How Big Data Analytics are perceived as a driver for Competitive Advantage

A qualitative studies on food retailers

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Abstract

The recent explosion of digital data has led the business world to a new era towards a more evidence-based decision making. Companies nowadays collect, store and analyze huge amount of data and the terms such Big Data Analytics are used to define those practices. This paper investigates how Big Data Analytics (BDA) can be perceived and used as a driver for companies’ Competitive Advantage (CA). It thus contributes in the debate about the potential role of IT assets as a source of CA, through a Resource-Based View approach, by introducing a new phenomenon such as BDA in that traditional theoretical background. A conceptual model developed by Wade and Nevo (2010) is used as guidance, where the concept of synergy developed between IT assets and other organizational resources is seen as crucial in order to create such a CA. We focus our attention on the Food Retail industry and specifically investigate two case studies, ICA Sverige AB and Masoutis S.A. The evidence shows that, although this process is at an embryonic stage, the companies perceive the implementation of BDA as a key driver for the creation of CA. Efforts are put in place in order to develop successful implementation of BDA within the company as a strategic tool for several departments, however, some hurdles have been spotted which might impede that practice.

Keywords: Big Data, Big Data Analytics, Resource-Based View, Competitive Advantage, Retail Industry, ICA AB, Sweden
Definitions and Abbreviations

BDA= Big Data Analytics

CA= Competitive Advantage

IT=Information Technology

Organizational resources: “resources that include 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” (Barney, 1991, p.101)

Competitive Advantage: “a process in which the firm is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors” (Barney, 1991, p.102)

IT resources: technological resources such as tangible assets (in the form of IT hardware and software), or intangible assets such as technical and managerial IT knowledge (Melville et al. 2004)

IT tangible assets: widely available, off-the shelf or commodity-like information technologies that are used to process, store, and disseminate information (Wade & Hulland 2004)

IT-enabled resources: relations between IT assets and organizational resources (Wade & Nevo, 2010)

Emergent capabilities: capabilities that neither component can possess by itself (Wade & Nevo, 2010)

Synergies: positive emergent capabilities, or emergent capabilities that result in positive outcomes (Wade & Nevo, 2010)
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1. Introduction

1.1. Background information

We live in an era in which data are constantly proliferated and become more easily accessible. The rise of the Internet has led to a highly interconnected world, which generates an exponential amount of data that can take many forms, from meteorological calculations and health records, to social media networks and online services. Within the business field, with millions of transactions being made online and the rise of the smart-phone applications, data is everywhere, leading to an increase of a data-driven decision making in business (Harris et al., 2010). Retailers, health care providers, insurers, financial institutions and other organizations collect large amounts of data on every transaction.

The retail industry in specific shows an increasing interest in the use of data, because of the high volume and quality, stemming from Internet purchases and social-network conversations (Brown et al., 2011). Retailers use customer data to get insight into customers' needs, by using integrated customer, shopping and behavioral data and in that way they have visibility into user demographics, buying behaviors and mobile application downloads (Savitz, 2012). They are also exploiting big volumes of customer data in order to better target customers and gain loyalty, in order to personalize campaigns, coupons and offers to individual customers. Some of them use techniques to mine the huge streams of data now generated by consumers using various types of social media, measure responses to new marketing campaigns in time much quicker than the one of traditional feedback (Rogers, 2011). As a result, with the use of data, retailers can communicate directly with their customers, sell smarter and increase margins (Savitz, 2012).

Since the amount of data generated is changing, new technologies are emerging that can analyze data on a faster pace (McAfee & Brynjolfsson, 2012). That systematic analysis of data and statistics in business contexts in order to obtain useful information is called analytics (Cooper, 2012). The latest trend of Information Technology (IT) in the field of data analytics has been named as Big Data Analytics (BDA) and meets a big interest in business circles. BDA describe how companies examine large amounts of data of a variety of types in order to obtain useful information (McAfee & Brynjolfsson, 2012).

Seeing BDA in relation to traditional Analytics, one might ask how the former differ. BDA has been differently defined, something that shows the existing uncertainty towards that new concept,
which is also in stage of experimentation as far as its use is concerned. Nowadays, Big Data and BDA are viral terms that are used to define the data sets and analytical techniques in applications that are so large and complex, that they require advanced and unique data storage, management and analysis technologies (Hsinchum et al., 2012). The size of Big Data is a major differentiator from traditional data, but “big” is not just a matter of size; it might include volume, velocity or variety (Gobble, 2013). Volume is the increasing amount of business data—created by both humans and machines. Variety is also about the increasing number of data types and sources that need to be handled differently from simple email, data logs and credit card records (Preimesberger, 2011). To be more specific, the variety of Data includes both structured and unstructured data. Unstructured data lack a predefined structure and normally stem from social networks, web pages and other similar communication channels. Finally, velocity is about the speed at which this data moves from end-points into processing and storage (Preimesberger, 2011).

The use of BDA is becoming a trend and several businesses are now investing in BDA, in an initial level. A survey conducted to Fortune’s 500 biggest corporations in the United States, revealed that about 85% of respondents already had BDA initiatives planned or in progress (Kiron, 2013). The potential of BDA is foreseen as tremendous, since it can make information transparent in a higher frequency, and the collection of data and analysis can lead to better decision making, forecasting of needs and further adjustment of business. It is observed that by a consistent analysis of Big Data, firms will transform into ‘intelligent enterprises’ that will enhance their productivity and competitiveness in the market, by optimizing their operations on precise information coming from various sources combined (Caesarius & Lindvall, 2012). The BDA phenomenon is forecasted to expand even more (Parise et al., 2012), and it is also expected to further create new growth opportunities and new categories of companies (McGuire et al., 2012), by highlighting the path we are towards a more evidence-based decision making.

Although the term of BDA has been variously defined -mostly concerning the factors that differentiate them from traditional analytics-, little attention has been drawn in relation to how BDA can affect organizations’ performance, which may also be due to the recent character of the phenomenon. The benefits derived from the use of BDA have been forecasted (Savitz, 2012; McGuire et al., 2012; Brown et al., 2011), but it remains rather unexplored how this new example of IT can influence firms’ competitiveness and may lead to a Competitive Advantage (CA). This study will explore how BDA are perceived to affect a firm’s CA.
1.2. Problem Discussion

In theory, there has been a long debate on what the effect of IT in organization’s performance is and in what way IT contributes to firms’ competitiveness, but the answer remains rather unclear (Mata et al., 1995; Mellville et al., 2004; Kohli & Grover, 2008; Wade & Nevo, 2010). Although there is a recognition of the importance of IT to firms’ competitiveness, academics do not seem to agree on which the relationship between IT and business performance is, and specifically to how IT can be a driver of CA to organizations (Wade & Nevo, 2010). In specific, on the one hand, it was argued, that IT technologies are unlikely to be leading to a CA of a firm, since they are widely available to all the competition of a market (Mata et al., 1995). However, on the other hand, it was also observed that those technologies have been shown to provide capabilities which, when combined with other factors available in a firm-such as the human capital and business knowledge-, can provide a basis for realization of a CA (Kros et al., 2011; Wade & Hulland, 2004; Wade & Nevo, 2010). As Carr (2003) states, because IT has become a commodity in recent years, it is not important which technologies companies are adopting, but how they are using them. This confirms our approach to focus on how BDA are used and perceived to make an organization more competitive, because that perception influences the way in which an organization uses BDA and vice versa.

Given that BDA is a very recent example of IT, the existing debate becomes even more acute when it comes to such a powerful tool: BDA can provide a firm with an amount of data that could not even be conceived a few years ago (McGuire et al., 2012). Firms have now access to the most capable information tools so far, but the path between those technologies and CA for firms is rather unexplored. The purpose of this study is to explore how BDA are used and perceived to affect a company’s CA. By using the theory developed so far about IT as guidance, we will explore a very recent IT example, the one of BDA. The study will be focused on the retail industry, because it is an area of great interest due to the high volume of data being used for analysis (Greengard, 2012), since, as mentioned above, retailers use BDA to analyze various sources from customers’ data in order to get insight to buying behaviors, personalize offers and increase margins (Savitz, 2012). Knowledge on how BDA are perceived to lead to CA will contribute to richer insights into the persisting theoretical problem concerning how IT can lead to firms’ CA. Since the contribution of IT to business performance is yet unclear (Kohli & Grover 2008), empirical evidence on how organizations perceive this new and powerful IT example, will also contribute to the existing debate. The research also contributes to information management by increasing the theoretical and practical understanding of how BDA can affect firms’ competitiveness and it helps to understand
the role of such an IT application within a company. Practical implications, useful for organizations engaging on BDA are the provision of an overview about that recent phenomenon, and helping organizations on what to expect concerning use of BDA and how this will affect their competitiveness. This study will help those companies interested in BDA, to better understand how those can increase their competitiveness either before investing to such a technology, or also after, in understanding how it should be better used in order to lead to a competitive advantage.

1.3. Research question
The previous discussion leads to the main question of the present research which is the following:

“How are Big Data Analytics used and perceived by an organization to affect its competitive advantage in retail industry?”

In order to answer that question, we will first provide an overview of the existing literature debate on IT and how it has been seen in research as a driver for a CA and will then link the theory to the emerging IT example of BDA and see how BDA are used in retail and perceived to affect the competitiveness of a firm in our given case. In order to do so, we are going to test a conceptual model developed by Wade and Nevo (2010) through a case study in the retail industry. Wade and Nevo (2011) tested already their model through a quantitative study on customer services and found out that when an IT asset is combined with other organizational resources, the developed synergy may provide a CA for the company. However, we believe, supported by Saunders (2009), that in order to understand in depth this new phenomenon and the concepts expressed in the conceptual model, a questionnaire with closed questions is not reliable enough, even if statistically valid. Thus, we chose a different approach, which is to test Wade & Nevo’s model (2010) with a qualitative study, with open questions and a focus on a specific industry, to see if it applies concerning the use of BDA in retail and firms’ competitiveness.

1.4. Thesis Disposition
The thesis is structured as follows: the present section introduces the research study. It contains information in order to provide a background to the research area and formulated the research question. Section 2 continues with a discussion of literature. It presents the existing literature debate on how IT can lead to a CA, to conclude by linking that literature to the emerging IT example of BDA. Then, section 3 presents the type of research, the selected strategy behind and the selection of cases. It also explains the data collection strategies and their analysis, to conclude with the
limitations and validity of the present study. Section 4 provides the data collected, and section 5 analyses the information gathered from a theoretical perspective, in order to give an answer to the research question, and draw relevant discussions. Finally, section 6 constitutes the concluding section of the present thesis; concluding remarks are presented, along with limitations of study and suggestions for further research.

2. Literature Review

2.1. Contribution of IT to Competitive Advantage

IT has become an integral part of modern organizations and it has changed many business processes. However, researchers and practitioners have struggled to pinpoint its contribution to business performance (Kohli & Grover 2008). The increasing attention in literature on IT and how it can affect firms’ competitiveness is due to the big investments made in IT and the subsequent need that comes with knowing how those investments can bring value to organizations. The value of IT in research is underpinned by a Resource-Based View (RBV), which is applied to understand the relationship between IT and organizational performance. The RBV provides a strategic framework to assess the competitiveness of organizational resources and how they can lead to a CA (Barney, 1991; Penrose, 1959; Wernerfelt, 1984). However, despite a significant amount of research during the past two decades, the results on IT’s business value are rather mixed and there is an ongoing debate about whether IT improves firm performance and in what way (Kohli & Grover, 2008; Wiengarten et al., 2013). Hence, the role, if any, that IT plays in supporting firm strategies, remains unclear (Piccoli & Ives, 2005).

2.1.1. Resource Based view

The Resource Based View of the firm was developed firstly by Penrose (1959) who stated that the uniqueness of a firm is established on the unique combination of its resources. Since then, several scholars debated the role and the functions of resources within organizations. Wernerfelt (1984) had yet started to link the use of resources to the performance of the firm. Indeed, he affirmed that firm’s performance is determined by the resources it owns. Moreover, Penrose (1959), first, and Tsoukas (1996), later, stressed that resources cannot be seen as something predefined, but, instead, they provide different services to the company based on the way companies use them.
Organizational resources are defined as "resources that include 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" (Barney, 1991, p.101).

