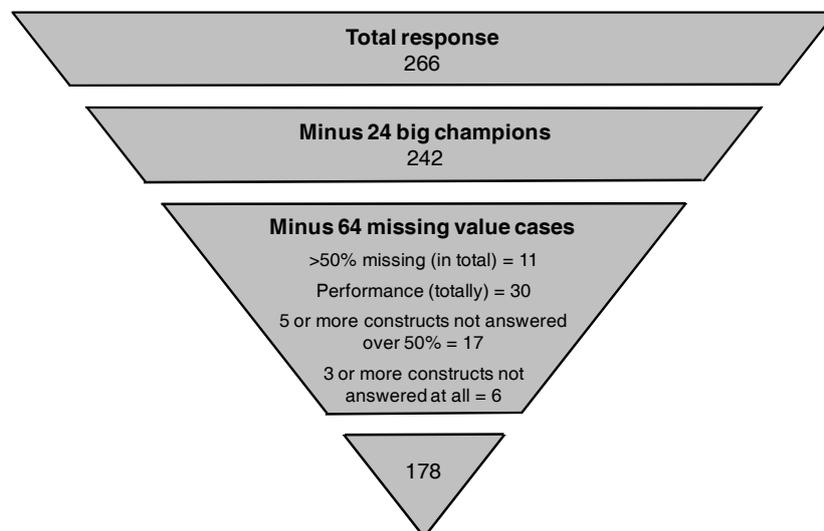
Firstly, it is important to point out that the amount of missing values in this dissertation's survey-data is fairly high since the participants often used the option "No comment/not known".³⁵⁴ This is, unfortunately, frequently the case in research – especially with long and sensitive questionnaires (Göthlich 2007: 120; Olbrich, Battenfeld, Buhr 2012: 79; Hair, JR. et al. 2014: 51 & 122) – and explains why some researchers do not include this option in their surveys at all (Kuß, Eisend 2010: 83). Nevertheless, because of the sensitivity of this doctoral theses' questions, the "No comment/not known" option is incorporated (cf. chapter 6.3.1) and now has to be dealt with.

Specifically, it can be noted that Joseph Hair, JR. et al. (2010: 48) recommend to delete all *cases* with missing values over 50% and all data sets with missing data for the dependent variables. Thus, all observations with more than 50% of questions not answered and all cases which totally omit the questions on 'lasting competitive business performance' are eliminated.

³⁵⁴ In the scope of this dissertation, there are only cases of purposely missing data because accidental failure to answer a question is prevented by the online survey (Hair, JR. et al. 2014: 51) – i.e. a direction to please answer missing questions before proceeding pops up.

Moreover, the remaining data is checked for systematically missing data (Weiber, Mühlhaus 2010: 142).³⁵⁵ In this regard the one-third rule from chapter 5.2.4 is applied again. In detail, this means that all cases which left five or more³⁵⁶ constructs blank to over 50% – i.e. 50% of the questions related to a latent construct or dimension are answered with “No comment/not known” – are deleted, too. Likewise, all observations which did not answer three or more constructs/dimensions at all are also eliminated. For details on the specific number of deleted cases please look at figure 74.

Figure 74: Impact of Missing Values on Sample Size



After the 64 cases are deleted, the *variables* are also checked for their degree of missing data. Again, all variables which are missing more than 50% values are deleted (Hair, JR. et al. 2010: 48). This applies to two performance variables (return on assets with 54% and return on equity with 50% of missing data) and is not surprising when taking into account the sensitivity of the questions. All other

³⁵⁵ This includes the analysis of suspicious response patterns (Hair, JR. et al. 2014: 52 et seq.), of which none are identified.

³⁵⁶ 14 constructs/dimensions in total \times 1/3 which is allowed to miss = 4.66666 = 5 latent variables/dimensions not answered to 50% or more are deleted.

variables are kept.

7.1.3.2 *Outliers*

“Outliers are observations with a unique combination of characteristics identifiable as distinctly different from other observations”

(*ibid.*: 64).

Outliers, such as item-values which are far above or far below the bulk of the data, need to be identified and dealt with since they can lead to severe issues during statistical analysis (Kristensen, Eskildsen 2010: 333; Temme, Kreis, Hildebrandt 2010: 49 & 56). PLS does, however, not support the identification of outliers (Hair, JR. et al. 2014: 53). Therefore, David Hoaglin et al.’s (1986; 1987) resistant rule for identifying outliers³⁵⁷ and SPSS (Hair, JR. et al. 2014: 53) as an instrument to determine lower and upper fourths are used for this matter.

The calculations of David Hoaglin et al.’s formula point to various outlines (cf. appendix 16). However, these statistically identified outliers are further checked with respect to contents since “(...) not all outliers are errors” (Chapman 2005: 17). Put differently, some answers are perfectly fine and thus, represent reality although they are smaller or larger than the lower or upper quartile.

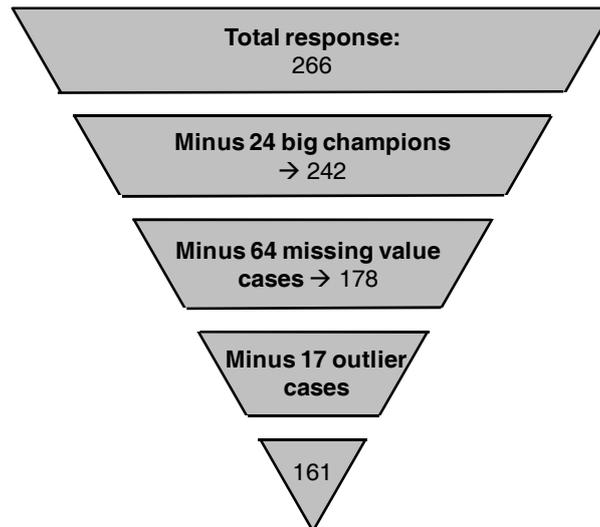
Building on this, 17 entire cases are excluded to improve the data's quality. A specific explanation including the reason for elimination can be found in appendix 17.

Overall, it can be concluded that although there are some influential observations, only minor data needs to be deleted. This is most likely the case because the online survey is programmed in a way to avoid – or better not allow – outlier-answers: e.g. maximum caps and/or lower limits are defined, for year-dates only

³⁵⁷ Upper boarder = $Q3 + (2.2 * (Q3 - Q1))$ and lower boarder = $Q1 - (2.2 * (Q3 - Q1))$ (Hoaglin, Iglewicz 1987; Hoaglin, Iglewicz, Tukey 1986).

18XX, 19XX or 20XX are accepted etc. The resulting sample size after the deletion of cases with outliers sums to 161 cases (cf. figure 75).

Figure 75: Impact of Outliers on Sample Size

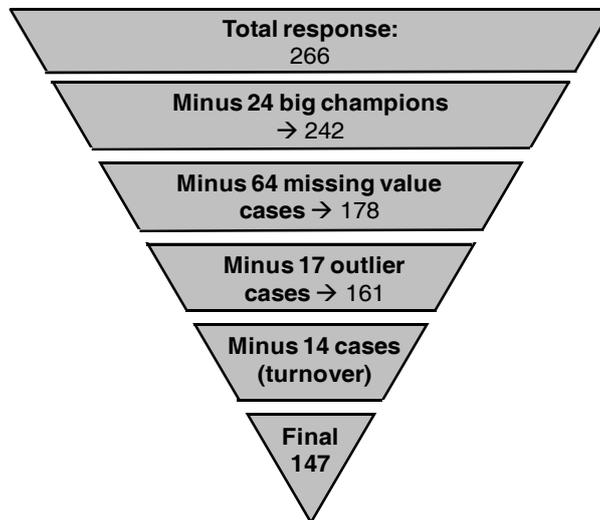


7.1.3.3 Additional Cleansing

Additional 14 cases are deleted because of unrealistic turnover figures. This refers predominantly to cases with profit figures of zero or very low and thus, unlikely amounts (cf. for a detailed overview please see appendix 18). An example includes a case with a turnover of € 190.000 which is highly unlikely for a company with 100 employees and € 770.000 investments in IC, only. Thus, it is assumed that wrong answers were (accidentally) entered into the online survey. Since such cases can lead to wrong calculation-results, they are eliminated before running PLS to ensure that only high quality data is used.

After erasing these 14 cases, the final sample contains 147 cases (cf. figure 76 for a detailed overview). All of these 147 cases enter the SEM calculations in PLS and thus, deliver the results of this doctoral thesis' empirical evaluation.

Figure 76: Impact of Additional Cleansing on Sample Size



7.1.4 Final Sample Size

„There is no doubt that sample size plays an important role in almost every statistical technique applied in practice. Although there is universal agreement among researchers that the larger the sample the more stable the parameter estimates, there is no agreement as to what constitutes large“

(Marcoulides, Saunders 2006: iii).

Since there is no agreement, this doctoral thesis relies on *rules of thumb* to determine whether the collected observations are sufficient.

As already indicated in chapter 5.1.4, PLS generally works well even with small samples. However, the most *general rule* states that one requires ten times the maximum number of arrows pointing at a latent construct (Hair, JR. et al. 2014: 75). In this case this is six: six dimensions point towards RC. This leads to a minimum sample size of 60 (= 10 × 6). Since the 147 valid data sets of this dissertation surpass the 60 demanded cases by far, the sample size is evaluated as appropriate.

However, Joseph Hair, JR. et al. (2014: 21 & 75), who refer to Jacob Cohen’s *power*

primer (1992), state that a proper sample size with six arrows pointing towards a latent variable should range between a minimum of 32 cases (to detect R^2 of minimum 0.75 at a significance-level of 10% and 80% statistical power) and 217 responses (to detect R^2 values of minimum 0.1 at a significance-level of 1% and 80% statistical power). The 147 cases of this research do, unfortunately, not meet the highest demanded sample size of 217. However, it clearly exceeds the second highest recommendation of 103 data sets for six arrows and with R^2 of minimum 0.25 at a significance-level of 1% and 80% statistical power. Consequently, the 147 are again judged as acceptable.

Besides, 147 observations surmount Richard Bagozzi and Youjaeb Yi's (2012: 29), Wynne Chin's (2003: 200 et seq.; 2010a: 662) and Frank Huber et al.'s (2007: 2) *recommendations* of a minimum of 100 cases and best near 150 to improve PLS's accuracy.

7.1.5 Missing Values: Imputation

After deleting various cases as well as variables, as described in the previous chapters (cf. chapters 7.1.1.1 & 7.1.3), there are, unfortunately, still missing values left. These need to be filled with values since SEM requires complete data sets (Weiber, Mühlhaus 2010: 142). There is, however, not yet an established best practice to handle missing values (Göthlich 2007: 132; Göthlich 2009: 132). Generally, it can be said that if missing values are below 5% (Hair, JR. et al. 2014: 51) or 10% (Schnell, Hill, Esser 1999: 430 cited by Göthlich 2007: 132; Festge 2006: 110; Schnell, Hill, Esser 2011: 457) respectively, they are regarded as 'not critical' and thus, can be substituted by the mean values of the available information. But if the missing values exceed this threshold, it is recommended to impute missing values via the regression technique or the model-base method such as expectation maximization (EM) (Hair, JR. et al. 2010: 48 & 56).³⁵⁸

³⁵⁸ For an overview of alternative methods please refer to Stephan Göthlich (2009).

Before imputing any data and especially via the EM approach, however, one has to examine whether the missing data are *missing completely at random* (MCAR) – i.e. “(...) the missingness depends neither on the observed variables nor on the missing values” (McLachlan, Krishnan 2008: 265). It is important to do so because MCAR allows using any (ML) imputation method - including EM (Hair, JR. et al. 2010: 49 & 62; Weiber, Mühlhaus 2010: 143). For this matter Roderick Little’s (1988: 1198 et seqq.) MCAR test is applied in SPSS.³⁵⁹ Since the null-hypothesis for Little’s test, that the missing data is MCAR, is not rejected (Chi-square = 6993.165; df = 7101; significance (p-value) = 0.817 > 0.05 – cf. chapter 7.1.2 and footnote 353), this dissertation’s missing values are classified as MCAR (Enders 2010: 21). Hence, (ML) imputation can be performed within the scope of this doctoral thesis.

Following the above presented recommendations, the missing values of this dissertation's indicators with *less than 10% missing values* are imputed by their *mean values*. The missing values of all variables with *more than 10% of missing data* are, contrarily, replaced via the iterative *expectation maximization (EM) imputation* which “(...) consists of an expectation step followed by a maximization step” (Dempster, Laird, Rubin 1977: 1).³⁶⁰ This procedure is chosen because of two key reasons: firstly, it is the most common technique among the model-based approaches (Göthlich 2009: 127; Weiber, Mühlhaus 2010: 143); secondly, it is more exact in representing the original distribution of values than the conventional methods – e.g. deletion or mean substitution – especially when the missing values are fairly high (Göthlich 2009: 129; Wold, Eriksson, Kettaneh 2010: 262 et seq. & 275). As SmartPLS is unable to deal with missing values via EM (Temme, Kreis, Hildebrandt 2006: 7, Temme, Kreis, Hildebrandt 2010: 745), all missing values over 10% are calculated and substituted via the EM-function in SPSS.

³⁵⁹ The following assumptions are made: All variables apart from one - i.e. SC05_01 which is categorical - are handled as quantitative variables. The standard 25 iterations, as proposed by SPSS, are used.

³⁶⁰ Cf. appendix 19 for all indicators and their missing values.

In order to improve the data imputation, the sample is divided into five subgroups with similar characteristics. Specifically, these five subsamples differ in terms of matching variables: industry (production vs. service) and size (turnover small SME vs. turnover medium SME) while one group contains all cases that cannot be distributed to any of the four groups.³⁶¹ For each of the four distributable subgroups the data is individually replaced using mean values or EM-imputation depending on the amount of missing values. Subsequently, the four data sets are consolidated and jointly used as the basis to impute the missing values of the fifth subsample (with the cases that do not fit into the former four groups).

This approach of dealing with missing data relies on the idea of *statistical twins*, which have matching attributes. By considering cases with similar characteristics from the same sample, missing values can be more precisely replaced than by using the whole data set (Bacher 2002: 38; Noll 2009: 1 & 3; Asham 2010: 14).

7.1.6 Data Ratios and Standardization

After imputing all missing values, the variables which shall be *weighted* (cf. chapters 5.2.1.1, 5.2.1.2 and 5.2.1.3 for indicators market with *, ** or ***) are put into relation to their respective variable.

Moreover, the data is *standardized* via a *z-transformation* in order to deal with the fact that quite different measures and measurement scales are used. Specifically, this means that each variable gets a mean value of zero and a standard deviation of one. This is also done because it facilitates calculations (particularly the factor analysis), makes the interpretation easier and allows simply comparing the variables since they are on the same scale (Hair, JR. et al. 2010: 524 et seq.; Backhaus et al. 2011: 338).

After these two steps, the data is ready to be used in PLS.

³⁶¹ The five groups: 1) production and small, 2) production and medium, 3) service and small, 4) service and medium, and 5) others.

7.1.7 Respondents: Descriptive Statistics

Before demonstrating the results of the SEM, it is interesting to present details of the sample based on additional questions raised in the survey. Firstly and as it is shown in figure 77, the majority of SME in this dissertation’s survey is medium-sized. Specifically, 78% employ more than nine employees whereas the group which employs between 10 and 49 employees represents the largest share with 44%.³⁶² Similarities can be observed for turnover: only 31% of the surveyed SME are small according to their turnover figures. Simultaneously, 69% are, in terms of turnover, considered medium-sized as illustrated in figure 78.³⁶²

Figure 77: Sample Group: Employees

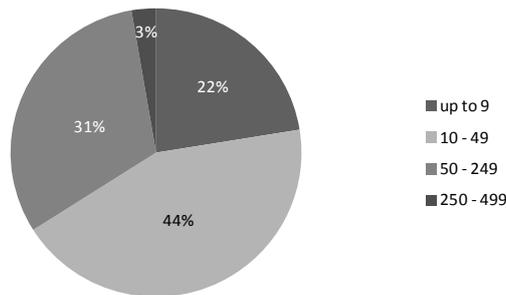
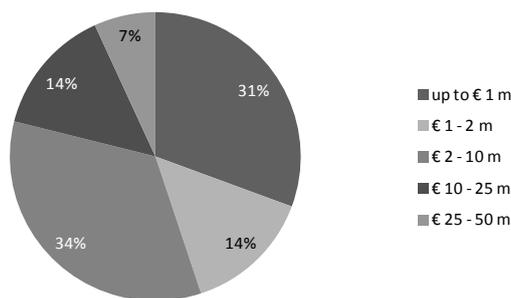


Figure 78: Sample Group: Turnover



³⁶² This contradicts the statistics of the IfM according to which the majority of German SME is small - status: 2009 (Günterberg 2012: 16).

Figure 79 demonstrates the geographical allocation of the sample. As can be seen, most of the sample's SME (14%) are located in Bavaria and North Rhine-Westphalia respectively, followed by 12% in Baden-Württemberg as well as Hesse. Opposite to this, only 1% is from Saarland and just 2% from Berlin and Bremen, which corresponds to the relative small size of e.g. the state Berlin. Moreover, the SME of the sample are mainly resident in rural areas instead of big cities with a minimum of 50,000 citizens (cf. figure 80). This is not surprising since Herman Simon (1996: 173 et seqq.; 2006: 58; 2007: 314 et seqq. & 323 et seq.) pledges that the majority of German SME or more specifically German hidden champions are located in small towns and the country side.

Figure 79: Sample Group: Location – State

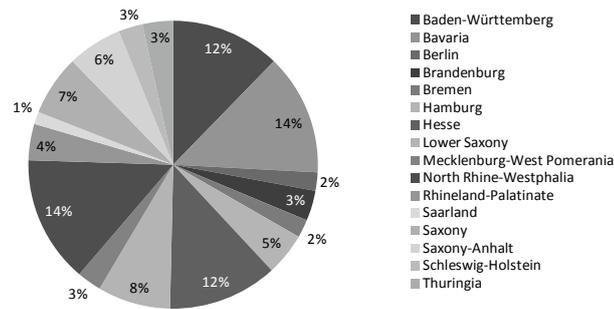
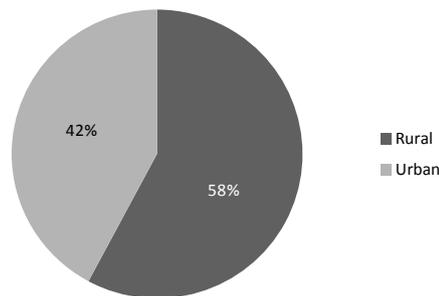


Figure 80: Sample Group: Location – Rural vs. Urban



Concerning the branches, in which the surveyed firms operate, it can be stated that almost a third concentrates on production and manufacturing (28%).

Moreover, wholesale and other services are fairly strong represented with each 12% as presented in figure 81.³⁶³ Likewise, no sample participant works in the field of mining, quarrying and extraction of stones and soil; water supply, sewage disposal, waste management and remediation activities; and arts, entertainment and recreation activities.

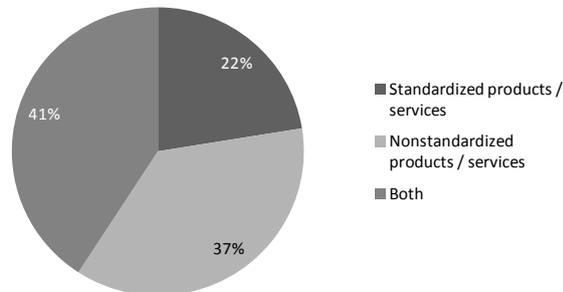
Figure 81: Sample Group: Branch



Figure 82 points to the fact that most surveyed German SME offer either only non-standardized niche products or services (37%) or a mix of standardized and non-standardized offerings (41%). Interestingly, however, only 38% out of these 41% focus on non-standardized products and services. Nevertheless, the rational numbers indicate that the majority of the sample SME rely predominantly on non-standardized products and services (77 SME with non-standardized offerings vs. 66 with standardized; and 4 undistributable cases). This supports previous findings as well as the general line of argumentation in the research field of German SME (Adenäuer 2007: 26, 35 et seq. & 41 et seq.; Tinner 2007: 191; Staiger 2008: 17).

³⁶³ This contradicts the general German SME' statistics of the IfM – status: 2009 (Günterberg 2012: 7).

Figure 82: Sample Group: Offerings



It can also be noticed that more than half of the sample (60%) operates its business as a GmbH (a limited liability company). Furthermore, figure 83 shows that 15% use sole proprietorship as their legal basis. OHG (general partnership) and UG (entrepreneurial company) are each applied by only one SME and thus, do not seem to be common.

Figure 83: Sample Group: Legal Structure

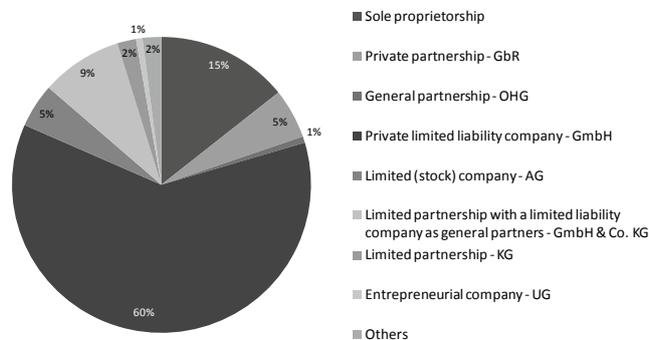


Figure 84 highlights that 84% of the respondents, who answered the questionnaire, are the business leaders of the respective German SME. Such a high ration is expected because the entrepreneurs are considered to be the most suitable addressees since they best know their company and all its intangibles. In other words, they are expected to be the most familiar with these issues. The descriptive statistics also show that most of the surveyed German SME have either one or two leaders as illustrated in figure 85.

Figure 84: Sample Group: Individuals Completing the Survey – Their Position in the Company

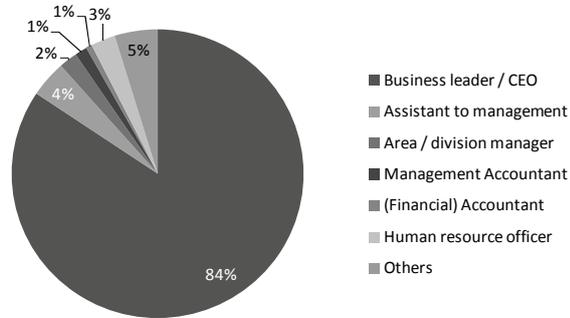
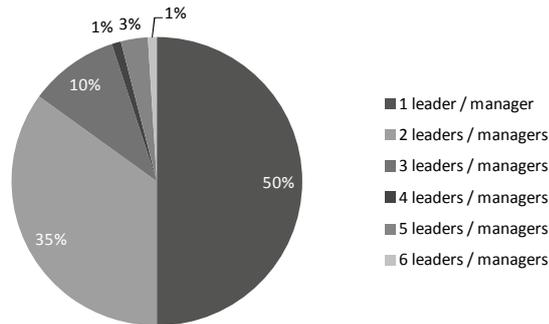
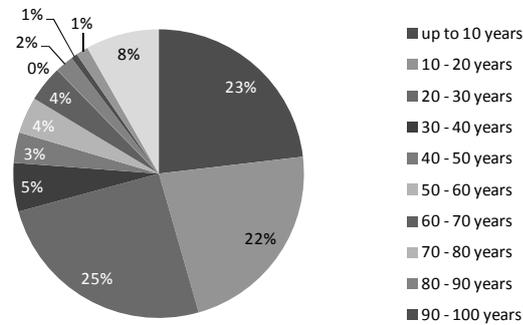


Figure 85: Sample Group: Number of CEOs



Lastly, the age of the surveyed German SME is only briefly looked at since details on this issue are presented in chapter 7.4. Specifically, the pie chart presented in figure 86 indicates that the age is fairly wide spread. Specifically, the majority of the sample SME are not older than 30 years. German SME between 30 and 70 years are, nevertheless, reasonably well represented with something between 3% to 5%. Old German SME founded around the 1930's and even before also sum up to 12% of the sample.

Figure 86: Sample Group: Age



Overall, it can be concluded that the above illustrated figures show that the sample is highly diversified. As such, it is expected to appropriately represent its population.

7.2 RESULTS OF MEASUREMENT MODEL: THE IMPORTANCE OF INDIVIDUAL COMPONENTS OF GERMAN SME' INTELLECTUAL CAPITAL

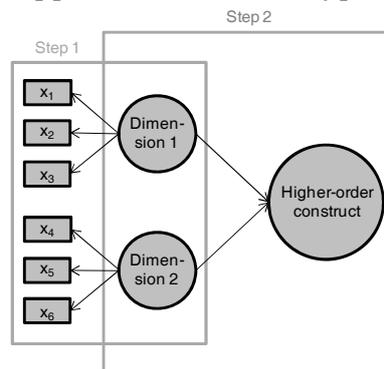
After the descriptive analysis and the purification of the collected data, this chapter turns to the SEM-evaluation. As already described in the introduction of chapter 7, there is no global quality criterion for PLS which is why it is necessary to evaluate the measurement model and the structural model consecutively. Following this recommendation, the measurement model is first looked at (cf. figure 65).

With respect to the analysis of the measurement model it has to be noted that there are *different criteria* to evaluate *reflective* and *formative* measures (Bollen 1984: 381; Bollen, Lennox 1991: 307; Chin 1998b: 306; Eberl 2004: 7; Götz, Liehr-Gobbers, Krafft 2010: 692; Hair, JR. et al. 2014: 113). Specifically, one finds very clear instructions on reflective constructs (Churchill, JR. 1979: 64 et seqq.) while the formative handling is controversially discussed (Diamantopoulos, Winklhofer

2001: 269 et seqq.; Hair, JR. et al. 2010: 751). The following text passages primarily rely on the recommendations of Wynne Chin (1998b: 316), Adamantios Diamantopoulos and Heidi Winklhofer (2001: 269 et seqq.), Frank Huber et al. (2007: 25 et seqq.), Christian Ringle and Florentine Spreen (2007: 212 et seqq.), Oliver Götz et al. (2010: 694 et seqq.), and Joseph Hair, JR. et al. (2010: 695 et seqq.; 2014: 95 et seqq.) who discuss and partly compare available options to assess the PLS-SEM's and particularly its measurement model's quality.

Before starting the evaluation, it is important to highlight that type II higher-order measurement models, which are deployed in the scope of this dissertation, cannot be evaluated in one step. Instead, it is necessary to firstly investigate the reflective relationship between the indicators and the dimensions (cf. chapter 7.2.1) and then the formative linkage between the dimensions and their higher-order constructs (cf. chapter 7.2.2) as it is illustrated in figure 87.

Figure 87: Two-Step Approach to Evaluate Type II Second-order Constructs



7.2.1 Reflective One-dimensional Constructs and Reflective First-order Constructs

Reflective indicators of this work are present by the one-dimensional performance construct and the measurement of the IC-categories' dimensions. When evaluating these, *focus* is primarily placed on the *reliability and validity* of the measurement models (Hair, JR. et al. 2014: 113). In detail, *reliability* describes whether the indicators consistently measure without default – e.g. the same

results are gained in repeated runs (Söhnchen 2007: 137). Since reliability is a necessary but not a sufficient condition, validity needs to be evaluated, too (Churchill, JR. 1979: 65). Specifically, *validity* determines if the indicators actually measure what they are supposed to measure and thus, reflect their directly unascertainable construct (Ping, JR. 2004: 130; Söhnchen 2007: 137).

Particularly, *four criteria* are most commonly used to deal with reflective measures: 1) indicator reliability, 2) construct reliability, 3) convergent validity and 4) discriminant validity (Bagozzi 1979 cited by Götz, Liehr-Gobbers, Krafft 2010: 694; Churchill, JR. 1979: 64 et seqq.; Peter 1981: 133 et seqq.; Ringle, Spreen 2007: 212 et seqq.; Götz, Liehr-Gobbers, Krafft 2010: 694 et seqq.; Hair, JR. et al. 2014: 100 et seqq.). Each of these four principals is firstly discussed in *theoretical* terms and *then applied to this these's data*.

7.2.1.1 Indicator Reliability

The first quality test investigates how well each indicator is suitable to measure its latent variable (Schloderer, Ringle, Sarstedt 2009: 580). Specifically, the *indicator reliability* describes the variance of an indicator which is explained by the latent construct (Ringle, Spreen 2007: 212; Götz, Liehr-Gobbers, Krafft 2010: 695). Generally speaking, the explained variance is recommended to exceed 50% – i.e. less than 50% variance is allocated to errors (Hair, JR. et al. 2010: 709) – which corresponds to a *loading* of (minimum) 0.7 (Chin 1998a: 13; Panten, Boßow-Thies 2007: 321; Schloderer, Ringle, Sarstedt 2009: 580; Götz, Liehr-Gobbers, Krafft 2010: 695).³⁶⁴ If a loading fails to meet this threshold, which indicates that the item has only a minor relationship with its construct in terms of shared variance (Chin 1998b: 306), it does not necessarily mean that the respective item has to be deleted. Instead values as low as 0.5 or 0.4 are acceptable – especially in newly developed measurement models (Hulland 1999: 198; Götz, Liehr-Gobbers, Krafft

³⁶⁴ The rationale behind this idea is that the reliability equals the squared factor loading: $0.7^2 = 0.5 \rightarrow$ explains 50% variance (Ringle, Spreen 2007: 212; Hair, JR. et al. 2010: 709).

2010: 695; Hair, JR. et al. 2010: 693 & 695; Naskrent 2010: 244; Bagozzi, Yi 2012: 18; Hair, JR. et al. 2014: 103) as it is the case in this dissertation.

Furthermore, it is recommended to look at the *significance* of the loadings (Huber et al. 2007: 35; Hair, JR. et al. 2010: 708). Because of PLS's assumptions and specifically the one referring to abnormally distributed data, parametric significant tests cannot be used. Instead, it is recommended to apply non-parametric bootstrapping tests³⁶⁵ which produce t-values (Hair, JR. et al. 2014: 130). When assuming a 1%, 5% or 10%³⁶⁶ significance-level – i.e. probability of error –, for example, one would look for t-values above 2.57, 1.96, and 1.65, respectively (Huber et al. 2007: 35; Ringle, Spreen 2007: 213; Schloderer, Ringle, Sarstedt 2009: 582 & 285; Hair, JR. et al. 2014: 171).

7.2.1.1.1 Human Capital's four Dimensions

Table 22 shows the indicator reliability of the measurement of HC or more specifically of HC's dimensions. Specifically, table 22 illustrates the loadings and the significance (t-values) of the HC-indicators.³⁶⁷ Unfortunately, the loadings of various items fall below the lowest recommended threshold of 0.4 (i.e. ZHC01_02, ZHC01_03, ZHC02_01, ZHC02_05, ZHC03_01, ZHC03_03, ZHC04_01, ZHC04_02, ZHC04_03, and ZHC04_08). Moreover, most of the latter identified indicators are

³⁶⁵ Bootstrapping is a nonparametric estimation approach: n observations are randomly selected from the original data set and used to estimate the model. The observations are then put back into the data set – i.e. replacement - and a new random subsample is drawn. With this (second) subsample, the model is estimated again. Subsequently, the second set of observations is put back to the original set and a third set of observations is extracted ... this procedure is repeated m times – minimum 100 times and best 5,000 times. As a result, one gains m model estimates. Based upon these one can calculate the mean weights as well as their standard deviations which allow deriving at the t-values to determine significance (Chin 1998b: 320; Panten, Boßow-Thies 2007: 323; Ringle, Spreen 2007: 213; Schloderer, Ringle, Sarstedt 2009: 583; Chin 2010a: 675; Hair, JR. et al. 2014: 127).

³⁶⁶ Significance-levels of 10% can be generally expected in exploratory research (Hair, JR. et al. 2014: 171).

³⁶⁷ The indicators' abbreviations and their descriptions can be found in appendix 9.

also insignificant and thus, require deletion. There is also one indicator – i.e. ZHC01_05 – which has a value just above 0.4 but which is not significant. Because of this insignificance, item ZHC01_05 is also removed. After these eleven erasures, HC is still measured via eleven indicators.

Table 22: Loadings, T-values and Significance of the Human Capital Indicators

Indicator	Loading	T-value	Significance
ZHC01_01	0.6651	2.9783	***
ZHC01_02	0.3913	1.4617	
ZHC01_03	0.2243	0.9404	
ZHC01_04	0.4440	2.3449	**
ZHC01_05	0.4025	1.4858	
ZHC01_07	0.5913	2.7967	***
ZHC02_01	-0.1594	0.8063	
ZHC02_02	0.8815	4.9391	***
ZHC02_05	-0.3715	1.8163	*
ZHC02_06	0.4263	2.4583	**
ZHC02_07	0.6283	3.5906	***
ZHC03_01	0.0461	0.4390	
ZHC03_03	0.3235	2.2806	**
ZHC03_05	0.9272	45.8812	***
ZHC03_06	0.9103	31.3171	***
ZHC04_01	-0.2562	1.0499	
ZHC04_02	-0.0733	0.3431	
ZHC04_03	-0.0823	0.1920	
ZHC04_04	0.5051	2.1116	**
ZHC04_07	0.7770	2.9089	***
ZHC04_08	0.2744	1.0774	
ZHC04_09	0.5020	2.4119	**

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

7.2.1.1.2 Structural Capital's three Dimensions

In line with the previous chapter 7.2.1.1.1, table 23 shows the loadings, the t-values and thus, the significance of the reflective measurement of SC's dimensions. Specifically, table 23 highlights that the loadings of six indicators do not meet the required level of 0.4; these are ZSC01_09, ZSC01_10, ZSC01_11,

ZSC06, ZSC02_01 and ZSC03_01.³⁶⁸ Additionally, the t-values indicate that these six measures plus another two items – i.e. ZSC02_04 and ZSC02_06 – are insignificant and hence, only hold for the surveyed sample instead of the whole population. Consequently, all eight indicators are deleted and SC is henceforth 'only' measured via five remaining reflective indicators. One of these five indicators, particularly ZSC02_08, is remained although it is statistically not significant. That is because its t-value of 1.6025 is very close to the threshold value of 1.65 and because this indicator's loading of 0.6581 is reasonably high. Moreover, ZSC02_08 is kept since its deletion would lead to the disappearance of an entire dimension – i.e. development capital – since no measure would be left to represent it.³⁶⁹

Table 23: Loadings, T-values and Significance of the Structural Capital Indicators

Indicator	Loading	T-value	Significance
ZSC01_08	0.5083	2.9071	***
ZSC01_09	0.1674	0.8525	
ZSC01_10	-0.0895	0.4848	
ZSC01_11	0.2236	1.3864	
ZSC05_01	0.8895	9.7826	***
ZSC06	0.1860	0.8135	
ZSC02_01	-0.1702	0.3752	
ZSC02_04	0.5145	1.2096	
ZSC02_06	0.5198	1.3635	
ZSC02_08	0.6581	1.6025	
ZSC03_01	-0.0020	0.0054	
ZSC03_02	0.7082	2.6874	***
ZSC03_03	0.6850	2.3376	**

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

³⁶⁸ The indicators' abbreviations and their descriptions can be found in appendix 10.

³⁶⁹ The deletion of formative dimensions is not recommended – cf. chapter 7.2.2.

7.2.1.1.3 Relationship Capital's six Dimensions

With respect to the indicator reliability of RC and its six dimensions, table 24 demonstrates that unfortunately many indicators do not meet the required quality criteria of a minimum 0.4 loading and a t-value above 1.65.

Table 24: Loadings, T-values and Significance of the Relationship Capital Indicators

Indicator	Loading	T-value	Significance
ZRC01_01	0.5148	2.7725	***
ZRC01_02	0.1860	0.6253	
ZRC01_04	0.6413	2.3151	**
ZRC01_07	-0.1193	0.4377	
ZRC01_08	0.6742	2.7285	***
ZRC02_01	0.4016	1.6492	
ZRC03_01	-0.2054	0.8217	
ZRC03_02	-0.3229	0.8467	
ZRC03_04	0.5966	2.3289	**
ZRC03_05	0.0923	0.4141	
ZRC03_06	0.5763	2.0967	**
ZRC04_01	0.6349	2.0622	**
ZRC05_01	-0.7928	1.1820	
ZRC05_03	-0.0014	0.0039	
ZRC05_04	0.6132	1.1587	
ZRC06_01	0.5862	1.2240	
ZRC07_01	0.9736	2.1987	**
ZRC07_02	0.2984	0.8124	
ZRC07_03	0.0383	0.0943	
ZRC07_04	0.3588	1.1357	
ZRC08_01	0.5054	2.4689	**
ZRC08_02	0.8165	4.5691	***
ZRC08_03	0.3647	1.2371	
ZRC08_04	0.6011	3.6099	***
ZRC09_01	0.6376	1.7000	*
ZRC09_02	0.5126	1.6545	*
ZRC09_03	0.7282	1.7239	*
ZRC09_05	-0.1721	0.3630	

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

Specifically, the following indicators are deleted because they miss the cutoff value: ZRC01_02, ZRC01_07, ZRC02_01, ZRC03_01, ZRC03_02, ZRC03_05, ZRC05_01, ZRC05_03, ZRC06_01, ZRC07_02, ZRC07_03, ZRC07_04, ZRC08_03

and ZRC09_05.³⁷⁰ Actually, one would have to remove item ZRC05_04 as well, since it is not significant. However, ZRC05_04 is kept in order to somehow measure the dimension 'creditor and shareholder relationships'.³⁷¹ Specifically, ZRC05_04 is maintained because it depicts the highest loading of the four items which are supposed to measure the creditor and shareholder dimension.

The other remaining thirteen measurement items are above the acceptable 0.4 level of reflective loadings and significant.

7.2.1.1.4 Lasting Competitive Business Performance

The loadings and t-values of the one-dimensional performance construct are presented in table 25. The values indicate that three items (ZPE01_01, ZPE01_02 and ZPE01_06) need to be deleted since they neither meet the minimum loading threshold of 0.4 nor an acceptable significance-level. Henceforth, performance is measured as a single-item constructs. Because of that, the other quality criteria – i.e. composite reliability, convergent validity and discriminant validity – do not require discussion in this chapter. Yet, a total overview of the evaluation of the performance construct is provided, along with HC, SC and RC, in chapter 7.2.1.5.

Table 25: Loadings, T-values and Significance of the Performance Indicators

Indicator	Loading	T-value	Significance
ZPE01_01	0.2170	1.0483	**
ZPE01_02	-0.0716	0.232	
ZPE01_06	-0.1278	0.3609	
ZPE02_01	0.9203	2.2155	

Significance (two-tailed): *** (α = 0.01), ** (α = 0.05), * (α = 0.10), 5000 bootstrapping samples

³⁷⁰ The indicators' abbreviations and their descriptions can be found in appendix 11.

³⁷¹ Cf. footnote 369.

7.2.1.2 Construct Reliability

After concentrating on the indicators solely, attention shall now be paid to the multi-item constructs (Hulland 1999: 199 cited by Panten, Boßow-Thies 2007: 321): *Construct reliability* indicates whether and if so, how well all indicators jointly measure their underlying latent variable. Put differently, it examines if the items of a block are internally consisted and thus, adequately convergent (Chin 1998b: 320; Ringle, Spreen 2007: 212; Schloderer, Ringle, Sarstedt 2009: 580; Chin 2010a: 671; Hair, JR. et al. 2010: 695).

Construct reliability can be evaluated by looking at the *composite reliability* (CR) (Werts, Linn, Jöreskog 1974 cited by Chin 1998b: 320, by Panten, Boßow-Thies 2007: 321 and by Chin 2010a: 671), which is also known as *factor reliability* (probably) because it is based on the actual factor loadings and thus, very exact. The values of this test can vary from zero (= 0) to one (= 1) whereas value over 0.6 are generally defined as acceptable. Items with values below 0.6 are recommended to be deleted from the scale (Huber et al. 2007: 25; Panten, Boßow-Thies 2007: 321; Ringle, Spreen 2007: 212; Götz, Liehr-Gobbers, Krafft 2010: 695).

7.2.1.2.1 Human Capital's four Dimensions

Table 26 shows HC's CR based on the remaining eleven indicators. The values of 0.7207 for employees' competencies, 0.7373 for employees' attitude, 0.9274 for employees' intellectual agility³⁷², and 0.6702 for leader (ship) & management ability all surpass the above mentioned cut-off value of 0.6. Consequently, it is not necessary to modify the measurement of HC.

³⁷² The CR of employees' intellectual agility (0.9274) is just below the highest acceptable CR-level of 0.95. If it were above 0.95, it would indicate that all items of employees' intellectual agility measure the same phenomenon and thus, do not represent a valid measurement of the dimension (Hair, JR. et al. 2014: 102).

Table 26: Composite Reliability of Human Capital’s Dimensions

Dimension	Indicators	Composit reliability
Employees' competencies	ZHC01_01, ZHC01_04, ZHC01_07	0.7207
Employees' attitude	ZHC02_02, ZHC02_07, ZHC02_07	0.7373
Employees' intellectual agility	ZHC03_05, ZHC03_06	0.9274
Leader (ship) & management ability	ZHC04_04, ZHC04_07, ZHC04_09	0.6702

7.2.1.2.2 Structural Capital’s three Dimensions

Similar to HC, SC’s measurement model does not require modifications since its CR-values, which are shown in table 27, are above 0.6 and below 0.95. The CR of the single-item dimension 'development capital' is one. That is because a precise CR cannot be determined for single-item constructs since the calculation takes into account the different indicators’ loadings. Correspondingly, the CR of 1 does not constitute perfect construct reliability (Hair, JR. et al. 2014: 101 &110); and does not allow to evaluate the dimension.

Table 27: Composite Reliability of Structural Capital’s Dimensions

Dimension	Indicators	Composit reliability
Organizational capital	ZSC01_08, ZSC05_01	0.6907
Development capital	ZSC02_08	1
Technological capital	ZSC03_02, ZSC03_03	0.6630

7.2.1.2.3 Relationship Capital’s six Dimensions

The CR of RC also indicates that the RC-indicators are jointly able to measure their underlying RC-dimension well. That is because the CR-values of customer relationships, supplier relationships, creditor and shareholder

relationships, alliance relationships, informal network relationships, and public perceptions are all within the threshold of 0.6 and 0.95 (cf. table 28).³⁷³

Table 28: Composite Reliability of Relationship's Dimensions

Dimension	Indicators	Composit reliability
Customer relationships	ZRC01_01, ZRC01_04, ZRC01_08	0.6887
Supplier relationships	ZRC03_04, ZRC03_06, ZRC04_01	0.6972
Creditor & shareholder relationships	ZRC05_04	1
Alliance relationships	ZRC07_01	1
Informal network relationships	ZRC08_01, ZRC08_02, ZRC08_04	0.7000
Public perceptions	ZRC09_01, ZRC09_02, ZRC09_03	0.6974

7.2.1.3 Convergent Validity

The third quality criterion is called *convergent validity*. It is concerned with the amount of variance explained by a construct – i.e. captured from its indicators – in relation to the variance rooted in error; or put differently, how well the reflective indicators of a latent variable are actually able to represent their attributive construct (Chin 1998b: 321; Panten, Boßow-Thies 2007: 321; Schloderer, Ringle, Sarstedt 2009: 581). Usually convergent validity is measured via Claes Fornell's and David Larcker's average variance extracted (AVE)³⁷⁴ (1981: 45 et seq.). An AVE below 0.5 is not accepted because it means that more variance is attributed to error variance than to indicator variance (Chin 1998b: 321; Huber et al. 2007: 25; Panten, Boßow-Thies 2007: 321; Schloderer, Ringle, Sarstedt 2009: 581; Götz, Liehr-Gobbers, Krafft 2010: 696; Hair, JR. et al. 2010: 709).

³⁷³ Concerning the CR of the dimensions 'creditor and shareholder relationships' and 'alliance relationships', please refer to chapter 7.2.1.2.2.

³⁷⁴ AVE "(...) is defined as the grand mean value of the squared loadings of the indicators associated with the construct (i.e., the sum of the squared loadings divided by the number of indicators)" (Hair, JR. et al. 2014: 103).

7.2.1.3.1 Human Capital's four Dimensions

The AVE of HC or more specifically, the AVE-values of the four HC-dimensions are presented in table 29. The AVE-values indicate that two dimensions are not well measured: the AVE of the dimension employees' competencies and of the dimension employees' intellectual agility are below the demanded value of 0.5. Hence, these two first-order constructs require further treatment to reduce the variance explained by error.

Table 29: AVE of Human Capital

Dimension	AVE
Employees' competencies	0.4712
Employees' attitude	0.5009
Employees' intellectual agility	0.8646
Leader (ship) & management ability	0.4150

In order to improve the AVE, it is recommended to delete indicators with loadings between 0.4 and 0.7 (Hair, JR. et al. 2014: 103). Hence, the indicator with the lowest loading and the lowest significance-level of each of the two dimensions – i.e. employees' competencies and employees' intellectual agility – is removed. Specifically, this refers to the items ZHC01_04 (loading of 0.5317 compared to 0.6489 and 0.8426, and significance of 2.1091 compared to 2.7806 and 4.6369) and ZHC04_04 (loading of 0.5144 compared to 0.5525 and 0.8216, and significance of 2.2811 compared to 2.522 and 5.4314). After excluding the two latter mentioned indicators, the AVE-values of all four HC-dimensions exceed the threshold of minimum 0.5 (cf. table 30) and thus, represent good measurement.

