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Business Intelligence

Analysis of vendors' and suppliers' arguments for BI

Bachelor's Thesis within Business Administration

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Abstract

Introduction

Organizations are exposed to a rapidly changing business environment with never ending challenges. Investments in information technology (IT) have been one common approach to support organizations. Business Intelligence (BI), an off-spring from IT, is a system that assists many organizations in taking more accurate and timely decisions, improving process monitoring and providing better support for decision making. Recently organizations have started to realize the value of investing in BI, by discovering its analytical methods and capabilities to create business value.

Problem

Investments in BI have increased substantially over the past years and one reason for this might be due to vendors praise about BI's ability to deliver business value. Significantly increased business value, better decision making, and high returns on investments are only a few benefits that have been claimed for. When considering the fact that it is very difficult to measure any direct benefits from IT investments in general, and BI as a consequence, an interest for analyzing the arguments used for selling BI emerged.

Purpose

The purpose of this thesis is to identify what arguments vendors and suppliers use when selling BI solutions, and explore their value by analyzing them through the use of existing theories from literature.

Method

A qualitative approach has been adopted, where unstructured interviews with BI vendors and suppliers were conducted. An inductive approach has been applied to gather arguments and then shifted to a deductive, in order to finalize the study and analyze arguments with appropriate theory. The research has been performed from without the Swedish market with well-known organizations.

Conclusions

A single version of the truth, control, and time savings are credible arguments for investing in BI. Furthermore, cost savings and improved analytical capabilities are fairly credible, whereas increased efficiency has least credibility when analyzed against theories. In general, we believe that the ability to gain from these positive effects from BI, organizations have to take an active role in realizing these.

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1 Introduction

The inspiration for this topic mainly arose from two different sources: courses taken and personal interests in how organizations' deal with their decision making. The fast growing market of business intelligence systems tends to indicate its potential to support organizations in their decision making processes. The thesis begins with a background that describes decision making, information systems and business intelligence followed by a problem discussion and research questions.

1.1 Background

In today's competitive environment, organizations are exposed to a rapidly changing business environment with never ending challenges. Customers, suppliers and society constantly put pressure on organizations through new demands for increased productivity, more efficient processes, higher profits, and better use of resources. All these demands force organizations to constantly change and be agile in order to survive in a complex and hostile environment. Heavy investments in information technology (IT) have been one common approach to adapt and respond to these tough demands. The area where most money has been allocated is mainly in implementations of information systems. Unfortunately new demands evolve as soon as existing ones have been satisfied. In order to increase efficiency and effectiveness continuously, new technologies have evolved (Turban, Sharda, Aronson, & King, 2007). Business Intelligence (BI) is one new IT solution that assists many organizations in taking more accurate and timely decisions, improving process monitoring, providing better support for operational activities, enabling tactical and strategic planning, forecasting prediction, and assisting in analyzing market segments. With the use of BI solutions, organizations can now access better information and use analytical methods to optimize business performance through better use of existing data in already implemented information systems. Traditionally, analytics of data has not been something organizations compete with, but today, organizations have started to realize the value of BI investments and its potential as a competitive resource. One reason for this might be due to vendors and suppliers praise about BI's ability to deliver business value. Significantly increased business value, better decision making, and high returns on investments are only a few vendor and supplier arguments that have been in circulation. As a result of these promises, many organizations have invested in BI systems with a belief that the system will create major business value. This increased business value has been realized by numerous organizations, but far from all implementations of BI have generated satisfactory results (Turban et al., 2007).

1.2 Problem

The traditional user of BI systems, or systems for decision support, is more than often a representative from the business side of the organization rather than the technology side (Bräutigam, Gerlach, & Miller, 2006). This person is often responsible for choosing, or practicing some sort of influence on what kind of BI system the organization should invest in. Choosing BI system is a complicated and time consuming process with many parties and resources involved. Deciding which BI solution to implement and what vendor to work with is difficult and requires thorough research and comparison of alternatives before being able to make a decision. To make a distinction between which arguments that have been proven to be true and which arguments sales representatives use without solid foundation is not an easy task. Previous research has proved it to be very difficult to measure di-

rect benefits from IT investments in monetary terms, since IT in many cases act as a support function to other processes throughout the organization (Falk & Olve, 1996). Due to the problematic nature of evaluating IT, it would be interesting to take on a different approach by examining BI vendors' and suppliers' arguments, using existing theories regarding BI, IT, and related areas. In our knowledge, no previous research has adopted this approach before. The outcome of such research could assist people in organizations in the process of implementing a BI solution.

The aim of this thesis is to provide an answer to the following research question:

- What arguments do vendors and suppliers use for investing in BI, and are they credible?

1.3 Purpose

The purpose of this thesis is to identify what arguments vendors and suppliers use when selling BI solutions, and explore their value by analyzing them through the use of existing theories from literature.

1.4 Delimitation

The arguments we aim to analyze in this study will be limited to only include Swedish BI vendors and suppliers' sales arguments for BI solutions. At first we considered to only focus on vendors or suppliers, but after many discussions we decided that including both of them in our study would give a more complete picture, since both vendors and suppliers have direct contact with customers in the sales process. We have also decided not to include analysis of arguments that are connected to specific vendors' and suppliers' platforms or systems, neither arguments for why customers should buy a specific company's BI solution. The reason for this is that we aim to avoid arguments bound specifically to a certain company or BI solution.

1.5 Definitions

Information Technology (IT): *All involvements of computers retrieving, storing and transmitting organizational data.*

Information Systems: *An information system is the arrangement of people, data, processes, presentation of data, and information technology that supports our everyday needs.*

Decision Support System (DSS): *Any decision making process that is supported by any kind of computerized system.*

Business Intelligence (BI): *Getting the right information to the right people at the right time by analyzing organizational data for more efficient decision making processes.*

Corporate Performance Management (CPM): *Refers to all of the processes, methodologies, metrics and systems needed to measure and manage the performance of an organization.*

1.6 Disposition

The thesis consists of the following chapters illustrated in figure 1.1. The arrows indicate the workflow and the stages are briefly discussed and described below.

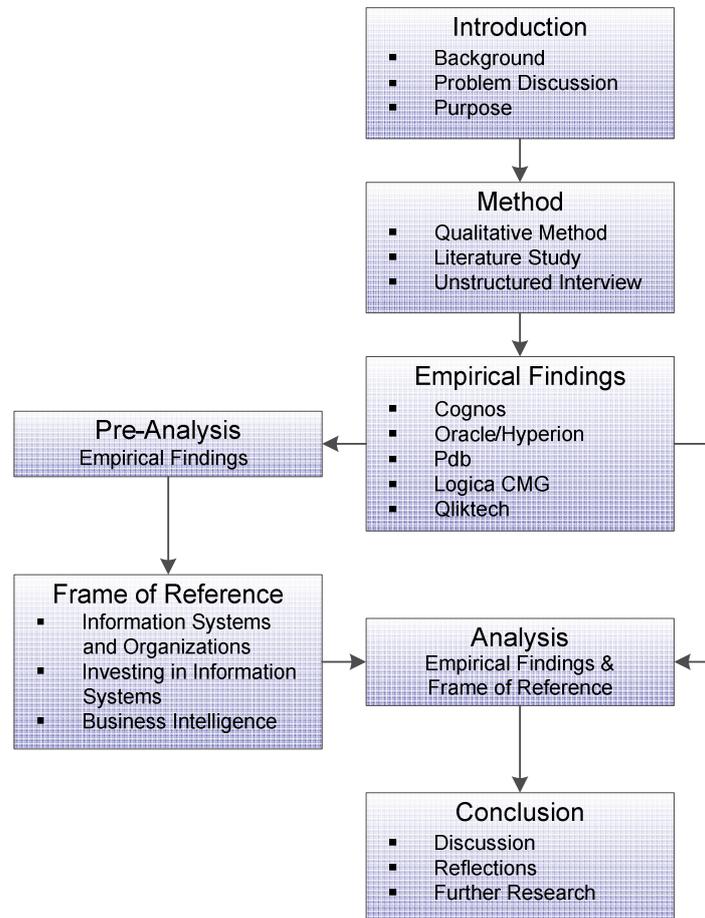


Figure 1.1 - Disposition

In the introduction phase, the background and problem area is described from which this thesis has evolved. The area of BI and its surroundings are briefly explained and the purpose of the thesis is clarified.

The method chapter will explain the scientific choice. Methods are discussed and how the thesis will be conducted.

The next chapter will contain our empirical findings. A brief description of interviewed organizations and relevant findings that are important to answer our research questions will be presented.

Our pre-analysis chapter is used to analyze empirical findings which we intend to use in order to find what arguments vendors and suppliers use. The content in the frame of reference chapter will then be based on this pre-analysis and the arguments that will occur.

The frame of reference contains theories and descriptive areas that are relevant for fulfilling the purpose. Areas such as information systems in organizations, IT investments, and business intelligence are to be discussed.

Further on, in the analysis chapter we will combine the frame of reference with the empirical findings to conclude if vendors and suppliers' arguments can be justified and have support in the literature or not.

In our conclusion we intend to present our findings regarding vendors and suppliers arguments and see how literature supports them. We will then give our reflections of the findings and research. Additionally, suggestions on further research that may be interesting to explore will be presented.

2 Method

This chapter discusses different research approaches and incorporates whether we intend to use an inductive or deductive approach, followed by our choice of qualitative or quantitative methods. We present the data collection and interview methods adopted as well as discussions concerning how to interpret data, and trustworthiness.

2.1 Research approach

Researchers have different approaches to choose from when conducting research. It is important that the selected approach fits the study and helps fulfilling the purpose of the research (Holme & Solvang, 1997). Consequently, accompanied sub headings will have great impact on the proceeding choice of methods and the continuous working process.

2.1.1 Inductive and Deductive Research

Researchers can choose from two main approaches when developing new theories, the deductive approach and the inductive approach (Holme & Solvang, 1997). To illustrate the characteristics and courses of actions connected with each approach, the model “*wheel of science*” (figure 2.1) will be used. The deductive approach has theory as a starting-point and proceeds clockwise until incorporating the right half of the circle. In this approach the researcher derives a hypothesis from existing theories and then collects empirical data to support the hypothesis. The main purpose of a deductive approach is to test or explain theories. In contrast, the left side of the circle represents the inductive approach, having data as its entry point. The research begins with collection of data in order to generalize social life or specific behaviors to make generalizations. General statements derived from generalizations will thereafter aim to generate new theories (Bailey, 1996).

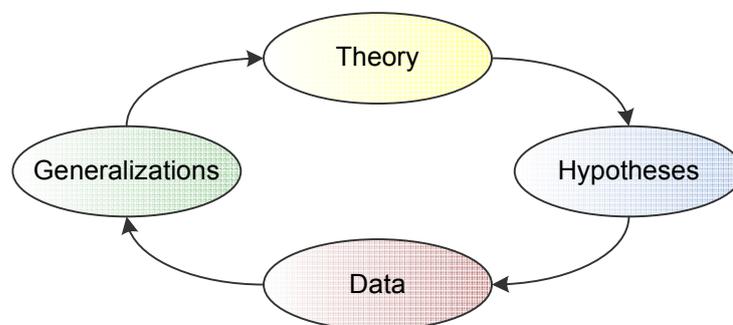


Figure 2.1 - *Wheel of science* (Bailey, 1996)

When deciding upon what research approach to implement, we discovered that the most suitable strategy would be to combine the strengths from both the inductive and deductive approach. According to Holme and Solvang (1997), it is often in the combination of the two approaches where new and interesting knowledge emerge.

