‘How the Business Intelligence output is being used in organizational decision-making process’

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Sincerely thanks to all my friends for the support all this time

I dedicate this thesis to my family, Dimitris, Gianna, and Giorgos and to my girlfriend, Ivana, for their unconditional love and support all this time

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Abstract

This thesis is concerned with the role of Business Intelligence in organizational decision-making processes. The primary focus of this research paper is to examine how the Business Intelligence tools are being used by the decision-makers in order to support the decision making process.

Conducting the literature review from the scope of organizational decision-making, and not from a technical scope, a theoretical framework on formal analysis is generated. An interpretive study was conducted in Devoteam in order to compare the findings with the theoretical framework that was generated.
# Table of Contents

1 Introduction.............................................................................................................. 7  
  1.1 Objectives and Research Question................................................................. 7  
  1.2 Research Scope and Limitations........................................................................ 8  
  1.3 Structure Overview............................................................................................. 9  
2 Literature review on Business Intelligence.......................................................... 11  
  2.1 The concept of Business Intelligence............................................................... 13  
  2.2 The two perspectives of Business Intelligence................................................ 16  
    2.2.1 The technology view..................................................................................... 16  
    2.2.2 The process view......................................................................................... 18  
  2.3 The three stages................................................................................................. 19  
    2.3.1 Storage and Gathering data........................................................................ 20  
    2.3.2 Processing and analysis............................................................................... 21  
    2.3.3 Presenting the output of BI.......................................................................... 22  
  2.4 Business Intelligence and Decision Making Process....................................... 24  
  2.5 Summary........................................................................................................... 24  
3 Organizational Decision Making........................................................................... 25  
  3.1 Organization Decision-making......................................................................... 25  
    3.1.1 Rational choice theory................................................................................ 27  
    3.1.2 Alternatives approaches............................................................................. 28  
  3.2 The formal analysis in organizational decision-making process.................... 29  
    3.2.1 The functionalist perspective..................................................................... 30  
    3.2.2 The political view....................................................................................... 33  
    3.2.3 The symbolic view..................................................................................... 34  
  3.3 Summary........................................................................................................... 35  
4 Methodology........................................................................................................... 36  
  4.1 The interpretive perspective............................................................................. 36  
  4.2 Research design................................................................................................ 38  
    4.2.1. Personal background................................................................................. 39  
    4.2.2 Designing the literature review................................................................. 40  
      4.2.2.1 Data Collection.................................................................................... 40
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>(BI)</td>
<td>Business Intelligence</td>
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<tr>
<td>(CEO)</td>
<td>Chief Executive Officer</td>
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<td>(CRM)</td>
<td>Customer Relationship Management</td>
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<td>(DW)</td>
<td>Data Warehouse</td>
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<tr>
<td>(EIS)</td>
<td>Executive Information Systems</td>
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<tr>
<td>(ERP)</td>
<td>Enterprise Resource Planning</td>
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<td>(ETL)</td>
<td>Extract Transformation Load</td>
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<tr>
<td>(HBR)</td>
<td>Harvard Business Review</td>
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<td>(HQ)</td>
<td>Headquarters</td>
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<tr>
<td>(IEEE)</td>
<td>Institute of Electrical and Electronics Engineer</td>
</tr>
<tr>
<td>(KPI)</td>
<td>Key Performance Indicator</td>
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<tr>
<td>(OLAP)</td>
<td>On Line Analytical Protocol</td>
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Chapter 1: Introduction

This research study examines the role of the Business Intelligence (BI) output in the organizational decision-making process. The main incentive behind the topic choice was my master program in Copenhagen Business School. The course provided me with in an area that combines Information Technologies and Business Processes.

In addition after one and a half year in Denmark, I had already realized how huge the IT sector is. Hence this topic gave me the opportunity to conduct my research in the field that connects the IT with the Business Sector. Yet I had in my mind that I wanted to conduct my research in collaboration with an organization. Conducting a purely theoretical research was not in my plans.

The opportunity that Devoteam gave me, added more value to my research as it is a company that operates in the field of IT consultancy. An interpretive study was conducted in Devoteam in order to compare the findings with the theoretical framework that was generated.

1.1 Objectives and Research Question

The main purpose of the research was to identify the role of the BI out in organizational decision-making process. In order to achieve that, I implemented a strategy that would lead me to that path. I set up several sub-objectives in order to place the workload in an order.

One of the first sub-objectives that I had in my mind was to specify my research question. Hence it wasn’t formulated in this form from the first day, the research question that this thesis examines is:
'How the Business Intelligence output is being used in organizational decision-making process’

To answer this question, I had to separate my workload in two parts.

The first one includes literature in two topics. The first one is in the scope of Business Intelligence and the second in the scope of organizational decision-making. The second research conducted while I was reflecting in the Business Intelligence literature review.

The second part included an investigation and an interpretive study on the findings that acquired from my interaction with Devoteam. Before I conduct my on-field research, I made it sure that I had acquired the knowledge that I needed from the theoretical research. Moreover, this strategy helped me to be more focus on the data that I needed when I conducted the on-field research.

1.2 Research Scope and Limitations

Shortly after I begun my research, I realized that there are only a few studies that have examined the topic from this perspective. Most of the studies on BI have examined the topic from its technological aspect, by investigating the tools and processes of BI. This research study examines it from the scope of decision-making.

The limitations that were applied in the process, formulated the final outcome. Limitations in time, resources and space were known from the first day of the research and were considered when I formulated my strategy.
1.3 Structure Overview

This research paper is being structured in eight chapters as they are being presented below.

Chapter 1 Introduction
In this chapter the topic of this research paper in being introduced: the use of Business Intelligence outcome in the decision making process. It provides a brief description of the research area by introducing to the reader the basic ideas of this study. It presents the research question, the research scope and it gives a first definition of the basic terms of this study.

Chapter 2 Literature review on Business Intelligence
The second chapter provides an in depth, examination of the literature on Business Intelligence. The main purpose of this chapter is to provide a map into the BI literature. The chapter begins with an overview of Business Intelligence. Then, it examines the current perspectives of BI. The chapter ends by illustrating the connection between Business Intelligence and Decision-making process.

Chapter 3 Organizational Decision Making
This chapter presents an overview on the organization decision-making theory by focusing on the use of formal analysis in the decision-making process. Moreover it is presented three different views on the use of formal analysis. This chapter is address a framework on organization decision-making process by reflecting on the BI literature review.

Chapter 4 Methodology
This chapter presents my research approach on this study. The chapter presents my research design for literature review and for the interpretive study. Moreover
addresses the philosophical perspective that I followed and provides a personal background of the author.

Chapter 5 Empirical setting
This chapter provides an assess of the organization in which I conducted the interpretive study. The aim of this chapter is to provide insight information of the context where the study was conducted.

Chapter 6 Analysis
This chapter analyzes the empirical findings that were gathered during the research. The theory-driven approach was used in order to provide a better connection with the theory.

Chapter 7 Discussion
This chapter discusses the empirical findings as they are presented in the analysis. Moreover, further empirical findings are provided in order to elaborate better with the literature

Chapter 8 Conclusion
This is the last chapter of this thesis. It provides a brief summary and suggest further research.
Chapter 2: Literature review on Business Intelligence

This chapter presents a literature review on Business Intelligence (BI) in order to provide insights into the theory, the limitations and the assumptions of the topic. The theoretical overview that is presented in this chapter has a twofold purpose: to establish the theoretical framework and to define the connection between the Business Intelligence and the Decision Making process. This theoretical framework may not be the only one in the scope of the Business Intelligence field, but it is presented as the one who serves best, the purpose of this research paper.

Most of the work of this literature review was conducted before the fieldwork. The analysis of the articles that are presented in the next chapters provided me an understanding in the Business Intelligence that was necessary to me in order to design the questionnaire for the interviews and to define my data collection process. This review was conducted prior to the Decision Making theory review since it helped me to put limitations into that study and eliminate those elements that was not relevant with the Business Intelligence and the connection between them.

This chapter discusses the studies that are related to the topic of Business Intelligence and they provide the most insights into it. During my research I found out that there is a huge number of papers and articles that have been published about the topic and the huge amount of data that I had to deal with. This literature research is focused on the scope of Business Intelligence, therefore I tried to evaluate these article and study those that are relevant with the topic. The papers and articles that are being cited in this review are these that are considered to be the most relevant with the topic. They provide with insights and
support the theory and they are available for further studying to those who want to extend the knowledge that is provided from this research paper.

Taking into consideration the above principles, the outcome of this literature review divides the BI scope into two streams: the technology view and the process view. As we will examine below in our research the technology view includes all the BI technologies that have been developed all these years whilst the process view focuses on the processes that have been designed and implemented in order to make the existing technologies useful to the end user. Both views examine the same steps that information follows from their own perspective. The technology view focuses on storage, analysis and presentation of the data while the process views focuses on the process of gathering data, analyzing them and presenting a useful outcome. As we will examine below and we will state that the process view is the one that is directly connected with the decision making process. Moreover this review examines in depth all the relevant aspects of both views: the type of data, structured or unstructured, the BI resources, the methods to create intelligence and the assumptions that arise from both views and the topics that this literature review will examine.

