Web GIS to Enhance Relational Capital: The Case of General Merchandise Retailers

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Abstract

Purpose – *This paper studies the impact of Information and Communication Technologies in organizations to capture and manage Intellectual Capital. The paper focuses particularly on the use of Web-based Geographical Information Systems (Web GIS) to increase relational capital.*

Design/methodology/approach – *This paper analyzes in detail the websites of 143 general merchandise retailers, which have been grouped according to their dominant operational format. Menus and search tools have been used to find out about the way in which these retailers provide information to the customers about their stores, with special attention to the use of Web GIS.*

Findings – *The results obtained show that most of the companies analyzed use Web GIS to provide information about the location and other characteristics of the stores. The findings in this paper also suggest that the quantity and quality of the information provided by is somewhat related to the company size.*

Research limitations/implications – *The limitations of this study come from the difficulty of predicting if Small and Medium Enterprises (SMEs) will generalize the use of Web GIS in the future.*

Practical implications – *The findings of the paper suggest that large retail firms have adopted Web GIS to provide information to the customers and for other geomarketing purposes. Moreover, Small and Medium Enterprises (SMEs) should use Web GIS to improve their relationship with customers.*

Originality/value – *To our knowledge, no paper has analyzed in detail the use of Web GIS by companies with the aim of enhancing relational capital.*

Keywords: *Knowledge management, Relational capital, Information and communication technologies, Web GIS, Geomarketing, Retailing.*

Paper type: *Research paper.*

1. Introduction

Globalization, regulation and new technologies have created a very competitive environment in which agents demand higher levels of efficiency from organizations, which often decide to increase their research, development, and innovation investments. Some researchers have empirically determined that tangible and intangible resources have positive relationships with innovation and performance (Bueno et al., 2010). Intangible resources are important for organizations to create value and to increase its competitiveness, particularly in international markets. Knowledge management (KM) is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all the enterprise's information assets included in databases, documents, procedures, etc. (Duhon, 1998). Knowledge, along with tangible assets, has been used as a production factor in which it constitutes the building blocks of Intellectual Capital (IC) (Rexhepi *et al.*, 2013). IC is a form of capital of growing importance. That includes intangible resources that are of value to an organization in order to improve its competitiveness, particularly in international markets. IC is considered a new

management discipline (Mohamed and Mohamed, 2011) that includes not only intellectual property, but also other items such as knowledge, experience, relationships, processes, innovations, market presence and community influence. In fact, KM has a catalytic role in developing IC to achieve corporate sustainability (Robinson, 2011). A deep and broad knowledge base leads to better innovation outcomes (Leal-Rodríguez et al., 2013). Interest in IC and KM has increased remarkably over the last decades. In fact, a basic search in Scopus (2015) reveals a considerable and ever increasing number of research papers published in journals that contain these terms in their title, abstract and keywords, as it is shown in Figure 1.

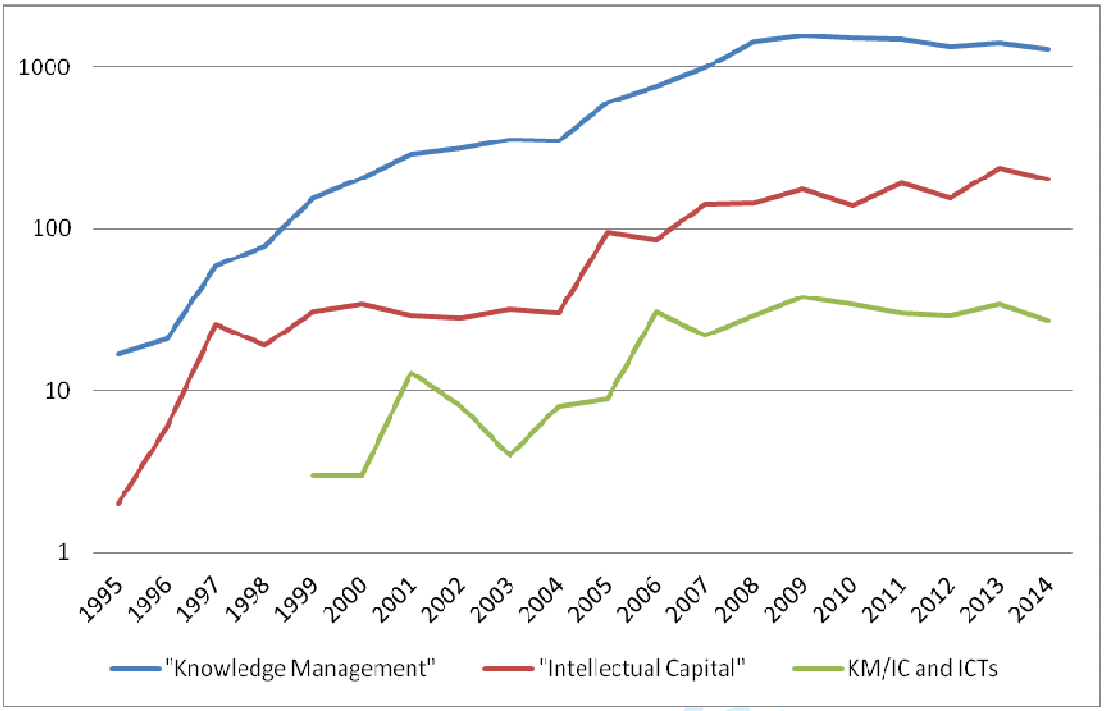

Figure 1: Number of articles, using a logarithmic scale, in Scopus database including the terms: (a) “Knowledge Management”, (b) “Intellectual Capital”, and (c) “Knowledge Management” or “Intellectual Capital” and “Information and communication technologies” in abstract, title, or keywords.