Except for a brief literature study, aiming at familiarize ourselves with the topic, an inductive approach will be adopted. An empirical study will be initiated by interviewing BI vendors and suppliers regarding the arguments they use when selling BI solutions. In the pre-analysis, possible patterns and similarities among the arguments will be identified and thereafter processed and divided into different categories. Instead of continuing with a deeper analysis of the arguments and begin the process of generating new theories, we switch from

an inductive approach to devolve into a deductive approach. We use this approach since the BI vendors' and suppliers' arguments are not known in the beginning of the research. By knowing and understanding the arguments, this strategy will help us find theories that can assist us in fulfilling the purpose of this thesis. We will then proceed with the process of building up our theoretical framework. Ultimately, the final steps in the research will be solely deductive. Using this procedure will allow us to analyze and compare arguments with appropriate theories, and answer our research questions.

2.1.2 Qualitative and Quantative method

Distinctions are usually made between two different approaches when conducting research, the quantitative and the qualitative approach. Quantative research is more formalized and structured, mainly focusing on transforming empirical data into numbers which are analyzed using statistical procedures (Holme & Solvang, 1997). As opposed to qualitative methods, which are used when an explanation or understanding of a situation or phenomena, and the surrounding context is needed. Qualitative research aims to provide an in-depth understanding of the area of interest, based on the researcher's own interpretation of detailed and information rich data (Ritchie & Lewis, 2003). In order to both identify what the vendors and suppliers' arguments are, as well as developing an understanding for the detailed reasons for those arguments, a deeper knowledge within this field of research will be a necessity. With a qualitative approach, it will become possible to examine phenomena from "the inside", therefore gain a deeper and more complete understanding (Ritchie & Lewis, 2003). This will enable us to understand the reasons behind the arguments, and how and why they use them respectively when selling BI solutions. As a result, the qualitative approach will be the most suitable for this specific research.

2.2 Data Collection

Obtaining data is a natural part of the research process. There are two different approaches classified for this purpose, primary and secondary sources of data. By utilizing a primary approach, *new* data is collected in order to support and act as a foundation of the analysis (Rienecker & Jørgensen, 2002). The other approach, collection of secondary sources of data, involves gathering data collected by others and for different purposes than the researchers (Rienecker & Jørgensen, 2002). Researchers argue that primary sources of data in conjunction with secondary sources of data is to prefer since it will generate a more valid and supplementary investigation (Ritchie & Lewis, 2003). In addition to that Goldkuhl (1998) states that, it is the interaction of existing knowledge and new research where interesting connections can be made. It is therefore very important to do a thorough examination of existing knowledge to be able to develop new knowledge. In accordance with these assumptions the data in this thesis will be collected from both primary and secondary sources.

Primary data can be collected in various different ways but the three most common approaches are observation, surveys, and interviews. Observation is characterized by studies of human behavior and the way in which they interact. The second approach is the use of surveys. Surveys are somewhat similar to an interview except for the divergence that the interviewer has been replaced by a number of printed questions on a questionnaire. Finally, primary sources can be collected by performing interviews. Which is the most commonly adopted method, and can be organized and structured in many different ways depending on the occasion (Repstad, 1993). As opposed to observations and surveys, interviews are

characterized by a direct interaction between the interviewer and the respondent (Holme & Solvang, 1997). To explore what kind of arguments BI vendors and suppliers use when selling BI solutions, interviews will be conducted. This approach suits the purpose of our research very well, since the direct contact with the respondents will generate the deep understanding needed when evaluating the arguments in the analysis. Interviews will also allow us flexibility in the sense that it will be possible to immediately follow-up and clarify aspects that have been revealed in the interaction with respondents. Nevertheless, it is important to be aware of the risk the interviewer faces by failing to ask questions that will generate a correct reflection of the truth, due to lack of skill and expertise. Failure to comprehend and interpret responses may also cause incorrect data (Marshall & Rossman, 1999). By keeping this in mind when preparing for, performing and finally analyzing the outcome of the interviews, we hope to minimize the risk of this outcome.

Secondary sources are based on *existing* sources, information already available and completely independent of the researchers own study (Theorell & Svensson, 2007); this approach is usually performed through literature studies (Goldkuhl, 1998). A literature study will provide us with a deeper understanding of the subject matter, and assist us in our research in numerous ways. First, it will help us making strategic decisions about what kind of knowledge we want to explore and how this new data should be collected. Furthermore, it will support us when analyzing the outcome from the empirical study by facilitating discovery of interesting connections followed by conclusions. Thus, one obvious drawback using literature in a study is the need for interpretation by the researcher (Marshall & Rossman, 1999). In order to avoid misinterpretations of sources, comparisons with sources from different authors will be made.

2.2.1 Literature Study

A literature study is the process of finding, examining and analyzing information that is already available (Theorell & Svensson, 2007). In this research the secondary sources of data will have a particularly important role, since it will be essential for the foundation of the analysis. After all, the theories extracted from the literature study will serve as framework for making comparisons between data collected from the primary sources, and existing theories

A literature study will be initiated at an early state of the research through the collection of books, scientific journals, articles and searches in databases for keywords that are related to BI, business value and investments in IT. In addition, various literatures about research methodology will be collected. This approach will aim to generate a deeper understanding of the subject matter from the commencement of the research, which in turn will facilitate strategic decisions for further course of action. Search words, in both English and Swedish, that will guide the search for research material are: Business intelligence, BI, Decision support systems, DSS, business value, etc. Throughout this research a conscious decision has been made regarding choice of theories and their characteristics. As a guiding principle, recognized theories developed by prominent researchers within the area of BI and relevant related areas will be prioritized and used when analyzing the primary sources. Preferably these sources are to be found in a physical published format since the quality of published material on the Internet can vary considerably (Leth & Thurén, 2000). The date of publishing for these sources is expected to differ, mutually old and new theories are of interest as long as they are relevant for evaluating BI arguments by vendors and suppliers.

To be able to develop a theoretical framework that can justify a trustworthy analysis, the literature study will be conducted in two parts. Initially focus will be on finding theories about experienced benefits from implementation of BI, in addition to the BI arguments that are published on vendors and suppliers' websites. All together, this data will aim to assist in the process of developing an understanding of what kind of arguments vendors and suppliers can be expected to use when selling these applications. Information that is necessary to make an optimal choice when deciding how the primary data should be collected. The second part in the literature study, commencing after the empirical interviews, will be to expand the theoretical framework even further by finding theories that can assist in the analysis of the arguments for BI. One important thing to point out though is that the literature study in this thesis should be seen as an iterative process, the choice of conducting the study in two parts is only an expression of how the main collection of secondary data is expected to be divided.

2.2.2 Interviews

Depending on the desired outcome and the purpose of the research, several techniques are used to guide and shape interviews. One important distinction can be found in the level of structure of the interview. Researchers commonly refer to three different ways to perform interviews; unstructured, structured and semi-structured. An unstructured interview, also referred to as an open interview, is characterized by an informal conversation between the interviewer and the respondent about the particular area of interest. Generally the respondent leads the interview, whereas the interviewer's influence on the respondent is limited. In contrast to the unstructured interview, the interviewer inhibits more control in a structured interview. In this approach the researcher asks a predetermined set of questions as well, but this time the questions are not expected to be changed or reordered. In between these two extremes is the semi-structured interview, where the researcher only uses an interview guide with a few main topics and issues that needs to be covered. Moreover, interviews can be categorized into personal interviews and group interviews. In a personal interview the interviewer and the respondent meet face to face and interact directly. Ruane (2006) stresses that a personal interview is an excellent way to add depth to the interview since a close contact with the respondent becomes feasible. In a group interview, also referred to as focus group, people are brought together to have a free flowing but focused discussion on a particular topic. This type of setting is a good way to reveal and bring forth discussions and thinking patterns (Fisher, 2007).

In this research unstructured personal interviews will be conducted. Unstructured interviews will enable us to create an interview setting where the vendors and suppliers are free to reveal their arguments for BI solutions without extensive influence from our behalf. Therefore, our aim will be to conduct an interview where the arguments for BI solutions are brought up by the respondent, not by us. We expect that an unstructured interview will provide us with the limited possibility to influence that is necessary. When combining the unstructured approach with personal interviews, we hope to gain from their respective strengths. Personal interviews will add value to our research by facilitating a relaxed atmosphere where the respondent can talk freely about the subject, and hopefully provide us with more comprehensive explanations for the sales arguments they use when selling BI solutions to clients. However, since personal interviews might not be achievable in every case, we intend to conduct unstructured telephone interviews when there are enough reasons to do so. Telephone interviews will limit the interaction, but in return we believe it will open up the possibility of including companies that could not have participated in our study otherwise. Ruane (2006) support our choice by stating that telephone interviews is the second

best choice when personal interviews are not feasible. In addition to that, it is also most often a lot cheaper and faster to conduct than personal interviews (Ruane, 2006). Unstructured interviews might also compose a problem by increasing the risk that the researcher might fail to cover the questions of interest due to the lack of structured preparation (Ritchie & Lewis, 2003). Keeping this in mind, the purpose of the interviews and the expected outcome will be thoroughly discussed as a preparation for the empirical study. Techniques will also be considered, regarding how to guide the respondent to stay within the area of interest without interfering too much. Since we are not experienced interviewers we also intend to be very observant on our own performance by evaluating techniques and approaches adopted, so that we can adapt and change continuously if we discover techniques which are less successful.

2.2.3 Selection of Research Objects and Respondents

A decision was made to include both BI suppliers and vendors in the empirical study. We believed this decision would provide us with a more complete picture of the arguments customers come across when purchasing BI solutions, since both suppliers and vendors have direct contact with customers in the sales process. When selecting respondents for the interviews, a list will be developed containing BI suppliers and vendors that are represented on the Swedish market. These will be ranked based on their respective market share and influence on the Swedish market. The ranking will be performed based on a list produced by the research analyst company Excido, over BI vendors' and suppliers' respective market shares on the Swedish market (Excido, 2007). Companies with a high ranking will be prioritized and contacted first. Nevertheless, local IT companies situated in Jönköping will be asked to participate in our study as well even though they might not be BI market leaders in Sweden. The reason behind this is that we believe that the possibility to organize a face to face interview with these companies is higher than with BI suppliers and vendors situated in Stockholm, Gothenburg, and Malmö etc. Anyhow, only IT companies that provide BI solutions from famous BI suppliers will be asked to participate. To achieve a satisfying number of respondents participating we expect it to be necessary to contact most of the companies on the list. Our aim will be to get at a minimum of five interviews, if possible seven interviews. The respondents interviewed will have to have great knowledge about BI solutions; preferably they are head of the BI department or have a couple of years experience of selling these products and applications. The main thing is that they are well informed about the benefits BI delivers, and that they can be expected to know the advantages their respective company presents to customers.