As stated above the purpose of this literature review is twofold. From the one side is to address the theoretical framework of BI that was used in this research and from the other side to define the connection between the BI and the decision making process. These two sides are not completely separated, as the second one is being considerate in order to establish the limitations for the first one. In this aspect the theoretical framework has been filtered and defined as in connection with the organizational decision making process. For this reason that framework was used to examine how the BI tolls and processes are being by organization in order to support the decision making process. Examining Business Intelligence from this specific angle, the main purpose of this paper was to identify how BI
outcome is being used by organizations, what purposes serves and how it can affect the decision making process within an organization.

Business Intelligence is related to the strategic management, performance management and decision making (Davenport & Prusak, 1998). However this research paper attempts to focus more on the operational decisions rather than the strategic decisions and to make a distinction between these two processes. The distinction between these two will be examined in Chapter 3 of the research paper.

The main goal of this literature review was to gain the knowledge that would allow me to collect all the data that were necessary in order to conduct this research. In the first phase I started my research in collaboration with my thesis supervisor using two of her published articles in order to familiarize with the topic and then made a more broad research in established online databases. The examination of this process is presented in chapter 4 as it is not the purpose of this chapter.

2.1 The concept of Business Intelligence

Historically, the first time that we see the term of Business intelligence in a published scientific paper was in 1958 in the journal article “A Business Intelligence System” by Hans Peter Luhn (Luhn, 1958) in the IBM Journal and Research Development journal. In this article, H.P. Luhn, who was an IBM researcher describes the BI an “automatic method to provide current awareness services to dentists and engineers” (Luhn, 1958). However it was not until after the 1990’s that the term of ‘Business Intelligence’ started to be using more extensively in the scientific papers with the expansion to come after 2000
(Shollo, 2013). According to (Dekkers, Versendaal, & Batenburg, 2007) the term of Business Intelligence became more extensively familiar because it was used by an analyst of Gartner. During the 2000s, the academic scientific research on Business Intelligence was poor comparing to the needs of the industry which was the leader in BI development (Arnott & Pervan, 2008).

In 2007 Pirrtimäki defines BI as:

- ‘an intelligence process that includes a series of systematic activities, being driven by the specific information needs of decision makers and the objective of achieving competitive advantage’ (Pirrtimäki, 2007).

Earlier than that, there was a confusion between Business Intelligence and Competitive intelligence. Under this notion Vedder et al (1999) define Business Intelligence as:

- ‘Competitive intelligence (CI), also known as business intelligence, is both a process and a product. As a process, CI is the set of legal and ethical methods an organization uses to harness information that helps it achieve success in a global environment. As a product, CI is information about competitors’ activities from public and private sources, and its scope is the present and future behavior of competitors, suppliers, customers, technologies, acquisitions, markets, products and services, and the general business environment’ (p. 109)(Vedder, Vanecsek, Guynes, & Cappel, 1999).

Based on (Choo, 2002; C. S. Fleisher & Blenkhorn, 2001; C. Fleisher, 2003; Weiss, 2003) Pirrtimäki defines that Business Intelligence includes the Competitive Intelligence as a concept (Pirrtimäki, 2007)
The above figure (Pirttimäki, 2007) represents the relationship between BI, CI and competitor intelligence. In (Negash, 2004), CI is defined as ‘the process for ensuring your competitiveness in the marketplace though a greater understanding of your competitors and the overall competitive environment. Business Intelligence on the other hand is the intelligence concept with the broadest scope among the other concepts. (Choo, 2002; Negash, 2004; Pirttimäki, 2007) Business intelligence is the concept that is being operated across different source, internal and external environment within an organization and across different types of data, structured and unstructured (Choo, 2002; Negash, 2004; Pirttimäki, 2007).

The literature research showed that the Business Intelligence has two aspects. Some of the scholars define Business Intelligence as a set of technology and some of them as a process. The next parts of this chapter present these two
streams by defining them, addressing their characteristics and examining the similarities and the differences between them. These streams are different on the way they view and understand the Business Intelligence. The technology view focuses on the tools and the technologies that allow to collect, store, analyze and present data, whilst the process views focuses more on the processes that are being designed and implemented in order to gather and analyze data and finally to present the outcome.

- ‘Business Intelligence is a broad category of technologies, applications and processes for gathering, storing, accessing and analyzing data to help its users make better decisions’ (Wixom & Watson, 2010)

However the research question that this study formulates focuses on how the organizational decision-makers are using the BI outcome to support the decision-making process. Hence is nor the process or the technology that the decision-makers use rather than the outcome of them. In order to fully understand how the BI output is being shaped, this literature review will map every relevant aspect in the Business Intelligence concept. These aspects include the type of data that BI handles, the sources that are being used, the methods that exist to create intelligence and the assumptions that arise for both views.

### 2.2 The two perspectives of Business Intelligence

#### 2.2.1 The technology view

As we stated, above the Business Intelligence concept can be examined under the technological view where the BI can be identified as the set of the technologies and the tools that provide the user the function to store, analyze and present data (Wixom & Watson, 2010). In the next part of this review are being mapped the 3
stages of the BI tools where data can be transformed into information and then into intelligence. According to (Petrini & Pozzebon, 2009) the variation of the tools that are being implemented is big and contains systems, platforms, packages, applications and tools.

Under the technological aspect, BI uses a combination of Data Warehouse technologies, data mining technologies and a set of tools such as the on-line analytical processing (OLAP) (Negash, 2004) Although a deeper analysis of these technologies and tools would be too technical and out of the scope of this research, a briefing description is provided in order to provide useful insights to the reader for the next chapters.

Historically, the development of the data warehouse goes back in the 1960s, in a joint project between an American corporation called ‘General Mills’ and Dartmouth college (Kimball & Ross, 2002). Later on, in the 1970s the company ACNielsen provided dimensional data marts tools for retail businesses(Kimball & Ross, 2002). Today ‘a data warehouse maintains its functions in three layers: staging, integration, and access; Staging is used to store raw data for use by developers (analysis and support); The integration layer is used to integrate data and to have a level of abstraction from users; The access layer is for getting data out for users’ (Patil, Rao, & Patil, 2011).

• ‘Data Warehouse are larger repositories that integrate data from several sources in an enterprise for analysis’ (Pedersen & Jensen, 2001)

One of the processes that run in a data warehouse in the ETL process (Kimball, Ross, Thorntwaite, Mundy, & Becker. Bob, 1998). The ETL process has three stages, extract, transformation and load (Kimball et al., 1998). In the first phase the ETL process involves extracting data from a source, internal or external (Kimball et al., 1998). The second phase, transform stage, applies a series of rules in the data that were extracted in the previous phase in order to prepare the
data for the next phase (Kimball et al., 1998). In this phase some sources require less or no manipulation of the data comparing to other sources, which they may require a series of transformation types to be applied in order the data to be compatible and meet the technical and business needs that has been set for the database (Kimball et al., 1998). The last stage in an ETL process is the load phase where the data are being loaded to the end target, depending on the requirements that has being set to the data warehouse (Kimball et al., 1998).

When the data are gathered and stored in the data warehouse they are ready to be analyzed and presented in a useful form to the end user. Business intelligence tools are the application who are designed to analyze and present data for the Business intelligence. Such BI tools are the online analytical process (OLAP), the data mining and the spreadsheets. ‘Online analytical processing systems provide fast answers for queries that aggregate large amount of detailed data to find overall trends’ (Pedersen & Jensen, 2001). ‘Data mining applications seek to discover knowledge by searching semi-automatically for previously known patterns and relationships in multidimensional databases’ (Pedersen & Jensen, 2001).

### 2.2.2 The process view

The process view defines Bi as ‘the continuous activity of gathering and analyzing data supported by a BI system’ (Dekkers et al., 2007). A more accurate definition about BI I given by (Petrini & Pozzebon, 2009) where the process view is connected with the decision making process and is being addressed as a continuous process, similar to (Dekkers et al., 2007), which supports the decision making process by gathering, analyzing and aggregating data in order to be useful to the decision makers who are using the BI outcome. In this view the Business Intelligence tools have a supporting role as they provide they means to facilitate these processes. (Davenport, 2006; Pirttimäki, 2007).
• ‘The term “business intelligence,” which first popped up in the late 1980s, encompasses a wide array of processes and software used to collect, analyze, and disseminate data, all in the interests of better decision making. Business intelligence tools allow employees to extract, transform, and load (or ETL, as people in the industry would say) data for analysis and then make those analyses available in reports, alerts, and scorecards.’ (Davenport, 2006)

Moreover ‘Business Intelligence can be defined as the process of turning data into information and then into knowledge’ (Golfarelli, Rizzi, & Cella, 2004)

Similar to the technological view, the process views consist also of three stages.