Therefore, resources are factors that can either be tangible or intangible (Helfat & Peteraf, 2003), with physical (tangible) ones being for instance a plant or equipment, and intangible ones being customer relationship, know-how, or brand-name recognition. Those resources may allow a firm to achieve a CA. Barney (1991) defines CA as "a process in which the firm is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors" (p.102). This definition, given by Barney (1991), points out that in order to lead to CA the company must own resources with four characteristics/attributes, (Barney, 1991): they have to be valuable, rare, imperfectly imitable and non-strategically substitutable.

*Valuable* means that the resource must enable the company to develop a value-creating strategy, improving its efficiency and effectiveness. In other words, the resource must be used in a way that leads to a costs reduction or to the development of new products/services. *Rare* means that not all the companies can own this resource; by definition, indeed, a firm is implementing a value-creating strategy, and so a CA, if and only if this strategy is based on resources that competitors cannot possess. *Imperfectly imitable* means that competitors cannot copy or imitate the resource; it might be hard for the competitors to understand the link between the resource and the CA and consequently, hard to act in order to imitate firm’s strategy. Lastly, *not strategically substitutable* means that two different resources that can be exploited separately in order to implement the same strategy do not exist (Barney, 1991).

RBV theory indicates that the resources that meet those criteria could lead to sustained CA. Then the concept of complementarity of resources described by Milgrom and Roberts (1995) explained how different resources can complement each other and enhance business value. Accordingly, it was stated that the value of the organizational resources can increase in the presence of complementary resources because it is more difficult for those to be copied by competitors (Bharadwaj et al., 2007). Regarding IT, Clemons and Row (1991) used complementarity in order to explain how technology can be considered as a source of value when leveraged with some other resources. Moreover, Kettinger et al. (1994) overcame the issue of the paradoxical nature of technology in its contribution to business value because they stated that the combination between IT
and complementary resources like structure, culture, etc. make difficult for competitors to duplicate it.

2.1.2. Information Technology resources and competitive advantage

As we saw above, the strategic potential of the resources in the RBV depends on the existence of the four properties of value, rarity, inimitability and non-substitutability. Following the logic of RBV, IT resources are defined as technological resources such as tangible assets (in the form of IT hardware and software), or intangible assets such as technical and managerial IT knowledge (Melville et al., 2004). IT tangible assets differ from intangible ones because of their physical nature and from the fact that they can be bought from vendors. Their definition can be summarized as following: IT tangible assets are widely available, off-the shelf or commodity-like information technologies that are used to process, store, and disseminate information (Wade & Hulland, 2004).

By linking those IT resources with the strategic potential they can provide, IT assets, being seen as tangible commodities that everyone can have access on, have never been seen as able to affect CA because they do not embody the four properties (Mata et al., 1995; Wade & Hulland, 2004), whereas intangible ones may possess these properties (e.g., IT management skills are firm specific and cannot easily be traded or transferred; Mata et al., 1995). Subsequently, it has been observed, that IT intangible resources—and not tangible ones— have been so far at the center of IT-based RBV research (Wade & Nevo, 2010), and empirical evidence shows that many IT intangible resources can provide organizational performance gains (e.g., Bharadwaj, 2000; Tanriverdi, 2006).

In specific, it has been argued that since IT has become commonplace, standardized, and available to all competitors, its potential as a source of differentiation has diminished (Clemons & Row, 1991; Champy, 2003). This statement was also developed by Mata et al. (1995), who had stated that technology assets such as networks and databases are unlikely to be leading to a CA, since they could be easily procured in factor markets, so if a firm owns a resource that is possessed by numerous other competing firms, that resource cannot be a source of CA (Mata et al., 1995).

However, combining hardware and software assets to create a flexible IT infrastructure can be inimitable, because creating such an infrastructure requires carefully melding technology components to fit firm needs and priorities (Ross et al., 1996). In addition to a sophisticated IT infrastructure, skilled human resources, relationships between the IT department and user departments, and managerial knowledge are valuable resources that are positioned to be of strategic value (Mata et al., 1995). As Barney (1991) specified, many competitors can possess the same physical technology but only one of them might own the social resources that are needed in order to
exploit IT assets and implement a valuable strategy in the same way. For example, Barley (1986) conducted a study in which he compared two different radiology departments that were using the same scanners, discovering that, due to different “social” resources, the two departments not only had a different level of efficiency, but also had two different organizational structures.

Therefore, although tangible IT assets usually do not directly induce CA, these technologies have been shown to provide capabilities that may lead to enhanced performance of a firm (Kros et al., 2011; Wade & Hulland, 2004). This is based on the argument that the effects of IT innovation adoption occur at the functional/operational level via enhancing various aspects of efficiency and effectiveness (Grant, 1991). As it is argued, the ability to leverage these assets can be indeed a strategic differentiator (Bhatt & Grover, 2005). When those IT assets are combined with additional organizational resources, the adoption of off-the-shelf technologies may provide the basis for a firm to realize CA (Mata et al., 1995; Wade & Nevo, 2010; Hazen & Bird, 2012). Indeed, Wade and Nevo (2010) developed a conceptual model that describes how IT assets can lead to the creation of CA by employing the concepts of synergies and strategic potential. They also tried to find empirical consequences of the model developed by testing it through survey data on IT-enabled customer service departments (Wade & Nevo, 2011).

2.1.3. Conceptual model

Wade & Nevo (2010) argue that the research made so far, underestimates the fact that IT assets cannot be considered in isolation, by saying that the fact that IT assets are widely available and that they are regarded as commodity products does not tell the full story of their business value. Instead, they argue that IT assets derive their business value from the impact they make on the organizational resources with which they interact. They name those relations between IT assets and organizational resources, as IT-enabled resources. The interactions between those two components, (IT assets and organizational resources), develop emergent capabilities—that are, capabilities that neither component can possess by itself (Wade & Nevo, 2010). This concept helps in understanding that an IT-enabled resource cannot be considered only as the sum of its components and so, it cannot be explained just with the aggregation of the capabilities of its constituent components. Instead, it can only be explained in its totality (i.e., by considering the relationships among its components).

In order to be beneficial Wade and Nevo (2010, p.168) believe that an emergent capability must show “the potential to help an IT-enabled resource achieve organizational tasks or goals”. If this is
the case we expect that the relation between the components will be synergistic. Thus, synergies are defined as positive emergent capabilities, or as emergent capabilities that result in positive outcomes. For instance increased efficiency and enablement of new processes are examples of synergistic outcomes that can be associated with IT-enabled resources. However, even if they are not able to define the concept of synergy more concretely, when they tested it, Wade and Nevo (2011) used a quantitative approach instead of a qualitative one. This leads to a possible decrease in the reliability of their results because it is not feasible to test abstract definitions with statistic elements (Saunders, 2009).

Organizations have a tendency to anticipate in advance how IT-enabled resources will help the organization achieve its goals. They therefore anticipate some potential synergistic relationships between IT assets and other resources and they invest in an IT asset if it appears to functionally complement an organizational resource (Wade & Nevo, 2010). In order for a potential synergy to become realized, two enabler conditions must be present: compatibility and integration (see Figure 1).

Compatibility has been defined as “the ability of an organizational resource to apply an IT asset in its regular activities and routines” (Wade & Nevo, 2010, p.170) and IT asset-organizational resource integration effort as “activities taken by the organization’s management to support, guide, and assist the implementation of the IT asset within the organizational resource” in a manner that is congruent with the organization’s goals (Wade & Nevo, 2010, p.173). If those two enabling factors of compatibility and integration apply, then we have an actual synergy.

After the concept of realized synergy, Wade and Nevo (2010) extended a causal chain from this synergy to strategic potential and finally to CA, based on the RBV as explained above. The creation of synergy is supposed to positively affect the strategic potential of IT-enabled resources that acquire value, rarity and inimitability and in this way create CA (see Figure 1). The relation of synergy with each of those four strategic properties was explained as following:

a) Value Property
It is suggested that synergistic IT-enabled resources are likely to be considered valuable, because synergies may allow an organization to use an IT-enabled resource to capitalize strategic opportunities or diverge from potential threats (Wade & Nevo, 2010). For example, if a customer service department uses an IT asset -like for instance a client management system, to store and
access information about clients and their desires - then it may be possible to custom-fit a new product or service to a group of customers with a certain profile (Wade & Nevo, 2010). Also, if a CRM department uses an IT asset that analyses data and reveals intentions of a customer to switch to a competitor, it can foresee this threat and try to keep the customer within the company. By those means, the IT-enabled resources which were created from the synergies between those departments with the IT-assets are considered to bring value to the organization.

b) Rarity

It is also suggested that a synergistic relation between IT asset and organizational resources might produce a rare IT-enabled resource. Indeed, even if the IT asset is not rare in the market and several companies can buy it, this does not mean that all of those companies can develop certain IT-enabled resources, which makes them rare to obtain (Wade & Nevo, 2010). For example, a study conducted by Clemons and Row (1988), presents the case of two companies, McKesson and Bergen, that, even if they were using the same IT assets, achieve different performances thank to the synergistic relation that only one was able to develop. In particular, only the sales department of McKesson developed a new, more lucrative, consulting service, an example that highlights the rarity of the IT-enabled resources. Therefore synergistic relations can also be considered as rare.

c) Inimitability

Moreover, Wade and Nevo (2010) affirm that a synergistic relation between an IT asset and an organizational resource might result in an inimitable IT-enabled resource. Indeed, even though an IT asset can be widely available with a commodity-like nature (Mata et al., 2005), it might develop complex systems with other organizational resources that will be hard to imitate for competitors. In fact, competitors may possess both IT-asset and the organizational resource, but, due to complexity, they might not be able to understand the nature of the relation between them and thus, to develop the same relation in order to achieve the same performance.

d) Non-substitutability

An organizational resource is considered substitutable if other resources can be used to implement the same strategy (Barney, 1991). Wade and Nevo (2010) did not find a link between synergy and non-substitutability. Different organizational resources or combinations of resources could conceivably be used to achieve the same organizational outcomes as the IT-enabled resource; therefore this fourth attribute of non-substitutability does not apply in the case of synergistic relations between IT and other resources.
Those attributes of value, rarity and inimitability are important for the creation of CA for companies because they confer strategic potential to firms’ organizational resources. Therefore, those companies who own those kinds of strategic resources can implement strategies that are unavailable to their competitors. Further, the CA is sustained when the strategies cannot be duplicated by the firms’ current and future competitors (Barney, 1991). Strategies are based on collections of organizational resources and, as such, their ability to confer a CA and sustain it depends upon the strategic potential of those resources. Therefore, the ability of an IT-enabled resource to generate sustained competitive advantage and affect performance is contingent upon the above properties.

Conceptual Model on the creation of Competitive Advantage through the development of synergies

![Conceptual Model](image.png)

Figure 1 - Source: Wade and Nevo (2010), p.171

2.2. Big Data Analytics and Competitive Advantage

By following the model mentioned above of Wade and Nevo (2010) of how IT assets may contribute to firms’ CA as our guidance, we link the concept of IT assets to BDA.

2.2.1. Big Data Analytics as an IT asset

BDA require new tools for analysis and we have witnessed a sharp rise in dedicated appliances for high performance analytics: databases for fast query results and open-source tools for high-speed analytics against various types of BDA sources. Those are information assets, which companies buy from vendors, like databases and software. They are, in other words, off-the shelf or commodity-
like information technologies that are used to process, store, and disseminate information (Wade & Hulland, 2004) and therefore meet the definition of an IT asset adopted on the present paper. In addition, as stated by Wade and Nevo (2010), even some IT assets that are customizable, and, as such, may not be regarded as completely undifferentiated, they are still considered commodities since they are not protected by isolating mechanisms. Therefore, even if companies can sometimes acquire BDA assets and customize them, they can still be considered as IT assets.

