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Business Intelligence Systems

Assessing the benefits of business intelligence use within an organization

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Business Intelligence Systems: Assessing the benefits of business intelligence use within an organization

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Abstract:
The Business Intelligence (BI) systems are increasingly becoming an important piece of the puzzle for the success of organizations. That being so, it is important to acknowledge the benefits that can be obtained from the use of such systems. Furthermore, for those who hesitate in investing in BI systems this research presents how the organizations operating in different business fields are using the BI systems in practice as a part of their business operations. In order to carry out such overview, the authors of this master thesis have based their study on a previous research that proposed a limited number of benefits and their grouping into four categories based on mathematical calculations. Subsequently, the authors are doing qualitative research on the use of BI systems and the benefits that can be achieved from its use on an organizational level. Furthermore, the findings from the research are presented in the context of interpretation of how the BI systems function in organizations, as well as assessments on obtaining the proposed benefits from the use of such systems. Finally, the authors are discussing their observations and impressions regarding the empirical results obtained through means of qualitative research method.

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1 Introduction

The Business Intelligence (BI) systems are information systems whose purpose is to secure a conversation of unintelligible input data into understandable information that can be used as a base for decision-making (Rouibah & Ould-Ali, 2002).

Going back to the history, the earliest "Business Intelligence" term was brought by Richard M. Devens (En.wikipedia.org, 2017). In his book Devens (1868) has explained the way of how a banker Sir Henry made money by gathering information about the environment around him and by acting upon that information. Fast-forwarding to year of 1958, the IBM researcher Hans Peter Luhn explained the term of "Business Intelligence" in the Webster's dictionary, while in 1989 Howard Dresner used the term in order to describe the concepts and methods that can improve the business decision-making through the use of fact-based support systems (En.wikipedia.org, 2017).

Nowadays, the BI systems can bring competitive advantage to the companies over their competence (McAfee et al. 2012), and also they can support company's future decisions (Rouibah & Ould-Ali, 2002; Griffith et al. 2008; Azvine et al. 2006; Watson & Wixom, 2007; Hočevar & Jaklič, 2008).

1.1 Background

The radical changes in the business environment forced the need for using management tools and technologies that provide comprehensive, fast, and effective use of all available data, which can ease the management of the companies (Kandampully & Duddy, 1999). Having said this, we can declare that the radical business environment changes are forcing the companies to use their available potential and resources as much as possible. The competitive dominance of the companies in most markets and industries is obtained through the application of innovations (Kandampully & Duddy, 1999). Nowadays, if a company wants to learn about its opportunities for future growth and development, on which basis a high-quality business strategy would be developed, should be able to collect all available and relevant information (Hočevar & Jaklič, 2008). In fact, the proper use of data may change the faces of the traditional businesses, offering them great opportunities to gain advantages over their competitors (McAfee et al. 2012).

Seeing that the companies' competitiveness in the global marketplace increasingly depends on the information technologies (Powell & Dent-Micallef, 1997), every company should try to make some improvements in that sector. With the introduction of the strategic management field, strategy researchers and strategic management, the users are showing higher interest in the role of information technology in the process of strategy formulation and implementation, as well as in its implications on the financial performance of the companies (Sabherwal & King, 1991). In this context, the general acceptance of BI could bring a competitive advantage

to the companies through the deployment of a significant number of benefits (McAfee et al. 2012).

BI is a strategic approach for organized targeting, tracking, interacting, and transforming some weak signals into an actionable information that could be used as a base for decision-making later on (Rouibah & Ould-Ali, 2002). From the information aspect, BI is a very complex information system that uses the automated way to collect data from various sources, e.g. internal sources, supplied by external sources or business partner (Watson & Wixom, 2007). Moreover, this information system transforms, integrates and process the data in order for high-quality information to be delivered to the users (Michalewicz et al. 2006). Having said this, the application of BI systems could bring companies information that could be helpful for their future performance.

The new information technologies enable storage of large amounts of data in data warehouses (Chaudhuri et al. 2011), their analysis and transformation (Michalewicz et al. 2006), with final aim to obtain information that will serve as decision support (Griffith et al. 2008). The scope of the data available is continuously increasing because of the constant growth of the existing data warehouses, the increase of computer processing capacity, the increase of database access from the companies, and the expansion of Internet search engines (Baker et al. 2009).

1.2 Problem Area

The BI seems to be relatively new Information Systems (IS) discipline, on which an intensive development based on the current IT knowledge should be applied. Petrini & Pozzebon (2009) argue that after years of systematic investment in bringing in place a technological platform that will bring a lot of benefits, most organizations came to a point where the use of tools to support the process of decision-making at the strategic level appears to be more important than ever. For this reason, BI could contribute to the success and stability of the company, by giving, as McAfee et al. (2012) argue, the wide range of benefits that can serve as an advantage over the competitors.

Academic literature on BI suggests the wide range of benefits that can be derived from the use of BI systems (Thomas Jr, 2001), however, in practice it is a different story. The use of BI within the organizations does not always result in gaining improvements. Côrte-Real et al. (2014) argue that the use of BI systems and tools sometimes can result in a loss of huge amount of money rather than improving their performance. On account of this, Yeoh & Koronios (2010) state that the most common issue that leads to failure of BI initiative is when the expectations from its use do not fulfill the core objectives of the business, thus it does not align with the business vision. The BI systems demand a lot of resources, but the benefits that occur from its use are not always as expected (Rouhani et al. 2012). The previous statement makes assessing the benefits from the use of BI systems an interesting topic for conducting a research on. Moreover, besides for further and deeper investigations of benefits from the use of BI systems, this research will help companies to perceive the reality regarding the benefits that can occur in different business fields.

1.3 Research Question

Since the use of BI systems within companies could be support for their sustainability (Petrini & Pozzebon, 2009), the research question of this thesis is:

" *What are the benefits of business intelligence use within an organization?* ".

There are a number of researches that indicate the existence of a wide range of benefits that occur from the use of BI systems (Antia & Hesford, 2007), but without validation from empirical data collected through academic research (Elbashir et al. 2008; Petrini & Pozzebon, 2009). That being so, we will make our contribution to academia by conducting a qualitative research from which we are going to draw conclusions on what is actually happening in the practice.

1.4 Purpose of Research

The main purpose of our research is to present benefits that companies have achieved by using the BI systems. In fact, the BI systems are securing a transformation of the incomprehensive data as an input into comprehensive information as an output which can be later used in the decision-making processes (Rouibah & Ould-Ali, 2002).

Therefore, the first objective of this research is concerned to assessing the benefits that could appear from the use of BI systems within companies. This research will point out the possibility of the appearance of those benefits in the companies from different business fields. The BI systems request a lot of resources in order to be used, and often the benefits obtained from their use are hard to be precisely defined (Rouhani et al. 2012). Sometimes companies can lose a huge amount of resources from the use of BI systems rather than improve company' performance (Côrte-Real et al. 2014).

The second objective of our research is to portray how the BI systems are being used within companies. Through our selected research method, our intention is to make the use of BI within different companies as transparent as possible to readers of our thesis. At the beginning of the second chapter we are doing theoretical elaboration and consideration of the basic fundamentals and features of BI systems that are the important part of fulfilling our objective.

At the end, our research will make several contributions:

1. An exploration study involving assessments from BI practitioners on benefits identified in academic literature;
2. It will provide a presentation of the actual reality on occurrence of benefits from the use of BI systems within organizations, to organizations that hesitate to invest in BI systems;
3. It will provide insights into how organizations that are operating in different business fields and that are different in sizes use BI systems and tools in their business operations.

1.5 Delimitations

This thesis is delimited to studying several benefits defined in a previous scientific research, which organizations can achieve by using the BI systems. However, our research does not evaluate current BI systems that are being used within organizations as the part of their business operations nor does it measure performances of BI systems within such organizations. Moreover, we are not studying software and hardware specifications because we believe it is out of scope for our study. Hence, the thesis will focus on benefits achieved by organizations from the use of BI systems rather than technical challenges of implementation or development of current BI systems.

2 Literature Review

The effective and real-time business information could be important for the future performance of the companies. Therefore, BI systems are trying to detect all the shortcomings in a company through analyzing of the available real-time data and delivering business insights and indications in real-time at the point of decision-making, which is very important for the existence of the companies (Azvine et al. 2006; Watson & Wixom, 2007). Gaining competitive advantage in the changing conditions of business fields nowadays is increasingly a result of the implementation of new technological innovations and their use in business processes (Ireland & Webb, 2007; Ngwenyama & Bryson, 1999).

2.1 Business Intelligence

Hočevar & Jaklič (2008) argue that the need for information led to changes in the process of making a decision in the companies. Managers, who aim to retain as well as gain their company's edge over its competitors, cannot and should not rely solely on their intuition anymore (Hočevar & Jaklič, 2008). With ever-increasing competition and the expeditiously changing customer needs, the decision-making managers are not anymore truly convinced with the anticipated analytical reports, key performance indicators (KPIs), nor fixed dashboards (Azvine et al. 2006). Thus, the decision-making should be supported by information about events within as well as out of the company (Hočevar & Jaklič, 2008). Because of this, a company is required to have an information system that will enable managers access to the necessary information, in order to provide the effective business decision (Watson & Wixom, 2007; Hočevar & Jaklič, 2008). No matter what type of data is being processed by company's information systems, the goal is most commonly the same - the information that the user receives from the system should be of high-quality (Fisher et al. 2003; Hočevar & Jaklič, 2008). Hočevar & Jaklič (2008) argue that information, apart from being of high-quality, includes accuracy, clarity, and timeliness. The significance of the information, whether it is good or bad, can be determined from the value of a good or bad decision that is based on the very same information (Hočevar & Jaklič, 2008).

In order to ensure the high-quality basis for making a decision (Watson & Wixom, 2007), large amounts of data need to be turned into useful information (Negash, 2004; Hočevar & Jaklič, 2008). Thereby, the ability to convert large amounts of fuzzy data into useful information is very important (Hočevar & Jaklič, 2008). One of the technologies that allow conversion of large amounts of data into useful information are the BI systems (Hočevar & Jaklič, 2008). Moreover, the BI systems are used for understanding the business capabilities, trends and future directions on the markets, supported by information technologies and business surrounding in which an observed company operates (Negash, 2004). A real novelty that is offered by the BI systems is its ability to present business information in a quick, simple and efficient manner so that users can easily understand the logic and the meaning of the investigated information (Chen et al. 2012). Having said this, the users would use a wide range of analytical tools, concepts, and approaches to maximize the business value.

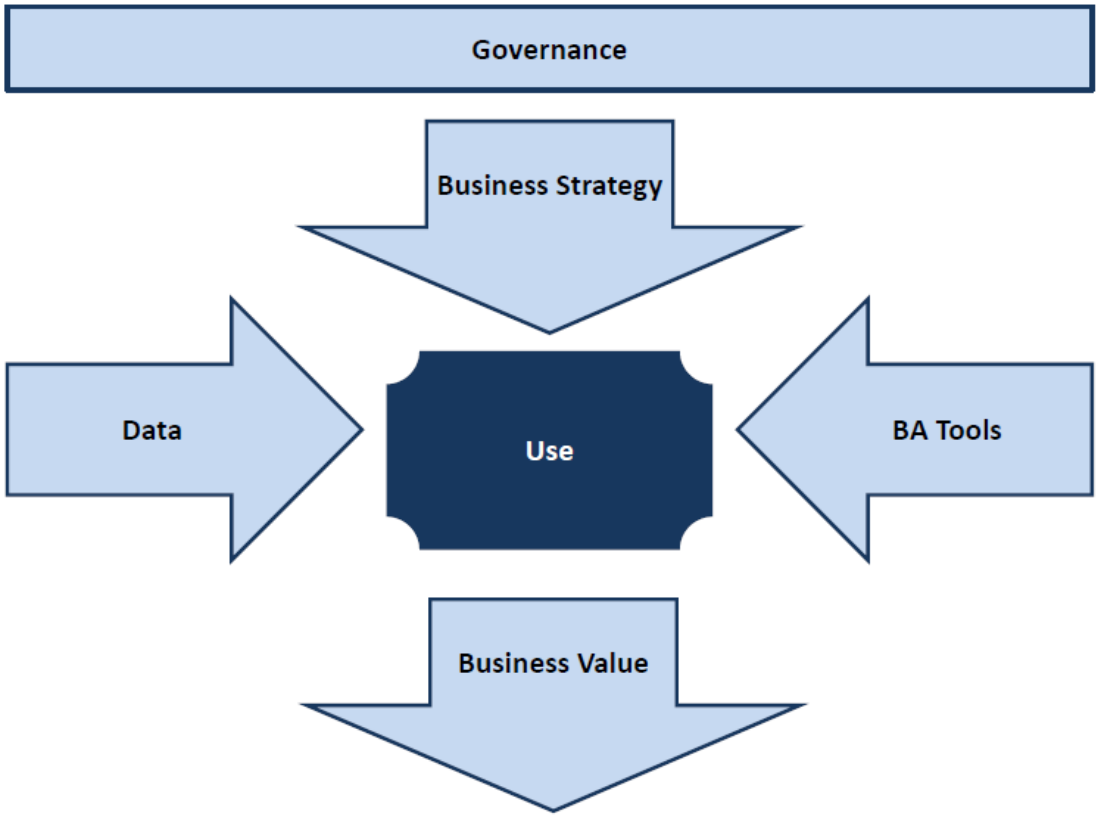

Figure 2.1: Business Analytics Model (Wixom et al. 2013)

Furthermore, the BI systems can offer certain competitive advantages (McAfee et al. 2012), because it provides greater functionality with regard to the access data and analytics (Michalewicz et al. 2006). However, on another hand, the use of the BI systems within a company requires a lot of resources and often would be very difficult to precisely define the benefits that will be obtained from its use (Rouhani et al. 2012).

There are several definitions for what does BI systems represent, and these definitions vary not only depending on the author, but also from the standpoint of which this term is observed. Thus, according to Negash (2004), BI system is an architecture and collection of integrated operational applications that try to understand the company position, customers, and its competitors, and the main aim of this architecture is to serve as a base for decision-making. Furthermore, according to Chaudhuri et al. (2011), the BI system is a set of decision support applications and technologies for the enterprises with the aim to enable chief executives, managers, and analysts to make accurate and fast decisions. According to the aforementioned, the BI definitions indicate that BI systems include the process of collecting available internal and external relevant data and then translate it into useful information that could help the users in making decisions.

The awareness of the benefits that come from the use of BI systems in the complex business environments is obviously growing day by day, and therefore the need for the introduction and application of such information systems, specifically the introduction of tools and systems for BI, would enable the use of this discipline in practice. The BI tools should enable the business users better overview through analysis of huge amounts of complex data (Ranjan, 2009). Then, the business users determine insights from that data and produce decisions by

which they fix crucial and critical business problems, producing a big spectrum of tangible and intangible business values (Wixom et al. 2013).

An important assumption of the application and the use of BI systems could be that the consumers express their preferences depending on the type of information they want to receive, the frequency of information, and methods of communication through which that information is being received. These are several main features of BI:

- Monitor the performance of the company (Brynjolfsson & Hitt, 1996);
- Ability to provide quality and real-time information for higher levels of management (Watson & Wixom, 2007);
- Support the strategic activities such as decision-making, planning, and forecasting future trends (Negash, 2004);
- Collecting, analyzing and integrating external and internal data, defining the dynamic profile of the key performance indicators (Azvine et al. 2006); etc.

2.1.1 Basic Business Intelligence Components and Architecture

The system architecture of the business intelligence is presented in the Figure 2.1.1 below in this section. According to Ong et al. (2011), the BI structure consists of five main components: Data Source layer, ETL layer, Data Warehouse layer, End User layer, and Metadata layer.

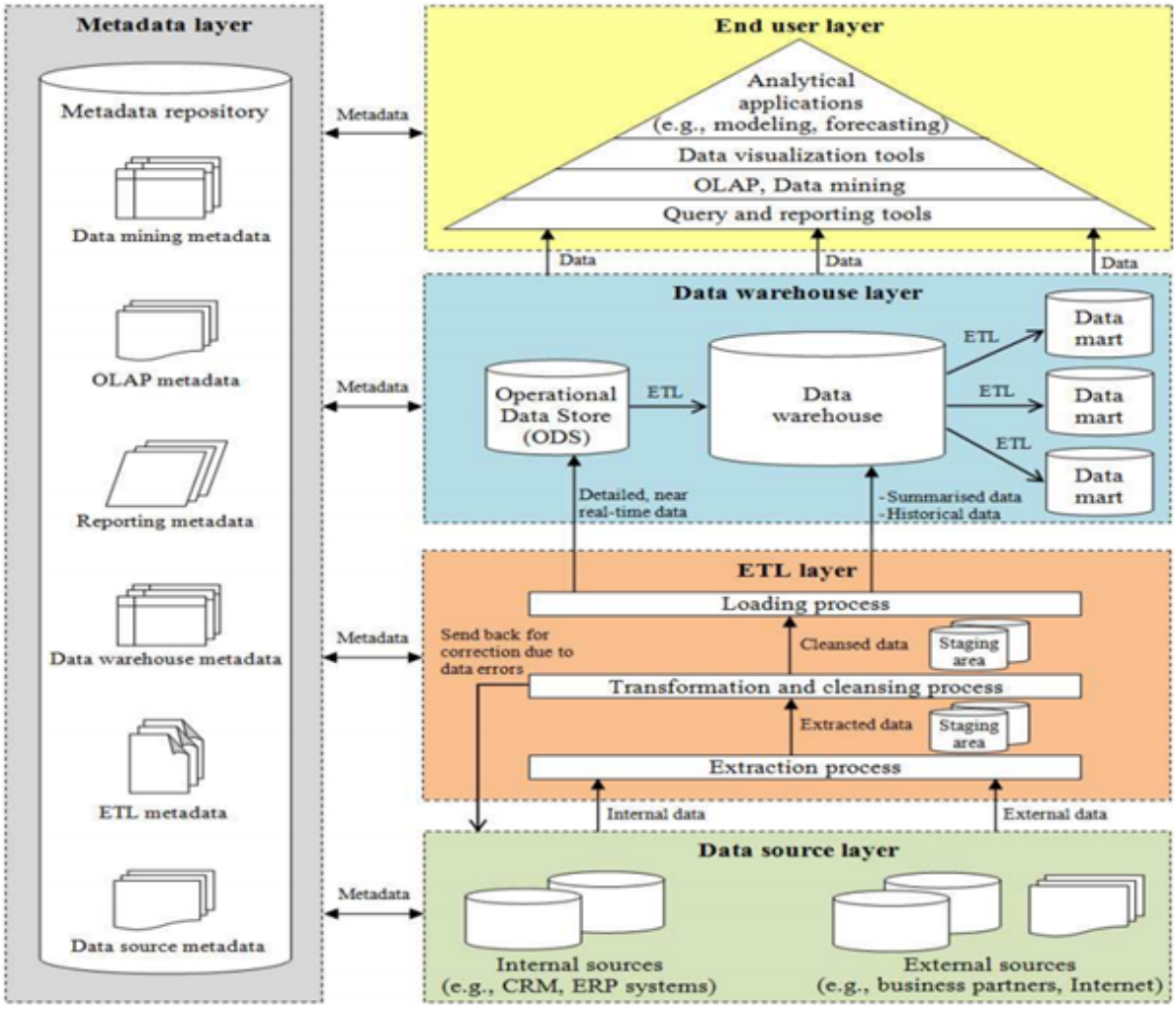

Figure 2.1.1: Business Intelligence Architecture (Ong et al. 2011)

2.1.1.1 Data Sources

In the first stage, it is necessary to integrate data stored in a variety of internal and external sources of the organization (Negash, 2004). Having said this, we can conclude that generally the data collected is divided into two types, namely, *internal data* and *external data*.