Table 30: New AVE of Human Capital

Dimension	AVE
Employees' competencies	0.6427
Employees' attitude	0.5009
Employees' intellectual agility	0.8646
Leadership & management ability	0.6200

7.2.1.3.2 Structural Capital's three Dimensions

Table 31 illustrates the AVE-values of SC's reflective measurement. It can be noticed that the AVE of technological capital does not meet the demanded value of 0.5. However, because 0.4967 is very close to 0.5 the measurement is not adjusted and remains the way it is.³⁷⁵

Table 31: AVE of Structural Capital

Dimension	AVE
Organizational capital	0.5450
Development capital	1
Technological capital	0.4967

7.2.1.3.3 Relationship Capital's six Dimensions

To investigate how well the reflective indicators of RC represent its dimensions, one has to look at the AVE presented in table 32. Unfortunately, table 32 highlights that the four RC first-order constructs, for which AVE can be

³⁷⁵ It is allowed to do so – cf. Julia Naskrent (2010: 242).

calculated, are not well measured since the AVE values fall below the recommended threshold of 0.5. For that matter and in line with the above explained procedures (cf. chapter 7.2.1.3.1), indicators which represent customer relationships, suppliers relationships, informal network relationships, and public perceptions, respectively, have to be erased.

Table 32: AVE of Relationship Capital

Dimension	AVE
Customer relationships	0.4297
Supplier relationships	0.4348
Creditor & shareholder relationships	1
Alliance relationships	1
Informal network relationships	0.4398
Public perceptions	0.4370

After deleting four items (ZRC01_04, ZRC03_06, ZRC08_01, ZRC09_03) because of their low loadings and/or significance-levels³⁷⁶, the AVE-values improve majorly as can be seen in table 33. Only the AVE of customer relationships still falls below the recommended value of 0.5. Yet, in line with the above (cf. chapter 7.2.1.3.2), it is accepted within the scope of this dissertation since 0.4884 is very close to 0.5.

³⁷⁶ ZRC01_04: Significance-level of 2.0432 compared to 2.7557 and 3.3815; ZRC03_06: loading of 0.6203 compared to 0.6549 and 0.7006; ZRC08_01: loading of 0.6058 compared to 0.6265 and 0.7482 as well as significance-level of 2.8478 compared to 3.9632 and 5.7764; and ZRC09_03: significance-level of 1.8308 compared to 1.8317 and 1.8578.

Table 33: New AVE of Relationship Capital

Dimension	AVE
Customer relationships	0.4884
Supplier relationships	0.5541
Creditor & shareholder relationships	1
Alliance relationships	1
Informal network relationships	0.5617
Public perceptions	0.6900

7.2.1.4 Discriminant Validity

Lastly, discriminant validity, which can be regarded as a “thorough validation procedure” (Götz, Liehr-Gobbers, Krafft 2010: 696), is applied to identify the extent to which a construct is undoubtedly different from the other constructs in the model (Churchill, JR. 1979: 70; Panten, Boßow-Thies 2007: 322; Hair, JR. et al. 2010: 689). In other words, one examines if every latent variable shares more variance with its respective indicators than with any other latent variable in the model (Götz, Liehr-Gobbers, Krafft 2010: 696; Hair, JR. et al. 2010: 710; Hair, JR. et al. 2014: 113). For this matter, a construct’s AVE must be larger than the squared correlations among the latent constructs; or put differently: it must be larger than the correlation with any other construct in the model (Chin 1998b: 321; Panten, Boßow-Thies 2007: 322; Chin 2010a: 670; Götz, Liehr-Gobbers, Krafft 2010: 696).

Additionally, one can look at the (cross) loadings of the items and other latent constructs in order to test discriminant validity. In detail, one aims to establish evidence that an indicator’s loading on its predefined construct is larger than its loadings on any other construct in the model – i.e. cross loadings. If this condition cannot be fulfilled, a modification of the measurement model is recommended since it is unsure what exactly the respective construct 'reflects' (Ringle, Spreen 2007: 213; Hair, JR. et al. 2014: 113).

7.2.1.4.1 Human Capital’s four Dimensions

The square root of AVE of each HC’s dimension and its comparison to the correlation with the other HC-dimensions is shown in table 34. Concerning employees’ attitude, for example, it can be seen that its AVE’s square root of 0.70774 is higher than its correlation with employees’ competencies (0.151), employees’ intellectual agility (0.5332), and leader(ship) and management (0.261). This means that employees’ attitude shares more variance with its own indicators than with the other HC-dimensions included in the model of HC. The square roots of the other dimensions’ AVE are also higher than their correlations with the other HC-dimensions and thus, meet the first quality criterion of discriminant validity.

Table 34: Square Roots of AVEs and Correlations of the Human Capital Dimensions

HC-Dimension	Employees’ attitude	Employees’ competencies	Employees’ intellectual agility	Leader (ship) & management ability
Employees’ attitude	0.7077			
Employees’ competencies	0.1510	0.8017		
Employees’ intellectual agility	0.5332	0.4704	0.9298	
Leader (ship) & management ability	0.2610	0.1336	0.2783	0.7874

In line with the above mentioned recommendation, table 35 displays the cross loading-matrix of the HC-measurement items and the HC-dimensions. The light grey coloring highlights that the loadings of almost all items on their respective dimension are greater than their cross loadings with the other dimensions. Only the dark grey colored column shows that one indicator (ZHC02_06) has its highest loading on the 'wrong' dimension and thus, signals a discriminant validity problem (i.e. employees’ intellectual agility instead of employees’ attitude). In order to abolish this issue, item ZHC02_06 is deleted. As a consequence, HC is finally measured via 8 indicators which pass the above

discussed quality test.³⁷⁷

Table 35: Cross Loadings of the Reflective Human Capital Indicators and the Dimensions

Indicator	Employees' competencies	Employees' attitude	Employees' intellectual agility	Leader (ship) & management ability
ZHC01_01	0.9101	0.0856	0.4303	0.1192
ZHC01_07	0.6761	0.1943	0.3143	0.0944
ZHC02_02	0.0662	0.9046	0.4431	0.2469
ZHC02_06	0.3714	0.4535	0.4586	0.0408
ZHC02_07	-0.0303	0.6919	0.2499	0.2298
ZHC03_05	0.4388	0.4712	0.9401	0.2343
ZHC03_06	0.4366	0.5249	0.9194	0.2874
ZHC04_07	0.1139	0.2216	0.2503	0.9305
ZHC04_09	0.1040	0.2056	0.1888	0.6116

7.2.1.4.2 Structural Capital's three Dimensions

The top rows of table 36 demonstrate the square roots of development capital's, organizational capital's and technological capital's AVE. The other numbers represent the correlation among the SC-dimension. When looking at table 36, one can see that the square roots of the respective AVEs exceed their dimension's correlation with the other first-order SC-constructs. Hence, the constructs are indeed different from one another.

³⁷⁷ Cf. appendix 20: Data analysis - remaining reflective variables and their indicator description.

Table 36: Square Roots of AVEs and Correlations of the Structural Capital Dimensions

SC-Dimension	Development capital	Organizational capital	Technological capital
Development capital	1		
Organizational capital	0.0588	0.4185	
Technological capital	-0.0414	0.0539	0.7048

The same conclusion can be drawn from table 37. Specifically, the light grey highlights in Table 37 show that the loadings of the indicators on their predefined construct are higher than on any other construct in the measurement model of SC.

Table 37: Cross Loadings of the Reflective Structural Capital Indicators and the Dimensions

Indicator	Organizational capital	Development capital	Technological capital
ZSC01_8	0.5203	0.0960	0.1123
ZSC05_1	0.9052	0.0417	0.0069
ZSC02_8	0.0769	1	-0.0414
ZSC03_2	0.0979	-0.0358	0.7434
ZSC03_3	-0.0288	-0.0219	0.6638

7.2.1.4.3 Relationship Capital’s six Dimensions

Table 38 illustrates the square roots of the AVEs for the reflective first-order constructs of RC as well as their correlations among each other. When looking at the six square roots in detail, one can see that they are higher than the correlations with the other RC-dimensions. The square root of customer relationships’ AVE with a value of 0.6989, for example, clearly exceeds its other correlations of 0.2673, 0.2452, 0.2465, 0.1865 and 0.109, respectively.

Table 38: Square Roots of AVEs and Correlations of the Relationship Capital Dimensions

RC-Dimension	Alliance relationships	Creditor & shareholder relationships	Customer relationships	Informal network relationships	Public perceptions	Supplier relationships
Alliance relationships	1					
Creditor & shareholder relationships	-0.0330	1				
Customer relationships	0.1090	0.1865	0.6989			
Informal network relationships	0.0064	-0.0598	0.2673	0.7495		
Public perceptions	0.0266	0.1059	0.2452	0.1086	0.8307	
Supplier relationships	0.0924	-0.0550	0.2465	0.1975	0.1404	0.7447

Discriminant validity is also supported by looking at the cross loading-matrix of RC. Specifically, the light grey accentuations in table 39 illustrate that the RC indicators' loadings on their associated dimension exceed the loading on any other dimension. Exemplary, one can take the loading of ZRC01_08 on customer relationships. Its value of 0.8006 is indeed greater than its cross loadings of 0.1644, 0.1445, 0.243, 0.0315 and 0.2457.

Table 39: Cross Loadings of the Reflective Relationship Capital Indicators and the Dimensions

Indicator	Customer relationships	Suppliers relationships	Creditor & shareholder relationships	Alliance relationships	Informal network relationships	Public perceptions
ZRC01_1	0.5795	0.0771	0.1146	-0.0417	0.1154	0.3662
ZRC01_8	0.8006	0.2457	0.1445	0.1644	0.2430	0.0315
ZRC03_4	0.1148	0.6750	-0.0246	0.1249	0.1211	0.1339
ZRC04_1	0.2403	0.8078	-0.0544	0.0247	0.1693	0.0822
ZRC05_4	0.1865	-0.0550	1	-0.0330	-0.0598	0.1059
ZRC07_1	0.1090	0.0924	-0.0330	1	0.0064	0.0266
ZRC08_2	0.1990	0.0720	-0.0286	-0.0398	0.6774	0.0813
ZRC08_4	0.2038	0.2097	-0.0582	0.0399	0.8152	0.0824
ZRC09_1	0.3249	0.1873	0.1029	0.0014	0.0847	0.8844
ZRC09_2	0.0426	0.0228	0.0693	0.0506	0.0994	0.7731

7.2.1.5 Results of Overall Reflective Measurement: Human Capital, Structural Capital, Relationship Capital and Lasting Competitive Business Performance

After having looked at HC, SC, RC and lasting competitive business

performance separately, the current chapter presents the combined results of their reflective measurement evaluation. Starting with table 40, it can be noticed that the loadings of the remaining eight HC-indicators, the five SC-items and the ten RC-measures³⁷⁸ all surpass (with the lowest value of 0.5203) the required level of 0.4 by far and hence, are fairly strong. Moreover, a significance-level of minimum 5% is achieved for all linkages – apart from the single item measures for which t-values cannot be calculated. Thus, indicator reliability is established.

Table 40: Final Loadings, T-values and Significance of the Remaining Reflective Indicators

Indicator	Loading	T-value	Significance
ZHC01_01	0.9101	5.1241	***
ZHC01_07	0.6761	2.5907	***
ZHC02_02	0.9435	22.1330	***
ZHC02_07	0.7420	5.7655	***
ZHC03_05	0.9401	65.0416	***
ZHC03_06	0.9194	37.5940	***
ZHC04_07	0.9305	7.5147	***
ZHC04_09	0.6116	2.6378	***
ZSC01_08	0.5203	3.0717	***
ZSC05_01	0.9052	12.8072	***
ZSC02_08	1	0	
ZSC03_02	0.7434	3.3819	***
ZSC03_03	0.6638	2.5486	**
ZRC01_01	0.5795	2.9217	***
ZRC01_08	0.8006	3.2805	***
ZRC03_04	0.6750	3.4518	***
ZRC04_01	0.8078	3.9593	***
ZRC05_04	1	0	
ZRC07_01	1	0	
ZRC08_02	0.6774	3.7964	***
ZRC08_04	0.8152	6.2209	***
ZRC09_01	0.8844	3.0610	***
ZRC09_02	0.7731	2.4796	**
ZPE02_01	1	0	

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping sample

³⁷⁸ Cf. footnote 377.

Additionally, the thirteen reflectively measured first-order constructs as well as the one-dimensional performance construct display high levels of internal consistence and thus, composite reliability. This can be seen in the CR values above 0.6 in table 41.

Table 41: Final Composite Reliability Values of the Reflectively Measured IC-Dimensions and Performance

Dimension	Indicators	Composit reliability
Alliance relationships	ZRC07_01	1
Employees' attitude	ZHC02_02, ZHC02_07	0.8355
Employees' competencies	ZHC01_01, ZHC01_07	0.7788
Employees' intellectual agility	ZHC03_05, ZHC03_06	0.9274
Customer relationships	ZRC01_01, ZRC01_08	0.6506
Creditor & shareholder relationships	ZRC05_04	1
Development capital	ZSC02_08	1
Informal network relationships	ZRC08_02, ZRC08_04	0.7176
Leader (ship) & management ability	ZHC04_07, ZHC04_09	0.7578
Organizational capital	ZSC01_08, ZSC05_01	0.6907
Performance	ZPE02_01	1
Public perceptions	ZRC09_01, ZRC09_02	0.8159
Supplier relationships	ZRC03_04, ZRC04_01	0.7114
Technological capital	ZSC 03_02, ZSC03_03	0.6630

Likewise, table 42 indicates a high level of convergent validity since the AVEs of almost all reflectively measured latent constructs of this dissertation exceed the demanded value of 0.5. Only two dimensions – i.e. customer relationships and technological capital – are unable to meet this criterion. Yet, they are still accepted since their values are very close to 0.5 (cf. chapters 7.2.1.3.2 and 7.2.1.3.3).

Table 42: Final AVE-Values of the Reflectively Measured Dimensions and Performance

Dimension	AVE
Alliance relationships	1
Employees' attitude	0.5009
Employees' competencies	0.6427
Customer relationship	0.4884
Creditor & shareholder relationships	1
Development capital	1
Informal network relationships	0.5617
Employees' intellectual agility	0.8646
Leader (ship) & management ability	0.6200
Organizational capital	0.5450
Performance	1
Public perceptions	0.6900
Supplier relationships	0.5541
Technological capital	0.4967

As opposed to the previous chapters (cf. chapters 7.2.1.4.1 - 7.2.1.4.3), where 'only' the square rooted AVEs are compared with the correlations of the other dimensions of a particular higher-order construct – i.e. HC, SC or RC –, all dimension as well as the one-dimensional performance construct are now simultaneously evaluated. Specifically, table 43 shows the square roots of the above presented AVEs on the diagonal and the correlations between all reflectively measured constructs in the lower triangles. It can be noticed that the values of the square rooted AVEs always exceed the correlation with any other construct in the model. Hence, discriminant validity is justified.

Table 43: Final Square Roots of AVEs and Correlations of the Reflectively Measured IC-Dimensions and Performance

Dimension	Alliance relationships	Employees' attitude	Employees' competencies	Customer relationships	Creditor & shareholder relationships	Development capital	Informal network relationships
Alliance relationships	1						
Employees' attitude	0.0649	0.8488					
Employees' competencies	0.1145	0.0391	0.8017				
Customer relationships	0.1090	0.0347	0.2947	0.6989			
Creditor & shareholder relationships	-0.0330	0.0116	0.2944	0.1865	1		
Development capital	0.0962	0.0014	-0.0279	0.0240	-0.1403	1	
Informal network relationships	0.0064	-0.0127	-0.0485	0.2673	-0.0598	-0.0265	0.7495
Intellectual agility of employees	0.2649	0.4324	0.4704	0.3146	0.2473	0.0200	0.0003
Leader (ship) & management ability	-0.0296	0.2752	0.1336	0.0953	-0.0024	0.1550	0.0450
Organizational capital	0.0941	0.1814	0.1136	-0.0263	-0.0911	0.0769	0.0675
Performance	0.1031	0.1728	-0.1502	0.0108	0.1062	0.0529	0.1556
Public perceptions	0.0266	0.1046	0.1517	0.2452	0.1059	-0.0581	0.1086
Supplier relationships	0.0924	0.2381	0.1120	0.2465	-0.0550	0.0463	0.1975
Technological capital	-0.0616	0.0647	0.0765	0.1666	0.1447	-0.0414	-0.0524

Dimension	Employees' intellectual agility	Leader (ship) & management ability	Organizational Capital	Performance	Public perceptions	Supplier relationships	Technological capital
Alliance relationships							
Employees' attitude							
Employees' competencies							
Customer relationships							
Creditor & shareholder relationships							
Development capital							
Informal network relationships							
Intellectual agility of employees	0.9299						
Leader (ship) & management ability	0.2783	0.7874					
Organizational capital	0.2144	0.1979	0.7382				
Performance	0.1235	0.1452	0.1819	1			
Public perceptions	0.1873	0.0350	0.0477	0.0968	0.8307		
Supplier relationships	0.2348	0.0935	0.1299	0.2216	0.1404	0.7444	
Technological capital	0.2004	0.0082	0.0539	-0.0049	0.2370	0.0547	0.7048

To further substantiate discriminant validity, table 44 illustrates the loadings of the reflective indicators on their respective construct as well as their cross loadings. Since the cross loadings are, in all cases, lower than the loadings on the latent variables which they are supposed to measure, one can, again, conclude that discriminant validity is established.

Table 44: Cross Loadings of the Remaining Reflective Indicators

Indicators	Alliance relationships	Employees' attitude	Employees' competencies	Customer relationships	Creditor & shareholder relationships	Development capital	Informal network relationships
ZHC01_01	0.0655	-0.0114	0.9101	0.3337	0.3211	-0.0506	-0.0606
ZHC01_07	0.1462	0.1099	0.6761	0.0828	0.1046	0.0259	-0.0035
ZHC02_02	0.0516	0.9435	0.0662	0.0561	0.0372	-0.0360	-0.0150
ZHC02_07	0.0677	0.7420	-0.0303	-0.0215	-0.0445	0.0765	-0.0033
ZHC03_05	0.2491	0.3782	0.4388	0.3086	0.2207	0.0022	0.0376
ZHC03_06	0.2436	0.4302	0.4366	0.2743	0.2410	0.0375	-0.0428
ZHC04_07	-0.1049	0.2419	0.1139	0.1315	-0.0069	0.1191	0.0582
ZHC04_09	0.1490	0.1989	0.1040	-0.0341	0.0086	0.1492	-0.0078
ZSC01_08	-0.0246	0.0131	-0.0215	-0.1592	-0.1961	0.0960	-0.2026
ZSC05_01	0.1218	0.2047	0.1430	0.0487	-0.0084	0.0417	0.1794
ZSC02_08	0.0962	0.0014	-0.0279	0.0240	-0.1403	1	-0.0265
ZSC03_02	-0.0281	0.0915	0.1654	0.1555	0.2078	-0.0358	-0.1169
ZSC03_03	-0.0606	-0.0055	-0.0705	0.0751	-0.0160	-0.0219	0.0523
ZRC01_01	-0.0417	0.1192	0.1389	0.5795	0.1146	-0.0272	0.1154
ZRC01_08	0.1644	-0.0451	0.2594	0.8006	0.1445	0.0494	0.2430
ZRC03_04	0.1249	0.1040	0.1260	0.1148	-0.0246	-0.0049	0.1211
ZRC04_01	0.0247	0.2376	0.0503	0.2403	-0.0544	0.0664	0.1693
ZRC05_04	-0.0330	0.0116	0.2944	0.1865	1	-0.1403	-0.0598
ZRC07_01	1	0.0649	0.1145	0.1090	-0.0330	0.0962	0.0064
ZRC08_02	-0.0398	-0.0308	0.0090	0.1990	-0.0286	-0.0566	0.6774
ZRC08_04	0.0399	0.0071	-0.0725	0.2038	-0.0582	0.0089	0.8152
ZRC09_01	0.0014	0.1404	0.1609	0.3249	0.1029	-0.0636	0.0847
ZRC09_02	0.0506	0.0157	0.0810	0.0426	0.0693	-0.0283	0.0994
ZPE02_01	0.1031	0.1728	-0.1502	0.0108	0.1062	0.0529	0.1556

Indicators	Employees' intellectual agility	Leader (ship) & management ability	Organizational Capital	Performance	Public perceptions	Supplier relationships	Technological capital
ZHC01_01	0.4303	0.1192	0.1261	-0.0918	0.1952	0.1062	0.1158
ZHC01_07	0.3143	0.0944	0.0365	-0.1815	0.0009	0.0683	-0.0304
ZHC02_02	0.4431	0.2469	0.1590	0.1482	0.1092	0.2502	0.0820
ZHC02_07	0.2499	0.2298	0.1593	0.1582	0.0563	0.1249	0.0057
ZHC03_05	0.9401	0.2343	0.2399	0.1517	0.2019	0.2437	0.2019
ZHC03_06	0.9194	0.2874	0.1530	0.0725	0.1424	0.1877	0.1688
ZHC04_07	0.2503	0.9305	0.1882	0.1299	-0.0063	0.0383	0.0192
ZHC04_09	0.1888	0.6116	0.1123	0.1001	0.1052	0.1625	-0.0200
ZSC01_08	-0.0593	0.0437	0.5203	-0.0950	-0.1780	-0.0434	0.1123
ZSC05_01	0.2791	0.2086	0.9052	0.2591	0.1442	0.1728	0.0069
ZSC02_08	0.0200	0.1550	0.0769	0.0529	-0.0581	0.0463	-0.0414
ZSC03_02	0.3090	0.0562	0.0979	-0.0498	0.2408	0.0104	0.7434
ZSC03_03	-0.0459	-0.0507	-0.0288	0.0484	0.0850	0.0701	0.6638
ZRC01_01	0.1816	0.0826	0.0626	0.1278	0.3662	0.0771	0.3642
ZRC01_08	0.2523	0.0562	-0.0782	-0.0807	0.0315	0.2457	-0.0635
ZRC03_04	0.0853	0.0432	-0.0017	0.1816	0.1339	0.6750	-0.0138
ZRC04_01	0.2470	0.0915	0.1763	0.1534	0.0822	0.8078	0.0847
ZRC05_04	0.2473	-0.0024	-0.0911	0.1062	0.1059	-0.0550	0.1447
ZRC07_01	0.2649	-0.0296	0.0941	0.1031	0.0266	0.0924	-0.0616
ZRC08_02	-0.0038	0.0184	-0.0177	0.0536	0.0813	0.0720	-0.1064
ZRC08_04	0.0033	0.0462	0.1050	0.1676	0.0824	0.2097	0.0130
ZRC09_01	0.1947	0.0932	0.0224	0.0967	0.8844	0.1873	0.2414
ZRC09_02	0.1053	-0.0576	0.0638	0.0598	0.7731	0.0228	0.1400
ZPE02_01	0.1235	0.1452	0.1819	1	0.0968	0.2216	-0.0049

Overall, it can be concluded that the reflective measurement models of this dissertation are, after being modified, able to fulfill all required quality criteria (cf. table 45). Hence, the reflective measurement models can be used as the foundation in order to calculate and analyze the formative measurement model as well as the structural models.

However, it has to be borne in mind that various indicators are deleted in order to meet the above mentioned principles (cf. appendix 20 for a list of the remaining measures).³⁷⁹

Table 45: Overview of the Reflective Measurement Evaluation

Quality Criterion	Requirement	Result
Indicator reliability	- Factor loading of at least above 0.4 -Significance: t-values of at least 1.65	After modifications ✓
Composite reliability	CR of at least 0.6	✓
Convergent validity	AVE of at least 0.5	After modifications ✓
Discriminant validity	-Square root of AVE > Correlation - Cross loading-matrix	After modifications ✓

7.2.2 Formative Second-order Constructs

As opposed to reflective measures' focus on reliability and validity, formative measurement models – such as for HC, SC and RC which have four,

³⁷⁹ A more detailed discussion on this critical issue can be found in chapter 8.3.

three and six formatively operationalized dimensions, respectively – need to be evaluated, among others, in terms of their path coefficients on the latent variable, the coefficients' significance and multicollinearity (Ringle, Sarstedt, Straub 2012: viii; Hair, JR. et al. 2014: 113). This is, predominantly, because of formative indicators' reverse causality as well as their none or only minor correlation which makes correlation-based evaluation tools such as factor analysis or internal consistency³⁸⁰ unfeasible as well as inapplicable (Bollen 1984: 381; Chin 1998b: 306; Diamantopoulos, Winklhofer 2001: 271; Eberl 2004: 7; Eberl 2006: 652; Panten, Boßow-Thies 2007: 322; Ringle, Spreen 2007: 213; Schloderer, Ringle, Sarstedt 2009: 582; Albers 2010: 411; Götz, Liehr-Gobbers, Krafft 2010: 697; Hair, JR. et al. 2010: 751; Hair, JR. et al. 2014: 118).³⁸¹ Particularly, the *three* most commonly applied *quality criteria* are investigated within the scope of this doctoral thesis: 1) content validity, 2) indicator reliability, and 3) construct reliability.³⁸² These are firstly described in *theoretical terms* and *subsequently applied to the data* in chapters 7.2.2.1 to 7.2.2.3, and summarized in chapter 7.2.2.4.

7.2.2.1 Content Validity

Content validity assures that all facets of a construct are included – which is especially important since formative indicators cause their construct (cf. chapter 5.1.2). There is, however, no global quality criterion to determine content validity.

³⁸⁰ "Furthermore, formative indicators are assumed to be error free (...), which means the internal consistence reliability concept is inappropriate" (Hair, JR. et al. 2014: 119).

³⁸¹ "(...) causal indicators of the same concept can have positive, negative, or no correlation. Researchers relying on factor analysis or the examination of correlation matrices for selecting indicators may be overlooking valid measures of a construct if the indicators determine the latent variable" (Bollen, Lennox 1991: 307).

³⁸² The in this chapter discussed quality criteria for formative indicators can be applied to single-order as well as higher-order constructs in the same way (Giere, Wirtz, Schilke 2006: 688; Huber et al. 2007: 34; Chin 2010a: 667); Convergent validity and discriminant validity are irrelevant and not suitable for formative indicators since the latter do not or only minorly correlate (Götz, Liehr-Gobbers, Krafft 2010: 700). Hence, they are usually not applied (Ringle, Sarstedt, Straub 2012: viii).

Instead, it needs to be dealt with before the data collection (during the model specification) and thus, before the quality evaluation (Götz, Liehr-Gobbers, Krafft 2010: 698; Hair, JR. et al. 2014: 98). Consequently, this quality criteria does not need to be covered in this chapter; especially since it is already greatly discussed in chapters 4.1 and 5.2: the constructs and all their facets are precisely defined in the German SME context and transferred into measurable indicators which are pretested with German SME experts as well as 16 German SME (Diamantopoulos, Winklhofer 2001: 271 et seq.; Rossiter 2002: 305 et seqq.).

7.2.2.2 *Indicator Reliability*

Since formative indicators do not (or only minor) correlate, it does not make sense to apply the reflective tools to measure indicator reliability. Instead, it is recommended to evaluate the indicators' *weights* in order to discover which items have a substantial and which have a minor impact on the construct (Chin 1998b: 307; Huber et al. 2007: 38; Götz, Liehr-Gobbers, Krafft 2010: 698).³⁸³ Specifically, weights with values close to one are regarded as strong while values near zero signal a weak relation (Ringle, Spreen 2007: 213; Schloderer, Ringle, Sarstedt 2009: 583).

It is particularly important to note that the regression weights of formative measures are usually smaller than the reflective loadings since PLS aims to maximize the dependent variables explained variance. Thus, low path coefficients do not automatically signal a bad measurement and do not call for indicator elimination; particularly since there is a good reason why the indicators were incorporated in the first place – cf. chapters 5.1.2, 5.2 and 7.2.2.1 (Chin 1998b: 307; Götz, Liehr-Gobbers, Krafft 2010: 698; Hair, JR. et al. 2014: 127).

Furthermore, it is recommended to look at the weights' *significance* to see whether the weights significantly differ from zero. This can be done via bootstrapping and resulting t-tests in PLS (Huber et al. 2007: 38; Panten, Boßow-

³⁸³ This is also referred to as *indicator relevance* (Götz, Liehr-Gobbers, Krafft 2010: 698).

Thies 2007: 322; Christophersen, Grape 2009: 112; Schloderer, Ringle, Sarstedt 2009: 582; Hair, JR. et al. 2014: 127). If insignificant results arise, they do, however, not immediately call for elimination. Instead, their deletion needs to be justified in terms of logical reasoning with respect to contents (Huber et al. 2007: 38; Christophersen, Grape 2009: 112 et seq.).

A similar dilemma concerning the elimination or perpetuation of formative indicators can be observed with *multicollinearity* among the formative indicators of a construct (Hair, JR. et al. 2010: 751).³⁸⁴ Specifically, multicollinearity is a problematic issue since it biases parameter estimates and thus, makes it hard to determine each indicator's influence on its respective construct (Diamantopoulos, Winklhofer 2001: 272; Götz, Liehr-Gobbers, Krafft 2010: 698).³⁸⁵ To identify multicollinearity, it is recommended to apply the variance inflation factor (VIF) (Hübler 2005: 284; Huber et al. 2007: 39; Schneider 2007: 186 et seq.; Götz, Liehr-Gobbers, Krafft 2010: 699) since it is more exact than the alternative correlation matrix option (Panten, Boßow-Thies 2007: 320, Boßow-Thies; Panten 2009: 374): "(...) VIF is derived from the fact that its square root is the degree to which the standard error has been increased due to multicollinearity" (Götz, Liehr-Gobbers, Krafft 2010: 699). If the VIF-values exceed the rule-of-thumb threshold of 10³⁸⁶, multicollinearity is identified and calls for action (Chatterjee, Price 1977: 182 cited by Schneider 2007: 187; Diamantopoulos, Winklhofer 2001: 272; Hübler 2005: 284; Huber et al. 2007: 39; Schloderer, Ringle, Sarstedt 2009: 583; Götz, Liehr-Gobbers,

³⁸⁴ "(...) dropping an item may make the index incomplete, but keeping it may make an estimate(s) unreliable" (Hair, JR. et al. 2010: 751).

³⁸⁵ "More specifically, in practice, high levels of collinearity often affect the results of analyses in two respects. Firstly, collinearity boosts the standard errors and thus reduces the ability to demonstrate that the estimated weights are significantly different from zero. (...) Second, high collinearity can result in the weights being incorrectly estimated" (Hair, JR. et al. 2014: 123).

³⁸⁶ "(...) in general, the critical value should be defined individually and be based on practical considerations in respect of each analysis" (Götz, Liehr-Gobbers, Krafft 2010: 699). Some authors already consider values of 5 (Schloderer, Ringle, Sarstedt 2009: 583) or even 2 (Schneider 2007: 187) as a sign of multicollinearity since a value of 10 corresponds to a multiple correlation coefficient of 0.9 (Schneider 2007: 187).

Krafft 2010: 699).

7.2.2.2.1 Human Capital

Table 46 illustrates the weights as well as the significance-levels of HC's formative dimensions – i.e. the relationship between the HC-dimensions and HC. Specifically, one can see that the signs and strength of two path coefficients match the hypotheses: employees' attitude and employees' intellectual agility positively and significantly impact HC. Unfortunately, two dimensions neither have a strong nor a significant influence on HC – i.e. employees' competencies (weight = 0.0440) and leader(ship) and management ability (weight = 0.0988). Although Adamantios Diamantopoulos and Heidi Winklhofer (2001: 727) propose to delete such inappropriate items from formative measurement models, this is not done within the scope of this dissertation because it would distort the contents and the completeness of the constructs (Rossiter 2002: 308 et seqq. & 315). Thus, the dimensions employees' competencies as well as leader(ship) and management ability are kept in the formative measurement model of HC even though they are not significant and partly not strong either.

Table 46: Structural Parameters, T-values and Significance of the Human Capital Dimensions

Dimension	Structural Parameters	T-value	Significance
Employees' competencies	0.0440	0.5057	
Employees' attitude	0.2065	2.1834	**
Employees' intellectual agility	0.2790	3.2846	***
Leader (ship) & management ability	0.0988	1.1722	

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

The VIFs of HC's dimensions are displayed in table 47. Since all four values are below the threshold of 10 and even below the more radical threshold of 2, no multicollinearity is present. Hence, no actions need to be taken.

Table 47: VIF of the Human Capital Dimensions

Dimension	VIF
Employees' competencies	1.344
Employees' attitude	1.330
Employees' intellectual agility	1.680
Leader(ship) & management ability	1.122

7.2.2.2.2 Structural Capital

The extent to which the SC-dimensions influence SC is displayed in table 48. The second column shows that organizational capital and technological capital positively impact SC with a weight of 0.4030 and 0.2351, respectively. Contrarily, SC is only little determined by development capital as the path coefficient with a strength of 0.0376 indicates. Moreover, the relationship between the latter mentioned development capital and SC is insignificant; whereas it is significant between SC and organizational capital as well as between SC and technological capital. Nevertheless, the poor results of development capital do not lead to its deletion since development capital represents an important facet of SC which cannot be ignored (cf. also the reasoning of chapter 7.2.2.2.1).

Table 48: Structural Parameters, T-values and Significance of the Structural Capital Dimensions

Dimension	Structural Parameters	T-value	Significance
Organizational capital	0.4030	5.2405	***
Development capital	0.0376	0.5528	
Technological capital	0.2351	3.2164	***

Significance (two-tailed): *** (α = 0.01), ** (α = 0.05), * (α = 0.10), 5000 bootstrapping samples

The fact that development capital is kept can also be supported by table 49. The low VIF-values of table 49 highlight that organizational capital, development capital, and technological capital do not highly correlate and thus, that they

influence SC independently. The unfortunate results of development capital do therefore not impact the other two dimensions' positive effects. This, in turn, justifies the sustainment of development capital a little bit more.

Table 49: VIF of the Structural Capital Dimensions

Dimension	VIF
Organizational capital	1.009
Development capital	1.008
Technological capital	1.005

7.2.2.2.3 Relationship Capital

In line with the previous two chapters, table 50 exhibits the forces of the six RC-dimensions on RC. In detail, it can be seen that three dimensions display a fairly low and insignificant impact of RC: customer relationships (weight = 0.0558 and t-value = 0.814), creditor and shareholder relationships (weight = 0.0928 and t-value = 1.0709), and alliance relationships (weight = 0.0879 and t-value = 1.1068). Moreover, table 50 highlights that the strength of the dimension public perceptions and its sign are not only weak but also negative and insignificant. Hence, the dimension public perceptions does not correspond to what was hypothesized (cf. chapter 4.1.3.6). Overall, table 50 can be concluded by stating that all six dimensions of RC are remained (cf. argumentation of chapter 7.2.2.2.1) while only two relationships between the dimensions and RC are positive, fairly strong and significant: supplier relationships and informal networks.

Table 50: Structural Parameters, T-values and Significance of the Relationship Capital Dimensions

Dimension	Structural Parameters	T-value	Significance
Customer relationships	0.0558	0.8140	
Supplier relationships	0.2388	2.5084	**
Creditor & shareholder relationships	0.0928	1.0709	
Alliance relationships	0.0879	1.1068	
Informal network relationships	0.2428	3.3816	***
Public perceptions	-0.0139	0.1958	

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

No multicollinearity can be observed among the RC-dimensions. In particular, table 51 presents the VIF of the RC-dimensions. All VIF-values fall below the recommended threshold of 10 (or 2, respectively). Because of that – and in line with the former argument – no model-alteration has to be done.

Table 51: VIF of the Relationship Capital Dimensions

Dimension	VIF
Customer relationships	1.239
Supplier relationships	1.109
Creditor & shareholder relationships	1.068
Alliance relationships	1.021
Informal network relationships	1.114
Public perceptions	1.079

7.2.2.3 Construct Reliability

Since internal consistence measures cannot be applied to the above tested uncorrelated formative constructs, the literature proposes to use *external validity*, which is also referred to as *nomological validity*, to test for construct reliability (Diamantopoulos, Winklhofer 2001: 272; Götz, Liehr-Gobbers, Krafft 2010: 699). This measure suggests to look at the linkage between a latent construct measured by formative indicators and another latent construct in the model in order to evaluate if their relationship corresponds to the theoretically expected outcome –

e.g. direction, intensity and significance (Diamantopoulos, Winklhofer 2001: 272 et seq.; Götz, Liehr-Gobbers, Krafft 2010: 700 et seq.). This evaluation is, however, postponed to chapter 7.3 which looks into the structural model anyway.

7.2.2.4 Overview of Overall Formative Measurement and its Interpretation

Table 52 and table 53 show the final results of the formative measurements of HC, SC and RC, which are summarized in table 54 and related to the hypothesis in table 55. Specifically, it can be seen in table 52 that only six out of the thirteen relationships between the dimensions and their respective higher-order construct are positive and significant and thus, confirm their corresponding hypothesis: employees' attitude, employees' intellectual agility, organizational capital, technological capital, supplier relationships and informal network relationships. Likewise, six relations are positive but not significant while one is even negative and insignificant (public perceptions).

Table 52: Final Structural Parameters, T-values and Significance of all IC-Dimensions

Dimension	Structural Parameters	T-value	Significance
Employees' competencies	0.0440	0.5057	
Employees' attitude	0.2065	2.1834	**
Employees' intellectual agility	0.2790	3.2846	***
Leader(ship) & management ability	0.0988	1.1722	
Organizational capital	0.4030	5.2405	***
Development capital	0.0376	0.5528	
Technological capital	0.2351	3.2164	***
Customer relationships	0.0558	0.8140	
Supplier relationships	0.2388	2.5084	**
Creditor & shareholder relationships	0.0928	1.0709	
Alliance relationships	0.0879	1.1068	
Informal network relationships	0.2428	3.3816	***
Public perceptions	-0.0139	0.1958	

Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

Even though the previously mentioned results are not like postulated, table 53 attenuates this by pointing to the fact that the thirteen dimensions do not

correlate and thus, are independent of each other. This means that the poor effect of one dimension neither impacts the other dimensions of its higher-order construct nor any dimension of another second-order construct in the model. Hence, the formative measurement models of this dissertation do not need to be modified.

Table 53: Final VIF of all IC-Dimensions

Dimension	VIF
Alliance relationships (RC)	1.139
Employees' attitude (HC)	1.404
Creditor & shareholder relationships (RC)	1.214
Employees' competencies (HC)	1.463
Customer relationships (RC)	1.389
Development capital (SC)	1.070
Informal network relationships (RC)	1.164
Employees' intellectual agility (HC)	2.014
Leader(ship) & management ability (HC)	1.198
Organizational Capital (SC)	1.134
Public perceptions (RC)	1.143
Supplier relationships (RC)	1.192
Technological Capital (SC)	1.142

Overall, table 54 summarizes that the content validity quality criterion is fulfilled within this doctoral thesis' formative measurement (cf. chapter 7.2.2.1). This implies that all relevant facets of HC, SC and RC, respectively, are included in the formative measurement models. Moreover, indicator reliability is met in terms of multicollinearity which is not present within the scope of this dissertation. However, the direction, the strength and the significance of the path coefficients between the dimensions and their higher-order constructs do not always correspond to their hypotheses as it is already discussed above. Possible explanations for this deviation are given in the next paragraphs.

Table 54: Overview of the Formative Measurement Evaluation

Quality Criterion	Requirement	Result
Content validity	Considered already at the design stage of this study	✓
Indicator reliability	<ul style="list-style-type: none"> -Path coefficients between 1 and -1 - Significance: t-values of at least 1.65 -Multicollinearity (VIF < 10) 	 Not fully satisfied but accepted

Starting with the positive evidence of *HC*, it can be noted that *intellectual agility* has the highest significant impact on *HC* (0.279***) and thus, confirms hypothesis H1c. This is astonishing since this dimension is not considered in any other IC-study on German SME. In more detail, this dissertation's data shows that approx. 41% of German SME' employees can solve problems by themselves and are therefore able to handle 'difficult' situations on their own. This allows fast reactions to, for example, environmental changes (cf. figure 1 and chapter 2.3.2.2.2) and thus, facilitates success. Furthermore, about 46% of German SME' employees are capable of performing tasks beyond their actual or direct field of competencies which means that they can potentially be deployed among divisions or departments. This in turn provides flexibility which is especially important in today's dynamic business world.

The *attitude* of the workforce has an important as well as significant influence on German SME' *HC*, too and therefore supports hypothesis H1b. Specifically, the data highlights that the majority (specifically 55% on average) of SME' employees are highly motivated and thus, likely to perform at their best. Additionally, 83% of German SME' employees participate, on average, in company events. Since most of such activities are assumed to take place during leisure time, it indicates the motivation to be part of the firm (Mertins, Wang, Will 2009: 118) and to see colleges or even the boss during time off. Moreover, it leads to the assumption of high team spirit (Thorleifsdottir, Claessen 2006: 58) as well as a high identification with the firm (Simon 2006: 58). Furthermore, it is internationally argued that close social ties between employees as well as with the business leader(s) decrease the

chance of high fluctuation (Desouza, Awazu 2006: 39). As such, it reduces time, efforts and financial funds to acquire and potentially train new employees, and allows maintaining a constant stock of knowledge and IC in particular.

The impact of German SME' *leaders* on HC (and in turn on performance) is lower than expected (weight = 0.099) and also insignificant. Due to this hypothesis H1d is not approved. Such results are especially surprising when taking into account that the average leader dedicates approx. 28.5% of his/her managerial tasks to the direct communication with employees, which should facilitate knowledge transfers. Furthermore, the collected data illustrates that German SME' leaders consider themselves as almost 60% visionary and thus, do not lose sight of where they want their company to be in the future. However, the low weight as well as insignificance could indicate that this is not enough. In addition, the poor results can, potentially, also be traced back to the indicator elimination (due to statistical inappropriateness) because of which many of the critical factors of leadership had to be excluded (cf. chapters 4.1.1.4, 7.2.1.1.1, 7.2.1.2.1, 7.2.1.3.1, and 7.2.1.4.1). Hence, it is advised to further investigate this issue and probably to repeat this survey with different indicators.

The dimension which looks into the *competencies* of German SME' employees has the lowest and also an insignificant impact on HC. Accordingly, hypothesis H1a is not attested either. Specifically, this doctoral thesis' survey data demonstrates that the percentage of academics, which is fairly high with almost 22%, and the percentage of employees with interdisciplinary experience (about 23%) do not seem to matter much for German SME' HC. One can, for example, argue that these percentages are too low or even too high. Likewise, one can assume that there are potential other factors which are more important for the competence base of German SME' employees. Yet, since such speculations are not satisfying, additional research is required.

Overall, it can be concluded for HC that the IC of German SME' employees seems to be more important than that of German SME' leaders. This finding can also be supported by former research (BMWi 2007: 52 & 55).

With respect to SC, it can be noted that hypothesis H2a is verified. The high impact of *organizational capital* on SC with a significant path coefficient of 0.403***

would, according to previous perception-based German SEM research, be explained via internal cooperation and knowledge issues (BMW 2007: 59; Mertins, Will, Wuscher 2007: 201; Mertins, Wang, Will 2009: 119; Voigt, Finke, Orth 2009: 275). Contrariwise, the study at hand uses two different indicators: one which looks into German SME' business culture and the other into their percentage of formalization. With respect to culture it can be stated that German SME' corporate culture is fairly strong – especially in crisis – (its strength is, on average, approx. 4.6 out of 6) and therefore able to contribute to success. Concerning formalization, the results show that the surveyed SME formalize, on average, approx. 61% of their processes. They are therefore less flexible than expected but still seem to be flexible enough to adjust to (external) demands in a successful manner.

Hypothesis H2c is also proven within the scope of this dissertation's study. Specifically, a relatively high and significant contribution of *technological capital* on SC (0.235***) is observable. This indicates that technological capital is an undeniable driver of German SME' SC and success, respectively; which is especially important in today's fast changing environment and the current half-time value of technologies. In particular, the results of this examination point out that the surveyed SME invest less than 0.5% of their turnover in ICT. Yet, they spend on average 2.73% of their annual income on maintaining/guaranteeing state-of-the-art technology levels of machinery, process engineering and equipment. Accordingly, one can argue that even relatively low investments can have a leverage effect on SC. Lastly, it is interesting to mention that the dissertation's findings are also fairly meaningful since most IC-studies do not include technological issues at all.

The low as well as insignificant influence of *development capital* (path coefficient of 0.038) and in particular of employees' improvement suggestions on SC is, at first glance, incomprehensible. Yet, it is reasonable when looking at the data in detail: the average amount of improvement suggestions sums to approx. 19 per year – i.e. about 1.5 per month – for the surveyed firms with average 50 employees. This makes an average of 0.38 suggestions per employee p.a. and does not seem to be

enough to positively influence SC.³⁸⁷ Consequently, hypothesis H2b is rejected. Nevertheless, it has to be considered that the results are not significant. Hence, the impact might be different among all German SME. Moreover, development capital might still be important for German SME but is, in the context of this study, simply not measured via the 'right' indicators. Hence, future research should elaborate on this topic.

Hypothesis H3e, which is concerned with the positive association between *informal networks* and *RC*, is strongly established within the scope of this doctoral thesis. Specifically, informal relationships are, with a significant loading of 0.243***, the most important dimension of German SME' RC. This is a rather unexpected finding for all German SME because informal relations were expected to be of particularly high relevance for young German SME (cf. chapter 4.1.3.5). Yet, this discovery is highly interesting; and especially because this RC-facet was not included in previous IC-studies. A potential reason for this result could be that family and friends are especially important for young enterprises in order to compensate for diverse missing resources (on average, the surveyed SME rely on 3 family members and/or friends for help); while memberships in associations could be more important for established SME, for example, to facilitate the exchange of expertise, experience etc. (on average approx. 4.75 memberships). Yet, this is only one possible explanation and does not mean that it could not be the other way around as well. Consequently, further research is required on this issue.