2.3 Analysis and Interpretation

The analysis of empirical findings received from an unstructured interview is always difficult since it involves feelings, perceptions and experiences. There are no agreed rules on how to analyze qualitative research but there do exist some suggestions. One way is to identify key themes, categories or concepts for further interpretation (Ritchie & Lewis, 2003). Since theories exist about BI benefits, the categorization will be made according to these benefits. The large amount of material that an unstructured interview contains must be captured in a way that minimizes distortion. Bailey (1996) suggests that skimming through the material is of great importance in order to recognize the overall picture since it will point out main focus areas. Because this thesis involves unstructured interviews, the data capturing will be made with a tape recorder suggested by Marshall and Rossman

(1999). By recording the interviews it becomes feasible to minimize errors, distortion, and in turn maximize focus and allow iterative interpretation.

According to Ritchie and Lewis (2003) it is important to analyze every unit systematically and using a comprehensive approach. It is crucial that no units are treated differently because it will be impossible to discover associations between the units. This implies that the analysis must be systematically undertaken and applied across the setting of units. Qualitative data analysis involves identifying common statements and relationships to build a comprehensive understanding (Marshall & Rossman, 1999). The thesis will use unstructured interviews and since BI involves both tangible and intangible benefits and the arguments can be expressed in various ways the empirical findings will be analyzed with a holistic approach.

Marshall & Rossman (1999) suggest that the analytical procedure should be conducted in six phases. The first, organizing data contains procedures where unnecessary data is cleaned out by documenting key findings essential for the research. It is important that descriptive data which describes phenomenon are interpreted and documented and not disregarded. The next phase involves generating categories, themes and patterns and this require an understanding of the data. It involves indentifying legitimate and essential data, which can be done with logical reasoning. The third step is to codify the data by identifying example key words or numbers and the researcher may through this process discover new understandings that can be evident for the research. Ritchie and Lewis (2003) suggest that indexing instead of codifying because the data will be more accurate and undistorted. The fourth phase involves evaluating the content in order to discover areas that need to be further explored. It is also important to evaluate if there are any gaps in the empirical findings that need further research (Marshall & Rossman, 1999). The unstructured interviews will be beneficial according to this. It is easy to complement gaps in the empirical findings by returning to respondents for complementary information. The fifth stage is to search for alternative explanations. This implies searching for other explanations of the data and also linkages between them that can evolve in new findings or require further research. The last phase involves, the writing about qualitative data, in which the analytical setting can not be separated. In order to summarize, reflect and analyze, the researcher is involved in a complex interpreting act that is outlining the meaning of the data. In this research the six phases suggested by Marshall & Rossman (1999) seems suitable to unstructured interviews and interpretation and analysis of this kind of empirical findings.

2.4 Trustworthiness

A very important part of the data analysis is to adopt a critical attitude towards the data collected concerning its credibility (Repstad, 1993). Holme & Solvang (1997) stresses that it is only through continuous critical examination and care, a satisfactory level of reliability and validity can be attained when processing material generated from the research. High reliability exists when independent researchers study the same phenomena and where results are similar or almost alike (Holme & Solvang, 1997). Ritchie & Lewis (2003) refer to the degree of reliability as the level of replication that can be expected when similar studies are undertaken. Validity of data on the other hand, is traditionally measured by the level of correctness or precision of the research reading. Thus, whether or not you are investigating what you claim to be investigating. Besides reliability and validity there exists another closely related concept named generalization. Generalization address whether or not a research sample can be held equally true of the parent population from which the sample is drawn (Ritchie & Lewis, 2003).

In order for us to achieve a high level of trustworthiness, considerations will be made throughout this thesis concerning the problematic nature of creating accurate data. Elements where this will be especially important are when selecting respondents for the interviews, preparing for and conducting the interviews, and ultimately when interpreting the results. To minimize the risk of low reliability, validity and generalizability, we will discuss carefully when making strategic decisions regarding course of action, and how they can affect the trustworthiness of the outcome. These discussions will be integrated throughout the text in this thesis.

3 Empirical Findings

In this section the qualitative findings that were revealed in the personal and telephone interviews with the vendors and suppliers: Cognos, Oracle/Hyperion, Pdb, Logica AB and QlikTech.

When performing the qualitative interviews it soon became evident that some of the companies that we interviewed referred to their BI solutions as Corporate Performance Management (CPM), Business Performance Management (BPM), or Enterprise Performance Management (EPM), which are all concepts for business controlling. Gartner (2002) defines CPM, which is the most adopted concept, as all the processes, methodologies, metrics and systems needed to measure and manage the performance of an organization. As opposed to Business Intelligence, CPM is a wider concept incorporating analysis, reporting, follow up, actions, and planning. Consequently, BI-products and platforms are seen as a technical enabler to CPM (Schüldt, 2007). Each company's preferred concept will be stated when presenting the outcome of the interviews. However, in order to minimize the risk of confusing the reader, *BI solutions* will hereon be referred to when discussing CPM and the like.

3.1 Cognos

	
Business Activity: BI Supplier	Respondent: Peter Jönsson
Employees: 3,500	Position: Senior Software Specialist
Region: World-wide	Date: 2007-11-13
	Interview: Telephone

Cognos is a Canadian-based company founded in 1969 and is one of the world leaders in BI and performance management solutions. The company operate in more than 135 countries and their products are available from more than 3,000 partners and resellers world-wide. Cognos works closely with customers in all industries to provide the IT support needed and be a partner in the change work related to improvements of decision making processes in organizations (Cognos, 2007).

In sales situations, Cognos always attempts to understand how customers' organizations operates by using scenarios and examples customers can relate to and identify themselves with. This approach provides customers with a vision of what the organizational environment could be like by implementing BI solutions. In these scenarios and examples different sale arguments for BI emerge. Jönsson states that showing how Cognos has been involved in similar projects before is a great means to demonstrate that Cognos has knowledge about customary problems and obstacles that frequently occur in many organizations.

Jönsson claims that organizations primarily work with three statements; *How are we performing?*, *Why?*, and *What should we be doing?*, which are closely related to Cognos' arguments for BI. To answer the first question organizations often use different measurements and tools, such as scorecards and dashboards. Having these tools updated with current information

requires substantial manual work, as numbers from different systems need to be gathered. Since these processes are reoccurring they are likely to be completed differently each time, resulting in a risky process that is hard to control. The second statement, *why?*, concerns situations where several separate systems and tools exist in the same organization and how it is likely that the numbers extracted differ and do not reflect the truth. *“It is not unusual that the first hour of a meeting is spent discussing which numbers to base a decision on.”* High cost of ownership and low confidence in the numbers are likely to occur as direct results of this phenomenon. Using the third statement, *“what should we be doing?”*, Jönsson explains how organizations rely on Excel spreadsheets being sent across the organization to understand where the organization is heading. Business users have to fill-in numbers such as sales, products, or markets, which is a time-consuming and resource heavy task. Also, it does not provide a uniform picture of the state of the organization needed by management. Jönsson explains that the answers to the three statements are scattered across different systems, therefore one single place that provides a full view of the organization is required. Business Intelligence solutions fulfill this need and provide this shared platform for decision making.

Additionally, Jönsson gives examples of customers that have experienced several positive effects of implementing Cognos’ BI solutions. One customer’s implementation has generated much appreciated value, inducing strengthened partnerships with customers. Another customer reports large savings and high ROI through improved analysis and increased efficiency in their sales force. Furthermore, a third customer has reported time savings originating from a more efficient process when gathering and compiling numbers.

To support their arguments, Cognos primarily uses existing customers as reference. Jönsson explains how meetings are held with organizations of similar size, industry, and international presence. According to Jönsson, Cognos has a *“large, broad, and very satisfied group of more than 2,000 customers working with BI in Sweden.”* However, Cognos does not have any statistics over satisfied customers. Jönsson states that it would not be reliable if Cognos provided this information. Instead, Cognos works with independent research analyst companies and provides these companies with lists of customers to interview, hence serving as an input to their ranking of BI suppliers and vendors.

3.2 Oracle/Hyperion

	
Business Activity: BI Supplier	Respondent: Anders Eckman
Employees: 55,000	Position: Business Development Manager
Region: World-wide	Date: 2007-11-22
	Interview: Telephone

The Oracle Corporation is one of the largest software companies in the world, with more than 55,000 employees in 145 countries. In the beginning of 2007 Oracle purchased Hyperion, also an American company, specialized at business performance management and business intelligence products. Oracle/Hyperion develops their own BI solutions but cooperate with partners to enhance their solutions. Oracle/Hyperion usually refers to BI as

Business Performance Management (BPM), Corporate Performance Management (CPM) or Enterprise Performance Management (EPM), which are all concepts for business controlling. According to Eckman, the company's customer base has traditionally been characterized by large, global companies listed on a stock exchange, having many affiliates within the corporation. Typically these companies originated from the financial consolidation side, but today they target a wider customer segment. The reason behind this is that their solutions nowadays provide functionality suitable for most companies that wishes to improve their business planning. Almost exclusively, Oracle/Hyperion gets in contact with their customers by so called cold-calling. They call up companies which they believe have a need for their solutions.

Eckman stresses that Oracle/Hyperion's three strongest arguments for implementing BI solutions are *pervasive*, *hot-pluggable* and *open standard*. The concept of *pervasive* refers to satisfying information needs. Oracle/Hyperion's BI solutions act as a tool that can be distributed throughout the company, satisfying every individual's need for information on every level. Consequently, every person working next to a PC can access the information that they need. The second strong argument for implementing Oracle/Hyperion's BI solutions is called *hot-pluggable* and refers to the ability to link the existing infrastructure with new BI-tools or applications. Oracle/Hyperion provides a solution that makes it possible to connect to the customer's present portal and the tools they are already using with the new ones. Therefore the customer can keep the existing systems without having to switch. As a result the customer does not have to have Oracle's solutions from the beginning, they can have an intelligent Oracle server as a foundation and then use a Cognos tool in the front. In addition to that, Oracle/Hyperion's BI solutions offer full connectivity with the entire Microsoft Office suite and accept any tool when extracting, transforming and loading the data in the ETL process. Finally, one of Oracle/Hyperion's most important concepts is *open standard*. Eckman claims that the company is completely open to other systems on the market. However, the industry has many shared standards regarding communication between different systems. This is especially important when implementing Service Oriented Applications (SOA), where it is necessary to establish a connection between all the different services. The entire concept of SOA builds on openness, hence requiring open software applications and a language between these which enable a linkage. This makes Oracle unique today; the ability to use a SOA solution and then just simply establish a link with a BI solution. This optimizes the analysis of the business processes. Individuals in the sales, finance, or logistics departments etcetera, can continuously access information from the BI system which in turn facilitate actions. Except for these three strong arguments for implementing BI solutions, Eckman mentions *scalability*, which is closely related to hot-pluggable. The scalability of their BI solutions enables the customer to grow with their solution. The customers can start out with a small solution and then expand by connecting more and more users, and by adding additional connections between the software and the servers.