As it can be seen from the Figure 2.1.1, Ong et al. (2011) show that the sources could be external and internal. The external data sources are those who operate in business partner environments, the Internet or in other circumstances, while the internal data sources are those that belong to the user and such systems could include finance, legacy, CRM and ERP systems (Ong et al. 2011). Essentially, a great effort is required in order to unite and integrate these various data sources.

- *Internal Data Sources*

The internal source of data is information collected from different operational systems within one organization (Imhoff et al. 2003). For instance, internal data sources combine data related to customers, products, and sales (e.g. purchases, transactions, re-orders, etc.) (Ong et al.

2011). By making a literature review, a variety of important internal data sources are mentioned: ERP systems (Negash, 2004), CRM systems (Imhoff et al. 2003), etc.

Customer Relationship Management (CRM) system is a system in which the client is placed in the core of the business processes (Hendricks et al. 2007), where the implementation of CRM best practices are the key factors for gaining customer loyalty as an integral part of successful business (Foss et al. 2008). CRM is actually a system that observes and studies the behavior of the clients, thus providing proper guidance to better customers service and improvement of the relations with them (Peppard, 2000; Imhoff et al. 2003).

The behavior of the client is in the focus of modern companies CRM systems (Imhoff et al. 2003; Hendricks et al. 2007). Nowadays, the CRM systems are a synthesis of multiple functionalities such as: sales, management, marketing and communication with consumers as the main feature, where these functionalities are also used as methods for data accumulation (Sheth et al. 2000; Jancic & Zabkar, 2002). CRM systems also include market research, development and management, testing different products, advertising, sales analysis and analyzing the behavior of users as well as communication channels, telemarketing, call center, etc. (Foss et al. 2008). Having said this, we can advocate that in the CRM systems, various aspects of system communications are implemented in order to accumulate more data from the customers, where these data would be used by the BI systems within the companies to achieve better relations with the customers.

Enterprise resource planning (ERP) as a company integrated system, it provides management of commercial functions within the companies such as: planning, inventory, materials management, procurement, production, finance, accounting, human resources, marketing and sales (O'Leary, 2000). This system should provide easy and simple ways of recording and monitoring of the business processes in a modern company. The advantage of ERP system could be a better functionality, flexibility, adaptation (customization), the connection of all modules and numerous predefined reports and the ability to create new reports in different programs such as Word, Excel, etc. An important thing offered by the ERP systems is the use of a single database for all individual modules (Imhoff et al. 2003).

- *External Data Sources*

As well as the internal data sources, companies can also use external data sources in order to supply their needs for data. There are some examples of external data sources: business partners, the Internet, etc. (Ong et al. 2011). However, a company that uses external data sources should be confident with the validity and reliability of those data sources (Sørensen et al. 1996).

2.1.1.2 Extract-Transform-Load (ETL)

This component of the BI architecture is focused on three processes in which the data is extracted from the sources, transformed into usable data, and loaded into the data warehouses and data marts (Baars & Kemper, 2008). According to Ong et al. (2011), this BI component is very important because the quality of the data depends on those three processes. In this manner, we can conclude that this layer could be the most important one because it plays a mediation role between the source layer and the data warehouse layer.

- *Extract*

The extract is the first process of an ETL layer. It this process, the data derived from the source systems is extracted (Ong et al. 2011). This process could be considered as the most important one within the ETL systems because the success of the following process would highly depend on how good the data was extracted.

- *Transform*

Transform stage of the ETL layer applies a variety of rules and functions to previously extracted data in order to prepare that data for the next process, that is loading (Ong et al. 2011). However, in some cases, there is no need for data transformation, so in that case the data only pass through the transformation process.

Another important function of the transformation process is the cleaning of the data. The main aim of this function is to pass well-structured data to the next process (Ranjan, 2009).

- *Load*

The last stage of an ETL layer loads the data into the data warehouse (Vassiliadis, 2009). Having said this, the data should be then stored in the data warehouse.

2.1.1.3 Data Warehouse and Data Marts

Ong et al. (2011) argue that this layer consists of three components: operational data store, data warehouse, and data marts. Using the tools for extraction and transformation, the data collected from different sources is stored in databases that are designed to support the analysis (Vassiliadis, 2009), Numbers of companies are experimenting with different existing database technologies to set up data analysis like in-memory and in-database processing solutions, traditional warehouse structures, streaming engines, etc. (Watson, 2014). The data warehouses or data marts are categorically intended to play "sandbox" role for data specialists in order to allow them to make data experiments (Buytendijk, 2014). The main role of data warehouse is to provide decision-support for higher hierarchical levels of management through specifically structured analysis of data (Watson & Wixom, 2007).

In order to bring better functionality, the data warehouse should be in a constant touch with the environment, because the information coming from the data sources could be important for finding, analyzing and evaluating data that are put in decision-making. However, to have complete insights into the business processes the most important data would be the one that indicates changes. Therefore, a historical data is required in order something new concerning to the business and its processes to be discovered (Negash, 2004). Despite historical data, an external data comes also from the business environment (Ong et al. 2011), which is stored in the data warehouses and then using the analytical and statistical methods these two different data sets are processed and presented in the form of reports (Chaudhuri et al. 2011) or they could be applied to the automated decision-making software. From what is previously written, the data in the form of reports can be highly used for decision-making by the top management.

2.1.1.4 End User

The pyramid (End User layer) in Figure 2.1.1 shows all the tools present in this layer. These tools are grouped hierarchically in a pyramid according to their level of comprehensiveness

on which the data is being processed and represented (Ong et al. 2011). The following tools are part of the End User layer:

- *Query and Reporting Tools*

These are very useful tools that can be used for fast query data access (Ong et al. 2011). According to Ong et al. (2011), these tools can also be used for producing reports by using standard reports, ad hoc reports, metadata reports and budgeting and planning reports.

- *Online Analytical Processing (OLAP)*

This term represents a technology for fast, consistent and interactive approach and manipulation of multidimensional data, collected from different sources and stored in data warehouses (Chaudhuri et al. 2011). The main aim of OLAP tools is to process the data stored in the data warehouses and give an overview of a large amount of information. This processing can be done by performing calculations, finding problem areas, checking of assumptions and plans as well as performing some other analysis through operations such as filtering, aggregation, pivoting, roll-up and drill-down on the multidimensional view of the data (Chaudhuri et al. 2011). Knowing that they are intended for interactive use, the primary requirement for these applications could be the speed.

The OLAP technologies are becoming more popular segment of information systems (Negash, 2004), especially in the medium-sized and large companies. By their application, an order and consistency of the actions for complex analysis and reporting could be introduced. OLAP servers enable sales forecasting, what-if analysis, analysis of the product and its profitability, marketing analysis, etc. (Hoobs, 2007). These features can be "calculated" from historical data, i.e. data collected previously (Negash, 2004). As a result of the possibility of doing heavy calculations, OLAP servers could transform historical data into useful predictive information (Reddy, 2010). For this reason, it is important to create analytical operations that will use historical data that can be converted into predicate information that can support the companies in decision-making (Reddy, 2010). There are several OLAP tools:

- Relational Online Analytical Processing (ROLAP);
- Multidimensional Online Analytical Processing (MOLAP);
- Hybrid Online Analytical Processing (HOLAP). (Chaudhuri et al. 2011).

- *Data Mining*

Data mining is a set of activities that are used for finding new, hidden, and unexpected models from investigated data that is then used to develop rules (Griffith et al. 2008). Data mining can also be viewed as a set of analytical techniques that analyze large amounts of data collected from various sources (Chaudhuri et al. 2011). Having said this, using data mining techniques and tools, useful information can be obtained which later can be used within the companies for better decision-making (Fayyad et al. 1996). Also, with the help of data mining tools, future trends and behaviors could be predicted.

The data mining has two main aims. The first main aim of data mining is to enable data driven decision-making through creating a model for forecasting from segmentation of the observed objects into separate groups and value estimation of the observed objects (Provost & Fawcett, 2013). The second aim of data mining is to allow the companies to better understand what is happening in their business environment (Fayyad et al. 1996).

- *Visualization*

The performance of the companies could be improved by understanding their customer needs. In this way, the companies could offer exclusive solutions for their clients, after the understanding of the analyzed data collected strictly from their customers. An example of an instrument used for understanding the customer needs is the introduction of HTTP-based 1.0 web systems (Chen et al. 2012). This instrument allows organizations to promote their businesses, but in the same time they indirectly interact with the customers and collect their information such as logs and cookies that are a source of understanding the customer needs (Chen et al. 2012).

A lot of tools for data visualization can be found whose purpose is to help the companies to better understand the analyzed data. Those visualization tools offer a user-friendly data overview that gives an advantage to the people that are supposed to make business decisions according to what has been discovered from the analyzing of data. In this context, software solution like Tableau Public has been used for a long time as a driving force for "learning" from data that has been visualized (Kosara & Mackinlay, 2013). From the statement given by Kosara & Mackinlay (2013), we can conclude that the authors want to say that the visualization tools should be interactive with, and attractive for the users.

- *Analytical Tools*

According to Ong et al. (2011), at the top of the End User pyramid are the analytical tools. These tools are similar to OLAP, as they provide sales forecasting, what-if analysis, analysis of the product and its profitability, marketing analysis, etc. (Popovič et al. 2009). Applications that are equipped with analytical capabilities can improve the performance of users' business operations (Ong et al. 2001). Therefore, we can say that end users can obtain great benefits by using analytical tools.

2.1.1.5 Metadata

As it can be seen from the Figure 2.1.1, the last layer of the BI system is metadata repository (Ong et al. 2001). Every well-designed BI systems should have metadata layer included (Ong et al. 2001). This layer should help users to store and standardize their metadata within different systems. By possessing well-structured metadata users can have better overview of the data flow within their BI environment (Pant, 2009). Given these points, we can conclude that the metadata layer is equally important as the other layers in one, well-designed BI system.

2.2 The Use of Business Intelligence

The organizations are not enough using their greatest strategic resource - the data (Davenport et al. 2012). The consequences of this poor exploitation of data resources could include poor returns from IT investments and unsatisfied end-users, which could be the reason why many companies hesitate to invest in BI systems.

Reinschmidt & Francoise (2000) argue that the effectiveness of the BI systems to a high extent depends on how they are integrated into activities that engage the end-user. This means that the end-users should have an access to the information to the required information in the format that will fulfill their needs (Ranjan, 2009). Having said this, the BI systems would re-

spond to the end user needs by granting them with an opportunity to manipulate with its driven information.

2.2.1 The Companies' Need For Use of Business Intelligence Systems

Possessing the right information in today's business environment is a major prerequisite for the survival of organizations in the current turbulent environment (Hočevar & Jaklič, 2008). However, the companies very often lack the right information that should be used as a base for future decision-making (Hopkins et al. 2009). Besides for decision-making, the BI systems should also allow the companies to identify their issues on time so that they can focus on eliminating the causes instead on solving the consequences. The elimination of causes can be done when the right information is delivered at the right time to decision-makers (Watson, 2015).

If we focus on the requirements coming from the market conditions, the need for using BI systems within organizations should be primarily intended for keeping the existing and finding new customers. In customer relationship management context, the BI systems are intended for analytical processing of data on customers and their behavior with the aim to optimize the relationships with the customers by maximizing their satisfaction, thus enhancing their loyalty (Hočevar & Jaklič, 2008). Hočevar & Jaklič's (2008) statement would mean that the companies should put some efforts in order to keep their loyal customers. In a situation of high competence and energetically changing customer needs (Azvine et al. 2006), the companies can easily lose their loyal customers. As an overall assumption, we can say that if a company succeeds in keeping its loyal customers that would be an indicator that the business is going in the right direction.

2.2.2 The Expectations of Business Intelligence Systems

The lack of data is not a problem for the companies anymore, the problem is how to get the right information that will help the company in making decisions that will increase the revenue and reduce costs (Hopkins et al. 2009). The main objective of the BI systems is to collect (Watson & Wixom, 2007), and then analyze the collected data (Ranjan, 2009) so that useful information will be extracted which will help in making proper and efficient business decisions. The BI systems also allow monitoring of the achievements of the company in real-time (Brynjolfsson & Hitt, 1996), so the information is available when it is necessary. This would shorten the time for making operational and strategic decisions.

The expectations of the BI systems are related to almost all areas of business operations (Elbashir et al. 2008). Namely, it is expected to positively impact the optimization of inventory levels, marketing, introduction of new products, to better focus on customers, increasing competitive advantage, increasing of revenues, and everything concerned with achieving organizational, business partners/suppliers relation, internal process efficiency, and customer intelligence in terms of benefits (Elbashir et al. 2008). With the faster development of the BI systems and tools the power of information produced by the BI enables advanced decision-making processes (Hočevar & Jaklič, 2008), which will perform most routine employee tasks, thus much more time will remain so that the employees can use that time for making better and accurate decisions. It is obvious that the companies have a lot of expectations from the use of the BI systems, but according to Elbashir et al. (2008), the most important expectations of investing in BI systems in terms of expected benefits are:

- To secure organizational benefits;
- To improve the business supplier/partner relation;
- To secure efficiency of the internal processes;
- To receive customer intelligence insights.

2.3 Benefits of Business Intelligence

The BI infrastructure organizes and presents the information in a way in which the users could have insights from its use, which could help in future when actions should be taken. In the process of making a literature review about the topic "Benefits of Business Intelligence Systems" there is wide range of benefits given by different authors.

B1: Improved customer service;
B2: Improved efficiency of internal processes;
B3: Increase staff productivity;
B4: Reduction in the cost of effective decision-making;
B5: Reduced operational cost;
B6: Reduced inventory levels;
B7: Reduced marketing costs;
B8: Reduced customer return handling costs;
B9: Reduced time-to-market products/services;
B10: Reduction in the cost of transactions with business partners;
B11: Improved coordination with business partners/suppliers;
B12: Improved responsiveness to/from suppliers;
B13: Increased inventory turnover;
B14: Increased efficiency of utilizing assets;
B15: Increased value of assets;
B16: Leverage the advantages of IT upgrades, improvement;
B17: Increased revenues;
B18: Reduction of lost sales;
B19: Increased geographic distribution of sales;
B20: Enhanced profit margin;
B21: Increased return on investment (ROI):
B22: Improved competitive advantage.

Figure 2.3.1: Benefits from the use of BI systems (Elbashir et al. 2008)

However, as it can be seen from Figure 2.3.1, Elbashir et al. (2008) have proposed twenty-two benefits that could be achieved by the use of BI systems. The authors have divided those twenty-two benefits into four groups of benefits (or factors as they call them): organizational benefits, business supplier/partner relation benefits, internal process efficiency benefits, and customer intelligence benefits (Elbashir et al. 2008). However, for the purpose of our research, we have used twenty out of twenty-two benefits originally included in Elbashir et al.'s (2008) research, as we thought that *Increased inventory turnover* and *Increased value of assets* benefits are either similar to the other benefits or hard to be assessed from our respondents. Rouhani et al. (2012) argue that the implementation and use of BI systems requires a lot of resources, and often it is very hard to define precisely the benefits that can be obtained from its use.

Due to the increasingly high applicability of BI systems within organizations, the benefits obtained from the use of BI systems can be numerous. Antia & Hesford (2007) argue that a number of studies indicate the existence of variety of benefits that can be obtained from the use of BI systems, but according to Elbashir et al. (2008), most of them are not validated with empirical data collected through research. Finally, we have grouped these twenty benefits we included in our research into four categories, and that is in align with how Elbashir et al. (2008) categorized them in their research:

- Organizational Benefits;
- Business Partner/Supplier Relation;
- Internal Process Efficiency;
- Customer Satisfaction

2.3.1 Organizational Benefits

Under the group of Organizational Benefits, Elbashir et al. (2008) have included following business benefits:

- *Increased revenues/services provided*

Increasing the revenue for the companies could be produced as a result of the use of BI systems which, according to Ranjan (2009), analyze data from delivered from the data sources, e.g. brands, customers, distributors, etc. Increased revenue could be achieved in long term by using BI (Hočevar & Jaklič, 2008; Thompson, 2006; Carver & Ritacco, 2006).