• Gathering and storage
• Data process and analysis
• The process view BI outcome

2.3 The three stages

This part of this chapter examines these phases for both the technological and process view of BI. In order to provide useful insights to the reader, this part addresses these stages for both views by providing definitions and explanations, pointing out the similarities, and comparing the differences. Moreover it is being examined the type of data that BI handles and the type of sources that can be used.
2.3.1 Storage and Gathering data.

In the phase of gathering and storage the technological view examines in this stage two critical dimensions, the types of resources that are being used and the type of type that is being gathered (Negash, 2004).

The are two main sources that are being used, the internal sources and the external; the first one has to do with the internal environment of the organization and the latter one with the external environment. (Negash, 2004).

All the data that are being generated within an organization by the employees are data that belong to the internal environment. ERP systems, applications and tools that handle business processes and integrate with the data warehouse are sources that provide internal data for storage (Negash, 2004). Moreover, data that is being generated by the employees inside the scope of the organization, such as documents or emails, are also considered as internal data.

On the other hand all the data that are being gathered out of the scope of an organization are considered external data. Typical tool to gather external information is the CRM tool which is an application that’s focuses on customers’ information (Negash, 2004). In a more general form external data, consists of data about competitors, customers, markets, products and generally everything that can be relevant to an organization but it is out of the scope of it (Negash, 2004).

The second dimension examines the type of data. The distinction here is between structured data and unstructured data. Structured data are those data the “fit neatly into relational or flat files” (Negash, 2004). Technologies such as the relational databases and the spreadsheets can be considered as examples of technologies that structure data (Shollo, 2013). Other examples of technologies
that generate structure data are the OLAP tools, the data mining tools, the ERP applications and the Executive Information Systems (EIS) (Negash, 2004). On the other hand there are data that ‘does not fit neatly into relational or flat files (Negash, 2004). These type of data is called unstructured. These data have to be transformed into structured data in order to be able to be stored in a rational database (Kimball & Ross, 2002; Negash, 2004). Business processes, e-mails, phone calls, video files and reports can be considered as unstructured data (Negash, 2004). It is very clear that both structured and unstructured data are crucial in order to create intelligence.

- ‘To create business intelligence information, the integrated data are searched, analyzed, and delivered to the decision maker. In the case of structured data, analysts use Enterprise Resource Planning (ERP) systems, extract-transform-load (ETL) tools, data warehouses (DW), data-mining tools, and on-line analytical processing tools (OLAP). But a different and less sophisticated set of analytic tools is currently required to deal with semi-structured data.’ (Negash, 2004)

### 2.3.2 Processing and analysis

After the data have been gathered, it comes to the point where they have to be transformed and stored. The BI tools in this case aim to support the staging phase. ‘The data staging area is everything between the operational source systems and the data presentation area’ (Kimball & Ross, 2002). The data staging is a set of tools and a set processes and is referred as ETL (Kimball & Ross, 2002). ‘Extraction is the first step in the process of getting data into the data warehouse environment. (Kimball & Ross, 2002) Extracting means reading and understanding the source data and copying the data needed for the data warehouse into the staging area for further manipulation.(Kimball & Ross, 2002).
According to the process view ‘the data processing and information analysis phase refers to the ways data are analyzed and transformed into information, which is then filtered, aggregated and provide to the users, i.e. managers and decision makers (Shollo, 2013). This is the phase where the BI processes are focused in methods that create intelligence by ‘supporting mangers in collecting and analyzing data and information that is relevant to their strategic goals (Shollo, 2013).

Davenport (Davenport, 2010) addresses the connection between BI and decision making process and describes it in three approaches. From one approach to the other this connection changes from loosely to more structured (Davenport, 2010). During the first approach the information that is being offered is not specified to support as specific decision rather than, it supports a wide range of decision (Davenport, 2010). In the second approach the decision is more structured, therefore the information that is being required is more specific (Davenport, 2010). In the last approach the decision making process is more automated, it is well structured based on rules that identify the exact needed information and can be made by a machine (Davenport, 2010). In order organizations to improve the decision making process they have to examine and identify the process that decisions are being made, assess how the information is being used and try to improve the connection between them (Davenport, 2010).

2.3.3 Presenting the output of BI

The last stage is the presentation of the information to the decision makers. ‘Business Intelligence systems present complex and competitive information to planners and decision makers’ (Negash, 2004)

Under the notion of complexity, the main target for the organizations is to improve the quality of the outcome and the timeframe that is needed to be
presented to the decision makers (Negash, 2004). Moreover following the second and third approach (Davenport, 2010), that are being mapped in the previous part during the analysis of the process view in the phase of processing and analysis, organizations tend to create outcome that is targeting specific decisions (Kimball & Ross, 2002). In order for the databases to become more simple and understandable, dimensional data modeling has been introduced to the organizations (Kimball & Ross, 2002). In this stage the information is presented to the decision through different tools and applications which are referred as data access tools (Kimball & Ross, 2002). These tools can have a big variety of capabilities and functions and they can provide to the decision maker the ability to acquire the leverage of using the BI outcome during the decision making process (Kimball & Ross, 2002). The variety in data access tools ranges from simple tools to more complex applications (Kimball & Ross, 2002). A simple data access tool can be an ad-hoc query tool whilst a more complex tool can be a ‘sophisticated data mining or a modeling application (p14)’ (Kimball & Ross, 2002). The contrast here is that, simple tools, such as an ad hoc query, can be very effective but they can only be used by a small group of end users because they require from the user pre-existing knowledge (Kimball & Ross, 2002). Customized access data applications may be more complex in their functions, but they are represented through templates that are more friendly to the end user without requiring from them to have the technical knowledge to integrate with the system (Kimball & Ross, 2002). Modeling applications and forecasting tools are typical examples of the more sophisticated data access tools (Kimball & Ross, 2002). Some of these tools have also the ability to be used as a source system by sourcing their analysis results back to the storage phase (Kimball & Ross, 2002).
2.4 Business Intelligence and Decision Making Process

As noted above, the research question that this study formulates focuses on how the organizational decision-makers are using the BI outcome to support the decision-making process. Davenport addresses the link between Business Intelligence and decision making process by separating this connection into the three approaches that are being mentioned in a previous part of this chapter (Davenport, 2010). Moreover in his work proposes that ‘organizations must have a strong focus on decisions and their linkage to information. Businesses need to address how decisions are made and executed, how they can be improved, and how information is used to support them’ (Davenport, 2010). He identifies 4 steps through which organizations can improve their decision making process (Davenport, 2009). The steps are referred as identification, inventory, intervention and institutionalization (Davenport, 2009) and they formulate a framework that will be examined in the next chapter of this research study.

2.5 Summary

This chapter presents a literature review on Business Intelligence. The current perspective were examined and presented. Furthermore the three stage we identified in both perspectives and generated a framework that will be useful for the next parts of this study.
Chapter 3 Organizational Decision Making

After having examined all the relevant aspects of Business Intelligence, the purpose of this chapter is to address the framework of organizational decision-making theory. The examination of this framework is critical in order to gain an overall knowledge of the connection between the BI outcome and the decision-making process. Having in mind that BI outcome attempts to reduce uncertainty and ambiguity, this research focuses on the rational choice theory as this can be examined as a cognitive process.

3.1 Organization Decision-making

The human performance in decision-making process can be examined through the lenses of three perspectives, the psychological, the normative and the cognitive perspective. The psychological perspective, examines the psychology of the decision-makers in the context of a set of needs and preferences that an individual has and the values and results that they seek (Beach, 1997). The normative perspective, addresses the rationality and the logic in the decision making process (Kahneman & Tversky, 2000). Upon this notion, the decision theory can be identified as normative or descriptive (Kahneman & Tversky, 2000; Simon, 1959). In contrast with the normative perspective the descriptive approach “is concerned with people’s beliefs and preferences as they are and not as they should be”(Kahneman & Tversky, 2000). The cognitive perspective addresses the decision-making process as an ongoing process that is always integrated in the interaction of the environment (Ranyard, Crozier, & Svenson, 1997; Simon, 1947, 1959). Simon(1959) identified that the decision-maker interacts with the environment that he integrates as a need to assess a framework that would explain the decision-making including the human cognition. A
decision can be differentiate according to their type: structured or unstructured, and according to their scope: strategic or operational. The distinction between, structured and unstructured, was first introduced by Simon H.A. (1977) under the terminology of programmed and non-programmed. “Decisions are programmed to the extend that they are repetitive and routine, to the extend that a definite procedure has been worked out for handling them so that they do not have to be treated from scratch every time they occur” (Simon, 1977). In contrary, decisions are non-programmed “to the extend that they are novel, unstructured and unusually consequential” (Simon, 1977). Under the same notion, unstructured are defined the “decision processes that have not been encountered in quite the same form and for which no predetermined and explicit set of ordered responses exists in the organization” (Mintzberg, Raisinghani, & Theoret, 1976). At this point a distinctions has to be made between the strategic decision and the operational decision. Decisions are operational if they require to to be made in a more regular base, usually it is being referred as every day decisions, and while strategic are those that are being made in the scope of the strategic management of the whole organization. Strategic decision tend to be more unstructured while operational tend to be more structured (Simon, 1977). Strategic decisions are those that are “important in terms of action taken, the resources committed, or the precedents set (Mintzberg et al., 1976). Although a distinction is clear, everyday decisions can create of destroy the organization’s strategy (Bower & Gilbert, 2007). “ Strategic decisions are critically affected not just by senior corporate managers, but also by midlevel general managers, their teams, and the operating managers who report to them (Bower & Gilbert, 2007). As we stated in the previous chapters, this research paper focuses on how the BI outcome can help managers to improve the operational decision-making process.
3.1.1 Rational choice theory

The decision-making process can be defined as a rational or irrational process. As we stated above, the normative and cognitive perspective indicates that the decision-makers acts in a rational sense. “According to the rational choice theory, the decision-makers “operates by selecting the alternative with the highest expected value once specific goals have been defined, all the alternatives of achieving the goals have been identified, and their consequences have been evaluated”(Shollo, 2013).