The majority of medium-sized and large businesses, and public administrations, have adapted their structures and internal processes to the realities of this era of globalization and the technology. However, many of them still need to improve their management practices in order to both acquire and manage IC. One of the most difficult tasks for organizations is to acquire all the valuable knowledge they require. Fortunately, new technologies enable them to collect, transform, share, and reuse knowledge instantaneously (Duffy, 2001). Indeed, the development of IC has been boosted by the growth of new technologies. For instance, several investigators have concluded that information and communication technologies (ICTs) help to establish social networks through their deployment via digital networks and also provide channels for communication and learning for improving products and services (Mohamed and Mohamed, 2011). Among these new technologies, Geographic Information Systems (GIS) have become powerful tools to process geographical information

considered of interest for decision-making processes in different areas of the organization. In particular, GIS have been widely used to optimize decisions about the location of facilities, one of the most important strategic retailing issues because location determines the geographic trading area from which a store draws its clients (Pride et al., 2014). Other important strategic and tactical issues are the selection of store format and size, the products offered, etc. These decision-making processes are often talked using computational optimization methods, including parallel and multi-objective approaches (Baños et al., 2006). The generalized use of GIS for marketing issues has permitted the development of a new emerging discipline known as 'geomarketing'. It has become essential for those businesses interested in considering the spatial variable for decision support, such that it is possible to identify the points where a company will have higher benefit. With this purpose, companies are increasing their efforts to optimize decisions related to the location of their facilities using Huff-based competitive facility location models (Huff, 1964). They consider that the probability that a customer patronizes a facility is inversely proportional to the distance between the customer and the facility (Küçükaydin et al., 2010). Most GIS include tools for automatically determining the location of one or several facilities according to: location of demand points, their own facilities and competitor's facilities. In addition to the internal use of GIS for analysis and decision making purposes, Web GIS are becoming popular in companies' websites to provide customers spatial information about the geographical location of their facilities. Web GIS becomes an interesting communication channel between general merchandise retailers and clients. Having in mind that the profitability of the venture depends on the sales revenue, being the sales revenue depending of the customers' demand, the use of Web GIS can be determinant in the customer's choice of retail stores where to buy anything. In fact, business purchases depend on consumers' planning and necessities (Pride et al., 2014), and this information can be used by customers to select stores close to their location. This is important for general merchandise retailers, which have thousands of stores around the world that serve thousand or even millions customers daily. Some authors have shown that web infrastructure is a critical issue for knowledge sharing (Popa et al., 2016). Thus, in addition to using social networks to increase brand awareness and sales from their websites, companies can enhance their relational capital by using Web GIS. The popularization in the use of Web GIS is being facilitated by the possibility of visiting firms' websites from any device connected to the Internet, including mobile devices (smartphones, tablets, etc.). Web GIS is particularly important for those customers moving to a new place where they need to buy products found in general merchandise retailers. In fact, for some time now there is an increasing movement of people around the world due to work reasons or leisure activities.

This paper analyzes the inclusion of Web GIS in general merchandise retailers' websites, with geomarketing purposes. The remainder of the paper is organized as follows: Section 2 studies the importance of IC and KM for organizations. Section 3 introduces the basic concepts related to Web GIS. Section 4 studies how a large number of general merchandise retailers use Web GIS, while conclusions are provided in Section 5.

2. Intellectual capital and knowledge management

Knowledge management and intellectual resources are increasingly important factors in the outstanding achievement of organizational objectives (Striukova *et al.*, 2008). According to Gold *et al.* (2001), the knowledge management process can be grouped into four dimensions: acquisition, conversion, application and knowledge protection. Knowledge acquired through information can be articulated and thus is at risk of expropriation, whereas the knowledge residing in routines, processes and analysis is tacit knowledge of the organization. Higher levels of efficiency mean that knowledge becomes an important source of competitive advantage. This requires organizations to understand the relationships between physical, financial, and intellectual capital, to increase their market value and to achieve corporate sustainability.

The term Intellectual Capital (IC) has become popular among industry professionals and academic researchers. However, the depth and breadth of the IC concept, and the lack of consensus about its significance and limitations, often hinder its application in real contexts. This has led some authors to recommend defining a general taxonomy (Beattie and Thomson, 2007). It is commonly accepted that IC consists of three main components (Sydler *et al.*, 2014): human capital (knowledge, skills, and competences of the company's employees), structural or organizational capital (managerial philosophy, corporate culture, intellectual property, management processes, etc.), and relational capital (relationships of the organization with employees, suppliers, dealers, sellers, and customers). A review of the state of the art in this field reveals that interest in intangible assets first arose in the early 1980s when the notion of intangible value was often called 'goodwill'. It continued in the mid-1980s when interest focused on analyzing the large market-to-book value differences, and it was around this time that the concept of IC appeared (Castilla-Polo and Gallardo-Vázquez, 2008). Stewart (1997) defined IC as the total stocks of collective knowledge, information, technologies, intellectual property rights, experience, organizational learning and competence, team communication systems, customer relations and brands that are able to create values for a firm. Because the nature of IC is abstract, intangible, and difficult to measure, it is not easy to fix a price tag on a specific piece of knowledge. That is the reason why, for business managers, evaluating IC performance effectively becomes a challenge. During the last two decades, many researchers have proposed methods to measure IC (Sydler *et al.*, 2014). Manzari *et al.* (2012) carried out an interesting review regarding the concept s, components and indicators related to IC, and they concluded that some indicators are not appropriate for all organizations. Despite the fact that IC is a major contributor to the market value of a large number of companies, it is often not reflected on the balance sheet (Beattie and Thomson, 2007). Thus, the accounting perspective focuses on specific indicators of intangibles, such as research and development expenses, training costs, advertising, and patents (Guthrie *et al.*, 2012), while the management control perspective describes how these indicators can be used for management control purposes. The traditional accounting system looks largely at separable assets, although recognition is given to some IC under the heading 'goodwill' (Abeysekera and Guthrie, 2005). Some authors warn that current financial reporting is not useful to reflect the full value of companies because an increasing gap is observed between the market value and book value of firms.

In an attempt to respond to these questions, some companies often disclose this information through the media and through separate supplements to their annual reports (Campbell and Rahman, 2010).

Though some studies have theorized that IC is a critical organizational tool for survival in the 21st century, others have observed a gap between the theoretical understanding of IC and its practical implementation in organizations. In fact, many companies still focus primarily on tangible resources (physical and financial capital) because they are relatively easy to measure, while IC is generally recognized as an intangible resource that is difficult to evaluate by means of financial reports. Moreover, it should be taken into account that the presence of IC is not a sufficient condition for creating value, but these intellectual resources must be used together with tangible assets for value creation (Beattie and Smith, 2013). Some investigations have stressed that IC is a very important issue for improving organizational performance in knowledge economies dominated by service industries. The correct management of IC is behind successful international partnerships and large projects. This is why IC has become an asset that provides a competitive market position to the largest and most powerful companies around the world, especially in periods of economic turbulence. It has effects on the performance of new products (Chen *et al.*, 2014), and also positive and meaningful effects on organizational learning capabilities (Farsani *et al.*, 2012). So much so that some investigations have demonstrated that IC has a positive effect on employees' job satisfaction and retention (Longo and Mura, 2011). IC is closely related to organizational strategy, innovation, firm performance, and many other related issues (Bontis, 2003). For example, multinational companies need to engage and align their international workforce to design and implement structures and systems, and to generate relationships across the stakeholders it interacts with.