- *Reduction of lost sales/lost services provided*

BI systems could be used to identify hidden costs or missed opportunities (Gibson et al. 2004) and can find all shortcomings within a company (Watson & Wixom, 2007). Based on those conclusions the resources could be allocated to fix or produce highly profitable products or services, thus increasing the profitability of the company. Also having a clear overview of these activities can help in effective monitoring of the resource costs.

- *Increased geographic distribution of sale/services provided*

With the ability of the BI systems to segment and cluster the customers (Elbashir et al. 2008), according to how big is the number of the customers in a given geographical region, the geographic distribution of sales could be increased.

- *Enhanced profit*

Nowadays, the companies could become more profitable thanks to the use of BI systems. While in the past, many departments within the companies were not generating revenue, now with the use of BI, those departments generate recurring income from the sale of information to customers, partners and suppliers (Manovich, 2011).

- *Increased return on investment (ROI)*

Calculating the ratio of return on investment (ROI) is often quite complicated due to the existence of a number of qualitative indicators both in terms of costs, but more in terms of the benefits obtained with the use of BI systems (Hočevar & Jaklič, 2008). However, the proper use of BI systems could mean increased return on investment because this infrastructure could be source of funds, e.g. some companies sell the collected data to make money (Manovich, 2011).

- *Improved competitive advantage*

Based on the information collected from different sources using BI systems the companies should accurately determine which product to launch through which marketing campaign, on which customer segment, etc. Using BI systems, the companies can "extremely" segment the marketplace and thereby gain competitive advantage (Elbashir et al. 2008; Hall, 2004).

2.3.2 Business Partner/Supplier Benefits

Business partner/supplier relation benefits include benefits that are coming as a result of improved business partner relations such as good coordination, reduction in costs of transactions, responsiveness improvement, and inventory level reducement - which are of big importance for the organizations (Elbashir et al. 2008).

- *Improved coordination with business partners/suppliers*

The coordination between company and its business partners and suppliers could be improved by using BI systems in a way in which the company can use advanced analytics of the collected data (Ranjan, 2009), so that the company could predict what could be "the next step", and therefore the company can better coordinate with its partners. For example, if a company predicts that some specific material is essential for a given process to begin, the supplier can bring that material before that process is ready to start.

- *Reduction in cost of transaction with business partners/suppliers*

Knowing facts and figures in the business environment could be an advantage for a company when it comes to negotiating with suppliers and customers (Hutchison et al. 2007). For example, by analyzing the performance of the supplier (delivery time, price changes, etc.), the company could take an excellent position when it comes to negotiations, thus every company could extort wide ranges of discounts from the suppliers. Hočevar & Jaklič's (2008) research shows that OLAP, which is a part of every BI system, through graphical analysis can bring strong arguments in defending some standpoint in negotiations.

- *Improved responsiveness to/from suppliers*

As it is explained in the improved coordination benefit section in this chapter, the responsiveness from the supplier could be improved if the supplier is notified on time, and, as Ranjan (2009) argues, that notification comes as a result of advanced analytics of collected data.

- *Reduced inventory levels*

The BI systems should be used for exact calculation of resources needed for a specific process. Thompson (2006) argues that by using BI systems a faster and more accurate reporting can be achieved, thus based on those reports, the company could reduce the inventory levels, and keep in its inventory only the materials that are necessary for specific processes.

2.3.3 Internal Process Efficiency

Internal process efficiency benefits refer to benefits that come as a result of better organization functionality. Those benefits can be internal processes efficiency improvement, staff productivity enhancement, effective decision-making cost reduction and decreased operational costs (Elbashir et al. 2008).

- *Increased efficiency of utilizing assets*

Just as the title of this benefit says, from the use of BI system the efficiency of the utilization of assets could be increased. This can be done through an analysis of the assets management ratios which can give answer of how efficiently and effectively a company is using its resources in the process of revenue generation (ReadyRatios, 2017).

- *Leveraged the advantages of IT upgrades, improvements, and/or new developments in back-end IT systems*

According to BusinessDictionary.com (2017), the term "leverage" in business context represents the ability to significantly increase the income of a company without increasing the utilization of assets but through influence on a given system. Having said this, an overall assumption would be that the IT implementations, such as BI systems, will increase the income of the companies to a specific extent.

- *Improved efficiency of internal processes*

The BI systems should be able to empower the companies with ability to efficiently improve the internal processes so that those processes can provide higher value for the customers and thus better meet their requirements. The main role of BI systems is to provide insights and understandings of the internal business environment (Hočevar & Jaklič, 2008).

- *Increased staff productivity*

The BI systems should allow users to design their own questionnaires and reports, thereby enabling organizations redeployment of developers who formerly worked on this task. This can generate significant staff productivity (Carver & Ritacco, 2006), because some employees may be reassigned to projects important for the company.

- *Reduction in cost of effective decision-making*

For example, if one department is better or worse than the others within a company it is necessary to identify the cause giving those consequences so the possible problems could be solved in the best way. With the use of BI systems the problems and consequences occurring inside or outside the companies can be easily tracked, thus faster decision could be made (Hočevar & Jaklič, 2008). After clearly identifying the reasons for the occurrence of problems and consequences, the companies can take appropriate actions.

- *Reduced operational costs*

Williams & Williams (2003) argue that there are a number of BI tools that have to be fully exploited as tools for tactical and operational process improvements concerning the supply chain and operations. This improvement would mean reduction of the operational costs.

2.3.4 Customer Satisfaction

According to Elbashir et al. (2008), the customer satisfaction benefits are benefits that come from better understanding of the customers and that understanding can result in decreasing of customer return handling costs, decreasing of marketing costs and decreasing of the time needed to supply products or services to the market.

- *Improved customer service*

According to Alton (2017), the BI can improve the customer service in 5 ways: stronger customer voice - the customer voice could be "heard" especially from the use of social networks in terms of giving comments; more quickly identify trends - as the BI collect and visualize data, this infrastructure can predict what is coming for some particular operation in future; more than just surface analysis - thanks to the deeper analysis that the BI systems can offer, the users can identify which things are done good and what should be improved in real-time; deeper customer satisfaction - once the things are targeted, the customer satisfaction will raise after the changes are implemented; more engaged employees - in the process of customer satisfaction the workers can also feel satisfied which can result with better work environment.

- *Reduced customer return handling costs*

By targeting the right consumers of a specific product or service, the number of unsatisfied customers will be reduced, thus the customer return handling costs will be decreased (Elbashir et al. 2008).

- *Reduced marketing costs*

By using the BI systems the companies could reduce the marketing cost by clearly targeting the consumers of a specific product or service (Elbashir et al. 2008).

- *Reduced time to market products/services*

With less time delay and faster response the customers could be satisfied from the companies (Elbashir et al. 2008), thus that will keep them as loyal consumers of companies' products or services.

2.4 Research Model

When we were in the process of selecting and framing our topic we have searched for various academic literature online on Google Scholar. After reading numerous of articles and previous researches in domain of BI, we got interested in exploring the actual reality regarding the benefits that organizations have achieved after started using the BI system. Although there are not a lot of investigations conducted on this specific topic, we have managed to find multiple academic literature to support our selected research topic. Hence, as we mentioned previously, we based the main part of our work on Elbashir et al.'s (2008) research. Furthermore, Elbashir et al. (2008) have identified twenty-two benefits or twenty-two measuring items in their research, and those twenty-two benefits are the result of previous investigations and researches. However, for the purpose of our research we included twenty out of twenty-two benefits from Elbashir et al.'s (2008) research. As we have explained earlier, in our opinion, the two excluded benefits are either similar to some other benefits or hard for interviewees to give their assessments on. Moreover, we acknowledge that our list of benefits is not complete, and we believe the reason for that is that the users tend to find new ways of using the BI systems.

Thus, there is no universal framework regarding the positive and negative aspects or solely positive (benefits) related to the use of BI systems. Having said this, the main framework of this thesis is built on research of Elbashir et al. (2008) and is explained previously in this chapter. Moreover, we are using this framework to analyze which benefits from our list appear most frequently from the use of BI systems within organizations. This framework appeared to be the most relevant one for our research, although we acknowledge that some might find our framework as benefit-limited and there could be a risk that this model could be biased in some way.

In addition, our research is also consisted of finding out how the companies of different size and from different business fields are using the BI for their business operations. Hence, we have created a questionnaire with twenty-five open-ended questions prior to the benefits table in order to give an overview of companies' operations related to the use of BI. Thus, we consider any information provided by our respective respondents as valuable. As a final point, it can be concluded that we have included those twenty-five questions in order for us, as researchers, as well as for readers of our master thesis to gain a better understanding of how companies operate in their business fields, and how does BI help them better achieve their goals.

3 Methodology

In the fifth chapter of his book, Recker (2013) addresses the most popular and commonly used methods in information systems (IS) research: qualitative, quantitative, design science, and mixed methods. Moreover, Recker (2013) claims that the most popular methods in social science are either quantitative or qualitative, and increasingly, studies that rely on design science research method. For carrying out our research we have chosen the qualitative method since we believe it is best suitable for exploring the benefits that organizations have achieved as a result of using the BI. One of the main reasons for why we have chosen the qualitative research method over the quantitative can be put in the following way:

" The simplest distinction between the two is that quantitative methods focus on numbers, and qualitative methods focus on text, most importantly text that captures records of what people have said, done, believed or experienced about a particular phenomenon, topic, or event. " (Recker, 2013, p. 88)

That being so, we believe that quantitative research method would not be ideal for our research since quantitative researches focus on measurement (Recker, 2013) and employ numerical data like scores and metrics (Bhattacherjee, 2012). Moreover, Recker (2013) argues that since the quantitative researches focus on measurement it tends to isolate specific aspects of phenomena, and that is by measuring only those aspects through instruments. Recker (2013) believes that specific focus in quantitative methods comes as a result of a lack of consideration of the wider setting in which phenomena occur. Although numerical data is more precise, textual data is much richer but less precise when compared to numerical data, so it gives researchers the freedom to interpret (Gummesson, 2003).

Our motive for conducting this research lies in our desire to better understand the system as complex as BI from a practical point of view, and then to determine what are the benefits that organizations have achieved by using it. The intention of qualitative research method is to explore every context of why people or group of people make decisions and act in the way they do, and later offer the explanation for why that specifically observed phenomenon occurred that way (Recker, 2013). Moreover, Recker (2013) argues that qualitative methods investigate phenomena in a real-life context and are really helpful when the researchers want to study specific phenomena more in depth. That being so, by conducting our research we hoped that we can uncover some complex or hidden phenomena that can later lead to a more multi-perspective view (Recker, 2013).

Further down this chapter the information on what/how we based our research strategy on, how we approached the data collection stage, who have we approached to how we have collected the data, how we analyzed the data, and how we ensured that our research is of highest of qualities, is given.

3.1 Research Strategy

As we have pointed out earlier, our research aims to determine what are benefits that the organizations have achieved by using the BI systems. On account of that, our selected research strategy must be able to derive the opinions and perspectives of people who have a general overview of the BI systems within their respective organizations. With that being said, our research strategy is selected and based on its suitability to the aim of our scientific research.

As mentioned earlier in this chapter, we do believe that the qualitative research is best suitable for us to understand the BI system and determine the advantages, i.e. benefits of its usage within organizations. Furthermore, our strategy is aligned with some of the characteristics of qualitative research methods suggested by both Recker (2013) and Bhattacherjee (2012). Namely, our research is performed in the field and studies a phenomenon in which it occurs (Recker, 2013; Bhattacherjee, 2012). By conducting the research in the natural setting (Recker, 2013; Bhattacherjee, 2012) it enables us as researchers to gain a better understanding of the researched phenomena from different perspectives. Moreover, those different perspectives are granted through interviewing professionals in the domain of BI. With that in mind, it can be said that we as researchers serve as the key instrument of the research, which is also one of the characteristics of the qualitative research methods (Recker, 2013; Bhattacherjee, 2012). As explained by Recker (2013), when researchers are acting as an instrument for collecting data, they collect qualitative data themselves and that is through face-to-face interactions or interviews with their respective respondents, rather than through an objective instrument. This leads us to develop interpretations of the data we collected, and that is once again one of the characteristics of qualitative research methods (Recker, 2013).

3.2 Data Collection Technique

As we have learned from previous two sections in this chapter, qualitative and quantitative research methods are different in many ways. Regarding data collection techniques, there are also big differences between these two research methods, and Recker (2013) explains that is mainly because of their different data collection techniques, analyzing techniques, and interpretations approach to the phenomenon. The most commonly used data collection techniques in qualitative research methods are the interview, observation, and documentation (Recker, 2013). Earlier in this chapter, we have pointed that in terms of collecting empirical data we are relying mostly on conducting interviews with BI experts.

Speaking of interviews, interviews are a typical data collection technique of qualitative research, and through means of it, we could capture personal comments and opinions from our respective interviewees regarding our research topic (Bhattacherjee, 2012). We believe that interviews are best suited for collecting empirical data for our research, since we are dealing with the complex social phenomena of understanding the benefits that companies have achieved after implementing and using the new technology, in this case BI systems and tools. Interviews are the more personalized form of data collection method in comparison with questionnaires and are conducted by interviewers using the same research protocol as questionnaire surveys (Bhattacharjee, 2012). Moreover, there are three types of qualitative interview: structured, unstructured or semi-structured, and group interview (Myers & Newman, 2007). We have used the semi-structured interview approach, since we wanted to guide our interviewees to give answers to our proposed questions, but at the same time feel free to add more

detailed descriptions of their observations and answers to our questions and let them talk about other things that might be of significance for our research (Recker, 2013). In that way, we hoped that we might end up with something interesting and that we did not expect when we have structured our questionnaire. The most typical form of the interview and form that we preferred, is the face-to-face interview, where the researchers work directly with the interviewee to ask questions and record their responses simultaneously (Bhattacharjee, 2012).

Our questionnaire is split into three parts: introduction, general questions, and benefits table, as it can be seen in Appendix 2. Furthermore, our questionnaire consists of 25 "general" questions with a variation of themes on the usage of BI and a table with 20 measuring items/benefits that we have "tweaked" from original 22 included in Elbashir et al.'s (2008) research. Moreover, we have used the Likert scale in order to capture respondent's opinion on business benefits in our benefits table in the questionnaire (see Appendix 2). We acknowledge that Likert scale is most commonly used in survey research, but the only reason for including it in our qualitative research as a part of the questionnaire is because we hoped that it would provoke more detailed answers from the interviewees or in-depth description of their option selected on 1 to 5 scale.

3.2.1 Selection of Interviewees

Regarding our selection of interviewees part, we have contacted numerous companies that operate in different industries. By collecting data from different-field companies we hoped that we could get a more realistic overall picture about our subject of research. Namely, we did not have some specific delimitations regarding which companies to approach. Matter of fact, it can be said that we only had two filters regarding the selection of companies: that the companies are using the BI systems and tools as part of their business operations, and that they operate on the Swedish soil. Also, our intention was to make interviews with informants that are at the highest of positions in the BI hierarchy within their respective companies, preferably managers, project leaders, BI architects, etc. The reason for targeting people at such high working positions is because we believe that these people are best suitable for getting good information from for purpose of our research. Moreover, since we are covering different aspects of benefits within an organization mentioned in the second chapter, we believe that people who are not familiar with all the aspects of the department they are a part of, could not be able to provide all the answers to our questions and assess all benefits from our list.

It is important to mention that we have first contacted one of our personal contacts that we knew that they are working with BI systems and tools within an organizational level. Since we already knew that our contact is working in the BI department within their respective organization, we have sent them emails in which we have skipped all the formalities and appointed the time, date and location of our interview. We have also asked our contact if they can recommend us organizations that are also using the BI, which our contact did eventually. Following the recommendations provided by our contact, we began our search for contact information of those organizations. Eventually, we have approached various organizations by sending an e-mail in which we wanted to make sure that they are using the BI system (see Appendix 1 for the body of our approach e-mail). In the case of getting a positive feedback, we have sent follow-up emails in which we asked our contacts about their willingness to participate in our research by being our interviewees.

From 115 companies contacted, including our personal contact, we received 17 responses, where 9 of those were positive regarding their interest in being participants, i.e. our interviewees for our study. Finally, due to the fact that some of the contacted informants did not want to share sensitive information about their company's BI system and some could not find enough time for an interview and thus could not participate, we ended up conducting three interviews with three different organizations in Sweden. Two interviews were conducted in a face-to-face manner, while the other one was done via Skype call. It is important to note that approached companies were represented by one person each, which can be also said for us. In other words, during the time of each interview only one of us was present and leading the discussion with our respective interviewee.

We acknowledge that the number of conducted interviews is relatively low and one might argue that we did not collect enough data for our research topic to be trustable. However, we believe that we have gathered data of high quality in interviews with those three companies. That is due to the fact that we managed to get detailed answers on almost all of our questions from our interviewees, and we believe that we have interviewed informants that are best suitable for our study at this period of time. Moreover, more information on our approached respondents can be found in Table 3.2.1.

Table 3.2.1: Information on interviewees

Name	Position	Experience	Company/ Industry	Date and Duration of the Interview	Method	Transcription
Jonas Linders	Regional Manager, Insights & Data Department	More than 19 years	Capgemini; IT Consultancy;	27.04.2017; 113 minutes	Face-to-face	Appendix 3
Interviewee 1	Data Scientist	More than 1 year	Company 1; Multinational Technology Company	02.05.2017; 57 minutes	Face-to-face	Appendix 4
Interviewee 2	Business Intelligence Architect	More than 1 year	Company 2 Small Swedish Technology Company	14.05.2017; 24 minutes	Skype	Appendix 5

3.2.2 Interviewing

The interview is the most used qualitative data collection method (Polkinghorne, 2005). There are different methods or forms that can be used to conduct interviews, such as the face-to-face, one-to-many, and telephone/conferencing (Recker, 2013). As mentioned previously, our preferred method of interviewing is the face-to-face interview, and we have used a semi-structured interview type and asked open-ended questions in the first part of our interview. By doing so we hoped that we could draw valuable information for our research out of our interviewees (Recker, 2013). In order to conduct interviews of high quality in means of getting as much relevant information for our research topic as possible, we have followed a number of guidelines proposed by different authors (Myers & Newman, 2007; Kvale, 2006; Recker, 2013).