2.2.2. **Big Data as a Driver for Competitive Advantage**

By following the model presented by Wade and Nevo (2010) as guidance and by considering BDA as an IT asset we are going to investigate how BDA are perceived by an organization’s management as a potential source of CA. To be specific, our investigation will focus on the synergies that might arise between BDA and other organizational resources. Concerning what other organizational resources can relate with the BDA, those can be for example the IT department and other departments, such as Marketing Department, Customer Relationship Management Department (CRM), Sales Department, Logistics Department etc. Other resources can be the companies’ human capital, people’s skills and knowledge, IT-Business Partnership etc. We will use concepts derived from the adopted model; we will investigate whether the two enable conditions of compatibility and integration exist in the system created by the relation between BDA and other organizational resources and whether synergies are expected to be realized. Those synergies, being the positive relationship between BDA and other resources, can enable their strategic potential.

3. **Method**

3.1. **Research type**

The present study will test if the model proposed by Wade and Nevo (2010) applies in the industry of food retailers in the case of BDA. Wade and Nevo already published in the 2011 a research where they tried to test their model empirically. However, they did that in a different industry, customer services, so we believe that there is still room for a better understanding of their model in such a different environment. The strategy employed is the one of two case studies because we want to get a rich understanding of the relative processes enacted and a case study could potentially provide us with the answer of how something happens, and in that case, how BDA are perceived to contribute to firms’ CA (Saunders et al., 2009, p.140). We select two cases and investigate them in depth, in order to find answers to our research question. The research involves two cases to be studied, because application of BDA is a relatively new phenomenon, which might also have a
subjective and unclear definition: in a study conducted by The Data Warehousing Institute (TDWI) in 2011 most participants were familiar with something resembling BDA, but only 18% used the term “Big Data Analytics” for this (Russom, 2011). This problem along with the novelty of the whole phenomenon itself has made the application of BDA less easy to identify.

3.2. Selection of cases
The case studies we chose refer to the big food retailers in Sweden and Greece, ICA AB (Euromonitor International Passport, 2012) in Sweden and Masoutis S.A in Greece respectively. By big we refer to their market share in the industry. The option of those countries was made of two reasons: first, they are known to be countries which are on the front of innovation and adopt quickly new technologies (Florida et al., 2011). Second, it was easier for us to conduct the research in those countries due to geographical proximity reasons. The reason why cases from the retail industry were chosen to be studied is because retail industry is one of the industries that in research has been emphasized as engaging the most with investing to BDA and it is also one area that witnesses the most beneficial impacts of BDA (Brown et al., 2011). There is an emphasis on qualitative study and analysis because it is considered helpful to explain a phenomenon and the way it is perceived to affect an organization. Thus, ICA AB and Masoutis S.A fit the profile of study, they were selected due to their relevance to the theoretical issue being researched and were used as an example for theory (Denscombe, 2003), as both have acknowledged to be using BDA systems.

3.3. Data Collection and Analysis
Data were collected through personal interviews with responsible managers at ICA Headquarters in Stockholm and Masoutis Headquarters in Thessaloniki, especially with interviewees coming from IT and Marketing Departments. Moreover, additional data contributing to our analysis were five phone interviews, annual reports, retail industry reports, specialized journals and newspapers.

In specific:
Concerning ICA, two personal interviews were conducted with responsible managers, one from BI/IT department and one from the CRM department (part of Marketing department). The first interview was conducted with Olof Granberg, who is software architecture manager in Business Intelligence and IT Services department and his responsibility is to find technical solutions that match business needs. The second interview was conducted with David Holmstrand, chief CRM manager, who is in charge of several of the areas where customer data is refined to valuable knowledge and, in turn, to actions. Among his responsibilities are personal offers (1-to-1) and
providing customer insights internally and externally (e.g. with suppliers). In addition, four phone interviews with managers of ICA stores in Uppsala were conducted (ICA Supermarket Alvikstorg, ICA Supermarket Samköpt, ICA Supermarket Torgkassen and ICA Nära Folkes Livs), in order to get their perspective on the topic and see if they have access to BDA practices.

Concerning Masoutis, one interview was conducted with the Marketing Director of the company, Apostolos Filaktos, who is responsible to supervise all marketing activities of the company, including Data Analysis for marketing purposes and a phone interview was conducted with Katerina Papadopoulou, employee within the Data Analysis department.

The choice of these departments was based on their involvement in the BDA process. Since we wanted to investigate the perception of the companies relating to BDA, we wanted to retrieve two aspects that can lead to a better perception: an IT perspective and a business perspective. A perception of a retail company on BDA is efficiently represented by the perception of the IT department and the CRM/Marketing department for the following reasons: the IT department is the one mostly responsible on BDA and it also gets to work with different other departments of the company, and the CRM/Marketing department is the department which employs the most the results coming from BDA. Furthermore, since the use of BDA is still on an embryonic level, it is not deeply rooted in the organizational processes, only a few people are involved with BDA and therefore the role of management at this stage is crucial. The people interviewed could provide us with an understanding of how their departments work with BDA as a whole, because of their position regarding BDA projects. For those reasons we chose to conduct the aforementioned interviews.

The interviews were organized in a semi-structured and informal way, in order to gain more flexibility during the discussion and point out areas of specific interest more extensively (Saunders et al., 2009). The flexibility was needed to explore the complexity and dynamics of the topic. Moreover, since the study takes on a relatively new topic, semi-structured interviews are advantageous because they allow the interviewees to explain their response and lead the discussion into areas not thought of before (Saunders et al., 2009). The interviews lasted approximately one and a half hour each and they were conducted in English with ICA, because the authors are not fluent in Swedish, and in Greek with Masoutis, because one author is a native Greek speaker. There were no barriers of communication since all the ICA interviewees were fluent in English and the Masoutis ones were Greek native Speakers.
The interviews were mainly comprised by two parts: a first part which aimed to a general orientation, and a second one with a more intense focus on BDA as an organizational asset and how it is perceived to affect the organization’s competitiveness. The semi-structured questions of both parts were the same in all interviews (see Appendix I), they were used as guidelines, but there were further explanatory questions in each case, to avoid misinterpretations. The first part included mainly general questions about what BDA are, how they employ the result of their analysis and why they started using them. It was also asked which tools are used for BDA, which data they select and why, and whether they are satisfied with their BDA operations so far (see Appendix I). In addition, the description of a specific BDA project was requested, in order to gain a deeper understanding of how they work with them. The second part was more specifically focused on testing the model as described in section 2. Indeed, we asked questions related to the actual management and analysis of Big Data and if and how they perceive them to affect firm’s performance. We asked how BDA are implemented and what the management’s involvement is, in order to understand if the enabler conditions (compatibility and integration) were effectively present. It was also asked whether BDA can be seen as an independent source for CA, which the relationships between BDA as an IT asset and other organizational resources are and how BDA are perceived to make the firm more competitive (Table I and Appendix I).

The following table (Table 1) presents the questions asked, their purpose, and for the ones stemming from the model it shows which constructs we intended to capture:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part 1 - Orientation interview</strong></td>
<td></td>
</tr>
<tr>
<td>Can you tell us in a few words what position you own within your organization and what you are responsible for?</td>
<td>Understanding of the position and responsibilities of the interviewed</td>
</tr>
<tr>
<td>How would you define Big Data?</td>
<td>Understanding if the definition we used was coincident with the one used within the company</td>
</tr>
<tr>
<td>Is your company analyzing Data referred as Big Data already in a functional way?</td>
<td>Understanding at which level of development the company was in the use of BDA</td>
</tr>
<tr>
<td>a. What systems are you using in order to analyze Big Data?</td>
<td>Understanding if the company was using structured or also</td>
</tr>
<tr>
<td>b. What are the sources where you gather Data from? Do you use</td>
<td></td>
</tr>
<tr>
<td>Social Media as a source?</td>
<td>unstructured data</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>c. Which data do you select and what for?</td>
<td></td>
</tr>
<tr>
<td>a. In which areas do you employ the results from the Analysis of Big Data?</td>
<td>Understanding the general idea that is behind BDA projects in the company</td>
</tr>
<tr>
<td>b. Do you have any specific questions behind that you are looking to answer?</td>
<td></td>
</tr>
<tr>
<td>c. Before adopting Big Data Analytics, did you predict where it could contribute best?</td>
<td></td>
</tr>
<tr>
<td>a. Can you describe us any ongoing Big Data Projects?</td>
<td>Understanding in depth the characteristics of a BDA project</td>
</tr>
<tr>
<td>b. Who was the one that decided the implementation of Big Data projects?</td>
<td></td>
</tr>
<tr>
<td>c. Are the people working in those projects coming from the IT department or elsewhere?</td>
<td></td>
</tr>
<tr>
<td>What is the main reason why the company started employing Big Data Analytics? What did they expect to find?</td>
<td>Understanding of the strategy behind BDA</td>
</tr>
<tr>
<td>Are you satisfied so far with the results you get of Big Data Analytics? Do you face any problems in their implementation?</td>
<td>General idea about results and potential problems</td>
</tr>
</tbody>
</table>

**Part 2 - Core interview**

| Do you know if your competitors are also engaging in the analysis of Big Data? | Understanding the company awareness of the competitive field |
| Can people from your department employ Big Data systematically, in their regular activities and routines? Can you have daily interactions with Big Data Analytics if needed? Can you give us an example of how these interactions happen practically? | Capturing the presence of the first enabler condition: compatibility |
| a. Were there any activities taken by the organization’s management to support, guide, or assist the implementation of Big Data within ICA? What kind of activities? b. Do you think that uses of Big Data and other organizational resources share the same goals? Are they the same with the goals of the company? | Capturing the presence of the second enabler condition: integration effort |
| a. Is the adoption of a Big Data Analytics system by itself capable of producing a competitive advantage that will last over time? (By this term we mean just the Big Data software and tools as bought from the IT vendors) b. (if not), what other organizational resources are needed to be combined with Big Data Analytics in order to give this advantage against competitors? | Capturing the presence of synergy |
| Does Big Data Analytics together with its interactions with your department provide value to your company? Is there a situation in which Big Data allow you to capitalize strategic opportunities? | Capturing the presence of the first factor of the strategic potential: value |
Do you consider your department able to develop new products/services that are not present in the competitors’ offer thanks to the collaboration with BI department and the use of Big Data?
Can you give us an example?

Capturing the presence of the second factor of the strategic potential: **rarity**

<table>
<thead>
<tr>
<th>Do you think that those innovative products/service you developed can be imitated by your competitors in an easy and quick way or not? Could you give us an example?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capturing the presence of the third factor of the strategic potential: <strong>inimitability</strong></td>
</tr>
</tbody>
</table>

a. Do you see Big Data Analytics as a way to enhance the firm’s competitiveness?
b. Do you see Big Data Analytics as a way for the company to gain an advantage against its competitors?

Capturing if the company experienced the last step of the model: **creating CA**

<table>
<thead>
<tr>
<th>Would performance of your department be affected, had we removed the use of Big Data Analytics? If yes, how?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding the importance of BDA within the company</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How do you picture your company using Big Data in 5 years?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision of the future</td>
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</tbody>
</table>

**Table 1 – Questions and purpose**

Notes were taken during the interviews and there were two complementary interviews with the ICA managers for some further questions which arose after the conclusion of the first one. Then, a report was drafted containing the information gathered from the interviews and all the interviewees were asked to review it and provide further feedback if necessary. This was done in order to reduce the risk of subjective interpretation of the interview data. The feedback provided confirmed the content of the reports. Regarding the data gathered through reports, journals and newspaper, a scanning of all the Year-End Reports and all the Annual Reports published by the two companies from 2008 was made in order to find relevant information regarding their BDA projects. The articles found in Swedish were translated both by a Swedish native speaker colleague of ours and from an online translator. Accordingly, the translation of reports, questions and answers between English and Greek were also conducted from the native Greek speaker co-author and the use of an online translator.