3. ICTs for knowledge management

Despite the fact that most research studies related to IC management have focused on controlling and evaluating intangible assets (Gogan *et al.*, 2014), the increasing use of new and powerful technologies has enhanced interest in IC acquisition. According to Ragsdell (2009), for most knowledge management systems, the use of appropriate ICTs is critical to ensure that new technologies are effectively used. IC information is related to the management control of knowledge resources, which requires organizing and modularizing these resources. Namvar and Khalilzadeh (2013) explore the role of IC dimensions in the development of e-business models (Soto-Acosta et al., 2016). García-Álvarez (2015) has recently presented a theoretical framework that analyses the effects of ICTs on KM and innovation, and determines which technologies and KM processes are beneficial for the organizations in terms of innovation of product and process innovation. The fact that new ICTs have been generalized in all the organizations around the world has also implied the appearance of new challenges (Bechina and Nkosi-Ndlela, 2008). Since IC comes on the heels of Information and Communication Technologies (ICTs), the continuous expansion of the latter means that the relative importance of the former is increasing with respect to tangible capital assets. In particular, ICTs respond to the increasing demand for the identification of organizations' IC to provide managerial insights in knowledge-intensive industries (Tsui *et al.*, 2014). This is especially important if we take

into account that one of these an important hallmark of these industries is the high proportion of staff having academic background and working experience.

Knowledge acquisition refers to the collection of knowledge in the organization (Gold *et al.*, 2001). Recent advances in knowledge acquisition are connected to new innovations through which knowledge can be created from existing data. Several authors have analyzed the creation of relational capital (Cegarra-Navarro et al., 2011; Dewhurst and Cegarra-Navarro, 2004). Currently, most companies establish relationships with external agents (suppliers, dealers, sellers and customers). They use social media, not only as a marketing tool, but also as a way to acquire and manage IC. While customers use information from social media as part of the decision-making process, companies use social media as a screening tool to spread among their clients marketing messages and to collect clients' opinions. Several research papers have studied the effect of online social networks on firm performance and how this technology creates value (Palacios-Marqués et al., 2015a). The relationship between social networks and relational capital has also been analyzed (Cho *et al.*, 2007, Howard, 2010; Massingham, in press). ICTs play an important role in capturing and retaining tacit and explicit knowledge, which is a critical issue for most organizations. ICTs are useful for IC (Bechinaand Nkosi-Ndlela, 2008), and IC is important to evaluate ICTs (Calabrese *et al.*, 2013). ICTs are often used by public and private organizations for knowledge acquisition. Nevertheless, it is important to remark that it is not only necessary that companies provide computers and Internet connectivity to their employees. Companies should also encourage their workers to share knowledge and carry out collaborative activities with other organizations. Some interesting papers that show the advantages of ICTs for IC are: Colomo-Palacios *et al.* (2011), who analyzed a software tool which was developed to include Internet applications features to IC management; Tai and Chen (2009), who presented a new model for IC performance evaluation by combining fuzzy linguistic and multi-criteria decision making approaches; Lee (2010), who developed an intellectual capital evaluation model to facilitate the analysis of the university performance; Tsui *et al.*(2014), who proposed an algorithm for Knowledge-based Intellectual Capital Extraction (KBICE). It incorporates computational linguistics and artificial intelligence technologies for automatic processing of unstructured data and extraction of important IC related information.

4. Web SIG, geomarketing, and relational capital

Two processes are transforming knowledge management currently: expansion of digitization and ICTs, and the spatialization of information worldwide in technical GIS systems. In fact, some authors have used the term ICT-GIS-based KM (Baud *et al.*, 2014). ICTs play a critical role for the success of companies in the current competitive world, since these technologies help people share knowledge through common platforms. The use of suitable ICTs facilitates data sorting and presentation, storage, flow through the organization and finally, supporting the thoughts processes that inform effective decision-making (Yi and Jayasingam, 2012). The growing use of ICTs has not only involved the adoption of new interaction paradigms, but also it has increased the amount of information shared, which is often of great interest for public and private organizations. In particular, over the last years the amount of geospatial data has grown rapidly; that is the reason why GIS have become

powerful tools for processing geographical data. GIS is software of strategic importance for enterprises, as they allow them to capture, manage and analyze spatial or geographical data. GIS produce data analysis, including procedures for decision-making in order to understand what occurs in geographic space (Goodchild, 2009).

Some authors have concluded that IC reporting provides companies the opportunity to employ a valuable marketing tool. García-Meca and Martínez (2007) consider that IC information is a marketing asset for companies. Medium-sized and larger companies use marketing information systems, which are decision support systems targeted at marketing-specific decisions. According to Hess *et al.* (2004), GIS are useful techniques for constructing marketing information systems since they allow users to integrate information from disparate sources and span multiple decision domains. This is why many companies use GIS software for marketing (Turk *et al.*, 2014). Fernström (2005) argues that even though marketing has not historically included IC in the commonly used terminology, there are many resources, strategies and capabilities that fall under the category of IC resources, such as client relationships and their management, creative and negotiation skills, etc. Baxter and Matear (2004) analyzes between company and sellers. According to Abdullah and Sofian (2012), relational capital includes marketing channels, relationships with customers, dealers and suppliers, client loyalty, governmental and industrial networking, intermediaries or partners. Bellora and Guenther (2013) include the processes involved in marketing and distribution of the firm's innovations within the relational capital. Kim *et al.* (2011) indicate that relational capital is the knowledge embedded in the marketing channels and client relationships that an organization develops through the course of conducting business. Campbell and Rahman (2010) consider marketing and advertising, and creative marketing strategy as relational capital. Some other authors consider marketing and human capital jointly. Thus, Beattie and Thompson (2007) include the company's experience in advertising, marketing and market research as part of the human capital. Baum and Silverman (2004) consider that the top management team should have experience in marketing, directors of research and development, etc.