We have divided our interviews into three main stages: entry, performance, and exit, as proposed by Myers & Newman (2007). These three stages are taken out of the context of the dramaturgical model of Myers & Newman (2007). Moreover, Myers & Newman (2007) believe that social interactions can be compared to drama where actors perform on a stage using a script. Furthermore, Myers & Newman (2007) point out that during the performance (interview in the context of research) actor's (interviewer's) appearance and manners are very important.

That being said, in the entry stage - at the very beginning of the interview, we introduced ourselves to the interviewee, presented the purpose and objective of our study, our research question, as well as explained to our interviewee how the information from the interview is going to be used in our research. Upon having a discussion with our interviewees on structure and objective of our thesis we asked them whether they want their and/or their company's name to be kept anonymous. Afterward, we have politely asked our respondents if they are okay with the interview being recorded by voice recording device. By recording the interview we have a chance to re-analyze the interview again after its completion. In fact, the voice recording of the interviews helped us make the summary of higher quality because every detailed answer from our interviewees is saved and can be re-listened as much as we need to. However, if the respondent does not want the interview to be recorded, we had a backup plan. Namely, in case we are not allowed to record the interview then the important information would be stored by taking notes during the interview. Luckily, all of our respondents have let us record the interviews. After deciding whether or not to record the interview and keep their and/or name of their company anonymous, we asked our interviewees if they are ready to begin with the discussion on our questions. Afterward, we asked them to provide some general information about themselves as well as the company, such as: name (in a case where interviewee expresses not to keep their or company's name anonymous, of course), position within the company, working experience, etc.

Regarding the performance part, since we were using semi-structured interview type, we have taken the advantage of that type of interview and asked additional questions or requested more detailed information (Recker, 2013) when we felt we needed more information on a specific question or benefit from our questionnaire or on topic we were discussing at that time. Nevertheless, we also gave our interviewees the freedom to comment and continue with providing the answers without us interrupting the flow of the interview.

Finally, in the exit stage, after getting answers on all of our questions, we expressed our gratefulness towards our interviewees for their time and voluntary participation in our study. In addition, we asked the interviewees whether they have some concluding thoughts, comments or requests, etc.

3.3 Data Analysis Technique

After we have collected our qualitative data through interviews we needed to analyze it so we can make the sense out of it. Qualitative analysis is the analysis of qualitative data, such as the data collected from interview transcriptions (Bhattacharjee, 2012). Kvale & Brinkmann (2009) defined transcription as the step in which the oral conversation from the interview is transformed into written text. Moreover, Kvale & Brinkmann (2009) argue that transcription is an analytical process in which the researchers interpret the audio (voice) into text. Bhattacharjee (2012) points that the emphasis in qualitative analysis is on understanding a phenomenon, rather than predicting or explaining, as it is the case with quantitative analysis. Moreover, Bhattacharjee (2012) argues that the credibility of the whole research can be upgraded by giving evidence of the researcher's engagement in the area of study by using the interview transcription.

The transcription of the interview is the next step we have taken after conducting all the interviews. As soon as we finished with transcribing our interviews we have read the transcriptions so we can get a better understanding of everything that was said during the interviews. It is important to mention that each transcription was done by one of the researchers, and later checked by the other one to ensure the higher quality of the transcript. Nevertheless, we did this in order to prevent any important information "slipping" in the process of transcription; if the researcher who is transcribing the interview first miss something, then the other one would hopefully "catch" the missing information. Also, our transcripts do not contain laughter, coughing, or any other similar distraction noises, i.e. tones that are not relevant for the research itself.

All our interview transcripts can be found in Appendix (Appendix 3,4, and 5). As it can be seen in the Appendix, before every actual interview transcription we have provided as much information on the conducted interviews as we could. Moreover, information such as: time and date when the interview happened, location where the interview was conducted, duration of the interview, how the interview was conducted (in a face-to-face manner, via Skype, etc.), who or which researcher(s) has/have conducted the interview, who was the interviewee, the name of the company our interviewee is working for, name of the researcher who transcribed the interview, name of the researcher who re-checked the interview, and lastly, the date when transcription was completed.

3.4 Research Quality

The quality of social science may vary greatly. Compared to the scientific research which can be done using more standardized methods of analysis (Akkerman et al. 2008), our research as a social science research - according to Akkerman et al. (2008) is more a subject of decisions that undermine credible findings. Social science research, in general, refers to the patterns of

behaviors within the specific population (Bhattacherjee, 2012). Namely, the quality of our research mostly depends on many factors that cannot be and concepts that can be controlled.

In the following sub-headings we will describe the concepts taken into consideration in order to ensure the highest possible quality of our study. The concepts of validity and reliability, as attributes that can be used to define the quality of a research, are discussed. In addition, we have also addressed the ethical aspects that had to be taken seriously throughout the whole process of conducting our research.

Moreover, concerning the research quality of our research, in this section we will consider the so-called "psychometric properties" - reliability and validity (Bhattacherjee, 2012). In the context of qualitative research method, the reliability refers to replicability of the processes and the results of a given research, whereas the validity refers to the appropriateness of the tools, processes, and data used in a research (Leung, 2015). Hence, we can conclude that these two properties could be extremely important in achieving the higher quality of our research since they refer to the most important parts in the process of making of a research.

As we have mentioned previously, in this part we will consider the ethics that are also important for achieving better research quality (Bhattacherjee, 2012). In particular, Brinkman & Kvale (2005) argue that the ethics are not something universal, but the product made of cultural discourse. In addition, as Bhattacherjee (2012) argues, ethics is a moral distinction of what is right or what is wrong and sometimes some unethical procedures may not be necessarily forbidden or illegal.

In order to make it easy for readers of our thesis to critically evaluate the quality of our work, in the following sub-headings we have outlined the guidelines we considered in order to maintain the quality, which could increase the trustworthiness (Golafshani, 2003) of our research. For instance, our research depends on interviewing BI professionals, and therefore, improving the quality of the interviewing phase is a critical factor that affects the quality of analysis and reporting later on (Kvale & Brinkmann, 2009).

3.4.1 Validity

As we have stated previously, validity in qualitative research refers to the adequacy and appropriateness of the tools, processes, and data used and collected in the research (Leung, 2015). In the process of assessing a validity of a qualitative research, the methodology used in that research should be able to provide the researchers with the ability to detect findings in an appropriate way. Moreover, Bhattacherjee (2012) emphasize the importance of the external validity that refers to the degree of the extent to which the final results can be generalized to different contexts. On the other hand, the validity of the research should also depend on a number of conducted interviews that can allow higher generalizability. However, according to Kvale & Brinkmann (2009), the number of interviews cannot be precisely determined in order for a higher level of generalizability to be achieved.

Since we are doing interpretive social science research that according to Bhattacherjee (2012) interprets the social reality through the subjective participant viewpoints, we will provide a detailed description of our empirical results, with the aim to prove the validity of our research. The researcher must provide detailed descriptions that are rich with information about the research and its findings so that the readers can decide to what extent the findings are trans-

ferable to other settings (Bhattacherjee, 2012). The idea of the transferability is similar to the idea of external validity.

3.4.2 Reliability

In order to try to fulfill the reliability rigor, in our qualitative research we have provided the detailed descriptions for all parts of our thesis. We tried to make our research process "trustable" by describing in detail all phases we went through, starting from defining our work in the literature review part, defining what research method we have chosen to conduct our study on, how we collected our data, how we selected our informants, how we did the data analysis, what have we done to ensure the quality of the research, reporting of the empirical findings, and providing the full questionnaire as well as the transcripts of all our conducted interviews in Appendix. Hence, by providing all these details about our research our aim is to increase the trustworthiness of it, as suggested by Golafshani (2003). Moreover, we believe that by providing all of the details mentioned earlier give our respective readers a chance to critically evaluate our work.

As mentioned earlier, we have audio recorded all of our interviews. Therefore, upon getting informants agreement on interviews to be recorded we have used two different devices to record the interviews: a smartphone and a laptop for all of our face-to-face interviews and the one via Skype call. We did in order to ensure that we have captured the responses from our interviewees, and in case if something unexpected happens to a recording option on one device the other one can still record the interview. Prior to conducting the interview, we ran tests on all of our recording devices to check if there are any technical issues present. Afterward, we checked the quality of the recorded audio files on both recording devices for all of our conducted interviews and then selected the recording from each interview that is of higher quality. We did this by having in mind that the quality of transcription later on is conditioned by the quality of the audio recording.

3.4.3 Ethics

Ethics can be best described as unwritten rules or moral principles that govern person's behavior or the conducting of an activity in a certain way (Bhattacherjee, 2012). Bhattacherjee (2012) points out that there are numerous guidelines for researchers to follow in order to ensure good ethics in their research. With that being said, in order to achieve good ethics in our research we followed a number of guidelines found in the academic literature that enabled us to limit the ethical issues (Bhattacherjee, 2012; Brinkmann & Kvale, 2005; Myers & Newman, 2007). Namely, after identifying our potential informants we have contacted them via emails (see Appendix 1 for our approach mail). After introducing ourselves, we have briefly explained what is the purpose of our research, provided our research question, and then we politely asked them if they are interested in participating in our research. After receiving a positive feedback from our contacts we sent them our questionnaire so they can get a glimpse of the topics that are going to be discussed during the interview and as well as to understand the context of our research, and prepare for the interview. Since we knew that we are going to conduct interviews with non-native English speakers, we gave a special attention to framing our questions in a way that our interviewees do not have many troubles understanding them (Kvale & Brinkmann, 2009).

Moreover, Creswell (2007) stresses out the importance of protecting the integrity of interviewees if they require it. Therefore, we have informed our interviewees that before the start of the interview they will have the option to choose whether they want their and/or their company's name to be kept anonymous for the purpose of our study. Based on their choice, we have kept both the identity of our interviewee and respective organization's name confidential for two out of our three conducted interviews. Also, as pointed out by both Creswell (2007) and Kvale & Brinkmann (2009), prior to conducting the interviews the researchers must get the interviewee's informed consent regarding their participation in a research. Hence, as we mentioned earlier in this chapter, we have informed our interviewees that their answers will be recorded and later published as the part of our master thesis. Moreover, at the beginning of interviews we asked for the consent of the interviewees regarding the audio recording of the interview. As we reported earlier in this chapter, all interviewees approved the recording of the interviews.

4 Empirical Results

In the fourth chapter of our thesis, we will present empirical results collected from interviews with BI professionals. As we have pointed out earlier throughout the thesis, our research has two objectives: (i) to portray or give an overview of how BI is being used in different organizations, and (ii) to assess the benefits of BI use within such organizations. With that being said, in this part of our thesis, we are looking to fulfill the objectives by the presentation of our collected data.

Since have conducted interviews with three different organizations operating in different business fields we have recognized that BI is being used differently in each organization. Moreover, each interviewee has reported exclusive assesses of business benefits of BI use within their respective organization, as this information can be found further down this chapter.

4.1 The Use of Business Intelligence

The first part of our empirical results provides insights in how observed companies are using BI systems and tools. Therefore, we have found that BI systems and tools are being used differently within every investigated organization. The most important and interesting findings aggregated from interviews conducted with Capgemini, Company 1 and Company 2 are presented further down this part.

4.1.1 Capgemini

For the purpose of our interview, Capgemini was represented by Mr. Jonas Linders, who is a well-known person within IT consultancy industry in Sweden. Mr. Linders has explained that he has over 19 years of experience of working within IT consultancy companies and with BI systems and tools (Appendix 3, row 54). Before joining Capgemini in September of 2016 he worked for CGI, which is also a large IT consultancy company, for 18 and a half years (Appendix 3, row 54). Although he spent only 8 months within Capgemini he is working as regional manager for southern Sweden within Insights and Data department (Appendix 3, row 54).

When asked to give an overview of the company he is currently working for, Mr. Jonas Linders stated:

" *Capgemini is what we typically in the business refer to as a service integrated. So we are one stop shop for all sort of IT related services. All in all, we are one hundred and... close to one hundred ninety thousand worldwide, so that would put us among top 5 I would say worldwide.* " (Appendix 3, row 8)

In order for us to better understand the business model of IT consultancies, Mr. Linders has drew up a model on the whiteboard during the time of our interview. Moreover, he explained that Capgemini interacts with their customers through full life cycle of the IT system development change, and therefore there are 3 phases: Design, Build, and Run (Appendix 3, row 10). Regarding those 3 phases Jonas has added:

" *So, this is early stage - we are doing typically a pre-study bits, we are doing governance discussions, we are doing architectural pieces, inspiring... sort of, yeah. Second to that, we would start to build the actual solution. Once gathered the requirements understanding what we should do. So that would be build. And then in the run phase we are looking at the aftermath of the development project, so handed it over to application management typically.* " (Appendix 3, row 10)

Moreover, in order to portray how the company competes on the market, Jonas has drew another model during the interview. Namely, Mr. Linders applied Treacy & Wiersema's (1997) Value Discipline Model on Capgemini's case. Treacy & Wiersema's (1997) Value Discipline Model consists of three different axis or values and those are product leadership, customer intimacy, and operational excellence. Moreover, Jonas has stated the following:

" *So, different parts of the organization's sort of standard process landscape would be the leading bit in how we compete and win. Also, Treacy and Wiersema states that you choose one axis, any one where you decide to be world class. And by necessity, on the other ones you stay with good enough to support that. Otherwise you would be stuck in the middle.* " (Appendix 3, row 36)

However, it is interesting to mention that Mr. Linders argued that Capgemini is not really following the "golden rules" of Treacy & Wiersema's (1997) model, stating:

" *In Capgemini we have due to the sheer size of the organization - we are one stop shop and we cover all the angles. But also facing the sort of Treacy and Wiersema's challenges as a consequence. It would be easy to just choose one but we aren't.* " (Appendix 3, row 60)

After giving us a valuable introduction to IT consulting industry by explaining the way how usually IT consultancies operate through models, Mr. Linders has provided us with some stats and figures about the company. Namely, we have learned that out of 190.000 employees that work for Capgemini worldwide (Appendix 3, row 68) around 2.000 are working in Sweden (Appendix 3, row 52). Moreover, Jonas has mentioned that there are around 10.700 employees working with insights and data (Appendix 3, row 64).

Regarding the use of BI within an organization, Mr. Jonas Linders did not know the exact year when Capgemini has implemented the system. That is, of course, due to the fact that he is relatively new in the organization, but he has also explained that it is hard to determine the year or reasons for implementing the BI system since the company implements systems and solutions for others - their customers (Appendix 3, row 66). Furthermore, he has explained that company does not have only one BI system for their internal purposes, stating:

" *Well, in an organization covering pretty much every country in the world with one hundred and ninety thousand employees, we do not have one BI system. Though I know that the gen-*

eral idea we are having in one enterprise data warehouse single version of the truth sort of thing, isn't really not achieved in that size of operation. " (Appendix 3, row 68)

In addition, Mr. Linders revealed that, since the company is in moneymaking business (Appendix 3, row 124) and in game of providing services according to their customers' needs, the quality of their internal BI systems is undoubtedly lower in comparison to those provided to their customers (Appendix 3, row 66). Mr. Linders defined his company in BI space as "*product and sector agnostic implementer of business intelligence*" (Appendix 3, row 106). Being agnostic means working with different BI software vendors in order for Capgemini to deliver the best possible solution to their customers. With that being said, Capgemini serves as a mediator between supply and demand. That means that their customers are typically not aware of who is the "real" vendor of the BI software/product which they are using, but as Jonas argues: "*being agnostic really means agnostic, so you would pretty much be market definition of BI vendors*" (Appendix 3, row 108).

And speaking of relationships with their business partners and suppliers, Mr. Linders confirmed that Capgemini is working with wide variety of companies in BI space (Appendix 3, row 106). Moreover, he explained that the company's decision on selecting who to work within BI space is based on the need of their customers (Appendix 3, row 106 and 110), stating:

" *(...) once we built it there will still be a scarcity on the market for competency when we hand it out. So hence, we are product and sector agnostic implementers because we do strongly sense that you need to take those things* [functionality, price, etc.] *into consideration having just the best of breed solution, is not necessarily what gives the most value to the customer.* " (Appendix 3, row 106)

However, Jonas argues that the company is closely monitoring vendors that provide the best quality of products that are of Capgemini's interest:

" *(...) once you say you are agnostic you sort of hand it over to who is performing well on the market, because then you would have the supply of competence all that trailing and then it's feasible for the customer to maintain such a solution.* " (Appendix 3, row 110)

With that being said, Mr. Linders has confirmed that company can be referred to as both prospector and hit-seeker; i.e. the one who is on the constant lookout for new developments and solutions, and the one who is prioritizing sort of "best of brands" solutions (Appendix 3, row 114).