Supplier relationships represent the second most important dimension of German SME' RC (0.239 and significant at 5%) and attest hypothesis H3b. Similar to informal networks, this finding is also rather surprising since previous German studies mostly highlight the importance of knowledge about and relationships with customers (Voigt, Finke, Orth 2009: 275; BMWi 2010a: 14) as well as

³⁸⁷ Interestingly, Hermann Simon's (2007: 321) Hidden Champions only have 0.32 improvement suggestions per employee as well.

cooperation partners (Vanini 2011: 6) within RC.³⁸⁸ The finding of this dissertation can, however, be explained by considering that German SME are well known and respected by the customers for their quality (Simon 2007: 334); and in order to meet and uphold the demanded as well as desired quality standards German SME require appropriate inputs from their upstreamed suppliers, too. Another reason why supplier relationships are an important facet of RC could be that German SME' business is to large parts 'SME to SME' (Krüger 2006: 20). Thus, suppliers are SME, too. Because of that it is expected that they have good relationships and deliver products of high quality (satisfaction averages to approx. 4.75 out of 6) which explains why these suppliers are respected and important for the supplied SME.

Apart from informal and supplier relationships, there are no more strong and significant path coefficients which point to relevant dimensions of German SME' RC. Hence, hypotheses H3a, H3c, H3d and H3f are not proven.

The fairly low and insignificant contribution of *creditors and shareholders* to RC (with a path coefficient of only 0.093) is not surprising because previous studies confirm that German SME do not value their (external) shareholders, investors, financial institutions etc. and relationships with them very much (Alwert 2005: 146 & 152 et seq.; BMWi 2007: 54 & 57 et seq.; BMWi 2010a: 14 et seq.; BMWi 2010b: 10). Instead German SME prefer to be financially independent (Simon 2007: 259 et seq.; Dömötör 2011: 12). This is also supported by the collected data: the surveyed German SME have an average equity ratio of 55%.

Similar to the low contribution of capital providers to RC, this doctoral thesis' findings on *alliances* correspond to previous studies, too (Simon 1996: 145 et seq., Simon 2006: 49 & 57; Simon, Huber 2006: 51 et seq. & 68; Adenäuer 2007: 27, 34 et seq., 37 & 41 et seq.; Simon 2007: 256, 273 et seq. & 277; Durst 2008: 418 & 424). Specifically, the low and insignificant impact of 0.088 supports the discovery that German SME are successful because they favor to work independently and thus, secure i.a. their company knowledge, high quality standards as well as potential

³⁸⁸ In a similar manner, this doctoral thesis' finding cannot be supported by the result of a New Zealand study, which highlights customer satisfaction and customer loyalty (Steenkamp, Kashyap 2010: 380).

competitive leads. In detail, the surveyed companies of this dissertation only perform about 10% of their project with the help or together with other firms. As such, the low impact of 0.088 is not surprising.

The minor influence of *customer relationship* on RC with an insignificant path coefficient of 0.056 is probably the most remarkable difference compared to previous German SME-IC studies. That is because past studies reveal that German SME perceive their customer relationships to be the most significant element of their RC (BMW 2007: 54 & 57; Mertins, Kohl, Krebs 2008: 50; Voigt, Finke, Orth 2009: 275; BMW 2010a: 14). This cannot be supported by the hard-fact-based results of this dissertation. Nevertheless, the highly contradicting findings can be partly explained by the fact that the indicators of this study only consider the dependence on certain customers as well as informal relationships (cf. chapter 7.2.1.1.3, 7.2.1.2.3, 7.2.1.3.3, and 7.2.1.4.3); and both of these factors do not seem to be critical for German SME' success. Specifically, the surveyed companies are, with an average total turnover of approx. 43% highly dependent on their top 5 customers. This threatens their (long-term) success – especially if these customers withdraw from the firm. Their informal relationships, which may facilitate a better relation, represent just about 11% of all customer relationships and thus, may be too little to promote RC. Lastly, it is important to repeat that many relevant aspects of German SME' customer relationships (cf. chapter 4.1.3.1) are not included in this final empirical examination because of the statistical inappropriateness of the applied indicators. Thus, customer relationship may still be important for German SME' RC, too. Yet, this requires further examination via additional research with (differing) hard-fact-based questionnaires.

Marketing and PR have, according to the results of this dissertation, a negative and insignificant impact on German SME' RC; and thus, reject hypothesis H3f. A possible reason for this could be that German SME do not make high marketing efforts in terms of special departments or staff (Simon 1996: 86 et seq.; Simon 2007: 161). The surveyed SME, in particular, spend only approx. 1.5% of their turnover on marketing and even less on PR (approx. 0.3% of their sales). Hence, it can be argued that the low budgets of 0.3% - 1.5% are simply not enough and that a positive impact on RC requires more than this. Alternatively, and in line with findings on young enterprises, it can be claimed that German SME' *public perceptions* are rather dependent on the reputation of the entrepreneur and his/her

image (Hormiga, Batista-Canino, Sanchez-Medina 2011a: 624); and correspondingly on the reputation of their managers in larger (established) SME. Yet, further evidence is desired on this matter.

Table 55: Overview of Results: Hypotheses Testing

Abbreviation	Hypothesis	Result
H1a	The competencies of German SME' employees are a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.	
H1b	The attitude of German SME' employees is a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.	
H1c	The intellectual agility of German SME' employees is a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.	
H1d	German SME' leader(ship) and management ability is a strategically relevant dimension of German SME' human capital and thus, important for lasting competitive business performance.	
H2a	The organizational capital of German SME is a strategically relevant dimension of German SME' structural capital and thus, important for lasting competitive business performance.	
H2b	The development capital of German SME is a strategically relevant dimension of German SME' structural capital and thus, important for lasting competitive business performance.	
H2c	The technological capital of German SME is a strategically relevant dimension of German SME' structural capital and thus, important for lasting competitive business performance.	
H3a	German SME' customer relationships is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.	
H3b	German SME' supplier relationships is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.	
H3c	German SME' creditor and shareholder relationships is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.	
H4d	German SME' alliance/cooperations relationships is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.	
H4e	German SME' informal network relationships is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.	
H4f	German SME' public perceptions is a strategically relevant dimension of German SME' relationship capital and thus, important for lasting competitive business performance.	

Finally, table 55 summarizes the above presented results with respect to the hypotheses raised in chapter 4.1: as already mentioned before, table 55 highlights that six hypothesis can be confirmed, while seven cannot.

7.3 RESULTS OF STRUCTURAL MODELS

After the evaluation of the measurement model and its acceptance, it is necessary to turn attention to the structural models in order to test the proposed main hypothesis (e.g. H1, H2 and H3). In other words, the following chapter's focus is placed on "(...) the nature and magnitude of the relationships between constructs" (Hair, JR. et al. 2010: 728). For this matter, the following *five quality criteria* are applied (Ringle et al. 2006: 86 et seq.; Huber et al. 2007: 42 et seqq.; Ringle, Spreen 2007: 214 et seq.; Schloderer, Ringle, Sarstedt 2009: 584 et seqq.; Hair, JR. et al. 2014: 168 et seqq.): 1) the collinearity assessment, 2) the path coefficients and their significance, 3) the coefficient of determination (R^2), 4) the effect size f^2 , and 5) the predictive relevance (Q^2) as well as its effect size q^2 .

Similar to the previous chapters (cf. chapters 7.2.1 and 7.2.2), these five principles are first explained from a *theoretical viewpoint* (cf. 7.3.1) and *then used* to evaluate the quality of the data in the structural models (cf. chapters 7.3.2 and 7.3.3).

7.3.1 Structural Model Assessment Criteria

7.3.1.1 Collinearity Assessment

At first, it is important to assess the structural model for collinearity .

"The reason is that the estimation of path coefficients in the structural models is based on OLS regressions of each endogenous latent variable on its corresponding predecessor constructs. Just as in a regular multiple regression, the path coefficients might be biased if the estimation involves significant levels of collinearity among the predictor constructs"

(Hair, JR. et al. 2014: 168).

The in chapter 7.2.2.2 introduced variance inflation factor (VIF) is again applied to test for collinearity. This quality criterion needs to be employed to each set of predictor constructs individually (ibid.: 170).

7.3.1.2 Path Coefficients and Their Significance

The second quality criterion focuses on the path coefficients and in particular their strength and significance which give an indication of the impact of an exogenous construct on an endogenous construct (ibid.: 87). With respect to the *strength*, it can be noticed that the coefficients can have values between -1 and +1. Negative values indicate a negative relation between two constructs – i.e. the more a, the less b. Positive path coefficients stand for a positive relationship – i.e. the more a, the more b. Lastly, zero does not signal any impact at all (ibid.: 171). The literature also highlights that path coefficients should, at best, display values of 0.1 (Lohmöller 1989: 60 cited by Reuschenbach 2012: 147; Huber et al. 2007: 104) since they do otherwise only have minor explanatory power. Concerning the *significance*, it can be noted that it is important to test the goodness of the coefficients (Schloderer, Ringle, Sarstedt 2009: 584; Götz, Liehr-Gobbers, Krafft 2010: 702). Moreover, the significance specifies whether a hypothesis can be transferred to the entire population (Riesenhuber 2009: 9) – in this case all German SME. The significance can, within the scope of PLS, be examined via bootstrapping and related t-statistics (cf. chapter 7.2.1.1) (Christophersen, Grape 2009: 114; Schloderer, Ringle, Sarstedt 2009: 584; Götz, Liehr-Gobbers, Krafft 2010: 702).

7.3.1.3 Coefficient of Determination

The coefficient of determination, which is represented by R^2 , helps to estimate the predictive power and accuracy of structural models (Chin 2010a: 674; Hair, JR. et al. 2014: 174). Specifically, R^2 , which can only be calculated for endogenous latent variables, explains how much variance is explained by the predicting constructs. In other words, it provides information concerning the strength with which the exogenous constructs drive the endogenous one (Chin 1998b: 316; Huber et al. 2007: 107; Christophersen, Grape 2009: 114; Schloderer, Ringle, Sarstedt 2009: 584; Chin 2010a: 674). Generally speaking, R^2 can take on values between zero and one (Götz, Liehr-Gobbers, Krafft 2010: 701; Backhaus et al. 2011: 75; Hair, JR. et al. 2014: 175). Wynne Chin (1998b: 323), for example, states that R^2 values are judged as substantive if they are equal or above 0.67, moderate

if they are equal or above 0.33 and weak if they are equal or above 0.19. Yet, it is important to emphasize that the evaluation of the R^2 -values needs to be done with respect to the context of the investigation. As such, lower R^2 – even as low as 0.1 – are sometimes acceptable, too (Schloderer, Ringle, Sarstedt 2009: 584; Götz, Liehr-Gobbers, Krafft 2010: 701; Backhaus et al. 2011: 100; Hair, JR. et al. 2014: 175).

7.3.1.4 *Effect Size f^2*

Based on R^2 , the effect size, which is symbolized by f^2 , can be determined. The effect size indicates whether a specific independent variable actually has an effect on its dependent latent construct. Specifically, it is established by looking into changes of R^2 when calculating the R^2 of an endogenous construct once with (R^2 incl.) and once without an exogenous variable under investigation (R^2 excl.); and by comparing the results subsequently (Chin 1998b: 316 et seq.; Huber et al. 2007: 46; Panten, Boßow-Thies 2007: 323; Schloderer, Ringle, Sarstedt 2009: 585; Götz, Liehr-Gobbers, Krafft 2010: 702; Hair, JR. et al. 2014: 177 et seqq.). The effect size is calculated based on the following formula:

$$\text{effect size } f^2 = (R^2 \text{ incl.} - R^2 \text{ excl.}) / (1 - R^2 \text{ incl.})$$

It can be noticed that the larger the effect size f^2 , the more important is the impact of the exogenous latent variable under investigation (Panten, Boßow-Thies 2007: 323). In detail, a f^2 of 0.35 is regarded as substantial, of 0.15 as moderate, and of 0.02 as weak (Cohen 1988: 410 cited by Chin 1998b: 317, by Chin 2010a: 675, by Götz, Liehr-Gobbers, Krafft 2010: 702, by Reuschenbach 2012: 149 and by Hair, JR. et al. 2014: 178).

7.3.1.5 *Predictive Relevance and Effect Size q^2*

Because of the predictive nature of PLS (cf. chapter 5.1.4) it is important to test a model's predictive power, too (Naskrent 2010: 265): how well the observed

values can be reconstructed via the model and its parameter estimates (Chin 1998b: 318, Chin 2010a: 680; Götz, Liehr-Gobbers, Krafft 2010: 703). To do so, one can apply the so called Stone-Geisser test (Stone 1974; Geisser 1974 cited by Schloderer, Ringle, Sarstedt 2009: 286)(Geisser 1975: 320 cited by Chin 1998b: 316, by Chin 2010a: 659 and by Götz, Liehr-Gobbers, Krafft 2010: 702) which is usually termed Q^2 .

Q^2 is in PLS determined via a blindfolding procedure which

“(…) omits a part of the data for a particular block of indicators during parameter estimation and then attempts to estimate the omitted part using the estimated parameters. This process is repeated until every data point has been omitted and estimated”

(Chin 1998b: 317).³⁸⁹

As a rule, one should aim for Q^2 values larger zero since they indicate predictive relevance. Likewise, it is not desired to have values below zero (Fornell, Cha 1994: 73 cited by Götz, Liehr-Gobbers, Krafft 2010: 703; Chin 1998b: 318; Schloderer, Ringle, Sarstedt 2009: 286; Chin 2010a: 680; Hair, JR. et al. 2014: 178).

However, Q^2 can, within the scope of PLS, only be calculated for endogenous latent variables with reflective measurement models (Panten, Boßow-Thies 2007: 322; Schloderer, Ringle, Sarstedt 2009: 585) and is not applicable to formative endogenous constructs (Hair, JR. et al. 2014: 178). As such, it can only be applied to the 'performance' construct within the context of this research work.³⁹⁰

³⁸⁹ “The blindfolding procedure removes some data from the sample and treats these data as missing in the estimation. In the next step, the obtained parameter estimates are used to reconstruct the raw data that the blindfolding procedure assumes are missing. Consequently, the blindfolding technique produces general cross-validation metrics as well as the parameter estimates’ jackknifing standard deviation” (Götz, Liehr-Gobbers, Krafft 2010: 703).

³⁹⁰ This is particularly interesting with respect to model II in which SC as well as RC are exogenous as well as endogenous, formatively measured constructs and thus, not suitable for a Q^2 calculation.

In line with the f^2 calculation for R^2 , one can also determine q^2 of Q^2 and thus, the relative predictive relevance of an exogenous construct on an endogenous construct. q^2 is calculated via the following formula (ibid.: 183 et seq.):

$$q^2 \text{ effect size} = (Q^2 \text{ incl.} - Q^2 \text{ excl.}) / (1 - Q^2 \text{ incl.})$$

Similar to f^2 , q^2 -values of 0.35, 0.15 and 0.02 highlight a substantial, medium and small predictive relevance, respectively (ibid.: 183).

7.3.2 Model I: The Direct Impact of German SME' Intellectual Capital Categories on Lasting Competitive Business Performance

After looking into the quality criteria from a theoretical perspective, they shall now be applied to this dissertation's data. The chapter at hand starts to do so with respect to the simple model of German SME' IC: HC, SC and RC are hypothesized to directly and positively impact lasting competitive business performance. In order to test these hypotheses, the PLS estimates are evaluated against the five quality criteria which are introduced in chapter 7.3.1.

7.3.2.1 Collinearity Assessment of Model I

Due to the fact that the VIF is supposed to be applied to each set of predictor constructs individually (cf. chapter 7.3.1.1) and since the IC-categories do not interact in model I, there is only one set of predictor constructs: HC, SC and RC which (directly) predict performance. Hence, only one analysis needs to be performed.

Table 56: VIF of Predictor Constructs in Model I

HC, SC and RC as predictors of Performance	
Construct	VIF
HC	1.150
SC	1.064
RC	1.094

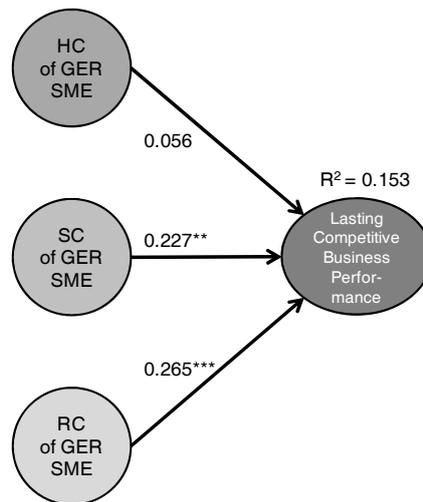
The results of this analysis are presented in table 56. Since all three VIF-values undercut the minimum threshold of 10 and even the highly conservative threshold of 2, collinearity can be ruled out. Hence, one can conclude that HC, SC and RC do not correlate; and one can proceed with the next four quality tests.

7.3.2.2 Path Coefficients and their Significance of Model I

Figure 88 presents the path coefficients' strength as well as the significance-level of the linkages between HC, SC, RC and performance. It can be seen that RC has the strongest significant impact on German SME' competitive business performance (0.265***). This means that German SME' lasting competitive success is the most dependent on good relationships to firms' stakeholders. The relation between SC and performance is also positive and significant (0.227**). This implies that SC represents the second most important (direct) intangible force of German SME' above-average success. Figure 88 also shows that the impact of HC on performance is below 0.1 and thus, is regarded as having a very low explanatory power. Moreover, HC's influence is not significant. Hence, it can be stated that HC does not play a critical role when it

comes to the direct impact of IC on German SME' performance.³⁹¹

Figure 88: Structural Model I: Path Coefficients and their Significance



Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

³⁹¹ Additionally, it is interesting to compare the path coefficients presented in Figure 88 to other studies in the field of IC in order to better evaluate their strength. George Tovstiga and Ekaterina Tulugutova (2007: 705), for example, discover only slightly higher path coefficients for SC (0.355) and RC (0.355) on performance among Russian SIE. Same holds true for the SEM on Argentine SME which is conducted by Carlos F-Jardon and Maria Martos (2009: 612). They report a path between SC and performance of 0.455***. Moreover, they find an insignificant direct link of 0.055 between HC and performance. A third study also discloses comparable results. Wen-Ying Wang and Chingfu Chang (2005: 230), who look into listed IT firms in Taiwan, reveal a path coefficient of 0.222*** between RC and performance and 0.172*** between SC and performance. They can also not prove a strong and significant impact of HC on performance (0.048). As a result of these comparisons, this dissertation's path coefficients and in particular their strength can be concluded as acceptable.

7.3.2.3 *Coefficient of Determination of Model I*

The next step is to evaluate the model's coefficient of determination (R^2). Since R^2 -values are only available for endogenous latent variables, one finds only one R^2 in model I: that of performance (cf. figure 88).

The illustrated R^2 of 0.153 indicates that 15.3% of the variance of performance is explained by HC, SC and RC. According to Wynne Chin's (1998b: 323) rules of thumb this is regarded as very weak. However, as already mentioned in chapter 7.3.1.3, the exact interpretation of R^2 – and of low R^2 values in particular – needs to be done with respect to the context of the investigation. In order to do so, it might be interesting to look at the R^2 discovered in previous research on SME' IC. A first study, conducted by George Tovstiga and Ekaterina Tulugutova (2007: 705), reports a fairly high R^2 of 0.678. Hence, this doctoral thesis' R^2 of 0.153 looks quite poor. However, Carlos F-Jardon and Maria Martos (2009: 612) as well as Josee St-Pierre and Josee Audet (2011: 215) both test PLS-SEM with data from SME and report R^2 values of 0.265 and 0.051, respectively. Since this dissertation's R^2 lies somewhere in between these, it is regarded as acceptable.³⁹²

The R^2 of 0.153 is also accepted because it can be argued that IC creates value by interaction with other (tangible) assets (Lev 2001: 7), which might facilitate competitive success but which are not considered in the dissertation's model. Lastly, it is worth stating that the relatively low R^2 of 0.153 might be caused by the fact that various theoretically relevant IC-facets are excluded from the structural model calculation because the collected data did not meet the required statistical quality (cf. chapter 7.2).

7.3.2.4 *Effect Size f^2 of Model I*

After analyzing and accepting R^2 , R^2 's effect size (f^2) can be examined within the scope of this thesis' model I. f^2 is applied to discover the individual impact of

³⁹² It needs to be considered, however, that Carlos F-Jardon and Maria Martos (2009: 612) as well as Josee St-Pierre and Josee Audet (2011: 215) test interacting models instead of the direct impact of the IC-categories on performance only.

HC, SC and RC on performance. The f^2 -values of model I are reported in table 57.

Table 57: Effect Size f^2 of Model I

	R^2 incl.	R^2 excl.	f^2	Interpretation
$f^2_{HC \rightarrow Perf}$	0.153	0.150	0.0035	Almost none Weak Weak towards medium
$f^2_{SC \rightarrow Perf}$	0.153	0.105	0.0567	
$f^2_{RC \rightarrow Perf}$	0.153	0.089	0.0756	

The first row of table 57 indicates that R^2 changes almost not at all when excluding HC from the calculation (from 0.153 to 0.150) and thus, that the effect size of HC is very weak. This supports the findings of chapter 7.3.2.2 which also show a minor (and insignificant) impact of HC. The results of chapter 7.3.2.2 can also be confirmed by the second and third line of table 57 which illustrate that SC is fairly important to determine performance while the effect size of RC is even stronger.

Overall, it can be concluded that the effect sizes of model I vary between very weak, weak and weak to medium. They help to better understand the results of the previous chapters.

7.3.2.5 Predictive Relevance and Effect Size q^2 of Model I

Lastly, the predictive power of model I requires examination, too. Because of the fact that Q^2 can only be calculated for endogenous, reflectively measured constructs, just one Q^2 value is available: the Q^2 of performance. Since this Q^2 -value of 0.1674 (cf. table 58, column two; omission distance 5) exceeds the minimum cut-off value of zero, it can be concluded that model I is able to predict the initially observed data values.

Table 58: Q² and Effect Size q² of Model I

	Q ² incl.	Q ² excl.	q ²	Interpretation
q ² HC -> Perf	0.1674	0.1467	0.0249	Weak Almost medium Weak towards medium
q ² SC -> Perf	0.1674	0.0491	0.1421	
q ² RC -> Perf	0.1674	0.0597	0.1294	

Table 58 also shows the effect size q². In detail, the results correspond to what is discovered in the previous chapter 7.3.2.4 and thus, strengthen previous arguments: HC has a weak predictive relevance while SC and RC tend to have a medium impact.

7.3.2.6 Overview of Structural Model I and its Interpretation

To confirm the overall quality of structural model I, table 59 summarizes the results of chapters 7.3.2.1 to 7.3.2.5. Specifically, it can be reported that the three IC-categories, namely HC, SC and RC, do not correlate and thus, impact performance independently. It is also shown that only two of the three tested path coefficients are positive, strong and significant and that these results can be further supported via the f² and q² values. Lastly, it is worth stating that IC explains about 15.3% of German SME' competitive business performance and that the predictive ability of model I is appropriate.

Table 59: Overview of the Structural Model Evaluation: Model I

Quality Criterion	Requirement	Result
Collinearity assessment	VIF < 10	✓
Path coefficients and significance	- Path coefficients between 1 and -1 -Significance: t-values of at least 1.65	✓ ✗/✓
Coefficient of determination	R ² below 0.19 accepted in terms of contents	✓
Effect size	f ² at least 0.02 to be considered as weak	✓
Predictive relevance	-Q ² above zero - q ² at least 0.02 to be considered as weak	✓

Because of the fact that the information provided in the latter paragraph is quite technical, it shall now be transferred into a discussion with regard to contents. Specifically, table 60 illustrates that two of the three previously raised hypotheses can be supported by the data. Details can be found in the next three paragraphs:

Hypothesis **H3** is substantiated with most evidence because of its strong path coefficient, a favorable significance-level of 1% as well as relatively high effect sizes (f² and q²). This finding is astonishing since it does not confirm previous studies on German SME' IC: Kai Mertins, Markus Will and Sven Wuscher (2007: 201) as well as the BMWi (2010b: 9; 2010a: 13), for example, discover that RC has the lowest perceived impact (compared to HC and SC) on performance. Likewise, a different German SME study discovers that RC has the second strongest impact (Vanini 2011: 7) but again, not the strongest. These differences between prior perception-based research and the current hard-fact-based examination indicate that German SME' perceptions concerning the IC-drives of their business performance do not match reality. Going one step further, one might even argue that German SME seem to underestimate the power of their

stakeholder relationships and thereby take the risk to ignore great success potentials.

Hypothesis **H2** is also fairly well supported. In depth, the path coefficient between SC and performance is reasonably high as well as significant at 5%. Additionally, SC demonstrates medium effect sizes (f^2 and q^2) which means i.a. that SC is responsible for IC's contribution on success. As opposed to hypothesis H3, the findings concerning H2 are also confirmed by former perception-based studies of German SME (Mertins, Will, Wuscher 2007: 201; BMWi 2010b: 9, BMWi 2010a: 13).³⁹³ Hence, German SME seem to evaluate the impact of their SC on business success quite right.

The fact that HC has the lowest impact on success – i.e. low and insignificant path coefficient as well as very weak effect sizes (q^2 and f^2) – is an unpredicted outcome which conflicts not only hypothesis **H1** but also the findings of earlier perception-based studies on German SME' IC (Mertins, Will, Wuscher 2007: 201; BMWi 2010b: 9, BMWi 2010a: 13). Yet, this thesis' HC-result matches the discovery of Ute Vanini (2011: 7) who also reveals that German SME judge their SC and RC to be more important for success than HC. The reason for the low and insignificant direct impact of HC on competitive success is, according to Wen-Ying Wang and Chingfu Chang (2005: 231), that HC is the origin of IC and as such, impacts performance only via SC and RC. In more detail, the two authors believe that the insignificant coefficient of HC does not mean that HC is not important. Alternatively, they argue that HC simply impacts performance in an indirect manner. However, whether this is true in the context of German SME needs to be tested in model II in the following chapter 7.3.3.

³⁹³ One study even reveals that SC is the most important aspect of German SME' IC (Vanini 2011: 7).

Table 60: Overview of Results: Hypotheses Testing

Abbreviation	Hypothesis	Result
H1	The human capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.	
H2	The structural capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.	
H3	The relationship capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.	

7.3.3 Model II: The Interaction Effect of German SME’ Intellectual Capital Categories and Lasting Competitive Business Performance

As indicated in prior studies, it is not essentially necessary for enterprises to invest in each aspect of IC. Instead it is hypothesized that investments in HC, for example, result in positive changes of SC and/or RC, too (Cohen, Kaimenakis 2007: 258). To elaborate on this aspect, the following section evaluates model II based on the quality criteria which are theoretically introduced in chapter 7.3.1.

7.3.3.1 Collinearity Assessment of Model II

Building on the theoretical explanation of the collinearity assessment in chapter 7.3.1.1, this section discusses the VIF-calculations for HC and RC which act as predictors of SC, as well as for SC and RC which jointly determine performance.

Table 61: VIF of Predictor Constructs in Model II

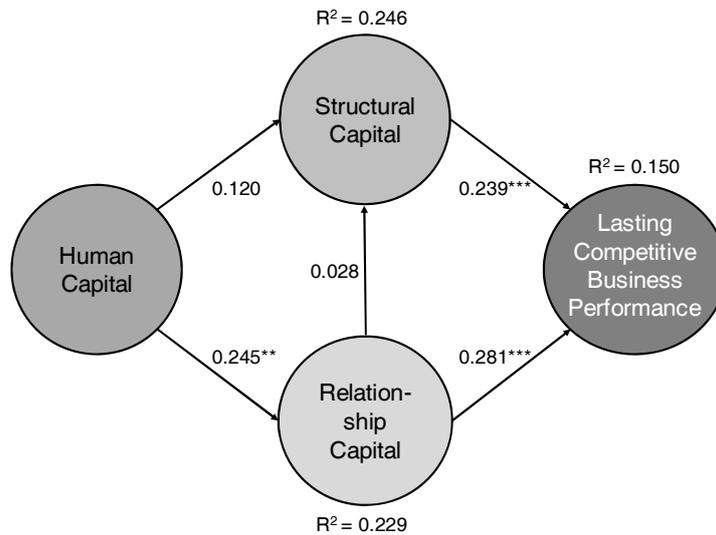
HC and RC as predictors of SC		SC and RC as predictors of Performance	
Construct	VIF	Construct	VIF
HC	1.094	SC	1.012
RC	1.094	RC	1.012

Table 61 illustrates the results of these calculations. Since all of the VIF are below 10 and even lower 2, they do not indicate collinearity and thus, do not need to be eliminated, merged into single constructs or pulled together as higher-order constructs (Hair, JR. et al. 2014: 170 & 186).

7.3.3.2 Path Coefficients and their Significance of Model II

Figure 89 illustrates the structural model of model II.

Figure 89: Structural Model II: Path Coefficients and their Significance



Significance (two-tailed): *** (α = 0.01), ** (α = 0.05), * (α = 0.10), 5000 bootstrapping samples

It can be seen that one relationship – i.e. between RC and SC – does not surpass the minimum path coefficient of 0.1 in order to be recognized as having explanatory power. Moreover, this path coefficient is not significant either. Hence, it can be deduced that RC does not have an impact on SC. There is another path coefficient in model II which is not significant: HC impacts SC with an insignificant force of 0.120. Hence, this result seems to hold only for the sample data of this dissertation instead of being valid for all German SME. Nevertheless, three significant, positive and strong associations between model II's constructs can be noted in figure 89: HC influences RC (0.245**); and RC as well as SC both influence (similar to model I) performance with a strength of 0.281*** and 0.239***, respectively.³⁹⁴

Apart from the direct effects, model II also illustrates a significant indirect effect – i.e. HC impacts performance indirectly via RC. In order to calculate this

³⁹⁴ Model II's coefficients can be compared to other studies in order to better evaluate their strength. Similar to the study at hand, Nick Bontis, William Keow and Stanley Richardson (2000: 97) discover an insignificant path between HC and SC. Yet, their coefficient of 0.304 exceeds the one of this dissertation's model II. Concerning the relationship between HC and RC it can be noticed that various publications confirm this doctoral thesis finding (Bontis 1998: 76; Bontis, Keow, Richardson 2000: 97; Wang, Chang 2005: 231; Do Rosario Cabrita, Bontis 2008: 228 et seqq.; F-Jardon, Martos 2009: 612). However, these studies' path coefficients vary between 0.391*** (Do Rosario Cabrita, Bontis 2008: 228 et seqq.) and 0.798*** (Bontis, Keow, Richardson 2000: 97) and hence, clearly surpass this examination's 0.245. The link between SC and performance is also higher reported by other authors than in this dissertation. Specifically, one finds values as high as 0.262** (Bontis, Keow, Richardson 2000: 97), 0.398*** (Bontis 1998: 79), 0.431*** (Do Rosario Cabrita, Bontis 2008: 228 et seqq.), 0.455*** (F-Jardon, Martos 2009: 612), and 0.611*** (Wang, Chang 2005: 231). Nevertheless, this thesis' strength of the path between RC and performance is much alike other examinations. Wen-Ying Wang and Chingfu Chang (2005: 231), for example, discover a coefficient of 0.205***. This corresponds to Maria do Rosario Cabrita and Nick Bontis' (2008: 228 et seqq.) path of 0.291***. Overall it can be reported that this dissertation's path coefficients of model II are, in most cases, smaller than the ones of other studies. Yet, this does not necessarily mean that this doctoral thesis' results are less worth. Instead, the lower regression coefficients might be caused by different HC-, SC- and RC-definitions as well as the different samples (St-Pierre, Audet 2011: 216).

indirect effect, one has to multiply the path coefficients from HC on RC and from RC on performance (Huber et al. 2007: 117; Hair, JR. et al. 2014: 174 & 207 et seqq.). Moreover, one derives at the *total* effect if the indirect effect is added to the direct one (Huber et al. 2007: 117; Hair, JR. et al. 2014: 174 & 207 et seqq.). This total effect is especially important to correctly determine the impact of an exogenous latent variable on an endogenous one – especially if the direct impact is minor but the total effect is crucial (Huber et al. 2007: 117).

Table 62 demonstrates the indirect and total effect of HC on performance. Since there is no direct connection between HC and lasting competitive business performance in model II, the indirect effect equals the total one. Specifically, it can be noted that the indirect effect of HC on performance (via RC) sums to 0.0688 (= 0.245×0.281).³⁹⁵

Table 62: Indirect and Total Effects of Model II

Path / Relationship	Total Sample		
	Direct	Indirect	Total
HC -> Perf	0		
HC -> RC -> Perf		0.0688	
HC -> Total			0.0688

7.3.3.3 Coefficient of Determination of Model II

As opposed to model I, which has only one endogenous construct, model II has three. Specifically, R^2 values are available for SC, RC and performance. They are illustrated in figure 89. The R^2 of RC is 0.229 and indicates that 22.9% of RC are determined by its dimensions and HC. Although this value is regarded as weak,

³⁹⁵ This strength lies somewhere in-between other studies whose indirect effects of HC on performance via RC vary between 0.0157 (F-Jardon, Martos 2009: 611 et seq.), 0.1425 (Wang, Chang 2005: 231) and 0.2794 (Bontis 1998: 76). Hence, it can be assumed that this study's results are acceptable, too.

it seem appropriate since it corresponds to former research on SME which reports R^2_{RC} of 0.170 (St-Pierre, Audet 2011: 215) and 0.214 (F-Jardon, Martos 2009: 612). SC exhibits a R^2 of 0.246 and can be interpreted to the extent that the SC-dimensions and RC explain almost 25% of SC's variance. This weak result cannot be supported with IC-research on SME which discloses values as high as 0.565 (ibid.: 612) or 0.680 (St-Pierre, Audet 2011: 215). Yet, other IC-studies reveal R^2_{SC} of 0.039 (Wang, Chang 2005: 231) and 0.249 (Bontis 1998: 79) which match this dissertation's coefficient of determination. Lastly, the R^2 of performance (0.150) is weak but it lies also somewhere between former findings which range from 0.051 (St-Pierre, Audet 2011: 215) over 0.265 (F-Jardon, Martos 2009) to 0.560 (Bontis 1998: 76). Overall, it can therefore be concluded that this doctoral thesis' R^2 -values are weak; yet, located within acceptable ranges.

7.3.3.4 *Effect Size f^2 of Model II*

Now that the R^2 values are accepted, the effect size f^2 can be analyzed. Table 63 illustrates the six f^2 values of model II. As opposed to model I where one can only evaluate the effect of HC, SC and RC on performance, one can also look into the effect of HC on SC and on RC, respectively, as well as of RC on SC. Specifically, it can be seen that two constructs do not have an effect on another construct: HC does not impact performance; and RC does not influence SC. Moreover, table 63 shows that HC has a very low effect on SC. The effects of SC on performance with an effect size of 0.0659 and of HC on RC with 0.0752 are considered as weak, too. Only one effect tends towards medium and represents therefore the strongest force of model II: The impact of RC (via SC) on performance.

Model II's findings concerning f^2 can be concluded by stating that they support the argumentation of chapter 7.3.3.2: HC and RC do not matter much for SC. HC does, however, impact RC. Furthermore, SC and RC influence performance whereas the effect of RC on performance is the strongest in the model.

Table 63: Effect Size f^2 of Model II

	R ² incl.	R ² excl.	f ²	Interpretation
f ² HC → SC/RC → Perf	0.150	0.150	0	None
f ² SC → Perf	0.150	0.094	0.0659	Weak
f ² RC → Perf / RC → SC → Perf	0.150	0.073	0.0906	Weak towards medium
f ² HC → RC	0.229	0.171	0.0752	Weak
f ² HC → SC	0.246	0.234	0.0159	Almost none
f ² RC → SC	0.246	0.246	0	None

7.3.3.5 Predictive Relevance and Effect Size q^2 of Model II

Due to the fact that Q^2 -values are only obtainable for endogenous constructs with reflective measurement models, Q^2 can only be disclosed for performance and not for the other two endogenous constructs in model II – i.e. SC and RC. The precise Q^2 -value of performance sums to 0.168 as can be seen in table 64 (omission distance 5). Since 0.168 surpasses zero, the predictive relevance of the path model can be concluded: the exogenous constructs HC, SC and RC predict the exogenous performance variable.

Table 64: Q^2 and Effect Size q^2 of Model II

	Q ² incl.	Q ² excl.	q ²	Interpretation
f ² HC → SC/RC → Perf	0.168	0.1467	0.0256	Very weak
f ² SC → Perf	0.168	0.0662	0.1224	Weak
f ² RC → Perf / RC → SC → Perf	0.168	0.0510	0.1406	Weak towards medium

The effect size q^2 is also illustrated in table 64. The values indicate that HC has a very low predictive relevance while SC and RC impact performance to a medium extent. Accordingly, it can be stated that this chapter's results support the conclusions drawn in the chapters above.

7.3.3.6 Overview of Structural Model II and its Interpretation

Table 65 accumulates the discussions of chapters 7.3.3.1 to 7.3.3.5. Based upon this, model II can be summarized by stating that the model’s path coefficients are not biased since the predictor variables SC and RC as well as HC and RC do not correlate. Four of the five path coefficients also surpass the marginal value of 0.1 and thus, indicate explanatory power. Unfortunately, only three of these four relationships are also significant. Hence, two relationships in model II cannot be transferred to the whole population of German SME. The f^2 - and q^2 -values also support this argumentation. The R^2 s of model II are rather low but correspond to previous research and can therefore be accepted. In total, model II explains 15% of German SME’ lasting competitive business performance. This is only a little less than for model I and indicates that the direct impact of HC, SC and RC is slightly more important for success than their interaction (cf. chapters 7.3.2.3 and 7.3.2.6).

Table 65: Overview of the Structural Model Evaluation: Model II

Quality Criterion	Requirement	Result
Collinearity assessment	VIF < 10	✓
Path coefficients and significance	- Path coefficients between 1 and -1 -Significance: t-values of at least 1.65	✓ ⚡/✓
Coefficient of determination	R^2 below 0.19 accepted in terms of contents	✓
Effect size	f^2 at least 0.02 to be considered as weak	⚡/✓
Predictive relevance	- Q^2 above zero - q^2 at least 0.02 to be considered as weak	✓

A second summary of model II is presented in table 66 which connects the above discussed empirical results with their corresponding hypotheses. A detailed discussion is provided in the next text passages:

With respect to hypothesis *H4a* it can be stated that it can neither be fully rejected nor fully supported. That is because the relationship between *HC* and *SC* is not significant and its effect size f^2 is not noteworthy; whereas the relation between *SC* and *performance* is. This implies that only part of the hypothesis finds prove.

Concerning the insignificant link between *HC* and *SC* one can argue that German SME do not successfully transform their *HC* into company-owned *SC*. Because of that a lot of knowledge remains tacit (Bontis, Keow, Richardson 2000: 97 et seq.). This, in turn, can indicate two conflicting things. One the one hand, it can increase German SME' long-term competitive edge because tacit IC-facets are undepreciable, intransferable, inimitable and non-substitutable. One the other hand, it can threaten German SME' competitive position because they lose much of their IC when, for instance, employees withdraw from a firm. Which of the two outcomes holds true, cannot be clearly answered within the scope of this thesis and is recommended to be deepened in future research.

The significant relationship between *SC* and competitive performance also requires interpretation within the scope of hypothesis *H4a*. Specifically, it suggests that organizational IC-aspects such as formalized processes, a strong company culture, and investments in guaranteeing state-of-the-art technological level increase competitive advantages which are manifested in financial outcomes (Bontis, Keow, Richardson 2000: 97; F-Jardon, Martos 2009: 613). Hence, it can be recommended that German SME' should enlarge aspects and related actions like these.

Opposite to hypothesis *H4a*, which can only partly be confirmed, hypothesis *H4b* finds full support in the data.

In depth, it can be confirmed that *HC* significantly impacts *RC*, and that the effect sizes further back this. This entails that German SME use – whether intended or intuitively – the potential of their employees to establish relationships with the external (business) world and its stakeholders. Likewise this means that the better the workforce, the better they are at pleasing the market (Bontis, Keow, Richardson 2000: 96 et seq.). Hence, one can argue that German SME should increase their efforts towards *HC* (F-Jardon, Martos 2009: 612 et seq.).

To wrap up, it can be stated that hypothesis H4b confirms the argument that HC is the origin of RC and thus, IC. However, since the latter does not hold true for H4a – which discovers an insignificant link between HC and SC and thus, IC – it cannot be fully supported with the empirical results of this dissertation. Therefore, it can be concluded that HC is the origin of RC but not of IC.

Moreover, the survey data and its analysis show that the impact of RC on lasting competitive performance is the strongest in the model and that RC is the most driving force of German SME' competitive success. Simply put, German SME' good relationships with their company-external stakeholders facilitate business performance; and hence, should be the most leveraged to promote future success.

Unfortunately, it has to be reported that the IC-categories RC and SC do not interact and hence, that hypothesis *H5* needs to be declined. In particular, this means that RC does not have a strong and significant effect on SC; and that German SME do not do well at combining external-focus as well as demands with internal structures (Bontis, Keow, Richardson 2000: 97). This is expected to threaten their long-term existence because of various reasons. Firms are, for example, required to adapt to environmental conditions in today's fast changing economy (cf. chapter 1.1 and 2.3.2.2) and by not adjusting their internal settings they could be at risk. This does not only apply to customers and their wishes but also to other stakeholders like suppliers and their deliverings. Moreover, not integrating externals' knowledge into internal structures means that potentially important inputs, for instance, from alliance partners, who share best practices or other relevant experiences, are left out. This in turn can lead to missed opportunities.

However, it would be interesting to investigate if German SME' RC impacts their HC in order to discover if German SME' focus is switched from internal structures to individual employees who respond to external situations. Yet, this issue requires additional research. Likewise, it is recommended to conduct future research on the impact of SC on RC since this dissertation's results could be traced back to an improper line of argumentation.

Table 66: Overview of Results: Hypotheses Testing

Abbreviation	Hypothesis	Result
H4a	German SME' human capital is the origin of IC because it has a positive impact on their structural capital, which, in turn, determines German SME' lasting competitive business performance. Consequently, human capital has an indirect impact on German SME' corporate success.	
H4b	German SME' human capital is the origin of IC because it has a positive impact on their relationship capital, which, in turn, determines German SME' lasting competitive business performance. Consequently, human capital has an indirect impact on German SME' corporate success.	
H5	German SME' structural capital and relationship capital interact. Specifically, German SME' relationship capital has a positive impact on their structural capital.	

7.4 RESULTS OF MULTIGROUP ANALYSES: TEST FOR COMPANY-AGE AND -GENERATION

Building on chapter 5.4, the 147 appropriate data sets (cf. chapter 7.1.4) are split into three sub-groups:

- *sample one* embodies 34 enterprises which are at the beginning of their company life cycle and *not older than ten years*,
- *sample two* represents 58 firms which are still in their first company generation but already established and thus, *older than ten years*, and
- *sample three* is characterized by 52 enterprises which are also established but in their *second or further company generation*.

Table 67 demonstrates this distribution of the sample (the bottom line of table 67 shows the number of observations which enter the multi-group analysis for each sub-population).³⁹⁶ In detail, one can notice that the sample size of each sub-population varies. However, unequal sample sizes are no issue and can be handled by PLS.³⁹⁷

³⁹⁶ Three out of the 147 cases cannot be distributed to any of the three sample groups because no information on these three companies' age is available.

³⁹⁷ Cf., for example, Joseph Hair, JR. et al. (2014: 254 et seq.).

Table 67: Multigroup-Analysis: Groups

	Sample 1 - Younger than or equal to 10 years -	Sample 2 - Older than 10 years & 1 st generation -	Sample 3 - Older than 10 years & later generations -	
Total response	54	94	108	266 (incl. 10 undefinable)
After deleting big champions	51	91	95	242 (incl. 5 undefinable)
After deleting cases with many missing values, outliers etc.	34	58	52	147 (incl. 3 undefinable)
	144			

Furthermore, it can be stated that the above presented samples fulfil the size criteria (Hair, JR. et al. 2014: 250) which are required to run PLS (cf. chapter 7.1.4). Specifically, it can be seen that all three group surpass the minimum sample size of 32 (with 6 arrows pointing to a construct) which is recommended by the statistical power primer (Cohen 1992; Hair, JR. et al. 2014: 21). Moreover, this dissertation’s three sample sizes between 32 and 58 observations are sufficiently high when considering the less conservative rule of thumbs of 5:1, 3:1 or 2:1 ratios (Yi, Davis 2003: 163; Bagozzi, Yi 2012: 29) instead of Wynne Chin’s (1998b: 311; 1999: 326 et seqq.; 2010b: 62) rigid 10:1 principle which has been previously introduced (cf. chapters 5.1.4 and 7.1.4).³⁹⁸ It can therefore be concluded that PLS can be calculated based upon these data.

After having dealt with the sample size issue, model I and model II can be run for each sub-group in PLS. The results of these calculations (incl. significance

³⁹⁸ Within the scope of this dissertation, the 10:1 rule corresponds to 60 cases, the 5:1 rule corresponds to 30 cases, the 3:1 rule corresponds to 18 cases, and the 2:1 rule corresponds to 12 cases.

via bootstrapping³⁹⁹) are separately shown in chapters 7.4.1, 7.4.2 and 7.4.3, and afterwards compared in chapter 7.4.4.

7.4.1 Sample One: Younger than or Equal to Ten Years and First Generation

7.4.1.1 Structural Model I: Direct Impact of Sample One's Intellectual Capital on Lasting Competitive Business Performance

Table 68 to table 70 as well as figure 90 show the results of the direct impact of sample one's HC, SC and RC on their lasting competitive business performance.

Specifically, the VIF-values illustrated in table 68 indicate that the three IC-categories do not correlate and thus, impact business success independently.