However in reality, decisions-makers do not always follow the rational approach. There are some factors, such as biases, or limitations that can affect the rational process and they lead the decision-makers to make a more irrational decision (Schacter, Gilbert, & Wegner, 2010; Simon, 1947). The first one who pointed out that rationality is an ideal state and cannot be reached in practice was Simon H.A (Simon, 1947, 1957). He pointed out that “the capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world – or even for a reasonable approximation to such objective rationality (Simon, 1957). In Models of Man (Simon, 1957), he points out that the decision-makers act rationally only partially and irrational or emotional for the rest part of their process. The term that was introduced by Simon was “bounded rationality”. Under this notion, limitations are set in human’s mind to recognize and evaluate every alternative option and every possible consequence, and limitation are recognizing in the cost of information, gather, analyze, process (Simon, 1957). In the years that followed, numerous scholars tried to approach the organizational decision making process proposing models either that were in touch with the bounded rationality concept or not. By specifying the decision-making procedures explicitly, Rubenstein proposed a process to model-bounded
rationality through which the decision-makers have to make decisions about when and how to decide (Rubinstein, 1998).

### 3.1.2 Alternatives approaches

As we stated above, some scholars developed models in the scope of bounded rationality, whilst others have developed theories and models that include the roles of institutions, uncertainty and determination of the individual biases by their socioeconomic environment (Fernández-Huerga, 2008). These models rely on individual’s beliefs and experiences, and on unconscious automatic processing. Upon this notion, a part of this case study is focused on how the BI outcome can reduce these factors in order the decision-makers to be biased-free when they make a decision.

Furthermore the decision-maker’s rational approach can be affected by the organizational environment, in which he has to act. There are several characteristics that can affect the decision making process. Lack of information when it comes to general organization’s issues and a vague situation where are not clear the roles and the structures in the decision-making process, are according to Davenport (2009) some of these characteristics. Identifying a role structure and understanding how roles emerge, are factors that can reduce the implications in the process (Simon, 1959) Moreover, in organizational level, the decisions are often connected with the resource allocation and the external factors that can apply a strong impact in the decision-making process (Bower & Gilbert, 2007). General managers and operational managers are likely to have a different impact on this process (Bower & Gilbert, 2007). External factors, such as the best customers and the capital markets, can also have a strong impact in resource allocating and in the company’s strategy affect directly the decision-making process (Bower & Gilbert, 2007). Simon (1959) identifies 5 goals of a
firm, from which some of them may come in contrast with the individual’s values or goals (Simon, 1959):

1) It is not determined whether firms care more about long term or short term profits.
2) The shareholders may acquire all kind of “physical income” beyond monetary rewards.
3) The shareholders “may not care to maximize, but may simply want to earn a return that they regard as satisfactory”
4) There is a distinction between the equity owners and the managers in the scope of setting maximization of profit as a goal.
5) Maximizing of profit can be an ambiguous goal for an organization.

Another main distinction is that, comparing to the individual’s decisions that are may require judgmental accuracy, organizational decisions are consistent and are made in an ongoing process (Shapira, 2002).

All the above characteristics and approaches sets further limitations to the rational choice theory by setting a variety of different parameters that have to be consider in order to define a model that examines the decision making process. The next parts of this chapter present three complementary streams as they were categorized by Baker et al. (2004).

### 3.2 The formal analysis in organizational decision-making process

The limitations of the rational choice, were addressed very early when Simon (1945) introduced us to bounded rationality. Limitations in the availability of
information, goals that cannot be predefined clearly, difficulties in considering all the possible alternatives and lack in defining all the consequences are the limitations that are being set to the decision-makers even when they start a rational choice process but they end up in “bounded rationality” (Simon, 1947). Furthermore, it is defined in practice that organization decision-making process has three dimensions: rationality, judgment, and politics (Baker, Ginsburg, & Langley, 2004).

Formal analysis is considered as a part of the rational procedures that gather and analyze information. (Baker et al., 2004). BI as a set of tools and processes that gather, analyze, and present information is considered, under this notion, as the process that provides the output of formal analysis. Simon (1978) predicted that with the development of more sophisticated models in the formal analysis and the increase in the available information, the rational choice model would get to a point to provide a more accurate description of the organization decision-making process (Simon, 1978). On the other hand, Baker (2004) contradicts that stating that “at the same, the attempts to use rational approaches do not appear to have substantially altered the processes of decision making (Baker et al., 2004)

The next parts of this chapter present the use of formal analysis under different perspectives. For this purpose, the categorization that provided by Baker (2004) is adopted and presented.

3.2.1 The functionalist perspective

The functionalist perspective is being used in the scope of rational choice and bounded rationality, considering information as being used to reduce uncertainty by informing the decision makers. Different scholars have developed several
models in the scope of decision-making as a rational process with a specific start and end and with linear phases.

Simon was one of the first who developed such a model describing the three phases of organizational decision processes: (Simon, 1977)

- Intelligence phase
- Design phase
- Choice phase.

Under the same notion, Mintzberg, Raisinghani and Theoret developed a model that consisted from the phases of: (Mintzberg et al., 1976)

- Identification
- Development
- Selection

In more depth, these phases can be broken down into seven routines: (Mintzberg et al., 1976)

- Recognition
- Diagnosis
- Search
- Design
- Screening
- Evaluation
- Authorization

In a more recent approach, Davenport identifies four steps though which “smart” organizations can help their decision-makers: (Davenport, 2009)

- Identification
- Inventory
• Intervention
• Institutionalization

According to this view, formal analysis is being used to decrease uncertainty. However there are factors that can affect the use of formal analysis in decision-making process. (Baker et al., 2004). Decision-making that is based on formal analysis is efficient when there is clarity of the objectives and clarity of the means for producing results. (Thomson & Tuden, 1959). According to this view, formal analysis is possible only when both, objectives and means are clear, because formal analysis requires the ability to gather unambiguous information about the alternatives. (Thomson & Tuden, 1959). When one of these two, or both of them, is unclear, Thomson and Tuden (1959) propose a different approach that the decision makers have to follow rather than the formal analysis. These three approaches can be seen at the table below.

Table 1 - alternative approaches to formal analysis based on (Thomson & Tuden, 1959)

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Means</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known</td>
<td>Unclear</td>
<td>Judgment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Experiential knowledge can be taken into account</td>
</tr>
<tr>
<td>Unclear</td>
<td>Known</td>
<td>Bargaining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* The main concern is to achieve an agreement that will satisfy the majority of the shareholders</td>
</tr>
<tr>
<td>Unclear</td>
<td>Unclear</td>
<td>Inspiration or Intuition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* It is considered as a highly problematic situation that is called “anomie”</td>
</tr>
</tbody>
</table>
In this segment, the functionalistic view was presented as a perspective that is using formal analysis to reduce uncertainty in the decision-making process. As with every model, limitations and malfunctions that may arise were presented. A model that can identify unambiguity in the process, that can affect the optimal decision was mapped alongside with the optimal solutions that are being presented by the scholars. On the notion of reducing uncertainty, this view of formal analysis is adopted by the business intelligence literature and was presented in the 2nd chapter.

3.2.2 The political view

The political perspective examines whether analysis can be used in different ways than what it was presented in the functionalist view. In these cases, analysis can be used for non-informational purposes in order to support political processes (Baker et al., 2004). There have been identified cases where formal analysis is used in political perspective in order to:

- To support a decision that has already been made (Meyer, 1984)
- To provide support in a debatable discussion (Lindblom & Cohen, 1979)
- To apply control (Dalton, 1959)
- To deflect attention away from specific issues (Meltsner, 1976)

Langley (1959) supports that the political dimensions of the decision-making process and the rational dimensions, are mutually exclusive. Rather than, the social interactive and the formal analysis appear to be symbiotic. “formal analysis would be less necessary if everybody could execute their decisions themselves, and nobody had to convince anybody of anything. In fact, one could
hypothesize that the more decision-making power is shared between people who do not quite trust one another, the more formal analysis will be important” (Langley, 1989 p.609)

Baker (2004) advocates that although that the formal analysis in use of political perspective can be seen as negative, it can help to improve the decision-making process. Especially when it is used in communications, in cases where there are different groups who they have different goals and different access to information, it can be used as a tool that ensures all the information and the aspects have been debated and considered (Baker et al., 2004).