In order for us, as researchers, to understand how the powerhouse company like Capgemini as well as IT consultancies operate in general, Mr. Linders drew up another matrix on the whiteboard during our interview. Moreover, he placed terms Big Discovery, Performance Management, Domain-Specific Applications, and Enterprise Reporting in 2 x 2 matrix. Furthermore, those 4 terms are seen as quadrants whereas quadrants are spread across 2 opposite axis: integration and harmonization. Moreover, since it is a 2 x 2 matrix, integration and harmonization axises are split into high and low amount (extent) each. So, that at end puts every term in a specific amount of integration and harmonization. For instance, Business Discovery quadrant is placed in low amount of harmonization and high amount of integration part of the matrix. (Appendix 3, row 68 and 70). Mr. Linders explained this by stating:

" *So what you want to do is to be able to connect different data sets, but you don't want to be forced by the definitions of your current dimensions hierarchies, etc. You want to replace "we build your organization" according to: "What if we acquire this new company and we rebuild this and we moved that over there" sort of things and testing your hypothesis.* " (Appendix 3, row 70)

The matrix also plays the vital part in understanding company's handling of data. Namely, Mr. Linders explained the differences between the sources of data for Business Discovery quadrant and the other three by arguing:

" *Also, the amount of data in all the other three quadrants is basically the data you have from your internal business processes. But, in the last quadrant it expands to everything that could be found on the web. So this is a sort of explosion. And hence the terms of big data and in order to make sense of big data you can't rely on your eyes or your brain anymore.* " (Appendix 3, row 70)

With that in mind, it can be said that for all four quadrants the collection of data are important, but some quadrants value data coming from one particular source more than the other. Hence, Mr. Linders has explained that his company has all of those 4 quadrants (Appendix 3, row 70). However, in comparison to other 3 quadrants they have just started looking more into data from Business Discovery quadrant, alluding to the term of big data and information coming from external sources as opposing to other 3 quadrants where data is coming from internal sources (Appendix 3, row 70 and 118).

Speaking of big data, Mr. Linders has explained that Capgemini has recognized the value and started looking for data coming from external sources for around 5 or 6 years at this moment (Appendix 3, row 82). Moreover, he argues that big data help company understand the technology and how their customers interact with their services, so in that way they could deliver better end product to their users eventually (Appendix 3, row 82). Jonas has argued that their customers are dictating what data to look after, stating: "*what's interesting to them is actually interesting for us*" (Appendix 3, Row 124).

We have learned that BI plays an important role in almost all of the company's operations, as Mr. Linders has explained:

" *So, as I said the three different areas or quadrants, we do… I know that for sure, do the domain specific applications sort of BI specifically around sales power opportunity follow-up sort of thing. We have more traditional sort of enterprise reporting applications for the both regulatory and also for sort of the internal information flow of the predominantly the financial status of operation. And we do have sort of performance management since we have scorecards for oh so many things and incentive models. We are using enterprise warehousing sort of applications and analysis in order to make sure that people get rewarded in the proper way.* " (Appendix 3, row 86)

Having BI systems implemented enables Capgemini to become familiar with market trends to a certain level on one hand, as argued by Mr. Linders (Appendix 3, row 90). However, he believes that the company does not have a full grasp of reception that their services and products get when delivered (Appendix 3, row 90). Namely, he argues that by being the IT consul-

tancy (as business to business organization) it is a bit harder to understand and react in real-time (Appendix 3, row 90). Moreover, he backed his statement by arguing that their customers, for example, do not use Twitter, Facebook or other social media sites to address the issues with products and services delivered by the company or comment on company itself (Appendix 3, row 90).

When asked if the company like Capgemini would survive or exist on the market without having BI as the part of their business operations, Mr. Linders has strongly denied it, arguing:

" *No, I don't think so. Because you would leave us to situation where we had to rely on our gut feeling and in operation of 190,000 individuals. It's way too many guts! I put it that way. So, we need to have a commonly agreed word view. And BI is crucial to that.* " (Appendix 3, row 2016)

Although BI systems proved to be very important piece of the puzzle for Capgemini's business success, when asked to identify problems or challenges that company is facing currently, Mr. Linders pointed to velocity from 3 V's definitions of big data. Namely, Jonas believes that company copes well with variety and volume of data but insists that there is still work to be done when it comes to velocity. Moreover, he believes that there are too many standardized solutions and tools for dealing with high velocity of data, and sometimes their customers have troubles with deciding with which solution should they go with and from which vendor. He argues that by having more solutions and tools is good for competing within vendors but presents sort of nightmare for consultancies. However, Mr. Linders believes that although there are a lot of solutions available on the market there is still no standardized tool for building an algorithm or articulating hypothesis. (Appendix 3, row 132).

However, when it comes to dealing with barriers in current systems in terms of architecture on conceptual level, Mr. Linders believes that answer lies in Gartner's Bimodal BI:

" *(...) I think there is already a resolution to the challenge "should I go with high harmonization or low harmonization?", and the explicit reply to that is given by Gartner: "You should do both". So, Bimodal BI. That's the current sort of best reply to the question. You do need, I think that's a TED talk example from Facebook who decided early on that the only BI they needed was the business discovery sort of Hadoop analytics predictive sort of thing. And they have gradually come to the conclusion that we actually do need traditional BI for performance management, go figure. And most of the more sage or senior organizations who have been around started out with the warehousing bit. And they do realize we need something to add to the type of insights we can draw from our data warehouse. So, I think Gartner has as a very valid point about… they called it Bimodal IT and applies to all sorts of IT, but it also sits very well with the business intelligence or analytics domain.* " (Appendix 3, row 134)

When asked how he sees BI systems and tools in the future, Mr. Linders replied by expressing his beliefs that we getting more guided development tools (Appendix 3, row 136). He argues that nowadays handling with BI tools is getting easier with drag-and-drop method, stating:

" *I mean, the BI has been for many many years a domain where people with good coding or theoretical skills, but not necessarily business acumen, have been able to make quite a bit of money in all that I think. Taking this into the future, if you are a BI consultant you are re-*

quired to understand the business. Because the coding bit has become less complex. I think that's a sort of change we are looking at. " (Appendix 3, row 136)

4.1.2 Company 1

As we have reported earlier in the thesis, our respondent who represented the company wanted to keep both his and company's identity confidential for the purpose of our study. Hence, we can confirm that our respondent is a male and therefore we are referring to him as Interviewee 1 and his company as Company 1.

Interviewee 1 works as data scientist in of the teams within the company and he has been working on that specific position for over a year (Appendix 4, row 12). He has explained that he worked previously in quality assurance department within the same company (Appendix 4, row 12). However, although he does not have much of experience at the current position he has worked previously with some BI tools, mainly reporting in order to understand the market trends (Appendix 4, row 14).

Company 1 is one of the household names in technology industry. It can be said that the company is sort of trendsetter in certain services and products provided (Appendix 4, row 56). Interviewee 1 gave us a good overview of the company's operations and importance of BI in achieving better results, stating:

" *Well, the company I think is one of the biggest companies in the world in the software business. Not only in software, as you might now. And we deliver basically to wide variety of users. And for that reason business intelligence is very important to us to understand how the users use our products, and what can we improve, and so on.* " (Appendix 4, row 10)

When asked if the company is developing their own BI software or are just using software provided by a vendor, Interviewee 1 stated the following:

" *We are developing the software. I am not saying that we only use our own software. There are places when we use some third-party products, I guess. Especially for reporting and so on. But we have our own solutions which we actually leverage more and more. And I guess the only reason other tools are used are some kinds of legacy things or maybe, like a bit easier integration in some places. But in general, we use our own solutions. Both for data gathering, data mining, machine learning, and things like that.* " (Appendix 4, row 50)

In addition, when asked if he can refer to his company as prospector or someone who is always on the lookout for new solutions or development made in BI space, Interviewee 1 had rather interesting response. Namely, he prefers to refer to his company rather trendsetter and not a follower, stating:

" *I would say that we are in some cases we are trendsetters as well. Because, you know, looking at the level of, like the amount of information, the amount of data we collect or manage - it's something we excel in I would say so. I'm not sure if there is… I just don't know if there is anyone looking on what's on the market. We try to set the trends.* " (Appendix 4, row 56)

The company is using BI systems and tools internally for their own purposes but is also providing BI tools and solutions to their customers (Appendix 4, row 18). Moreover, Interviewee 1 argues that the company provides BI services and tools in a way in which their customers can create their own solutions (Appendix 4, row 18), so their services provided act as some sort of framework for customers to build on. The interesting fact is that the company vendors the same BI system to the customers as the one that is being used internally (Appendix 4, row 18), i.e. every development made on the internal BI system will be sooner or later exposed to customers as well (Appendix 4, row 52). The company had the BI system implemented way before Interviewee 1 joined the organization, but he argues that there are numerous reasons for why the company has implemented the system, stating:

" *It shouldn't be difficult to guess. I think the most important factors like, at least to understand how users are using our products. That's the one factor, so you know, in order to make the products better for the user. And the second factor is act to mining toward the quality of the products. So, we know what's going on there on the market. And if something is seriously wrong we can react quickly and then help users to fix issues.* " (Appendix 4, row 32)

As mentioned earlier, BI plays big part in company's success and it is being heavily used within almost all departments and work phases of the company (Appendix 4, row 36). Interviewee 1 argues that the company's culture has changed over the last couple of years toward being data driven, as he explained that almost every department is feeding off of data provided by data science teams (Appendix 4, row 36). Also, Company 1's culture and way of functioning are now being shaped by users' demands (Appendix 4, row 46). Furthermore, he adds that the obvious change of culture can be portrayed in how project managers' (PM) decision-making approach has changed. Moreover, Interviewee 1 argues that in the past PMs have trusted their gut feelings when making a business decision (Appendix 4, row 106). However, that has changed, nowadays even PMs at high level are demanding the data, and their business decisions are becoming more and more based on data (Appendix 4, row 106). Interviewee 1 argues that BI has helped company become more familiar with market trends after its implementation (Appendix 4, row 42), as well as to better understand their operations, stating:

" *It definitely helps us to understand how we perform, because we have a data from our own platform and tools.* " (Appendix 4, row 42)

Company 1 collects and process data coming from both internal and external data sources (Appendix 4, row 62 and 64). But, since the company is getting more focused on pleasing their customers, and therefore getting insights into customers' preferences and demanding feedback on their services and devices (Appendix 4, row 62), we can justify that data coming from external sources represents the cultural shift mentioned earlier. However, Interviewee 1 argues that both data sources are valuable and that the company is using data coming from both sources in single set of reports (Appendix 4, row 64), arguing there are no big differences between processing data from those 2 datasets:

" *We do process internal data so we know... Actually we've been exactly using exactly the same tools, so you know, there is no difference between internal and external data. So we use the same tools to check our own processes, our own development progress, our own way how the development tools works internally, if there is, like any quality issues, and there are liability issues, performance issues, and everything like that. That's collected with the same tools and that's purely internal. And well, of course there is much more data coming from the*

fields… which of this data is more valuable is hard to say, but of course we value customers, that's what we really we are crazy now about. Everything here is centralized about pleasing the customers. " (Appendix 4, row 62)

Moreover, data collected from external sources plays big part in company's assessment of quality of their products and services (Appendix 4, row 66). That is the data coming from feedback on deliverables: usability, reliability, and performance of deliverables (Appendix 4, row 66). Moreover, Interviewee 1 believes that company needs to know how are their products performing, are there any issues present, what is the general opinion on a specific product or company in general, so they can make improve their services accordingly and on time (Appendix 4, row 66). Apart from getting feedback on their products, company is also trying to understand the behavior of their customers, as Interviewee 1 argues:

" *(...) Then, we do try to understand our users, you know, like activity data is sort of important as well. So, it's not for spying or like… it's for understanding how users use the product in order to make the product better. So it's not like that we track particular user, we collect like aggregated information about the way how the products are used and then you know, that can be used for different machine learning algorithms… you can like cluster the user in certain way, you can get some… like hidden knowledge from the data stream and to understand things you could not even think… you know, why you are designing or the stuff. So, it's basically all over the engineering process right now. So it's both in pre-planning, design, development, then like the quality monitoring and maintenance, everything.* " (Appendix 4, row 66)

Speaking of data, the company is storing the data on an "in-house cloud" (Appendix 4, row 68). Interviewee 1 provided further explanation of location where the data is stored by stating:

" *Well, just define it how you would like… it's in the cloud but this is the in-house, this is our own cloud, so the in-house cloud.* " (Appendix 4, row 70)

The company is using wide variety of tools for data processing, as Interviewee 1 explained:

" *Well, definitely we use a lot of machine learning. We do provide also like the machine learning tools for the customers so we use those tools as well. We do use a lot of, like internal programming with languages like Python or R. We do use the simplest approaches to just do aggregation with. We have a sort of extended version of CQL language which you can operate on the large data sets, like terabytes of data efficiently and do aggregation and then based on the aggregations on that data we can CQL-ize it as well and just us it as a normal… like a source for normal reporting.* " (Appendix 4, row 76)

Deciding and understanding what the company wants to learn upfront has been highlighted as the most challenging process of current BI systems (Appendix 4, row 82). Furthermore, Interviewee 1 argues that the process of collecting and then visualizing the data is very much straight forward nowadays, but processing depends on whether they have clearly defined it upfront (Appendix 4, row 82). Regarding identifying barriers in current BI systems, Interviewee 1 argues that some visualization tools are "*not very flexible*" (Appendix 4, row 88). For this reason, he would like that to be changed in the future so the users can have bigger impact and control over creation process of visualizations in order to be able to develop sto-

ries behind the data (Appendix 4, row 88). Nevertheless, he believes that even bigger barrier has been already overcome, stating:

" *(...) the biggest barrier which used to be here but I don't think that it exist anymore was, like implementing this culture of being data driven. Previously it was like really like what the PMs think we we need to deliver, what the PMs think the user need. And we had to change this culture into like let's first ask the users, listen to the users how they use the current products and how to improve it or how to they would like the product to be. So, before we start planning something, before we start designing the feature or something let's build the story around the user.* " (Appendix 4, row 88)

Interviewee 1 pointed out that there are a lot of processes in current BI systems that demand high level of expertise and manual work, but he sees that becoming more automated in the future (Appendix 4, row 94). On account of this, he believes that tools and algorithms will become smart enough to learn directly from data, and therefore create visualization automatically, etc. (Appendix 4, row 94). Nevertheless, Interviewee 1 strongly believes BI will surely play a big role in the future businesses, stating:

" *Well, BI is here to stay definitely. So, BI will be a very important feature for… I'm not talking about my company here but the market in general. And that's not only about the software market, basically everything will be connected sooner or later and that's I think the only way to provide value for the customers. And that's, in some cases, even the cheapest way, I guess. So, whatever the industry - it will rely on some way of BI.* " (Appendix 4, row 92)

4.1.3 Company 2

As it is the case with Company 1 and Interviewee 1 whose identities we kept anonymous for the purpose of our study, we have also kept identities of both Company 2 and Interviewee 2 confidential. Also, as it is the case with Interviewee 1, Interviewee 2 is also a male and we will refer to him accordingly. Interviewee 2 is working as BI architect within his company, and he has been working at that position for almost a year and a half (Appendix 5, row 14). Moreover, he explained that he is currently working on a financial project within his company, but he has also worked on different projects before (Appendix 5, row 18). Before joining his current company, Interviewee 2 confirmed that he has worked with BI tools previously, and that is at IKEA and Ericsson, respectively (Appendix 5, row 16).

Regarding Company 2, our interviewee revealed that it is a Swedish company that has been progressively growing, and therefore it is going international (Appendix 5, row 10). In addition, Interviewee 2 has stated: "*We work with IT, engineering, in different domains and we are like almost two thousands employees.*" (Appendix 5, row 10). We have learned that company has had the BI system implemented for around 4 years (Appendix 5, row 18) and Interviewee 2 believes that reasons for system's implementation are obvious:

" *(...) Because, it's like* [different systems, data coming from all units, etc.] *create huge amount of data every day. So, we want to get kind of value or knowledge of this huge amount of systems and data.* " (Appendix 5, row 22)

Moreover, the company's BI system is integrated with other systems within the company (Appendix 5, row 24), and almost every department and unit (Appendix 5, row 28), but mainly management and economy departments, as well as business controllers and unit managers,

are using the BI system (Appendix 5, row 26). Interviewee 2 believes that on a daily basis 5 to 10 employees use BI, whereas 30 to 40 employees are using it during a period of one month (Appendix 5, row 30). Our informant has also confirmed that the system allows company to become familiar with market trends in the area of their business (Appendix 5, row 36) and that it helps determine the return on investment, adding:

" *(...) in this system for instance we calculate how much we are like spending on different things, and then how much like… yeah, returns and profit we are making. So, of course, it helps us to determine the return on investments.* " (Appendix 5, row 36)

Regarding handling of the data collected, Company 2 values and therefore collects only data coming from internal sources (Appendix 5, row 56 and 60). Interviewee 2 pointed out that at the moment data from external sources is not of interest to the company, stating:

" *At the moment, we have enough amount of data coming from this different systems. As I said, it's almost two thousand employees, a lot of transactions, customer projects... So, we don't have any external data sources at the moment.* " (Appendix 5, row 60)

Moreover, the company is storing their collected data in-house. Interviewee 2 suggests that the reason for storing data in-house rather than on cloud lies in the sensitivity of the data. Furthermore, he believes that moving to cloud is not an option when generating such sensitive data. (Appendix 5, row 62).

The company is using software provided by different vendors in BI space in a way in which those software systems and tools provided by others serve as a framework to develop their own solutions (Appendix 5, row 40). Interviewee 2 named Microsoft as the business supplier of BI solutions that the company is using (Appendix 5, row 4), and he believes that they have worked with them "forever" (Appendix 5, row 40). Moreover, Interviewee 2 believes that services provided by Microsoft are well suited for company's needs, adding:

" *(...) Microsoft - it has all the tools that we need. From that there is ERP tools, there is interface, there is integration tools, and all of them are well established, well developed and easy to use.* " (Appendix 5, row 46)

However, Microsoft is not the only supplier of BI tools and solutions, the company is also using products from numerous vendors with Interviewee 2 mentioning QlikView, for instance (Appendix 5, row 46). Furthermore, Microsoft provides wide variety of tools while QlikView has only self-service BI that is more about database usage (Appendix 5, row 46). It is important to mention that this company is always on the lookout for new developments made in the BI space (Appendix 5, row 48). However, Interviewee 2 insists that it is cost-effective and easier to keep developing the existing systems in comparison to building a new one from scratch, adding that it would cost more and that is not easy to rebuild it (Appendix 5, row 52 and 54).