In order to back up their arguments, as to why customers should implement their BI solutions, they primarily use references and reports from analyst companies. The customer always wants to know if they have done this before and if they have references from this industry or a closely related area. Oracle/Hyperion has a list on their website with over one hundred companies acting as references. Each company's initial problems are presented together with the solution that was implemented and ultimately the result that followed. The references are also used as an argument in the selling process; that they have great experience and have done this before. The references are not only used as a way to back up their arguments, they are also used as a selling tool. When they have a meeting with a bank they always present a reference story from another bank. When Oracle/Hyperion sells their BI

solutions to customers they usually present what research analysts say about their solution versus other solutions. They frequently refer to Gartner’s Magic Quadrant to show the customer how they are positioned against other BI suppliers. Forrester, IDC and Blur are other research companies that are referred to. They also buy reports from Swedish research analyst companies, to see what trends exist specifically on the Swedish market.

3.3 Pdb

	
Business Activity: BI Vendor	Respondent: Peter Skånheden
Employees: 85	Position: Head of BI Department
Region: Sweden	Date: 2007-11-23
	Interview: Personal

The Swedish IT consultancy company Pdb, supplier of various computer platforms including BI solutions, has been operating in the Jönköping region for over 20 years but is now expanding by purchasing a company located in Stockholm. Pdb works closely with their current customer base, simultaneously as focusing on attracting new clients. However, the company has recently expanded their market and sales unit in order to process the market with an even higher intensity than previously; hence extending their offer to more domains. The company mainly targets mid-sized and large companies Skånheden states. Pdb offers several BI platforms such as Microsoft, Cognos, and QlikTech in order to supply companies with the BI solution that best suits their needs. According to Skånheden, most of their customers already have Microsoft licenses whereas it becomes very cost efficient with a BI platform from Microsoft.

According to Skånheden, BI has grown substantially and is now seen as an important ingredient in many companies. One of the most important arguments for implementing BI is *central reporting of information* according to Skånheden. This is most commonly accomplished with a data warehouse (DW) designed specifically for BI. It is not uncommon that companies have many different sources of information that are gathered by many different business users, which in the end results in dissimilar decision support for users throughout the organization. Skånheden stresses that when implementing a BI solution, all refer points and measurements will be the same. That is to say, all business users will have the same information as everyone else and the information will be verified and correct. Business users will therefore be able to make decisions based on the same information which will have a positive effect on the level of control in different areas within the organization. Skånheden states that a higher level of control is required when guiding business development. Control enables companies to adjust their processes and ultimately to reduce costs. Pdb emphasizes that BI can enhance planning and analysis of data in order to be cost efficient and achieve goals. Another major benefit is *time*, meaning the time spend on gathering and compiling information. Saving time is a very strong argument for BI solutions since gathering and compiling information is very time consuming and can be reduced substantially by implementing BI. Information that used to take several days or weeks to extract and gather, can now be retrieved within minutes or even seconds. The user interface can also be scalable

and business users can perform some own configuration retrieving information specifically for their needs and perform dynamic analysis.

In order to prove their concept when selling BI solutions Pdb frequently use *references from existing customers* that have already implemented BI applications and platforms. New potential customers then get a chance to meet with reference companies so that they can learn from their experiences and the potentials and usefulness of BI. Other methods used are *workshops* where Pdb demonstrates and appraise benefits of different BI systems. According to Skånshagen some customers want to have a demonstrative application in their own environment before they decide to implement a system. In such case, a problem area is identified where Pdb implement a small part in order to show the potential of the BI system. Pdb also uses statistical analyze to review the outcome of implementations in order to improve and enhance their services.

Furthermore analyst reports from companies such as Gartner are used to keep up with global trends within BI. Cooperation with the research analyst company Radar Group has also been initiated in order to access analyzes that better reflect the trends on the Swedish market.

3.4 Logica AB

	
Business Activity: IT Vendor	Respondent: Andreas Schüldt
Employees: 40,000	Position: Head of CPM
Region: World-wide	Date: 2007-11-27
	Interview: Telephone

WM-data is a Nordic IT company with 10,000 employees, geographically located in all the Nordic countries, Estonia, and Poland. However, since October 10, 2006 WM-data belongs to LogicaCMG Group, thereby becoming an international company with 40,000 employees in 41 countries. WM-data will officially change their brand name to Logica AB February 27, 2008. From hereon we will refer to WM-data as Logica. Schüldt points out that Logica Nordic usually refers to Performance Management or Corporate Performance Management (CPM) when talking about Business Intelligence. Logica only provides packaged BI solutions. They are product independent and works with the most popular products on the market from companies such as SAS Institute, Cognos, Business Objects, Microsoft, Oracle's back-end solutions, Informatica and sometimes OlikTech and other specialized products. They help their consumers make a choice suitable to their needs. Logica mainly target large European companies such as AstraZeneca, Sony Ericsson, and IKEA. Generally, their customers contact them. Logica has an extensive customer base and many of their existing customers want to implement BI solutions or extend present ones.

The arguments Logica primarily uses when selling BI solutions to customers are adapted to each customer's maturity level. The maturity levels are based on the customer's problems and needs and are divided into three different perspectives: *Automation*, *Process* and *Strategic*.

The *Automation perspective* deals mostly with classical problems. The customer has information but does not have access to it, the information is stored in the wrong format and can therefore not be used to make decisions or the quality of the information stored in their data warehouses is bad. The automation perspective mainly deals with accessibility and cost efficiency, almost exclusively about saving money and increasing quality. The second type of customers have a *Process perspective*. That is to say, they look at their problems from a more strategic angle: they apply a cost and revenue perspective. They think about how they need to optimize their customer relationships, and improve the Human Resource (HR) process. Logica then looks objectively at the entire organization from a decision support perspective. Schüldt stresses that after all, BI is all about extracting information at the right time, in the right format and to every individual so that they can make correct business decisions. This is the process perspective. The last perspective is the *Strategic perspective* which incorporates balanced scorecards and strategy maps. It deals with the essentials of the company, it measures how the company fulfills the strategy, and how the company communicates its visions and finally secures the realization of these. The strategic perspective is broken down into two sub perspectives: the run perspective (evolution) & the change perspective (revolution). The first one deals with continuous improvements. Processes and functions within the company are looked over to increase the operational efficiency. The change or revolution perspective on the other hand, deals more exclusively with steering the organization in a longer-term. Logica's task is to assure that their customers' reports, analysis, and scorecards support their goals, so that they in turn can secure an efficient production, improve customer loyalty, concurrently as steering the organization strategically.

Hence the strategic perspective can be seen as a perspective that brings about change, and the automation and the process perspective as a perspective that induces optimization of an organization. To conclude, the automation and the process perspective deals directly with BI, such as reporting, storing of data, online analytical processes (OLAP) and mining. When adding change, CPM comes into the picture – connecting strategies with operational processes.

Schüldt states that CPM is generally quite hard to measure since it incorporates many intangible benefits. *One single version of the truth* and *one company* is such benefits. It aims to ensure that every individual makes business decisions based on the truth, which demands that every individual has access to the same information. When it comes to justifying arguments used when selling CPM solutions, Logica mainly uses reference cases according to Schüldt. SJ and Gunnebo are two examples of references Logica uses when referring to previous implementations of CPM. In addition to this a database is being planned to be developed, storing information about their CPM implementations. In the future, statistics are to be stored measuring how successful Logica is at helping their customers and generating return on investment (ROI) on their implementations. Thus, the strategic perspective is very difficult to measure whereas the automation perspective is easier since it delivers more tangible results.

3.5 QlikTech

	
Business Activity: BI Supplier	Respondent: Robert Kusec
Employees: 349	Position: Account Manager
Region: World-wide	Date: 2007-11-28
	Interview: Personal

QlikTech was founded in 1993 as an IT research and development (R&D) company in Lund, Sweden. During the last three years, QlikTech has doubled their sales every year and has at present time 17 offices in 8 countries with more than 6,300 customers in 80 countries. “Simplifying analysis for everyone” is their motto and they sell their BI product QlikView with promises of “delivering QlikView to half the cost, in one fourth of the time, with twice the business value”. QlikView is based on a patent called “In memory analysis”, a new approach to data analysis which is the base of the business.

When selling their BI application to customers, QlikTech uses *saved resources in terms of time and money* as their strongest arguments. Their salesmen work similar to doctors and ask customers where they need improvements and how they think their problems could be solved. Kusec states that it is easy for business users to find necessary information or data in their existing systems but gathering and compiling the information to useful reports can be a very time-consuming process. This means less time for analyzing the results, maybe as little as 5 – 10 % of the total amount of the time users spend on their reports. With BI systems, the gathering of the information or data could be done automatically and the user could spend more time on value-adding activities such as analyzing numbers. “*One potential customer spends 600 man-hours per month gathering data for their reports. With a BI system, this customer could save 1,800,000 SEK per year, money that today is wasted*” Kusec explains.

According to Kusec, BI systems help organizations *create business value*. A manager or user can analyze sales data to find customers less likely to be profitable and spend more time talking to other customers, more likely to buy their product. This could *improve business processes* and *increase revenues*.

QlikTech uses reference customers to show potential customers how BI has improved processes in other organizations. Kusec states that an application that is similar to the potential customer’s needs is used during these demos. Further, Kusec explains a concept called “Seeing is Believing” (SIB) which is used when selling QlikView. In SIB, QlikTech installs a BI system that uses live data, with a functionality limited to 50 – 60 % of the full potential. The customer evaluates the system for a couple of weeks and QlikTech then revisits the customer to discuss their impressions and what they think about QlikView. Kusec explains that SIB is a very successful concept and they rarely lose a sale with this approach.

4 Pre-analysis of Empirical Findings

After compiling and analyzing the outcome of the empirical study, seven main arguments for BI were identified. The arguments, in conjunction with an assortment of the essential statements made by the companies, will be presented below.

In order to get a free flowing text, that is not disrupted by too many references, we have decided to exclude them throughout the text. Instead the references will be listed below, and from hereon we will only refer to the respondents by citing the company they represent.

Cognos: Peter Jönsson (P. Jönsson, personal communication, 2007-11-13)

Oracle/Hyperion: Anders Eckman (A. Eckman, personal communication, 2007-11-22)

Pdb: Peter Skånshagen (P. Skånshagen, personal communication, 2007-11-23)

Logica AB: Andreas Schöldt (A. Schöldt, personal communication, 2007-11-27)

QlikTech: Robert Kusec (R. Kusec, personal communication, 2007-11-28)

4.1 Single Version of the Truth

A frequently occurring aspect and one of the most important reasons for investing in BI is to create a shared platform for decision making. Cognos made clear that when separate systems and tools exist in the same organization it is likely that the numbers extracted differ and do not reflect the truth. Logica also mentioned this problem and pinpointed that a single place of data storage is one benefit BI provides. It ensures that individuals make business decisions based on the truth, that is, same information for all business users. Refer points and measurements will, according to Pdb, be the same for every business user and therefore lead to better organizational decisions. Since a shared platform with organizational data for every decision maker seems to be an important and common argument for BI, we will use the term *“single version of the truth”*.