An analysis of the data gathered from the interviews was made on their content, by getting first a deep understanding of the data available and assessing their quality. The data were organized into two coherent categories after they were collected, in accordance with the sequence of the questions asked as presented above: the first category concerns **the implementation of BDA** and it gives information about BDA projects, the human capital involved, the top management’s involvement in BDA, the access of resources in the use of BDA and perceived hurdles arisen in their implementation; the second category contains data of **how BDA is perceived as a driver for CA**. The
data were systematically analyzed and carefully re-read, then condensed and matched with the concepts developed in the literature review. The focus of the analysis was to respond to the research question and the data were organized by question to look across both respondents, in order to identify consistencies and differences. The data categorization brought meaning to the text and gave a three-fold structure to the analysis, which comes in accordance with the three main stages of the model, as described in the theory section (see again Figure I); those three categories of analysis are: 1. Creation of potential synergy and enablers for actual synergy, 2. IT enabled resources and strategic potential, 3. IT enabled resources and competitive advantage. Hence, the method of analysis chosen for this thesis draws upon the interpretation and synthesis of findings that emerged from the investigations of the individual interviews.

3.4. Reliability and Validity of research

As it is normally the case with semi-structured or in-depth interviews as a strategy for collecting data, the validity of this study can be influenced by several factors. The most important include the willingness from interviewees to cooperate, provision of limited information due to reasons of secrecy and the application of some relative concepts, such as “to enhance competitiveness or performance”, or the notion of competitive advantage. The last factor that can limit the research validity will be tried to be eliminated by defining all concepts within the context and for the purposes of the research, and making sure that they coincide with the ones perceived and used by the interviewees during the selection of data. Another limitation is the existence of bias, since the research is concentrated on how the interviewees perceive a given situation and that can differ within different people, different organizations or different industries. In order to improve the validity of the data gathered through the interviews a triangulation with information collected from corporate reports, industry reports, specialized journals and newspapers was made. A triangulation, as stated by Saunders et al. (2009), “is the use of two or more independent sources of data or data collection methods to corroborate research findings within a study” (Saunders et al., 2009, p.154). It is a methodology highly recommended when the type of research is a case study conducted through semi-structured interviews (Saunders et al., 2009). The present study is concentrated in the specific industry of retail in the Swedish and Greek markets, and it is also based on the way a phenomenon it is perceived to affect a specific organization. Therefore we reserve our doubts on whether the results can be generalized under different contexts and different industries.
4. Case studies
This section includes the data collected from the case studies ICA AB and Masoutis S.A. The data are presented as mentioned above into two broad categories, which are in accordance with the questions and the order those were posed (Table I). Those are: BDA implementation within the firms, in order to understand the way they use BDA and BDA as a driver for CA, in order to retrieve their perception of the correlation between BDA and firms’ competitiveness.

4.1. ICA Case Study
ICA AB is one of Northern Europe’s leading retail companies, with nearly 2,150 stores in Sweden, Norway, Estonia, Latvia and Lithuania. Since 1938, ICA AB has been supplying a wide range of fresh foods to locations throughout Europe. ICA Sverige AB is the Swedish subsidiary of ICA AB and it has a strong and comprehensive national presence in grocery retail. It had 1,375 outlets in operation in Sweden at the end of 2010 (Euromonitor International Passport, 2012) and it is the leader in grocery retailers with retail value share of 36% (Euromonitor International Passport, 2012). ICA Sverige AB operates around the country in cooperation with independent retailers. The retailers own and manage their own stores, but have agreements with ICA Sverige AB in a number of important areas.

As mentioned above, the first interview was conducted with Olof Granberg from the IT department, and the second one was conducted with David Holmstrand, chief CRM manager. The phone interviews were conducted with the managers of the aforementioned ICA stores in Uppsala, who all preferred to stay anonymous.

4.1.1. ICA case is a Big Data Analytics case
ICA Sverige AB (from now on referred as “ICA”) constitutes a BDA case and the firm acknowledged the Analytics systems they use as BDA systems. Big Data were defined the same way as on the present study from the IT/BI department of ICA, characterized by the three Vs (Volume, Velocity and Variety). Concerning how those three characteristics apply in the case of ICA, the following was stated:

*Volume* is related to the amount of information (transactions) that companies deal with on a daily basis; ICA defines one transaction as one line on one receipt, for instance: two bottles of milk for one customer in a specific purchase is one receipt line. However, it’s a hard concept to define
precisely because it depends on the kind of business we are considering; for some businesses, for example, 10 million transactions per day are a huge amount of data, for others, instead, like the bank industry, are not. ICA is claiming to use 50-100 millions of transactions for analysis on a daily basis (Granberg, 2013).

*Velocity* regards both how fast data moves and how fast customers’ behaviors change; “if ICA is able to be there when those behaviors change we might have a huge advantage. Being on the top of that wave has a big impact on firm’s performance”, Olof Granberg reveals.

*Variety* regards all the products customers buy and all the ways they do it. That means that they must be able to present personal offers as precisely as possible. Regarding the variety of the sources of the data they gather, it was stressed that ICA does not analyze unstructured data, especially the part that comes from social media. Their focus is on the “point of sale data”, which means the receipt line, so info stemming from the receipts of the customers purchases. Indeed, the majority of their data comes from the ICA Card that is both a loyalty and a bank card, from which they can get a lot of information regarding customers’ behaviors and purchase habits. ICA Card has been claimed to have an excellent percentage of penetration between ICA customers, which is more than 60% (Granberg, 2013).

ICA has been using BDA for two years now. Although they have recognized already a lot of benefits that BDA can provide ICA with, it was stressed from all the interviewees that they are still at a starting point. They are still in the beginning of their use and the company is on its way to have a deeper understanding of that phenomenon.

### 4.1.2. Big Data Analytics’ implementation within ICA

As mentioned above, ICA is using BDA with a main focus on structured data coming from the receipts of the customers’ purchases. Concerning the IT systems they use for BDA, they buy the databases and the tools needed but they also design their own data models in order to reach a higher level of flexibility regarding their needs. The main sources are the sales information, such as “line receipt”, and the ICA Card (Granberg, 2013). This provides several kinds of information, such as demographic data: household, age, etc. They analyze those data in order to personalize the behavior patterns and understand each customer’s needs individually. The main areas where the results from BDA are implemented are: Customer Relation Management (CRM) department in a high degree, in order to personalize product offers to individual needs and retain customers’ loyalty and Supply
Chain and Logistics departments in a lesser degree, in order to optimize their operations (Granberg, 2013).

Relating to the main reason why ICA started employing BDA and what they expected to find, it was stated that there was not a specific reason why they started implementing BDA projects; for them, it was more like a natural evolution coming from data analytics. BDA is seen as a process, in which they are just making small steps, thus it is impossible to define a specific moment in which they started calling them BDA instead of data analytics. Indeed, “data have always been there, they only grew over time” (Granberg, 2013). However, it was stated that ICA had predicted before investing in BDA which departments would gain the most from their use; Sales and CRM/Marketing departments were the ones predicted to gain the most advantage from the implementation of BDA (Granberg, 2013). This was due to the relationship between the use of customer data with the business need of personalizing offers and, in that way, enhance marketing.

Regarding the projects implementation, there are two main ways in which ICA is approaching the analysis of Big Data: one is initiated when a specific department has a specific question that needs to be answered. In this case the Business Intelligence and IT department spends some time, more or less one week, of analyzing data and trying to answer this question. The second one is a long-term project (Granberg, 2013). ICA is developing several “start-up projects” and business cases between IT/BI and other departments, such as CRM/Marketing, Supply Chain, Logistics and Sales department. He continued stating that the most effective way is to work with one department at a time, because in that way they can better specify the needs of each individual case and therefore select the data that need to be analyzed in order to serve those needs (Granberg, 2013).

An example of a long term ongoing project with the objective of increasing sales, was to study how customers move inside the stores (“customer lap”) in order to understand if they walk in front of each shelve or not; the BDA contribution was that ICA got data from the receipt line about which products each customer bought, data which were used in order to try to understand their “lap”. Identifying the way customers move inside the stores is also achieved with offering them the opportunity to scan each product by themselves. In this way it is more feasible to follow their moves inside the store. Indeed, consumers seem to be increasingly using self-service scanning and payment systems to conduct their grocery shopping but are also additionally indicating a greater willingness to use the internet to plan, order and purchase their grocery shopping (Euromonitor International Passport, 2012), and thus respond positively to those kind of practices initiated.
Moreover, another important project in which BDA are applied was explained by David Holmstrand to be the Mina Varor (“My groceries”) one, the first one-to-one marketing project. The idea of Mina Varor came up after many customers told the company that the offers they receive in the mail do not fit their needs (ICA Annual Report, 2008). Although the analytics involved are fairly simple, the sheer volume of information is rather impressive, at least compared to other marketing operations. Through Mina Varor, ICA presents personalized offers to its customers in order to improve their satisfaction towards the brand and thus increase their loyalty. To be specific, it was mentioned that “eleven times a year approximately two million customers receive a unique combination of up to eight offers, selected from a bank of more than 1,400 offers involving nearly 10,000 items. According to wolframalpha.com, there are 358 758 599 801 819 985 075 combinations of eight offers out of 1,400 possible” (Holmstrand, 2013). This agrees with what had been also mentioned by Fredrik Persson, the former manager of CRM department of ICA, on an interview for an online Swedish newspaper; he stated that the service of “Mina Varor” faced an evolution during the years, thanks to new CRM databases: ICA is now offering discounts not only on products that customers are used to buy, but also on new products that might be potentially interesting for them. Moreover, through “Mina Varor”, ICA is sending a newsletter regarding the new products that are present in the stores and he argued that the sales of new products in the supermarkets increased (Ollén, 2011). Persson continued stating that this service is also helping the suppliers because they can use these data in order to decide which new product they should launch following consumers consumptions habits (Ollén, 2011).

Another solution was to study the “product pairing”: it means checking which products customers bought in pair (for example hamburger and hamburger bread) and find a way to encourage people to do this kind of purchases and improve also the placement of the products on the shelves (Granberg, 2013). Fredrik Persson, former CRM manager of ICA, had commented on product pairing, that he believed the next step will be to “remind” customers products that they might have forgotten; for example, “product pairing” and information such “others who bought this product, also bought that product” included in the personalized offers will go in this direction (Ollén, 2011).

BDA are also used to analyse the opportunity to open a new store in a specific location; in this case they use open source data from Statistics Sweden in order to understand if in that area there are people living with enough funds, that could be potential customers (http://www.scb.se/default____2154.aspx). They cross this information in combination with the
presence of the competitors’ stores in that place, in order to identify the best locations to build their stores.

Regarding to the human resources that are used during the implementation of those projects in general, it was affirmed by all interviewees that projects are run by a group comprised by IT employees with the collaboration of some people from other departments, depending on the ongoing project. Projects usually involve a project owner from a department on the business side, resources from other relevant/affected departments, and IT competence. When it comes to handling BDA, especially customer data, ICA's CRM department is usually involved both on the business and IT side, implying that a few individuals with specific competencies each participate in several such projects. Not everyone is involved in every project but there are certain key resources that have their say in most development activities they have. There are always specialists’ competences involved in all parts of development, whenever it is needed, e.g. controllers looking at the financial processes, logisticians handling replenishment matters etc.

In order to understand the way by which various ICA departments have access to BDA, it was asked whether those departments can systematically employ BDA in their regular activities and routines. It was confirmed from Olof Granberg, that there are daily interactions between IT and other departments that are involved in projects with BDA. As it was stated, other departments have free access to databases if they need to find information already stored. Moreover, he claimed that knowledge is easily shared within the company and therefore easily accessible for all departments. As he specified, BDA are not just a project but also an ongoing process. However, David Holmstrand handled the question a bit differently. Although he affirmed as well that people in CRM can have regular access to those analytical technological tools, he mentioned one basic factor that could limit Big Data’s systematic employment. This limitation relates to the effective understanding of BDA from the majority of the employees. Indeed, he stated that there are a limited number of employees (specialists) who could, and are, employing BDA in their daily routines and it’s not easily accessible for the great mass of employees. For this reason, whenever someone needs something relating to BDA that request needs to be handled by the few individuals who have this accessibility, often IT specialists.