As we demonstrated in this research segment, the political view of the use of formal analysis can have a twofold side: positive or negative. It can still be used to support the process by decreasing uncertainty but it can also be used as a tool to mislead or to exert control over someone.

3.2.3 The symbolic view

The highly symbolic value that has been attached to the rational approach and the formal analysis can sometimes lead to an outcome that is not rational at all (Feldman & March, 1981). In organizational level, the concept that decision making processes need to convey rationality has been enhanced into their culture and they have been institutionalize to the level that they do not examine whether the outcome of this process is rational or not (Feldman & March, 1981). In this case, because formal analysis is connected to rational behavior, the symbolic value tend to be higher than the informative value (Feldman & March, 1981).

“this perspective suggests that when norms of rationality are dominant, displaying the use of formal analysis procedures enhances legitimacy, even when such uses are instrumentally inappropriate” (Baker et al., 2004)
Feldman and March (1981) observe that organizations gather information for all the reasons that have been identified in the functionalists and the political perspective, yet they often view this process as rational to the level that can not draw a line where they should stop gathering, partially relevant, information and you a different approach, such as judgment or negotiations. In this case the symbolic value that is being attributed to the process is the one which increases the efficiency that is being attribute to the decision maker, even thought the information that is gather may be or not be relevant.

3.3. Summary

The main purpose of this chapter was to present different approaches to organizational decision-making process. A framework was present in order to gain a more deep understanding into the field of organizational theory. The main focus of this research was the rational choice. The formal analysis was presented as a significant part of the rational choice theory and a map was presented where it was examined the use of formal analysis, not only in the scope of gathering and analyzing data, but also through its use for political or symbolic purposes.

These two chapters provided with the knowledge and the insights that I needed in order to conduct this research. Many of the concepts of these chapters is used in chapter 6 where I have conducted my analysis in the use of BI tools in the decision making process.
Chapter 4 Methodology

The main purpose of this chapter is to give an insight on how the research design of this paper took place. As early as I started my literature research I was faced the dilemma of choosing my lenses on the philosophy of science. This chapter does not present the process of choosing a view, hence it addresses the interpretive perspective as the chosen one.

From the point that I chose to examine the Business Intelligence’s impact in decision-making process through a qualitative research, the terms: case study, qualitative research and interpretive perspective fitted perfectly in my mind.

The qualitative research methods are very helpful when the researcher wants to examine the human’s behavior in the socio-economic environment of an organization and it can focus on the relationships between information technology, people and organizations (Meyer, 1984). One of the aspects that this research examines is “how the decision-makers are using the BI tools”, the qualitative method was considered as highly relevant in examining the individual’s behavior in the socio-economic context that they act.

4.1 The interpretive perspective

Shortly after I had decided to conduct a qualitative research, I start looking at several perspectives to find the lenses through which I would understand and examine the case. I had in my mind that if I want to assess how BI tools can improve the decision-making process, I had to examine how the BI tools are
being used in organizations. For that reason the second part of my literature review, chapter 3, is about human choice. In order to understand the decision-making process we have to understand the individual’s behavior. This behavior does not exist in a perfect and unbiased context, as we addressed in chapter 3, but in the social environment of an organization, which includes rational norms, political expediencies and biased influences.

“…social processes can be usefully studied with an interpretive perspective, which is explicitly designed to capture complex, dynamic, social phenomena that are both context and time dependent” (Orlikowski & Baroudi, 1991 p.18).

The interpretive approach can be very useful to the researcher who wants to examine how people create meaning and act in a specific context. (Orlikowski & Baroudi, 1991). Furthermore, this approach focuses on the human understanding by examining the meaning that the humans assign to the situations in the social context (Klein & Myers, 1999).

It is considered important for the researcher in the interpretive approach to be active and be able to follow the previous notion by employing methods and by increasing awareness in order to understand the humans perceptions (Walsham, 1995). Yet he acknowledges that there not unbiased researcher: “we are all biased by our own background, knowledge and prejudices to see things in certain ways and not others” (Geoff Walsham, 2006 p.321).

Having in my mind the scope of this research study, I chose the interpretive perspective as I find it, the one that will give me a better understanding in my research. Interpreting human behavior under these terms can create a valuable asset to this study.
4.2 Research design

At the beginning, my main focus of the research was the literature research. Shortly after, I realized that the existing literature for the Business Intelligence is not consistent. Thus, there is not a study that includes all the relevant aspect of the BI. The literature is more like spare parts that overlap or contradict. Hence I had to formulate a strategy on how I would conduct this research. The following segments of this chapter address this strategy in the terms of data collection and data analysis.

In the part of organizational decision-making, my approach was relatively different, as the literature appears to be more impact in knowledge. The terms and theories were defined long time ago. My approach there followed a timeline. I started from the early definitions of the theory and followed it as it was enhanced in knowledge and modified it in some cases.

The biggest part of this literature review was conducted prior to the fieldwork. The good understanding of it, provided me with the insights that helped me understand better of the findings. A qualitative interpretive approach was considered as the most useful to analyze the findings reflecting in the theory. The transition from the literature study to the interpretive study was pretty clear, as I had defined from the start that it should happen only after I had a full understanding of the resented literature. Yet the two parts were not separated as I kept reflecting back in the literature during my interpretive study.
4.2.1. Personal background

As the researcher can be considered neutral during the interpretive study (Walsham, 2006) I will try to provide a rich but brief background of me. Through this description I will try to cover all the possible biases that may arise based on my educational and professional experience.

I hold a bachelor’s degree in economics with a specialization in business administration and international business relations from Democritus University of Thrace. With this research study, I finish my studies on the master course of Business Administration and Information Systems at Copenhagen Business School. Prior to my enrollment in this master program, I had no educational exposure to BI. Yet through the courses of this master program, I gained knowledge and insights that I found very helpful during my research. It was that exposure to the field of BI that pushed me to choose this topic for my master thesis. When it comes to organizational decision theory, I had acquired most of the theoretical knowledge through my bachelor studies.

In the gap between my bachelor and my master studies relies my professional experience. I worked both in the private and private sector. This provided me with valuable experience on the organization’s environment and processes. Both of my positions provided me with experience that ended up to be highly relevant with this study. On my first job, I worked in a sales department dealing with operational decisions very often. As the researcher of this study, having this experience helped me to interpret better the findings that I observed. I find it easy in moments to be in their shoes and understand their actions. My second job provided me with experience in a broad organizational level by working in a large organization. The relevance with my study is that, by working there, I acquired experience through my every day use of the systems. From ERP and
accounting solution to customized solutions for direct querying the database, my everyday workload was based on exporting and analyzing data.

I doubt that my educational background forced me to be negatively biased during my interpretive study, but I feel confident that it helped me to conduct a more quality analysis.

4.2.2 Designing the literature review

The literature review was conducted in two stages. On the first stage of the research, the Business Intelligence literature was reviewed focusing on its relation with the decision making process. On the second stage, the organizational decision-making literature was examined with a focus on the rational choice and the formal analysis. This literature review was conducted in two phases: data collection phase and data analysis phase.

4.2.2.1 Data Collection

The main goal of this process was to identify and gather all the articles that were relevant with the scope with this research.

I started the process of search in the BI scope in relation to the decision-making theory. My thesis supervisor provided me a pool of 12 articles to me, in the preface, as an introduction to the topic. Later on, I started my search on the online databases. The keywords that I used during research were: “BI”, “Business Intelligence”, “decision theory” and “decision-making”. I conducted several searches with the keywords either separate or in combination.
The primary research was conducted in online journals and online databases. I targeted those that I considered relevant to my research and they are known for their credibility at the same time. Namely, I conducted search in Harvard Business Review (HBR), Strategic Management Journal, IEEE and EBSCOhost. Moreover, I used the CBS online library as starting access point to the previous sources and as an extra resource for online search. Most of the articles that came out in the result were scanned out from the title or the abstract.

I continued my research on organizational decision decision-making topic. I started my research in the CBS library were I found many books on the topic. Then I continued my research online in the EBSCOhost, Ivey Publishing (Ivey cases) and HBR.

Although that the research pointed out many results, the majority of the articles were identified during the review of the articles based on reviewing the citations.

4.2.2.2. Literature Synthesis

With the end of backward and forward citation review the pool of the articles defined. The first phase was sorting out. I read thoroughly all the abstracts and those who were considered not relevant were sorted out. Those who were considered partially relevant I try to sort them based on a fast scanning of the article. In the second phase I read thoroughly all the remaining articles and separated according to their context. In the third phase I picked those that I use in my literature review based on relevance, credibility of the author, impact knowledge context and are available for further studying.