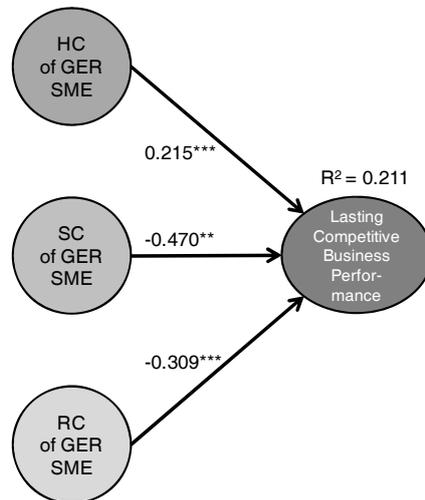
Table 68: VIF of Predictor Constructs in Model I: Sample 1

HC, SC and RC as predictors of Performance	
Construct	VIF
HC	1.128
SC	1.197
RC	1.209

Moreover, figure 90 reveals for sample one that HC, SC and RC influence business performance in a significant manner. However, only HC has a positive impact while SC and RC present negative forces.

³⁹⁹ The bootstrapping analysis is based on 5,000 samples. The number of cases depends on the size of the sample. Group 1, for example, is based on bootstrapping with 34 cases, group 2 with 58, and group 3 with 52. The no sign change option is applied as recommended by Joseph Hair, JR. et al. (2014: 135).

Figure 90: Structural Model I of Sample 1: Path Coefficients and their Significance



Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

In detail, this means that HC is the key IC-driver of the success of young German ventures; which is opposite to model I with all German SME, in which HC has the lowest and an insignificant impact on performance. Yet, the HC-result of sample one’s model I seem to be acceptable since it matches the result of the perception-based study on young German SME’ IC (BMW 2010b: 5).

SC has the largest significant impact on performance. Unfortunately, this impact is negative and hence, attests that the higher SC, the lower young German SME’ performance. Building on this as well as the former results on HC, it can be assumed that young German SME’ competitive success rests predominantly on internal sources whereas these internal sources relate to the employees rather than internal structures which seem to harm the business. In more detail, it is assumed that, for example, young German SME’ organizational culture is not yet established yet. Thus, their immature (and inexperienced) culture is unable to successfully guide towards success. Likewise, it can be argued that young German enterprises might require more flexibility – i.e. less formalized processes – than they currently have (on average 45%) in order to find out what works well and what does not.

RC has also a fairly high and significant influence on German SME' competitive performance. Yet, and in line with SC, it is negative. Likewise, it implies that the higher RC, the lower is the competitive business success of young German SME. This is a surprising outcome since it highlights that external IC/knowledge-inputs are not important and instead rather threatening for young German business. A potential explanation for this phenomenon could be that external relationships are not well established yet. Alternatively, one can assume that the already existing relationships are either not with the right stakeholders or simply not strong enough to compensate for other missing resources.

Sample one's R^2 with a value of 0.211 is fairly weak but higher than for all German SME (cf. chapter 7.3.2.3). This implies that IC is more important for young ventures than for the average SME. As such, this thesis' findings correspond to the results of the only identified perception-based study on young German SME' IC (BMWi 2010b: 5 & 15).

This dissertation's finding is especially interesting when taking into account that two out of the three IC-categories have a negative impact on performance. Accordingly, it can be assumed that HC is so important for sample one that it evens out the negative force of SC and RC.

Table 69: Effect Size f^2 of Model I: Sample 1

	R^2 incl.	R^2 excl.	f^2	Interpretation
$f^2_{HC \rightarrow Perf}$	0.211	0.175	0.0456	Weak
$f^2_{SC \rightarrow Perf}$	0.211	0.027	0.2332	Medium
$f^2_{RC \rightarrow Perf}$	0.211	0.132	0.1001	Weak towards medium

Unfortunately, this reasoning cannot be supported by the effect sizes presented in table 69 and table 70. Specifically, f^2 and q^2 indicate that HC has a weak strength and relative predictive relevance on performance while SC and RC have medium and almost large effect sizes.

Table 70: Q² and Effect Size q² of Model I: Sample 1

	Q ² incl.	Q ² excl.	q ²	Interpretation
q ² HC -> Perf	0.1916	0.1916	0	None Medium towards large Medium
q ² SC -> Perf	0.1916	-0.0150	0.2556	
q ² RC -> Perf	0.1916	0.0529	0.1716	

Overall, it can be concluded that one cannot be sure which IC-categories do, in fact, directly impact sample one’s performance since the results of the path coefficients and the effect sizes do not match. It is therefore recommended to deepen this topic via further research.

7.4.1.2 *Structural Model II: The Interaction Effect of Sample One’s Intellectual Capital and Lasting Competitive Business Performance*

Since sample one’s model I does not provide coherent results on their IC and its impact on lasting competitive success, model II shall now be evaluated in order to shed more light on this matter.

Starting with table 71 and its relatively low VIF-values, one can rule out that the predictor constructs of SC and of performance, respectively, correlate. Specifically, this means that HC and RC influence SC independently; and that the same applies to SC and RC on performance.

Table 71: VIF of Predictor Constructs in Model II: Sample 1

HC and RC as predictors of SC		SC and RC as predictors of Performance	
Construct	VIF	Construct	VIF
HC	1.105	SC	1.032
RC	1.105	RC	1.032

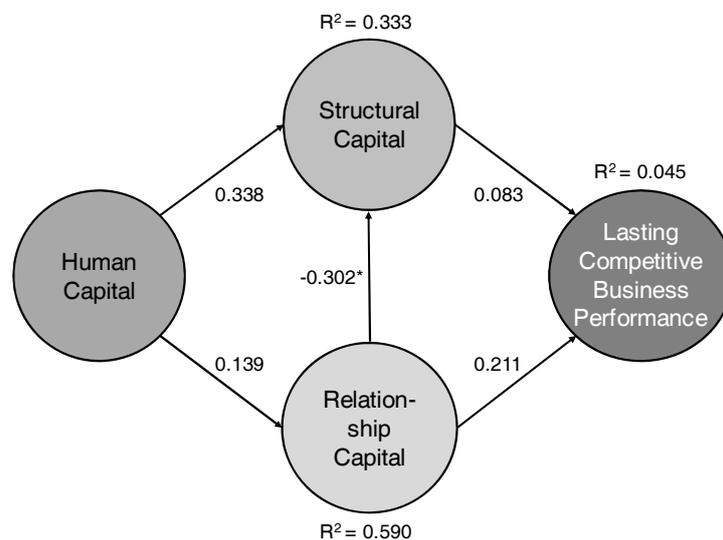
The structural model presented in figure 91 indicates that sample one’s

IC-categories do not interact; apart from one relationship between SC and RC.

Specifically, it can be seen that HC is not the origin of sample one's IC since HC does neither have a significant impact on SC nor on RC. This is potentially the case because young enterprises do not have a lot of employees yet and the already existing workforce needs to focus on getting its daily task done instead of dealing with things such as setting up standard rules for knowledge-documentation.

What is interesting, however, is the fact that the relationships between SC and performance, as well as RC and performance turn from negative into positive when HC is up streamed. This signals a positive impact of HC. Yet, since these connections are not significant either, one cannot be sure whether this finding actually holds true for all young German SME. Figure 91 also reveals that RC has a significant negative influence on SC. This supports the previously mentioned argument (cf. chapter 7.4.1.1) that young German SME' do not rely on external sources (or the 'wrong' ones) in order to boost their IC-based success potentials.

Figure 91: Structural Model II of Sample 1: Path Coefficients and their Significance



Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

The R^2 values of sample one's model II are also illustrated in figure 91. The

R² value of performance (0.045) lies below the minimum threshold of 0.1 and signals that the direct impact of the IC-categories on young German enterprises' competitive performance (cf. model I's R² of 0.211; chapter 7.4.1.1) is much higher. This is not a surprising finding when considering the fact that only one out of the five relationships in structural model II is significant.

The R² of SC and RC with values of 0.333 and 0.590, respectively, display that their variances are moderately explained by their predicting constructs. In detail, this means that HC and RC' dimensions clarify 59% of RC, while HC and SC' dimensions explain 33% of SC. These values are particularly high when comparing them to model II of all German SME (cf. chapter 7.3.3.3). Yet, since the relationships between HC and SC as well as HC and RC are not significant in sample one's model II, one can assume that it is rather the dimensions which are better able to present the higher-order constructs of young German SME. To confirm this assumption, additional research is demanded.

Table 72: Effect Size f² of Model II: Sample 1

	R ² incl.	R ² excl.	f ²	Interpretation
f ² HC -> SC/RC -> Perf	0.045	0.045	0	None
f ² SC -> Perf	0.045	0.039	0.0063	Almost none
f ² RC -> Perf / RC -> SC -> Perf	0.045	0.002	0.0450	Weak
f ² HC -> RC	0.599	0.576	0.0574	Weak
f ² HC -> SC	0.333	0.249	0.1259	Almost medium
f ² RC -> SC	0.333	0.266	0.1005	Weak towards medium

Table 72 shows that most of the effects of the exogenous constructs on their respective endogenous construct are fairly low. Specifically, one can recognize that HC does not have any impact on performance. Similar conclusions can be drawn for HC's predictive power (q²) on performance (cf. table 73; the Q² just above zero signals weak predictive relevance). The impacts of HC on RC and on SC are weak, too as can be seen by the f² of 0.0574 and 0.1259. These findings align with the argumentation presented above. Furthermore, f² and q² demonstrate that SC and RC have only minor impacts on performance which was expected considering their relatively small and insignificant path coefficients. Lastly, it can be noted that the effect f² of RC on SC is weak towards medium. This means that

RC actually influences SC in a negative manner. As such, it can be assumed that young German SME enter 'too many' relationships with 'wrong' stakeholders.

Table 73: Q² and Effect Size q² of Model II: Sample 1

	Q ² incl.	Q ² excl.	q ²	Interpretation
f ² _{HC -> SC/RC -> Perf}	0.0581	0.0397	0.0195	Very weak
f ² _{SC -> Perf}	0.0581	-0.0127	0.0752	Weak
f ² _{RC -> Perf / RC -> SC -> Perf}	0.0581	-0.0183	0.0811	Weak

Overall, it can be summarized for sample one that its IC-categories do not interact. More specifically, young German SME should only deal with RC since it negatively influences SC with a medium force. Lastly, it is important to highlight that the impact of HC, SC and RC on performance is very low once they interact.

7.4.1.3 Summary of Sample One's Structural Models

Building on the findings of chapters 7.4.1.1 and 7.4.1.2, it can be concluded for sample one that the direct impact of the IC-categories on competitive business performance majorly exceeds the impact of when the categories interact. Moreover, it is shown that HC, SC and RC do not influence each other apart from RC which negatively impacts SC. Hence, it is recommended that young German SME choose their external partners wisely since they can harm internal organizational matters as well as performance. The same applies to SC since it is also proven to have a negative impact on young businesses success. Furthermore, the empirical results suggest that young German SME should particularly focus their efforts on HC since it has a significant positive direct influence on competitive business performance; and because it might improve the impact of SC and RC on performance when it is up streamed.⁴⁰⁰

⁴⁰⁰ The latter point is not significantly proven. That is why the wording "might" is applied.

7.4.2 Sample Two: Older than Ten Years and First Generation

7.4.2.1 Structural Model I: Direct Impact of Sample Two’s Intellectual Capital on Lasting Competitive Business Performance

The current chapter presents the results of sample two’s model I. Table 74 discloses the VIF-values of HC, SC and RC. Since all three values fall below the maximum cut-off score of 10, it can be concluded that collinearity among the predictor constructs can be ruled out. Hence, the evaluation of model I can be continued with the path coefficients and their significance.

Table 74: VIF of Predictor Constructs in Model I: Sample 2

HC, SC and RC as predictors of Performance	
Construct	VIF
HC	1.316
SC	1.288
RC	1.104

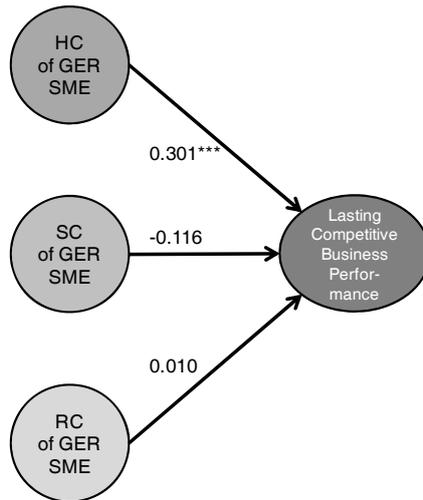
Similar to sample one, sample two has only one significant positive link between the IC-categories and lasting competitive business performance (cf. figure 92): HC impacts competitive business performance with a force of 0.301. Thus, it can be argued that organizational members and their IC matter the most for the competitive success of German SME during their first company generation – no matter whether young or established.

Also in line with sample one is the fact that the SC of established first generation SME has a negative influence on above-average performance. Yet, this is not significant in the context of sample two and can, therefore, not be transferred to all German SME that are older than ten years but still in their first company generation.

Figure 92 also demonstrates that RC has only a very small impact on competitive success, which is also not significant. This might allow interpreting that the negative impact of RC in the early years of a company’s life-cycle (i.e. sample one) turns into a minor positive one over the years. Hence, RC is expected to be more relevant and should not be neglected. Yet, the latter point requires additional

research since it does not hold true for all established German SME in their first company generation.

Figure 92: Structural Model I of Sample 2: Path Coefficients and their Significance



Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

Figure 92 also highlights that the R^2 figure of lasting competitive business performance is very weak and even below its minimum acceptable value of 0.1. Particularly, it implies that HC, SC and RC are only able to explain 7.4% of sample two's competitive business performance. This is not only little compared to all German SME (cf. chapter 7.3.2.3, $R^2 = 0.153$) but especially low in comparison with sample one's R^2 of 0.211 (cf. chapter 7.4.1.1). With respect to the latter it can therefore be argued that the direct impact of IC on competitive success decreases with company-age.

Table 75: Effect Size f^2 of Model I: Sample 2

	R ² incl.	R ² excl.	f ²	Interpretation
f ² _{HC -> Perf}	0.074	0.005	0.0745	Weak Very weak Almost none
f ² _{SC -> Perf}	0.074	0.063	0.0119	
f ² _{RC -> Perf}	0.074	0.073	0.0011	

The above presented line of argumentation can also be supported by table 75 and its f^2 -values: When it comes to explaining the R^2 of performance, it can be noticed that HC has the strongest impact. Likewise, the influences of SC and RC, which are both insignificant as previously highlighted, are very small.

Table 76: Q^2 and Effect Size q^2 of Model I: Sample 2

	Q^2 incl.	Q^2 excl.	q^2	Interpretation
$q^2_{HC \rightarrow Perf}$	0.1136	-0.0124	0.1422	Medium
$q^2_{SC \rightarrow Perf}$	0.1136	0.0356	0.0880	Weak
$q^2_{RC \rightarrow Perf}$	0.1136	-0.0541	0.1892	Medium

What is interesting, however, is the fact that RC has the highest predictive relevance in sample two's model I (table 76). More specifically this means that RC is best able to predict the data points of the indicator in the reflective measurement model of lasting above-average performance (Hair, JR. et al. 2014: 178). Yet, the predictive power of RC is only slightly larger than the one of HC which supports the argumentation presented above.

Taken together, it can be summarized for sample two that SME which are older than ten years but still in their first company generation should especially pay attention to HC which has the largest direct influence on competitive business success. Yet, the direct forces of HC, SC and RC only explain 7.4% of this performance.

Since HC, SC and RC are, however, expected to be well established in sample two, one can assume that they lead to more success when they interact. This shall be investigated in the next chapter.

7.4.2.2 *Structural Model II: The Interaction Effect of Sample Two's Intellectual Capital and Lasting Competitive Business Performance*

The chapter at hand evaluates sample two's model II in order to gain more insights on established, first generation German SME' IC.

In accordance to model I, it can be noticed that the predictor constructs of sample two's model II do also not correlate. Specifically, I can be seen that the VIF-values presented in table 77 fall below the maximum limit of 10.

Table 77: VIF of Predictor Constructs in Model II: Sample 2

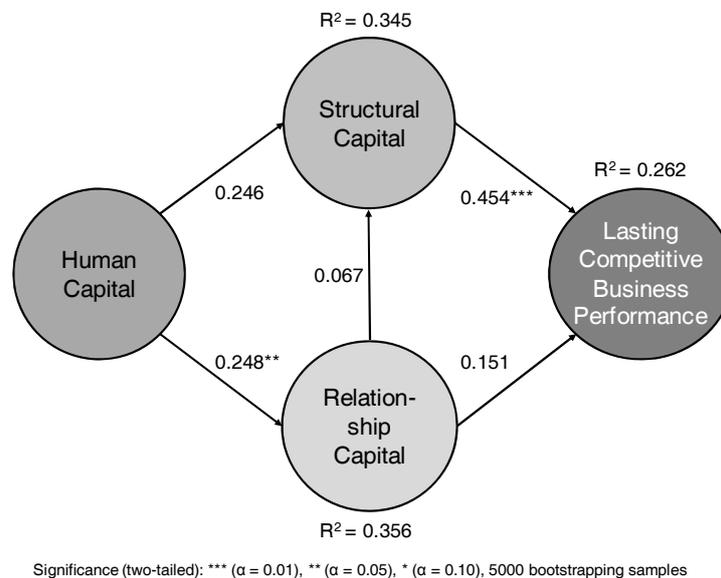
HC and RC as predictors of SC		SC and RC as predictors of Performance	
Construct	VIF	Construct	VIF
HC	1.085	SC	1.062
RC	1.085	RC	1.062

The structural model of sample two's model II is illustrated in figure 93. The graph shows that the HC of established, first generation German SME has not only a direct impact on performance (cf. chapter 7.4.2.1) but also influences RC in a significant manner. This implies, for example, that investments in employees' IC also improve stakeholder relationships. Yet, RC does, in line with model I, not significantly influence performance even though its strength enlarges from 0.010 to 0.151. This could be because established German SME do not value external relationships, for instance, with capital providers due to preferred financial independence; or with alliance partners due to the risk of losing competitive leads. Yet, this is only an assumption and requires further, especially significant, evidence.

Moreover, it can be noted that the impact of SC on performance changes from insignificant and negative in model I to significant and positive when SC interacts with HC. Hence, it can be recommended to put efforts towards leveraging SC. Unfortunately, HC is, however, no driving force of SC as is illustrated by the insignificant path coefficient of 0.246. That is arguably the case because the organizational members of sample two concentrate on establishing strong RC and might not have the capacity to simultaneously focus on SC.

With respect to the relationship between RC and SC it can be stated that it is minor and also insignificant. Nevertheless, its strength clearly exceeds the negative linkage which is observed for sample one (cf. chapter 7.4.1.2). Consequently, it can be argued that the impact of RC on internal structure might improve as German SME get older – potentially because they have established and intensified their relationships with external stakeholders. Yet, in line with the aforementioned, further research is required on this matter.

Figure 93: Structural Model II of Sample 2: Path Coefficients and their Significance



The R^2 -value of lasting above-average performance (0.262) expresses that the interaction of HC, SC and RC explains 26.2% of sample two's competitive business success. Since this is much higher than the 7.4% of model I (cf. chapter 7.4.2.1) it can be concluded that the interplay of the IC-categories leads to better company results.

The moderate R^2 s of SC and RC are superior to the values which are revealed for all German SME (cf. chapter 7.3.3.3). Yet, based on the available data one cannot be totally sure whether this is the case because the dimensions fit better to sample two's background or because the interaction is so powerful.

Table 78: Effect Size f^2 of Model II: Sample 2

	R^2 incl.	R^2 excl.	f^2	Interpretation
$f^2_{HC \rightarrow SC/RC \rightarrow Perf}$	0.262	0.262	0	None
$f^2_{SC \rightarrow Perf}$	0.262	0.068	0.2629	Medium
$f^2_{RC \rightarrow Perf / RC \rightarrow SC \rightarrow Perf}$	0.262	0.241	0.0285	Weak
$f^2_{HC \rightarrow RC}$	0.356	0.298	0.0901	Weak towards medium
$f^2_{HC \rightarrow SC}$	0.345	0.304	0.0626	Weak
$f^2_{RC \rightarrow SC}$	0.345	0.342	0.0046	Almost none

The above illustrated findings can also be backed by the effect sizes of table 78 and table 79: The strongest impact on performance as well as its predictive power is given by SC. In addition, it is established that HC has a weak towards medium influence of RC's R^2 but does not impact performance at all. The other relationships vary between very weak or medium and thus, are not very influential. Hence, it can be assumed that it is rather the dimensions which impact RC and SC rather than HC.

Table 79: Q^2 and Effect Size q^2 of Model II: Sample 2

	Q^2 incl.	Q^2 excl.	q^2	Interpretation
$f^2_{HC \rightarrow SC/RC \rightarrow Perf}$	0.2493	0.2620	-0.0169	Negative weak
$f^2_{SC \rightarrow Perf}$	0.2493	0.0501	0.2654	Medium
$f^2_{RC \rightarrow Perf / RC \rightarrow SC \rightarrow Perf}$	0.2493	0.2209	0.0378	Weak

Altogether it can be concluded that 26.2% of sample two's competitive business performance is explained when HC, SC and RC interact. In particular, it is advised to pay attention to HC since it influences RC with a medium force (even though HC does not have an effect on supernormal success in model II). A positive impact is also observed for the relation between SC and performance. Thus, SC particularly requires direct management consideration, as well.

7.4.2.3 *Summary of Sample Two’s Structural Models*

In accordance with sample one, sample two should also focus on HC. That is because HC has a strong and significant direct impact on performance and further presents the origin of RC. Hence, it can be argued that efforts towards HC do not just directly lead to competitive success but also improve the potential of external stakeholder relationships. Moreover, it is recognized that the impact of IC on performance increases majorly when the IC-categories interact. Hence, employees should be motivated to establish strong stakeholder relations as well as to use their IC in order to build internal settings, which positively drive success as well.

7.4.3 Sample Three: Second and Subsequent Generations

7.4.3.1 *Structural Model I: Direct Impact of Sample Three’s Intellectual Capital on Lasting Competitive Business Performance*

This chapter deals with the direct impact of sample three’s IC on performance. Beginning with collinearity, table 80 and its VIF-values below 10 illustrate that HC, SC and RC are autonomous and thus, impact performance independently.

Table 80: VIF of Predictor Constructs in Model I: Sample 3

HC, SC and RC as predictors of Performance	
Construct	VIF
HC	1.162
SC	1.048
RC	1.213

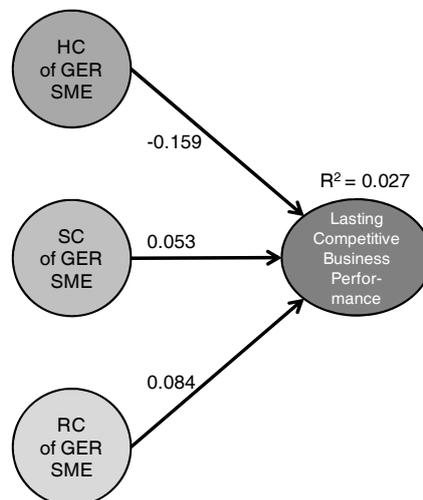
Moving on to the structural model, it can be noted that sample three’s HC has a negative impact on their competitive business performance. This contradicts the previous findings of this doctoral thesis (cf. chapters 7.3.2.2, 7.4.1.1 and 7.4.2.1)

as well as former perception-based studies on German SME' IC (Mertins, Will, Wuscher 2007: 201; BMWi 2010b: 9; BMWi 2010a: 13) which report a positive influence. An explanation for this could be that employees are unable to contribute to above-average success unless they have innovative products (i.e. interplay with SC) and good stakeholder relationships (i.e. interplay with RC) which allow them to source required inputs as well as to sell products once they are produced.

SC and RC do, however, impact competitive success in a positive manner. This allows assuming that SC and RC are the key drivers of sample three's above-average performance. Yet, this reasoning is not fully supported by the data: SC's and RC's impacts are only minor since their path coefficients do not surpass the minimum threshold of explanatory power (cf. chapter 7.3.1.2).

Moreover, it has to be noted that none of the three relationships between the IC-categories and competitive performance is significant. Hence, the results only hold true for the 52 questioned German SME that belong to sample three and not all German SME in their second or later company generation.

Figure 94: Structural Model I of Sample 3: Path Coefficients and their Significance



Significance (two-tailed): *** ($\alpha = 0.01$), ** ($\alpha = 0.05$), * ($\alpha = 0.10$), 5000 bootstrapping samples

The point that HC has an insignificant negative impact on supernormal business performance while SC and RC influence it only very little and also insignificantly is further supported by the R^2 of performance (cf. table 81). Specifically, the value of 0.027 indicates that IC drives only 2.7% of sample three's competitive success. Accordingly, there must be other factors relevant for their lasting above-average performance.

Table 81: Effect Size f^2 of Model I: Sample 3

	R^2 incl.	R^2 excl.	f^2	Interpretation
$f^2_{HC \rightarrow Perf}$	0.027	0.005	0.0226	Weak
$f^2_{SC \rightarrow Perf}$	0.027	0.024	0.0031	Almost none
$f^2_{RC \rightarrow Perf}$	0.027	0.021	0.0062	Almost none

The above illustrated reasoning that SC and RC are unable to majorly drive performance is also supported by table 81. Specifically, it can be seen that only HC has a weak impact on competitive success while the influences of SC and RC are so low that they are not assumed to affect it at all.

Table 82: Q^2 and Effect Size q^2 of Model I: Sample 3

	Q^2 incl.	Q^2 excl.	q^2	Interpretation
$q^2_{HC \rightarrow Perf}$	0.0334	0.0158	0.0182	Very weak
$q^2_{SC \rightarrow Perf}$	0.0334	-0.0152	0.0503	Weak
$q^2_{RC \rightarrow Perf}$	0.0334	-0.0046	0.0393	Weak

Lastly, the effect size q^2 is demonstrated in table 82. Opposite to effect size f^2 , the q^2 values imply that only SC and RC can minorly reconstruct the parameter estimates of the performance indicator, while the power of HC is so little that it is not expected to do well.

All things considered, it can be concluded for sample three's model I that no clear results can be deduced since the whole structural model is insignificant and

since the results of the two effect sizes vary as well. Hence, one has to turn to model II in order to better comprehend the IC of German SME in their second or later company generation.

7.4.3.2 *Structural Model II: The Interaction Effect of Sample Three's Intellectual Capital and Lasting Competitive Business Performance*

Due to the fact that this dissertation does not find significant evidence for sample three's model I, it is particularly interesting to see if this picture changes when the IC-categories interact. Before going into the analysis of the structural paths, it is important to establish that the predictor constructs of a particular endogenous construct do not correlate. This is proven for sample three's model II as can be seen in the very low VIF-values presented in table 83.

Table 83: VIF of Predictor Constructs in Model II: Sample 3

HC and RC as predictors of SC		SC and RC as predictors of Performance	
Construct	VIF	Construct	VIF
HC	1.158	SC	1.045
RC	1.158	RC	1.045

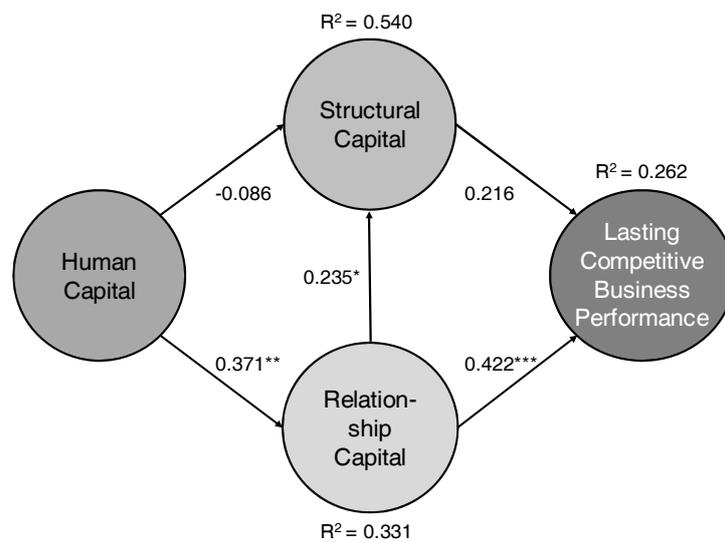
Since collinearity is not present, one can proceed with the evaluation of the structural model. Figure 95 displays that HC is, similar to sample two, the origin of RC: the relationship has a significant path coefficient of 0.371. Moreover, figure 95 reveals that the insignificant low direct impact of RC on performance (cf. model I, chapter 7.4.3.1) changes into a fairly strong and significant positive influence when it interacts with HC. In addition, one can see that RC also impacts SC in a significant manner. Therefore, it can be recommended that sample three firms should especially invest in RC since it drives not only competitive success but also shapes internal settings.

Moreover, sample three enterprises should not neglect investment in HC since it

indirectly impacts performance (with a force of 0.1566) as well as SC (0.0872), and has a total impact of 0.2437 (cf. table 84). Unfortunately, it has to be noted, however, that the direct influence of HC on SC only holds true for the surveyed sample rather than all German SME in their second or later generation. Moreover, one has to bear in mind that it is negative, too. This means that the HC of the participating established second or later generation German SME has a weak negative direct impact on their internal structures. A possible explanation might be that the structural capital of these SME is primarily driven by the environment and that the direct force of internal HC harms this effect by providing an internal perspective only (instead of the external perspective required in today’s knowledge economy). Yet, it is important to repeat in this regard that HC significantly and positively impacts SC with a strength of 0.0872 in an indirect way – i.e. via RC.

Lastly, one can notice that the direct relationship between SC and performance is insignificant, too. This is not surprising considering the negative force of HC on SC – i.e. which is likely to damage SC. Moreover, it implies that the positive force of RC on SC is arguably unable to compensate for HC disadvantageous impact.

Figure 95: Structural Model II of Sample 3: Path Coefficients and their Significance



Significance (two-tailed): *** (α = 0.01), ** (α = 0.05), * (α = 0.10), 5000 bootstrapping samples

Table 84: Indirect and Total Effects of Model II: Sample 3

Path / Relationship	Total Sample		
	Direct	Indirect	Total
HC -> Perf	0		
HC -> RC -> Perf		0.1566	
HC -> RC -> SC		0.0872	
HC -> Total			0.2437

In line with sample two, it can be noticed for sample three that the R^2 of supernormal performance improves majorly when the IC-categories interact. Specifically, one sees a raise from 0.027 (cf. model I in chapter 7.4.3.1) to 0.262 (cf. model II in figure 95). This implies that established firms – no matter whether they are in their first or later company generation – need to focus more on the interplay between their IC-categories than their direct forces.

The R^2 of SC is the highest among the three sub-samples although HC negatively impacts SC. Building on this one can assume that the SC-dimensions fit the context of sample three the best. Yet, this cannot be fully proven without further research.

Lastly, the moderate R^2 of RC aligns with the relatively high values of sample one and sample two. Thus, it seems acceptable and does not indicate major differences between the sub-groups.

Table 85: Effect Size f^2 of Model II: Sample 3

	R^2 incl.	R^2 excl.	f^2	Interpretation
$f^2_{HC \rightarrow SC/RC \rightarrow Perf}$	0.262	0.262	0	None
$f^2_{SC \rightarrow Perf}$	0.262	0.218	0.0596	Weak
$f^2_{RC \rightarrow Perf / RC \rightarrow SC \rightarrow Perf}$	0.262	0.092	0.2304	Medium
$f^2_{HC \rightarrow RC}$	0.331	0.200	0.1958	Medium
$f^2_{HC \rightarrow SC}$	0.540	0.534	0.0130	Very weak
$f^2_{RC \rightarrow SC}$	0.540	0.494	0.1000	Weak towards medium

What is interesting, is the fact that the f^2 - and q^2 -values of table 85 and table 86 partly contradict the argumentation presented above: When it comes to

explaining the R² of performance, it can be noticed that HC does not have any impact although this was expected based upon the indirect effect of HC (cf. table 84). The same applies for the weak predictive power of HC, too. However, the other f² and q² values match the line of discussion presented above. Specifically, it can be noted that the impact of HC on SC's R² as well as of SC on performance's R² are weak. Likewise, one finds medium forces of RC on performance, HC on RC, and RC on SC. Ultimately, table 86 illustrates that RC has also the highest predictive relevance of the performance indicators.

Table 86: Q² and Effect Size q² of Model II: Sample 3

	Q ² incl.	Q ² excl.	q ²	Interpretation
f ² HC -> SC/RC -> Perf	0.283	0.2467	0.0506	Weak
f ² SC -> Perf	0.283	0.2037	0.1106	Weak towards medium
f ² RC -> Perf / RC -> SC -> Perf	0.283	-0.0053	0.4021	Large

In the main, sample three's model II can be summarized by stating that HC, SC and RC are able to explain more than a quarter of lasting competitive business performance when they interact with each other. Particularly, the medium impacts of RC on SC as well as on performance disclose its high relevance. HC is also of importance since it is the source of RC even though it seems rather ineffective with respect to performance.

7.4.3.3 Summary of Sample Three's Structural Models

Similar to sample two, it can be summarized for sample three that its IC-categories do not independently and directly impact competitive performance. Yet, when HC, SC and RC start to interact, they cause over 25% of the success of establish second or later generation German SME. In particular, these German enterprises are advised to especially focus on their external relationships since RC does not only drive competitive performance but also SC. Likewise, it is recommended that they leverage their investments in HC since it impacts RC. Yet, because HC does not (yet) influence competitive performance, it requires

additional management attention.

7.4.4 Overview of all Three Sub-Samples' Structural Models and the Significance of their Differences

After the individual evaluation of the three sub-samples' two models, it is recommended to descriptively compare the path coefficients of the structural models as well as their significances for differences (Huber et al. 2007: 51; Hair, JR. et al. 2010: 759; Henseler, Fassott 2010: 496; Sarstedt, Henseler, Ringle 2011: 210) (cf. chapter 5.4).

To do so, chapter 7.4.4 starts with an overview of model I among the three sub-samples which is presented in table 87.

Table 87: Structural Model Overview: Direct Impact of HC, SC and RC on Performance among the Three Sub-samples

Path / Relationship	Sample 1 - Younger than or equal to 10 years -	Sample 2 - Older than 10 years & 1 st generation -	Sample 3 - Older than 10 years & later generations -
HC -> Perf	0.215***	0.301***	-0.159
SC -> Perf	-0.470***	-0.116	0.053
RC -> Perf	-0.309***	0.010	0.084
R ² of Perf	0.211	0.074	0.027

Table 87 signals that sample one, sample two and sample three vary in many ways.

While all three IC-categories of sample one influence supernormal performance in a significant manner, none of the categories does so in sample three. Hence, it can be outlined that sample one's IC has a direct impact on competitive success but that this is not the case in sample three at all. Similar conclusions hold for sample two as well. That is because only HC significantly impacts performance in a direct way.

Concerning that latter, it can also be stated that sample two aligns with sample one to the extent that HC has a significant positive effect on performance. In accordance with the above, this is not proven for sample three: its HC negatively and insignificantly impacts above-average business success. Consequently, it is only recommended for sample one and sample two to leverage their HC in order to boot above-average company results right away. Likewise, sample three should place management efforts on HC in order to improve its potential⁴⁰¹ impact - i.e. turn it into a positive one.

Inverse conditions hold for SC. Specifically, it can be noted that SC has a positive (insignificant) impact on performance in sample three. Opposite to that, it is negative in sample two, and negative as well as significant in sample one. As such, it implies that young (and potentially even established) first generation SME should reevaluate their SC and try to uncover more of its positive success potentials since it currently harms their performance.

In addition, it is necessary to look at the relationship between RC and performance. In detail, sample two's and sample three's insignificant and low path coefficients of 0.010 and 0.084 are relatively comparable. In contrast to this, one finds a significant and negative strength for sample one. This implies, in line with the previous conclusion, that young German SME need to enlarge their actions in order to turn stakeholder relationships into profitable sources of success.

Lastly, the R^2 values related to supernormal success reveal that the IC-categories have the strongest direct impact on lasting competitive business performance in sample one. Likewise, HC, SC and RC are not very important for directly influencing success in sample two and three as they only explain 7.4% and 2.7% of it.

Overall, it can be concluded that sample one noticeably differs from sample two and sample three. Yet, sample one shares more in common with sample two than with sample three. This is not a surprising outcome taking into account that the two latter mentioned sub-samples are both still in their first company generation.

⁴⁰¹ The wording "potential" is chosen since it is not significant and hence, does not apply to all German SME that are in their second or later company generation.

Having said this, it has to be considered, however, that sample two and sample three are quite alike each other, too; even though they contradict with respect to the signs as well as the significance of the impacts of HC and of SC on lasting competitive business performance.

Finally, it can be stated in the context of model I that there is evidence that the direct impact of HC, SC and RC on competitive business performance varies with age and among company generations. However, whether hypotheses H6a, H6b and H6c are fully supported, requires further evaluation as can be seen in the subsequent paragraphs.

Table 88: Structural Model Overview: Interaction of HC, SC, RC and Performance among the Three Sub-samples

Path / Relationship	Sample 1 - Younger than or equal to 10 years -	Sample 2 - Older than 10 years & 1 st generation -	Sample 3 - Older than 10 years & later generations -
HC -> SC	0.338	0.246	-0.086
HC -> RC	0.139	0.248***	0.371**
SC -> Perf	0.083	0.454***	0.216
RC -> Perf	0.211	0.151	0.422***
RC -> SC	-0.302*	0.067	0.235*
R ² of Perf	0.045	0.262	0.262

After looking into model I, attention shall now be paid to the group comparison of model II.

Specifically, table 88 illustrates that HC is not the origin of SC. This conclusion can be drawn since the relationship between HC and SC is not significant for any of the three sub-samples. More specifically, this implies that internal settings such as the degree of formalized processes or investments in latest technology are not significantly influenced by an organization's members.

Moreover, it can be noticed in the context of sample two that SC is adumbrated to be completely independent since it is not significantly influenced by RC. However, the opposite holds for sample one and sample two. In more detail, table 88 highlights that sample one's SC is significantly and negatively determined by

RC while it is significant and positive in sample three. This allows proposing the recommendation that young German SME should rethink their external partner relationships and create strategies on how to turn this negative effect into a positive one. Likewise, sample three enterprises should focus on leveraging the positive force between RC and SC.

Nevertheless, it can be argued that HC is the origin of IC since it has a positive and significant impact on RC in the context of sample two and sample three; whereas the impact in sample three is larger (also when looking at the effect size). As such, it can be argued, for example, that investments in employees' IC lead to improvements of stakeholder relationships, too. Since this cannot be confirmed for sample one, it can be assumed that HC needs to be well established before it is able to positively interact with other IC-categories.

Because of the reason that SC and RC require maturity in order to interactively contribute to lasting competitive business success, it cannot be proven that SC and RC impact success in sample one. Yet, in sample two SC does and so does RC in sample three. Consequently, it can be brought forward that the intangible sources of German SME' success move from internal matters in the first generation to external stakeholder relationships in later generations.

In line with the previous passage, it is also interesting to look at the R^2 related to performance. In this regard, table 88 highlights that the interaction of HC, SC and RC only leads to 4.5% of sample one's above-average success. Contrarily, the three IC-categories explain 26.2% in sample two and sample three, respectively. This supports the previously mentioned line of argumentation: young German SME' IC is not 'ready' yet to interact while established and later generation German SME' IC is. Since the R_{perf}^2 values of sample two and sample three equal, it can further be assumed that the influence of SC on performances simply switches to RC as firms pass their first company generation.

Taken together, the above paragraphs allow concluding that sample one, sample two and sample three obviously differ with respect to model II. As such, it supports the previous claim that hypotheses H6a to H6c are proven.

However, only looking at the path coefficients and their significance is not enough in order to find support or to reject hypotheses H6a, H6b and H6c.

Instead, it is important to discover if the above discussed differences are statistically significant, too (Hair, JR. et al. 2010: 772; Henseler, Fassott 2010: 496; Sarstedt, Henseler, Ringle 2011: 210). This is in particular the case because if they are not significant, then it means that the groups are indeed not different (Hair, JR. et al. 2010: 764).

To test for significant differences, various methods have been proposed and discussed. Broadly speaking, one can distinguish between two kinds of approaches (Sarstedt, Henseler, Ringle 2011: 199; Marzec 2013: 126): the one based on normal-distribution assumptions (parametric approach) (Chin 2000; Keil et al. 2000: 315) and the distribution-free procedure (non-parametric approach) (Chin 2003: 33 et seqq.; Henseler 2007: 104 et seqq.; Henseler, Ringle, Sinkovics 2009: 308 et seqq.; Chin, Dibbern 2010: 171 et seqq.; Henseler 2012: 497 et seqq.). The former mentioned *parametric approach* represents an unpaired sample t-test (Henseler 2012: 496) which relies on the standard errors obtained from the bootstrap calculation (Sarstedt, Henseler, Ringle 2011: 199). It has the disadvantage that it requires normally distributed data in order to work well. As such, it does not fit PLS' characteristics (Henseler, Ringle, Sinkovics 2009: 309; Chin, Dibbern 2010: 172; Henseler 2012: 497) and is not suitable for the scope of this dissertation. Among the *non-parametric approaches*, which align with the nature of PLS, one can notice that Wynne Chin's (2003: 33 et seqq.) permutation-based method, which is also explained by Wynne Chin and Jens Dibbern (2010: 171 et seqq.), has some limitations, too. Specifically, it demands fairly large and group-specific, similarly sized samples (Chin, Dibbern 2010: 176 et seq.; Sarstedt, Henseler, Ringle 2011: 201). Because of that it cannot be applied in this doctoral thesis with its relatively small and unequally sized sub-samples – i.e. 34, 58 and 52 cases. Yet, Jörg Henseler's (2007: 104 et seqq.; 2009: 308 et seqq.; 2012b: 497 et seqq.) *non-parametric*

PLS-MGA approach can be applied because it overcomes these shortcomings.⁴⁰² Specifically, Jörg Henseler's procedure is similar to the parametric approach since the PLS path model – incl. bootstrapping – is run separately for each sub-sample and compared afterwards (Henseler 2007: 105)⁴⁰³; but it differs "(...) in the way in which the bootstrap estimates are used to assess the robustness of the subsample estimates" (Henseler 2012: 497)⁴⁰⁴. In more detail, Jörg Henseler's PLS-MGA aims to establish the probability that one group's path coefficient is larger than that of the other group (ibid.: 497). To test this,

"Each centered bootstrap estimate of the second group is compared with each centered bootstrap of the first group across all the bootstrap samples. The number of positive differences divided by the total number of comparisons (...) indicates the probability that the second group's population parameter will be greater than that of the first group"

(Sarstedt, Henseler, Ringle 2011: 202).

In order to ensure that the groups certainly differ, this calculated probability (p) is supposed to be smaller than the predefined significance-level of, most typically, 5 to 10% (Henseler, Ringle, Sinkovics 2009: 309; Marzec 2013: 127).

The problem with the PLS-MGA approaches (incl. Jörg Henseler's procedure) is, however, that they allow testing two groups only (Sarstedt, Henseler, Ringle 2011: 198; Henseler 2012: 500). Thus, this dissertation, with its three sub-groups, has to expand conventional techniques and to rely on an additional method: the Bonferroni correction.

⁴⁰² The decision for Jörg Henseler's (2007: 104 et seqq.; 2012a: 497 et seqq.; 2009: 308 et seq.) non-parametric PLS-MGA approach within the scope of this dissertation is particularly supported by three facts: a) it does not rely on assumptions of normally distributed data which aligns with the distribution-free characteristic of PLS, b) it does not put constraints on sample-size requirements, and c) it is relatively easy to use because it builds on bootstrap outputs provided by SmartPLS. Moreover, one can request a sample spreadsheet by contacting Jörg Henseler.

⁴⁰³ "(...) the bootstrap outcomes serve as a basis for the hypothesis tests of group differences" (Henseler, Ringle, Sinkovics 2009: 309).

⁴⁰⁴ "(...) the new approach evaluates the bootstrap outcomes' observed distribution" (Sarstedt, Henseler, Ringle 2011: 202).

The fairly conservative Bonferroni method for multiple comparisons⁴⁰⁵ is applied in the scope of this doctoral thesis (Emerson 1991: 184; Sarstedt, Henseler, Ringle 2011: 206; Howell 2013: 384) because of two key reasons: firstly, because of its variance-based assumptions which fit PLS and secondly, because of its easy usage – especially compared to other options (Sahai, Ageel 2000: 79; Hair, JR. et al. 2010: 440 et seqq.).⁴⁰⁶

In detail, the Bonferroni correction is an approach which adjusts the alpha rate based upon the number of observed subgroups. Specifically, the alpha level is divided by the number of subsamples (Emerson 1991: 185; Hair, JR. et al. 2010: 440 & 473; Howell 2013: 384). In the case of this dissertation this means that the desired maximum α -level of 10% is divided by three. Thus, each group difference needs to align with the significance-level of $0.\bar{3}$ to be regarded as relevant.

When turning the above illustrated theoretical discussion on the examination of the significant differences among the three sub-samples into a more practical perspective, the following procedure can be summarized: Firstly, this doctoral thesis compares its three sub-samples pairwise (Sarstedt, Henseler, Ringle 2011: 213) – group 1 with group 2, group 2 with group 3, group 1 with group 3. Subsequently, the resulting probability-values (p) are evaluated against the adjusted alpha level of $0.\bar{3}$. Only if p is smaller than $0.\bar{3}$ it can be concluded that the path coefficients of the compared samples actually differ.

⁴⁰⁵ It is also known as Dunn's (1961: 52 et seqq.) multiple comparison procedure because Olive Dunn was the first to formalize it (Sahai, Ageel 2000: 79; Howell 2013: 384).