4.2 Control

Gathering numbers manually from different systems is a risky process according to our respondents. Since information can be retrieved from the same source with BI, Pdb argues that a higher level of control can be achieved in different areas within the organization. As Cognos mentioned, by a single version of the truth, better control will occur. This implies that better organizational control is achieved when all business users make decisions based on the same information: something that is usually a common problem among organizations and which can be devastating. QlikTech argues that BI is an efficient tool for analyzing the organization in order to control performance, costs, processes, and guide business development. All respondents claim that BI solutions enhance the level of control, which is likely to affect the confidence in decisions made. We conclude that better *“control”* is emphasized by our respondents as a benefit and argument for BI.

4.3 Time Savings

One argument, that our respondents' claim has a huge impact on organizations, is the actuality that BI saves time. As mentioned, Pdb stated that gathering and compiling information is a very time consuming task that can be substantially reduced when implementing BI. Information that used to take several days or weeks to extract and gather can now be retrieved within minutes or even seconds. Our findings regarding access to data are clearly connected with time savings. QlikTech affirmed that information can be retrieved automatically within seconds, resulting in more time over for the user to spend on more value-adding activities such as analysis of numbers. Logica also reported that BI can assist organizations in saving time by delivering the information at the right time and in the right format. Cognos described a situation taking place in many organizations, where business users send spreadsheets across the organization that other members continuously updates, by adding new numbers; hence a very resource heavy and time consuming task that can be solved by implementing BI. Oracle/Hyperion stressed that everyone next to a computer within the organization can use information in a timely manner with BI. As an implication, we have noticed that our respondents advert "time savings" as a strong argument for BI.

4.4 Cost Savings

Every investment organizations do must generate something in return and according to our respondents BI is no exception. Pdb argued that BI enables organizations to adjust their processes and ultimately to reduce costs. This is also supported by Logica, stating that BI solutions are cost efficient and almost exclusively deals with cost savings. They also mentioned that easy accessibility to information and a high level of control lead to cost reductions. By implementing BI, our interpretation is that the respondents imply that planning and analysis of organizational data will enhance organizations knowledge, and thereby perform actions that will later on implicate cost savings. As Pdb declared, improvements such as cost efficiency and realizing goals can more easily be accomplished by using analytical capabilities of BI. Cognos further stated that one of their clients had experienced remarkable ROI due to their BI initiative. QlikTech referred to one potential customer of theirs that every month had spend six hundred man-hours compiling data, which in monetary terms is close to 1.8 MESK per year; money that could have been spent on something else. Since our respondents kept mentioning "*cost savings*", in one way or another, this concept was one very strong argument for BI.

4.5 Increased Efficiency

Improving business processes and generating increased revenues were two areas BI could assist organizations in, according to QlikTech. As Logica stated, processes and functions can be monitored to assure that business users' reports, analysis procedures, and scorecards support organizational goals. Cognos also emphasized the analytical capabilities of BI by stating that gathering, compiling, and performing of analytics on organizational data could improve business efficiency. Oracle/Hyperion also mentioned that by integrating a BI solution, business processes could be optimized. This was also agreed on by Pdb, who explained that adjustments of processes could easily be done with BI. Ultimately, since effective processes with BI are mentioned by most respondents we affirm that "*increased efficiency*" is a strong argument.

4.6 Improved Analytical Capabilities

BI can according to Pdb enhance analysis of data, dynamically, specifically designed to business users in any situation. The analysis perspective was also pointed out by Oracle/Hyperion who addressed optimization of business processes through analytical tools as an argument for investing in BI. Cognos mentioned that one of their customers had experienced substantial ROI, and increased efficiency in their sales forces by using the analytical capabilities their BI solution provided. Logica brought up analytical functionality of BI, by stating that online analytical processes (OLAP) and data mining are used respectively to perform analysis on organizational data. Based on these findings we ascertain that “*improved analytical capabilities*” was one of the main arguments for BI.

4.7 Summary of Arguments

The six arguments identified in the interviews with the five companies can be found in table 4.1. The table provides a short summary of each argument, as a quick overview of the empirical findings.

Table 4.1 - *Summary of Arguments*

ARGUMENTS IDENTIFIED	BRIEF DESCRIPTION
Single Version of the Truth	All organizational members use the same information
Control	Increased control of business processes, information, and functions
Time Savings	Time reduction in different areas
Cost Savings	Cost reduction in different areas
Increased Efficiency	Processes throughout the organization can be managed differently
Improved Analytical Capabilities	Ability to analyze organizational information

5 Frame of Reference

This section represents the result evolving from the literature study of Business Intelligence and related areas. It will constitute the theoretical framework that will guide the preceding empirical study and analysis.

The theoretical framework is composed by well-known established theories from acknowledged researchers within the topic field. Both theories representing positive and negative aspects related to IT and BI will be presented in order to attain balance between the theories when analyzing the arguments in the final analysis.

5.1 Organizations and Information Technology

In most organizations, IT has become a critical resource in today's business environment. IT supports and consumes a significant amount of organizational resources and as any other resource it has to be managed wisely. IT supports people in their work, and when implemented correctly in the organization, it enables people to focus their time and resources on more value-adding activities. New technologies emerge and new business opportunities arise which can be of importance for the organization. To exploit new opportunities and gain competitive advantage, managers need to understand how to get, and how to better use information in decision making processes. Organizations' ability to achieve their goals can be jeopardized if an inappropriate IT solution is implemented. Not even will customers be lost, increased production costs, business directions by managers will be inappropriate which can be disastrous (Pearlson & Saunders, 2004).

Organizations' design as well as choices made to define, set up, coordinate, and control processes are all incorporated in the concept of organizational strategy. The organizational strategy is an attempt to answer the question "*how will the organization achieve its goals?*". Plans and actions are developed in order to coordinate and combine different variables including managerial decision rights, business processes, and formal reporting systems to achieve the organizational strategy. Even control variables, such as availability of data, quality planning, and the effectiveness of performance measurement and evaluation systems, are important to consider (Pearlson & Saunders, 2004). Performance measurement systems, in this thesis referred to as BI, provide an effective way to accomplish organizational strategies according to Anthony & Govindarajan (2007). Measures and target points are outlined and set by managers that best represent the organization's strategy. The information consists of financial and non-financial information that serves as managerial control variables. It is important to combine financial and non-financial measures because it is insufficient to rely on only one perspective to ensure that the organization achieves its strategy (Anthony & Govindarajan, 2007). Most organizations today, according to Turban et al. (2007), use some kind of performance measurement system. Managing and measuring how well the organization performs using a holistic approach with identical metrics and refer points ensures rapid and effective implementations of strategies. One of the most common approaches for performance measurement is a variant of Kaplan and Norton's balanced scorecard (BSC) that uses four perspectives: financial, customer, internal business, and innovation and growth as key areas (Turban et al., 2007; Anthony & Govindarajan, 2007). The interface of a performance measurement system is often called dashboards and provides important insights on how the organization are aligned with its strategy, thus serving as a control system (Anthony & Govindarajan, 2007). In many cases dashboards consist of key performance indicators (KPI), commonly used to control and measure the current organizational condition. KPIs consist of pre-defined measures that guide managers to accomplish defined targets and achieve the organizational strategy (Turban et.al, 2007). However, hav-

ing a clear strategy and analyzing the industry, is according to Eisenhardt (1990) no longer a guarantee for success, rather to move fast and keep the pace. In a high competitive environment or in a technology driven industry, it is essential to make fast strategic decisions; the question Eisenhardt (1990) scratches his head about is *How do people make fast decisions?*. There are several strategies that can be performed to answer this question based on conventional wisdom. One way is to use a limited amount of information in decision making, that is extracting only relevant data from a few sources. This strategy is fast, but may include disadvantages such as reduced quality and insufficient information for decision making. Confident decisions and the lack of supportive information can therefore be of a major concern for decision makers. Another strategy is to avoid conflicts which can drag out decision making processes, especially if the conflict persists. By minimizing conflicts, faster strategic decision making can be performed and accelerate choice (Eisenhardt, 1990).

Most fast decision makers according to Eisenhardt (1990) often use simple tactics and procedures to accelerate choices. They monitor and analyze real time operating information, and rely on comparative analysis and multiple alternatives to speed up. Their use of advice and integration creates the self-confidence needed for fast decision making. One myth is that fast strategic decision makers limit decision makers information by reducing numbers, and numbers of sources. Typically, they use operational measures of internal performance and prefer indicators such as profitability on a monthly, weekly or daily basis. When it comes to slow decision makers, they are usually stuck in information exploration, overwhelmed with alternatives, and are continuously facing uncertainty. They rely more on planning and futuristic information than real time operational information. They spend much time on developing plans, scanning markets, monitoring actions by competitors and evolving technologies. However, fast and slow decision makers, often have different objectives, and as a result, there is sometimes a difference in information content, number of sources, and time horizon (Eisenhardt, 1990).

5.1.1 Centralized and Decentralized Approach

Defining IT architectures that fulfill the organizations strategy today is relatively simple, the question is; *How far into the future do our strategy extend?*. This implies that considerations have to be made from both existing IT architecture and future architecture. Also questions like *What issues can arise and change these assumptions*, and *How long can the architecture and its associated infrastructure fulfill strategic goals*, are aspects that must be considered when choosing a decentralized or centralized IT approach (Pearlson & Saunders, 2004). The centralized approach brings together hardware, software, data, and processing into a single location in contrast to a decentralized approach. Another distinction between the two approaches are related to the concentration of decision making. Centralization implies the concentration of decision-making power in a single person, or small group, as opposed to decentralization that implies that decisions are made at various levels in the organizational hierarchy. This means that centralization of control preserves top management needs in most decisions, whereas decentralization allows lower level managers good judgment in choosing among options (King, 1983). King (1983) further states that, traditionally centralized IT is less costly since it usually involves economies of scale. It is also easier to justify expensive equipment since it becomes possible to distribute it to more users than with a decentralized approach. Moreover, centralization facilitates a standardization throughout the organization which increases quality of data, control of computing activities, and access to more information (Pearlson & Saunders, 2004). According to King (1983), the decentralized approach incorporates a greater amount of flexibility than centralization does, which in turn can assist individuals needs in a better way. IT systems can also be better suited and adjusted to de-

partments and functions throughout the organization. Pearlson and Saunders (2004) stresses that decentralization is a form of non-standardization, it enables a closer relationship between the IT department and business users, and makes it possible to exploit the utilization of systems in a better way. This implies that an increased loss of control is likely to arise with a decentralized approach. On the other hand, the advantages of decentralization, with its associated commitment to end-user focus, are strongly regarded in situations where there is a desire to loosen central control and release the creativity and energy which resides at business unit level (Fowler & Wilkinson, 1998). However, King (1983) points out that decentralization is likely to raise the amount of costs, but can be justified by its increased productivity instead. He further adds, by executing a centralized approach, benefits can arise, and advantages occur if the approach is planned, executed, and maintained properly.