When asked to identify most challenging process(es) in current BI systems and tools, Interviewee 2 pointed out at the integration part (Appendix 5, row 76). He believes that bringing data stored differently in different systems can be tricky and challenging (Appendix 5, row

75). Furthermore, Interviewee 2 admitted that loading time and storage-changing dimensions are certainly one of the barriers with which the company is faced nowadays and needs to be solved in the future, stating:

" *Right now we are suffering a little bit from loading time. It's like five hundred million rows, and loading time is really difficult. And yeah, kind of supporting storage changing dimensions, sometimes the system might crash, and so on. So, we are looking for some improvements maybe.* " (Appendix 5, row 78)

When asked how he sees BI in the future, Interviewee 2 has stated:

" *In storing in two ways, I would say. The first way is about enabling the end-user, business users to use BI easily and without any technical knowledge. And other direction is going into big data, so current use would not be enough, maybe soon. And yeah, going into Hadoop and nosql unstructured data, and so on.* " (Appendix 5, row 80)

4.2 Benefits of Business Intelligence Use

This section is intended to present the empirical results concerning the benefits stemming from the use of BI systems within observed companies. The findings are presented in terms of assessment of previously defined benefits by our respondents, supported with their explanations regarding their assessments.

4.2.1 Organizational Benefits

The assessments from the interviewees on Organizational Benefits that their respective companies have achieved after started using the BI systems are as follows:

- *Increased revenues/services provided*

Mr. Jonas Linders, regional manager at Insights and Data department at Capgemini, *strongly agrees (5/5)* that with the use of BI system Capgemini has increased the revenues or services provided. Furthermore, he believes that by possessing data collected and analyzed by using the BI systems a better decision can be made in order to make the better action (Appendix 3, row 200). Likewise, Interviewee 2 is on the "same side" as Mr. Linders, as he also *strongly agrees (5/5)* that this benefit can be earned by the use of BI system in a business environment in which they are operating, stating:

" (...) by using BI we see where the market going for instance, and where we have to invest more, where we have to focus on when we talk to our customers, or when we build our like, customer and use data for instance, where to focus our marketing… and yeah, that makes more money for sure. " (Appendix 5, row 160)

However, on the other hand, Interviewee 1 stays *neutral (3/5)* on if his company has increased the revenues or services provided because he is not working at the position on which information as such is available (Appendix 4, row 138).

- *Reduction of lost sales/lost services provided*

Concerning to the question if the company gained a benefit in a sense of reduction of lost sales or services provided, all three interviewees have *strongly agreed (5/5)*. Moreover, Interviewee 1 argues that the use of BI system helped the company in high extent, because by using the BI they can detect anomalies (Appendix 4, row 140). For instance, Company 1 can find that there are some services broken because of their complicated infrastructure, as Interviewee 1 argues:

" *(...) yes, we had cases when we through the BI we realized that there are services broken, like integration is broken in some cases because the whole infrastructure of the deliverables we here we provide is kind of complicated. There might be issues you can't see before it's released, and BI gives us visibility on that.* " (Appendix 4, row 140)

We believe that by receiving the same grade (5/5) from all three interviewees on this benefit could mean that the BI system can bring this benefit to the companies, no matter in which business field they operate and size of the organization.

- *Increased geographic distribution of sale/services provided*

For the "Increased geographic distribution of sale or services provided" benefit, all three interviewees stay *neutral (3/5)*, but nevertheless Mr. Linders argues that the BI systems can make changes in the geographical distribution in a sense of increased penetration and availability in graphical matters, stating:

" *If it's all a question about increased sort of penetration or availability in graphical matters. Because then you have decided that only the positive outcome of the analysis should be counted. And given the fact that the bean counters of organization are so powerful typically they are part of the audience for this type…* " (Appendix 3, row 252)

- *Enhanced profit*

Regarding whether the companies have enhanced their profits after they started using the BI system, Mr. Jonas Linders argues that the BI system has indeed increased Capgemini's profit in numerous indirect ways (Appendix 3, row 210). That is predominantly through reducing the costs, so he *strongly agrees (5/5)* that his company has achieved this benefit (Appendix 3, row 210). Same as Mr. Jonas Linders, Interviewee 2 also *strongly agrees (5/5)* on this benefit, stating:

" *(...) you always need to know where you are going and what you are doing. And then when you know what you are doing you can learn how to do it better in the future and enhance the profit.* " (Appendix 5, row 172)

Unlike Mr. Linders and Interviewee 2, Interviewee 1 stays *neutral (3/5)* about this benefit because of the lack of information, but he gives an interesting statement:

" *I would say so, because otherwise it does not make sense to keep us here in the data science team. And we have proven in lot of cases when we really provide value for the customers. But, how it translates to money…* " (Appendix 4, row 146)

- *Increased return on investment (ROI)*

Regarding the assessment of the "Increased return on investment (ROI) benefit", Interviewee 1 argues that he cannot either disagree or strongly disagree that his company has increased the

return on investment by using the BI system (Appendix 4, row 148). Moreover, he believes that by using the BI, a "second revenue flow" appears as an example when the services provided are improved, but in a lack of solid information he remains *neutral (3/5)* (Appendix 4, row 148). However, Mr. Jonas Linders *agrees (4/5)* that a company could increase the return on investment, and argues that it is very hard to say what kind of revenue and return on investment a company can get, but for example when it comes to the use of BI for a better decision-making, a value could be a better decision (Appendix 3, row 212). However, Interviewee 2 *strongly agrees (5/5)* with the statement that the company increased the ROI by using the BI (Appendix 3, row 212).

- *Improved competitive advantage*

For the last benefit of the organizational group of benefits - "Improved competitive advantage", all of our respondents gave positive assessments. Mr. Jonas Linders *agrees (4/5)* that the competitive advantage can be achieved to some extent by the use of BI system, stating:

" *So, this is the business development quadrant to me. And I think to very limited extent that is true. I mean, we are looking at the win rate, we are looking at who we lose out to, we gain intel on the sort of competition, in that respect. But, we haven't taken it to the full Monty by using intel about the competitor in sort of the more common terms. We are still very much looking at our internal processes when it comes to the competition. That's the huge area for improvement I think, to look beyond the fence of your premise, rather than just seeing the effects of what's happening on the market - actually looking at the competitor market.* " (Appendix 3, row 214)

Likewise, Interviewee 1 *strongly agrees (5/5)* that this benefit can be achieved with an argumentation that it comes from the availability of the data (Appendix 4, row 150). Moreover, Interviewee 2 *agrees (4/5)* as he thinks that the competitive advantage can be improved, arguing:

" *(...) when you know how you are doing and what you are doing wrong then you can improve and you get better competitive advantage, as well.* " (Appendix 5, row 180)

4.2.2 Business Partner/Supplier Relation

The assessments from the interviewees on benefits from the second group of benefits, the Business Partner/Supplier Relation, gained with the use of BI systems are presented below:

- *Reduction in the cost of transaction with business partners/suppliers*

Capgemini's representative Mr. Jonas Linders *strongly agrees (5/5)* that with the use of BI systems Capgemini has tremendously reduced the costs of transaction with business partners or suppliers (Appendix 3, row 178). Furthermore, he argues that this can be achieved in many ways:

" *So, just by taking your sort of accounts payable, just by that mere action. So, it's a limited set of tables in your ERP system, you would put that into BI and you will start to do traditional BI spend analytics. You could consolidate the number of vendors you have, you could use a volume as an argument to get better deal sort of things.* " (Appendix 3, row 178)

Likewise, Interviewee 2 *agrees (4/5)* that this benefit can be achieved by the use of BI system (Appendix 5, row 124), whereas with the lack of data Interviewee 1 remains *neutral (3/5)* (Appendix 4, row 124).

- *Improved coordination with business partners/suppliers*

When asked if the companies have improved the coordination with their business partners or suppliers, Interviewee 2 *strongly agrees (5/5)* that this is the case with his company arguing:

" *(...) I can see for this customer how we work with him, which projects we did, which tools we used, and how much we made, how much is left... like everything.* " (Appendix 5, row 130)

Likewise, Mr. Linders *strongly agrees (5/5)* that Capgemini has improved the coordination with its business partners and suppliers (Appendix 3, row 236). However, Interviewee 1 stays *neutral (3/5)* about whether his company has achieved this benefit after using the BI, stating that he is not in a possession of such information (Appendix 4, row 126).

- *Improved responsiveness to/from suppliers*

For the "Increased responsiveness to and/or from suppliers" benefit, Interviewee 2 gives *neutral (3/5)* asses (Appendix 5, row 134). On the other hand, Mr. Jonas Linders *strongly agrees (5/5)* that the increased responsiveness can be achieved by using the BI system, providing an example of the negotiation for a number of days payable when the invoices are payable (Appendix 3, row 182). Capgemini help their customers in different ways, adds Mr. Linders:

" *We help numerous customers with that type of solution, and it so shows that quite a few organizations tend to pay their invoice before they had to, with a negative impact on the cash flow. So, by using the actual same number of days payable to better extent, you would get better efficiency of your economy.* " (Appendix 3, row 182)

In addition, Interviewee 1 *agrees (4/5)* that this benefit can be gained by the use of BI, but because of his position at the company, he argues that his assessment is based on "gut feeling" and not precise information (Appendix 4, row 128).

- *Reduced inventory levels*

Regarding "Reduced inventory levels" benefit, Interviewee 1 stays *neutral (3/5)* arguing that he has no visibility on that, arguing:

" *We are in the hardware business as well so I can only guess it is the case*. " (Appendix 4, row 130)

Just as Interviewee 1, Interviewee 2 has a *neutral (3/5)* assess about this benefit (Appendix 5, row 134). However, Mr. Jonas Linders *agrees (4/5)* that Capgemini is reducing the inventory levels in different ways, stating:

" *So, in retail today we are doing quite a few sort of inventorial warehouse predictive analytics to decide your order point in time rather than having your sort of physical minimum levels. We are using predictives to say "okay, here is a pattern of how people buy jeans", for instance. So, this would be the right point in time to do reorder and also calculating where do I get the best discount given, how long I would store that amount of money on the shelf before it is actually turns into revenue.* " (Appendix 3, row 184)

4.2.3 Internal Process Efficiency

The assessments from the interviewees on benefits from the third group of benefits, Internal Process Efficiency, gained with the use of BI systems are presented:

- *Increased efficiency of utilizing assets*

For the first benefit "Increased efficiency of utilizing assets" which is the part of Internal Process Efficiency benefit group, all three interviewees gave positive assesses. Mr. Jonas Linders *agrees (4/5)* that this benefit can be gained by the use of BI systems, but only by analyzing "*less digitalized or less heavily costly assets*":

" *(...) there is a new set of technology referred to as Beacons or iBeacons. So, by putting Beacon on that and putting a receiver - you could instantly see where you have your assets laying around.* " (Appendix 3, row 188)

Interviewee 1, speaking about the company in which he works and the business environment in which the company operates, he *strongly agrees (5/5)* that this benefit can be gained giving the following argumentation:

" *(...) we are trying to build only things which users want. That's not that we are like immediately cut off of every waste. On the contrary, sometimes we do create waste purposely. I mean, we do experiment on different ideas and majority of those will never end up in production. But that allows us to understand users better, understand our products better and also give us fresh view and new different directions. The more different things you try the better products become at the end. So, all in all, the efficiency is much increased, but thanks to that we also have a room for waste, but that's purposeful waste.* " (Appendix 4, row 134)

Likewise, Interviewee 2 also *strongly agrees (5/5)* that the efficiency of utilizing assets can be increased with the use of BI systems, even in the business field in which the Company 2 operates (Appendix 5, row 144). In this context he argues:

" *I mean, it's like which employees are working and having many projects, which ones have lower work load... and yeah, then we can maybe know like next months or like in every minute who have been working in this domain, or like this person need new project, etc.* " (Appendix 5, row 146)

By having slight differences in the assessments, as an assumption for "Increased efficiency of utilizing assets" benefit we can say that the probability of appearing of this benefit in different business fields seems to be high, but the extent of this benefit can be different from field to field.

- *Leveraged the advantages of IT upgrades, improvements, and/or new developments in back-end IT systems*

Coming from different business environments, our respective interviewees have different opinions on this benefit. Interviewee 1, who works for large international technology company, *strongly agrees (5/5)* that his company has achieved or experienced this benefit (Appendix 4, row 136). Moreover, he argues that everything in his company depends on the IT upgrades:

" *Everything is depending on that. Definitely! There is like back-end… well development in the platform itself. The way how all the data is gathered and send, and so on… development*

in the back-end, there is a huge huge cloud behind it. There is great set of tools to be able to manage that amount of data, to process it quickly… you know I can query terabytes within seconds which is really impressive. And that's all thanks to the developments in the back-end and IT systems. " (Appendix 4, row 136)

However, on the other hand, Mr. Linders who is working in a large IT consultancy company, and Interviewee 2 who is working for small Swedish technology company, both remained *neutral (3/5)* on whether their respective companies have achieved this benefit (Appendix 3, row 244; Appendix 5, row 154). It appeared to be that they have misunderstood the meaning of this benefit, which could be result of their job position or lack of data or some other factors.

- *Improved efficiency of internal processes*

"Improved efficiency of internal processes" is a benefit on which all three interviewees gave positive assesses even though they work for companies operating in different business environments. For instance, Interviewee 1 *strongly agrees (5/5)*, arguing that the BI systems can improve the efficiency of the internal processes, providing detailed explanation on this benefit:

" *(...) there is no huge discussion anymore, you know about like "Yeah, what to build? How the feature should look like?"... it's no more, it's a simple answer, let's check from the data, just like query. And on top of like BI here is also experimenting, we do a lot of experiments as well right now, it's also like process through the same pipeline basically. We have some idea how to improve something and there is usually several permutations of that idea and we just like to test it on real users so we get the actual feedback what's good and what's wrong. And in many cases we had like a bad… so we had to change the idea or even abandon the idea completely. But, that's definitely improved, like the process efficiency because we don't build things we don't have to build.* " (Appendix 4, row 102)

Likewise, Interviewee 2 also *strongly agrees (5/5)* that his company achieved this benefit, providing an explanation how their BI system helps them to improve the efficiency of the internal processes:

" *We have some key performance indicator for different units and different domains. So, this system... we calculate this KPI's every month and see how it's moving or being better or worse. Then, of course, with data we go to every unit and tell them: "You are doing well" or "Maybe you can improve". So, for sure… yeah, it helps.* " (Appendix 5, row 94)

However, Mr. Jonas Linders thinks that the efficiency of internal processes is not improved directly from the use of BI systems, but he still *agrees (4/5)* that BI can have some sort of impact on achieving this benefit (Appendix 3, row 158). He argues:

" *(...) it's one thing to get inside the data underpinning that you should sort of commence change. It's another thing to actually deploy the change, and that's a business decision. It is not something automatically out of BI, but you can sort of get data to suggest and hint where you can tune your internal processes. But it doesn't happen automatically, it's a business decision, a way before you actually see the change.* " (Appendix 3, row 158)

- *Increased staff productivity*

When asked to assess the "Increased staff productivity" benefit, both Mr. Linders and Interviewee 1 *strongly agreed (5/5)* (Appendix 3, row 162; Appendix 4, row 104), whereas Interviewee 2 *agrees (4/5)* because he could not find direct connection to strongly agree on this benefit (Appendix 5, row 98). This slight difference in assessments of benefits could be again because of the difference of business environment in which their companies operate, and/or the purposes for which they use their BI systems for. In this context, Mr. Linders argues that it is all about the business decision (Appendix 3, row 160), while Interviewee 1 argues that:

" *We, as a data team for example, we are providers of the data and everyone knows where to look for the data. So, if someone needs something extra just ask us we deliver. But, in most of the cases we already have what people need.* " (Appendix 4, row 104)

This statement given by Interviewee 1 about what they do with BI system could be the key to improving staff productivity. Moreover, when employee has the important information on time the company could eventually save a lot of time, resources etc., making that particular employee more productive.

- *Reduction in cost of effective decision-making*

The "Reduction in cost of effective decision-making" benefit is one of the benefits assessed with all three interviewees' highest assessment. That is, all three interviewees *strongly agreed (5/5)* that BI systems can highly reduce the costs of effective decision-making (Appendix 3, row 164; Appendix 4, row 106; Appendix 5, row 100). Having said this, Interviewee 1 argues:

" *All the PMs even on the high level they are looking at the data and they are requesting the data. They define the KPIs which we need to follow and they base their decision on those KPIs. And I already heard a couple of times commands that the decisions made on the data, even there were sometimes might be surprising one, are much than those made on the guts feelings before.* " (Appendix 4, row 106)

This situation when we received three highest grades on one benefit could mean that even though these three companies have different business models and operate in different business fields, the costs of effective decision-making can be reduced with the use of BI systems, no matter the "nature" of the company.

- *Reduced operational costs*

And for the last benefit from Internal Process Efficiency benefit group - "Reduced operational costs", there are differences in assessments provided by our respective interviewees. Interviewee 2 remained *neutral (3/5)* because of lack of information regarding this benefit (Appendix 5, row 104 and 106), whereas Mr. Linders and Interviewee 1 *agreed (4/5)* that their companies have experienced this benefit (Appendix 3, row 116; Appendix 4, row 112). Hence, Mr. Linders provided further explanation of his assessment:

" *(...) you would look at indirect cost and indirect spend sort of thing. You would make adjustments, you would renegotiate with your vendors depending on how much call upon the services, you would argue that "Okay, this is the actual volume that we buy from you"... That sort of examples could be pulled.* " (Appendix 3, row 166)

4.2.4 Customer Satisfaction

The assessments from the interviewees on four benefits from the fourth and the last group of benefits - Customer Satisfaction, gained with the use of BI systems are presented:

- *Improved customer service*

For the first benefit "Improved customer service" which is the part Customer Satisfaction group of benefits, all three interviewees *strongly agreed (5/5)* that their companies have achieved this benefit by using the BI systems. Interviewee 1 supports his assessment by giving the following argumentation:

" *(...) I can see it, like within that year in which I was involved with that I can see the difference already. So it's like twelve months and there is like huge huge change. We do build new features around the user feedback, we do react to user problems very quickly* [than before]. " (Appendix 4, row 98)

Moreover, Interviewee 2 supports his assessment of the benefit by stating:

" *You see like how we are worked in with this customer, which areas he is looking for, when you delivered most last year for instance then you know that this month maybe you will get new request from this customer... and yeah, I mean everything that goes between... I mean, in this system at least everything that goes between you and this customer is register and lies. So, for sure, yeah… it helps you to support this customer better in the future maybe.* " (Appendix 5, row 90)

Therefore, by receiving all 5/5 assessments on this particular benefit, it could mean that no matter what the size or the environment in which the company operates, "Improved customer service" benefit could be achieved by the use of BI systems.