The aforementioned access to BDA regards only the employees of the different departments within ICA. In relation to the individual ICA store owners, those are not using BDA in their everyday practices. From our phone interviews with the store owners, it was confirmed by all that they do not
consider themselves as users of analytics, because they cannot do anything on their own: their only
access is in a database (ICA Web) in which they can see groups of data concerning their customers.
They can therefore track information about their customers and find for example about their age or
shopping habits. Then they can send a request through the database to the head offices to send for
example some personalized discounts, birthday cards or letters. For example they can ask to
promote a health product with a personalized discount to customers whose data reveal that they tend
to buy health products, or to their best customers. It is the head offices that send those offers to the
relevant customers, addressed as they come from the specific stores. The store owners cannot ask a
specific question through this database in order to be answered by the IT after the analysis of data.
Furthermore, it is only the store-owners or managers themselves that have access to this database
inside the stores, and they claim to be using it on a regular basis.

Regarding the goals that are to be served amongst different departments and BDA, it was stated
from Olof Granberg from IT, who gets to work with different departments, that different
departments usually have different goals. However, during the process of a common project the
objective becomes the same and the departments work together to perform as good as possible. One
specific example of how different goals of different departments are aligned by BDA projects is the
following: Logistics department wanted to achieve a 0% amount of waste of products from the
shelves of ICA shops (i.e. no products on the shelves after the expiring date); however, BDA
showed that 0% could not be a goal to achieve, because, for the sales department, 0% waste means
that ICA is not selling enough. This is because, in order to avoid waste, the amount of products on
the shelves wouldn’t be enough to satisfy customers’ demand. Thus, the project revealed that an
ideal percentage of waste, high enough to satisfy consumers’ needs, is 7% (Granberg, 2013).

The departments’ goals in the use of BDA are claimed by both the interviewees to be in accordance
with the goals of the organization as a whole; ICA wants to remain leader in grocery retail industry,
improve customers’ loyalty, and continue to excel in responsible business (ICA AB, Year-end
report, 2012). In particular, in 2013, ICA will continue to develop a future digital communications
and sales solution. The idea is to consolidate ICA’s offering digitally and lay the foundation for
online sales of foods, non-foods and other products. ICA will also analyze in various ways how it
can offer customers a better selection based on the data it has access to and their priority is to be a
When discussed about the role of the company’s management in the implementation of BDA, it was claimed in both interviews, that top management has put in place efforts to align the departments’ different objectives with the enterprise wide strategy. Indeed, it was commonly stated that the direction to follow is clear and the progress will speed up in the years ahead. Management is claimed to ensure that BDA and other organizational resources are properly combined and in line with the organization’s goals and there were claimed to be efforts of encouraging employees for the implementation of BDA, for example by inviting them to use Analytics for many decisions they needed to make. The first step of this process is an understanding on the topic itself and it is believed that ICA’s management has done that, as it is shown in set strategies by initiating those BDA projects (Holmstrand, 2013). Hence, only small steps have been taken so far and it is not believed that executing on these strategies has been carried out to a great extent yet. David Holmstrand stressed out further the importance of management’s involvement, by saying that “it is really important that the employees have the sufficient mandate to take actions based on the analytics, no matter if it concerns building a new warehouse or making sure that customers enjoy a satisfactory shopping experience”. This is where the management support is crucial and where there is also room for improvement; as it was suggested, although there has been management’s efforts in encouraging the use of BDA, managers should need to understand better all the advantages of BDA in order to actively facilitate employees to use them (Holmstrand, 2013; Granberg, 2013).

Concerning the organizational structure and if it has changed in order to help to the best exploitation of BDA, it was stated from Olof Granberg that there is one modification of structure which is still in progress: in specific, the IT/Business Intelligence Department has always been at the base of the organization in the implementation of BDA projects, while interacting with other departments. Interactions with those other departments have been realized by a few people of each department who have daily relations with the BI department. However, now they are already working on a different structure in which BI is still the base, but the interactions and communications between the different departments are so strong, that Big Data analysts are directly hired by the other departments because they will totally work for them. Thus, more business analysts who combine both business knowledge and data analytics knowledge are hired from each department in order to help them use analytics and serve their needs, by decentralizing gradually the structure from the main focus on the IT/BI department.

Concerning whether they are satisfied so far with the results they get from BDA, it was mentioned in all interviews that they are satisfied so far with their implementation in terms of having enhanced
customers’ loyalty and customers’ satisfaction. However, it was mentioned from Olof Granberg in IT department, that there are two main problems that they need to solve: the first is that they do not really know what they can do with all this data. What exactly they need to know is not straightforward yet. This is a problem that will be aggravated if they start gathering unstructured data coming from social media, because it will be even more difficult to define a specific objective/purpose of analysis. The second problem is related with handling volumes, which is more difficult than most vendors say; they can rarely use the information they get towards a specific objective and the information they gather is not “ad hoc” information. It means that it is complicated to select the precise information they need from the huge amount of data they gather. Indeed, it was stated that they are facing a trade off with the software they use nowadays; they cannot match full flexibility with performance in terms of volume because the software available nowadays are not developed for their specific objectives, but only to gather the maximum amount of data as possible.

Moreover, from a CRM perspective, it was stated that the development generally takes too much time and other resources (like exploitation of human resources, time and funds) which are considered luxuries in a market where continuous improvements are essential. However, since it is seen as a natural process, it was a common statement that they are essentially learning by doing it, that they are still in an experimentation process and that there is a bigger potential yet to be discovered (Holmstrand, 2013).

4.1.3. Big Data Analytics as a driver for competitive advantage in ICA

BDA were claimed to have positively affected ICA’s performance by both interviewees but not as much as it could do, due to the big potential that can be further explored in the future. All interviewees claimed that BDA have led to an enhancement of the firm’s competitiveness; indeed, Mina Varor is an important example of how ICA was able to deliver an innovative service to its customers, and the contribution of the volume of data through BDA is impressive, as David Holmstrand specified. Moreover, he continued, “even if the process is still at an embryonic stage, ICA can radically change the way its entire offer is shaped based on BDA in the future, for example by improving the use of them in category management”. Category management is a strategic approach in which products are divided in categories. Each category is run as a single business unit, with its own targets and strategies. To be specific, it requires a continuous exchange of information and data about each single product category in order to develop a more effective delivery of the products, and this is where the role of BDA is crucial, in providing those data.
BDA are also positively seen as a way to gain advantage against competitors for ICA. In fact, both interviewees in ICA stressed that they see BDA as something that can “absolutely lead to an advantage against competition”. Concerning how BDA are therefore perceived as a way to lead to a CA, IT systems by themselves are not seen as they are much of help (Holmstrand, 2013; Granberg, 2013). As stated, they always need to be combined with other resources such as, collaborations with other departments, human interactions and business knowledge in order to be able to produce a CA. It was a common statement that ICA needs a strategy that incorporates IT and business knowledge in order to enable the development of a CA. As it was specifically mentioned by all the interviewees, Big Data technologies, are not possible to isolate, it is not something that can stand alone; it needs people with knowledge, competence and mandate, along with a strong, sustainable management support (Holmstrand, 2013). ICA’s employees must understand what the data/insights mean and be competent enough to use it in everyday situations. If not, BDA is claimed to be just a waste of resources (Holmstrand, 2013; Granberg, 2013).

Another factor was also pointed out by David Holmstrand, which, as he mentioned, should not be neglected: the human and emotional aspect of shopping experiences. By human aspect he meant human interactions that take place in the stores on a daily basis, i.e. with store employees. It is believed that the business of food groceries will rely on such interactions for quite some time because many customers have needs that data analytics by themselves cannot provide, at least not today (or without major investments). This could be the need of having specific questions being answered about a recipe, including the employee’s own experience and tips, but it could also be just someone who listens to them. BDA cannot substitute those human interactions within the stores on the one hand, but what they do, is that they improve those interactions by collecting data on what customers like to face in ICA’s employees and therefore lead to a CA.

The perception of the interviewees that BDA and IT can absolutely lead to a CA in the industry, is supported also from other competitors in the Swedish retail industry; Bergendahl & son and in particular their major brand, City Gross, had affirmed on a Swedish newspaper, regarding the potential of BDA as a source to CA, that they believe that the key to competition in Swedish Retail Industry is a smart implementation of IT (Ryberg, 2013). Indeed City Gross, the fourth biggest food retailer in Sweden (Ryberg, 2013), stated that they are developing a new IT strategy that will might allow them to be more competitive; customers who scan the products directly in the stores will have the opportunity to receive real-time offers on the scan screen, connected to the product just scanned.
This is due to a personal number that they have to insert in the scan which will link the specific customer, and thus all his previous purchases, to the CRM database (Ryberg, 2013).

When asked whether the interviewees know if their competitors are employing BDA, Olof Granberg answered that to his knowledge, ICA is the only one engaging in their analysis. David Holmstrand named two competitors (Coop and Axfood), that he thinks may be handling BDA but he mentioned that it is anyway to a much lesser degree than they do. Relating to the issue of whether competitors might be able to imitate the initiatives that ICA has put in place so far in the application of BDA, it was stated that if the management is strongly committed, it would be possible but hard for the other retailers, to develop similar services; while the Big Data analytical tools are widely available for other competitors in the market as well, it was believed that the soft skills and the combination of them with technological assets can be, in the long term, hardly imitable. Indeed, people, their knowledge and their commitment, are still considered the core resources of a company like ICA and this aspect, combined with BDA, is considered a great advantage against its competitors. This coincides precisely with what the former CEO of ICA, Kenneth Bengtsson had revealed, referring to their personalized offerings through “Mina Varor”: “we won’t be alone for long in communicating with and serving customers in a more personal, targeted way. Our strategies and techniques can always be copied, but our commitment will be more difficult. It is why our culture gives us a competitive advantage.” (ICA AB, Annual Report, 2008)

As it was highlighted by the interviews, even though the understanding of what BDA can provide with has grown immensely over the past years, it’s still something new in a business that basically operates in the same way as always (e.g. there is a very small share of marketing that is 1-to-1 and most business is executed in physical stores and not online, as David Holmstrand claims). However, both the interviewees confirmed that a potential interruption of the use of BDA would have a negative impact on those departments and on the whole company. ICA, for example, wouldn’t know anymore what its customers were buying, and therefore would not be able to understand customers’ needs and behaviors, something which would have negative consequences on firm’s performance.

Concerning the future, in conclusion, it is believed that in 5 years ICA will be able to refine the “point of sale data”, to develop a better “ad hoc” analysis and to have a good platform for the analysis of structured data that will allow the company to work with data more quickly and obtain
relevant information even the last moment. Their goal is to be able to predict customers’ behaviors and purchase habits in order to pre-calculate their questions, buying the right hardware that allows them to overcome the existing trade off and reaching a code optimization that allows them to be able to develop perfect “ad hoc” solutions. It was affirmed that ICA is a market leader in food retail and desire to maintain this position by increasing their market share and profit by keeping customers satisfied. It’s not forecasted, however, from the IT department, to begin working with unstructured data, because it will not be possible, yet, to obtain really relevant information (Granberg, 2013).

4.2. Masoutis Case Study
Masoutis S.A. (Masoutis) was first established in 1976 in Thessaloniki, Northern Greece, and since then it possesses the largest network of stores in Northern Greece and is a leader in the retail sector, while at a Greece-wide level the company is amongst the four (4) largest chains. With 243 stores, 224 supermarkets and 19 wholesale cash & Carry outlets, Masoutis S.A. covers all the prefectures of Makedonia, Thrace, Thessaly, Epirus, Thesprotia as well as the islands of Limnos and Lesvos. It employs more than 6000 people (Masoutis Annual Report, 2012) and it has met a significant increase in its sales the last years, with an impressive growth of sales of 11% between 2011 and 2010 (Kiosses L, Panorama of Greek Supermarkets 2012).