5.2 Types of IT Investments

Like any other investment, the scope, the impact on the organization, total cost of ownership, and other uncertainties and sensitive areas related to the investment need to be considered and thought through. Alternatives to the investment should be mapped out and presented as well as what a future without the investment would be like. To clearly show different courses of action and the difference between alternatives, Falk and Olve (1996) categorize IT investments into four distinct groups; *crucial*, *rationalizing*, *decision support*, and *competitive*.

Crucial systems are needed for the organization to operate. When facing a decision whether to invest in a crucial system or not, you typically do not have a choice but to go ahead with the investment. The least expensive alternative is usually chosen if alternatives exist. Organizations invest in *rationalizing* systems primarily to reduce costs. However, Falk and Olve (1996) point out that reduced cost could lead to lower prices, which might have a positive impact on the organization's ability to compete. Systems for *decision support* usually provide intangible benefits, which are hard to evaluate and put a price on. Decision support systems might enable new ways of doing business or improve existing processes with less waste as a result (Falk & Olve, 1996). Systems of *competitive* nature help organizations prepare and act as a solid foundation for the future. Falk and Olve (1996) describe changing consumer patterns and the introduction of new services as two examples where organizations invest in this kind of system. Nonetheless, there is often hard to make a clear distinction between what group a system belongs to. As an example, Falk and Olve (1996) notes that a system classified as *crucial* can have *rationalizing* effects on the organization.

5.3 Reasons for Investing in IT

During the last decades, IT has served as one of the cornerstones for organizational success (Lundberg, 2004). The primary role of IT in organizations has changed as the technology has evolved and matured. IT has become a powerful tool in creating competitive advantage (Falk & Olve, 1996). Historically, the main reason for investing in IT in the 1960s and 1970s was to increase efficiency and effectiveness. Henceforth, during the 1980s and 1990s, the primary role of IT investments changed towards a more strategic function. In recent years however, IT's primary role has altered to become a tool to bring about value creation in organizations (Pearlsson & Saunders, 2004). Falk and Olve (1996) suggest two main reasons for investing in IT, *cost reduction* or to enable *new ways of doing business*; both resulting in increased business value. Accordingly, Onliner & Sichel (2000) report that firms

have been investing in information technology at a furious pace in an effort to reduce costs, coordinate large-scale operations, and to provide new and enhanced services.

5.3.1 Does IT bring the Expected Value?

The headline and the content of the article “IT doesn’t matter” by Nicholas Carr was revolutionary and heavily debated in the academic context when it was published in 2003. Carr (2003) brought up the discussion regarding the fact that all organizations use the same kind of systems and therefore; no company can have a competitive advantage over another. Instead the strategic benefits are rather addressed to how well organizations use the systems. In many debates regarding the value of, and the reasons for investing in IT, the *productivity paradox* is often discussed. The productivity paradox more closely refers to researchers problem in finding a positive correlation between IT investments and increased productivity, hence questioning if computers really contribute significantly to productivity or not. Quite often benefits have been lower than expected, resulting in an on-going debate whether or not IT is worth investing in (Brynjolfsson & Hitt, 1998; Falk & Olve, 1996; Lundberg, 2004). Nevertheless, some studies have found positive effects on intermediate factors such as cost efficiency or market share, conversely pointing out the difficulty of tying these benefits to the bottom line. As a reason for this, some people have pointed out the inadequacies of measuring the productivity. Stressing it is not surprisingly that IT many times look like a bad investment, considering the fact that it is fairly easy to count the cost of IT but very difficult to assess the benefits –particularly those that take time to be realized (Brynjolfsson & Hitt, 1998). Lucas (1999) emphasizes the important role IT plays in organizations, but also sheds light on the complex nature of measuring its added value. He stresses that some investments demonstrates traditional returns that can be expressed in monetary terms, but more than often returns from IT investments are indirect and cannot be touched upon. Most productivity metrics are oriented around counting things: number of employees, pounds of nails, or number of checks processed. As long as computers allow firms to produce more of the same product at lower costs, these metrics work reasonably well. But there is strong evidence that managers are not simply making IT investments to cut costs when asked about why they have invested in IT. Instead surveys suggest that customer service and quality consistently rank above cost savings as the prime motivation for making investments (Brynjolfsson & Hitt, 1998).

Throughout the years many organizations have invested in new technology without fully understanding the potential or benefits they could lead to (Falk & Olve, 1996). The concept of *Silver bullet thinking* implies that organizations believe IT investments automatically generate benefits once implemented. Thorp (2001) states, in order to realize the benefits from IT investments, organizations need to focus on how the investment should be used to create business value through proactive management; IT alone cannot generate this value. According to Lundberg (2004), it is not just a matter of implementing new tools and systems; IT itself does not provide any business value or increased productivity. “*Rather, IT should be seen as an enabler*” (Falk & Olve, 1996, p. 15), suggesting that major changes in the organization are needed to be able to take advantage of the great potential IT can deliver. Employee training is for example crucial to receive promised benefits and business value from the system Brynjolfsson & Hitt declare (1998).

5.4 Business Intelligence

According to Turban et al. (2007) the main reason for investing in BI is to improve business value by providing the right information, to the right person, at the right time. Organizations need to better capture, understand, and use their existing data to improve business operations and gain competitive advantage. Using a centralized data repository and an extensive set of tools, business users are able to generate reports as well as analyzing data and information for faster and more informed decision making (Turban et al., 2007). According to Eckerson (2003), BI consists of two environments, a data warehouse environment and an analytical environment. The data warehouse environment is set up to automatically gather data from different source systems throughout the organization, such as orders, shipping or inventory, into one central data storage, often referred to as a data warehouse. Data is structured into appropriate format and stored, ready for analytical processing (Turban et al., 2007). Figure 5.1 displays a model representing the logic of a BI solution.

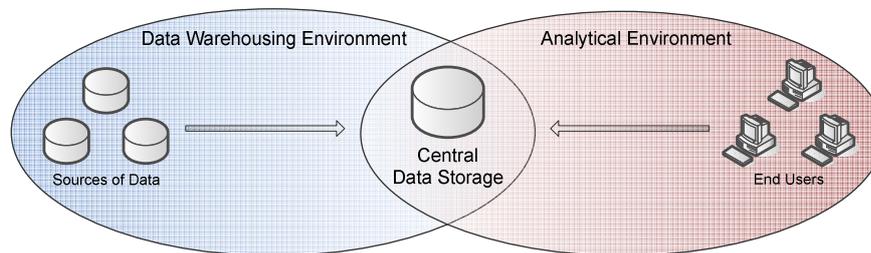


Figure 5.1 - BI Component framework - based on Eckerson (2003)

A higher level of control is reached when data is stored in one central location. Activities such as validation and verification of data is a lot easier to perform when data is stored in one central location – providing a single version of the truth (Miller et al., 2006). If each user in a functional organization develops, copies, summarizes, and transforms its own data; identical business queries are very likely to generate different results, something that can be solved with a central repository (Gardner, 1998). In the analytical environment, business users utilize the data from the central data storage. BI offers easy access to different analytical tools depending on the user's needs (Turban et al., 2007). Some users use simple reporting capabilities. However, the analytical environment offers a wide range of more advanced functionality. For instance, it enables changing the view or level of details in reports, filtering data by relevant criteria so called “slice and dice”, trend analysis, data mining and aggregation of data usually presented in dashboards and scorecards, to keep track of organizational performance using key performance indicators (KPI) to follow up on organizational goals (Eckerson, 2003).

5.4.1 Benefits of Business Intelligence

In a report, organizations operating in the 21st century, Eckerson (2003) discusses what organizations need to consider when investing in BI. According to Eckerson (2003), BI investments generate both tangible and intangible benefits. Tangible benefits are easily measured in units, percent or using a monetary value. Intangible benefits, on the other hand, are harder to measure since they have no physical value or appearance. Eckerson (2003) conducted a survey among 510 organizations regarding the benefits their BI systems generates (figure 5.2). The majority of the reported benefits were intangible. Eckerson (2003) reports *time savings* as the most common answer, followed by BI systems' ability to deliver a *single version of the truth*, *better strategies and plans*, and *better tactics and decisions*.

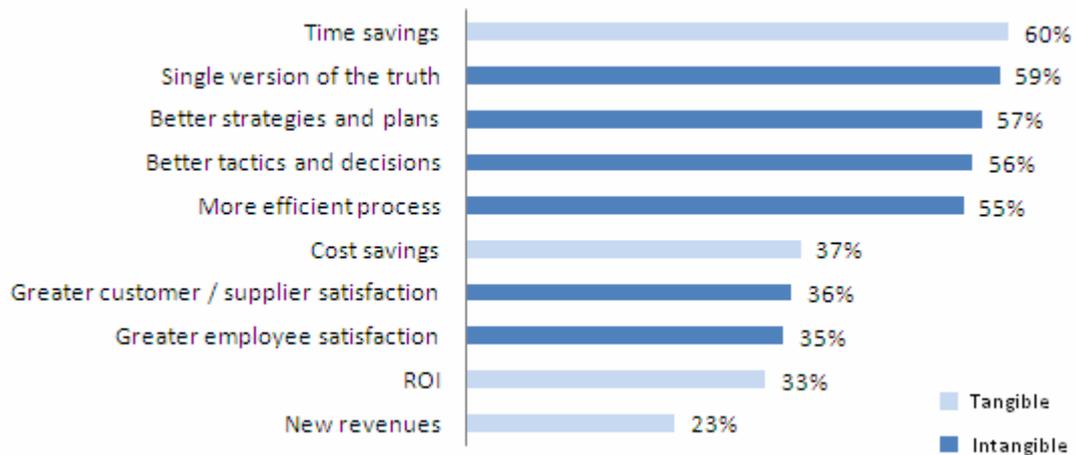


Figure 5.2 - Benefits of BI (Eckerson, 2003)

Thompson (2004) reports similar results in a report where he investigates a global survey with more than 1,000 participating organizations worldwide about their use of BI. According to Thompson (2004), most organizations reported *faster and more accurate reporting*. Using a simple interface the content, layout, or calculations of a report can be changed to fit the exact needs of the user. *Time is saved* when only numbers relevant to the user are displayed. Reports can be accessed ad hoc, periodically or both, which offers great flexibility for the user. Also, BI systems can be set to predefined subscriptions, schedules, or events, automatically sending out reports or alerts to users across the entire organization or even outside the organization (Turban et al., 2007). According to Thompson's (2004) report, the second most common benefit organizations report is *improved decision making*. Turban et al. (2007) argue that using BI for analyzing data, organizations can move from making decisions based on intuition to decisions based on facts. One central location for data storage assures decision makers of a "*single version of the truth*", which Eckerson (2003) reports, meaning the numbers they are analyzing are the same as everyone else's. Information previously not shared or not shared fast enough for decision making can now be used. BI enables decision makers to analyze different dimensions of data, such as number of sales in specific region during a certain time to find trends and based on this analysis *make more informed decisions* when all data generated by different systems in the organization is used. Faster sharing of information within the organization improves operational decisions. Numerous organizations report *returns or increased revenues from BI systems* (Eckerson, 2003; Thompson, 2004). Turban et al. (2007) state that the realized returns range from 17 percent to over 2,000 percent with a median *return of investment (ROI)* of 122 percent. Most returns are, according to Eckerson (2003), the result of *cost savings* enabled by the implemented BI system. However, out-of-stock situations can be avoided with improved forecasting capabilities. BI helps organizations to gain a better insight of consumer behavior leading to *new strategies* and completely *new business models*; resulting in fewer lost sales, new sources of revenue (Eckerson, 2003), and finally *improved customer service*. From where the last-mentioned is the third most reported benefit of BI according to Thompson's (2004) report.