In the scope of organizational decision process I had a different approach. I started by examining the earlier works of Simon H.A.. In parallel I tried to
understand the psychological aspect of the topic (Beach, 1997) but shortly I realized that it was not relevant. After examining the rational theory of choice by Simon, I started my research to identify in what form the theory is applied today. The result was to identify the use of formal analysis in the three view that we presented in the previous chapter.

4.2.3 Designing the interpretive study

The interpretive perspective and the qualitative method where chosen for the reasons that were addressed in the 4.1 segment of this chapter. The interpretive study is considered a well accepted method of research (Myers, 2004). The interpretive study is consisted of three phases: a pre-phase, the data collection and the data analysis.

4.2.3.1 Pre-phase

After I finalized my thesis topic, in parallel with the literature research, I started looking for an organization where I could apply my theoretical framework. After a couple of months I was introduced the guy who in the next months would be my link with Devoteam. During our first meeting I presented to him the basic ideas of my research study and he came back to me with an analytic presentation of the company. During that meeting the data collection phase had begun.

4.2.3.2 Data Collection

The first step of this phase was to collect as much information as I could for the company. The main target at that point was to identify whether Devoteam
fulfilled my criteria to be a part of my research study. The fulfillment of these criteria will be explained in the next chapter. Beyond the scope and the activities of Devoteam, empirical data were gathered through the first meeting. Internet was my second source of information. The company’s website and a Google search was enough to gather a significant amount of data for the company.

Yet the scope of my research how the organization is using the BI tools in order to improve the decision making process. Hence it was critical for my research to get access and insights inside the company. For that purpose I conducted interviews with a senior partner and responsible for the sales processes employee. In a qualitative research the interviews can be considered as the main source of information (Mingers, 2001; Walsham, 1995). These two were considered relevant for the research, because they both have authority and responsibility on making operational decisions. The interview guide (appendix) was conducted based on the examination of the literature review and the insights that I would like to acquire for the qualitative interpretive analysis. The interviews were recorded as they would create an advantage for the research by disclosing a full description of what was said (Walsham, 1995). The interviews were semi-structured. The semi-structured interview is more open allowing the discussion to be held in more broad area. The transcripts of the interviews are not disclose in the research study and they remain in the possession of the researcher. After the interviews, more data acquired when follow-up questions were conducted wherever it was necessary.

4.2.3.3 Data processing and reflection

The next step in the interpretive study is the analysis of the data. In this part the data that have been collected are being presented. The model that I apply is theory driven. Based on that the data are presented in relevance with the theoretical framework that was presented in the previous chapters. After the data
are being examined and presented in relevance with the theoretical framework, the next chapter presents a reflection and a discussion upon the empirical findings.

Chapter 5 Empirical Setting

5.1 Devoteam group

Devoteam group was founded in Paris in 1995 and historically is coming from Telecom. The company created as a partner for guiding the IT transformation for its clients. The combination of consulting specialization and technological expertise gives to the company the ability to provide independent advice and optimal solutions to their customers in order to meet the strategic industrial objectives.

The company is based in 23 countries, alongside Denmark, and is present in Europe (majority offices), Middle East and North Africa. The group occupies 5000 employees whilst 4100 of them are professionals from consulting to integration. The group expanded through more than 30 M&A deals in about 10 years in order to create an international footprint and leadership in IT service management.
5.1.1 Devoteam portfolio

The company is focused on supporting its clients through all the stages of their IT transformation by implementing an optimal mix of business, technical and change management skills. The portfolio of the company offers 6 areas of consulting:

- IT transformation
- Mobile Enabler
- Cloud Transformation
- IT service Excellence
- Risk & Security
- Network Transformation

Through these segments, Devoteam delivers cutting edge services by using disruptive technologies in order to enhance the customer’s business performance. Moreover, the solutions that are being implemented have a cost effect for the customers as the cost of IT in the segments that they are applied. Devoteam reduces cost by optimizing the performance of the business.

5.1.2 Financial Overview

The growth of Devotean can be spotted also in the company’s financial results. Revenues expanded form 370m € in 2007 to 528m € in 2011 and 515m € in 2012 (annual reports 2007 - 2012). Nine different core geographical regions represent the 75% of group revenues. France (core) holds the biggest percentage in that group whilst the Scandinavian region is second. The Scandinavian region contains the countries: Denmark, Sweden, Norway and United Kingdom. While the 2012 revenues was decreased around 4% in comparison with 2011, the
projection for 2013 predicts an increase of 5.5% (Devoteam Strategic Presentation, July 2012).

5.2 Devoteam Denmark

The office in Copenhagen was established in 1978 as Fischer & Lorenz. In 2002 Devoteam reached an alliance agreement with France's Siticom Group. Shortly after the alliance agreement, Devoteam acquired majority control of Siticom. In addition to this acquisition, Devoteam took control of Fischer & Lorenz, based in Denmark, and Austria. The Danish offices belong today in the Scandinavian region, alongside with Norway, Sweden and United Kingdom. In Denmark there are approximately 120 employee while in the region around 370. Moreover in this region they use also a lot of subcontractors (Employee S.P.). The field is the same as with the group, business IT consulting, and there are three business lines: 1) IT consulting, 2) Solution partner within IT service management, 3) Expertise, in this business line, as expertise is considered when the customer hires from Devoteam an person with specific skills and specialization (Employee S.P.).

“In consulting you are selling value propositions and project but in expertise, you are selling CVs, single persons” (Employee S.P.).

In the Danish sector, the customers belong equally to public and private sector. According to Employee S.P. this creates a balance in the situation of Economic crisis as the public sectors is more stable financially, comparing with the private sector where the market decrease affects the sector rapidly.

As it was being mentioned above, the focus on this part of the research is on the sales process as it is consider a continuous process that requires, very often,
operational decision to be taken. These decisions are operational because they have an impact on how the employees process things in the company’s business model.

5.2.1 Mission, Vision and Success

The key statement of Devoteam is “Connecting Business and Technology” and this can be considered as the mission of the company. But when it comes to employees, people have many different tracks of missions and visions. Sometimes employee’s vision is in harmonization with the excellence of the company’s while others it can be to become the leader of the market.

What is your personal mission and vision? Does this comes close to the company’s mission or vision?

“‘That’s complex answer […] when it comes to sales, its professionalize our sales and be more efficient and effective in our sales process [...] create trust relationships with our customers. (Employee S.P.)

“My mission and vision for Devoteam […] is to become the McKinsey for IT advisory […] to be the best in Denmark […] you can see that there’s a limitation […] because I say advisory but we also have delivery solutions. (Employee H.S.)

But in order to reach the goals that vision set, you need to succeed in your field. So, naturally my next topic of interest was, how they define success in Devoteam. In this case there are more clear objectives that can be measured and define success or failure. These objectives have different perspectives depending if the refer to financial targets, employees or customers.
Meeting the financial targets is the first one. These targets are being set in agreement between the local Chief Executive Office (CEO) and the Headquarters (HQ) in Paris. These targets include Key Performance Indicators that are related with financial indicators like turnover, margin and profit. The financial targets are also connected with the employees performance. In Devoteam is called pyramid, and it is a system that categorizes the employees according to their position in the company. Each level contain employees with different gross margin. The performance of sales employee is measure with a KPI that is called “lemtar”. This is a standardized measurement that compares the sales of the employee with his target. This is an indicator that is being measure across the Devoteam group under the same specification and can compare employees, country offices and regions. In customer perspective, customer satisfaction over time is the target. There are KPIs on customer’s satisfaction and it is important for the company to meet these criteria in order to be considered as succefull in this perspective.

5.3 Summary

Starting chronologically, the purpose of this chapter is to assess the environment under which this research was conducted. It can be seen as introduction to the next chapter, which is the analysis of the company’s tools and processes based on the frameworks that were presented in chapters 2 and 3.
Chapter 6 Analysis

The main of this study was to identify the use of Business Intelligence tools in the decision-making process. This chapter presents the analysis of the findings of my research. As it is state in chapter 4, this analysis is theory driven. Hence it is based on the theoretical models that were developed in the previous chapters in order to provide with sufficient results and examine the research question. The analysis that is presented in this chapter follows the sequence of the literature.

The first part of this analysis examines how business intelligence exists in Devoteam. A thorough examination of the systems and processes is considered necessary and helpful for the second part. In order to evaluate how the BI output is being used, it is necessary to examine how it is being produced. Based on the literature review distinction is made between BI tools and BI processes. Moreover, the 3 stages, gathering, analysis and presentation are examined.

The second part of this analysis follows the decision-making framework that was presented in the chapter 3. The impact of BI outcome in the decision-making process is being investigated as the decisions are being examined based on how they use the formal analysis.
6.1 Business Intelligence in Devoteam

This segment of analysis examines the BI tools and BI process that are being implemented in Devoteam. This analysis adopts the categorization that was documented in chapter and groups the BI tools and BI processes according to what stage they operate. The stages are three:

- Gathering and Storage
- Processing and Analysis
- Presenting the outcome

In some cases, one tool or a process can belong to more than one stage. Moreover, we will try to examine the type of sources that are being used and the types of data.