- *Reduced marketing costs*

The one and only negative assessment of the benefit is provided by Mr. Jonas Linders who *disagrees (2/5)* that Capgemini has reduced marketing costs after the company started using the BI system (Appendix 3, row 168). Mr. Linders provided the lengthy explanation about his assessment:

" *And the reason for that* [his assessment] *is set up until this point it is about to change, but up until this point in marketing we were using gut feeling. We think that this would be a good channel to communicate in, we think we get our money's worth by spending X, Y, Z millions on TV commercials getting the sort of brand recognition, we think. And then after we sent off the message, we are looking at the order book and see do we see an increase. And if we see an increase we assume that it's related to the message we broadcasted.* " (Appendix 3, row 168)

This strong and exclusive explanation given by Mr. Jonas Linders could be a perfect definition of why the marketing costs cannot be reduced by the use of BI systems, especially in IT consultancy business field. However, Interviewee 2 *agrees (4/5)* that his company has achieved this benefit (Appendix 5, row 108), and Interviewee 1 remains *neutral (3/5)* as he is not in possess of data to be able to assess this benefit accordingly (Appendix 4, row 114).

- *Reduced customer return handling costs*

Regarding "Reduced customer return handling costs" benefit we received positive assesses from our interviewees. In this context, as well as the Interviewee 2 (Appendix 5, row 114), Interviewee 1 *agrees (4/5)* that his company has achieved this benefit after started using the BI system (Appendix 4, row 116 and 118), but however his assessment is based on his "gut feeling", as he argues:

" *(...) like in this case, in majority of the cases, not all, we deliver software. So return is more handful for the hardware business and we are in the hardware business as well. I know all the cases when the data provided insights that there is something going on, either that hardware was quickly redesigned or there were like software fixes for some either driver issues or so on.* " (Appendix 4, row 118)

Different to the first two assesses, Mr. Jonas Linders *strongly agrees (5/5)* on whether this benefit has been achieved by Capgemini, arguing:

" *(...) it's business decision that actually reduce the cost defining the data, when it comes flawed products, or products not having the sort of actual quality that was promised, yes. But that goes back to sort of early identifying that we have situation here.* " (Appendix 3, row 172)

- *Reduced time to market products/services*

And for our last measuring item which is "Reduced time to market products or/and services", we received three different, but still positive feedbacks. Moreover, Interviewee 2 and Mr. Jonas Linders both *agreed (4/5)* that their companies have achieved this benefit by using the BI systems (Appendix 3, row 234; Appendix 5, row 116), but in this context Mr. Jonas Linders has stated:

" *There are two way to generic components operating on that question for me to give a good answer. One thing is, it all depends on what sort of service. And, the second one is again the situation where it calls the business decision to act upon the data shown. But, could we show data that could speed up the process of designing, developing the right products, could it be used to do a sort of limited test on the product for market segment to see whether or not is ready to be released? Yes.* " (Appendix 3, row 174)

Positively than the previous assess, Interviewee 1 *strongly agrees (5/5)* to this benefit, and his assessment comes from the following explanation:

" *(...) the whole process, the whole culture has changed. It's no more like waterfall, like if the PM's have the gut feeling like "yeah let's do this", and then for 2 years develop and then suddenly we publish something which like user like "yeah, fine but we don't need it" right. But now everything is around the users. We know what the users want. We think we know what the user want, we build features, we deliver quickly, it's basically like monthly cadence right now…* " (Appendix 4, row 122)

5 Discussion

This chapter is intended to present authors' impressions and observations concerning the empirical results obtained from the conducted research, as well as support the presented results with the chosen secondary literature resources.

5.1 The Use of Business Intelligence

The modern (contemporary) information technologies, like information systems that are used by growing number of companies on daily basis, are becoming strategically important tools (Petrini & Pozzebon, 2009). By this time, a growing number of companies rely on these information technologies (Petrini & Pozzebon, 2009). Nowadays, the companies that are in possession of the huge amount of data are facing serious problems concerning the costs for storing and processing of the data (Bantleman, 2012). Interviewee 2 argues that his company generates a significant amount of data, which for sure generate big expenditures (Appendix 5, row 22). Therefore, in this context, we believe that the use of BI systems and tools wouldn't be worthwhile if the collected data is of poor quality or the organizations have a lack of understanding of that data because, in that way, the companies will not meet their expectations. The common issue that entails the failure of BI initiative within the companies is when it does not fulfill the overall expectations from its use (Yeoh & Koronios, 2010). The common expectation from the use of every BI system within a company should be bringing an insight into and an understanding of the internal business environment (Hočevar & Jaklič, 2008).

The success and effectiveness of company are directly related to the speed of decision-making, i.e. responding on time on the everyday market needs (Hočevar & Jaklič, 2008). Therefore, the main aim of every business that uses BI systems should be the access to the quality data (Fisher et al. 2003; Kandampully & Duddy, 1999) in order to understand the business environment (Hočevar & Jaklič, 2008) and obtain expected benefits (Thomas Jr, 2001). In this way, in order to understand the business environment, Interviewee 1 argues that his company collects data on everything connected to the company environment like quality issues, development processes, etc. (Appendix 4, row 62). Business data is of great importance for any company when it comes to the use of BI systems because these data obtained can be the quality base for making appropriate and right business decisions (Sun Microsystems, 2005).

Also, Interviewee 1 says that by using the data that is collected from their platforms and tools, the company can understand the generic market trends (Appendix 4, row 42). Thus, we believe that the companies are becoming aware that the new market conditions require new solutions. The use of BI systems and tools within companies is one solution available to the companies, which implies continuous collection of data available to them (Watson & Wixom, 2007), then analysis and transformation (Michalewicz et al. 2006) to a new knowledge that will support future business decisions (Griffith et al. 2008). The integration of BI system on

the organizational level should allow interaction with all the data gathered through the use of BI systems in any segment of the company's operations. As Interviewee 1 says, if someone from the company need some data, they ask the "data team" which is providers of data (Appendix 4, row 104), we believe that the use of BI systems within the companies can give them a better overview of their staff, for the actual situation on the market.

Very often, before the decision for making an investment in BI systems is made, many companies are trying to calculate the feasibility of making an investment in such advanced information technologies. But, the calculation on the return on investment (ROI) could be quite often complicated due to the fact that it depends on the number of qualitative factors, both in terms of costs, but more in terms of benefits obtained from the use of BI system and tools (Marketing MO, 2017). Mr. Jonas Linders argues that it is very hard to say what kind of benefits can be obtained from the use of BI systems, but if the company is data driven and trust the story that data is trying to say, then the use of BI system could be complete "*magic in turnaround*" (Appendix 3, row 102). Given these points, we believe that the use of BI system could bring a number of benefits, depending on the purpose of its use.

5.2 The Benefits of Business Intelligence Use

On account of our empirical study, we can argue that the benefits obtained from the usage of BI are directly or indirectly connected to the business model and the business field in which the company operates.

5.2.1 Organizational Benefits

The values obtained from the use of BI systems can be expressed in terms of the company benefits (Elbashir et al. 2008). As it can be seen from the empirical results earlier in our thesis, depending on the business model and the business area in which company operates, different benefits of BI can be obtained. In this context, the *increased return on investment (ROI)* benefit is assessed with three different grades. However, even though Interviewee 1 gave the lowest grade, he still thinks that the BI system can indirectly bring some return on investment through "*second revenue flow*" (Appendix 4, row 148). Hočevar & Jaklič (2008) argue that the calculation of the return on investment ratio could be complicated due to the existence of quantitative indicators in terms of costs. Having said this, we believe that every business that operates similarly to our three observed companies, could obtain the same benefit in the reality, but to a different extent.

On the other hand, speaking about *enhanced profit* and *increased revenues/services provided* benefits Mr. Jonas Linders and Interviewee 2 strongly agreed their companies have obtained these two benefits. In this way, concerning to the *enhanced profit* benefit, Interviewee 2 argues that BI systems help them to understand "where are they going" and this knowledge helps them to make things better in future (Appendix 5, row 172). Moreover, concerning the *increased revenues/services provided* benefit, the same interviewee argues that the BI systems help them get insights in future trends, to understand in which areas or business processes to invest more, etc., explaining that in this way they could increase revenues (Appendix 5, row 160). In this context, we believe that companies operating in IT consultancy and IT and engineering field can enhance their profit as well as they can increase their revenues or services provided. Also besides what our respondents said, we believe that these companies can en-

hance their profit and increase their revenues through other ways provided by the use of BI systems. One of them could be through sales of data to customers, partners, and suppliers. As Manovich (2011) argues, nowadays many non-profitable departments within the companies are becoming revenue generators as a result of selling a data to their customers, suppliers or partners.

From the empirical results, it can be seen that we got three positive grades from all three interviewees about the *improved competitive advantage* benefit. That being so, Mr. Linders explained that this benefit could be obtained to a limited extent. He says that organizations should look "beyond the fence" instead of seeing the effects of what is happening in the market (Appendix 3, row 214). Positively, the empirical results make us believe that in reality the BI systems could bring this benefit to the companies through securing and analyzing data in real-time. That is supported by Watson & Wixom (2007), who argue that through analyzing real-time data the BI systems can detect shortcomings and deliver business insights and indications.

Same as for the previous benefit, the *reduction of lost sales/lost services provided* benefit all three interviewees strongly agreed that this benefit is earned by their companies, even though the companies which they are part of are having different business models. In that manner, Interviewee 1 argues that the use of BI system helped his company realize that some services are not being used accordingly because of the complex infrastructure that they possess (Appendix 4, row 140). Likewise, Gibson et al. (2004) argue that the use of BI systems can detect hidden costs or missed opportunities, as well as company's shortcomings (Watson & Wixom, 2007). That being so, we believe that BI system indeed could help organizations reduce lost sales, and even fix the services provided to some extent. Unlike the previous benefit, all three interviewees assess neutrally the *increased geographic distribution of sale/services provided* benefit. This situation arises from the lack of information by the respondents, even though some studies propose this benefit as a hypothetically possible to be gained from the use of the BI systems (Elbashir et al. 2008).

As a conclusion from the results, we believe that benefits from the organizational group of benefits could be obtained from the use of BI systems. However, that is merely by companies which have same or similar business model to the models of our observed companies, but those which have positive assesses one some benefits particularly.

5.2.2 Business Partner/Supplier Relation

Business partner/supplier relation benefits are those obtained from improved relations with business partners and suppliers (Elbashir et al. 2008). Our empirical results suggest that none of the four benefits from this group of benefits can be obtained by the use of the BI system. However, this is due to the lack of information that the interviewees possess in order to give the precise assessment to those benefits. In this context, Interviewee 1 is the one who is working at the position on which he does not have information for assessing *reduction in the cost of transaction with business partners/suppliers*, *improved coordination with business partners/suppliers* and *reduced inventory levels* benefits. Similar to Interviewee 1, Interviewee 2 has no information about the *reduced inventory levels* benefit. Even though some studies advocate the existence of those four benefits which refer to the improvement of the efficiency of the internal processes (Elbashir et al. 2008; Hesford & Antia, 2006), some of them can not be proved as existent in the reality.

Opposite to what is written previously, speaking of *reduction in the cost of transaction with business partners/suppliers* benefit, Mr. Jonas Linders argues that by the use of traditional BI spend analytics the companies could consolidate the number of vendors (Appendix 3, row 178). Moreover, for the *improved responsiveness to/from suppliers* benefit, through an example in a sense of paying invoices on time for the better business economy, Mr. Linders explained how BI helped Capgemini to improve the responsiveness from the suppliers (Appendix 3, row 182). Through graphical analysis, the OLAP technologies could find strong argumentation when it comes to defending company's standpoint during the negotiations (Hočevar & Jaklič's, 2008). Moreover, the advanced analytics of the collected information can bring early notifications (Ranjan, 2009), and these notifications could be about internal or external performances. Having said this, we believe that *reduction in the cost of transaction with business partners/suppliers* benefit can be obtained by companies that have same or similar business model as Capgemini and Company 2, while *improved responsiveness to/from suppliers* benefit can be achieved by companies that have same or similar business model as Capgemini and Company 1.

Concerning the *improved coordination with business partners/suppliers* benefit, Interviewee 2 says that they can see everything about their partners, starting from how they collaborate, what kind of projects they did together, etc. (Appendix 5, row 130). Moreover, concerning the *reduced inventory levels* benefit Mr. Jonas Linders argues that Capgemini uses BI predictives in order to reorder the best price materials in the right time (Appendix 3, row 184). So, as it is described in the previous paragraph, when a company has notifications obtained from advanced analytics (Ranjan, 2009) and fast and accurate reportings (Thompson, 2006), we believe that in reality companies that have same or similar business model as Capgemini and Company 2 could obtain *improved coordination with business partners/suppliers* benefit from the use of BI systems. Moreover, we believe that *reduced inventory levels* benefit can be achieved by companies that have same or similar business model as Capgemini.

5.2.3 Internal Process Efficiency

The *increased efficiency of utilizing assets*, *improved efficiency of internal processes*, *increased staff productivity* and *reduction in cost of effective decision-making* benefits are assessed from all three interviewees with the highest grade from the Likert scale. Concerning the *improved efficiency of internal processes*, Interviewee 2 said that his company uses key performance indicators (KPIs) in order to see the situation of their processes in terms of being better or worst (Appendix 5, row 94). Hočevar & Jaklič (2008) argue that the BI systems should administer insights and understandings about the inner-companies environments. So we believe that the use of BI systems would improve the efficiency of the internal processes as it helps in understanding what is happening inside the companies.

With the same assessment, regarding *increased efficiency of utilizing assets* benefit Mr. Jonas Linders popularized the use of iBeacon technology (Appendix 3, row 188). He argues that by using iBeacon and its receiver the companies can always have information about how their assets are laying around (Appendix 3, row 188). According to ReadyRatios (2017), the analysis of the management ratios for assets could find the answer about how efficiently and effectively the companies are using their resources. With the existence of such technology like iBeacon and analytical tools within BI systems, we believe that the use of BI systems would increase the efficiency of utilizing assets to a high extent.

For the next two benefits, Interviewee 1 argues that when the staff has some extra needs concerning the data, the data team can always help them (Appendix 4, row 104). In the same way, the data team from Company 1 follow the KPIs defined by their project managers (PMs), allowing PMs to make decisions based on those KPIs (Appendix 4, row 106). So, by providing the (extra) required data, we believe that the data team could increase the staff productivity in Company 1. Moreover, by having KPIs we believe that PMs could reduce the costs for effective decision-making. Hočevar & Jaklič (2008) argue that BI systems are tracking the problems that occur inside or outside the companies and their possible consequences, thus faster and better decision can be made.

Speaking about *leveraged the advantages of IT upgrades, improvements and/or new developments in back-end IT systems* benefit only Interviewee 1 was able to give an assess, saying that there is a wide range of tools that are able to process and manage huge amounts of data (Appendix 4, row 136). Regarding the assessments on *reduced operational costs* benefit Mr. Linders is the only one who explained that reduction of operational costs could be achieved in different ways (Appendix 3, row 166). The BI systems and its tools can contribute to the reduction of the operational costs using those tools for tactical and operational process improvements regarding the supply chain and operations (Williams & Williams, 2003).

As an overall conclusion about internal process efficiency group of benefits - according to our empirical results and support of literature, we believe that the probability of obtaining the first four benefits from the use of BI systems within companies with same or similar business models as our observed companies, is higher than the probability of obtaining the last two benefits explained in this section. However, we also believe that obtaining these benefits would be important about every company, because, as Elbashir (2008) argues, these benefits can improve the efficiency of the internal processes within organizations.

5.2.4 Customer Satisfaction

From our empirical results, it can be seen that *reduced marketing costs* and *reduced customer return handling costs* benefits from the Customer Satisfaction group of benefits cannot be achieved by the use of BI systems. Moreover, Mr. Linders and Interviewee 1 suggest that BI is unlikely to bring these two benefits to companies. When asked to assess *reduced marketing costs* benefit, Mr. Linders argued that companies believe that spending millions on TV commercials would be good, but the arguments for such decision are based on gut feeling (Appendix 3, row 168). The existence of these two benefits has been advocated by previous research (Elbashir et al. 2008; Hesford & Antia, 2006). However, according to our participants, in the reality, the appearance of these two benefits is not guaranteed.

On the other hand, *improved customer service* and *reduced time to market products/services* benefits can be earned by the use of BI systems, especially in the companies which are operating in same or similar business fields as our observed organizations. All three interviewees were decisive that by the use of BI their companies have achieved these two benefits. When it comes to *improved customer service* benefit, Interviewee 1 points the importance of customers by revealing that his company is working on building new features based on the user feedback (Appendix 4, row 98). Moreover, speaking of *reduced time to market products/services* benefit, Mr. Linders says that this benefit could be delivered depending on two different components: the type of service or whether a decision is required (Appendix 3, row 174). The BI can improve the customer service in five ways: stronger customer voice: the customer's voice

is heard by service providers; more quickly identify trends: the BI systems predict the future trends through collected data; more than just surface analysis: it can be detected in real-time what functions properly and what should be done better; deeper customer satisfaction: the satisfaction of customers will rise when changes are implemented; more engaged employees: the process of customer satisfaction can also satisfy the workers which can result in with better work environment (Alton, 2017).