6 Analysis of BI Arguments

In this section we analyze the arguments identified from our empirical findings using theories presented in the frame of reference.

6.1 Single Version of the Truth

A common argument for BI among the respondents was the positive effects related to having a *single version of the truth*, an argument revealed in a study by Eckerson (2003) as well. The purpose of Eckerson's (2003) study was to explore what benefits BI systems actually deliver to organizations. When asking 510 organizations what positive effects they had experienced from implementing BI, 59 % of the companies expressed positive effects originating from having a single version of the truth; thus being the second most frequently mentioned experienced benefit emerging from BI. Additionally, researchers have reported several beneficial effects resulting from having a central data repository, Miller et al. (2006) state that the validation and the verification process become easier when the data is stored in one central location. Furthermore, Eckerson (2003) concludes from his study that having one central location for data storage, assures that decision makers are able to make decisions based on the truth, meaning that the numbers analyzed will be the same as everyone else's. BI can therefore reduce the risk of occurrences where business users creates, copies, summarizes, and transforms its own data differently, processes that makes it impossible to ask business queries that returns the same results. The concept of a single version of the truth is very interrelated with the concept of centralization. King (1983) states that a centralized approach brings together the hardware, software, data, and processing into a single location. Increased quality and easier access to information can be realized when data is centralized into a single location according to Pearlson & Saunders (2004). Turban et al., (2007) also states that BI can improve business value by providing the right information, to the right person and at the right time.

Nevertheless, King (1983) states that the decentralized approach incorporates a greater amount of flexibility than centralization does, which in turn can assist individuals needs in a better way. We could not find any established theories that disagreed with the benefits of having a single version of the truth. Indeed, flexibility can add value to organizations in many different ways, but it can also impose a lot of problems. Managers may want their subordinates to be creative and flexible when developing new innovative products ideas, but we doubt that flexibility is as beneficial when it comes to making decisions on information that is "flexible" rather than precise. As for example, if data is stored in many different formats and at many different locations throughout the organization, we believe that it becomes very difficult to trust the information stored in each system, making it almost impossible to know if the information is accurate or not. Henceforth, if the information is incorrect, managers cannot make correct decisions and steer the organization towards strategic goals. Based on this logic, and the fact that we were not able to find any strong theories against this argument, we believe a single version of the truth is beneficial for companies, and that BI can deliver those benefits.

6.2 Control

Improved *control* was another strong argument the vendors and suppliers used when pointing out the reasons for investing in BI. Reviewed theories within the researched area suggest that BI solutions can assist businesses in improving their organizational control. The visual interface of a BI solution, often represented by dashboards and scorecards, can provide businesses with important insights on how the organization is aligned with its strategy; hence serving as a control system (Anthony & Govindarajan, 2007). The dashboards, most often include key performance indicators (KPI), commonly used as an efficient tool when controlling and measuring the current organizational condition. The KPIs help businesses keep track on organizational performance and compare them to organizational goals on a monthly, weekly or daily basis. As a result KPIs can guide managers to accomplish defined targets and achieve organizational strategies (Turban et.al, 2007).

The concept of BI suggests a centralized decision support; information is stored in a single place. According to Pearlson & Saunders (2004), centralization of data embodies standardization, resulting in a positive effect on the control of the organization. Miller et al., (2006), further states that a higher level of control is reached when data is stored in one central location. When having decentralized data instead, the probability of increased loss of control is much more likely to arise (Pearlson & Saunders, 2004).

However, businesses should be aware of the effects a centralized system may have on organizations. The culture of the organization may not be aligned with the implication a centralized system compose. Centralization of control will mainly favor top management in most decisions, whereas decentralization will permit lower level managers opinions and judgments. The concentration of decision making power is often distributed to a single person or just a small group of people when centralized control is applied. Decentralization rather implies that decisions are made on many different levels in the organization (King, 1983). Customization of reports and tables may be restricted to only a limited number of users and can therefore impose negative effects for some users throughout the organization (King, 1983). In organizations where a commitment to end-user focus exist, with a desire to loosen central control and release the creativity and energy which resides at business unit level, a decentralized approach might be more suitable (Fowler & Wilkinson, 1998).

To summarize, having a high level of control is one of the cornerstones in organizational strategy according to Pearlson & Saunders (2004). Based on our findings, BI solutions seem to oblige to organizational strategy: assisting organizations in facilitating a higher level of control over business processes through the use of KPIs. Notwithstanding, organizations need to consider effects that might arise from a more centralized system and control. The internal culture of decision making and the organization's users need for decision support needs to be taken into consideration.

6.3 Time Savings

The BI vendors and suppliers frequently mentioned *time savings* as an argument for investing in BI. As time saving is discussed in the literature, many authors claim that IT can deliver great organizational improvements with time savings as a result. Pearlson and Saunders (2004) argue that IT supports employees in their work by reducing the time needed to perform several different tasks. Turban et al. (2007) provide an example of this, by discussing how BI assists organizations in providing capabilities for gathering information automatically, and transform vast amounts of data into less comprehensive, but rich compilations of information that is more relevant for the user. In addition to that Thompson

(2004) adds that, time is saved when only numbers related to the user is displayed. This implies that, with limited information to base decisions on, faster decision making processes can be achieved (Eisenhardt, 1990). Consequently, employees save time, which can be spent on other value-adding activities. Turban (et al., 2007) also discuss how time is saved when distribution of decision support throughout the organization is made more efficient. As they describe, BI has support for sending out information based on subscriptions, schedules, and events (Turban et al., 2007). In Eckerson's (2003) study, 60 % of the companies that participated in the survey reported that time savings was the most essential benefit from BI (Eckerson, 2003). Facts suggests that time savings is a very important argument for implementing BI.

A slightly different context where the aspect of time savings is discussed is the positive effects originating from centralization of data. When data is stored in one single data repository, validated and correct organizational data can be achieved (Miller et al., 2006). A central location for data storage facilitates faster and more informed decision making (Turban et al., 2007). Because when organizations only have one version of numbers to base decisions on, it becomes easier to take collective decisions. As a result, Eisenhardt (1990) concludes that substantial amounts of time can be saved when disagreements and conflicts can be avoided. Furthermore, BI is build upon the concept of extracting and presenting relevant information from several different sources. According to Turban et al, (2007) this functionality of BI also enables fast decision making, consequently resulting in savings of time. Nevertheless, organizations need to be aware of that the ability of making fast decisions can constitute some drawbacks. Eisenhardt (1990) claims that this strategy might lead to reduced quality of the decisions per se. When managers rush decisions, important pieces of information might be left out; hence providing insufficient information for accurate and correct decision making.

When searching for theories regarding the validity of time savings related to IT and BI investments, it was easier to find arguments supporting than disproving this concept. This does not mean that BI automatically saves time. According to Lundberg (2004), it is not just a matter of implementing new tools and systems; IT itself does not grant any added business value. We believe that the system needs to be used in a suitable manner in order for organizations to experience any improvements. A quite interesting remark though, is the fact that time saving is referred to as a tangible benefit in Eckerson's (2003) presentation over benefits of BI. In the same chart, increased efficiency is referred to as intangible, which is a little bit odd, since we noticed that time savings and increased efficiency are closely related.

6.4 Cost Savings

One of the arguments for investing in BI was related to *cost savings*. When reviewing the literature, it became evident that there where both theories supporting and falsifying this claim. Falk and Olve (1996), suggest cost reduction as one of the main reasons for investing in IT. Organizations invest in *rationalizing* systems primarily to reduce costs. Additionally, Falk and Olve (1996) point out that reduced cost could lead to lower prices, which might have a positive impact on the organization's ability to compete. Onliner & Sichel (2000) report that firms have been investing heavily in information technology in effort to reduce costs. Accordingly, some studies have discovered positive effect on intermediate factors such as cost efficiency (Brynjolfsson & Hitt, 1998). In Eckerson's (2003) study, 37 % of the companies mentioned cost savings as a positive effect originating from BI, re-

porting *returns* or *increased revenues* as two examples (Eckerson, 2003). Eckerson (2003) further adds that most returns are the result of *cost savings* enabled by the implemented BI system. Thompson (2004) reports similar results in a report where he investigates a global survey with more than 1,000 participating organizations worldwide about their use of BI. Turban et al, (2007) state that the realized returns often range from 17 % to over 2,000 %, with a median *return of investment (ROI)* of 122 %.

However, even though many researchers claim that cost savings is a reasonable outcome of IT and BI investments, many other researchers question the positive effects originating from IT in general. The productivity paradox points out the frequent failure rate massive IT investments have suffered from regarding their ability to boost productivity. Quite often benefits have been lower than expected, resulting in an on-going debate whether or not IT is worth investing in (Brynjolfsson & Hitt, 1998; Falk & Olve, 1996; Lundberg, 2004). Lucas (1999) on the other hand disregards this belief by emphasizing the important role IT plays in organizations, and defends this opinion by shedding light on the complex nature of measuring the added value IT brings. He stresses that some investments demonstrates traditional returns that can be expressed in monetary terms, but more than often returns from IT investments are indirect and cannot be touched upon. Brynjolfsson & Hitt (1998) supports this by stating that it is indeed very difficult to assess the positive effects from IT, particularly intangible ones, in contrast to how easy it is to calculate the cost of IT. When taking on a slightly different perspective, the importance of cost savings have also been up for discussion. Brynjolfsson & Hitt (1998) reveals strong evidence that managers are not simply making IT investments to cut costs when asked about why they have invested in IT. Instead surveys suggest that customer service and quality consistently rank above cost savings as the prime motivation for making investments.

To conclude, the opinions regarding the legitimacy of cost savings as an argument for BI are scattered. There exist strong theories for, as well as against cost savings. The strongest argument against cost savings according to our opinion is that it is so difficult to measure. We believe that investments in IT cannot be measured as a closed entity, it is not restricted to aid a limited area within an organization and should therefore rather be seen as a tool that support other business processes in the organization. A tool that does not add value by itself, but rather help other processes and activities in the organization to create value. Nonetheless, we believe that the argument for cost savings is credible. Many established theories support this argument and many organizations have reported cost savings as an experienced benefit from BI. If BI is used in a proper way, we are convinced cost savings will be conceived.