⁴⁰⁶ For a detailed overview of the diverse (advanced) options to deal with three and more groups please look at Marko Sarstedt, Jörg Henseler and Christian Ringle (2011: 206). These authors suggest the ANOVA group bootstrap which is criticized by diverse authors, the omnibus test of group differences (OTG) which unfortunately requires very large computer-capacity and thus, is not feasible, and the Bonferroni correction.

Table 89: Statistical Significance of Differences among the Three Sub-samples – Direct Impact of HC, SC and RC on Performance

Path/ Relationship	Comparison	p	Adjusted α	Significant Difference (p < adjusted α)
HC -> Perf	Sample 1 vs. Sample 2	0.7528	0.3	X
	Sample 2 vs. Sample 3	0.9970		X
	Sample 1 vs. Sample 3	0.9966		X
SC -> Perf	Sample 1 vs. Sample 2	0.9548	0.3	X
	Sample 2 vs. Sample 3	0.7656		X
	Sample 1 vs. Sample 3	0.9998		X
RC -> Perf	Sample 1 vs. Sample 2	0.9948	0.3	X
	Sample 2 vs. Sample 3	0.6770		X
	Sample 1 vs. Sample 3	0.9975		X

* = significant and X = not significant

Table 90: Statistical Significance of Differences among the Three Sub-samples – Interaction of HC, SC, RC and Performance

Path/ Relationship	Comparison	p	Adjusted α	Significant Difference (p < adjusted α)
HC -> SC	Sample 1 vs. Sample 2	0.6427	0.3	X
	Sample 2 vs. Sample 3	0.9536		X
	Sample 1 vs. Sample 3	0.9508		X
HC -> RC	Sample 1 vs. Sample 2	0.6791	0.3	X
	Sample 2 vs. Sample 3	0.7182		X
	Sample 1 vs. Sample 3	0.8194		X
SC -> Perf	Sample 1 vs. Sample 2	0.9585	0.3	X
	Sample 2 vs. Sample 3	0.9075		X
	Sample 1 vs. Sample 3	0.7176		X
RC -> Perf	Sample 1 vs. Sample 2	0.6219	0.3	X
	Sample 2 vs. Sample 3	0.9513		X
	Sample 1 vs. Sample 3	0.6470		X
RC -> SC	Sample 1 vs. Sample 2	0.9497	0.3	X
	Sample 2 vs. Sample 3	0.8120		X
	Sample 1 vs. Sample 3	0.9900		X

* = significant and X = not significant

Table 89 and table 90 summarize the outcomes of the pairwise comparison (model I and model II) based on Jörg Henseler's PLS-MGA. Unfortunately, it can be seen that all 24 probability-values (p) exceed the alpha-level adjusted by the Bonferroni correction. This means that neither of the above discussed differences between sample one, sample two and sample three is significant.

Consequently, it has to be concluded that hypotheses H6a, H6b and H6c cannot be supported (cf. table 91) although differences are present as can be seen in the

beginning of this chapter.

Table 91: Overview of Results: Hypotheses Testing

Abbreviation	Hypothesis	Result
H6	The age and company generation of German SME influences the extent of their IC and its impact on lasting competitive business performance.	
H6a	The human capital of German SME and its impact on lasting competitive business performance vary with age and among company generations.	
H6b	The structural capital of German SME and its impact on lasting competitive business performance vary with age and among company generations.	
H6c	The relationship capital of German SME and its impact on lasting competitive business performance vary with age and among company generations.	

7.5 SUMMARY OF EMPIRICAL RESULTS

The chapter at hand summarizes the key results of chapters 7.2 to 7.4.

Starting with the reflective measurement model presented in chapter 7.2.1, it can be concluded that many reflective indicators have to be eliminated in order to meet the quality criteria of reflective measurement models – i.e. indicator reliability, construct reliability, convergent validity and discriminant validity. The remaining 23 indicators serve as the basis for the formative measurement model which is evaluated in chapter 7.2.2. In this context it is especially interesting to highlight that all thirteen IC-dimensions are kept even if they do not provide significant results. That is because even insignificant lower-order constructs represent important facets of their respective higher-order construct which would not be fully covered if certain insignificant dimensions were removed (Rossiter 2002: 308 et seqq. & 315). In more detail, it can be reported that the following six dimensions are the most important ones as they provide strong and significant evidence: employees' attitude and intellectual agility positively drive HC; organizational capital and technological capital positively impact SC; as well as supplier relationships and informal network relationships positively influence RC.

Since the group differences among the three sub-samples' structural models are discovered to be insignificant (cf. chapter 7.4.4), it can be argued that model I and model II presented in chapters 7.3.2 as well as 7.3.3 hold true for all German SME – no matter whether they are young or old and in their first or later company generation. These two models indicate that German SME' lasting competitive business performance is positively impacted by SC and a little more by RC in an independent, direct and significant manner; while HC is of no particular direct importance. This means that investment in, for example, latest technologies or stakeholder relationships boost long-term competitive advantages and hence, above-average financial performance straight away. Nevertheless, it is further discovered that HC shall not be entirely neglected since it indirectly impacts success via RC. This indicates that investments in organizational members, such as company events to enlarge workers' motivation and bind them to the firm, lead to better relationships with external stakeholders, which in turn influence success in a positive way. Put differently: smart and motivated employees do not create company value unless they interact with external stakeholders such as suppliers. With respect to the relationship between HC and SC, it can, however, be noted that it is not significant but that SC significantly and positively determines performance. Hence, SC is characterized by independence of other IC-categories and by a direct impact on performance, as it is seen in both models.

Table 92 summarizes the above illustration with respect to the key hypotheses which are also already explicitly discussed in chapters 7.3.2.6, 7.3.3.6 and 7.4.4. A detailed discussion of the findings' consequences as well as related management recommendations is additionally provided in chapter 8 and specifically part 8.2.1.

Table 92: Overview of Results: Hypotheses Testing

Abbreviation	Hypothesis	Results			
		Total	Sample 1	Sample 2	Sample 3
H1	The human capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.	⚡	✓	✓	⚡
H2	The structural capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.	✓	✓	✓	⚡
H3	The relationship capital of German SME is a strategically relevant source which has an actual positive, direct impact on lasting competitive business performance.	✓	⚡	⚡	⚡
H4a	German SME' human capital is the origin of IC because it has a positive impact on their structural capital, which, in turn, determines German SME' lasting competitive business performance. Consequently, human capital has an indirect impact on German SME' corporate success.	⚡/✓	⚡	⚡/✓	⚡
H4b	German SME' human capital is the origin of IC because it has a positive impact on their relationship capital, which, in turn, determines German SME' lasting competitive business performance. Consequently, human capital has an indirect impact on German SME' corporate success.	✓	⚡	✓	✓
H5	German SME' structural capital and relationship capital interact. Specifically, German SME' relationship capital has a positive impact on their structural capital.	⚡	⚡	⚡	⚡

Since the differences between sample 1, sample 2 and sample 3 are not significant, H6 (H6a – H6c) are rejected ⚡

8 CONCLUSION

8.1 RÉSUMÉ

Since the beginning of the 21st century, intellect-based (re)sources, also known as IC, are increasingly important for businesses and their long-term above-average corporate performance (Cater, Cater 2009: 191). Whether and to what extent this statement is also valid for German SME is investigated within the scope of this doctoral thesis. Moreover, it is the aim of this dissertation to discover if the impact of IC on competitive success varies among young SME in their start-up phase, established SME, and later company generations.

Building on strategic management literature – especially the RBV and the KBV with its conceptual IC-framework – as well as on literature and success factor research of German SME and start-ups, the key IC-categories, -dimensions and -attributes of German SME are identified: German SME' IC consists of three IC-categories, namely human capital (HC), structural capital (SC) and relationship capital (RC). Each of these IC-categories is specified via dimensions. Specifically, HC has four dimensions covering employees' competencies, employees' attitude, employees' intellectual agility, as well as leader(ship) and ability. SC consists of three dimensions looking into organizational capital, development capital, and technological capital. RC is characterized by six dimensions which are concerned with relationships to external stakeholders – especially customers, suppliers, capital providers, alliance partners, informal networks – and a company's public perception. Each of these thirteen dimensions is further particularized by attributes which help to precisely define the dimensions' contents. Based on the aforementioned sources as well as expert interviews and field (pre-)tests, two research models are proposed: model I looks into the direct impact of the IC-categories (i.e. HC, SC and RC) on performance; and model II evaluates the interaction between the IC-categories and how this influences business success. In line with the conceptualization of the two models and their dimensions hypotheses are raised. The two conceptual models are operationalized and tested via a multivariate statistical method called structural equation modelling (SEM).

SEM also allows analysing the importance of the individual IC-dimensions as well as -attributes, and group difference between differently aged German SME. The required data to empirically test this dissertation's hypotheses is collected from German SME via an online-survey between November 2013 and March 2014. In total, 266 German SME participated.

The empirical analysis reveals that six IC-dimensions are of particular importance: employees' attitude (HC), employees' intellectual agility (HC), organizational capital (SC), technological capital (SC), supplier relationships (RC), and informal network relationships (RC). Paying attention to these six issues, which are further specified via their defining attributes, is shown to positively drive the respective IC-category which, in turn, influence above-average corporate performance. Concerning the latter mentioned relationship between IC and supernormal success it can be concluded that IC impacts lasting competitive business performance in different ways depending on whether the SME are young, established or already in their second or later company generation. However, the identified differences are not significant. This means that they only hold true for the SME which participated in this doctoral thesis rather than the whole population of German SME. Consequently, it can be argued that the IC of all German SME impacts corporate success in an equal way. Specifically, it is discovered that stakeholder relationships (RC) are the most important element of German SME' IC-mix since they directly influence competitive advantages manifested in above-average performances. Moreover, it is noted that the force, with which RC impacts lasting competitive business performance, increases when RC interacts with HC. This implies that intangible resources related to organizational members (HC) are the origin of IC. Likewise, it is shown that HC only influences success in an indirect manner via RC. Furthermore, the results imply that internal, structural matters deserve attention because the IC-category SC drives competitive performance in both models, too. More to it, it can be seen that SC is independent of HC and RC.

Due to the fact that the outcomes presented above are very theoretical, they are transferred into more practical management recommendations and precise contributions in the context of practitioners as well as academics in chapter 8.2.

8.2 PRACTICAL AND RESEARCH CONTRIBUTIONS

8.2.1 Managerial Implications and Recommendations

The gained insights on German SME' IC are important from a practical viewpoint because they are supposed to support German SME and their managers in changing their mindset towards IC by appreciating that IC (management) positively impacts their sustainable business performance. Likewise, this doctoral thesis' outcomes are intended to help German SME to manage their IC effectively as well as efficiently in the long-run – rather than intuitively. More specifically, this is possible since this dissertation's results provide the basis to judge the status of German SME' IC-management and to uncover improvement potentials by making German SME aware of the six leading IC-dimensions and their respective attributes as well as the key IC-categories which positively influence their competitive success in today's knowledge society. Furthermore, this dissertation provides indicators with which the IC-attributes can be measured and thus, subsequently controlled.

In order to overcome the criticism from the field of IC (Serenko et al. 2010: 19) as well as success factor research (Nicolai, Kieser 2002: 581) that most empirical studies are not targeted at practitioners and instead are produced for the scientific community only, this dissertation bridges theory, research and practice by transferring its empirical results into precise practical management recommendations (Gruber 2000: Gleitwort). More specifically, this doctoral thesis' findings are rearranged in a *prioritized list* of IC-based intangible sources of lasting competitive business performance, which basically represents if-then-relationships (Bea, Schweitzer 2011: 299 et seq.) between IC-categories and -dimensions as well as performance.

Table 93: Ranking List of IC-based Sources of Success

Ranking	IC-Categories & Dimension	Management Recommendation	Indicators
1	<p>Relationship Capital</p> <p>1. Informal Networks</p> <p>2. Supplier Relationships</p>	<p>Focus on RC since it has the strongest direct impact on German SME' lasting competitive business performance.</p> <p>Do not underestimate the impact of informal networks – instead promote active help of family and friends and engage in associations.</p> <p>Good relationships with suppliers, with whom you are satisfied, are highly important to leverage RC.</p>	<ul style="list-style-type: none"> - No. of family members/close friends who support the business via active help - No. of memberships in associations or other interest groups - % suppliers who you would recommend to others - How satisfied are you with your suppliers on a scale from 0 (not at all) to 5 (fully)
2	<p>Structural Capital</p> <p>1. Organizational Capital</p> <p>2. Technological Capital</p>	<p>Attention shall also be paid to SC since it has a direct impact on competitive performance.</p> <p>Establish a certain degree of standards and do not hesitate to formalize process. Yet, make sure that you allow for enough flexibility to quickly respond to changes, for example, in the environment.</p> <p>Build a strong business culture which holds your business together - especially during crisis.</p> <p>Invest in latest technologies – whether with focus on production, processes, equipment or communication.</p>	<ul style="list-style-type: none"> - % of processes which are formalized (e.g. via manuals, form sheds, blanks, standardized screen masks etc.) - How strong is your company culture during crisis (scale from 0 to 5) - not only in 2012 but in general? - € invested in communication technologies - € invested to maintain / guarantee state-of-the-art technological levels of machinery, process engineering and equipment
3	<p>Human Capital</p> <p>1. Employees' Intellectual/Agility</p> <p>2. Employees' Attitude</p>	<p>Because of the fact that HC impacts RC, which in turn influences competitive business performance, it can be concluded that HC represents a (indirect) source of success which requires attention, too.</p> <p>Allow employees to solve problems without consulting their supervisor for advice and ensure that they are able to work across functions, departments, teams or so on since this provides important flexibility.</p> <p>Highly motivated employees contribute to company's HC. Such motivation can, among others, be facilitated via company events.</p>	<ul style="list-style-type: none"> - % of employees who can solve (important) problems/issues without consulting their supervisor for advice - % of employees who are (intellectually) capable of performing tasks beyond their actual/direct field of competencies - % of employees who are highly motivated - % of employees who participate in company events/firm activities (e.g. company excursion, barbecue, etc.)

Such a ranking list of IC-based, intangible sources of success is of particularly high interest to German SME because of their resource constraints – e.g. time, finance and personnel – and their related inability to deal with all IC-aspects (Jaspers 2008a: 9): it allows SME to manage their IC purposefully and effectively

by paying attention to, or investing in, value-adding tasks only.⁴⁰⁷ Specifically, the ranking list offers the potential to identify crucial IC-aspects, to select the most important ones for an enterprise, and to make decisions concerning the implementation of prioritized actions accordingly (Hall 1992: 142). Consequently, it allows, as already mentioned, improving German SME' (professional) IC-management as well as performance.

Table 93 illustrates the ranking list of German SME' IC-based sources of success. This list indicates that it is fundamentally important for German SME to focus efforts on *stakeholder relationships* since *RC* has the strongest direct impact on German SME' competitive business performance in the simple model I as well as in the more complex model II, where *RC* is impacted by *HC*.

More particularly, *informal network relationships* are identified to matter the most in this context. Precisely, this means that family and friends as well as memberships in associations and corresponding personal contacts shall be leveraged. That is because it can be argued that such connections help to counterbalance own resource shortcomings and because they help to learn, for example, from others' best practices. In other words, it seems fruitful to ask family members, friends or other social contacts to actively support a business, for example, via free-of-charge work capacity or financial support (cf. chapter 4.1.3.5). Specifically, German SME are advised to regularly evaluate the number of *family members and friends* who support the business, for example, via active help. If the number is low – e.g. below the average of the surveyed German SME of three – they should consider actions to expand and remedy this issue. Moreover, it is worth to connect with other business people from the same industry or with similar interests to gain from their shared experiences as well (cf. chapter 4.1.3.5). In particular, it can be recommended to assess the number of *memberships in associations* as well as the effects gained from the interaction with other professionals from the same field of expertise. In line with the family and friends,

⁴⁰⁷ "This becomes even more significant if we take into consideration that our sample consisted of SMEs which are inherently characterized by the scarcity of their resources. Thus, it is even more important to be able to bring about the desired results with the least possible use of resources" (Cohen, Kaimenakis 2007: 258).

actions to further leverage or cut back on certain memberships are advisable.

In order to establish and maintain competitive leads in the long-term, it is also recommended to focus on *supplier relationships*. More to it, it is especially the *satisfaction* with suppliers which should determine the relation. The most obvious reason for this can be seen in the fact that suppliers' deliveries and their quality impact the conditions of the end-products. If the suppliers offer, for instance, inputs of poor quality or do not deliver on time, then this clearly impacts the purchaser and his/her products or services, too. Therefore, it is advised to select supplying companies carefully and to constantly control if they can uphold the demanded standards. Concerning the latter, it can be stated that the satisfaction can be judged via (school) grades. Similarly, firms can reflect whether they would recommend a certain supplier under investigation to someone else.

Table 93 also indicates that German SME' management should be devoted to *internal, structural matters* since *SC* represents the second most important intangible source of German SME' above-average success. Due to the fact that *SC* impacts lasting competitive business performance in a direct manner in both examined models and because it is not determined by *HC* or *RC*, it can be treated as important; yet, also as independent of other intangible aspects.

In detail, it can be noted that *organizational capital* demands particular exploitation in the context of *SC*. This is the case because it is proven that a healthy and powerful *corporate culture* is priceless, especially during crises. The reason for this can be seen in the fact that a strong culture is able to hold the company together and to continue to give guidance to the organizational members during such tough times. In more detail, it helps employees not to lose sight of their company's goals and to collectively pull in the same direction (Sackmann, Bertelsmann Stiftung 2004). In accordance with supplier-satisfaction, SME can use grade systems to control the quality of their *company culture*. In addition, the data suggests that *formalized processes* are important in order to ensure that they always run smoothly, even (or particularly) if organizational members leave the firm. Having said this, it is, however, absolutely crucial to leave room for sufficient flexibility, too. That is because flexibility is indispensable in the currently prevailing, fast changing knowledge economy (cf. chapter 4.1.2.1). Consequently, German SME are encouraged to appraise the ratio between formalized and

informal processes (the survey companies have, on average, about 60% formalized standards).

Besides, attention shall be paid to state-of-the-art-technologies (*technological capital*). In detail, it is recommended to invest especially in the latest communication technologies and machinery or equipment, since even relatively small amounts of money can lead to positive results. A possible reason for this could be the short half-life period of technologies in the current knowledge society, which demands constant updates. Lastly, it is worth mentioning that it is believed to be best if the amount of investments is not only compared to historical values but also within the peer group – i.e. among competitors in order to keep up with them.

Even though *human resource matters* do not have an independent direct impact on competitive business performance, *HC* requires management attention since it is the origin of *RC*. As such, it impacts above-average success in an indirect manner.

In order to leverage the intangible sources of success related to organizational members, German SME are advised to focus on their employees instead of the entrepreneurs and/or the top management. Special attention shall especially be paid to the *problem solving capacities* of the workforce as well as their ability to *perform tasks beyond the actual field of competencies*, i.e. interdisciplinary or interdepartmental (*intellectual agility*). These issues are of particular relevance since they provide German SME with more flexibility as well as ease to adjust to the current environment, which changes in a continual and rapid manner (cf. chapters 1.1 and 4.1.1.3). This might also explain why high levels of *HC* lead to increased *RC*, too. As a consequence of this importance, SME should look into the percentages of their workers who can solve issues independently and/or are able to be flexibly assigned within the firm. As an indication, the SME, which were surveyed, report average percentages of 40 and 45, respectively.

Moreover, it is shown that *highly motivated* employees are of great importance towards success in today's business world. In this regard, *company events* and the workforce's participation shall especially be highlighted (*attitude*). That is because such events motivate people to be part of a particular firm and help to build or

even strengthen team spirit. Likewise, it can be argued that employees seem to highly identify with their enterprise if they spend their free-time with colleagues and their bosses. This, in turn, is expected to decrease employee turnover (cf. chapter 4.1.1.2). Furthermore, a high motivation and connection with the firm may cause employees to be more willing to dedicate themselves towards establishing strong relationships with external stakeholders. Potential indicators to control for such issues are the percentage of highly motivated employees and the percentage of the workforce that participates in company events like Christmas parties, barbecues, etc.

Overall, it can be concluded that the ranking list of German SME' IC-based sources of success, which is demonstrated in table 93, suggests that special attention shall be paid to RC, followed by SC and HC. Moreover, it points to the most important dimensions of RC, SC and HC; and provides precise recommendations on what could be done to leverage them.

Lastly, it is important to highlight, again, that the presented results might not be relevant to all German SME. Hence, they are no universal rules to succeed in today's business environment. Instead, it is important that German SME evaluate the ranking list with respect to their individual company background in order to decide upon precise management actions.

8.2.2 Theoretical Implications

This doctoral thesis is of high scientific importance since it expands the existing IC-literature and enriches German SME research via an additional perspective.

Firstly, it can be stated that until this examination, no research has investigated the actual, *hard-fact-based* impact of IC on German SME competitive business performance via a *structural equation model* (SEM). Specifically, it can be noted that former studies on German SME are based on perceptions – e.g. 'do you think that ... is important for your business and its success? And if so, how important on a scale from 0 to 10?' (BMWi 2010b: 6) – and present bar charts of this (e.g. 0 to 10)

distribution (Mertins, Wang, Will 2009: 120; BMWi 2010b: 9 et seqq.; Vanini 2011: 7). Hence, this dissertation is useful to evaluate such perception-based research outcomes against reality as well as to actually investigate the causality between IC and competitive success. Interestingly, it is discovered that German SME' beliefs and the results of this dissertation's SEM differ in many ways.

Moreover, no scientific knowledge was available about the *interaction of German SME' IC-categories* prior to the study at hand. This was a particular research deficit when taking into account that such information has already long been available for large companies (Wang, Chang 2005: 231; Do Rosario Cabrita, Bontis 2008: 229) as well as SME (F-Jardon, Martos 2009: 612; St-Pierre, Audet 2011: 215) in other countries. To overcome this research gap, this doctoral thesis runs model II in which HC, SC and RC influence each other. The results indicate that interactions between HC, SC and RC exist (cf. chapter 7.3.3); and that they differ from other countries' SME-related findings. In the German context, the results imply that investments in, for example, HC lead to enlarged RC as well as performance (in an indirect manner via RC), too. Likewise, model II raises new research questions which are discussed in chapter 8.3

Also a cutting-edge quality of this doctoral thesis is the SEM-evaluation of the *influence of company-age as well as -generation* on IC and its impact on success. In more detail, it can be noted that only one former study looks into the difference between young (10 years), medium aged (between 11 and 40 years) and old (older than 40 years) German SME (BMWi 2010b: 5 et seq. & 15 et seq.). Similar to the above mention criticism, this study is, however, based on perceptions which are analyzed via ANOVA. Contrarily, this dissertation uses hard-fact-based indicators within the scope of SEM-multigroup analysis and also examines the significance of the differences between its three sub-samples. Concerning the latter mentioned sample, it is also worth highlighting that the three sub-groups of this thesis (young German SME up or equal to ten years, established first generation SME, and later generation SME) vary compared to the BMWi study (2010b: 5 et seq. & 15 et seq.) since Hermann Simon (1996: 179 et seq.; 2007: 351 et seq.) discovered that second (or later) German SME-generations differ from founder generations. Ultimately, it can be concluded that there are no significant differences of IC's impact on performance among the three inspected sup-groups. This finding contradicts the BMWi study (2010b: 5 et seq. & 15 et seq.) and thus,

indicates, again, that perceptions and reality may differ.

Another contribution of this dissertation relates to the new integration of *informal relationships*. More precisely, it can be stated that informal relationships have, so far, been ignored in the context of RC. However, diverse literature sources (cf. chapters 4.1.3.5 and 4.3.3) point to the fact that family and friends as well as memberships in associations and related contacts are important for lasting competitive business performance. Interestingly, this doctoral thesis reveals that relations with informal networks represent the most contributing external, stakeholder-related intangible sources of above-average success; and hence provides new insights into (so far) underestimated stakeholders. Likewise, this indicates that former IC-studies have totally overlooked a major stakeholder group which clearly deserves more attention.

This dissertation also generates additional methodological value due to its operationalization of the IC-categories. That is because this doctoral thesis operationalizes HC, SC and RC as *higher-order constructs*. Prior to this study, this has, as far as the author of this work is aware, only been done once in the context of IC (specifically, for universities as learning organizations by Martinez-Torres 2006: 619 et seqq.). Yet, it seems reasonable to do so in order to advance IC-theory (cf. chapter 5.1.3). Firstly, the detailed description of the IC-dimensions and their attributes sheds more light on the individual aspects of German SME' IC. Likewise, this guides the questionnaire design for the survey, since it points to all relevant aspects which require approval. Secondly, the results are much more precise. Instead of only proving a ranking of the influence of HC, SC and RC on performance, six IC-dimensions are identified as relevant strategic sources of German SME' competitive business success.

Overall, it can be concluded that the above illustrated contributions as well as proceedings of this doctoral thesis shall serve as an orientation, proposals and recommendations for other researches in order to improve their works.

8.3 LIMITATIONS AND FUTURE RESEARCH

Although this dissertation provides many interesting findings and contributions, which are of particular interest to German SME as well as the scientific community, it has limitations which can influence the results' interpretation and may inspire future research.

Firstly, it is noticed that there are, unfortunately, various *results* of this dissertation which *do not match their hypotheses* and for which there are *no obvious explanations or evidence*. Hence, it is important to empirically investigate the assumptions and arguments made within the scope of this dissertation's interpretation of outcomes. Examples include the question if RC impacts HC or if SC influences RC; how visionary German SME' leaders should be; if family members and friends are more important for young or established firms; or if the entrepreneur's image is more important than large expenditures on marketing and PR. These and other questions raised in chapter 7 should be addressed by additional research in order to clarify them.

A second weakness of this doctoral work is the fact that one cannot be sure whether this thesis covers *all relevant aspects of German SME' IC*. That is firstly because there is no fully agreed, mainstream categorization of IC (Choong 2008: 622 et seq.) – e.g. human capital, structural capital and relationship capital vs. human capital, organizational capital and customer capital. Secondly, there might be additional attributes allocatable to the thirteen dimensions of this dissertation; attributes which the author of this research study as well as the validating experts and practitioners did not think of. This could particularly refer to negative intangible sources of success which are expected to harm lasting competitive performance – i.e. negative hypotheses. Consequently, future research should re-evaluate the chosen IC-model of this dissertation and potentially broaden or shift its focuses. To do so, it might be interesting to gain more insights on potential IC-issues via qualitative research such as case studies. Likewise, it might be valuable to look into cases as well as theories of unsuccessful or even insolvent German SME in order to identify damaging issues which might expand the model.

Moreover, the operationalization of German SME' IC via *higher-order constructs* can be judged as detracting. That is because various authors plead for the direct

usage of first-order constructs in order to reduce information losses as well as conceptual ambiguity, and to improve explained variance (Edwards 2001: 148; Albers, Hildebrandt 2006: 25 et seq.; Giere, Wirtz, Schilke 2006: 679). Consequently, future research may want to test the direct impact of the observable indicators on business performance and evaluate potential differences to the current handling.

Among the biggest shortcomings of this dissertation is the *elimination of many reflective indicators*, which are qualitatively pretested but were unable to withstand the ambitious quantitative reliability and validity tests. This is problematic because it means that various aspects/attributes of a reflectively measured IC-dimension are removed and thus, not included in the final data evaluation even though they are relevant with respect to the definition of their respective dimension. However, since the definitions of German SME' HC, SC, RC and the latter's dimensions as well as attributes are pretested and hence, considered as appropriate, future research should 'only' apply different indicators, which nevertheless match this doctoral thesis' definitions. Moreover, it is advised to quantitatively pretest these measures and to adjust them accordingly. Concerning the quantitative pretest, future researcher could rely on (confirmatory) factor analysis which is a common statistical procedure in that regard.

Furthermore, this dissertation's primary data gathering was not successful concerning the dependent *variable 'competitive business performance'*. Specifically, many survey participants refused to disclose their financial figures. This caused the issue that many cases had to be eliminated from the empirically tested data set and that many missing values had to be statistically imputed. As an alternative, future research on German SME' IC and its impact on success could try to rely on secondary resources to obtain financial performance measures (Cohen, Kaimenakis 2007: 242). By doing so, future researchers would also avoid issues regarding *single-source bias*, which is present in this work since the dependent and independent variables are collected from the same source (Nicolai, Kieser 2002: 584; Söhnchen 2007: 138).

With respect to the primary data collection, this doctoral thesis also suffers from *single-informant bias*. Specifically, this means that the validity of this dissertation's data is reduced since only one person is surveyed per company instead of asking many people from the same enterprise in order to ensure that all relevant

information is covered – i.e. fewer “No comment/not known”-answers are likely (Nicolai, Kieser 2002: 584; Kaya 2009: 55 et seq.; Reinemann 2011: 102). Thus, future research could extend this dissertation’s empirical tests by following a multiple-informants approach. It is especially recommended to collect data from business leaders, assistants to the management, human resource officers, area / division managers and management accountants since they seem, according to this thesis’ survey, able to answer the raised questions on IC.

Another challenging aspect, which is identified within the scope of this dissertation, is the *motivation of the participants*. In particular, it is very interesting that the 16 German SME, which took part in the pretest, were able to answer almost all questions of the questionnaire – i.e. if they had been unable, the questions would have been changed or deleted prior to the final data collection. Contrarily, many of the 266 German SME, which participated in the final survey, did not answer the majority of questions (specifically, they choose the “No comment/not known” option). Accordingly, and as already mentioned above, many cases had to be eliminated or missing values had to be imputed by the researcher of this doctoral thesis. Yet, since the pretests showed that the questions are indeed feasible, it can be assumed that many of the 266 German SME were simply not motivated enough to provide their stake to the research at hand. As a consequence, it is suggested that future research applies other techniques to excite potential SME. This might include pre-survey telephone calls to explain potential participants the purpose of the research; or to visit suitable companies and possibly even assist them while completing the questionnaire on-side in order to ensure fully answered data sets.

A key deficit of this doctoral thesis is also the fact that its research is *not longitudinal* (Bontis 1998: 72); instead its results represent a *snapshot* only (Wong, Aspinwall 2005: 77). More precisely, this dissertation does not identify long-term effects since the IC- and performance-variables are collected from only one and also the same period (Cohen, Kaimenakis 2007: 259). Although this issue is partly covered by hypothesis 6, which looks into the impact of corporate-age and -generation on German SME’ IC, it is not accurate enough to indicate how an individual German SME’ IC changes over time (Hutchinson, Quintas 2008: 136 &

147; Riesenhuber 2009: 8 et seq.).⁴⁰⁸ As a consequence, future research is recommended to apply this thesis' hypotheses as well as SEM, but with respect to time elements (Kamukama, Ahiauzu, Ntayi 2010: 567, Kamukama, Ahiauzu, Ntayi 2011: 160). This could, for instance, be done via a questionnaire which asks German SME to answer each question for the last three years. Then a MGA which compares the results between year 1, year 2 and year 3 can be applied. Moreover, the MGA allows testing the significance of the differences. Overall, this would be a major enhancement, especially when taking into account that a) investments in IC are likely to impact success with time-delays (Kivikas, Wulf 2006: 53; Cohen, Kaimenakis 2007: 259; Wulf, Pfeifer, Kivikas 2009: 146), and b) that factors which impact business performance today may not do so in the future – e.g. when markets change (Mandorf 2008: 7 & 26; Reinemann 2011: 103).

With respect to the latter mentioned MGA, it can be criticized that it is, according to the literature recommendations, *only performed for the structural model* within the scope of this doctoral thesis. As research advances, it might be interesting, however, to test the context of IC in differently aged German SME with respect to the measurement, too (Henseler 2012: 496). Since one would particularly gain interesting insights into the formatively measured dimensions of German SME' HC, SC and RC by doing MGA to the measurement model, it is advised for future research.

Additionally, chapter 7.2.1 and specifically part 7.2.1.3 illustrates that two IC-dimensions – i.e. technological capital and customer relationships – are accepted although their *AVE-values* slightly fall *below the recommended threshold* of 0.5. Even though this can be done, it is statistically not the best option. Hence, one might be better off and actually get more reliable (overall) results when deleting the two dimensions from the model. Yet, whether this is actually the case requires further research.

Besides, it is recommended to test a research model's *stability as well as generalization* by applying it *in diverse contexts* (Yi, Davis 2003: 163; Hair, JR. et al.

⁴⁰⁸ Moreover, the general procedure of testing hypothesis 5 can be criticized. The assignment of the participants into the three groups, for example, can be judged as arbitrary (Henseler, Fassott 2010: 721).

2010: 703). However, one cannot be sure if the higher-order SEM of this dissertation, which is particularly tailored to the conditions of German SME, actually works for other nations' SME. That is, in particular, because German SME are, as already mentioned within the scope of this doctoral thesis, regarded as unique compared to other countries' SME (Malshe 2012: 14; Malshe, Eckhoff 2012: 6; Ibbeken 2013: 2). Because of the latter, it can also be assumed that the results of this work may not be transferable to SME in other parts of the world. It is therefore recommended that future research replicates this dissertation's (new) higher-order research models for other geographical locations – i.e. outside German-speaking regions – to establish or reject external validity (Yi, Davis 2003: 163) as well as the model's generalization.

Lastly, literature, which criticizes success factor research, mentions that once *sources of success* are identified and *made public*, they *lose value* since they can be more easily copied by competitors (Nicolai, Kieser 2002: 585; Reinemann 2011: 103). Although this issue is less likely when considering the fact that German SME' IC is historically developed and highly company specific, this dispute may still impact German SME' IC-based competitive edge. Hence, research is required after this dissertation's completion in order to evaluate its impacts on German SME' competitiveness.

At the very end it is important to point out that it is believed that the above mentioned limitations of this doctoral thesis and in particular its resulting problem-solving recommendations for future research positively enhance the IC-research discipline and thus, further elaborate German SME' potential to succeed in the long-run.

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Appendix 1: Pretest – Interview Guide – German SME experts



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Pretest:
Expert Interview

Intellect-Based Intangibles of
German Small and Medium Sized Enterprises
- The Impact of Intellectual Capital on
Lasting Competitive Business Performance -

Interviewer:

Sabrina Aschenbrenner, M.Sc., B.Sc. (hons.)

Respondent/expert:

Place: _____

Date: _____

Time: Beginning _____

End: _____

1) Introduction

What - Topic / subject matter of investigation:

The dissertation at hand deals with the intellectual capital (IC) of German small and medium sized enterprises (SME).

In particular, the impact of IC – which is defined in terms of three categories of intangibles (namely: human capital, structural capital and relationship capital) – on SME' business performance is examined.

Furthermore, the relationship between the IC-categories among each other is investigated.

Why - Purpose of interview:

At first, the transmission of the general IC-approach, as it is described in the international literature, into the context of German SME shall be validated.

This is particularly important to make sure that the theoretical model and thus, the hypotheses cover all relevant facets of German SME' IC.

Furthermore, the operationalization of the research model - i.e. in the form of the statistical model - needs to be approved.

This matter is of central concern since many research studies - which also operationalize their research model via structural equation modeling – have been miss-specified (e.g. reflective measurement instead of the appropriate formative form).

Thirdly, there are some open issues which are important for finalizing the hypotheses and which still require specification. These shall be discussed and conclusions drawn upon.

Lastly, the selection of items (indicators) which measure the facets (dimensions) of German SME' IC shall be validated. This is a crucial step because it assures that the indicators, which are questioned in the survey, appropriately determine their dimensions and that they are understandable.

In particular, this is the point where some of the theoretically suitable items need to be eliminated for practically.

How – form of interview:

The first three of the above presented agenda-points of this interview are discussed via open-ended questions which are guided by a framework of questions and illustrations.

The last task is performed via a structured, written questionnaire where you state your opinion/expertise by ticking boxes on a prepared answer sheet.

Do you have any general questions or comments which you would like to state before I start the interview?

2) Warm up / "ice breaker" questions

a) Are you familiar with the term "intellectual capital"?

If yes, please specify your knowledge via a definition.

If not, this is how IC is defined in the scope of this dissertation

IC includes a group of knowledge-based assets which contribute to a firm's competitive advantages and thus, economic value. It is characterized by the following attributes:

- IC is intangible, invisible, and non-physical,
- IC is firm specific/unique,
- IC is a source of competitive advantage and as such, has an impact on (future) success/value
- IC consists of a (wide) range of components as well as categories of intangibles which establish the content of IC in form of IC-repository classes.

There is broad consensus that IC contains the following three IC-categories:

Human capital, structural capital, and relationship capital

(These three categories are defined in the later part of this interview).

b) Have you previously dealt with the topic of „IC in German SME“?

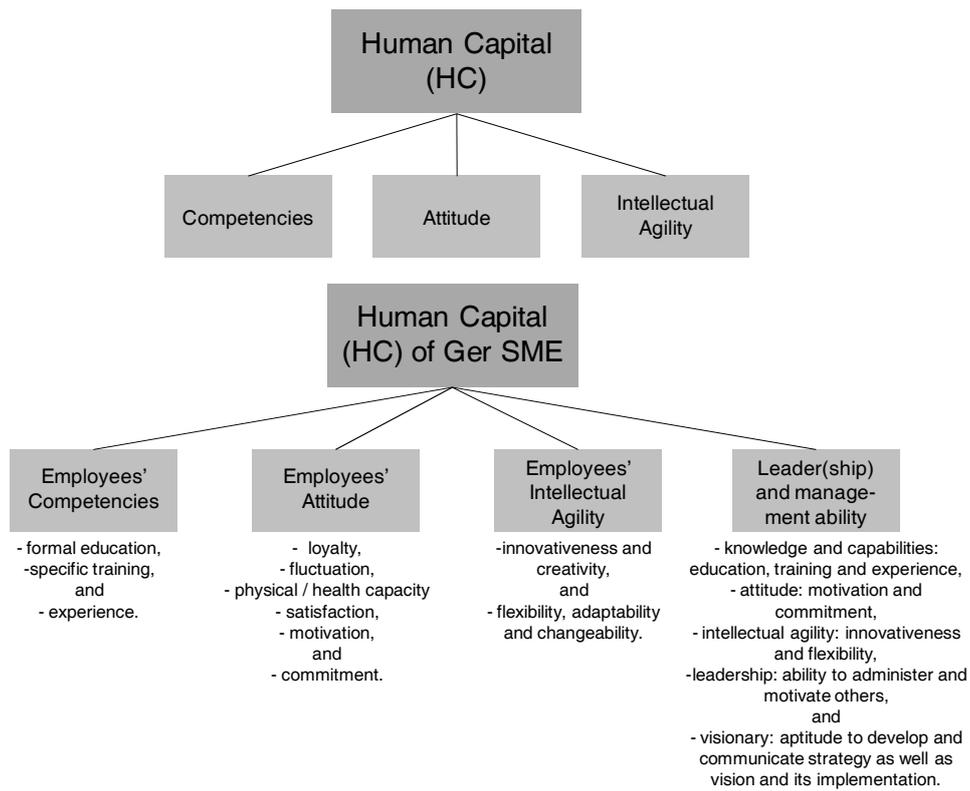
If yes, to what extent?

And are there any particular experience you would like to share/comment on?

If no, are there any particular reasons for this?

**3) Operationalization of IC-categories via dimensions
in the context of German SME**

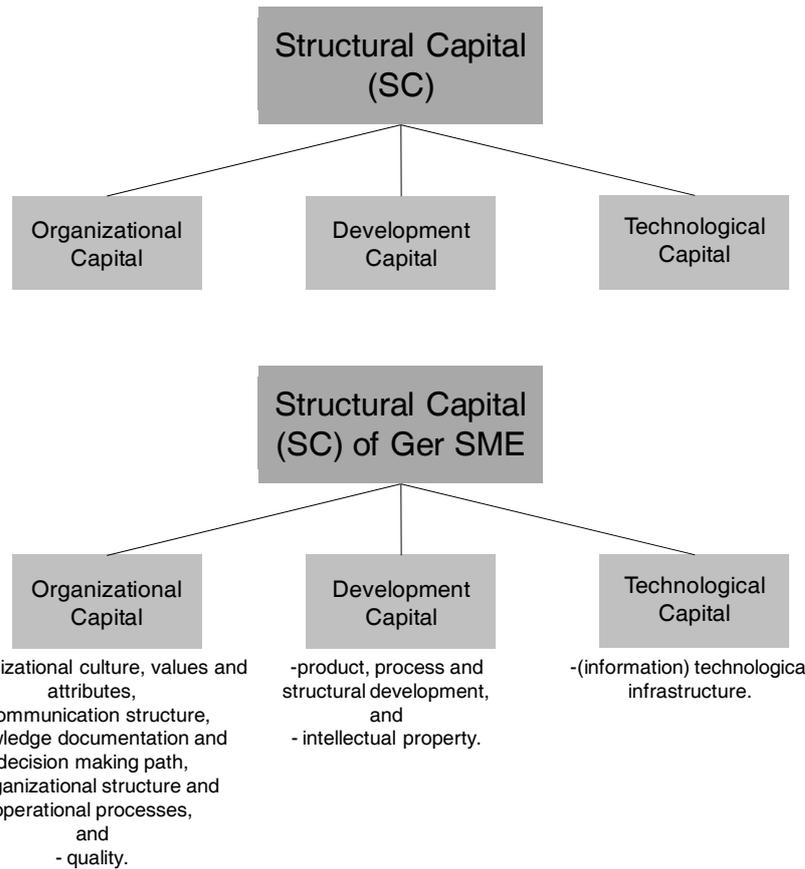
Definition of Human Capital: The essence of human capital is the sheer intelligence of the organizational members. It is owned by the employees and entrepreneurs/managers.



Do you comprehend the category and the model of 'human capital of German SME', respectively?

What is your opinion based on (empirical studies, literature)?

Definition of Structural Capital: Structural capital encompasses the intellect of an organization and in particular the non-human storehouses of knowledge which an enterprise has created/collected over time. It is a firm's property because it remains when the organizational members / HC go(es) home.



Do you comprehend the category and the model of 'structural capital of German SME', respectively?

What is your opinion based on (empirical studies, literature)?

How do you feel about 'quality' being part of organizational capital?

Should quality rather be a separate dimension of SC?

Pro separate	Con separate
Reasoning: all aspects of organizational capital involve common activities such as meetings and/or projects, decision making structures as well as work place arrangements. Only 'quality' contrasts a little with the other facets (i.e. in terms of content).	Reasoning: as organizational structures and operational processes alter, so may quality as it depends on the infrastructure of the firm.
Organizational capital is measured reflectively. Thus, some items may be eliminated via statistical operationalization. This way the 'quality facet' of organizational capital may disappear. Hence, an important success factor would be missing in the model.	Various authors regard 'quality' as part of process capital which belongs – according to my argumentation – to organizational capital.

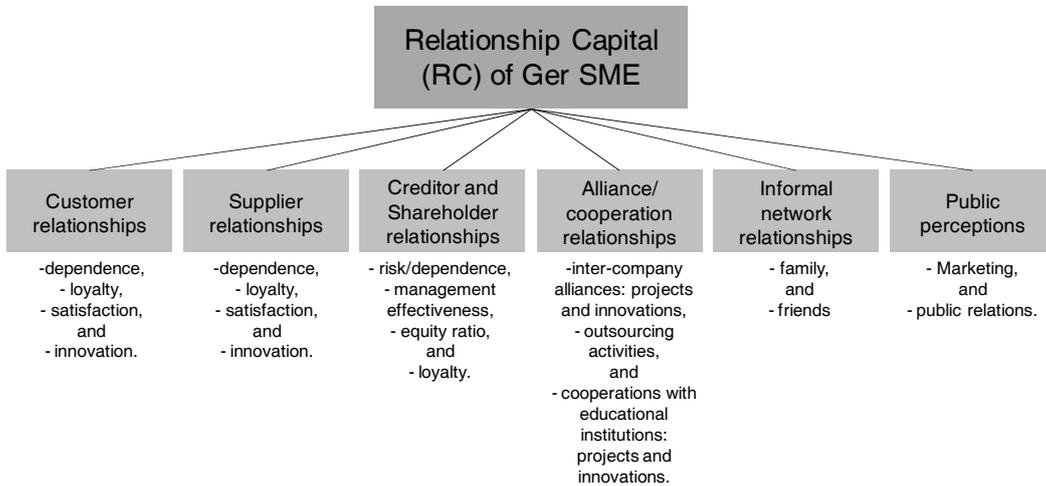
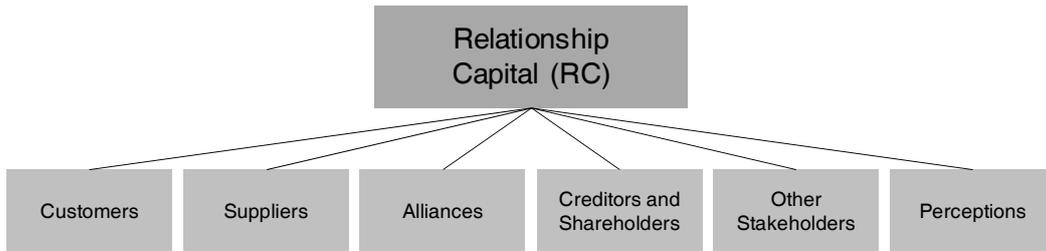
Your opinion: pro or con separation?

If you believe it should be separated, how do you suggest measuring it?

(If possible, please propose three potential indicators.)