As mentioned above, the people interviewed in Masoutis were: the Marketing Director of Masoutis Apostolos Filaktos, with his main responsibilities being the supervision of all marketing activities within the firm, such as: the design, implementation and development of business and marketing plans, translating business objectives into strategies and growth for Masoutis and the supervision of all activities of data analysis that are being held within the Marketing Department in order to correspond to the company’s needs and targets. In addition, a telephone interview with an employee of the Data Analysis Department Katerina Papadopoulou was conducted, in order to get her perspective on the topic as well. Katerina’s Papadopoulou main responsibilities are to elicit information entered in Masoutis’s information systems, to check the accuracy of registration, to detect any errors and ultimately to inform her superiors. After verifying that Masoutis has been engaging to practices of BDA as defined above on the present paper, we proceed with discussing the implementation of those practices within the company.
4.2.1. BDA implementation within Masoutis

The main fields of implementation of BDA practices in Masoutis are similar as the one described with ICA. When referring to the analysis of Big Data in Masoutis, they mainly refer to the collection and analysis of data stemming from the receipts from the daily transactions at all the branches. As such, they are observing what customers are buying the most, in what frequency, combination of products and during which time periods. As Mr Filaktos reveals, they are quite satisfied with the effectiveness of their BDA practices and the reason why they are using those tools are the fact that they consider them as the most suitable and functional to cover the firm’s needs. However, they believe that the full potential of those analytical practices is yet to be discovered, and although they seem to be helping the company, in Masoutis they constantly tend to improve their practices, update and revise them in order to evolve (Filaktos, 2013).

In Masoutis, they are using technological platforms bought from the vendors, but, as it was the case in ICA, they design their own software in order to serve best the interests of the company. The data the select mainly relate to costs, sales, profits and markets and the areas where their results are mostly used are primarily to inform the administrative department for the preparation of accounts, to provide information to various departments mainly concerning the customers’ preferences in order to adjust the company’s marketing campaigns and personalize offers (Filaktos 2013, Papadopoulou 2013). The questions and the search for answers to these are the driving force for the implementation of practical data analysis and therefore, there are specific questions in different occasions which they intend to answer when handling those kind of practices.

Some projects which Masoutis have initiated with BDA practices include projects to assist the sales of products by region and category of the store, to assist sales of products by category and level code, projects to assist the sales of some specific sections of the stored, like the grocery section, butcher section etc and finally to increase the profitability and improve the management within the stores. The analysis of data stemming from purchases has helped the firm understand which sections perform better, which products are mostly bought and therefore helped them initiate strategies to improve the marketing of the products and the overall performance of the firm. The people who were responsible to decide to perform data analysis tasks in Masoutis’ business were the heads of the various departments of their business (such as the sales, marketing), and the commercial and financial manager, without exception and the president of the company. The people who work in these practices come from individually departments of the company, essentially from
the Data analysis department combined with employees of other departments according to the specific needs of each project.

The main reason why they start dealing with data analysis, was claimed to be a quest for sound decision making (Filaktos, 2013). They firmly believed that the BDA would provide them with answers to critical questions concerning the correct operations of their business. In Masoutis, they seem satisfied so far with the results they get from data analysis, because the company is claimed to have plenty and satisfactory tools to extract data and employees claim to have every tool they need at their disposal, as Katerina Papadopoulou expresses (Papadopoulou, 2013).

4.2.2. BDA as a driver for CA in Masoutis

When discussing the impact BDA has had on the company, it was stated that it is believed that the data analysis has certainly influenced positively the performance of the organization (Filaktos, 2013; Papadopoulou, 2013). Indeed, both interviewees have highlighted its importance. In specific, as Filaktos stated, “the more an organization knows about the operation and financial results deriving from it, the better it can organize its operations, provide and predict economic outcomes and it takes better strategic decisions which further consolidate it in the market. As a result, the competitiveness of the firm is also enhanced” (Filaktos, 2013). Data analysis is also seen as a way for the company to gain an advantage over its competitors, because, since the decisions and goals put from Masoutis’s management is very often based on data analysis, it is believed that that this analysis can serve as an advantage over competition as well (Filaktos 2013, Papadopoulou 2013).

However, the adoption of a system of data analysis itself is not seen as capable of producing a competitive advantage that will hold over time. Both interviewees stress out that those systems are simply the tools used in order to obtain a competitive advantage. “If the use of these tools is not done in a prudent and orderly manner and if wrong practices are followed in terms of administration, then their effectiveness can be annihilated”, says Katerina Papadopoulou. The other resources that need to be combined in order to give this advantage over competitors are, essentially, other parts of business, employees, knowledge and business administration. In the sections dealing with data analysis systems, when employees are fully trained in these systems and have all the necessary knowledge required in order to be able to give the most to their work, along with continuous education and motivation from top management, it is believed that it can create the best conditions for increased competitiveness over other companies in the same industry (Filaktos 2013, Papadopoulou 2013).
When asking whether employees of the company can work with data analysis systematically in regular activities and routines, Katerina Papadopoulou, from her personal experience reveals that “all authorized employees can have daily access to company data and retrieve any information that is necessary for analysis” (Papadopoulou, 2013). Both interviewees agreed on the fact that plenty activities were taken from the organization’s management to support and assist in the implementation of analyzing data: The management of the company every year invests significantly on staff training on new systems data analysis. It is also believed that the company's objectives are the same the objectives of other organizational resources and the use of data analysis, since they work and are used on its behalf and the company sets the guidelines to apply.

It is believed that data analysis practices, along with their interactions with other departments, offer value to the company, because they have helped to exploit strategic opportunities through benchmarking data analysis. In specific, they are guided to improved performance through continued determination, understanding, and adapting discrete practices and procedures identified within and outside the activities of each department. The development and consolidation of multiple data sources leads to the extraction of information that can be converted into knowledge, revealing trends and patterns in data to make informed decisions at the right time in the long run will raise the value in Masoutis’s business (Filaktos 2013, Papadopoulou 2013). This conversion into knowledge, which results into right decisions and a corporate culture driven by sound and fact-based decision making, is a result of long term interactions of BDA practices with organizational resources which are specific in every business context and quite difficult to imitate, as Apostolos Filaktos says.

It is supported that the performance of Masoutis would be significantly deteriorated, had one removed the use of BDA, since they started getting used to a decision making which is based on facts and they gain knowledge that they could not even imagine in the past from analyzing data from various sources. They would not know anymore what the customers want and how to achieve that. Concerning the near future of BDA practices in 5 years, it is supported that due to the increasing demands of the administration, arising from the strong competitiveness of the industry, Masoutis we will be using much more “powerful” systems analysis in terms of capabilities. These practices will become more analytical, ie developed at a greater level, it will be of such a great volume and velocity capabilities and whatever the management asks, concerning any decision or set goals, will be feasible to be documented and analyzed. Moreover due to BDA they might be able to implement new strategies and invent different bases and priorities for decision making.
5. Analysis

This section is going to analyze the information gathered from the case studies from a theoretical perspective, in order to give an answer to the research question of how BDA are used and perceived to lead to organizations’ competitive advantage. By using the conceptual model of Wade & Nevo (2010) as guidance, we start by examining whether the two enable conditions of compatibility and integration exist in relationship between BDA and other organizational resources, to continue with the concept of synergies which can lead to strategic potential.

5.1. Potential Synergy and Enablers of Actual Synergy

Synergies have been explained to be the positive capabilities arising from the interactions between IT assets and other organizational resources (a system named as IT-enabled resources). In fact, as it was confirmed by the interviewees, BDA cannot be seen in isolation, as something that can stand alone, but only in collaboration with other factors or resources. This coincides with our adoption of the model of Wade and Nevo (2010) who drew their attention to the relationships emerging between IT assets with other resources. According to that, before the proof for existence of an actual synergy, there is an anticipation of a potential synergy and also two enabling conditions of integration and compatibility. If those factors apply, then there is an actual synergy.

Anticipation: Organizations tend to anticipate how IT-enabled resources may contribute to the achievement of organizational goals, thus anticipate potential synergies (Wade & Nevo, 2010) and it was in fact stated from the cases that before engaging in the investment of Big Data databases and tools, they had anticipated that those would help mainly in spotting the behaviors of customers and helping with increasing their loyalty with the collaboration with the Marketing departments. Thus, they anticipated a potential synergistic relationship between BDA and Marketing department, seen as another organizational resource.

Integration: Integration efforts were discussed to refer to the efforts of management to assist the implementation of the IT asset within the organization. In the context of this paper, integration effort is needed not only to ensure that an IT asset and an organizational resource interact, but that they do so in a manner that is congruent with the organization’s goals (Wade & Nevo, 2010). In fact, ICA has claimed that management had evaluated the potential synergy between BDA and other organizational resources and ensured that they are properly combined and in line with the organization’s goals. There were claimed to be efforts of encouraging employees for the
implementation of BDA and there was also another type of integration effort activity that is still in progress; this refers to the modification of organizational structure in order to assist the best exploitation of BDA, mentioned above. In addition, Masoutis’s management is claimed to invest significantly on staff training on new systems data analysis.

Regarding the issue of goals-sharing, both companies have witnessed that during the process of a common project the different objectives become aligned and the departments work together to perform as good as possible, and that the management puts in place efforts to align different objectives with the enterprise wide strategy. It is observed that management’s efforts to integrate an IT asset and other organizational resources positively impact the extent of realized synergy and the extent of their compatibility (Wade & Nevo, 2010, p.173), and both companies have verified the existence of efforts of integration from their management, in a way which is aligned with the companies’ goals. However, it was retrieved from all interviews that there is room for improvement and that management should get better familiarized with the potential of BDA. It was also evident that one of the hurdles they meet in the BDA implementation is that they do not really know what to do with all the data they gather, and therefore that they do not have a straightforward strategy on what exactly is that they need to know. We argue that only when management realizes what they can reach by exploiting BDA in their full potential, they will be able to employ a clear strategy, relatively inform employees and facilitate their employment through more projects with management sponsorship and training sessions. In addition, it was highlighted from Masoutis the management’s efforts to train the relevant employees to new BDA systems, but it was never mentioned that there were real efforts to motivate new employees to start using data analysis for various matters.

Compatibility: Concerning the compatibility between BDA and other organizational resources, both companies have confirmed that there are daily interactions between the departments that are involved in projects with BDA. They claim to have free access to databases if they need to find information already stored and organizational resources-departments are claimed to be able to apply BDA in their regular activities and routines. This shows the existence of compatibility to a certain degree, which is an attribute that makes the synergy feasible, since a synergistic relationship will be able to occur if the two components are able to work together on a regular basis. However, we can say that the degree of existing compatibility is limited due to the fact that “only a few employees have the necessary understanding of BDA needed in order to employ them on a regular basis” (Holmstrand, 2013). The mass of employees normally requests the use of BDA to be done through
them and this phenomenon might weaken the perceived degree of compatibility. It was specified that BDA are not treated by ICA just as a single project but as an ongoing process; however, this does not seem to be the case to us because simply having access to databases does not make it a continuous process, neither can it be an ongoing process when the access to BDA in reality is feasible only through a few employees. In addition, the same procedure seems to be happening in Masoutis as well, with Katerina Papadopoulou stating that “all authorized employees can have daily access to company data and retrieve any information that is necessary for analysis” and the rest of the employees have access to data only through the access of the authorized ones.

With the information derived, our cases seem to possess the enabler concepts of integration and compatibility (in the extents described above), which convert the potential synergies anticipated by the companies to actual ones (see figure 2). We will see now how those synergies relate to strategic potential and further CA and how BDA are perceived to associate with the three attributes of Value, Rarity and Inimitability as recognized from the conceptual model of Wade and Nevo (2010).