Several multidisciplinary applications of GIS include the natural resources management (weather and climate, land management in agriculture and forestry, conservation of natural areas such as seas and oceans, resource management and conservation of water, soil, plants, animals, etc.), energy and engineering (energy sources and distribution networks of petroleum, electricity and gas, transportation, civil engineering and architecture, telecommunication networks, etc.), business (marketing/geomarketing, logistics and distribution, banking and insurance, etc.), public sector (Geopolitics and geostrategy, armed forces, urban and regional planning, administrative organization, police and emergency services, public infrastructures, public transportation, education, health, etc.), etc. In particular, business applications are one of the most interesting areas in which GIS are used since geomarketing strategies allow to obtain information about resources, suppliers, dealers, sellers and customers, taking into account the geographical variable (Cliquet, 2006; Hess *et al.*, 2004). To implement geomarketing strategies in practice, internal data, external data, and maps are integrated in GIS. That is to carry out analyses taking into account the geographical variable. Figure 2 shows an

example in which a GIS is used to determine the influence area of a set of supermarkets in an urban area according to the Euclidean distance.

Figure 2: Using a GIS to determine the influence area of several supermarkets.

Some studies have indirectly analyzed IC taking into account the geographical variable. For example, Striukova *et al.* (2008) analyzed IC research works according to the geographical location of the authors. A similar study was later carried out by Guthrie *et al.* (2012), who concluded that 9.7%, 17.0%, 17.5%, and 45.6% of the contributions come from UK, Australasia, North America, and Continental Europe, respectively. Nitkiewicz *et al.* (2014) have extended the concept of IC to measure the socio-economic development of countries and regions. Gayialis and Tatsiopoulos (2004) propose solving a supply chain management application using a GIS integrated with an enterprise resource planning software (ERP), which is an enabling technology to build and augment IC (Lengnick-Hall *et al.*, 2004). Wandosell et al. (2015) also analyze how the use of ICTs and geomarketing can improve IC. Figure 3 shows a framework in which an information system -Web GIS- is used to promote relational capital.

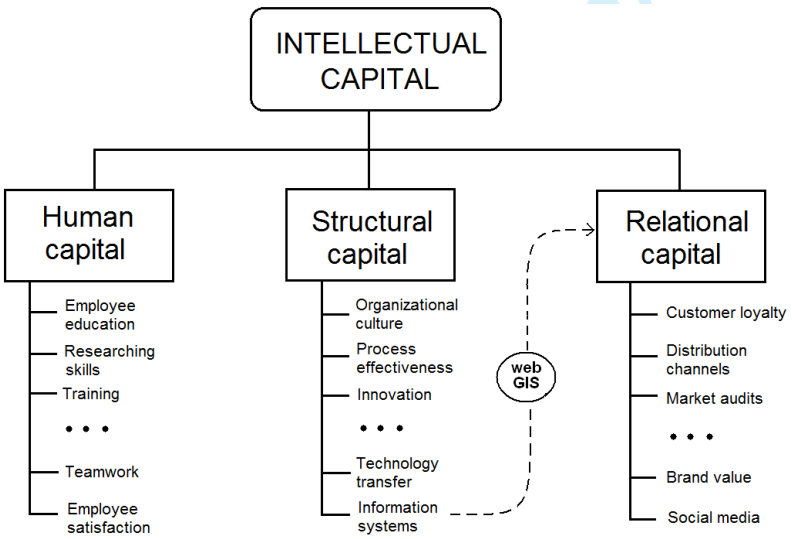

Figure 3: Use of Web GIS to enhance relational capital.

Bearing in mind that companies should make an effort to design and implement strategic plans to extend the use of geomarketing techniques supported by GIS, they should offer staff members high-level training to acquire IC and should encourage them to employ GIS and geomarketing techniques. This policy would involve advantages in terms of human capital since employees would increase their knowledge, skills, and competences from the use of GIS and geomarketing. In addition there would be benefits with respect to relational capital, since these strategies facilitate market segmentation, and therefore allow the company to improve its knowledge about suppliers, dealers, sellers and clients. This information would determine the way to establish relationships with these agents, to enhance the firm's image, to select marketing channels and strategies, to design promotional campaigns, etc. With this aim, most companies have established communication channels with clients through ICTs, including websites to promote e-commerce and release products and services, and social media to enhance their corporate image. Internet technologies are increasingly being used within all knowledge management processes (Palacios-Marqués, 2015b).

In the last years, companies have extended the use of GIS for internal decision-making processes to its use by external agents in order to enhance relational capital in organizations. Thus, in addition to GIS software for the development of geomarketing studies, organizations are increasingly using interfaces with citizens through Web GIS open-access platforms (Zavala-Romero *et al.*, 2014), with the aim to assist in the analysis and visualization of data. Several Web GIS libraries, which are application programming interfaces (API's) for the visualization and manipulation of spatial data, have been presented. The interest on Web GIS has been reinforced by the development of new web services, cloud computing platforms and mobile applications. The rise of web-based GIS resources has expanded the scale and scope of spatial information (Kong *et al.*, 2015). Publishing georeferenced data on a Web GIS site requires first generating the data to be published and uploaded into a map server, and then building the web interface (the Web GIS site) to display the data for the user. Web GIS is any GIS that uses Web technology to communicate between components (Fu and Sun, 2010). More specifically, Web GIS is a type of distributed information system, which should have at least a server and a client, where the server is a Web application server, and the client is a Web browser, a desktop or a mobile application. The server has a URL so that clients can find it on the Web. The client then relies on HTTP specifications to send any request to the server. The server performs the requested GIS operation and sends a response to the client, again via HTTP. Therefore, Web GIS integrate GIS and Internet technologies in order to ease ubiquitous access to the distributed information, multi-user activity, data transparency, platform independence, and better visualization. The main advantage of Web GIS is that it extends the typical GIS tools (spatial analysis, network analysis, etc.) of such that it makes possible that non GIS professionals can conveniently process geographical data and to make decisions using GIS (Jelokhani-Niaraki and Malczewski, 2015). Web GIS provides the end user with comprehensive and synthetic, both spatial and temporal, environmental information through a remotely customizable user-friendly graphical interface without need of using a traditional desktop GIS application (Kulawiak *et al.*, 2010). But the potentiality of Web GIS is not only limited to supply geographical information to the users, but also becomes an

interesting tool to acquire knowledge from the clients. On the one hand, since it is possible to know the location of website users by IP address, companies can obtain useful information for marketing activities. On the other hand, the distribution in the number of the accesses to the Web GIS can also be used to predict the future service demand.