Indicators:

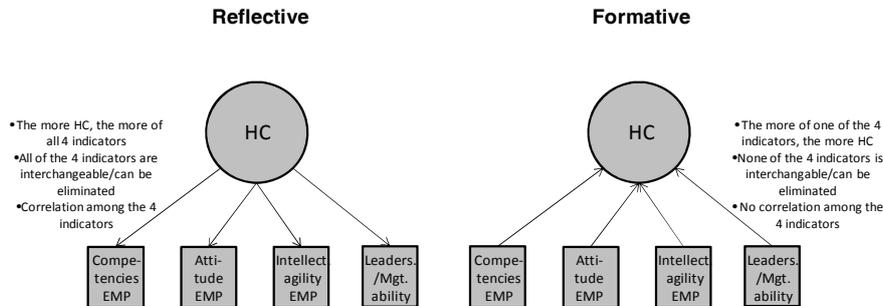
Definition of Relationship Capital: Relationship capital represents the knowledge/IC which is embedded and exchanged in formal as well as informal (long-term) relationships with firm-externals. Yet, it is only a resource enjoyed by the organization as long as the relationship exists but disappears when the relationship ends.



Do you comprehend the category and the model of 'relationship capital of German SME', respectively?

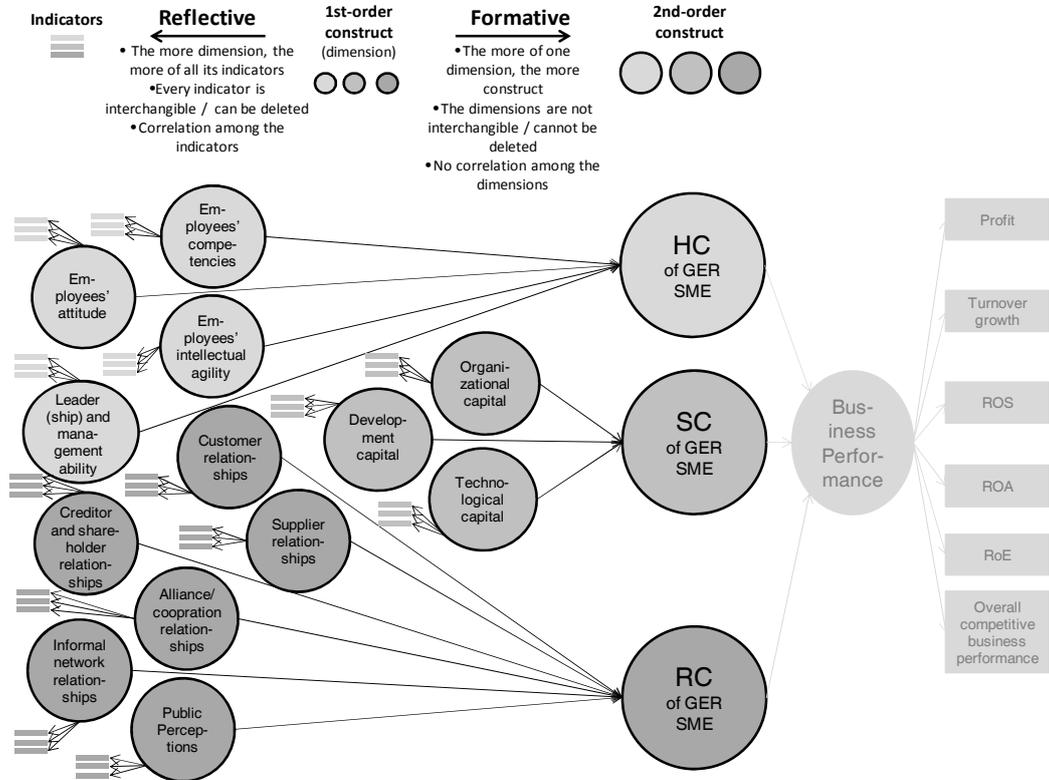
What is your opinion based on (empirical studies, literature)?

4) Statistical model: Classification of indicators and dimensions as reflective/formative



Decision rules for determining formative or reflective

		Reflective	Formative
1	Direction of causality	From construct to indicator. (e.g. a change of HC causes a change of “employees competencies”)	From indicator to construct. (e.g. a change of “employees competencies” causes a change of HC)
2	Interchangeability of the indicators	Indicators should be interchangeable. Dropping an indicator should not alter the conceptual domain (meaning) of the construct. (e.g. HC would conceptually be fine without “employees competencies”)	Indicators do not need to be interchangeable. Dropping an indicator may alter the conceptual domain (meaning) of the construct. (e.g. HC would conceptually not be fine without “employees competencies”)
3	Covariation among the indicators	Indicators are expected to covary with each other (i.e. to correlate). (e.g. “employee competencies”, “employee attitude”, “employee intellectual agility” and “leader(ship)/management ability” are dependent on each other/influence each other).	It is not necessary for indicators to covary with each other (i.e. to correlate). (e.g. “employee competencies”, “employee attitude”, “employee intellectual agility” and “leader(ship)/ management ability” are independent on each other/do not influence each other).

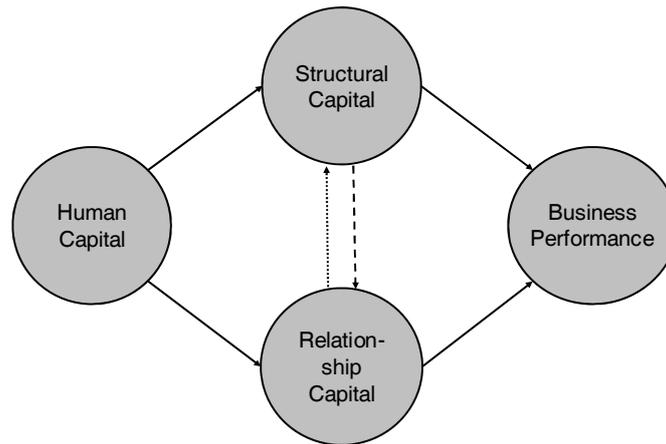


Do you agree - based on these decision rules – to the operationalization of this dissertation’s statistical model?

If not, what do you think is miss-specified and why?

5) Hypothesis: Relationship between the IC-categories

HC is the source of SME' IC because it positively influences SC and RC which in turn are the main determinants of German SME' business performance. As such, HC has an indirect impact on German SME' business performance.



2 options available since PLS (i.e. the statistical tool/software) cannot model bidirectional causal relationships:

Dotted = From RC to SC: German SME' RC impacts their SC because German SME have close contact to their stakeholders which may, for example, present their problems and thus, incentivize SME to be innovative.

Dashed = From SC to RC: German SME' flexible structures, direct communication and high innovation-power, for example, promote the close contact to stakeholders and thus, strengthen their relationships.

Which line of thought do you support?

What is your reason for this decision / what is your key argument?

6) Expert validation of selected items

The intellectual capital of German SME
– which is represented by three categories of intangibles, namely, human capital, structural capital and relationship capital – is specified via thirteen dimensions.

These dimensions are exceedingly explained and defined as success factors of German SME on the following pages.

The subsequent pages display a range of items (indicators) which can be used to determine the thirteen IC-dimensions.

Please assign each of the proposed items to one dimension, which you believe it captures the best, by ticking the appropriate box on the answer-sheet.

For example, if you think that a certain indicator is greatest suited to measure/matches the dimension 'employees' attitude', then please mark a cross in the column representing 'employees' attitude'.

It is recommended to place the definitions - as an aid in rendering your judgment - next to your answer-sheet while making your choices.

IC Category	Dimension	Definition
Human Capital of GER SME	Employees' competencies	<p>The deep and specific as well as broad and general(istic), application-orientated knowledge and capabilities of employees, which they have acquired during their career, are relevant success factors of German SME. That is because knowledge about things and know how are important to perform SME' daily multi-functional,interdisciplinary work-tasks which are influenced by/tough because of SME' differentiation focus.</p> <p>In detail, employees' competencies of German SME' predominantly embrace the following three aspects:</p> <ul style="list-style-type: none"> - formal education, - specific training, and - experience.
	Employees' attitude	<p>Employees' positive/contributing behavior is also a success factor of German SME because it promotes that people take on responsibilities, commit to their work, and are willing to exchange knowledge/use their knowledge and skills in order to contribute to business performance.</p> <p>In the context of German SME, employees' attitude can be specified by attributes such as</p> <ul style="list-style-type: none"> - loyalty, - motivation, - fluctuation, and - satisfaction, - commitment, - physical /health capacity.
	Employees' intellectual agility	<p>The intellectual agility of German SME's employees - as the mix of competencies and attitude - is also a relevant success factor which helps to compensate for limited resources (incl. staff). That is because German SME' employees are – due to their multifunctional tasks – particularly able to transfer their knowledge from one context to another, to link different (kinds of) knowledge, to create new ideas – the source of innovations –, to develop themselves, and to pitch in for each other/help each other out.</p> <p>Specifically, two key components describe German SME' employees' intellectual agility:</p> <ul style="list-style-type: none"> - innovativeness and creativity, and - flexibility, adaptability and changeability.
	Leader(ship) and management ability	<p>German SME's leaders and their ability to lead are another critical success factor and arguably even more important than qualified, motivated, innovative and flexible employees. That is, on the one hand, because leaders hold the company together and, on the other hand, because they are highly relevant to foster the sharing as well as application of (newly acquired) knowledge.</p> <p>In particular, German SME' leaders' abilities are characterized by, for example,</p> <ul style="list-style-type: none"> - leaders' knowledge and capabilities: education, training and experience, - leaders' attitude: motivation and commitment, - leaders' intellectual agility: innovativeness and flexibility, - leadership: ability to administer and motivate others, and - visionary: aptitude to develop and communicate strategy as well as vision and its implementation.

Structural Capital of GER SME	Organizational aspects	<p>The relatively small size of German SME allows for a less bureaucratic, flexible, high responsibility- and interdisciplinary-orientated, commonly agreed organizational (infra-)structure, design and communication which facilitates the fast exchange of knowledge, decision making. This, in turn, contributes to (strategic) adaptiveness as well as quality and hence, success.</p> <p>Aspects which belong to this SC-dimension are, against the background of German SME:</p> <ul style="list-style-type: none"> - organizational culture, values and attributes, - communication structure, knowledge documentation and decision making path, - organizational structure and operational processes, and - quality.
	Development aspects	<p>Development capital is a relevant success factor of German SME which helps SME to compensate for their relatively small size and limited tangible resources because new products and/or optimizations/improvements of their internal processes as well as structure support SME in adjusting to the environment – i.e. recognize, assimilate and apply new external knowledge. SME are particularly able to quickly adopt to changing (external) circumstance due to their small business size. Because of this innovativeness, development SME are argued to grow, create competitive advantages, remain competitive, and secure long-term survival.</p> <p>Intellectual property (IP) is not to be scoffed at but is still a less relevant IC-source of the SME' success because SME are less likely to have registered patents – compared to large firms.</p> <p>Overall, the following attributes are embedded in German SME' development capital:</p> <ul style="list-style-type: none"> - product, process and structural development, and - intellectual property.
	Technological aspects	<p>German SME' technological capital is regarded a success factor which is just as important as market aspects. That is because technology/the technical system and an I(C)T infrastructure are required to produce products in line with state-of-the-art facilities, to work efficiently with the help of technological support, to support the flow of information and knowledge etc. Furthermore, it helps to compensate for SME' relatively small size and other missing resources such as labor capacities.</p> <p>More to it, the technological capital of German SME primarily exists of the enterprise's (information) technological infrastructure.</p>

Relationship Capital of GER SME	Informal network relationships	<p>Informal networks are a critical intangible success factor of German SME that helps to compensate for their small size by providing additional (in)tangible resources – i.e. emotional support or active help – and financial investments.</p> <p>Principally, informal networks of German SME encompass two key angles:</p> <ul style="list-style-type: none"> - family, and <li style="text-align: right;">- friends
	Public perceptions	<p>German SME' image and reputation are critical success factors because they help to differentiate from competitors and increase the attractiveness of exchange relationships. This is even the case although SME are often not well known in the general public since they do little marketing – yet, they are well known in their niche market. Furthermore, they are usually well respected in their local environment because they are the key tax payers in Germany and promote a lot of sponsoring of clubs, museums, cultural activities etc.</p> <p>The perception of German SME in primarily build on:</p> <ul style="list-style-type: none"> - Marketing, and <li style="text-align: right;">- public relations.
Success	Lasting Competitive Business Performance	<p>Conceptually, 'lasting competitive business performance' represents a combination of sustainable competitive advantages and sustained above-average returns. Yet, because competitive advantages are latent, they are frequently measured solely based on financial figures. The latter demonstrate, for example,</p> <ul style="list-style-type: none"> - that it is economically worthy to run the company, - that the firm is able to grow and thus, to increase its profit making opportunities, - that the enterprise makes a reasonable profit with each Euro of sales <li style="text-align: right;">...etc.

Your opinion about the inclusion (yes) or exclusion (no) of the following indicators/items:

Dimension	Indicator / Item	Yes	No
Employees' competencies	% of training conducted in-house /on-the job training – as opposed to external advanced education		
Employees' competencies	% of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT)		
Organizational capital	% of processes which are formalized (e.g. via manuals, form sheds etc.)		
Development capital	% of innovations converted into patents		
Customer relationships	No. of personal visits to customers' side (per month)		
Supplier relationships	Estimate: % suppliers who you would recommend to others		
Creditor and shareholder relationships	Estimate: how satisfied you are with your key /major bank on a scale from 0 (not at all) to 6 (fully)		

Please specify your decision - what are the reason that you believe an inclusion (yes) or exclusion (no) is appropriate?

Dimension	Reason
Employees' competencies	
Employees' competencies	
Organizational capital	
Development capital	
Customer relationships	
Supplier relationships	
Creditor and shareholder relationships	

7) Conclusion

Thank you very much!

Is there anything which we have not discussed so far that you would like to add?

Do you mind if your propositions are quotes in the scope of this doctoral thesis (yes/no)?

Can we contact you for further questions – if required for clarification purpose?

And would you mind to confirm the interview protocol afterwards?



FACULTAD DE CIENCIAS JURÍDICAS Y DE LA EMPRESA

Pretest:
Experts of Statistics - Interview

Intellect-Based Intangibles of
German Small and Medium Sized Enterprises
- The Impact of Intellectual Capital on
Lasting Competitive Business Performance -

Interviewer:

Sabrina Aschenbrenner, M.Sc., B.Sc. (hons.)

Respondent/expert:

Place: _____

Date: _____

Time: Beginning _____

End: _____

1) Introduction**What - Topic / subject matter of investigation:**

The dissertation at hand deals with the intellectual capital (IC) of German small and medium sized enterprises (SME).

In particular, the impact of IC – which is defined in terms of three categories of intangibles (namely: human capital, structural capital and relationship capital) – on SME' business performance is examined.

Furthermore, the relationship between the IC-categories among each other is investigated.

Why - Purpose of interview:

- Inspection and consultation of the models' derivation (structural model and measurement model including quality criteria and handling)
- Discussion on statistical approach and quality criteria
- Other open questions

How – form of interview:

Open-ended questions which are guided by a framework of questions and illustrations.

Do you have any general questions or comments which you would like to state before I start the interview?

2) Warm up / "ice breaker" questions

a) Are you familiar with the term "intellectual capital"?

If yes, please specify your knowledge via a definition.

If not, this is how IC is defined in the scope of this dissertation

IC includes a group of knowledge-based assets which contribute to a firm's competitive advantages and thus, economic value. It is characterized by the following attributes:

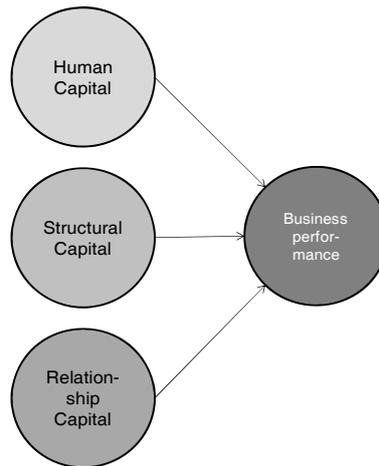
- IC is intangible, invisible, and non-physical,
- IC is firm specific/unique,
- IC is a source of competitive advantage and as such, has an impact on (future) success/value
- IC consists of a (wide) range of components as well as categories of intangibles which establish the content of IC in form of IC-repository classes.

There is broad consensus that IC contains the following three IC-categories: Human capital, structural capital, and relationship capital (These three categories are defined in the later part of this interview).

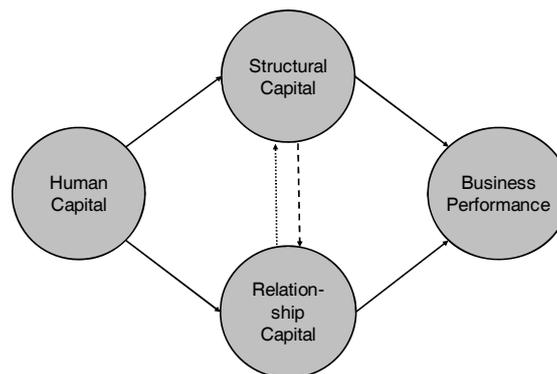
C) The Models' Derivation

1. Derivation of Structural Model:

Conceptual structural model based on international literature on IC since no SEM for German SME has been applied so far



E.g.: F-Jardon & Martos, 2009, pp. 604 et seqq.; Khan, 2011, p. 132; Tovstiga & Tulugurova, 2007, p. 705; and Tovstiga & Tulugurova, 2009, pp. 70 et seqq. for SME; Bontis, 1998, p. 76; Kamaluddin & Rahman, 2009, p. 5; and Wang & Chang, 2005, p. 224 in general.



E.g.: F-Jardon & Martos, 2009, pp. 604 et seqq.; and St-Pierre & Audet, 2011, pp. 209 et seqq. for SME; Bontis, 1998, pp. 70 & 76; Bontis, Keow, & Richardson, 2000, pp. 90 et seqq.; Rosario Cabrita & Bontis, 2008, pp. 219 et seqq.; Shih & Chen, 2010, pp. 6.4 et seqq.; and Wang & Chang, 2005, pp. 227 et seqq. in general.

**2. Derivation of Measurement Model – Content Validity:
Conceptual model for the three IC-categories based on international
IC-literature and its adjustment to the context of German SME (incl. the
validation of experts)**

Human Capital:

HC international definition:

E.g.: AKIW, 2005; Bontis, 1998; Brooking, 1997; Cohen & Kaimenakis, 2007; Daum, 2003; Edvinsson & Sullivan, 1996; Hermans & Kauranen, 2005; Lynn, 1998; Marr, 2006; Martinez-Torres, 2006; MERITUM, 2001; Saint-Onge, 1996; Seleim, Ashour, & Bontis, 2004; SKE, 2005; Stewart, 1997; Sveiby, 1997.

Definition of Human Capital - internationally: The essence of human capital is the sheer intelligence of the organizational members. It is owned by the employees and entrepreneurs/managers.

**Allocation of HC attributes (into dimensions⁴⁰⁹) – key sources = IC
international:**

- a) **Competence** (knowledge, capabilities, skills), b) **attitudinal** (motivation, behavior, mindset), c) **intellectual agility** (innovation, imitation, adaptation) (Tovstiga & Tulugurova, 2007, pp. 698 et seq.; Tovstiga & Tulugurova, 2009, pp. 71 et seq.) (SME)
- b) **Competence** (knowledge & skills), b) **attitudinal/attitude** (motivation, behaviour, conduct), c) **intellectual agility** (innovation, imitation, adaptation, packaging) (Roos, Roos, Dragonetti, & Edvinsson, 1997, pp. 35 et seqq.) (key author for IC)
- c) **Knowledge** (formal education, specific training, experience, personal development) b) **abilities** (individual learning, collaboration-team work, communication, leadership), c) **behaviors** (feeling of belonging and commitment, self-motivation, job satisfaction, friendship, flexibility, creativity) (Martin de Castro, Delgado-Verde, Lopez Seez, & Navas Lopez, 2011, p. 654) (lit. review)

⁴⁰⁹ Attention: Allocation of HC-attributes into dimension so far only conceptually done – not in SEM.

Allocation of HC attributes (into dimensions) – additional sources = IC international (Reporting):

- a) Employees, b) staff turnover and recruiting, c) skills and competence, d) employee satisfaction and attitude, e) executive competency (Thorleifsdottir & Claessen, 2006, p. 15)
 - a) Professional competence, b) social competence, c) employee motivation, d) leadership ability (SME focus!!! – i.a. German SME) (InCaS: Intellectual Capital Statement, 2008, p. 25; Mertins, Wang, & Will, 2009, p. 118)
-

Other international sources on HC (IC and/or knowledge management) of SME⁴¹⁰:

E.g.: Bosma, van Praag, Thurik, & de Wit, 2004; Desouza & Awazu, 2006; F-Jardon & Martos, 2009; Hermans & Kauranen, 2005; Keogh, Mulvie, & Cooper, 2005; Matejun, 2011; Meijaard, Brand, & Mosselman, 2005; Nunes, Annansingh, Eaglestone, & Wakefield, 2006; Ramos-Rodriguez, Medina-Garrido, Lorenzo-Gomez, & Ruiz-Navarro, 2010; RICARDIS, 2006; Steenkamp & Kashyap, 2010; St-Pierre & Audet, 2011; Wong & Aspinwall, 2005.

HC sources on German SME:

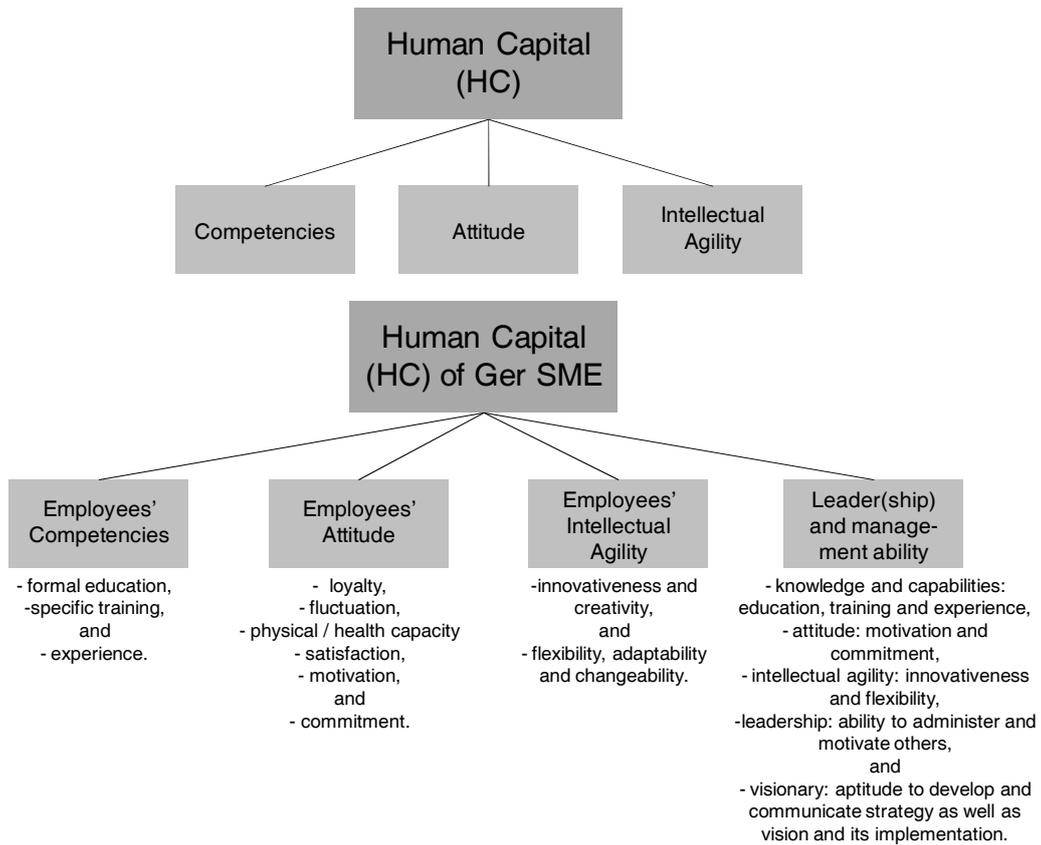
- a) Professional competence, b) employee motivation, c) social competence, d) leadership ability (BMWi, 2007, p. 52; BMWi, 2008, p. 20; Mertins, Will, & Wuscher, 2007, p. 200)
- **Additional studies on German SME' HC which offer arguments that can be applied:** e.g. Durst, 2008; Durst & Gueldenberg, 2009; Pawlowsky, Gerlach, Hauptmann, & Puggel, 2006; Pawlowsky, Gözalan, & Schmid, 2011; Staiger, 2008; Vanini, 2011; Voigt, Finke, & Orth, 2009; Völker, Sauer, & Simon, 2007; Walther-Klaus & Zimmermann, 2007.

Success factor research-sources on German SME which support the relevance of HC-attributes/-dimensions for success:

E.g. Adenäuer, 2007; BDA, 2009; Becker, Staffel, & Ulrich, 2008; Daschmann, 1993; Dömötör, 2011; Döring & Turnwald, 2007; Eichhorn, 2009; Frai & Thiehoff, 2007; Graf, 2007; Hauser, Kay, & Boerger, 2010; Heidenbauer, 2008; Kay, Kranzusch, &

⁴¹⁰ Partly transferable to German SME.

Suprinovic, 2008; Kunert, 2006; Küpper & Zoch, 2010; Landsberg & Wehling, 2006; Leitner, 2001; Simon, 1996; Simon, 2006; Simon, 2007; Simon & Huber, 2006; Tinner, 2007; Wallau, 2011; Witte, 2011.



Do you comprehend the category and the model of 'human capital of German SME', respectively?

What is your opinion based on (empirical studies, literature)?

Structural Capital:**SC international definition:**

E.g.: Brooking, 1997; Edvinsson & Sullivan, 1996; Stewart, 1997; Bontis, 1998; Daum, 2003; MERITUM, 2001; SKE, 2005; Sveiby, 1997; Marr, 2006; Martínez-Torres, 2006; Thorleifsdottir & Claessen, 2006; Halim, 2010; Hormiga, Batista-Canino & Sánchez-Medina, 2011; Wu, Chang, & Chen, 2008.

Definition of Structural Capital - internationally: Structural capital encompasses the intellect of an organization and in particular the non-human storehouses of knowledge which an enterprise has created/collected over time. It is firms' property because it remains when the organizational members / HC go(es) home.

Allocation of SC attributes (into dimensions) – key sources = IC international:

- a) **Organizational** (structure, infrastructure, processes, culture), b) **renewal & development** (R&D, organizational learning) (Tovstiga & Tulugurova, 2007, pp. 698 et seq.; Tovstiga & Tulugurova, 2009, pp. 71 et seq.) (SME)
- a) **Organization** (infrastructure, processes, culture), b) **renewal & development** (Roos et al., 1997, pp. 42 et seqq.) (key author for IC)
- a) **Technological capital** (efforts in research and development, technological infrastructure, intellectual and industrial property), b) **Organizational capital** (organizational culture, values and attitudes, information and telecommunication capability, organizational structure) (Martin de Castro et al., 2011, pp. 656 et seq.) (lit. review)

Allocation of SC attributes (into dimensions) – additional sources = IC international (Reporting):

- a) Information systems, b) quality management, c) innovativeness, d) competence development, e) working conditions, f) governance (Thorleifsdottir & Claessen, 2006, p. 15)
 - a) Corporate culture, b) internal co-operation and knowledge transfer, c) management instruments, d) IT and explicit knowledge, e) product innovation, f) process optimization and innovation (SME focus!!! – u.a. German SME) (InCaS: Intellectual Capital Statement, 2008, p. 25; Mertins et al., 2009, p. 118)
-

Other international sources on SC (IC and/or knowledge management) of SMEs:

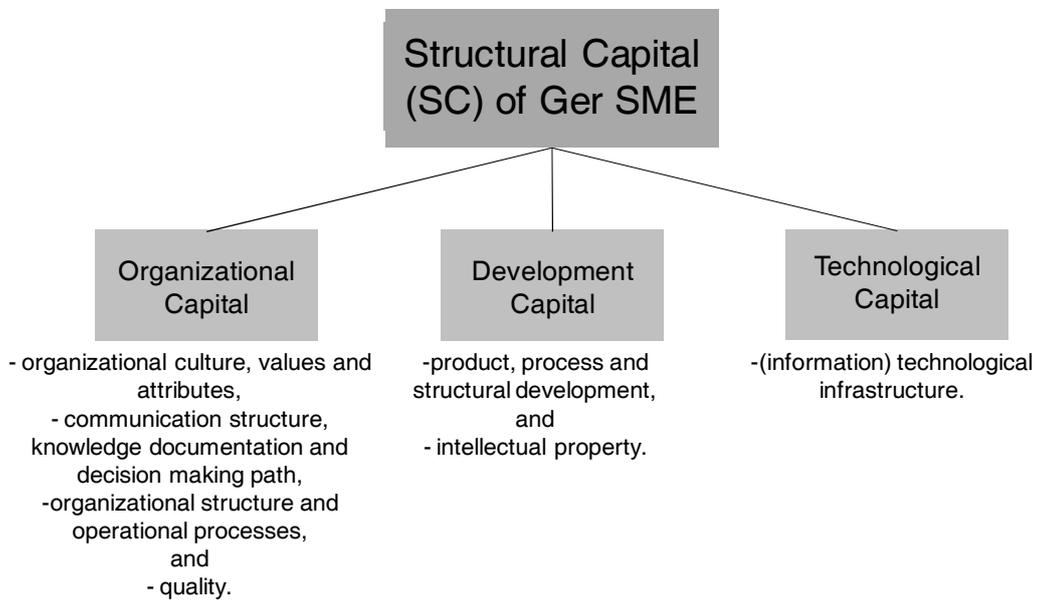
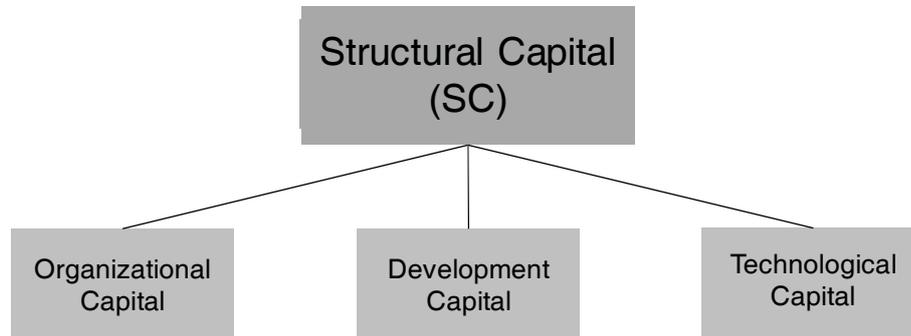
E.g.: Cohen & Kaimenakis, 2007; Daud & Yusoff Wan, 2010; Desouza & Awazu, 2006; F-Jardon & Martos, 2009; Hayton, 2005; Hermans & Kauranen, 2005; Huggins & Weir, 2007; Hutchinson & Quintas, 2008; Matejun, 2011; Mazzarol & Reboud, 2010; Meijaard et al., 2005; Nunes et al., 2006; RICARDIS, 2006; Steenkamp & Kashyap, 2010; St-Pierre & Audet, 2011; Watters, Jackson, & Russell, 2006; Will, 2008; Wong & Aspinwall, 2004, Wong & Aspinwall, 2005.

SC sources on German SME:

- a) Co-operation and knowledge transfer, b) corporate culture, c) process optimization and innovation, d) management instruments, e) IT and explicit knowledge, f) product innovation (BMW, 2007, p. 52; BMW, 2008, p. 20; Mertins et al., 2007, p. 200)
- **Additional studies on German SME' SC which offer arguments that can be applied:** e.g.: AKIW, 2003; Alwert & Vorsatz, 2005; Bullinger, 2009; Pawlowsky et al., 2006; Pawlowsky, Gözalan, & Schmid, 2010; Pawlowsky et al., 2011; Schauerte Hartmut, 2009; Voigt et al., 2009; Völker et al., 2007; Walther-Klaus & Zimmermann, 2007.

Success factor research sources on German SME which support the relevance of SC-attributes/-dimensions for success:

E.g.: Adenäuer, 2007; BDA, 2009; Becker et al., 2008; Daschmann, 1993; Dömötör, 2011; Eichhorn, 2009; Frai & Thiehoff, 2007; Gruber, 2000; Heidenbauer, 2008; Leitner, 2001; Maaß & Führmann, 2012; Offensive Mittelstand, 2010; Schleef, 2001; Schlömer-Laufen & Maaß, 2012; Simon, 1996; Simon, 2006; Simon, 2007; Simon & Huber, 2006; Tinner, 2007; Witte, 2011.



Do you comprehend the category and the model of 'structural capital of German SME', respectively?

What is your opinion based on (empirical studies, literature)?

Relationship Capital:**RC international definition:**

E.g.: Hermans & Kauranen, 2005; Kivikas, 2004; Lynn, 1998; Marr, 2006; MERITUM, 2001; de Ordóñez Pablos, 2003; Sanchez, Chaminade, & Olea, 2000; SKE, 2005; Sveiby, 1997; Choong, 2008; Cohen & Kaimenakis, 2007; F-Jardon & Martos, 2009; Hormiga et al., 2011; InCaS: Intellectual Capital Statement, 2008; Kamukama, Ahiauzu, & Ntayi, 2010; Martinez-Torres, 2006; Rosario Cabrita & Bontis, 2008; St-Pierre & Audet, 2011; Thorleifsdottir & Claessen, 2006; Welbourne & Pardo, 2008.

Definition of Relationship Capital - internationally: Relationship capital represents the knowledge/IC which is embedded and exchanged in formal as well as informal (long-term) relationships with firm-externals. Yet, it is only a resource enjoyed by the organization as long as the relationship exists but disappears when the relationship ends.

Allocation of RC attributes (into dimensions) – key sources = IC international:

- a) **Networking partner**, b) **alliance partner**, c) **customers/suppliers** (Tovstiga & Tulugurova, 2007, pp. 698 et seq.; Tovstiga & Tulugurova, 2009, pp. 71 et seq.)(SME)
- a) **Customers**, b) **suppliers**, c) **alliance partners**, d) **shareholders**, e) **other stakeholders** (Roos et al., 1997, pp. 43 et seqq.) (key author for IC)

Allocation of RC attributes (into dimensions) – additional sources = IC international (Reporting):

- a) Customers, b) market and **image**, c) **visibility** of expertise, d) networks (Thorleifsdottir & Claessen, 2006, p. 15)
 - a) Customer relationships, b) investor relationships, c) public relationships, d) investor relationships, e) relationships to co-operation partners (SME focus!!! – i.a. German SME) (InCaS: Intellectual Capital Statement, 2008, p. 32; Mertins et al., 2009, p. 118)
-

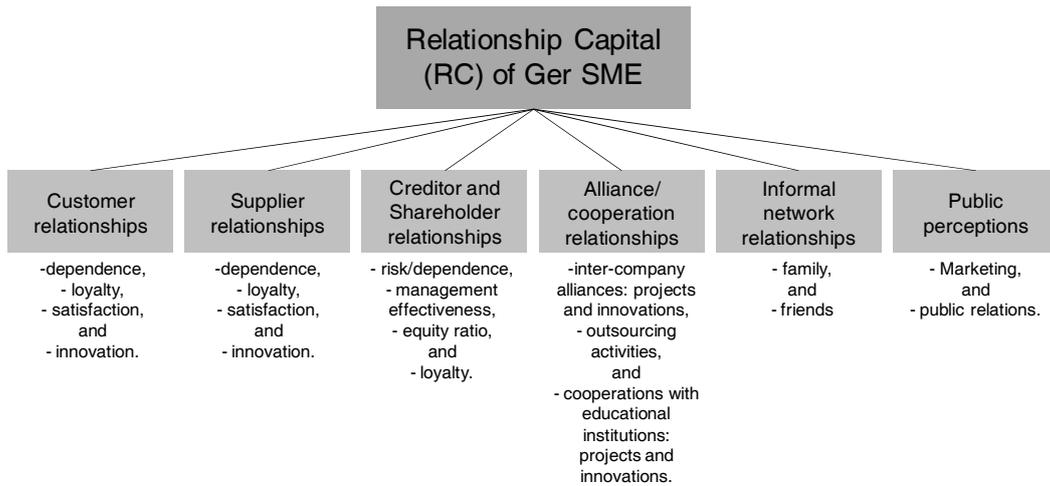
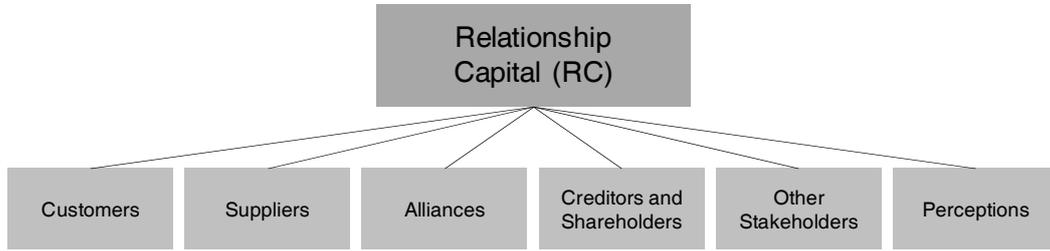
Other international sources on RC (IC and/or knowledge management) of SME:

E.g.: Altman, Sabato, & Wilson, 2010; Cegarra-Navarro, 2005; Cohen & Kaimenakis, 2007; Daud & Yusoff Wan, 2010; Desouza & Awazu, 2006; F-Jardon & Martos, 2009; Hayton, 2005; Hermans & Kauranen, 2005; Hormiga et al., 2011; Huggins & Weir, 2007; Hutchinson & Quintas, 2008; Matejun, 2011; Matos & Lopes, 2009; Ramos-Rodríguez et al., 2010; Steenkamp & Kashyap, 2010; St-Pierre & Audet, 2011; Welbourne & Pardo, 2008; Wong & Aspinwall, 2004.

RC sources on German SME:

- a) Customer relationships, b) relationships to co-operation partners, c) supplier relationships, d) public relationships, e) capital provider/investor/owner relationships (BMWi, 2007, p. 54; BMWi, 2008, p. 20; Mertins et al., 2007, p. 200)
- **Additional studies on German SME' RC which offer arguments that can be applied:** e.g.: Bischof, 2012; Durst, 2008; Pawlowsky et al., 2006; Pawlowsky et al., 2011; Pfeifer, 2007; Voigt et al., 2009.

Success factor research sources on German SME which support the relevance of RC-attributes/-dimensions for success: e.g.: Adenäuer, 2007; BDA, 2009; Becker et al., 2008; Daschmann, 1993; Dömötör, 2011; Eichhorn, 2009; Europäische Kommission/Europäische Gemeinschaften, 2004; Gruber, 2000; Heidenbauer, 2008; Kay et al., 2008; Knop, 2009; Krüger, 2006; Maaß & Führmann, 2012; Offensive Mittelstand, 2010; Rasche, 2003; Rautenstrauch, Generotzky, & Bigalke, 2003; Schneider, 2008; Simon, 1996; Simon, 2006; Simon & Huber, 2006; Witte, 2011.



Do you comprehend the category and the model of 'relationship capital of German SME', respectively?

What is your opinion based on (empirical studies, literature)?

3. Deriving at Measurement Model – Selection of Indicators: Based on Literature Review and Expert-Validation

Step 1: Literature review to identify indicators: IC-studies, IC-reporting, SME success factor research etc. (mainly based on the above mentioned sources)

Step 2: Selection of indicators together with Prof. Heupel

Key rules:

- Multi-item approach: minimum 2 indicators per construct (applied to dimensions, too)
- Predominantly objective measures (estimations or likert scales are only rarely applied)

Question: The direct measurement (for higher-order models) is only necessary at the level of the 2nd-order constructs? Or per dimension, too? _____

Step 3: 4 to 7 experts for validation - *item-sort task* (potentially eliminate indicators as a result) [Written pretest – see below]

Question: *Item-sort task* only for reflective indicators (incl. performance) – Assignment to dimensions - is that right?

Likewise, is it ok to check the validity of the formative dimensions via the comprehension of the model transfer to the German SME context?

Step 4: Online – Questionnaire pretested in 4 to 6 German SME from the sample group (potentially eliminate indicators as a result)

Step 5: Create final questionnaire

Step 6: Check indicators after the survey in terms of their quality criteria

Reflective (potentially eliminate indicators as a result):

1. Content validity – factor structure – Indicators load to the “right” construct
2. Indicator reliability – The indicators’ loadings are above 0.4-0.5 – better 0.7 – and significant
3. Construct reliability – composite reliability = min. 0.3 although larger than 0.6 is better
4. Convergent validity – AVE larger than 0.5
5. Discriminant validity

Formative (do not eliminate indicators as a result)

1. Content validity – made sure before the survey → expert interviews
Question: Can the transfer of the general IC model into the context of German SME be regarded as a test of content validity? _____
2. Indicator reliability – Weights of indicators (best 0.6) and their significance [usually lower loadings than reflective constructs] AND multicollinearity:
 - a) Evaluation of correlation matrix – value above 0.5 signal multicoll.,
 - b) Variance Inflation Factor (VIF) should not be larger than 10 – sometimes not larger than 5, c) if KI (Konditionsindex) is larger 30 = multicoll.
3. Construct reliability – external validity = nomological validity = Evaluate the relationship between the formative constructs and another latent variable ('dependent variable') within the model; regression coefficients between the constructs need to correspond to theory → can the theory be empirically supported?

Question: The study of Julia Naskrent does not test for multicollinearity (and neither for external validity). Is such a procedure fine as well?

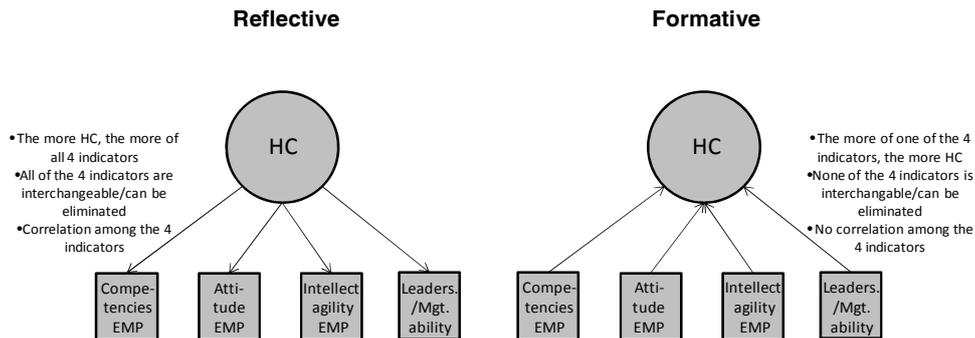
Do you agree to the procedure and the quality criteria?

If not, what is, according to your opinion, not right and why?

What is your opinion based on (empirical studies, literature)?

**Deriving a Measurement Model – Specification of Indicators:
Based on the above mentioned literature incl. logical reasoning and the
validation of experts**

Example of literature-based/logical deviation



Decision rules for determining formative or reflective

	Reflective	Formative
Direction of causality	From construct to indicator. (e.g. a change of HC causes a change of “employees competencies”)	From indicator to construct. (e.g. a change of “employees competencies” causes a change of HC)
Interchangeability of the indicators	Indicators should be interchangeable. Dropping an indicator should not alter the conceptual domain (meaning) of the construct. (e.g. HC would be conceptually fine without “employees competencies”)	Indicators do not need to be interchangeable. Dropping an indicator may alter the conceptual domain (meaning) of the construct. (e.g. HC would conceptually not be fine without “employees competencies”)

	Covariation among the indicators	Indicators are expected to covary with each other (i.e. to correlate). (e.g. "employee competencies", "employee attitude", "employee intellectual agility" and "leader(ship)/management ability" are dependent on each other/influence each other).	It is not necessary for indicators to covary with each other (i.e. to correlate). (e.g. "employee competencies", "employee attitude", "employee intellectual agility" and "leader(ship)/management ability" are independent on each other/do not influence each other).
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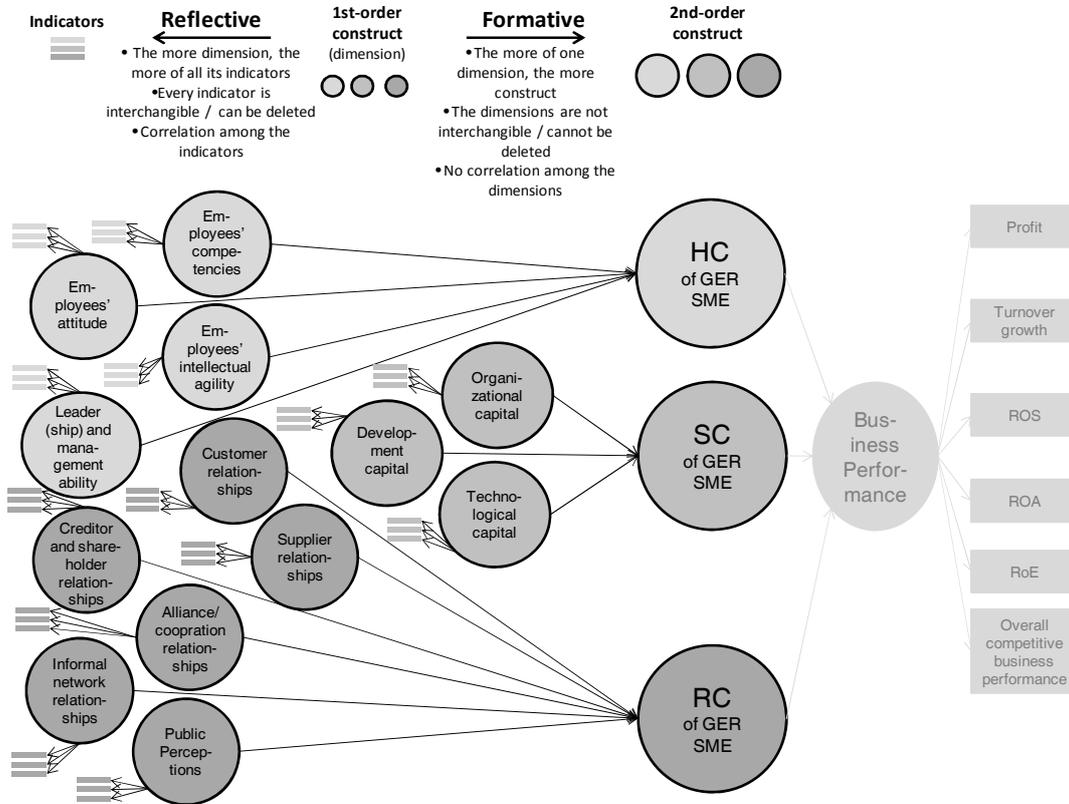
Formative – the dimensions are not interchangeable (type II & IV) because:

- They define/specify facets of the construct (according to Sönke Albers and Oliver Götz, 2006, pp. 672 et seq. only type II and IV are appropriate),
- The dimensions do not correlate (theory/logical reasoning),
- The dimensions are sources of success → always formative (Albers, 2010, pp. 410 et seqq. & 419; Albers & Götz, 2006, pp. 669 et seq.; Albers & Hildebrandt, 2006, p. 4; Christophersen & Grape, 2009, p. 104).