A typical tool that operates in more than one stage is the ERP. In Devoteam, Maconomy is being implemented as an ERP solution. Maconomy is being used as a tool that inputs and exports data from the system. On the top of the ERP, there are implemented two Management Information Systems that can do data analysis. The first one is called Business Objects. It is a BI tool that analyzes and extracts data. On that one, they have predefined the reports that they need to receive. The second one is called Maconomy Analytix. “For a user like me, Analytix is the most simple tool to create my own reports” (Employee S.P.). The ERP integrates locally, in Denmark. Therefore, it is not connected with the ERPs in the other countries.

Another tool that is very common is the CRM. In Devoteam, they use Impact CRM. This tool can operate in all three stages. The CRM is being used to import valuable data about customers, analyze them and export them as a valuable report. In Devoteam, the CRM can be used itself as a data export tool or it can export
data directly to MS Excel. The CRM system is integrated with the other countries. In that way they Devoteam Group uses a common CRM solution

There are several other tools and presentation forms that are being used to present the data. A predefined MS Excel template analyzes data and provides reports by integrating with the ERP and the CRM system and is used to combine information between these two. The Pipeline is a tool that is used to analyze and present indicator regarding on sales and future values. Customized spreadsheets solutions are also designed and implemented focusing on specific needs. Other presentation tools are slide packs, spreadsheets and pivot tables.

There is also an HR system, but its not being used because it is considered very old.

When it comes to processes, several processes were identified that gather, analyze and present data. Acquiring data from an external partner is such a process. They get market-oriented data from Gartner and IDC, “we retrieve some information about the market; how is the market developing normally […] to see how the market is going (Employee H.S.). They gather also information about customers and competitors. Usually these information are unstructured. There is a set of people that is doing the transformation from unstructured data to structure, for instance the opportunity team, who handles the opportunities, receives unstructured information that they try to formulate, evaluate and analyze. But in cases, this not so efficient because these are consultants and not employees that have the expertise to handle this process. There are formal scorecards that are being used to provide with valuable KPIs..

An overall presentation of all the BI tools and processes that were identified during this research was presented above. The findings are gathered in table 2.
### Table 2

<table>
<thead>
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<th>Tools</th>
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<tr>
<td>Gather/ Store</td>
<td>Receive data from Gartner.</td>
</tr>
<tr>
<td>Maconomy (ERP)</td>
<td>Receive data from IDC.</td>
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<tr>
<td>Impact CRM</td>
<td>Receive information about a customer.</td>
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<td></td>
<td>Receive information about a competitor.</td>
</tr>
<tr>
<td>Process/ Analysis</td>
<td>Teams that evaluate and analyze unstructured data.</td>
</tr>
<tr>
<td>Business Objects</td>
<td>Scorecards</td>
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<td>Maconomy Analytix</td>
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<td>Impact CRM</td>
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<td>MS Excel</td>
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<td>Customized spreadsheets solutions</td>
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<td>Pipeline</td>
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<td>Extract. Presentation</td>
<td>KPIs over customer’s satisfaction</td>
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<td>Maconomy (ERP)</td>
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<td>pipeline</td>
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</table>
6.1.1 Types of Data and Types of Sources

As it is addressed in the literature review, the data can be structured or unstructured. Structure data are those that rely or fit within a record or file. By definition the data that is being extracted is structured as it fit the specifications that we have set. Sources can be either internal or external.

ERP and CRM systems are using structured data. Unstructured is usually the information that is being gathered from external source. In our case, information that are received by Gartner and IDC are considered as unstructured as the have to be manipulated in order to used. Information about Customers and competitors are also considered as unstructured information. As it is addressed above, there are employee who has the role of manipulating these information.

In Devoteam, as it was pointed out on me constantly, they do not use external resources. Only in cases where they require a market analysis (Gartner od IDC) or in cases that they want to acquire information about a customer or a competitor. In the second case this source can be a phone call “…we give them a call, to ask them some questions, some unstructured information, how they see us.” (Employee H.S.).

The main purpose of this part of analysis was to identify and present the existence of BI tools and BI processes in the working environment of Devoteam. The next part of this analysis focuses on how the BI is being used in decision-making processes. Several decision-making processes were examined and are being present in the next chapter in order to understand better the role of BI in decision-making process.
6.2 Decision-making processes

This part of analysis presents the decision-making processes that were discussed during the interview that I conducted. These processes are investigated in collaboration with the BI. This part of analysis will provide us with insights that we need in order to discuss the research question in the next chapter.

6.2.1 Decisions-making process in Sales processes

6.2.1.1 Sales structure

The sales processes in Devoteam are not conducted by a sales department simply because there is not a sales department.

“The sales function in a consulting company as ours, is actually done by a lot of people not necessary dedicated to sales, so all the consultants and the senior consultants do the sales” (Employee H.S., responsible in Devoteam for the sales processes)

He is responsible for organizing, orchestrating and conduction sales processes in Deavoteam. The sales is structured like that, that the sales project is allocated to the partners. The whole budget is allocation to them. Then the partners themselves, they have either some customers who they serve directly or the have a team of senior partners that they serve these customers.

As an extend to this structure, there is a client segmentation into: gold, silver and others. In situations that the workload is higher than the capacity of the company, gold customers are served before the silver, which are served before the other.
A second distinction of the customers is between those who belong to the public sector and those who belong to the private. In each sales group there are partners that either on the public or the private group.

6.2.1.2. Sales processes

A sales decision is an operational decision that needs to be taken in Devoteam in a regular basis. It is considered as operation because it has a direct impact on business operating model of the company.

When it comes sales processes, it is not only one set of decision that it needs to be taken rather than a set of decisions. There are three stages in this process and each one of them requires a decision to be taken whether to move on or not. The stages are:

- Pre-Qualification
- Qualification
- Proposal

The pre-qualification stage is a process that has to be done before the opportunity goes to the opportunity board to decide whether they want to pursue or not. This process has 4 stages:

1. A person is responsible to receive often tenders
2. They evaluate whether that is actually interesting for the company or not
3. Then it goes to a sector responsible person, either public or private sector who evaluates it again
4. Then it goes to the one who is responsible for the opportunity and wants to prepare the information that will lead to the decision.
After these evaluation and preparations the opportunity is presented to the opportunity board for the next stage. In the qualification stage the decision that is needed to be made is whether the company will bid on this case or not. In this phase a team called ‘opportunity board’ is conducting meetings in order to decide whether to pursue or not. In the opportunity board the participants are:

- The manager of Devoteam Denmark
- The employee H.S.
- The consultants who make the proposal
- An employee who deliver the project

The participants are chosen because they bear the responsibility of the project. The first two are responsible for which things do the company bids and in what price. The rest are responsible for the assignment.

The opportunity board is meeting to analyze and discuss whether to pursue or not. They use a formal scorecard where they input data and as a result they score this opportunity. In this phase the main discussion is about the qualification. “We need to be able to qualified. And to be able to be qualified we need to have a set of Information that tell us whether we can win this, or not” (Employee H.S.). For this reason, it is required to use an external resource and gather information about the customer and the competitor.

This scorecard has a specific template for putting forward the opportunity request. It is an excel bid template. This report tool can extract data from the CRM and the ERP at the same time. There are two categories in the scorecard, a fit category and a relationship category. When it comes to fit, it is being evaluated how well the customer fits to the company, and how well the company fits to the customer. When it comes to relationship, it is being discussed, how well the company is positioned. In these cases, an external source may be used to add more information. These information tend to be unstructured and they have to be
manipulated and placed into the CRM for analysis. The output of the CRM is used to evaluate the relationship.

Other relevant that are being considered are: in which client segmentation the customer belongs, is it on area that the company has strong competence?

All these information are being analyzed and assessed by the opportunity board, because even if they make the assessment that the company can win this bid, the board tests this assessment before they confirm the decision to pursue or not.

The next stage is the proposal. On this stage when they make the proposal they have to take the decision on what will be price and what will be the commercial conditions.

On this phase the decision is made based on a tool that is called ‘pricing tool’. “here we have a formal process on how to fill out our pricing tool which compares, the actual price which intended to use with our list prices and we can see how much discount we can give or not” Employee S.H. in this phase the decision is made passed on calculations that are being made by the pricing tool.

An example of a sales process decision is presented below

“We had a decision today, about whether we should make a bid or not on a case. We got the opportunity one week ago. Then the team starting to collecting the information. They put them in our CRM system. They filled our bid template with all the information. They present it today. And exactly what I said...what discussed it and we decided to move on and make a bid on that. We take that type of decision 2-4 times per week” Employee H.S.
6.2.1.3 Resource allocation

The resource allocation decision is an operational decision that is being taken in the companies very often. This segment presents a resource allocation decision that is collected with the sales process.