5. Use of Web GIS by general merchandising retailers

Retail firms are interested in establishing efficient communication channels with clients. Previous studies have explored the strategies of retail firms and their implications on the IC development and KM, given that for retail organizations asset intangibility is a particular feature (Watson *et al.*, 2005). Geomarketing strategies play an important role in the definition of retail sector (Cliquet and Guillo, 2013). GIS have been traditionally used to analyze the process of selecting a retail site location (Roig-Tierno, 2013). Nevertheless, the use of Web GIS for marketing/geomarketing has not been sufficiently analyzed in the literature and, to our knowledge, no paper has analyzed in detail the use of Web GIS by companies with the aim of enhancing relational capital.

5.1. Methodology

The retail sector is a huge part of the economic and social performance of any country. A large type of retail stores exists, but nomenclature is not always uniform. One way to classify them is the breadth of products offered (Pride et al., 2014). According to this classification, retailers can be categorized according two main groups: (a) General merchandise retailers, which offers a large variety of product lines stocked in considerable depth; (b) Specialty retailers, which offer substantial assortments in a few product lines. Some previous studies have also shown a positive relationship between external Web content and firm performance (Meroño-Cerdán and Soto-Acosta, 2007). With the aim of highlighting the growing importance that firms are giving to the use of Web GIS to provide information about the location of their stores, we analyze the use of Web GIS of a large number of general merchandise retailers' websites. Table 1 shows the primary types of general merchandise retailers using the classification of Pride et al. (2014).

Table 1: Primary types of general merchandise retailers (Pride et al., 2014).

In particular, we have considered the data provided by the report "Global Powers of Retailing 2015", produced by Deloitte Touche Tohmatsu Limited (DTTL, 2015) with STORES media. This survey includes information about the 250 largest retailers around the world based on publicly available data for fiscal year 2013. Since most of these companies operate in different formats (e.g. Carrefour S.A. operates through hypermarkets, supermarkets, convenience stores, cash & carry, etc.), this report classifies these companies into several categories according to the dominant operational format included in DTTL (2015), i.e. Cash & Carry/Warehouse club, Convenience/Forecourt store; Department store; Discount department store; Discount store; Hypermarket/Supercenter/Superstore; and Supermarket.

These companies' websites have been analyzed in detail. Menus and search tools have been used to find out about the way in which these retailers provide information about their stores location. In those cases in which this information has not been directly found in the websites, a search has been performed using Google, which is by far the most used search engine provider. The searches carried out have included the company name, and the words "stores", "find stores", "store finder", "store location", "store locator", "shop locator", "shop finder", etc. Google translator has been used to facilitate the search process of those websites in which no English version is available. The results retrieved from this double search (companies' websites, and Google search), the results retrieved have been analyzed to determine whether or not these companies provide Web GIS to find their stores, and if they do, which are the characteristics of the information provided. The information has been classified according to two criteria:

- Format: This criterion makes reference to the way in which the company shows information about their stores. Three formats have been detected: List/table (A), Static Map -that often redirects to a list/table- (B), and Web GIS (C).
- Information provided: This criterion makes reference to the information provided about their stores. The following information has been detected in the same URL of websites including list/tables, static maps, and Web GIS or a direct link to them: Postal address (D), contact information -telephone/fax/email- (E), store hours (F), store services/facilities (G), directions to stores (H).

Since DTTL (2015) includes many global companies, they usually have stores in various countries, and therefore, different websites in each one. To analyze the use of Web GIS in these cases, the companies' websites of the country in which the matrix is located have been selected. In case these companies had different Web GIS, according to the operational format of their stores, the dominant operational format is considered. When companies have several brands in the same dominant operational format, we have analyzed them in decreasing order of appearance, aiming to find geographical information about their stores. Information about postal address, contact information, store hours, store services/facilities and route planner to get directions is also considered when it is included directly in the Web GIS, or textually in the same webpage, or in a direct link. Figure 4 shows the website of one of the 143 companies analyzed. As it can be seen, this company provides information about the postal address, telephone number, store hours, store services and the option of getting driving directions. This information is presented using a Web GIS powered by Google Maps ©.

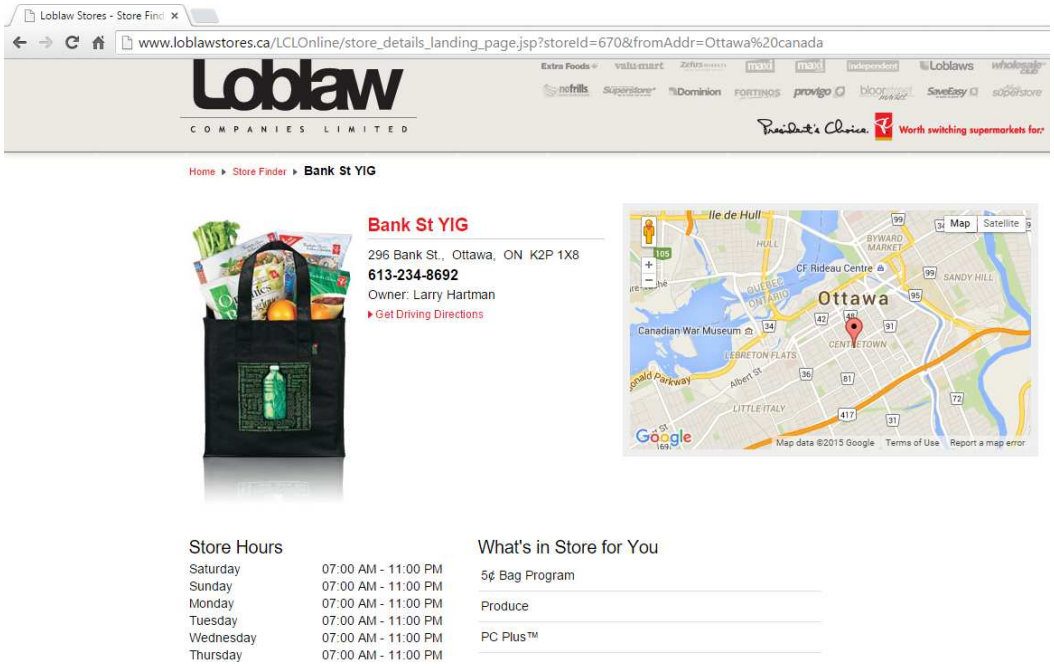

Figure 4: Store locator included in the website of Loblaw Companies Limited© (2015)