Reflective – the indicators are interchangeable (type II) because

(theory/logical reasoning)

- They are determined by the construct and thus, are no defying items,
- The indicators correlate,
- The IC-literature measures the constructs HC, SC und RC (almost) always in a reflective manner.



Do you agree - based on these decision rules – to the operationalization of this dissertation’s statistical model?

If not, what do you think is miss-specified and why?

What is your opinion based on (empirical studies, literature)?

5. Deriving at Measurement Model – Calculation of Dimensions

Since each construct has a different amount of dimensions and since the dimensions differ in terms of their amount of indicators, too, the most common method (= hierarchical component model) cannot be applied.

Additionally, the repetition of indicators is only recommended for solely formative indicators (type IV) (Albers & Götz, 2006, p. 674; Huber, Herrmann, Meyer, Vogel, & Vollhardt, 2007, p. 34)

→ Hence: 2 Options:

- Factor value = substitute the 1st-order constructs via their factor values
- Direct measurement approach

(Albers & Götz, 2006, p. 674)

Questions: Have you experience concerning the technical handling of these two options?

Please comment [What is your opinion based on (empirical studies, literature)?]

D) Statistical Approach: PLS

1. Reasons for PLS:

- The topic „IC of German SME“ is so far little investigated – in particular, no SEM has been performed → little specific theory to develop a model is available (Rather predictive than testing theory)
- No available measurement instruments because a) no IC-SEM exists for German SME and the international scales cannot be directly adopted since German SME are regarded as unique; b) IC has not been operationalized as a 2nd-order construct
- Formative operationalization/measurement between 1st- and 2nd-order constructs → CBSEM has difficulties with formative measurements
- Common approach in studies a) on IC and b) with higher-order constructs

2. Quality criteria for structural model in PLS:

- Path estimates / path coefficients – correctly signed and significant (e.g. 1.65 if 10%, 1.96 if 5%)
- Coefficient of determination / determination coefficient
→ $R^2 = 0.67$ substantive, 0.33 medium, 0.19 low
- Effect size: $f^2 = 0.02$ low, 0.15 medium, or 0.35 large impact
- Predictive relevance and validity respectively = Stone–Geisser test – $Q^2 = \text{larger zero}$

Do you agree to the procedure and the quality criteria?

If not, what is, according to your opinion, not right and why?

What is your opinion based on (empirical studies, literature)?

E) Moderator Effect – Company-age

Moderator = company-age because it has a potential impact on the relationship between the IC-categories – path coefficient, significance and sign (focus: structural model and dimensions)

Question: Do I need to evaluate R^2 , f^2 und Q^2 as well? _____

Question: It is not required to test the measurement model of the dimensions again, isn't it? _____

Each measurement model needs to have the same indicators – that is for sure.

Age = nonmetric variable → can be divided into groups:

- Young – up to 10 years (= founded after 01.01.2003) (BMWi, 2010; Demgenski & Icks, 2002, p. 3; KfW, Creditreform, IfM, RWI, & ZEW, 2010, p. 155; Kulicke, Bühner, & Lo, 2004, p. 16; Wagner, 2005)
- Old – 1st generation
- Old – 2nd or later generation – especially relevant since later generations are often better educated (HC) (= professionalized leadership/ management) (Simon, 1996, p. 179; Simon, 2007, pp. 351 et seq.)

Calculate SEM for each group and compare results.

Please comment [What is your opinion based on (empirical studies, literature)?]

F) Conclusion

Thank you very much!

Is there anything which we have not discussed so far that you would like to add?

Do you mind if your propositions are quotes in the scope of this doctoral thesis (yes/no)?

Can we contact you for further questions – if required for clarification purpose?

And would you mind to confirm the interview protocol afterwards?

Appendix 3: Variables – Item-Sort Task (Names and Abbreviations)

HC	Employees' Competence	Formal Education	E_FE1	No. of employees with academic degrees (e.g. Bachelor, Master, Diploma, PhD)	
			E_FE2	No. of employees with advanced professional qualifications (e.g. business administrator/bachelor, professional, business manager, master craftsman)	
			E_FE3	No. of employees currently in apprenticeship	
		Specific Training	E_ST1	€ invested in advanced education/training of employees	
			E_ST2	% of training conducted in-house/on-the job training – as opposed to external advanced education	
		Experience	E_Ex1	Average no. of years in business of leading personnel (i.e. employees with direction/leadership responsibilities but not top management)	
	E_Ex2		% of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT)		
	Attitude	Loyalty	A_LO	Average no. of years in your company of all employees (i.e. seniority)	
		Motivation & Satisfaction	A_MO	Estimate: no. of employees who are highly motivated	
		Commitment & Satisfaction	A_CO	No. of employees who applied via unsolicited application (as opposed to posted/advertised positions)	
		Fluctuation	A_FL	No. of employees who left your firm	
	Intellectual Agility	Health Capacity	A_HE	Average no. of sick days per employee	
		Innovativeness & Creativity	I_IN	No. of improvement/innovation suggestions made by employees	
			I_FL1	No. of employees who personally develop themselves after staff progress/performance review	
			I_FL2	No. of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.)	
	Leader(ship) and Management Ability	Knowledge and Capabilities	L_CO1	No. of entrepreneurs/managers with academic degrees (e.g. Bachelor, Master, Diploma, PhD)	
			L_CO2	No. of entrepreneurs/managers with dual qualifications (i.e. technical and business)	
			L_CO3	€ invested in advanced education/training of entrepreneurs/managers	
			L_CO4	Average no. of years in leading position (of entrepreneurs/managers)	
		Intellectual Agility	L_IA	No. of improvement/innovation suggestions made by entrepreneurs/managers	
Leadership	L_AD	No. of employees who regard their entrepreneurs/managers as role models (i.e. someone to follow, someone who motivates, someone who exemplifies actions etc.)			
Visionary	L_VI	Self-assessment: % to which the entrepreneurs/managers are visionary			
Direct measurement of HC		HC_D	How do you evaluate the quality of your human capital on a scale from 0 (very bad) to 6 (very good)?		
SC	Organizational Capital	Organizational Culture	O_OC	€ invested in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.)	
			O_CK1	No. of top management meetings per month	
			O_CK2	No. of cross-departmental meetings per month	
			O_CK3	No. of department-internal meetings per month	
		Communication Structure, Knowledge Documentation and Decision Making Path	O_CK4	% of decisions which are substantially based on team inputs/made by teams (i.e. mutual decision-making culture)	
			Organizational Structure and Operational Processes	O_OS1	€ invested to set up workplace for demographic changes (e.g. ergonomic workstations, integration of older employees, child care support, company sports etc.)
				O_OS2	No. of cross-departmental projects
	Quality	O_OS3	% of processes which are formalized (e.g. via manuals, form sheds etc.)		
		O_Qu1	€ invested in quality management (incl. accreditations such as ISO certificates)		
	Development Capital	Product, Process and Structural Development	O_Qu2	Warranty expenses in €	
			D_RD1	R&D intensity = € invested in R&D	
			D_RD2	€ invested in process improvements	
			D_RD3	€ invested in new organizational structures (e.g. process restructuring, organizational adaptations, cost center modifications etc.)	
			D_RD4	Turnover from innovations which have been developed in the previous three years	
		D_RD5	Duration (in month) between innovation-cycles (e.g. new product programs) in the previous three years		
		Intellectual Property	D_IP1	No. of patents	
	D_IP2		% of innovations converted into patents		
Technological Capital	Technological Infrastructure	T_TI1	€ invested in IT (i.e. hardware, software and support)		
		T_TI2	€ invested in ICT (e.g. mobile phone, telephone conference equipment etc.)		
		T_TI3	€ invested to maintain/guarantee state-of-the-art technological level of machinery as well as process engineering		
Direct measurement of SC		SC_D	How do you evaluate the quality of your structural capital on a scale from 0 (very bad) to 6 (very good)?		

RC	Customer Relationships	Dependence	CU_DE	Turnover generated with top 5 customers
		Loyalty	CU_LO	Average duration of relationship with top 5 customers
		Satisfaction	CU_SA1	Estimate: how satisfied are your customers with our firm on a scale from 0 (not at all) to 6 (fully)
			CU_SA2	% of customers' complaints (out of all delivered products/services)
			CU_SA3	Estimate: % customers who would recommend your company to others
	CU_SA4	No. of personal visits to customers' side (per month)		
	Innovation	CU_IN	% innovations developed with customers	
	Supplier Relationships	Dependence	SU_DE	% value of goods/raw materials/services procured from top 5 suppliers (in relation to total value of goods/raw materials)
		Loyalty	SU_LO	Average duration of relationship with top 5 suppliers
		Satisfaction	SU_SA1	Estimate: how satisfied are you with your suppliers on a scale from 0 (not at all) to 6 (fully)
			SU_SA2	% of received goods/raw materials/services which led to complaints (out of all received goods/raw materials/services)
			SU_SA3	Estimate: % suppliers who you would recommend to others
	Innovation	SU_IN	% innovations developed with suppliers	
	Creditor & Shareholder Relationships	Risk/Dependence	SH_DE	% of credits granted by one/the key bank
		Management Effectiveness	SH_ME	% ownership held by the key/major shareholder
		Equity Ratio	SH_ER	Equity ratio = equity / total capital
		Loyalty	SH_LO	Average duration of relationship with key/major bank
		Satisfaction	SH_SA	Estimate: how satisfied you are with your key/major bank on a scale from 0 (not at all) to 6 (fully)
	Alliance Relationships	Inter-Company Alliances	AL_CP1	% projects conducted in joint ventures – e.g. with other firms
			AL_CP2	% of innovations generated in joint ventures – e.g. with other firms
		Outsourcing Activities	AL_Ou	% of value added based on outsourcing activities
		Cooperations with Educational Institutions	AL_UP1	% of projects conducted with universities, business schools, scientists and other educational institutions
	AL_UP2		% of innovations generated with universities, business schools, scientists and other educational institutions	
	Informal Network Relationships	Family, friends and Other Social/Personal Contacts	IN_FF1	% of turnover generated via the help of „gate keepers“ known from social networks
			IN_FF2	No. of family members/friends who support the business via active help
			IN_FF3	% innovations initiated by family/friends
	Public Perception	Public Relationships, Reputation and Brands	PP_MP1	€ invested in marketing
PP_MP2			€ invested in public relations work (e.g. local sponsoring)	
PP_MP3			No. of press quotations about the enterprise or being mentioned in the media	
Direct measurement of RC		RC_D	How do you evaluate the quality of your relationship capital on a scale from 0 (very bad) to 6 (very good)?	
Performance	Profit	P_Prof	Profit after tax	
	Turnover Growth	P_TUGR	(Current year's turnovers / last year's turnovers) - 1 x 100%	
	ROS	P_ROS	Pre-tax profit / turnover	
	ROA	P_ROA	Pre-tax profit / average total assets	
	ROE	P_ROE	Pre-tax profit / average total equity	
	Overall competitive business performance	P_Comp	How competitive is your business performance – i.e. to what extent is your success above- or below-average compared to your rivals. Please evaluate on a scale from 0 (not competitive at all, below-average performance) to 6 (supernormal performance).	

Appendix 4: Item-Sort Task – Results for Human Capital

Expert	Emplo Compe							Attit				
	1	2	3	4	5	6	7	1	2	3	4	5
	E FE1	E FE2	E FE3	E ST1	E ST2	E Ex1	E Ex2	A LO	A MO	A CO	A FL	A HE
Helfried Schmidt	x	x	x	x	Yes	HC_IntAgil	Yes	x	x	RC_PubPerc	HC_Leader	x
Hermann Simon	SC_Deve	HC_IntAgil	x	x	Yes	Perform	Yes	x	x	? Labour Market ?	x	x
Thomas Kemmerich	SC_Deve	SC_Orga	SC_Orga	SC_Orga	Yes	SC_Deve	Yes	SC_Orga	HC_Int Agil	RC_PubPerc	SC_Orga	x
Stephanie Bschorr	x	x	x	x	Yes	HC_Leader	No	x	x	RC_PubPerc	x	x
Daniel Kathan	x	x	Non sense	x	Yes	x	Yes	x	x	RC_PubPerc	x	x

5

n_c	3	3	3	4		1		4	4	0	3	5
n_0	2	1	1	1		1		1	1	4	1	0
p_{ba}	0,6	0,6	0,6	0,8	Yes	0,2	Yes	0,8	0,8	0	0,6	1
c_{av}	0,2	0,4	0,4	0,6		0		0,6	0,6	-0,8	0,4	1
Decision	[Light Grey]		[Light Grey]	[Light Grey]	Yes	[Dark Grey]	Yes	[Light Grey]				

Expert	Int Agil			Leader							Direct
	1	2	3	1	2	3	4	5	6	7	1
	I_IN	I_FL1	I_FL2	L_CO1	L_CO2	L_CO3	L_CO4	L_IA	L_AD	L_VI	HC-D
Helfried Schmidt	SC_Deve	HC_Leader	HC_Attit	x	x	x	x	x	x	x	x
Hermann Simon	SC_Orga	HC_Attit	x	x	x	x	Perform	x	HC_Attit	x	x
Thomas Kemmerich	x	x	x	x	x	x	SC_Deve	x	HC_Attit	SC_Deve	x
Stephanie Bschorr	SC_Deve	x	HC_Attit	x	x	x	x	x	x	x	x
Daniel Kathan	HC_Comp	HC_Comp	HC_Attit	x	x	x	x	x	x	x	x

5

n_c	1	2	2	5	5	5	3	5	3	4	5
n_0	2	1	3	0	0	0	1	0	2	1	0
p_{ba}	0,2	0,4	0,4	1	1	1	0,6	1	0,6	0,8	1
c_{av}	-0,2	0,2	-0,2	1	1	1	0,4	1	0,2	0,6	1
Decision	[Light Grey]	[Dark Grey]	[Light Grey]								

n_c = the number of respondents assigning a measure to its posited construct
 n_0 = the highest number of assignments of the item to any other construct in the set
 p_{ba} = n_c / N
 c_{av} = $(n_c - n_0) / N$
 N = total number of responding experts
 x = correctly assigned (i.e. as supposed)

keep
 delete
 doubtful
 move to other construct
 Yes Relevant = Integrate
 No Not relevant = don't integrate

Appendix 5: Item-Sort Task – Results for Structural Capital

Expert	Orga									
	1	2	3	4	5	6	7	8	9	10
Helfried Schmidt	RC_PubPerc	HC_Leader	HC_IntAgil	HC_Attit	HC_Attit	HC_Attit	HC_IntAgil	Yes	x	RC_Custom
Hermann Simon	HC_Attit	Not sure	SC_Develo	HC_Attit	x	RC_PubPerc	SC_Develo	Not sure	RC_Custom	x
Thomas Kemmerich	x	HC_Leader	HC_IntAgil	HC_IntAgil	HC_IntAgil	x	RC_Allian	No	RC_Custom	x
Stephanie Bschorr	HC_Attit	x	HC_Comp	x	HC_Comp	HC_Attit	HC_IntAgil	Yes	x	RC_Custom
Daniel Kathan	HC_Attit	Non sense	Non sense	Non sense	HC_Attit	x	x	Yes	x	RC_Custom

5

n_c	1	1	0	1	1	2	1		3	2
n_0	3	2	2	2	2	2	2		2	3
p_{ba}	0,2	0,2	0	0,2	0,2	0,4	0,2		0,6	0,4
c_{sv}	-0,4	-0,2	-0,4	-0,2	-0,2	0	-0,2	Yes	0,2	-0,2

Decision 

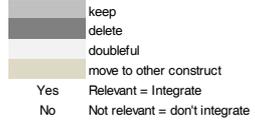
Expert	Deve							Tech			Direct
	1	2	3	4	5	6	7	1	2	3	1
Helfried Schmidt	x	SC_Orga	SC_Orga	x	x	yes	x	x	x	x	x
Hermann Simon	x	SC_Orga	SC_Orga	HC_IntAgil	Performa	yes	SC_Tech	SC_Orga	SC_Orga	SC_Develo	x
Thomas Kemmerich	x	x	SC_Orga	x	x	No	x	x	x	x	x
Stephanie Bschorr	x	SC_Orga	SC_Orga	x	x	No	x	x	SC_Orga	x	x
Daniel Kathan	x	SC_Orga	SC_Orga	x	Non sense	No	x	x	x	SC_Orga	x

5

n_c	5	1	0	4	3		4	4	3	3	5
n_0	0	4	5	1	1		1	1	2	1	0
p_{ba}	1	0,2	0	0,8	0,6	No	0,8	0,8	0,6	0,6	1
c_{sv}	1	-0,6	-1	0,6	0,4		0,6	0,6	0,2	0,4	1

Decision 

n_c = the number of respondents assigning a measure to its posited construct
 n_0 = the highest number of assignments of the item to any other construct in the set
 p_{ba} = n_c / N
 c_{sv} = $(n_c - n_0) / N$
 N = total number of responding experts
 x = correctly assigned (i.e. as supposed)
 delete = deleted although the indicator should actually be moved to a different construct



Appendix 6: Item-Sort Task – Results for Relationship Capital

Expert	Custom							Supp					
	1	2	3	4	5	6	7	1	2	3	4	5	6
	CU_DE	CU_LO	CU_SA1	CU_SA2	CU_SA3	CU_SA4	CU_IN	SU_DE	SU_LO	SU_SA1	SU_SA2	SU_SA3	SU_IN
Helfried Schmidt	x	x	x	x	x	No	x	x	x	x	RC Custom	Yes	x
Hermann Simon	x	x	x	HC_Int Agil	Perfor	Yes	SC_Develp	x	x	x	x	Yes	x
Thomas Kemmerich	x	x	x	HC_Int Agil	x	No	SC_Orga	x	x	x	x	Yes	x
Stephanie Bschorr	x	x	x	x	x	Yes	x	x	x	x	x	No	x
Daniel Kathan	x	x	x	SC_Orga	x	Yes	x	x	x	x	RC Custom	No	x

5

n_c	5	5	5	2	4		3	5	5	5	3		5
n_0	0	0	0	2	1		1	0	0	0	2		0
p_{aa}	1	1	1	0,4	0,8	Yes	0,6	1	1	1	0,6	Yes	1
c_{sv}	1	1	1	0	0,6		0,4	1	1	1	0,2		1

Decision

Expert	Creditors & Sharhol					Allia				
	1	2	3	4	5	1	2	3	4	5
	SH_DE	SH_ME	SH_ER	SH_LO	SH_SA	AL_CP1	AL_CP2	AL_Ou	AL_UP1	AL_UP2
Helfried Schmidt	x	x	x	x	Yes	x	x	x	x	x
Hermann Simon	x	x	Perfor	x	Yes	x	x	Perfor	Labour Market	SC_Develp
Thomas Kemmerich	x	SC_Develp	SC_Develp	x	Yes	x	x	x	SC_Orga	x
Stephanie Bschorr	x	Perfor	Perfor	x	Yes	x	x	x	x	SC_Develp
Daniel Kathan	x	Non sense	Perfor	x	Yes	x	x	x	x	x

5

n_c	5	2	1	5		5	5	4	3	3
n_0	0	1	3	0		0	0	1	1	2
p_{aa}	1	0,4	0,2	1	Yes	1	1	0,8	0,6	0,6
c_{sv}	1	0,2	-0,4	1		1	1	0,6	0,4	0,2

Decision

Expert	Info Net			Pub Perc			Direct
	1	2	3	1	2	3	1
	IN_FF1	IN_FF2	IN_FF3	PP_MP1	PP_MP2	PP_MP3	RC-D
Helfried Schmidt	RC_PubPerc	x	x	x	x	x	x
Hermann Simon	RC_Allian	HC_Leade	SC_Develp	RC_Custom	x	x	x
Thomas Kemmerich	x	x	x	x	x	x	x
Stephanie Bschorr	x	x	x	x	x	x	x
Daniel Kathan	x	x	x	x	x	x	x

5

n_c	3	4	4	4	5	5	5
n_0	1	1	1	1	0	0	0
p_{aa}	0,6	0,8	0,8	0,8	1	1	1
c_{sv}	0,4	0,6	0,6	0,6	1	1	1

Decision

n_c = the number of respondents assigning a measure to its posited construct
 n_0 = the highest number of assignments of the item to any other construct in the set
 p_{aa} = n_c / N
 c_{sv} = $(n_c - n_0) / N$
 N = total number of responding experts
 x = correctly assigned (i.e. as supposed)

keep
 delete
 doubleful
 move to other construct
 Yes Relevant = Integrate
 No Not relevant = don't integrate

Appendix 7: Item-Sort Task – Results for Lasting Competitive Business Performance

Lasting Competitive Business Performance GER SME						
Expert	Prof	Turn Grow	ROS	ROA	ROE	Comp Bus Perf
Helfried Schmidt	x	x	x	x	x	x
Hermann Simon	x	PC_Pub Perc	x	x	x	x
Thomas Kemmerich	SC_Devel	SC_Devel	SC_Devel	SC_Devel	SC_Devel	SC_Devel
Stephanie Bschorr	x	x	x	x	x	x
Daniel Kathan	x	x	x	x	x	x
5						
n_c	4	3	4	4	4	4
n_0	1	2	1	1	1	1
p_{sa}	0,8	0,6	0,8	0,8	0,8	0,8
c_{sv}	0,6	0,2	0,6	0,6	0,6	0,6
Decision						

- n_c = the number of respondents assigning a measure to its posited construct
 n_0 = the highest number of assignments of the item to any other construct in the set
 p_{sa} = n_c / N
 c_{sv} = $(n_c - n_0) / N$
 N = total number of responding experts
 x = correctly assigned (i.e. as supposed)

	keep
	delete
	doubleful
	move to other construct

Appendix 8: Overview of Outcomes – Interview with Experts of Statistics

Heading/ category	Prof. Dr. Julia Naskrent	Prof. Dr. Bianca Krol	Prof. Dr. Oliver Gansser	Similarities	Differences	Drawn conclusion - modifications of model/items
Procedure of deriving at structural model	Comprehensive = Agreed	Comprehensive = Agreed Suggestion: Test both ways: RC - > SC and SC -> RC; or go for the leading opinion among the experts.	Comprehensive = Agreed Suggestion: Test both ways: RC - > SC and SC -> RC; or go for the leading opinion among the experts.	Comprehensive = Agreed	Test both ways: RC - > SC and SC -> RC; or go for the leading opinion among the experts.	Only test the leading opinion among the experts.
Procedure of deriving at the dimensions and attributes of HC	Comprehensive = Agreed Why is the entrepreneur conceptualized on the same level than the employees?	Comprehensive = Agreed Some linguistic improvement suggestions. The entrepreneur with one dimension is unproportionally represented compared to the three dimensions of the employees.	Comprehensive = Agreed Some linguistic improvement suggestions.	Comprehensive = Agreed	linguistic improvement suggestions. HC-dimension concerning the entrepreneur.	The HC-dimension concerning the entrepreneur is not adjusted because of conceptual reasoning.
Procedure of deriving at the dimensions and attributes of SC	Comprehensive = Agreed	Comprehensive = Agreed	Comprehensive = Agreed	Comprehensive = Agreed	-	Comprehensive = Agreed
Procedure of deriving at the dimensions and attributes of RC	Comprehensive = Agreed	Comprehensive = Agreed Some linguistic improvement suggestions.	-	Comprehensive = Agreed	linguistic improvement suggestions. HC-dimension concerning the entrepreneur.	Comprehensive = Agreed

<p>Procedure of deriving at the measurement models for HC, SC and RC</p>	<p>Agreed - Direct measurement only required for the 2nd order constructs and not the dimensions. Item-sort task is fine for reflective measurement models. Checking the validity of the dimensions via the transfer-model is also fine. Multicollinearity can but does not have to be tested. Footnote for external validity is enough.</p>	<p>Agreed - Direct measurement only required for the 2nd order constructs and not the dimensions. Explanation required why item-sort task is applied instead of factor analysis - footnote is sufficient. 4-6 German SME for the pretest are not enough --> literature recommends a minimum of 15. Targeted sample group is biased - consideration of an additional sample group is highly recommended. Multicollinearity should be tested.</p>	<p>Are the indicators pretested? If so, how and why is a certain method chosen?</p>	<p>Agreed - Direct measurement only required for the 2nd order constructs and not the dimensions. Checking the validity of the dimensions via the transfer-model is also fine.</p>	<p>Explanation why item-sort task is applied. Multicollinearity issues to be tested. Footnote for external validity is enough. Sample size for pretest. Sample for actual data collection.</p>	<p>Explanation why item-sort task is applied (included as a footnote). Multicollinearity issues to be tested. Enlarged sample size for pretest. Broadened sample for actual data collection.</p>
<p>Procedure and decision - Operationalization between the constructs and the dimensions as well as between the dimensions and indicators</p>	<p>Comprehensive = Agreed</p>	<p>Comprehensive = Agreed Recommendation: Primarily stick to decision rules; discussion of correlation is better suited once the results are available.</p>	<p>-</p>	<p>Comprehensive = Agreed</p>	<p>Focus on decision rules; discussion of correlation is better suited once the results are available.</p>	<p>Discussion of correlation in detail once the results are available.</p>
<p>Procedure - Calculation of dimensions</p>	<p>Optional: first calculate a factor analysis in SPSS.</p>	<p>Procedures agreed</p>	<p>-</p>	<p>Procedures agreed</p>	<p>-</p>	<p>More research required.</p>
<p>Statistical approach - CBSEM vs. PLS and quality criteria</p>	<p>Comprehensive = Agreed Effect size needs to be independently calculated - PLS is unable to do it automatically.</p>	<p>Comprehensive = Agreed</p>	<p>-</p>	<p>Comprehensive = Agreed</p>	<p>-</p>	<p>Comprehensive = Agreed</p>
<p>Moderating effect</p>	<p>Focus only on path coefficients</p>	<p>Focus only on path coefficients</p>	<p>-</p>	<p>Focus only on path coefficients</p>	<p>-</p>	<p>Focus only on path coefficients</p>

Appendix 9: German SME' Human Capital – Final Operationalization – its Dimensions, their Contents and Indicators

HC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Abbreviation
Employees' competencies	Formal education	<ul style="list-style-type: none"> • No. of employees with academic degrees (e.g. Bachelor, Master, Diploma, PhD)* • No. of employees with advanced professional qualifications (e.g. business administrator/bachelor professional, business manager, master craftsman)* • No. of employees currently in apprenticeship* 	HC01_01 HC01_02 HC01_03
	Specific training	<ul style="list-style-type: none"> • € invested in advanced education/training of employees** • % of training conducted in-house (e.g. on-the job training via explanation, observation or supervised exercise of another employee, learning by doing etc.) 	HC01_04 HC01_05
	Experience	<ul style="list-style-type: none"> • No. of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT)* 	HC01_07
Employees' attitude	Loyalty & Fluctuation	<ul style="list-style-type: none"> • Average no. of years in the company of all employees (i.e. seniority) 	HC02_01
	Physical / health capacity	<ul style="list-style-type: none"> • Average no. of sick days per employee 	HC02_05
	Motivation, Satisfaction & Commitment	<ul style="list-style-type: none"> • Estimate: % of employees who are highly motivated • % of employees who participate in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.) • % of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.) 	HC02_02 HC02_07
		<ul style="list-style-type: none"> • % of employees who work on flexible work agreements (e.g. flexible working time account, home office option etc.) 	HC02_06
Employees' intellectual agility	Innovativeness and creativity; Flexibility, adaptability and changeability	<ul style="list-style-type: none"> • % of employees who are (intellectually) capable of performing tasks beyond their actual/direct field of competencies – potentially even inter-divisional/cross-departmental • % of employees who can solve (important) problems/issues without consulting their supervisor for advice (i.e. autonomous/self-dependent and responsible) • No. of cross-departmental projects • No. of cross-departmental meetings per month 	HC03_06 HC03_05 HC03_03 HC03_01
		<ul style="list-style-type: none"> • No. of entrepreneurs/managers with academic degrees (e.g. Bachelor, Master, Diploma, PhD)*** • No. of entrepreneurs/managers with dual qualifications (i.e. technical and business)*** • € invested in advanced education/training of entrepreneurs/managers (in total)** • Average no. of years in leading position (of entrepreneurs/managers) (e.g. with responsibility for employees) 	HC04_01 HC04_02 HC04_03 HC04_04
		<ul style="list-style-type: none"> • Assumed to be intrinsic – otherwise the leaders would not have founded / work for the business 	
	Attitude: motivation, identification and loyalty	<ul style="list-style-type: none"> • No. of top management meetings per month 	HC04_08
	Intellectual agility: flexibility, adaptability and innovativeness	<ul style="list-style-type: none"> • % of managerial tasks dedicated to direct communication with employees 	HC04_09
	Leadership: ability to administer and motivate others, to communicate strategy as well as its implementation.	<ul style="list-style-type: none"> • Self-assessment: % to which the entrepreneurs/managers are visionary 	HC04_07
	Visionary: clear picture about the future		

* = in relation to total employees

** = in relation to turnover

*** = in relation to total entrepreneurs/managers

Appendix 10: German SME' Structural Capital – Final Operationalization –
its Dimensions, their Contents and Indicators

SC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Abbreviation
Organizational capital	Organizational culture, values and attitudes	• How strong is your company culture during crisis (scale) - not only in 2012 but in general	SC05_01
	Communication structure, knowledge documentation and decision making path	• Do you document knowledge - i.e. in written format - and/or use specific communication tools to exchange knowledge (Yes/No) (e.g. mutual data basis, wikis, formalized filing systems etc.) • No. of firm-internal jour fix meetings - i.e. number of regular working meetings/sessions - per month	SC06 SC01_11
	Organizational structure & operational processes	• % of processes which are formalized (e.g. via manuals, form sheds, blanks, standardized screen masks etc.)	SC01_08
	Quality	• % of orders/services which are delivered/performed on time (adherence to delivery dates/time schedules) • % of products/services/projects which meet quality-standards at the first test	SC01_09 SC01_10
Development capital	Product, process and structural development	• € invested in R&D** • No. of improvement/innovation suggestions made by employees • Turnover generated via new products/services which have been launched in the past three years**	SC02_01 SC02_08 SC02_04
	IP	• No. of patents held by the firm	SC02_06
Technological capital	(Information) technological infrastructure	• € invested in IT (i.e. hardware, software and support)** • € invested in communication technologies (e.g. mobile phone, telephone conference equipment etc.)** • € invested to maintain/guarantee state-of-the-art technological level of machinery, process engineering and equipment**	SC03_01 SC03_02 SC03_03

** = in relation to turnover

Appendix 11: German SME' Relationship Capital – Final Operationalization
– its Dimensions, their Contents and Indicators

RC dimension	Dimensions' theoretical contents - attributes	Indicators – objective measures	Abbreviations
Customer relationships	Dependence	• Turnover generated with top 5 customers**	RC01_01
	Satisfaction	• Estimate: how satisfied are your customers with our firm on a scale from 0 (not at all) to 5 (fully) • % of orders/services/projects, which lead to complaints (complaint rate) • Estimate: % of customers who would recommend the company to others	RC02_01 RC01_07 RC01_04
	Loyalty	• Average duration of relationship with top 5 customers	RC01_02
	Other	• % of customer-relationships which are not only formal but also informal (e.g. families are friends, jointly conducted hobbies etc.)	RC01_08
Supplier relationships	Dependence	• % value of goods/raw materials/services procured from top 5 suppliers (in relation to total value of procured goods/raw materials)	RC03_01
	Innovation	• % of innovations developed with suppliers	RC03_05
	Satisfaction	• Estimate: how satisfied are you with your suppliers on a scale from 0 (not at all) to 5 (fully) • Estimate: % suppliers who you would recommend to others	RC04_01 RC03_04
	Loyalty	• Average duration of relationship with top 5 suppliers	RC03_02
Creditor & shareholder relationships	Other	• % of supplier-relationships which are not only formal but also informal (e.g. families are friends, jointly conducted hobbies etc.)	RC03_06
	Risk/dependence	• % of credit / debenture capital granted by the key external capital provider (e.g. financial institution)	RC05_01
	Equity ratio	• % of equity in relation to total capital (Equity ration = equity / total capital)	RC05_04
	Satisfaction	• Estimate: how satisfied you are with your key external capital provider (e.g. financial institution) on a scale from 0 (not at all) to 5 (fully)	RC06_01
Alliance / cooperation relationships	Loyalty	• Average duration of relationship with key external capital provider (e.g. financial institution)* * In case your company does not receive external capital, please answer this question with regard to the general relationship with your key financial institution (e.g. house bank)	RC05_03
	Inter-company alliances: projects and innovations	• % of projects conducted in cooperation with other firms - e.g. joint ventures • % of innovations generated in cooperation with other firms - e.g. joint ventures	RC07_01 RC07_02
	Outsourcing activities	• % of value added which is outsourced to third parties (i.e. outsourcing activities)	RC07_03
	Other	• No. of employees hired out of an alliance (with another firm as well as educational institution)*	RC07_04
Informal network relationships	Family and friends and other social/personal contacts: psychological support and active aid	• % of turnover generated via the help of „gate keepers“ known from social/private networks • No. of family members/close friends who support the business via active help* • % of innovations initiated via family/close friends • No. of memberships in associations or other interest groups	RC08_01 RC08_02 RC08_03 RC08_04
Public perceptions	Public relationships, reputation and brands: marketing and public relations	• € invested in marketing**	RC09_01
		• € invested in public relations work (e.g. local sponsoring)**	RC09_02
		• No. of press quotations about the enterprise and/or no. of times being mentioned in the media (online media like google and social media like facebook, twitter etc. are excluded)	RC09_03
		• No. of employees who applied via unsolicited application (i.e. not applied to posted/advertised position)*	RC09_05

* = in relation to total employees

** = in relation to turnover

Appendix 12: German SME' Lasting Competitive Business Performance –
Final Operationalization

Performance	Indicators– objective measures
Profit growth	$(\text{Current year's profit} / \text{last year's profit}) - 1 \times 100\%$
Turnover growth	$(\text{Current year's turnover} / \text{last year's turnover}) - 1 \times 100\%$
Return on sales	Profit / turnover
Returns on assets	Profit / average total assets
Returns on equity	Profit / average total equity
Overall competitive business performance	Company's overall financial performance compared to competitors

Wissenschaftliche Studie

Titel:

„Intellekt-basierte, immaterielle Werte des deutschen Mittelstands – der Einfluss des intellektuellen Kapitals auf den langfristigen, konkurrenzfähigen Unternehmenserfolg“

(im Original: „Intellect-based intangibles of German small and medium sized enterprises - the impact of intellectual capital on lasting competitive business performance“)

Verwendungszweck Ihrer Angaben:

Alle Ihre Auskünfte werden **ausschließlich für universitäre Forschungszwecke** und **nicht kommerziell** verwendet.

Anonymität:

Die Angaben, die Sie im Rahmen dieses Forschungsprojektes machen, werden **streng vertraulich und anonym** behandelt. Da Sie, wie alle anderen Testteilnehmer auch, die gleichen Zugangsdaten erhalten haben und die Daten **ausschließlich in aggregierter Form**, d.h. gebündelt über alle Testteilnehmer hinweg, **veröffentlicht** werden, sind **keine Rückschlüsse auf Sie persönlich und/oder Ihr Unternehmen möglich**.

Bearbeitung:

Zur Bearbeitung des Fragebogens bitten wir Sie um **ca. 25 Minuten** Ihrer Zeit.

Ab der ersten Frage wird Ihnen der Fortschritt Ihrer Beantwortung aufgezeigt. Dies hilft Ihnen, die Dauer der Bearbeitung abzuschätzen.

Sie können das Ausfüllen des Fragebogens auch **unterbrechen** und zu einem **späteren Zeitpunkt fortsetzen**, indem Sie Ihre E-Mail Adresse angeben und dem Ihnen zugesendeten Link zum Fortsetzen des Fragebogens folgen. **Ihre Angaben bleiben gespeichert.**

Dankeschön für Ihre Unterstützung:

Selbstverständlich können Sie kostenlos einen **umfassenden und exklusiven Bericht der wichtigsten Ergebnisse** dieser Studie erhalten. Dadurch bietet sich Ihnen die Möglichkeit, Ihr intellektuelles Kapital weiterzuentwickeln und ggf. Daten zum Unternehmensvergleich zu gewinnen. Sollten Sie dies wünschen, so kreuzen Sie bitte am **Ende des Fragebogens das entsprechende Kästchen** an.

Wir wären Ihnen sehr dankbar, wenn Sie durch die Beantwortung dieses Fragebogens Ihre Expertise und Ihre Erfahrungen für wissenschaftliche Zwecke zur Verfügung stellen würden.

Für **Rückfragen** jeder Art steht Ihnen Sabrina Aschenbrenner jederzeit unter der Telefonnummer +49 173 30 633 81 oder per E-Mail unter sabrina.aschenbrenner@fom-net.de zur Verfügung.

Projektträger:

Oskar-Patzelt-Stiftung, Leipzig
FOM Hochschule, Institut für Oekonomie & Management, Essen
Universidad Católica San Antonio de Murcia, Spanien, Ciencias Jurídicas y de la
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Projektverantwortliche:

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Católica San Antonio de Murcia, Spanien.

Wichtige Hinweise zum Ausfüllen der Fragen.

Bitte vor Ausfüllen des Fragebogens lesen!

1. Bitte beziehen Sie alle Angaben auf das Geschäftsjahr 2012, außer, wenn ein anderes Jahr genannt ist.

Beispiele:

- Wenn nach finanziellen Kennzahlen gefragt wird, so beziehen sich diese auf die Gesamtsummen zum Jahresende 2012 – z.B. Gesamtumsatz im Jahr 2012.
- Wenn nach den Ausgaben für Aus-/Fort-/Weiterbildung gefragt wird, so bezieht sich dies auf die Gesamtausgaben in Euro für Aus-/Fort-/Weiterbildung im Jahr 2012.
- Wenn nach der durchschnittlichen Anzahl der Meetings pro Monat gefragt wird, so bezieht sich dies auf den Durchschnittswert pro Monat im Jahr 2012.

2. Runden Sie bitte alle Kommastellen. Sie können gerne in Hunderter- oder Tausender-Schritten runden.

Wenn Sie zum Beispiel 2.593 Euro ausgegeben haben, runden Sie diese Ausgaben bitte auf, d. h. geben Sie bitte 2.600 Euro an.

Ebenso runden Sie bitte 81,25% ab, d. h. geben Sie bitte 81% an.

3. Bitte beachten Sie, dass pro Frage nur eine Antwort bzw. Angabe möglich ist bzw. angegeben werden kann.

So ist, zum Beispiel, eine Antwort wie "10-15" nicht zulässig.

4. Für den Erfolg dieser Forschungsarbeit ist es ausschlaggebend, dass Sie den Fragebogen bitte vollständig und wahrheitsgetreu ausfüllen.

Sollten Ihnen zu einer Frage dokumentierte Daten fehlen, so geben Sie bitte geschätzte Angaben an.

Nun beginnt der eigentliche Test und wir möchten Sie bitten, zunächst einige **allgemeine Fragen zu Ihrem Unternehmen** zu beantworten.

1. Bitte ordnen Sie Ihr Unternehmen einer Branche/einem Wirtschaftszweig zu.

Bitte wählen Sie eine der unten stehenden Optionen oder spezifizieren Sie unter „**Sonstige**“, falls keine der genannten Antwortmöglichkeiten zutreffen sollte. Falls Sie Ihr Unternehmen **mehreren Branchen** zuordnen können, so geben Sie bitte an, **welche Branche überwiegt**.

- Verarbeitendes Gewerbe (z.B. Nahrungs- und Futtermittel, Textilien, Druckerzeugnisse, pharmazeutische Erzeugnisse, Metallerzeugung und -bearbeitung, Maschinenbau etc.)
- Baugewerbe (inkl. vorbereitende Baustellenarbeiten, Bauinstallation und sonstige Ausbaugewerbe)
- Energieversorgung
- Wasserversorgung, Abwasser- und Abfallentsorgung und Beseitigung von Umweltverschmutzungen
- (Groß-/Einzel-) Handel (mit und/oder ohne KFZ); sowie Instandhaltung und Reparatur von Kraftfahrzeugen
- Bergbau und Gewinnung von Steinen und Erden
- Gastgewerbe
- Finanz- und Versicherungsdienstleistungen
- Information und Kommunikation (z.B. Verlagswesen, Kinos, Tonstudios, Rundfunkveranstalter, Telekommunikation, Erbringung von Dienstleistungen der Informationstechnologie etc.)
- Grundstücks- und Wohnungswesen
- Sonstige wirtschaftliche Dienstleistungen (z.B. Vermietung von beweglichen Sachen und Arbeitskräften, Reisebüros/-veranstalter, Wach- und Sicherheitsdienste, Gebäudebetreuung, Garten- und Landschaftsbau etc.)
- Freiberufliche, wissenschaftliche und technische Dienstleistungen (z.B. Architektur- und Ingenieurbüros, Rechts- und Steuerberatung, Wirtschaftsprüfung, Werbung und Marktforschung, Veterinärwesen etc.)
- Erziehung und Unterricht
- Gesundheits- und Sozialwesen
- Kunst, Unterhaltung und Erholung
- Verkehr und Lagerei (z.B. Transport, Luftfahrt, Verkehrsdienstleistungen, Post-, Kurier- und Expressdienste etc.)

- Sonstige Dienstleistungen
 - Sonstige – bitte spezifizieren:
-

2. In welchem Bundesland hatten Sie im Jahr 2012 Ihren Firmensitz?

Bitte wählen Sie eine der unten stehenden Optionen.

Falls Sie **mehrere Standorte** haben, geben Sie bitte an, wo sich Ihr **Hauptsitz** befindet.

- Baden-Württemberg
- Bayern
- Berlin
- Brandenburg
- Bremen
- Hamburg
- Hessen
- Niedersachsen
- Mecklenburg-Vorpommern
- Nordrhein-Westfalen
- Rheinland-Pfalz
- Saarland
- Sachsen
- Sachsen-Anhalt
- Schleswig-Holstein
- Thüringen

3. Wo befand sich der Sitz Ihres Unternehmens im Jahr 2012?

Bitte wählen Sie eine der unten stehenden Optionen.

Falls Sie **mehrere Standorte** haben, geben Sie bitte an, wo sich der **Hauptsitz** Ihres Unternehmens befand.

- In einer ländlichen Umgebung
- In einer städtischen Umgebung (ab 50.000 Einwohner)

4. Welche Produkte und/oder Dienstleistungen haben Sie im Jahr 2012 angeboten?

Bitte wählen Sie eine der unten stehenden Optionen.

Falls Sie sich für die dritte Antwort „**Beides**“ entscheiden, so geben Sie bitte an, welches von beiden **überwog**.

- Standardisierte Produkte/Dienstleistungen
- Nicht-standardisierte (Nischen) Produkte/Dienstleistungen
- Beides

Falls „beides“, so spezifizieren Sie bitte unten, was überwog (d.h. standardisierte Produkte/Dienstleistungen oder nicht-standardisierte (Nischen) Produkte/Dienstleistungen):

5. Welche rechtliche Struktur hatte Ihr Unternehmen im Jahr 2012?

Bitte wählen Sie eine der unten stehenden Optionen.

- Einzelunternehmen
 - GbR (Gesellschaft bürgerlichen Rechts)
 - OHG (Offene Handelsgesellschaft)
 - UG (Unternehmergesellschaft)
 - GmbH (Gesellschaft mit beschränkter Haftung)
 - KG (Kommanditgesellschaft)
 - GmbH & Co. KG (Gesellschaft mit beschränkter Haftung & Compagnie Kommanditgesellschaft)
 - AG (Aktiengesellschaft)
 - Sonstige – bitte spezifizieren Sie die rechtliche Organisationsform Ihres Unternehmens:
-

Vielen Dank für diese ersten Informationen.

Gehen Sie nun bitte zum Hauptteil des Fragebogens über, der sich mit dem intellektuellen Kapital Ihres Unternehmens beschäftigt.

Nun folgen einige **Fragen zu den Strukturen Ihres Unternehmens**, von denen angenommen wird, dass sie zur erfolgreichen Durchführung Ihrer Geschäftstätigkeit beitragen.

Zusätzliche Hinweise:

Bitte denken Sie daran, dass sich **alle Angaben** auf das **Geschäftsjahr 2012** beziehen.

Falls eine Frage/Aussage **auf ihr Unternehmen nicht zutrifft** (z.B., Sie haben in diesem Bereich nicht investiert), so geben Sie bitte **"Null" (= 0)** an.

Nur wenn Sie eine Frage **nicht beantworten können**, so klicken Sie bitte auf **"Keine Angabe / Nicht bekannt"**. Bitte wählen Sie diese Option nur in den seltensten Fällen.