6.5 Increased Efficiency

Increased efficiency of processes was one argument arising from the qualitative interviews. Since this argument was closely interrelated with many of the other arguments identified, it became very difficult to support increased efficiency with theories specifically addressing this issue. Historically, increased efficiency and effectiveness have been the main reasons for investing in IT (Falk & Olve, 1996). Pearlson and Saunders (2004) suggest when implementing IT correctly, IT supports people in their work and enables them to focus their time and resources on more value-adding activities; hence increasing operational efficiency. Turban et al. (2007), state that BI systems can solve information gathering problems, and provide users with tools for better analysis of operational data from multiple sources. Related to this, Eisenhardt (1990) claims that analyzing operational information and compar-

ing multiple alternatives can optimize business processes. This is also supported in Eckerson's (2003) study where 55 % of the organizations using BI reported "*more efficient processes*" as a positive effect originating from BI.

However, investing in IT does not automatically generate increased efficiency. Technology needs to be integrated in the existing organization and a clear strategy for how the investment should be used to create business value needs to be developed (Thorp, 2001). Lundberg (2004) argues that it is not just a matter of implementing new tools and systems; IT itself does not provide any business value or increased productivity. Every IT system needs to be used in order to generate any value or increased efficiency. But even with clear goals and strategy increased efficiency is not guaranteed. Implementing an improper IT solution could jeopardize organizations' goals instead of supporting it, (Pearlson & Saunders 2004). Pearlson and Saunders (2004) define a spectrum with two extremes for IT strategies organizations must consider when investing; decentralized and centralized. King (1983) claims that a decentralized IT strategy provides more flexibility compared to a centralized approach. A decentralized approach support individual needs better, as increased level of flexibility results in a solution easier to adjust to different departments and functions. Even though a decentralized approach might be more expensive, the higher cost could be justified by increased productivity (King, 1983).

We could not find many theories that supported increased efficiency of business processes using BI/IT. However, we agree with Thorp's (2001) and Lundberg's (2004) opinions regarding the fact that an implementation of an IT system never increases efficiency by itself. IT should only be seen as a tool organizations use to support and adjust their processes with. Organizations therefore have to take a great responsibility themselves to make sure that they combine efficient processes with suitable IT solutions. Only when this is successfully done, new business value can be achieved through increased efficiency.

6.6 Improved Analytical Capabilities

During the interviews, the companies frequently brought up *improved analytical capabilities* as an argument for investing in BI systems. Eckerson (2003) supports our findings by stating that BI offers easy access to many different types of tools for data analysis. By utilizing already existing organizational data and analytical tools, Eckerson (2003) argues that forecasting capabilities, and the ability to spot trends in customer patterns, can be improved by using BI. Using this insight, organizations can find ways to optimize processes. Falk and Olve (1996) agree with this by highlighting how competitive systems enable organizations to identify changing consumer patterns and introductions of new types of services. On the other hand, Brynjolfsson and Hitt (1998) points out the significance of training business users to utilize systems' capabilities properly, otherwise the business value from an implementation of a BI system cannot be achieved. This implies that user's knowledge about how to use BI may affect the degree of benefits emerging from using analytical tools. The degree of usage is also mentioned by Thorp (2001) as an important aspect for organizations to pay attention to. Thorp (2001) points out that an organization must focus on how they should use their IT investment if they want to create business value. Turban et al, (2007) states that by using the analytical capabilities BI provides, business processes can be analyzed and improved to deliver increased business value in different parts of the organization, for example the ability to analyze and monitor organizational performance. Pearlson and Saunders (2004) claim that by combining different sources of data, plans and actions can be developed to support the organizational strategy and achieve goals. The underlying functionality of BI also indicate its suitability for improving analytical activities in organiza-

tions. One of the core purposes with BI is to compile information from different sources, perform analytical processing on the data retrieved, and then compare the outcome of the analysis against KPIs in order to assure accomplishment of defined targets and organizational strategy (Turban et al., 2007).

An obvious complication with the argument saying that BI will deliver improved analytical capabilities is the implication of the data quality. Turban et al, (2007) remark that if the data being analyzed has poor quality, the quality of the information will be inadequate, and ultimately the capability of analyzing will be pointless. If the data in the data warehouse cannot be trusted, an analysis cannot be based on it – the rule of garbage in, garbage out applies.

To summarize, several theories advocate that BI possess the ability to improve analytical capabilities in organizations. BI is a tool specifically designed to enable analysis of data, monitoring of organizational processes and keeping track of the state of the company. However, the negative aspect brought up by Turban et al, (2007) regarding the significant correlation between quality of data and improved analysis, is an issue that cannot be neglected. When BI vendors and suppliers use improved analytical capabilities as an argument for BI, organizations should ask how they can assist them to secure a high level of quality and accuracy of data when loading the central data repository. In the end, the characteristics of the data will determine the success and credibility of using improved analysis as an argument for BI. On the other hand, we strongly believe that the user friendly interface BI solutions provide will increase users interest in analyzing reports, sales figures and the like. Users that previously apprehended complex data sheets as too difficult to analyze, can now easily analyze the condition of the organization, and trigger actions according to that.

7 Conclusions

This chapter will present the answers to our research question and purpose: what the arguments vendors and suppliers use when selling BI solutions, and find out if they are credible or not. This chapter will also include a discussion, reflections, and suggestions of further research.

Single Version of the Truth: One main argument for investing in BI, and which has a strong foundation in established theories, is the concept of *Single Version of the Truth*. Several researchers say that when data is stored in one central location, validation and verification become easier. Decisions are based on the truth, meaning that the numbers analyzed are the same throughout the organization. Centralization of data into one single location also increases quality and facilitates easy access to information. BI further improves business value by providing the right information, to the right person and at the right time. Nevertheless, single version of the truth has a negative impact on flexibility and fulfillment of individual needs. Our conclusion is that this argument is credible, since we did not find any strong theories disproving this argument.

Control: Another strong argument for implementing a BI solution is *Control*. Many theories support this argument by pointing at an increased level of organizational control as a benefit of BI. The visual interface of a BI system, often represented by dashboards, provides important insights on how the organization is aligned with its strategy, and acts as a control system. Centralization of data results in standardization and a higher level of control, but it also comprise a concentration of decision making. This limits decision making on several different levels in the organization. Our conclusion is that control is a valid argument for BI. Although, organizations should be aware of the impact centralization of control has on an organization.

Time Savings: From our analysis we conclude that *Time Savings* is one of the strongest arguments for BI when reviewing theory. BI delivers great organizational improvements with time savings as a result. Time needed to perform different tasks is reduced when information is automatically gathered. A central location for data storage facilitates faster and more informed decision making. On the other hand, organizations need to be aware of the risk of making rushed decisions, that are not based on sufficient information. Our conclusion is that time savings is a valid argument for BI.

Cost Savings: The argument of experiencing *Cost Savings* as a result of implementing BI is supported by theory. Organizations say they invest in BI in order to reduce costs and increase revenues. Numerous studies show that companies mention cost savings as a positive effect from BI. Nonetheless, some theories disregard the importance of IT by referring to the fact that benefits from IT investments are many times lower than expected. An opinion, opponent researchers' stress is a result of the difficulty of measuring the added value IT brings. Our conclusion is that cost savings is fairly credible.

Increased Efficiency: This argument, *Increased Efficiency*, is closely interrelated with many of the other arguments, which makes it especially difficult to support with theories. When implemented correctly, BI increases operational efficiency by supporting people in their work, and enable them to focus time and resources on more value-adding activities. BI does not automatically generate increased efficiency by itself; organizations have to use the system in an appropriate manner to realize the benefits of increased efficiency. Our conclusion is that increased efficiency is vaguely credible.

Improved Analytical Capabilities: Finally, *Improved Analytical Capabilities* is the last argument we identified in our interviews with the five companies. BI offers easy access to many different tools for data analysis that provides improved forecasting capabilities and increased ability to spot trends in customer patterns. Increased ability to analyze and monitor organizational performance is also enabled by BI, thus resulting in optimization of processes. However, it is vital that business users are trained to utilize the capabilities of the analytical tools, otherwise benefits emerging from using such tools will not be achieved. Furthermore, complications exist with assuring the quality of the input to the central data repository. If the data is not accurate, analytics on such information becomes pointless. Our conclusion is that improved analytical capabilities is credible in the sense that BI is an analytical tool, and has proven to offer those services, however this tool is only as credible as the quality of the data stored in the data repository.

To summarize, a single version of the truth, control, and time savings are credible arguments for investing in BI. Furthermore, cost savings and improved analytical capabilities are fairly credible, whereas increased efficiency has least credibility when analyzed against theories. In general, we believe that the ability to gain from these positive effects from BI, organizations have to take an active role in realizing these.

7.1 Discussion

- The sales techniques used by the vendors and suppliers when presenting the arguments, many times comprised building up scenarios by describing common problems organizations suffer from, and then simply finish off with insinuating or saying that BI solves these problems. As a result, many of the arguments were implicit and very difficult to identify.
- Our empirical findings include some aspects that we consider not directly linked to the concept or phenomenon of BI. Arguments such as *improved relationship to customers* and *loyalty* lack the foundation to be general and strong arguments for investing in BI. We believe organizations that read this thesis might be able to identify statements in our empirical findings that we have not considered arguments for BI, but can be beneficial and of use for their organization. Further, the respondents mention that they often use reference customers to convince new customers to invest in their BI system. At that stage, we assume that the customer has already decided to make an investment in BI but not chosen which system to implement. As of this, we believe that it is not in line with a general argument for investing in BI. Therefore, we conclude that this is not relevant for this thesis in order to fulfill our purpose and answer our research question.

7.2 Reflections

- When identifying and analyzing the arguments from the interviews, we immediately acknowledged the complexity present. Many of the arguments were very abstract and demanded a high level of interpretation from our side in our process of highlighting and categorizing them. Most of the arguments were closely interrelated and had many cause and effect relationships between them, which made it particularly difficult to separate them from each other. Due to the high level of interpretation present in this thesis, we find it likely that a slightly different outcome of the analy-

sis of the arguments could have been possible if the study was to be replicated by another researcher.

- Additional theories that we did not know exist, could most likely have contributed with valuable input to this research if included in the theoretical framework. However, we have done our best to build up our theoretical framework with theories from famous and established researchers within the area of IT and BI.
- Instead of breaking down the arguments into six separate arguments we could have analyzed them as an entity, perhaps resulting in a slightly different analysis. Nevertheless, we found it appropriate to discuss and analyze each argument separately against theories, in order to highlight their respective credibility.

7.3 Further Research

- It would be interesting to study an organization that has implemented a BI system, and through a case study examine the outcome to determine whether or not the BI vendors and suppliers' arguments were realized or not.
- Another approach could be to compare two organizations that have implemented a BI system, one that has been successful and one where the implementation has failed, to find critical success factors and reasons for failure.
- During the interviews, we found that the vendors of BI solution used different approaches when selling their systems. A suggestion for further research is a deeper analysis of sales strategies used when selling BI systems, with the aim to describe the different strategies used and when one is more preferable than another.
- Another aspect would be to conduct a study similar to our's, but using quantitative methods when collecting and analyzing the empirical findings, and thus see what the results would be with a larger sample size.

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