5.2. Results

Table 2 summarizes the data collected from the search performed through the websites of the companies having Hypermarket/Supercenter/Superstore as dominant operational format. According to the results obtained it can be seen as 20 out of 27 companies (74.1%) use Web GIS to provide information about their stores, whereas 18.5% use static maps, and 7.4% employ a table or list to display this information. Regarding the specific information provided, all the companies except one include the postal address and contact information. In most cases store hours are also provided. Nevertheless, less than half of the stores include information about the services they provide, or the best way to reach these locations (automatic route planner to get directions or textual information about the best routes to arrive using public or private transport). In particular, it is observed that the latter information is only supplied by some of the firms having highest ranking positions. In reference to the twenty companies providing information, which are employing Web GIS, we observe that in most cases (75.0%) Google Maps service is preferred, while Microsoft HERE (10%), Mapbar (5%), Mapbox (5%), and Yandex (5%) are the other alternatives.

Table 2: Companies having Hypermarket/Supercenter/Superstore as dominant operational format (DTTL, 2015).

In addition to the data collected from the search performed in the websites of the companies having Hypermarket/Supercenter/Superstore as dominant operational format (Table 2), the remaining general merchandising retailers included in DDTL (2015) have also been analyzed. Specifically, it has been possible to obtain information from 143 general merchandise retailers included in the report (DTTL, 2015), which dominant operational format fall under the category of general merchandise retailers: Cash& Carry/Warehouse club (4 companies); Convenience/Forecourt

store (9); Department store (23), Discount department store (3); Discount store (13); Hypermarket/Supercenter/Superstore (27); and Supermarket (64). As Table 3 shows, overall 78.3% of general merchandise retailers included in this report use Web GIS to provide information through their websites about their store location. Moreover, almost all the companies give details about their postal address and contact information, independently of the store format. Most firms include data about store hours, while less than a half of them bring details about store services and route planner to arrive the shops. Google Maps © is by far the most used maps application used in these websites.

Table 3: Summary of information provided by general merchandise retailers according to the store format.

Coming back to Table 2, it is observed that those companies having a higher volume of retail sales tend to provide customers with information about their stores using Web GIS. In fact, only two of the fourteen companies whose revenues are higher than $15,000 US$m do not use Web GIS, while the proportion using Web GIS among the companies whose income is lower than $15,000 US$m is lower: eight of thirteen. In order to analyze the relationship between revenue of these general merchandise retailers and the indicators defined above (see Table 2), a formula is considered (Equation 1). Weights of parameters included in Equation 1 are: α=1, β=3, γ=5, δ=1. Bearing in mind that a website can be only classified into one of the categories A, B, or C, these parameters guarantee that both groups of indicators (type of format and information provided) are valued equally (50% - 50%). Therefore, in the ideal case firms' websites include a Web GIS, postal address, contact information, store hours, store services, and route planner to get directions, firms' websites will score 10 points (it is the case of the website presented in Figure 4).

$$f = \alpha * A + \beta * B + \gamma * C + \delta * [(D + E + F + G + H)] \qquad (eq.1)$$

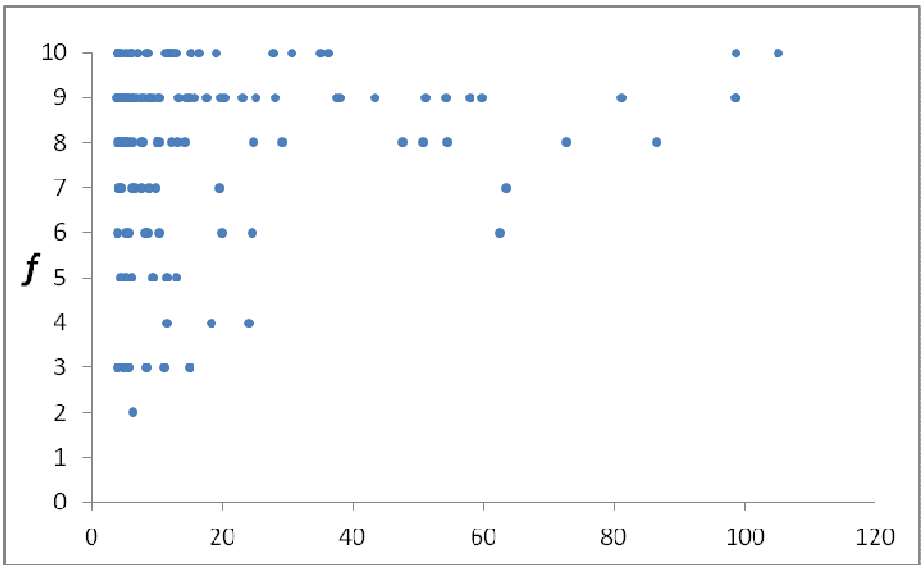

Figure 5: Relationship between revenue (*R*) and the information quality (*f*).

Figure 5 shows the relationship between the revenue of these general merchandise retailers (R) and the quality of the information provided by the firms according to the indicators defined above (f). For visualization purposes, information about the first company in terms of revenue has not been included, since its value on abscissa axis would be 476.294. It can be observed that those companies providing poor information ($f \leq 5$) are those having lower retail revenue ($R \leq 25.000$ US$m), while those having higher retail revenue ($R \geq 75.000$ US$m) offer a more complete information about the services and the location of their stores ($f \geq 8$). This tendency suggests that the use of Web GIS would be uncommon by Small and Medium Enterprises (SMEs), despite of some studies have shown that e-business use contributes positively to firm performance (Palacios-Marqués et al., 2015b; Soto-Acosta et al., 2016). That is the reason why policies to improve the quality of websites, including the use of Web GIS and information about stores, would improve the relationship between companies and clients. If the leader-follower theory were applied to this case, it would be expected that many SMEs in this sector will use Web GIS as large companies do now.