5.2. The strategic potential of IT-enabled resources

Since synergistic relationships seem to exist in the cases (which form IT-enabled resources), it is interesting to see how important a role BDA play in that synergy. We can verify whether they are crucial for the existence of the synergistic relationship, by asking if their removal would annul the synergy (Wade & Nevo, 2010). Indeed, both companies highlighted BDA as a major contributor by saying for instance that in case one had to remove BDA from the organization’s reach, the effect would be tremendous: in the case of the departments which use them the most and therefore implement the major synergies (like CRM department), it was stated that the interruption of the use of BDA would have a negative impact on those departments, but also for the whole company. They “would not know for example, what their customers were buying and why, with negative consequences on firm’s performance” (Holmstrand, 2013).

The strategic potential of BDA with other resources is coming through the existence of the three properties of value, rarity and inimitability (see Figure 2):

*Value:* In relation to whether BDA have provided value for the organization, ICA claims that it has done so, by allowing the company to capitalize strategic opportunities through the provision of new products/services. In specific, with BDA, ICA can now store and access data about their clients and their preferences and subsequently customize products and offers on a personal level. Indeed, the
company claims to have gained value through the development of innovative services such as “Mina Varor”, and the role of BDA was crucial during this process because of the high Volume, Variety and Velocity of the data collected. BDA have also helped the company, as explained, to identify a percentage of waste necessary to cover the different needs of both Logistics and Sales departments, and also helped with building new stores in the most appropriate locations. BDA are also claimed to enhance existing services by making them more efficient, like, for example, the improvement of the products’ placement on the shelves and even in ameliorating the human interactions between ICA employees and customers that take place daily in the stores. It was also mentioned that BDA can lead to the provision of completely new ways of products offering by the approach of category management, which will be another way to bring value to ICA. We believe, however, that this will require more time, necessary for ICA to better investigate the full potential of BDA and improve the way those are implemented inside the company. In addition, in Masoutis it is claimed that the development of BDA practices leads to the extraction of information that can be converted into knowledge, revealing trends and patterns in data to make informed decisions at the right time in the long run will raise the value of their business.

**Rarity:** Both companies agree also on the fact that even if BDA tools are not rare in the market and several companies can buy them, this does not mean that all of those companies can develop certain IT-enabled resources, which makes them rare to obtain (Wade & Nevo, 2010). For example, as ICA claims, although their competitors have access to the same tools and databases of BDA as they do, it is only ICA that have developed the specific collaborations between those assets with their other resources in order to achieve better performance.

**Inimitability:** Those kinds of synergistic relations between BDA and other organizational resources are claimed by both companies to be difficult to imitate as well. Due to complexity, competitors might not be able to understand the nature of the relation between them and thus, to develop the same relation in order to achieve the same performance. Indeed, it was particularly stressed by the interviewees and also supported from ICA’s CEO in their annual report, that are the soft skills, such as knowledge, human relations and management commitment that allow the company to gain and maintain over time an advantage on their competitors. Thus, what is hardly imitable for the other retailers are exactly the relations between those IT assets with the above organizational resources. This exact argument was also stressed out by Filaktos in Masoutis S.A, who stated that “a whole corporate culture driven by fact-based decision making is required, which is a result of long term
interactions of BDA practices with organizational resources which is specific in every business context and quite difficult to imitate” (Filaktos, 2013).

5.3. IT Enabled Resources and Competitive Advantage

As mentioned above, the attributes of value, rarity and inimitability can lead to the creation of CA for companies because they confer strategic potential to firms’ organizational resources (Wade & Nevo, 2010). Therefore, those companies who own those kinds of strategic resources can implement strategies that are unavailable to their competitors (Barney, 1991). Therefore, the ability of BDA to generate CA and affect performance is contingent upon the above properties. The analysis conducted so far revealed that based on the interviewees’ perception, the two cases present both enabler conditions (compatibility and integration) requested by the model developed by Wade and Nevo (2010) in order to transform the potential synergy in actual and also the three factors (rarity, value, non-imitability) which confers strategic potential (see Figure 2). In addition, all interviewees stated several times that the positive relations between BDA and other organizational resources can allow their companies to gain a CA. It does so, by developing new services for their customers (Mina Varor), exploiting market opportunities (opening a new store in a not served area), improving the efficiency of its supply chain (category management), increasing the amount of sales through the study of “customers lap” and “product pairing” and by increasing sound decision making. These are all examples of practical applications that allow the company to improve its performances and they all derive from the IT-enabled resources and actual synergies.
5.4. Discussion

In terms of factors that relate to a CA, our findings suggest that a high level of management efforts of integration and a high level of compatibility, are perceived to be associated with a higher likelihood and extent for the development of the subsequent synergies but also the relative strategic potential. This means that the stronger the existence of the enabler factors is, the stronger the strategic potential of the enabled resources will be (Wade & Nevo, 2010, p.173). Indeed, a potential critical aspect in our case might be considered the lack of employees with the sufficient knowledge to understand and manage BDA; this might reduce the grade of compatibility, because it makes harder to develop routines and daily interactions between departments and resources. Moreover, the fact that BDA do not seem to be, in practice, an ongoing process, but independent projects, shows that the extent of compatibility is limited and needs to be enhanced in order to result in the creation of stronger subsequent synergies. In addition, the interviews with the shop owners of ICA revealed that they are not closely involved with BDA. Thus, we argue that, because they are the closest to the customers and to their needs, involving them in particular BDA projects would positively affect compatibility and the strategic potential of the enabled resource.
Regarding management efforts, it was stressed how important the mandate from the management is in order to empower the use of BDA even between employees and departments that are not that used to them. We believe that this might be even more important at the starting point of the process, where the companies are nowadays, because cultural changes within the organization should be strongly supported from the very beginning of the process by all the management team (Thompson et al., 2010, p.399). However, it might be possible that, especially because only small steps have been made so far, both companies’ strategies on BDA seem to be lacking. This because, even if there is a clear idea of the direction that has to be followed, it was stated that “they do not really know what to do with all the data they gather” (Granberg, 2013). We argue that this problem, although mentioned, it was underestimated by our interviewees and, instead, it should be considered a strategic issue that will take time and resources to solve in order to understand the complete potential of BDA. Furthermore, in the case of ICA, since store owners cannot directly pose their questions that can be answered with data analysis to the head offices, this problem becomes even more acute: store owners’ questions may reveal every-day needs arising from the actual practice. Those needs, in turn, can provide insight on how to use the data being gathered. The same applies in the case of Masoutis S.A, where is stated “that they foresee the future of BDA as being capable to reply to any kind of question that the management may pose” (Papadopoulou, 2013), assertion which reveals that it will still remain up to the management to try to find what knowledge may be missing from the company’s reach and not to the mass of employees about everyday matters.

Thus, much attention should be put on integration efforts as an enabler condition not only of synergies and, thus, CA, but also as a way to enhance compatibility (Wade & Nevo, 2010, p.173). Indeed, the reinforcement of integration efforts, through training sessions, management sponsorships, etc. will improve employees’ knowledge about BDA and thus enhance daily routines and interactions within the company. In fact, we believe that management efforts are not as efficient as they should be in order to integrate completely BDA in firms’ operations, as the limited amount of employees with sufficient knowledge proves. In addition, the lack of strategy might be also considered the reason of the partial satisfaction expressed by all the interviewees regarding the successful implementation of BDA. We believe, indeed, that a higher management commitment can lead to a better implementation of the projects and thus to a better use of resources such as time and money defined as “luxuries” in that industry by the interviewees. In addition, the training sessions should focus not only to new IT platforms but also to expansion of the employees that have access to them, in order to enhance the degree of the existing compatibility.
Moreover, as it was stated by David Holmstrand, retail industry in Sweden is a business that did not face revolutionary changes in its operations during the last years. This means that the vast majority of consumers still prefer to shop in the physical supermarket instead than online, thus the “emotional” aspects of the shopping experience is still important. As he said, “BDA is still something new in a business that basically operates in the same way as always”. With data, however, revealing that the amount of customers who are willing to shop online is constantly increasing (Euromonitor International Passport, 2012), we argue that: the business should probably not operate the same way as always, but, instead, follow those trends; ICA, for instance, is a market leader in the industry and wants to remain market leader in digital sales as well (ICA AB, Annual Report, 2012).

6. Conclusions and beyond

6.1. Concluding Remarks
The purpose of this thesis was to see if BDA are used and perceived to lead to firms’ CA through the development of synergistic relationships with other resources. We reached our objective through capturing ICA’s and Masoutis’s managers’ perception on the issue. In fact, the analysis of our empirical investigations has revealed a pattern on how BDA are perceived to lead to a CA for firms: BDA can be seen as a driver that can lead to CA due to the synergies that are developed with other organizational resources. Moreover, since there is an involvement of other resources, the analysis of our findings highlighted the importance of the two enabler factors of integration and compatibility in the creation of the relative synergies. This is because those two factors facilitate the creation of the aforementioned synergies. It was also presented how BDA are perceived to bring a CA to the organizations by making resources more strategic, through the attribution of three factors of value, rarity and inimitability. Indeed, it was revealed that those relations between BDA with other resources such as soft skills, knowledge and human capital are perceived to be rather difficult to imitate for competitors and to bring value to the organization.

However, even though BDA are perceived as capable of providing a company with a CA, they are connected to several problems. First of all, there are problems which are connected to management’s commitment and management’s efforts to integrate BDA effectively within the organization. In addition, there are problems related to the ability of an organization to make BDA compatible to its processes and easily accessible to everyone inside the company. To be specific, an
example of problem that limits such perceived compatibility can be the way by which BDA are routinized in the everyday tasks and by whom are implemented. Another hurdle can be a lacking strategy which clearly defines what exactly the company wants to know from all the data gathered. Therefore, those are the areas where organizations should probably focus their BDA investments in their quest for a CA and employ straight-forward BDA strategies.

6.2. Contribution

In terms of contribution to literature, this thesis, by directly studying how BDA is perceived to lead to a CA, provided a base for a better understanding on how IT as a resource can help companies achieve a CA. It also applied a model adopted from Wade and Nevo (2010), and gave some empirical evidence concerning the application of the model in a specific example of IT and enhanced it therefore also with empirical validity. It also contributed to IT literature by providing a basis for a deeper understanding of what constitutes BDA and how they are used from an organization to become more competitive. Overall, the novelty of the study is the connection between such a recent technological application of BDA and the study of their effects under the light of the traditional and long existing theory of Resource Based View of the firm, in order to understand the effect of a new technology to firms’ competitiveness.

Concerning the implications in management, the present study provided an understanding of how BDA can be implemented within corporations in order to reach better performance and further gain a CA. Organizations interested in the use of BDA can better understand which factors are perceived to lead to CA. The strategic potential of BDA is contingent upon the organization’s ability to relate those assets to other resources and therefore create strategic IT-enabled resources. Thus, it alerts management to consider the importance not only to the IT assets in which they invest but mainly to the other resources in which those are implemented. Specifically, managers’ interest should be focused on how to integrate BDA investments in the way the organization functions and how to make them compatible with other organizational resources, since their importance in reaching a CA is crucial. Managers are advised to acknowledge this importance, since it could help them exploit a higher business value of IT within their organizations.

6.3. Limitations of Study Results and Suggestions for Further Research

While our chosen approach was appropriate for studying this framework, we are aware that some factors might not be ideally captured and there were several factors which limited our study. First of all, the study was based in a limited amount of interviews, and although they were with the most
knowledgeable on the matter, they might not represent the whole picture of the organization, which can be better captured in further studies. In addition, we are investigating the perceived organizational effects of a phenomenon which is very recent, and therefore companies engaging in BDA are still in the beginning of that process. This fact might negatively influence the perceived creation of the relevant synergies with other resources and the subsequent creation of a CA. Therefore it is suggested that the effects of BDA on firms’ competitiveness should also be studied in the years ahead, when companies now more about their use and have discovered better their potential and which other organizational resources to combine them with.