6. Bitte beantworten Sie die folgenden Fragen zur Organisation Ihres Unternehmens so präzise wie möglich.

- | | | |
|---|--|---|
| Anteil Ihrer Aufträge, die zeitgerecht ausgeführt wurden (Liefer- bzw. Termintreue) | _____ % der Aufträge | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anteil Ihrer Produkte/ Dienstleistungen/Projekte, die Qualitäts-Standards bei einer ersten Überprüfung bestanden bzw. erfüllt haben | _____ % der Produkte/ Dienstleistungen | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anteil Ihrer (Geschäfts-) Prozesse, die in 2012 formalisiert waren (z.B. in bzw. durch Handbücher, Formblätter, Vordrucke, standardisierte Bildschirmmasken etc.) | _____ % der Prozesse | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anzahl der betriebsinternen Jour fix Meetings pro Monat – d.h. Anzahl der regelmäßigen Arbeitssitzungen | _____ Jour fix Meetings / Monat | <input type="checkbox"/> Keine Angabe / Nicht bekannt |

Wurde in Ihrem Unternehmen Wissen dokumentiert – d.h. schriftlich festgehalten – und/oder wurden spezielle Kommunikationsinstrumente zum Wissensaustausch eingesetzt?

(z.B. gemeinsame Datenbanken, Wikis, formalisierte Ablagesysteme etc.)

- Ja
 Nein

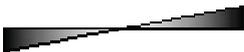
Falls „Ja“, so **spezifizieren Sie bitte, welche Instrumente** in Ihrem Unternehmen Anwendung fanden

Exemplarische Instrumente:

Wie resistent ist Ihre Unternehmenskultur in Krisen – nicht nur in 2012, sondern allgemein betrachtet?

Bitte **bewerten** Sie die generelle Stärke Ihrer Unternehmenskultur in Krisen auf einer Skala von 0 (**sehr schwach in Krisen**) bis 5 (**sehr stark in Krisen**).

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut bzw. sehr stark.

Schwache Kultur (0)  Starke Kultur (5)

Stärke der Unternehmenskultur in Krisen

7. Bitte beantworten Sie die folgenden Fragen zur Entwicklung Ihres Unternehmens im Jahr 2012 so präzise wie möglich.

- | | | |
|--|---|---|
| Anzahl der Verbesserungsvorschläge/Innovationen, die von Ihren Mitarbeitern angeregt wurden | _____ Verbesserungs-vorschläge/Innovationen | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anzahl der Patente, die Ihr Unternehmen hielt | _____ Patente | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Euro, die in Forschung und Entwicklung investiert wurden | _____ € Investitionen | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Umsatz in 2012, der durch die neuen Produkte/Dienstleistungen der letzten drei Jahre (d.h. 2010, 2011 und 2012), generiert wurde | _____ € Umsatz | <input type="checkbox"/> Keine Angabe / Nicht bekannt |

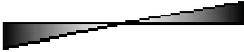
8. Bitte beantworten Sie die folgenden Fragen zur technologiebasierten Infrastruktur Ihres Unternehmens so präzise wie möglich.

- | | | |
|--|-----------------------|---|
| Euro, die in 2012 in Informationstechnologien (wie z. B. Hardware, Software und Unterstützung) investiert wurden | _____ € Investitionen | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Euro, die in 2012 in Kommunikationstechnologien (wie z.B. Handys, Ausrüstung für Telefonkonferenzen etc.) investiert wurden | _____ € Investitionen | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Euro, die in 2012 in Verfahrenstechnik und/oder Maschinen bzw. Ausrüstung investiert wurden, um den aktuellen Stand der Technik zu erlangen und/oder zu halten | _____ € Investitionen | <input type="checkbox"/> Keine Angabe / Nicht bekannt |

9. Wie beurteilen Sie die Gesamtqualität Ihrer strukturellen Aspekte (Fragen 6 – 8) in 2012 auf einer Skala von 0 (sehr schlecht) bis 5 (sehr gut)?

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut.

sehr schlecht sehr gut
(0) (5)



Gesamtqualität Ihrer strukturellen Aspekte
(Fragen 6 – 8)

Besten Dank für die Auskünfte zu Ihrem sogenannten *Strukturkapital*.

Bitte gehen Sie nun zum Fragebogenteil *Humankapital* über.

Beantworten Sie bitte folgende **Fragen zur Intelligenz und den Verhaltensweisen Ihrer Mitarbeiter sowie geschäftsführenden Personen**, von denen angenommen wird, dass sie zur erfolgreichen Durchführung Ihrer Geschäftstätigkeit in 2012 beitrugen.

Zusätzliche Hinweise:

Bitte denken Sie daran, dass sich **alle Angaben** auf das **Geschäftsjahr 2012** beziehen.

Falls eine Frage/Aussage **auf ihr Unternehmen nicht zutrifft** (z.B., Sie haben in diesem Bereich nicht investiert), so geben Sie bitte **"Null" (= 0)** an.

Nur wenn Sie eine Frage **nicht beantworten können**, so klicken Sie bitte auf **"Keine Angabe / Nicht bekannt"**. Bitte wählen Sie diese Option nur in den seltensten Fällen.

10. Bitte beantworten Sie die folgenden Fragen zu den Kompetenzen, d.h. dem Wissen und den Fähigkeiten Ihrer Mitarbeiter im Jahr 2012 so präzise wie möglich.

- | | | |
|--|---------------------|---|
| Anzahl der Mitarbeiter mit akademischem Abschluss (z.B. Bachelor, Master, Diplom, PhD/Dr.) | _____ Mitarbeiter | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anzahl der Mitarbeiter mit erfolgreich abgeschlossener beruflicher Aufstiegsfortbildung (z.B. Fachwirt, Betriebswirt, Meister) | _____ Mitarbeiter | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anzahl der Mitarbeiter, die interdisziplinäre Erfahrungen – d.h. Erfahrungen in mind. zwei Bereichen – hatten (z.B. Fliesenlegen und Sanitär oder Maschinenbau und IT) | _____ Mitarbeiter | <input type="checkbox"/> Keine Angabe / Nicht bekannt |
| Anzahl der Mitarbeiter in der (beruflichen) Ausbildung | _____ Auszubildende | <input type="checkbox"/> Keine Angabe / Nicht bekannt |

Anteil der Weiterbildungsmaßnahmen, die unternehmensintern stattfanden (d.h. am Arbeitsplatz durch Erklärungen, Zusehen und/oder Mitmachen unter Anleitung eines anderen Mitarbeiters, learning by doing etc.)	_____ % der Weiterbildungsmaßnahmen	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Euro, die (insgesamt) in Mitarbeiterweiterbildung investiert wurden	_____ € Investitionen	<input type="checkbox"/> Keine Angabe / Nicht bekannt

11. Bitte beantworten Sie die folgenden Fragen zu den Einstellungen bzw. dem Verhalten Ihrer Mitarbeiter im Jahr 2012 so präzise wie möglich.

Schätzzahl: Anteil der höchst motivierten Mitarbeiter	_____ % der Mitarbeiter	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil der Mitarbeiter, die an Firmen-Events/Aktivitäten (z.B. Firmenausflug, Grillfest, Weihnachtsfeier etc.) teilnahmen	_____ % der Mitarbeiter	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil der Mitarbeiter mit flexiblen Arbeitsvereinbarungen (z.B. Zeitkonten, Homeoffice etc.)	_____ % der Mitarbeiter	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Durchschnittliche Anzahl an Krankentagen pro Mitarbeiter	_____ Tage / Mitarbeiter	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Durchschnittliche Anzahl an Jahren, die ein Mitarbeiter für Ihr Unternehmen arbeitete (Betriebszugehörigkeit)	_____ Jahre	<input type="checkbox"/> Keine Angabe / Nicht bekannt

12. Bitte beantworten Sie die folgenden Fragen zu den Fähigkeiten Ihrer Mitarbeiter, Kompetenzen auf ähnliche und/oder neue bzw. völlig andere Strukturen sowie Problemstellungen anzuwenden, im Jahr 2012 so präzise wie möglich.

Anteil der Mitarbeiter, die (intellektuell) in der Lage waren, Aufgaben zu übernehmen, die nicht in ihrem direkten Kompetenzfeld lagen – ggf. auch bereichsübergreifend _____ % der Mitarbeiter Keine Angabe / Nicht bekannt

Anteil der Mitarbeiter, die (wichtige) Probleme lösen konnten – ohne Absicherung durch den Vorgesetzten (d.h. selbstständig und verantwortungsvoll) _____ % der Mitarbeiter Keine Angabe / Nicht bekannt

Anzahl der interdisziplinären/ bereichsübergreifenden Projekte _____ Projekte Keine Angabe / Nicht bekannt

Anzahl an bereichsübergreifenden Treffen pro Monat _____ bereichsübergreifende Treffen / Monat Keine Angabe / Nicht bekannt

13. Bitte beantworten Sie die folgenden Fragen zu Ihrer Geschäftsführung im Jahr 2012 so präzise wie möglich.

Anzahl der geschäftsführenden Personen mit akademischem Abschluss (z.B. Bachelor, Master, Diplom, PhD/Dr.) _____ Geschäftsführer Keine Angabe / Nicht bekannt

Anzahl der geschäftsführenden Personen mit Doppelqualifikation (d.h. technisch und kaufmännisch) _____ Geschäftsführer Keine Angabe / Nicht bekannt

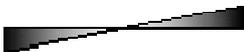
Euro, die (insgesamt) in die Weiterbildung der geschäftsführenden Personen investiert wurden	_____ € Investitionen	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Durchschnittliche Anzahl an Berufsjahren der geschäftsführenden Personen in leitender Funktion (z.B. mit (Personal-) Verantwortung)	_____ Berufsjahre	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil der Geschäftsführungstätigkeiten, die dazu dienen, direkte Kommunikation bzw. Wissensaustausch mit den Mitarbeitern zu verfolgen	_____ % der Geschäftsführungstätigkeit	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anzahl an Top Management-Besprechungen pro Monat	_____ Besprechungen / Monat	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Selbsteinschätzung: Zu wie viel Prozent sind die geschäftsführenden Personen Visionär(e) ⁴¹¹ ?	_____ % Visionär	<input type="checkbox"/> Keine Angabe / Nicht bekannt

⁴¹¹ Visionär = eine Person, die zielgerichtete Vorstellungen von der zukünftigen Entwicklung des Unternehmens hat.

14. Wie beurteilen Sie die Gesamtqualität Ihres Humankapitals – d.h. der Intelligenz und der Verhaltensweisen Ihrer Mitarbeiter sowie der geschäftsführenden Personen (Fragen 10 – 13) - in 2012 auf einer Skala von 0 (sehr schlecht) bis 5 (sehr gut)?

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut.

Sehr schlecht (0) Sehr gut (5)



Gesamtqualität Ihres Humankapitals (Fragen 10 – 13)

Herzlichen Dank für die Angaben zu Ihrem *Humankapital*.

Bitte gehen Sie weiter, um zum letzten Teilaspekt Ihres intellektuellen Kapitals zu gelangen.

Die folgenden Fragen beziehen sich auf **Ihre Beziehungen zu Personen und/oder Gruppen außerhalb Ihres Unternehmens**, von denen angenommen wird, dass sie zur erfolgreichen Durchführung Ihrer Geschäftstätigkeit beitragen.

Zusätzliche Hinweise:

Bitte denken Sie daran, dass sich **alle Angaben** auf das **Geschäftsjahr 2012** beziehen.

Falls eine Frage/Aussage **auf ihr Unternehmen nicht zutrifft** (z.B., Sie haben keine gemeinsamen Innovationen entwickelt), so geben Sie bitte "**Null**" (= 0) an.

Nur wenn Sie eine Frage **nicht beantworten können**, so klicken Sie bitte auf "**Keine Angabe / Nicht bekannt**". Bitte wählen Sie diese Option nur in den seltensten Fällen.

15. Bitte beantworten Sie die folgenden Fragen zu Ihren Kundenbeziehungen im Jahr 2012 so präzise wie möglich.

Anzahl Ihrer Kunden (insgesamt)	_____ Kunden	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Durchschnittliche Dauer der Beziehungen zu den fünf wichtigsten Kunden	_____ Jahre	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil der Aufträge, die zu Reklamationen führten (Reklamationsquote; bei Dienstleistungen ggf. Beschwerdequote)	_____ % der Aufträge	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Umsatz, der mit den fünf wichtigsten Kunden generiert wurde	_____ € Umsatz	<input type="checkbox"/> Keine Angabe / Nicht bekannt

Schätzzahl: Anteil der Kunden, von denen Ihr Unternehmen an Andere weiterempfohlen wurde

_____ % der Kunden

Keine Angabe / Nicht bekannt

Anteil der Kundenbeziehungen, die nicht nur auf formeller, sondern auch informeller Ebene stattfanden (z.B. die Familien sind befreundet, Hobbies, die man gemeinsam ausübt etc.)

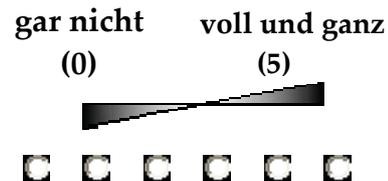
_____ % der Kundenbeziehungen

Keine Angabe / Nicht bekannt

Schätzzahl: Wie zufrieden waren Ihre Kunden mit Ihrem Unternehmen in 2012 auf einer Skala von 0 (gar nicht) bis 5 (voll und ganz)

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut.

Zufriedenheit Ihrer Kunden mit Ihrem Unternehmen



16. Bitte beantworten Sie die folgenden Fragen zu Ihren Lieferantenbeziehungen im Jahr 2012 so präzise wie möglich.

Durchschnittliche Dauer der Beziehungen zu den fünf wichtigsten Lieferanten

_____ Jahre

Keine Angabe / Nicht bekannt

Anteil des Waren-/Material- bzw. Dienstleistungswertes, den Sie von den fünf wichtigsten Lieferanten bezogen haben

_____ % des Waren-/Dienstleistungswerts

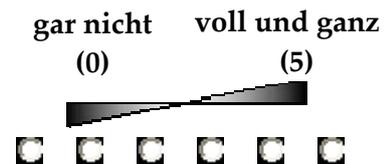
Keine Angabe / Nicht bekannt

Anteil der Innovationen, die mit Lieferanten zusammen entwickelt wurden	_____	% der Innovationen	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Schätzzahl: Anteil der Lieferanten, der Ihr Unternehmen an Andere weiterempfohlen hat	_____	% der Lieferanten	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil der Lieferantenbeziehungen, die nicht nur auf formeller, sondern auch informeller Ebene stattfanden (z.B. die Familien sind befreundet, Hobbies, die man gemeinsam ausübt etc.)	_____	% der Lieferantenbeziehungen	<input type="checkbox"/> Keine Angabe / Nicht bekannt

Schätzzahl: Wie zufrieden waren Sie mit Ihren Lieferanten in 2012 auf einer Skala von 0 (gar nicht) bis 5 (voll und ganz)

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut.

Zufriedenheit mit Ihren Lieferanten



17. Bitte beantworten Sie die folgenden Fragen zu Ihren Kapitalgeber-/Anteilseignerbeziehungen im Jahr 2012 so präzise wie möglich.

Durchschnittliche Dauer der Beziehung mit dem führenden externen Kapitalgeber (z.B. Finanz-Institut) ⁴¹²	_____ Jahre	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil des Fremdkapitals, das Sie vom führenden externen Kapitalgeber (z.B. Finanz-Institut) bezogen haben	_____ % des Fremdkapitals	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anteil des Eigenkapitals am Gesamtkapital bzw. Bilanzsumme (Eigenkapitalquote)	_____ % Eigenkapital	<input type="checkbox"/> Keine Angabe / Nicht bekannt

⁴¹² Falls Sie kein externes Kapital in 2012 in Anspruch genommen haben, so beziehen Sie diese Frage bitte auf die durchschnittliche Dauer der allgemeinen Beziehung mit dem führenden Finanz-Institut (z.B. Hausbank).

Schätzzahl: Zufriedenheit mit Ihrem führenden externen Kapitalgeber (z.B. Finanz-Institut)⁴¹³ in 2012 auf einer Skala von 0 (gar nicht) bis 5 (voll und ganz)

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut.

gar nicht (0) voll und ganz (5)



Zufriedenheit mit Ihrem führenden externen Kapitalgeber⁴¹¹



Von welchen Finanz-Instituten bzw. Quellen bezogen Sie in 2012 Ihr externes Kapital?

Mehrfachauswahl möglich!

- (Haus-) Bank(en)
- Kapitalmarkt
- Privat Equity
- Business Angels
- Mitarbeiter-Anteile

Sonstige – bitte spezifizieren:

⁴¹³ Falls Sie kein externes Kapital in 2012 in Anspruch genommen haben, so beziehen Sie diese Frage bitte auf die allgemeine Zufriedenheit mit Ihrem führenden Finanz-Institut (z.B. Hausbank).

18. Bitte beantworten Sie die folgenden Fragen zu Ihren Allianz-/Kooperationsbeziehungen im Jahr 2012 so präzise wie möglich.

Anteil der Projekte, die in Kooperationen mit anderen Unternehmen – z.B. Joint Ventures – durchgeführt wurden _____ % der Projekte Keine Angabe / Nicht bekannt

Anteil der Innovationen, die in Kooperationen mit anderen Unternehmen – z.B. Joint Ventures – entwickelt wurden _____ % der Innovationen Keine Angabe / Nicht bekannt

Anteil der Unternehmensaufgaben und/oder (ganzer) Geschäftsprozesse, die an Drittunternehmen ausgelagert waren (d.h. Outsourcing) _____ % der Wertschöpfung Keine Angabe / Nicht bekannt

Anzahl der Mitarbeiter, die als Resultat einer Allianz (u.a. mit anderen Firmen oder Bildungsinstituten) zu Ihrem Unternehmen kamen bzw. wechselten _____ Mitarbeiter Keine Angabe / Nicht bekannt

19. Bitte beantworten Sie die folgenden Fragen zu Ihren informellen Networking-Beziehungen im Jahr 2012 so präzise wie möglich.

Anzahl der Familienmitglieder/engen Freunde, die Ihr Unternehmen durch aktive Hilfe unterstützt haben _____ Familienmitglieder/Freunde Keine Angabe / Nicht bekannt

Anteil des Umsatzes, der durch "Türöffner", die aus dem engeren privaten Umfeld/Netzwerk stammen, generiert wurde _____ % des Umsatzes Keine Angabe / Nicht bekannt

Anteil der Innovationen, die von Familienmitgliedern/engen Freunden angestoßen wurden	_____ % der Innovationen	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anzahl der Mitgliedschaften in Verbänden, Vereinen oder anderen Interessengemeinschaften	_____ Mitgliedschaften	<input type="checkbox"/> Keine Angabe / Nicht bekannt

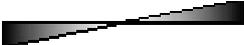
20. Bitte beantworten Sie die folgenden Fragen zur öffentlichen Wahrnehmung Ihres Unternehmens im Jahr 2012 so präzise wie möglich.

Euro, die in Marketing investiert wurden	_____ € Investitionen	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Euro, die in Public Relations/Öffentlichkeitsarbeit investiert wurden	_____ € Investitionen	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anzahl an Zitaten/Berichten in der Presse bzw. Anzahl, wie oft das Unternehmen in den Medien genannt wurde (ausgenommen Online-Medien wie Google und Social Media wie Facebook, Twitter etc.)	_____ (offline) Zitate/Berichte	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Anzahl der Mitarbeiter (ausgenommen Auszubildende), die sich durch Initiativbewerbung beworben haben (d.h. nicht auf ausgeschriebene Positionen)	_____ Mitarbeiter	<input type="checkbox"/> Keine Angabe / Nicht bekannt

21. Wie beurteilen Sie die Gesamtqualität Ihres Beziehungskapitals – d.h. der Beziehungen zu Personen und/oder Gruppen außerhalb Ihres Unternehmens (Fragen 15 – 20) - in 2012 auf einer Skala von 0 (sehr schlecht) bis 5 (sehr gut)?

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut.

sehr schlecht sehr gut
(0) (5)



Gesamtqualität Ihres Beziehungskapitals
(Fragen 15 – 20)



Danke!

Bitte gehen Sie nun zu dem Abschnitt, der den *finanziellen Erfolg* der oben angegebenen, durchgeführten Maßnahmen widerspiegelt.

Im folgenden Frageblock finden Sie Fragen zu Ihrem *finanziellen Erfolg*.

22. Bitte beantworten Sie die folgenden Fragen zum finanziellen Erfolg Ihres Unternehmens so präzise wie möglich.

Umsatzwachstum zwischen 2011 und 2012	_____ % Umsatzwachstum	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Gewinnwachstum zwischen 2011 und 2012	_____ % Gewinnwachstum	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Umsatzrendite 2012 ⁴¹⁴	_____ % Umsatzrendite	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Gesamtkapitalrendite 2012 ⁴¹⁵	_____ % Gesamtkapitalrendite	<input type="checkbox"/> Keine Angabe / Nicht bekannt
Eigenkapitalrendite 2012 ⁴¹⁶	_____ % Eigenkapitalrendite	<input type="checkbox"/> Keine Angabe / Nicht bekannt

⁴¹⁴ Gewinn vor Steuern ÷ Umsatz

⁴¹⁵ Gewinn vor Steuern ÷ Gesamtkapital

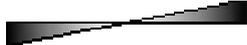
⁴¹⁶ Gewinn vor Steuern ÷ Eigenkapital

Wie schätzen Sie den finanziellen Erfolg Ihres Unternehmens im Vergleich zu Ihrer Konkurrenz ein?

Bitte bewerten Sie das Ausmaß Ihrer finanziellen Performance im Wettbewerb auf einer Skala von 0 (unterdurchschnittlicher finanzieller Erfolg) bis 5 (überdurchschnittlicher finanzieller Erfolg)

Achtung! Die Bewertung ist entgegen dem deutschen Schulnoten-System ausgerichtet – d.h. eine 5 ist sehr gut bzw. überdurchschnittlich.

	unterdurchschnittlicher finanzieller Erfolg (0)	überdurchschnittlicher finanzieller Erfolg (5)
Geschäftserfolg im Vergleich zur Konkurrenz	<input type="checkbox"/>	<input type="checkbox"/>



Abschließend bitten wir Sie noch um einige **Angaben zu Ihrem Unternehmen und dessen Historie.**

23. Bitte beantworten Sie die folgenden Fragen zu Ihrem Unternehmen und dessen Historie so präzise wie möglich.

Gründungsjahr Ihres Unternehmens

Ihre Unternehmensgeneration in 2012

_____ Geschäftsgeneration

Gesamtzahl der Mitarbeiter Ihres
Unternehmen in 2012 (inkl. Azubis,
Aushilfen, Teilzeitkräfte etc., aber ohne
geschäftsführende Personen)

_____ Kopfzahl

Anzahl Ihrer geschäftsführenden Personen
in 2012

_____ Gesamtzahl
geschäftsführender
Personen

Ihr Gesamtumsatz in 2012

_____ € Umsatz

Anteil der Firmenanteile, der 2012 außerhalb
der Geschäftsführung (und/bzw. deren
Familie) lag

_____ %

War Ihr Unternehmen Tochtergesellschaft eines Mutterkonzerns?

- Ja
 Nein

Waren die Anteilseigner/Eigentümer Ihres Unternehmens in die
Unternehmensführung bzw. wichtige Entscheidungen involviert?

- Ja
 Nein

24. Was ist die höchste Auszeichnung Ihres Unternehmens bei der Oskar-Patzelt-Stiftung?

- Premier
- Premier-Finalist
- Preisträger
- Finalist
- Premier – Bank
- Bank des Jahres
- Ehrenplakette
- Nominierung
- Sonstige – bitte spezifizieren: _____

25. Welche Position haben Sie in Ihrem Unternehmen?

Bitte wählen Sie eine der unten stehenden Optionen oder spezifizieren Sie unter „Sonstige“, falls keine der genannten Antwortmöglichkeiten zutreffen sollte. Falls Sie sich mehreren Positionen zuordnen können, so geben Sie bitte an, welche Position überwiegt.

- Geschäftsführer/in
- Assistent/in der Geschäftsleitung
- Abteilungs-/Bereichsleiter/in – bitte spezifizieren Sie die Abteilung/den Bereich: _____
- Controller/in
- (Bilanz-) Buchhalter/in
- Personalsachbearbeiter/in
- Sonstige – bitte spezifizieren: _____

Vielen Dank für Ihre Teilnahme und Ihr Vertrauen!

Herzlichst

Petra Tröger,
Dr. Helfried Schmidt,
Prof. Dr. Thomas Heupel,
Prof. Dr. Mercedes Carmona Martínez und
Sabrina Aschenbrenner, M.Sc., B.Sc. (hons.)

Zur Anforderung der Zusammenfassung der Ergebnisse füllen Sie bitte noch die nächste Seite aus.

Anforderung der Zusammenfassung der Ergebnisse

Dieser Teil des Fragebogens wird **gesondert von den oben angegebenen Daten erfasst**.

Ihre **Anonymität** bleibt weiterhin gewahrt.

Auswertung der Ergebnisse in elektronischer Form

Ja, ich möchte gerne eine Auswertung der Ergebnisse in elektronischer Form zugesandt bekommen.

Email: _____

Nein, ich bin an der Auswertung der Ergebnisse in elektronischer Form nicht interessiert.

Danke für Ihre Teilnahme!

Wir möchten uns ganz herzlich für Ihre Mithilfe bedanken und wünschen Ihnen und Ihrem Unternehmen weiterhin viel Erfolg!

Appendix 14: Motivation-/Cover Letter – Example Oskar-Patzelt Stiftung
– Original in German

Betreff: 20 Jahre „Großer Preis des Mittelstandes“ wird nun wissenschaftlich erforscht

Sehr geehrte Freunde der Oskar-Patzelt-Stiftung,
sehr geehrte Damen und Herren,

wir möchten Sie herzlich zur Teilnahme an einer interessanten wissenschaftlichen Studie einladen. Es geht um Erfolgsfaktoren, und zwar „Intellekt-basierte, immaterielle Erfolgsfaktoren des deutschen Mittelstands – der Einfluss des intellektuellen Kapitals auf den langfristigen, konkurrenzfähigen Unternehmenserfolg“.

Im Rahmen unseres 20-jährigen Jubiläums führen wir, die Oskar-Patzelt-Stiftung, diese Dissertationsstudie in Kooperation mit der FOM Hochschule für Oekonomie & Management gGmbH, Essen, sowie der Universidad Católica San Antonio Murcia, Spanien, durch.

Wir untersuchen, welche Bedeutung die immateriellen Werte (auch bekannt als intellektuelles Kapital oder Wissenskapital) für den Erfolg der deutschen kleinen und mittleren Unternehmen haben. Dabei verfolgt das Forschungsprojekt einen stark praxisorientierten Ansatz. Aufbauend auf den gewonnenen Erkenntnissen der Ihnen vorgelegten Umfrage werden konkrete Handlungsempfehlungen abgeleitet, um immaterielle Erfolgsfaktoren des deutschen Mittelstands zu optimieren.

Sie gehören durch die Nominierung zum 'Großen Preis des Mittelstandes' zu den besten Unternehmen des deutschen Mittelstands. Sie beweisen täglich, dass Sie nicht nur hervorragende wirtschaftliche Leistungen erbringen, sondern auch gleichzeitig nicht-monetäre, weiche Faktoren (z.B. im Bereich Personal, Innovation und Kundenservice) berücksichtigen. Sie sind deshalb für diese Umfrage optimal qualifiziert.

Wir wären Ihnen sehr dankbar, wenn Sie durch die Beantwortung unseres Fragebogens Ihre Expertise und Ihre Erfahrungen für wissenschaftliche Zwecke teilen würden.

Selbstverständlich werden alle Ihre Angaben streng vertraulich behandelt und ausschließlich anonym ausgewertet.

Die Beantwortung der Fragen wird erfahrungsgemäß ca. 25 Min. dauern.

Zugang zu dem Fragebogen erhalten Sie über folgenden Link:
https://www.soscurvey.de/IC_KMU_OskPat/

Das Passwort, das Sie zum einloggen benötigen, lautet: IC-KMU

Da alle Preisträger bzw. Nominierte der Oskar-Patzelt-Stiftung die gleichen Zugangsdaten erhalten und die Daten ausschließlich in aggregierter Form, d.h. gebündelt über alle Testteilnehmer hinweg, veröffentlicht werden, sind keine Rückschlüsse auf Sie persönlich oder Ihr Unternehmen möglich.

Der Fragebogen wird von heute bis Ende Januar 2014 freigeschaltet sein.

Falls Sie den Fragebogen nicht online bearbeiten möchten, so können Sie auch gern den elektronischen Fragebogen im Anhang dieser Email ausfüllen und per Email oder Post an uns zurücksenden (Sabrina Aschenbrenner, c/o OPS Netzwerk GmbH, z.H. Herrn Hendrik Mäder, Melscher Straße 1, 04299 Leipzig oder info@op-pt.de). Wir kümmern uns dann um die anonyme Weiterleitung an die auswertenden Forscher.

Zudem finden Sie im Anhang dieser Email auch ein detaillierteres Begleitschreiben zum Forschungsprojekt.

Als Dankeschön für Ihre Unterstützung erhalten Sie selbstverständlich einen umfassenden und exklusiven Bericht der wichtigsten Ergebnisse der Studie. Dadurch bietet sich Ihnen die Möglichkeit, Ihr intellektuelles Kapital mit anderen mittelständischen Unternehmen zu vergleichen und es ggf. zu optimieren.

Wir würden uns sehr freuen, wenn Sie an der Umfrage zu diesem neuen Forschungsprojekt teilnehmen und danken Ihnen im Voraus vielmals für Ihre Bemühungen.

Herzlichst

Ihre Petra Tröger und Ihr Dr. Helfried Schmidt
(Vorstand Oskar-Patzelt Stiftung)

Prof. Dr. Thomas Heupel
(Prorektor für Forschung, FOM Hochschule, Essen; Mitglied im wissenschaftlichen Beirat der Oskar-Patzelt Stiftung)

Bei Rückfragen jeglicher Art wenden Sie sich bitte an die Projektverantwortliche Sabrina Aschenbrenner (Telefon: +49 173 30 633 81 oder Email: sabrina.aschenbrenner@fom-net.de). Sabrina Aschenbrenner ist Mitglied im wissenschaftlichen Beirat der Oskar-Patzelt-Stiftung und erforscht im Rahmen ihrer Doktorarbeit zu den immateriellen Erfolgsfaktoren des deutschen Mittelstandes die Erfahrungen bzw. Erkenntnisse von 20 Jahren „Großer Preis des Mittelstandes“.

Appendix 15: Research Description – Example Oskar-Patzelt Stiftung –
Original in German



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Überblick zum Forschungsprojekt

„Intellekt-basierte, immaterielle Erfolgsfaktoren des deutschen Mittelstands – der Einfluss des intellektuellen Kapitals auf den langfristigen, konkurrenzfähigen Unternehmenserfolg“

(im Original: „Intellect-based intangibles of German small and medium sized enterprises - the impact of intellectual capital on lasting competitive business performance“)

Zielsetzung:

Das Forschungsprojekt untersucht, welche Bedeutung die immateriellen Werte (auch bekannt als intellektuelles Kapital (IC) bzw. Wissenskapital) für den Erfolg der deutschen kleinen und mittleren Unternehmen haben.

Zudem wird Klarheit über die Beziehung der Elemente des intellektuellen Kapitals untereinander hergestellt sowie den Einfluss des Firmenalters in diesem Kontext.

Aufbauend auf den gewonnenen Erkenntnissen der Umfrage wird die Dissertationsstudie konkrete praxisorientierte Handlungsempfehlungen zur Optimierung der immateriellen Erfolgsfaktoren des deutschen Mittelstands ableiten.

Relevanz des Forschungsprojekts:

Durch den Wandel von der Produktions- zur Dienstleistungsgesellschaft, die anhaltende Globalisierung sowie die kontinuierlichen Innovationen im Bereich der Informationstechnologie (IT) hat die Bedeutung der immateriellen Werte für Unternehmen aller Branchen zugenommen.

Durch seine spezifischen personellen, strukturellen und Stakeholder-orientierten Bestimmungsmerkmale ist der deutsche Mittelstand besonders stark durch immaterielle Erfolgsfaktoren geprägt.

Gleichwohl können jedoch selbst erfolgreiche Mittelständler langfristig nur überleben, wenn sie ihre immateriellen Erfolgspotenziale vorteilhaft managen. Dafür müssen die wesentlichen auf Intellekt basierenden Erfolgstreiber des deutschen Mittelstands identifiziert und nach ihrer Relevanz klassifiziert werden. Vor dem Hintergrund des demographischen Wandels und der relativ geringen materiellen Ressourcenausstattung der meisten KMU ist dieses Thema um so wichtiger.

Warum Sie als Studienteilnehmer ausgewählt wurden?

Nur an erfolgreichen Unternehmen und ihren Merkmalen kann man betriebswirtschaftliche Erfolgsfaktorenforschung betreiben.

Sie haben allein schon durch Ihre Nominierung zum 'Große Preis des Mittelstandes' bewiesen, dass Sie zu den besten Unternehmen des deutschen Mittelstands zählen. Herzlichen Glückwunsch!

Die Nominierung zu diesem Wirtschaftspreis belegt, dass Sie nicht nur hervorragende wirtschaftliche Leistungen erbringen, sondern auch gleichzeitig nicht-monetäre, weiche Faktoren (z.B. im Bereich Personal, Innovation und Kundenservice) optimieren. Deshalb sind gerade Sie ein optimaler Teilnehmer an dieser Mittelstandsstudie.

Wir wären Ihnen daher sehr dankbar, wenn Sie durch die Beantwortung dieses Fragebogens Ihre Expertise und Ihre Erfahrungen für wissenschaftliche Zwecke einbringen würden.

Verwendungszweck Ihrer Angaben

Alle Ihre Auskünfte werden ausschließlich für universitäre Forschungszwecke und nicht kommerziell verwendet.

Anonymität

Die Angaben, die Sie im Rahmen dieses Forschungsprojektes machen, werden streng vertraulich und anonym behandelt. Da die Daten ausschließlich in aggregierter Form, d.h. gebündelt über alle Testteilnehmer hinweg, veröffentlicht werden, sind keine Rückschlüsse auf Sie persönlich und/oder Ihr Unternehmen möglich.

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Oskar-Patzelt-Stiftung, Leipzig, Wissenschaftlicher Beirat.

Appendix 16: Outliers – Q1, Q3 etc.

Q1	SC05_01	SC06	SC01_11	SC01_08	SC01_09	SC01_10	SC02_01	SC02_08	SC02_04	SC02_06	SC03_01	SC03_02
Q3	4	0	2	30	90	90	0	3	24600	0	5000	1000
Upper = Q3 + (2.2 * (Q3 - Q1))	5	1	8	90	98	150000	150000	20	1500000	0	50000	10000
Lower = Q1 - (2.2 * (Q3 - Q1))	7.2	3.2	21.2	222	115.6	115.6	480000	57.4	4745880	0	149000	29800
	1.8	-2.2	-11.2	-102	72.4	72.4	-330000	-34.4	-3221280	0	-94000	-18800
Q1	SC03_03	SC04_01	HC01_01	HC01_02	HC01_03	HC01_04	HC01_05	HC01_07	HC02_01	HC02_05	HC02_02	HC02_07
Q3	500	4	0	1	0	2100	10	0	4	3	25	80
Upper = Q3 + (2.2 * (Q3 - Q1))	250000	5	5	6	4	17600	80	8	12	7	80	100
Lower = Q1 - (2.2 * (Q3 - Q1))	798900	7.2	16	17	12.8	51700	234	25.6	29.6	15.8	201	144
	-548400	1.8	-11	-10	-8.8	-32000	-144	-17.6	-13.6	-5.8	-96	36
Q1	HC02_06	HC03_06	HC03_05	HC03_03	HC03_01	HC04_01	HC04_02	HC04_03	HC04_04	HC04_08	HC04_09	HC04_07
Q3	2	20	15	1	0	0	0	0	12	1	10	33
Upper = Q3 + (2.2 * (Q3 - Q1))	100	70	70	18	4	2	1	5000	25	4	50	100
Lower = Q1 - (2.2 * (Q3 - Q1))	315.6	180	191	55.4	12.8	6.4	3.2	16000	53.6	10.6	138	247.4
	-213.6	-90	-106	-36.4	-8.8	-4.4	-2.2	-11000	-16.6	-5.6	-78	-114.4
Q1	HC05_01	RC01_01	RC02_01	RC01_07	RC01_04	RC01_02	RC01_08	RC03_01	RC03_05	RC04_01	RC03_04	RC03_02
Q3	4	77500	5	1	13.75	5	1.75	30	0	4.75	4.25	5
Upper = Q3 + (2.2 * (Q3 - Q1))	5	3500000	5	5	50	18.5	20	80	20	5	30	16.5
Lower = Q1 - (2.2 * (Q3 - Q1))	7.2	11029500	5	13.8	129.75	48.2	60.15	190	64	5.55	86.65	41.8
	1.8	-7452000	5	-7.8	-66	-24.7	-38.4	-80	-44	4.2	-52.4	-20.3
Q1	RC03_06	RC05_01	RC05_04	RC06_01	RC05_03	RC07_01	RC07_02	RC07_03	RC07_04	RC08_01	RC08_02	RC08_03
Q3	0	0	35	4	7	0	0	0	0	0	0	0
Upper = Q3 + (2.2 * (Q3 - Q1))	10	80	91.25	6	25.75	11.25	10	5	1	10	4.25	5
Lower = Q1 - (2.2 * (Q3 - Q1))	32	256	215	10.4	67	36	32	16	3.2	32	13.6	16
	-22	-176	-88.75	-0.4	-34.25	-24.75	-22	-11	-2.2	-22	-9.35	-11
Q1	RC08_04	RC09_01	RC09_02	RC09_03	RC09_05	RC10_01	PE01_01	PE01_06	PE01_02	PE02_01		
Q3	3	5000	1000	4	1	4	0	0	3	4		
Upper = Q3 + (2.2 * (Q3 - Q1))	5.25	61250	15000	20	10	5	21	12.5	17	5		
Lower = Q1 - (2.2 * (Q3 - Q1))	10.2	185000	45800	55.2	29.8	7.2	67.2	40	47.8	7.2		
	-1.95	-118750	-29800	-31.2	-18.8	1.8	-46.2	-27.5	-27.8	1.8		

Appendix 17: Outliers – Reasons for Deletion of Individual Values

Case	Variable/item	Reason for deletion
6	RC07_02	50% innovations with cooperation partners is impossible since already 95% innovations are developed with suppliers
7	RC08_03	60% innovations with family and friends is impossible since already 50% and 20% of innovations are developed with suppliers and alliance partners, respectively
10	SC02_01 SC03_01 SC03_03	2,500,000 € investments in R&D with a turnover of 600,000 € is unrealistic 2,000,000 € investments in IT with a turnover of 600,000 € is unrealistic 1,500,000 € investments in machinery technology with a turnover of 600,000€ is unrealistic
25	RC07_04	75 employees hired out of an alliance if only 2 employees work for the firm is unrealistic
34	RC09_05	50 employees with unsolicited application if only 3 employees work for the firm is unrealistic
45	RC07_03	if 100% outsourcing, then there are no internal activities left
50	RC07_02	100% innovations with cooperation partners is impossible since already 10% of innovations are developed with suppliers
53	RC08_02	150 family members actively supporting a firm is not realistic
62	RC09_05	50 employees with unsolicited application if only 3 employees work for the firm is unrealistic
80	RC05_03	180 years of relationship with financial institution when the firm is only founded in 1996 is impossible
104	RC01_01	15,000,000 € turnover with top 5 customers vs. 1,200,000 € total turnover is not possible
113	PE01_02	Return on sales over 100% is not possible
119	HC04_02	4 leaders with qualifications vs. 1 leader in total is impossible
135	RC09_05	43 employees with unsolicited application if only 32 employees work for the firm is unrealistic
164	PE01_01	8095% profit growth is not realistic
170	HC01_02	1230 employees with qualifications vs. 71 employees in total is impossible
174	HC04_02	4 leaders with qualifications vs. 2 leader in total is impossible

Appendix 18: Additional Cleansing – Reasons for Deletion of Individual Values

Case	Turnover	Reason for deletion
3	0 €	No turnover given for calculation
4	4,500,000 €	vs. 7,000,000 turnover with top 5 customers - cannot be right
7	1 €	1€ turnover only cannot be right
18	0 €	No turnover given for calculation
26	40,000,000 €	Turnover with innovations (2€) and turnover with top 5 customers (9€) cannot be right with 40,000,000€ turnover in total
27	190,000 €	Turnover too low for production business with 100 employees (especially with 770,000€ investments in IC)
34	0 €	No turnover given for calculation
36	100 €	100€ turnover only cannot be right
42	0 €	No turnover given for calculation
46	5,500,000€	75€ turnover with top 5 customers and only 5 customers but over € 5.5 m turnover – cannot be right
53	1,150 €	1150 € turnover only cannot be right
58	-	No turnover given for calculation
59	300,000 €	290% of turnover invested in IC - seems unrealistic
67	3,655,000 €	10€ invested in IT, 5€ in ICT, 10€ and 4€ in education of employees and managers respectively, as well as 30€ for marketing cannot be right for a company with 3,655,000€ turnover

Appendix 19: Missing Values – Indicators – up to or above 10% Missing

Variable	Missing Values		Variable	Missing Values	
	Amount	Percentage		Amount	Percentage
SC05_01	0	0,0	HC04_07	9	6,1
SC06	0	0,0	HC05_01	0	0,0
SC01_11	10	6,8	RC01_01	22	15,0
SC01_08	13	8,8	RC02_01	0	0,0
SC01_09	2	1,4	RC01_07	8	5,4
SC01_10	9	6,1	RC01_04	19	12,9
SC02_01	26	17,7	RC01_02	3	2,0
SC02_08	32	21,8	RC01_08	4	2,7
SC02_04	36	24,5	RC03_01	16	10,9
SC02_06	13	8,8	RC03_05	27	18,4
SC03_01	3	2,0	RC04_01	0	0,0
SC03_02	10	6,8	RC03_04	42	28,6
SC03_03	11	7,5	RC03_02	5	3,4
SC04_01	0	0,0	RC03_06	19	12,9
HC01_01	1	,7	RC05_01	12	8,2
HC01_02	3	2,0	RC05_04	19	12,9
HC01_03	2	1,4	RC06_01	0	0,0
HC01_04	15	10,2	RC05_03	2	1,4
HC01_05	10	6,8	RC07_01	17	11,6
HC01_07	14	9,5	RC07_02	23	15,6
HC02_01	15	10,2	RC07_03	15	10,2
HC02_05	13	8,8	RC07_04	16	10,9
HC02_02	2	1,4	RC08_01	13	8,8
HC02_07	1	,7	RC08_02	10	6,8
HC02_06	5	3,4	RC08_03	15	10,2
HC03_06	6	4,1	RC08_04	4	2,7
HC03_05	2	1,4	RC09_01	7	4,8
HC03_03	31	21,1	RC09_02	13	8,8
HC03_01	24	16,3	RC09_03	17	11,6
HC04_01	2	1,4	RC09_05	16	10,9
HC04_02	2	1,4	RC10_01	0	0,0
HC04_03	14	9,5	PE01_01	8	5,4
HC04_04	1	,7	PE01_06	3	2,0
HC04_08	11	7,5	PE01_02	47	32,0
HC04_09	8	5,4	PE02_01	0	0,0

0 (%) missing values
 less or equal to 10% missing values
 more than 10% missing values

Appendix 20: Data Analysis – Remaining Reflective Variables and their Indicator Descriptions

Variable	Indicator
HC01_01	No. of employees with academic degrees (e.g. Bachelor, Master, Diploma, PhD)
HC01_07	No. of employees with experience in more than one area/interdisciplinary (e.g. tiling and sanitary, or engineering and IT)
HC02_02	Estimate: % of employees who are highly motivated
HC02_07	% of employees who participate in company events/firm activities (e.g. company excursion, barbecue, Christmas party etc.)
HC03_05	% of employees who can solve (important) problems/issues without consulting their supervisor for advice (i.e. autonomous / self-dependent and responsible)
HC03_06	% of employees who are (intellectually) capable of performing tasks beyond their actual/direct field of competencies – potentially even inter-divisional/cross-departmental
HC04_07	Self-assessment: % to which the entrepreneurs/managers are visionary
HC04_09	% of managerial tasks dedicated to direct communication with employees
SC01_08	% of processes which are formalized (e.g. via manuals, form sheds, blanks, standardized screen masks etc.)
SC05_01	How strong is your company culture during crisis (scale) - not only in 2012 but in general?
SC02_08	No. of improvement/innovation suggestions made by employees
SC03_02	€ invested in communication technologies (e.g. mobile phone, telephone conference equipment etc.)
SC03_03	€ invested to maintain/guarantee state-of-the-art technological level of machinery, process engineering and equipment
RC01_01	Turnover generated with top 5 customers
RC01_08	% of customer-relationships which are not only formal but also informal (e.g. families are friends, jointly conducted hobbies etc.)
RC03_04	Estimate: % of suppliers who you would recommend to others
RC04_01	Estimate: how satisfied are you with your suppliers on a scale from 0 (not at all) to 5 (fully)
RC05_04	% of equity in relation to total capital (Equity ration = equity / total capital)
RC07_01	% of projects conducted in cooperation with other firms - e.g. joint ventures
RC08_02	No. of family members/close friends who support the business via active help
RC08_04	No. of memberships in associations or other interest groups
RC09_01	€ invested in marketing
RC09_02	€ invested in public relations work (e.g. local sponsoring)
PE02_01	Company's overall financial performance compared to competitors