The resources are compared on how close they are to the sales target. The resources has to follow this target. The decision in this case can be divided in two sub-decisions comparing on the position of the resources in relation with the target.

If the workload s much more compared to the capacity of the company, the decision that has to be made is who to serve. In this case the client segmentation is being used. The gold customers are served before the silver who are served before the other.

In the second case, if the capacity is higher than the workload, then the decision that is made is that the company needs to start some initiatives in order to fully utilize the employees.

6.2.1.4 Regional Management meeting

In the Regional Management meetings the discussions that are being and the decisions that are made are related with both strategic and operational meetings. Because the variety and the number of topics for discussion is high, this meeting may last up to one day and a half. The follow-up meetings are focused more on operational topics.

Employee S.P. is responsible for three kind of follow up meeting.
• Country pipeline review meeting
• Gold account review meeting
• Offer directors

On the follow-up meeting participates the regional executive vice president, the Employee S.P. and the country manager or the regional offer director, depending on the meeting.

On the first one there are discussed issues that are related to the country’s pipeline. The pipeline is an analysis tool in the CRM application. The pipeline in Devoteam is a pipeline of opportunities and opportunity has a probability and an awaited revenue. The pipeline has four stages:

• The first stage is called ‘detected’. The awaited valued on this is zero.
• After a couple of meetings with the customer you decide to qualify it. Now the probability will go up to 20% and the awaited revenue will be lifted up.
• The next level is negotiation
• The last level is enclosed

The pipeline is very important and the data are presenting in these meetings because its very much about production planning. Many of the KPIs that are being for analysis are connected to the pipeline.

In these meetings, valuable information from across the departments are presented. They are presented are slides packs, spreadsheets, sales statistics or pivot tables.

“I will do a presentation maybe on some sales statistics, and say for example, this is not good enough, we have to agree that we want to take it one step further” (Employee S.P.).
The information that is being presented in these meetings has to be accurate. “When it comes to some numbers, they need to be accurate. When it comes to sales statistics, I need it to be accurate, if it salary statistics, I need it to be accurate.” (Employee S.P.).

There are the decision-processes that examined through the interviews. Empirical observations that are related with the topics that were analyzed in this chapter are presented in the discussion chapter. In addition to that it is presented a reflection the research in comparison with the theory.
Chapter 7 Discussion

The purpose of this chapter is to conduct a reflection among the theoretical perspectives that were presented in the previous chapters, the findings that were presented in the empirical setting and the analysis chapter, and the knowledge that I gained as I conducted this research.

This research study revealed that the decision-making process can be far more complex. The limitations that are being set in the context where the decision maker acts can be crucial actor derails the process.

Before I reflect on the analysis in relation to the theory, I consider useful to present those factors.

7.1 Limitations

During my research I identified some factors that may add limitations in the decision-making process. Although these limitations can be considered as a part of bounded rationality, it is useful to be mentioned upon further reflection. The limitations are referred to the context of Devoteam.

Consultants are technically skilled.
Therefore they do not have sales culture. the professionalization of sales in Devoteam is a target that has its roots on that. Moreover, some of them, they miss those skills that are required in order to interpret information correctly. Decision-makers should posses these skills in order to understand the intelligence through information. Moreover as some of the reports require from the user to poses knowledge in a specific context.
Manipulation of unstructured data.
We addressed earlier that unstructured information is being interpreted and analyze from employee that are not specialized to conduct this process.

Accuracy of Information
As it is being mentioned in the analysis, information needs to be accurate. Especially when it referrers to specific indexes or indicators. The limitation that is being placed here is the cost of information. Accuracy, credibility and up-to-date information is highly connected with the cost of information. The participants on the research agreed to that and reflected that this cost can be a barrier for Business Intelligence

Limitations set by technology
The technologies that are being used in Devoteam are old. The participants disagreed whether this is efficient for the company. Ones argument came in contradiction with the others’ ambition. The HR application is no longer used anymore and a new data architecture model should be applied.

7.2 Reflecting on BI and the decision making-process

The BI outcome was used according to the notion of formal analysis. It was used as an informative tool in the decision-making process in order to reduce uncertainty and provide insight in related topics.

Although they do not use any of the new technologies of Business Intelligence, the tools and processes that they have implemented, provide sufficient
intelligence in the process. Tools and processes that gather, store, analyze and present data were identified. Devoteam’s system is efficient as long as they do not handle big amount of data.

The decision-making processes that were examined and presented fitted the framework of the functionalistic perspective that was presented in the third chapter. The rational approach of the process in combination with the limitations that have been set, formulates an environment of bounded rationality. Moreover the optimal use of the BI tools to reduce uncertainty indicates that the formal analysis was used according to the functionalist view.

Moreover the decision-making process that were presented in the analysis chapter fit the models of (Mintzberg et al., 1976; Simon, 1977) that were presented in the chapter 3.

I did not find any evidence to indicate that the formal analysis was used in the terms of political perspective.
Chapter 8 Conclusion

This thesis was focused on how the BI outcome is being used by the decision-makers in order to improve the decision-making process. The topic was examined from the perspective of the decision maker. Therefore it is not investigating the technological aspects behinds the BI tools that are presented.

The results are based on two literature reviews and one interpretive qualitative study. First I conducted the BI literature review, shortly after the decision-making research and then I started preparing for the interpretive. Good understanding of the theoretical perspective helped to extract the data that I needed for the analysis part.

In the scope of Business Intelligence, the current perspective of the BI were identified and presented. Therefore a distinction was made between tools and process. Further more the identification and examination of the three stages, gather, analysis, present connected the BI with the formal analysis the theoretical perspective that is presented in the next chapter.

8.1 Suggestions for further research

Through the process of research, analysis and discussion more question were generated than answered. This segment presents some of the topics that were so relevant but at the same time so out of topic:

- Can we assure that information is being translated into intelligence?
- Why do not make researches on the topic of BI in decision-making?


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Shollo, A. (2013). The Role of Business Intelligence in Organizational Decision-making.


## Appendix

### Table 3 List of employees that participated in the study

<table>
<thead>
<tr>
<th>Employee identification</th>
<th>Organizational Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee S.P.</td>
<td>Senior Partner</td>
</tr>
<tr>
<td>Employee H.S.</td>
<td>Head of Sales – Associate Partner</td>
</tr>
<tr>
<td>Employee P.C.</td>
<td>Principal Consultant</td>
</tr>
</tbody>
</table>

### Interview guide

#### Personal Questions:

1) Identification
   i) Name
   ii) Title
   iii) Profession
   iv) Age
v) Number of years working in the current position

2) Description of his job and work responsibilities

Company – Department – Vision – Mission

3) How is the company organized, divided (structure)?
4) Department’s vision and mission
5) How is you department organized?
   a) Purpose, Functions, Specialization
   b) Customers
   c) Systems in use
6) Personal vision and mission
7) How would you define success for your department?
8) Is there a formal method that you follow to evaluate success or failure?

Questions about decision making process

9) Can you describe in your own terms what is for you a decision making process? Can you give me an example?
10) What is an operational decision? - Example?
11) What is the process of decision making in Devoteam currently, as you see it?
12) Who participates in this process?
13) What kind of decisions are they required making in general? (strategic – operational – both)
14) How and why these people were selected to participate in the process?
15) How do they contribute to the decisions
16) Whose responsibility is to make the decision?
Identification of Problems/Opportunities (the role of Information)

17) How is the identification of the problems/opportunities done?
18) Is there a formal process to define them?

19) What sources are used to identify them?
   a) Reports
   b) Meetings
   c) Internal Sources – documents
   d) External Source – webpages, scientific papers
   e) Informal talk with other colleagues
   f) Sources from other departments

Use of Information in decision making support

20) What Information is required to support your decision?
21) How accurate needs the information to be?
22) What is the process for collecting, generating and supplying information?
23) What is efficient about this process?
24) In what timeframe does the information need to be obtained?
25) How specific does the information need to be?
26) Through which channels/systems do you obtain the Information?
27) In what form?
   a) Report
b) Spreadsheets, scorecards
c) Tables, graphs
d) indicators

28) Do you use information from other departments and which departments?
   a) What information do you find relevant to your work?
   b) How do you obtain them?
   c) Do you ask them in specific form?
      i) Report
      ii) Spreadsheets, scorecards
      iii) Tables, graph
      iv) Indicators

29) How you would describe the IT system in Devoteam

30) Mr. Fabrice Sarlat, Global Head of Cloud Transformation at Devoteam, stated that IT is easy, intuitive, available everywhere and at anytime, less expensive and usage-centric. With which of these do you agree?

31) What kind of external information do you consider relevant to you job and what sources do you use to collect them?

32) Can you give an example of how you use this information when making decisions?

33) How do you interact with the information, if you do?

34) Is there anything else that you consider relevant and you would like to tell me?

35) Is there any question that you were expecting me to ask and you were surprised that I didn’t?