6. Conclusions

The continuous development of new ICTs facilitates the acquisition and management of IC. Currently, most companies are focusing their efforts on using social media to establish a direct communication channel with clients, i.e. to improve their relational capital. In recent years, a new discipline known as Geomarketing has emerged thanks to the advances in GIS and decision support systems. Geomarketing methods are useful tools to acquire and process information about agents (suppliers, dealers, sellers and customers) taking into account the geographical variable. These strategies allow to collect valuable information in order to identify the points where they can have maximum impact (e.g. which one is the best location for a new facility). Nevertheless, typical geomarketing strategies are not focused to establish a direct communication channel with suppliers, dealers, sellers and customers as social media do, but to determine which may be considered the best marketing channels, marketing strategies, promotional campaigns, etc. according to the spatial distribution of these agents. In addition to the internal use of GIS for marketing, many companies are incorporating Web-based Geographical Information Systems (Web GIS) to enhance their relational capital by providing intuitive visual representation the users can observe and interact with. The aim of this paper is to analyze the websites of a large number of general merchandise retailers around the world to obtain empirical evidence to know how firms are using Web GIS. According to the results obtained, most of these large companies use Web GIS to provide geographical information about the location of their stores, and other important set of data (postal address, contact information, store hours, services, and directions to stores). Nevertheless, the quantity and quality of the information provided by these general merchandise retailers is somewhat related to the company size. This fact suggests that the use of Web GIS in Small and Medium Enterprises (SMEs) is not extended. In this case, SMEs should perform an additional effort to promote relational capital by using Web GIS, bearing in mind the advantages derived from the generalized use of mobile devices (smartphones, tables, etc.), and the development of new software applications. In order to contrast this hypothesis, we have in mind to extend this analysis to SMEs. Furthermore, it is also planned to extend this study to the case

of specialty retailers. Another interesting issue to be studied could be how customers use Web GIS and to which extent Web GIS could improve the relationship between retailers and customers.

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Table 1: Primary types of general merchandise retailers (Pride et al., 2014).

Type of analysis	Description
Department stores	Large retail organizations characterized by wide product mixes and organized into separate departments
Discount stores	Self-service general merchandise outlets that regularly offer brand name and private brand products at low prices
Convenience stores	A small self-service store that is open long hours and carries a narrow assortment of products
Supermarkets	Large self-service stores that carry a complete line of food products, as well as some non-food products
Superstores	Giant retail outlets that carry food and non-food products ordinarily found in supermarkets, but also routinely purchased consumer products, i.e. superstores combine features of discount stores and supermarkets
Hypermarkets	Hypermarkets combine supermarket and discount store shopping in one location. They are larger than superstores and offer a large number of types of low-priced products
Warehouse clubs	Large-scale members-only selling operations combining cash-and-carry wholesaling with discount retailing
Warehouse showrooms	Retail facilities with five basic characteristics: large, low-cost buildings; warehouse materials-handling technology; vertical merchandise displays; large on-premises inventories; minimal services

Table 2: Companies having Hypermarket/Supercenter/Superstore as dominant operational format (DTTL, 2015).

2013 retail revenue (US$m)	Type of format			Information provided				
	A	B	C	D	E	F	G	H
	List/ Table	Static Map	Web GIS	Postal address	Contact (Tel./ email)	Store hours	Store services / facilities	Route planner (Directions)
$476,294			✓ (Google)	✓	✓	✓	✓	✓
$98,688			✓ (Google)	✓	✓	✓		✓
$98,631			✓ (HERE)	✓	✓	✓	✓	✓
$63,468			✓ (HERE)	✓		✓		
$62,444		✓		✓	✓	✓		
$57,986			✓ (Google)	✓	✓	✓	✓	
$47,671			✓ (Google)	✓	✓	✓		
$30,697			✓ (Google)	✓	✓	✓	✓	✓
$25,010			✓ (Google)	✓	✓	✓		✓
$24,601		✓		✓	✓			✓
$15,211			✓ (Google)	✓	✓	✓	✓	✓
$15,000			✓ (Google)	✓	✓	✓		✓
$12,258			✓ (Google)	✓	✓	✓		
$11,689			✓ (Google)	✓	✓	✓	✓	✓
$11,164	✓			✓	✓			
$9,349			✓ (Google)	✓	✓	✓	✓	
$8,474			✓ (Google)	✓	✓	✓	✓	✓
$8,308			✓ (Google)	✓	✓	✓	✓	✓
$8,240	✓			✓	✓			
$5,564		✓		✓	✓	✓		
$5,157		✓		✓	✓			
$5,021			✓ (Google)	✓	✓	✓		
$5,000			✓ (Google)	✓	✓	✓		
$4,733			✓(Mapbar)	✓	✓			✓
$4,539			✓ (Mapbox)	✓	✓			
$4,330			✓ (Yandex)	✓	✓	✓		
$3,863		✓		✓	✓	✓		
TOTAL	2	5	20	27	27	21	9	12

Table 3: Summary of information provided by general merchandise retailers according to the store format.

	List/ Table (A)	Static map (B)	Web GIS (C)	Postal address (D)	Contact info (E)	Store hours (F)	Store services/ facilities (G)	Route planner (H)	*f*	
									MEAN	STD
Cash & Carry/ Warehouse Club (4)	0,0%	0,0%	100,0%	100,0%	100,0%	75,0%	50,0%	75,0%	**9,0**	1,15
Convenience/ Forecourt Store (9)	0,0%	33,3%	66,7%	88,9%	77,8%	33,3%	55,6%	11,1%	**7,0**	1,94
Department Store (23)	8,7%	26,1%	65,2%	100,0%	100,0%	87,0%	60,9%	47,8%	**8,1**	2,15
Discount Department Store (3)	0,0%	33,3%	66,7%	100,0%	66,7%	66,7%	66,7%	100,0%	**8,3**	1,53
Discount Store (13)	7,7%	7,7%	84,6%	100,0%	69,2%	76,9%	46,2%	61,5%	**8,1**	2,06
Hypermarket/ Supercenter/ Superstore (27)	7,4%	18,5%	74,1%	100,0%	96,3%	77,8%	33,3%	44,4%	**7,9**	2,05
Supermarket (64)	9,4%	6,3%	84,4%	100,0%	95,3%	85,9%	40,6%	43,8%	**8,2**	1,75
MEAN	**7,7%**	**14,0%**	**78,3%**	**99,3%**	**92,3%**	**79,7%**	**44,8%**	**46,2%**	**8,0**	1,90