Furthermore, since this study involves concepts of competition, such as the term of “Competitive Advantage”, it is valuable for research to know more information on how other competitors of a market engage in such a phenomenon, something which unfortunately was not feasible on the present study. A further research should investigate the topic into more competitors of the same market and thereby compare their answers by drawing relative conclusions, and in this case increase the validity of the research. In addition, a comparative study might also include organizations which belong to different industries and that are handling different types of BDA, and compare their answers on perceived enhancement of competitiveness. Last but not least, due to the novelty of the phenomenon this study did not measure actual facts of how BDA have affected firms’ performance but the perceptions of that. Therefore, further studies of actual facts that prove that there is causality between the use of BDA and effects on firms’ competitiveness would be desirable in the near future.

Moreover, the importance of the two enabling conditions’ influence on the creation of potential synergies and a further CA was hereby highlighted. However, it is still under-investigated how exactly those two conditions enable the creation of synergies and also, how do they further influence CA. In other words, how does greater degree of integration and compatibility lead to stronger synergies and higher chances of CA? Development of further models and frameworks would be desirable.

Another interesting factor involves the exploitation of the created synergies from organizations and how those might lead to a CA. How do different organizations exploit different synergies created? An understanding of what makes successful organizations stand out from unsuccessful ones even though they all possess the same IT assets and comparable organizational resources, would be
useful. Future research might be able to help understand better this issue by highlighting the barriers that prevent the unsuccessful organizations to realize those potentials.

Finally, in the model proposed by Wade and Nevo (2010) the factor of non-substitutability is not considered because it was stated that different synergies might lead to the same performance and thus to the creation of a CA. This is not in exact accordance with the theoretical definition given by Barney (1991), where resources’ strategic potential depends on the existence of all four factors of value, rarity, inimitability and non-substitutability in totality. This aspect should be considered in the study of competitive advantage. The link between the strategic potential and the creation of competitive advantage might not be as strong as it would be with all the 4 factors employed. Therefore, further research should be drafted in order to examine more in depth whether the fourth condition of non-substitutability applies, if not, for what reason and provide relevant justifications concerning the contribution of those three attributes to the creation of competitive advantage.
7. References


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Personal Interviews

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Phone Interviews

Manager of ICA Supermarket Alvikstorg, Uppsala, May 29, 2013, ICA AB, Stockholm. Phone interview

Manager of ICA Supermarket Samköpt, Uppsala, May 29, 2013, ICA AB, Stockholm. Phone interview

Manager of ICA Supermarket Torgkassen, Uppsala, May 30, 2013, ICA AB, Stockholm. Phone interview

Manager of ICA Nära Folkes Livs, Uppsala, May 30, 2013, ICA AB, Stockholm. Phone interview

Papadopoulou, K, Employee in Data Analysis Department of Masoutis S.A, Thessaloniki, July 16th, 2013, Masoutis S.A, Thessaloniki, Phone interview
Appendix 1

INTERVIEW QUESTIONS

Part 1 - Orientation Interview

The purpose of those questions is for us to try to get an understanding of whether ICA is using Big Data Analytics and in which way.

1. Can you tell us in a few words what position you own within your organization and what you are responsible for?
2. How would you define Big Data?
3. Is ICA analysing Data referred as Big Data already in a functional way?
4. a. What systems are you using in order to analyse Big Data?  
   b. What are the sources where you gather Data from? Do you use Social Media as a source?  
   c. Which data do you select and what for?
5. a. In which areas do you employ the results from the Analysis of Big Data?  
   b. Do you have any specific questions behind that you are looking to answer?  
   c. Before adopting Big Data Analytics, did you predict where it could contribute best?
6. a. Can you describe us any ongoing Big Data Projects?  
   b. Who was the one that decided the implementation of Big Data projects?  
   c. Are the people working in those projects coming from the IT department or elsewhere?
7. What is the main reason why ICA started employing Big Data Analytics? What did they expect to find?
8. Are you satisfied so far with the results you get of Big Data Analytics? Do you face any problems in their implementation?

Part 2 - Core Interview

The purpose of the following questions is to try to understand whether and how Big Data are perceived to have an impact on the competitiveness of the firm.

1. Do you know if your competitors are also engaging in the analysis of Big Data?
2. Do you think that Big Data has positively affected the performance of your organization so far? If yes, how?
3. a. Do you see Big Data Analytics as a way to enhance the firm’s competitiveness?  
   b. Do you see Big Data Analytics as a way for the company to gain an advantage against its competitors?
4. a. Is the adoption of a Big Data Analytics system by itself capable of producing a competitive advantage that will last over time? (By this term we mean just the Big Data software and tools as bought from the IT vendors)
   b. (if not), what other organizational resources are needed to be combined with Big Data Analytics in order to give this advantage against competitors?
5. Can people from your department employ Big Data systematically, in their regular activities and routines? Can you have daily interactions with Big Data Analytics if needed? Can you give us an example of how these interactions happen practically?
6. a. Were there any activities taken by the organization’s management to support, guide, or assist the implementation of Big Data within ICA? What kind of activities?
   b. Do you think that uses of Big Data and other organizational resources share the same goals? Are they the same with the goals of the company?
7. Does Big Data Analytics together with its interactions with your department provide value to your company? Is there a situation in which Big Data allow you to capitalize strategic opportunities?
8. Do you consider your department able to develop new products/services that are not present in the competitors’ offer thanks to the collaboration with BI department and the use of Big Data? Can you give us an example?
9. Do you think that those innovative products/service you developed can be imitated by your competitors in an easy and quick way or not? Could you give us an example?
10. Would performance of your department be affected, had we removed the use of Big Data Analytics? If yes, how?
11. How do you picture ICA using Big Data in 5 years?

Greek version

Ερωτήσεις

Μέρος 1-Γενικές ερωτήσεις

Ο σκοπός αυτών των ερωτήσεων για εμάς είναι να κατανοήσουμε τον κατά πόσον η επιχείρησή σας χρησιμοποιεί τεχνικές ανάλυσης δεδομένων μεγάλου όγκου (Big Data Analytics) και με ποιον τρόπο.
1. Μπορείτε να μας πείτε με λίγα λόγια ποια είναι η θέση που κατέχετε μέσα στον οργανισμό σας και ποιές είναι οι ευθύνες σας;
2. Πώς θα ορίζετε ότι χρησιμοποιείτε την ανάλυση δεδομένων καταναλωτών με λίγα λόγια;
3. Θεωρείτε ότι χρησιμοποιείτε ως τόρα πρακτικές ανάλυσης δεδομένων επιτυχώς και με λειτουργικό τρόπο;
4. a. Τι τεχνολογικά συστήματα χρησιμοποιείτε προκειμένου να αναλύσετε δεδομένα;
b. Ποιες είναι οι πηγές από όπου συγκεντρώνετε δεδομένα;
c. Ποια δεδομένα επιλέγετε προς ανάλυση και για ποιο λόγο;
5. a. Τι τεχνολογικά συστήματα χρησιμοποιείτε προκειμένου να αναλύσετε δεδομένα;
b. Έχετε συγκεκριμένες ερωτήσεις πίσω από αυτό που ψάχνετε να απαντήσετε;
6. a. Μπορείτε να μας περιγράψετε κάποια projects ανάλυσης δεδομένων στα οποία έχετε δουλέψει;
b. Ποιος ήταν αυτός που αποφάσισε την εκτέλεση εργασιών επιτυχώς δεδομένων στην επιχείρησή σας;
c. Από που είναι οι άνθρωποι που εργάζονται στα συστήματα που αναφέρατε;
7. Ποιος είναι ο κύριος λόγος για τον οποίο ασχολείστε με την ανάλυση δεδομένων; Τι περιμένετε να βρείτε;
8. Είσαι ικανοποιημένος μέχρι στιγμής με τα αποτελέσματα που θα έχετε από την ανάλυση δεδομένων; Έχετε αντιμετώπισε τυχόν προβλήματα κατά την εφαρμογή τους;

Μέρος 2-Core Ερωτήσεις

Ο σκοπός των ερωτήσεων που ακολουθούν είναι να προσπαθήσουμε να καταλάβουμε αν και πώς θεωρείτε ότι η ανάλυση δεδομένων έχει αντίκτυπο στην ανταγωνιστικότητα της επιχείρησης.
1. Ξέρετε αν οι ανταγωνιστές σας επίσης ασχολούνται με την ανάλυση δεδομένων;
2. Πιστεύετε ότι η ανάλυση δεδομένων έχει επηρεάσει θετικά την απόδοση του οργανισμού σας μέχρι τώρα; Εάν ναι, πώς;
3. a. Βλέπετε την ανάλυση δεδομένων ως ένα τρόπο για να ενισχυθεί η ανταγωνιστικότητα της επιχείρησής;
b. Βλέπετε την ανάλυση δεδομένων ως ένα τρόπο για την εταιρεία να αποκτήσει ένα πλεονέκτημα έναντι των ανταγωνιστών της;
4. a. Είναι η υιοθέτηση ενός συστήματος ανάλυσης δεδομένων από μόνη της ικανή να παράγει ένα ανταγωνιστικό πλεονέκτημα που θα κρατήσει την πάροδο του χρόνου; (Με τον όρο αυτό εννοούμε μόνο το λογισμικό ανάλυσης δεδομένων και τα τεχνολογικά εργαλεία που αγόρασατε από πωλητές) b. (Αν όχι), τι άλλοι πόροι απαιτούνται να συνδυαστούν προκειμένου να δώσουν αυτό το πλεονέκτημα έναντι των ανταγωνιστών (για παράδειγμα τμήματα της επιχείρησής, εργαζόμενοι, γνώση κα);
5. Μπορούν οι εργαζόμενοι της επιχείρησης να δουλεύουν με την ανάλυση δεδομένων συστηματικά, σε τακτικές δραστηριότητες και τις ρουτίνες τους; Μπορούν να έχουν καθημερινές αλληλεπιδράσεις με την ανάλυση δεδομένων αν χρειαστεί; Μπορείτε να μας δώσετε ένα παράδειγμα για το πώς αυτές οι αλληλεπιδράσεις συμβαίνουν στην πράξη;

6. a. Υπήρξαν δραστηριότητες που λαμβάνονταν από τη διοίκηση του οργανισμού για την υποστήριξη, καθοδήγηση, ή να βοηθήσουν στην εφαρμογή της ανάλυσης δεδομένων από περισσότερους εργαζόμενους; Τι είδους δραστηριότητες;

b. Πιστεύετε ότι οι χρήσεις της ανάλυσης δεδομένων και άλλων οργανωτικών πόρων μοιράζονται τους ίδιους στόχους; Είναι το ίδιο με τους στόχους της εταιρείας;

7. Μπορούν οι πρακτικές ανάλυσης δεδομένων, μαζί με τις αλληλεπιδράσεις του με το τμήμα σας, να προσφέρουν αξία στην εταιρεία σας; Σας έχουν βοηθήσει να αξιοποιήσετε ευκαιρίες στρατηγικής σημασίας;

8. Πιστεύετε ότι το τμήμα σας είναι σε θέση να αναπτύξει νέα προϊόντα / υπηρεσίες που δεν είναι παρόντες στους ανταγωνιστές σας χάρη στην ανάλυση δεδομένων; Μπορείτε να μας δώσετε ένα παράδειγμα;

9. Πιστεύετε ότι αυτά τα καινοτόμα προϊόντα / υπηρεσίες που αναπτύσσονται μπορούν να αποτελέσουν αντικείμενο μίμησης από τους ανταγωνιστές σας με έναν εύκολο και γρήγορο τρόπο ή όχι; Μπορείτε να μας δώσετε ένα παράδειγμα;

10. Θα επηρεαστούν η απόδοση του τμήματός σας, εάν απομακρύνουμε τη χρήση της ανάλυσης δεδομένων; Εάν ναι, πώς;

11. Πώς φαντάζεστε ότι θα χρησιμοποιείτε πρακτικές ανάλυσης δεδομένων σε 5 χρόνια;

Ευχαριστούμε πολύ.