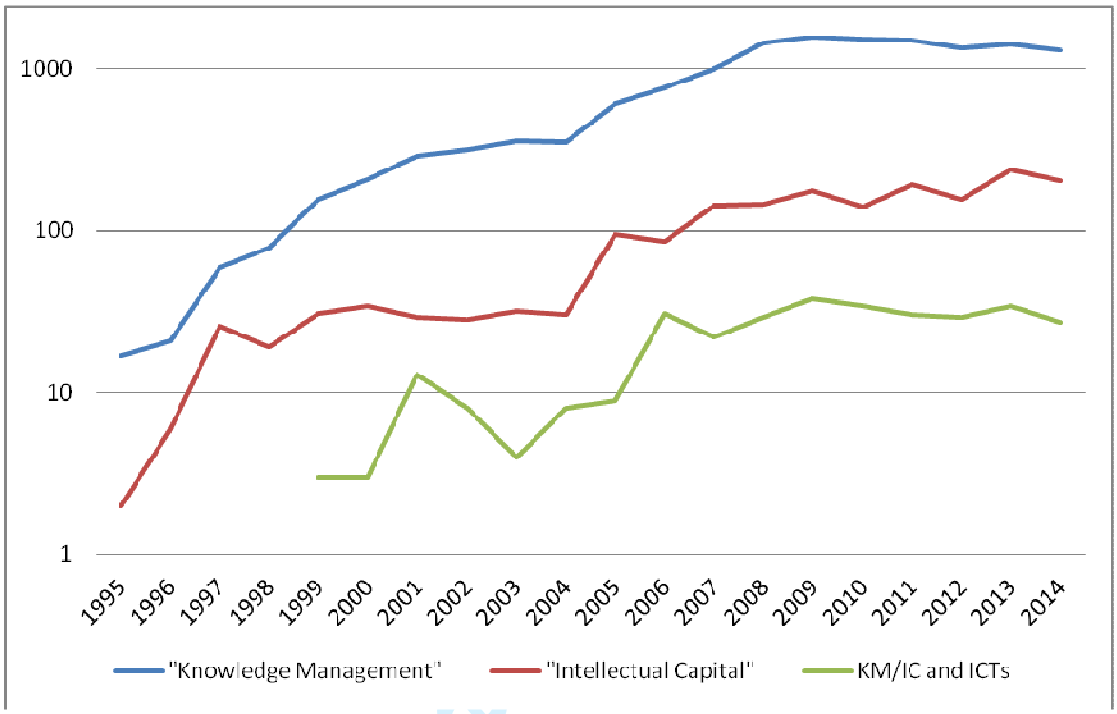

Figure 1: Number of articles, using a logarithmic scale, in Scopus database including the terms: (a) “Knowledge Management”, (b) “Intellectual Capital”, and (c) “Knowledge Management” or “Intellectual Capital” and “Information and communication technologies” in abstract, title, or keywords.

Figure 2: Using a GIS to determine the influence area of several supermarkets.

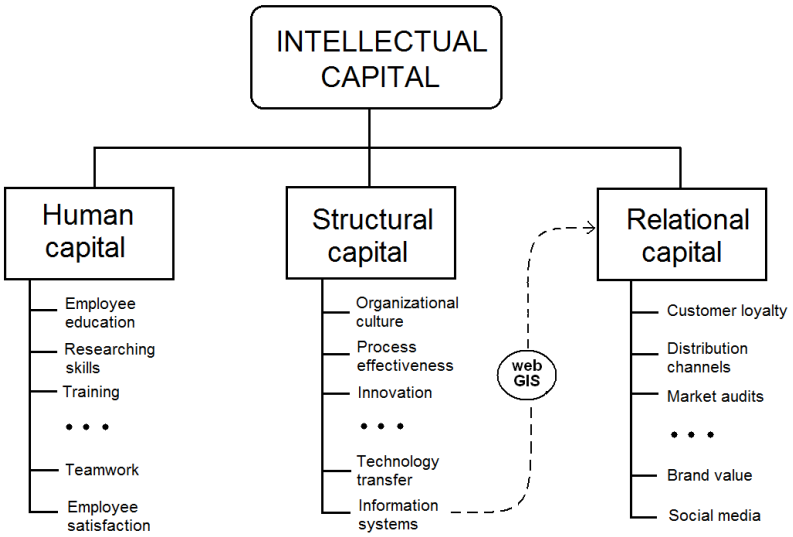

Figure 3: Use of Web GIS to enhance relational capital.

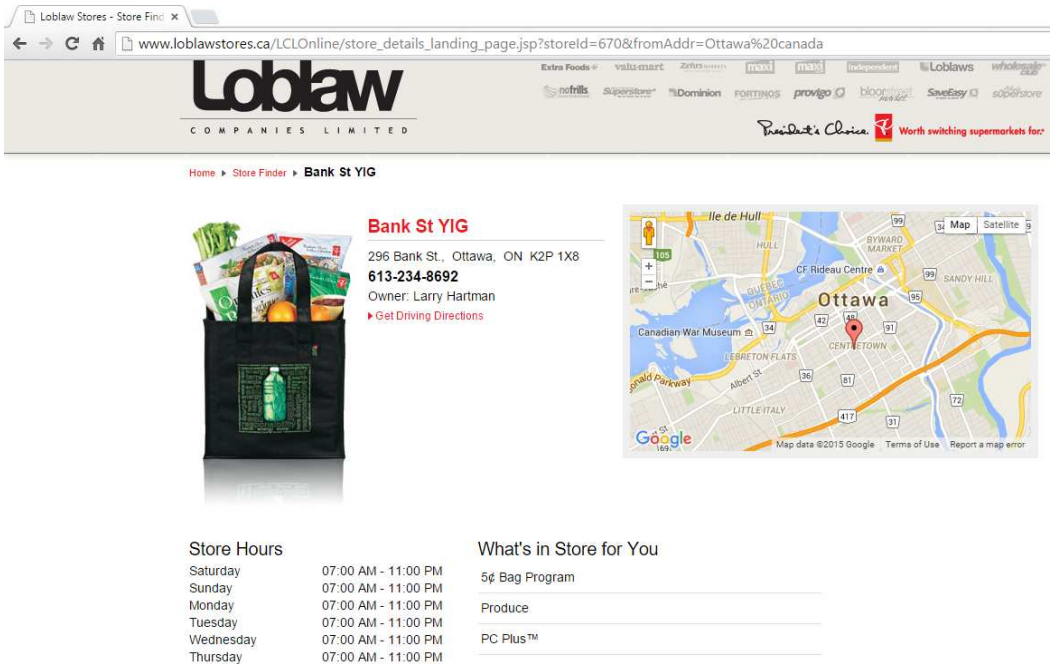

Figure 4: Store locator included in the website of Loblaw Companies Limited© (2015)