6 Conclusion

Our research aims at identifying benefits that organizations have achieved by using the business intelligence systems. Therefore, our theoretical framework is based on academic literature that is in aligning with the aim of our research. Moreover, we can justify that our research has two objectives: (i) to portray how the companies are using the BI systems and tools, and (ii) assess the benefits of BI use. Therefore, we have used the qualitative method to carry out our research, that is by doing interviews with BI experts working at the organizational level. With that being said, we have created a questionnaire consisted of twenty-five open-ended questions aimed to discover how the companies are using the BI systems, and a table of twenty benefits with a Likert scale (from 1 to 5) with the purpose to provoke and capture detailed responses from our respondents on each benefit. For the main part of our research, which is assessing the benefits of companies' use of BI systems, we have used twenty out of twenty-two benefits originally included in Elbashir et al.'s (2008) research. Moreover, we have targeted and approached individuals who have a good overview of their respective company's BI system. We ended up conducting interviews with three companies who operate in different business fields and that are different in size.

Through the analysis of our empirical data, we have addressed differences in how BI systems and tools are being used within observed organizations. Namely, we have found out that some companies are using multiple BI systems simultaneously, while others are using a single BI system with some BI tools provided by third-party vendors. Likewise, all of our observed companies have shown differentiations (variety) in preferences and focus regarding information coming from different data sources (internal, external, and mixture of both). Moreover, some companies vendor the same BI system that is being used internally to their customers, while others have reported that the quality of their internal BI system is significantly lower in comparison to developments made on the ones provided to their customers. There are also differences in the number of BI vendors whose systems or tools the companies are using, how much and which analytical tools they use, where and how they are storing their data, etc. However, all of here analyzed companies have reported that their BI systems are integrated with other systems within the company, and BI systems and tools are being used to some extent in almost all of companies' departments. Likewise, the majority of observed companies reported that BI allows them to become more familiar with the market trends in the area of their business operations, and determine the return on investment. Given these points and according to our findings, we believe that business models and business field in which company operates dictate the exploitation of BI within that company.

At the beginning of our thesis we have set the following research question:

" *What are the benefits of business intelligence use within an organization?* ".

Based on our empirical findings, benefits that are most likely to be achieved by the use of BI within an organization are: (1) *Improved customer service*; (2) *Reduction in the cost of effec-*

tive decision-making; (3) *Reduction of lost sales/lost services provided*; (4) *Improved the efficiency of internal processes*; (5) *Increased staff productivity*; (6) *Increased efficiency of utilizing assets*; (7) *Reduced customer return handling costs*; (8) *Reduced time to market products/services*; and (9) *Improved competitive advantage*.

Moreover, benefits that are likely to be achieved by company's use of BI: (10) *Improved coordination with business partners/suppliers*; (11) *Increased revenues/services provided*; (12) *Enhanced profit*; (13) *Reduction in the cost of transaction with business partners/suppliers*; (14) *Increased responsiveness to/from suppliers*; (15) *Increased return on investment (ROI)*; and (16) *Reduced operational costs*.

However, following benefits: (17) *Increased geographic distribution of sale/services provided*; (18) *Reduced marketing costs*; (19) *Reduced inventory levels*; and (20) *Leveraged the advantages of IT upgrades, improvements, and/or new developments in back-end IT systems* are unlikely to be achieved through the use of BI on an organizational level.

We consider benefits that are "most likely" to be achieved those benefits on which we received all three positive assessments (4/5 and 5/5) from the interviewees. Under "likely" we consider benefits that received two positive assessments, and "unlikely" - benefits on which we received a maximum of one positive assessment from the interviewees. The table of benefits with the assessments from our interviewees on each benefit can be seen in Appendix 6.

As the results of our study show, the use of BI systems and tools within an organization could certainly result in achieving the decent amount of benefits. It is important to mention that we believe that the development in the domain of BI field is conditioned by the development of the region or a country in which the observed company is situated. Moreover, we acknowledge that the results of our study might not be generalized, i.e. applicable in all the countries of the World or in a different setting since we have conducted our study on companies situated in a highly developed country - Sweden. Therefore, we believe that the level of country's development in which the observed company is situated plays a big role in determining which benefits of BI use the company may or may not obtain.

Appendix 1 Approach E-mail

Hello,

We are students from Lund University in Sweden on the Information Systems programme, and at the moment we are writing our master thesis in the subject of Business Intelligence (BI). More specifically, about the benefits that companies in Sweden have achieved after implementing and using BI.

Hence, we would like to know if you have implemented and are using the BI system within your organization. If that is the case, we wonder if there is an opportunity for us to interview someone who has a good overview of the BI system within your company. Our schedule is quite open so it would be better if you suggest time and date of the interview. We would send you our questionnaire in advance and the interview can be done via Skype or in your offices - it is up to you.

Kind regards,
Filip
Kristijan

Appendix 2 Questionnaire

INTRODUCTION

- Before we start this interview we would like to know whether you want your and/or your respective company' name to be kept anonymous?
- Are you okay with interview being audio recorded?
- If you do not mind, we will give the brief introduction to our research and ourselves.

GENERAL QUESTIONS

1. Can you tell us a bit about the company you are working for?
2. What is your position within the company and for how long have you been working at that position?
3. Have you worked on/with Business Intelligence (BI) projects/tools previously?
4. For how long your company had the BI system implemented? Do you know the exact year of implementation maybe?
5. Can you please tell us what were the reasons for implementing BI within your company?
6. Is your BI system integrated with other systems within your company? If yes, how? If no, why not?
7. In which segments of business operations you use BI? More specifically, for what jobs?
8. How many or which departments/units are using the BI tools?
9. Do you know how many users does your BI system have?
10. Does BI allow you to become more familiar with the market trends in the area of your business?
11. Does BI help you determine the return on investment (ROI)? If yes, in which way?
12. Are you (your company) developing the BI software or you are just using software provided by a vendor?
13. Can you name your BI software vendor?
14. For how long have your company worked with your BI software vendor?
15. What are the reasons for selecting that specific vendor?
16. Can you refer your company as a prospector - the one who is constantly looking for new BI tools and solutions?
17. Can you refer your company as hit seeker?
18. Regarding data collection process, what type of data (internal sources/external sources/both) is of great interest to your company and why?
19. Which information coming from external sources are you looking for? Why?
20. Do you know where the collected data is stored? Is it stored in-house or on cloud or somewhere else?
21. Do you know what kind of analytical tools for data processing is being used?
22. What types of visualization tools are being used when presenting results to your associates or partners?
23. In your opinion, which process(es) of current BI systems is/are the most challenging? Why?

24. What barriers or weakness would you identify in current BI systems and how do you think those barriers could be overcome in the future?
25. How you see BI in the future? In which direction are developments being headed to?

TABLE OF BENEFITS

Since it started using the Business Intelligence system my company achieved following business benefits:

	Benefit / Opinion	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	*Improved customer service*					
2.	*Improved the efficiency of internal processes*					
3.	*Increased staff productivity*					
4.	*Reduction in the cost of effective decision-making*					
5.	*Reduced operational costs*					
6.	*Reduced marketing costs*					
7.	*Reduced customer return handling costs*					
8.	*Reduced time to market products/services*					
9.	*Reduction in the cost of transaction with business partners/suppliers*					
10.	*Improved coordination with business partners/suppliers*					
11.	*Increased responsiveness to/from suppliers*					
12.	*Reduced inventory levels*					
13.	*Increased efficiency of utilizing assets*					
14.	*Leveraged the advantages of IT upgrades, improvements, and/or new developments in back-end IT systems*					

15.	*Increased revenues/services provided*					
16.	*Reduction of lost sales/lost services provided*					
17.	*Increased geographic distribution of sale/services provided*					
18.	*Enhanced profit*					
19.	*Increased return on investment (ROI)*					
20.	*Improved competitive advantage*					

Appendix 3 Interview 1 Transcription

Time and Date: 10:00h, 27th of April, 2017
Location: Malmö, Sweden
Duration: 113 minutes
I**nterview format:** Face-to-face
Researcher 1: Filip Dakic: FD
Researcher 2: Kristijan Markovski: KM
Interviewee: Jonas Linders: JL
Company: Capgemini
Transcribed by: Kristijan Markovski
Transcription checked by: Filip Dakic
Transcription date: 6th of May, 2017

Row	Speaker	Text
1	FD	Okay. So, as you see in the introduction, we would like to know whether you want your or your respective company's name to be kept anonymous?
2	JL	It's not necessary.
3	FD	Okay, great! Are you okay with interview being audio recorded?
4	JL	Yes.
5	FD	Great! So, we spoke about some things before, so if you don't mind I will give a brief introduction to our research and our master thesis. I'm doing a thesis with my colleague Kristijan who is not here, so I will be conducting this interview today. So, as I said to you in the e-mail, our topic is: "Assessing the benefits that companies have experienced by using and implementing business intelligence". Yes. So we have came up 25, let's say general questions, and as you see in the table down below we have 20 measuring items that we have taken from the article from the Internet. So, can we begin with the general questions?
6	JL	Yes.
7	FD	Okay, perfect! So can you tell us a bit about the company you are working for?
8	JL	Right. So, Capgemini is what we typically in the business refer to as a service integrated. So we are one stop shop for all sort of IT related services. All in all, we are one hundred and... close to one hundred ninety thousand worldwide, so that would put us among top 5 I would say worldwide. Yeah, well for what practical purposes... Are you familiar with sort of business model for consulting in general terms, otherwise I'll be happy to sketch it out

		for you.
9	FD	No, no, I would like to hear about it.
10	JL	Yeah, because I will probably refer to that when I start with my answers because it all depends on way you act and way you do things. So, if nothing else this is sort of general perception of a consulting business. This is not IP of Capgemini, it's my IP if anything but it's just a general observation. So, we interact with the customer throughout the full life cycle of the IT system development change and all those we refer to it as "design, build and run" being the three phases. Nothing new to that. So, this is early stage - we are doing typically a pre-study bits, we are doing governance discussions, we are doing architectural pieces, inspiring... sort of, yeah. Second to that, we would start to build the actual solution. Once gathered the requirements understanding what we should do. So that would be build. And then in the run phase we are looking at the aftermath of the development project, so handed it over to application management typically. Yeah?
11	FD	Yeah!
12	JL	Now, since we are commercial industry, we need to get our money one way or another. And the three typical ways to get the money, I think time and materials build by the hour, or... let me put it like this: in terms of time, cost and result. In a time and material game we are selling our resources or effectively CV's to the customer. We assume responsibility for the availability in terms of time and duration the consultant will stay on. We take responsibility for the cost, the price tag but we don't assume any responsibility for the results, because they are all part of the operations of the customers. Right?
13	FD	Indeed.
14	JL	Now, the other business model is project where we assume responsibility for the time and estimates and the costing, and also for the result. The third business model which is rapidly growing as a part of the industry is services. And in service game, the customer are not aware of what amount of resources we use to produce the service. However, they get a price tag and we guarantee a result typically we talk about service level agreement, so SLAs. All familiar stuff to you?
15	FD	Yeah, yeah!
16	JL	Good. Now, the observation is, if you are setting a practice might be in the national or just local team like in Malmo, you would like to stay along that sort of line so the combination between how we conduct design phase things, typically we would do that as time and materials, since it is all about chemistry between the customer and the actual consultant and the experience that the consultant brings on his CV. I have done this before and best you can get for money, sort of. Second to that, in building the systems, so in build phase, we would preferably do that as a project also assuming responsibility for the result. Reason for that is the simple: because in time and material the only thing that actually happens after we have conducted the assignment is added

		in new line on the CV for the specific consultant that he doesn't do anything for the company. Whereas in the project we would, if everything goes well, get a positive reference on the work done, we could sort of display this and say: "Okay, we have done this. We have helped customers X, Y, Z to achieve this". Yeah. Thirdly, in the service game, we heavily rely on our IP so we have a factory doing ETL. We have as a service in the clouds stacked somewhere where we can do all the magic sort of thing. And those are a sort of the general business models and how are they applied to the different stages. Mind you there, heaps of things that falls out of my sort of golden cut here. But, it also comes with the territory that this sort of percentage on the work force we have would fall long, typically the sort of numbers, once you have sort of established your practice. It would… yeah, gradually turn into that type of numbers.
17	FD	Yeah.
18	JL	Yeah?
19	FD	Yeah, great!
20	JL	Make sense?
21	FD	Yeah, perfectly, yes!
22	JL	Second to that, you also need to bear in mind... Have you done any sort of business grade in finance management?
23	FD	No, not really.
24	JL	Okay. So, Treacy and Wiersema came out with something I think they called it "The competing value strategies". And I think because it's commonplace now, the terminology is familiar to you, but I will do a bit of background and theory on this just to make it more obvious what this really means. So, in the model they say that three general ways of positioning you on the market. One way... and I will do, I will try to exemplify what this means by the automotive industry. This is… most people have a fair idea what car brand is that. So, one of them are operational excellence, commonplace term that you probably have a rough idea what does that means... Now, OPEX companies in the car industry would be typically Ford, Toyota, and the promise to the market is that we have the best price performance. We're not necessarily having the best product - the funkiest car, but considering the sort of quality you get, you couldn't find lower price tag; hence Ford claimed it was said about Ford, some fifty years ago you can have any color you want as long as you chose black, and that is… sort of the mindset. And also when it comes to OPEX companies, the way they make money, how they prosper, is all about tweaking the supply chain cost to the minimum and maintaining that quality, that's sort of competing game they're in. Now, in contrast to that you've something which is referred to as either product innovators or product leaders. Now, take a wild guess who would be the sort of product leaders in the car industry. Familiar household brands of cars that you know.

25	FD	I mean any brand of car? Like, that is at top level?
26	JL	Yeah!
27	FD	Maybe Mercedes, Porsche, BMW, Volkswagen maybe before the incident.
28	JL	Yeah, Audi...
29	FD	Yeah, as well.
30	JL	Vorsprung Durch Technik, it says in the catch phrase. If you necessarily are going to get yourself a car, this is a best thing money can buy.
31	FD	Yeah.
32	JL	Within standardized cost module. And as opposed to an OPEX company where shit goes down in the supply chain, magic happens in the research and development. So looking at the organizational processes which one of these for us to compete and win? This is production line, this is however R&D. And also if you would go in and look at spend, you would see that I'm right and so Treacy and Wiersema are right. So what is a third option then? If you want to sort of roughly position your strategy. It's called client intimacy. And the car industry doesn't really had that sort of hundred percent bespoke things, but Rolls Roy might became fairly close to what I'm talking about. So, you can have any number of champagne coolers in the backseat you want, you can have a flat screen TV. We are not saying it's going to be good, and we are definitely not saying it's going to be cheap, but it's going to be exactly what you wanted. And by the way, when we are getting the skin of the animal to dye it and make it your backseat, you can tag along on the on the right, going down to Italy shooting the reindeer or whatever it is. Yeah?
33	FD	Yeah.
34	JL	So that's the promise. And where does magic happen? In customer relations.
35	FD	Yeah, of course.
36	JL	So, different parts of the organization's sort of standard process landscape would be the leading bit in how we compete and win. Also, Treacy and Wiersema states that you choose one axis, any one where you decide to be world class. And by necessity, on the other ones you stay with good enough to support that. Otherwise you would be stuck in the middle.
37	FD	Yeah.
38	JL	Right?
39	FD	Yeah, of course
40	JL	Makes perfect sense.
41	FD	Yeah.

42	JL	Now, in the consulting industry, this would translate OPEX, it would translate into client intimacy or the products are sort of wrapped around the reality of the customer and their context in current situation and availability of starting, jodi jodi (etc.). Yeah? Whereas the service production is all about getting a very lean production of the quality you promised the customer living up to SLA's, everything else would go into bottom line if you don't need to spend that money. And, of course, this is product leadership.
43	FD	Yeah, makes perfect sense now.
44	JL	It makes perfect sense, but do you see the challenge in the consulting industry?
45	FD	Yes.
46	JL	We are heads on with what Treacy and Wiersema states - you choose one.
47	FD	Yeah. I mean, this is smart… business strategy. I mean, is hard to compete with everyone, it's better to focus on something and do it correctly and in a right way, I guess.
48	JL	It is. So, is that sort of relevant backdrop to you?
49	FD	Yeah, it is!
50	JL	To the forward discussions we are getting?
51	FD	Yeah, great! So, do you know maybe how much employees are in Capgemini just in Sweden?
52	JL	I will have to, sort crosscheck that number, but I think it will become around two thousand.
53	FD	Okay, right. So, speaking of you, what is your position within the company, and for how long you have been at the company and the position you are in right now?
54	JL	Okay. So, my formal... I'm within insights and data which is… you could say it's a competency domain, and also division within Capgemini. And my role is… I'm a regional manager for southern Sweden, whatever is sort of definition of "southern", but everything south of Stockholm currently. So that's my responsibility. I arrived at the company as late as September 2016, so I've only been run for seven months. However, I was doing the same sort of stunts for CGI for the last eighteen and a half years, so I was with CGI working within the BI industry. So, the only thing I know anything about is actually BI and consulting.
55	FD	Great!
56	JL	Yeah! I'm being pure player.

57	FD	So, on your scale you are basically OPEX and somewhere there.
58	JL	Not really, no, we are trying to cover all three boxes, this is really my business plan I've shown here.
59	FD	Yeah.
60	JL	But it could be anybody's business plan in this industry unless you decide... There are actors in this industry who have sort of singled out one of those is to act in. So your people have only sort of do the high level strategic work, but they don't really supply any hands and feet for doing the actual construction. But, in CGI… sorry, in Capgemini… you see, it's not so long ago… In Capgemini we have due to the sheer size of the organization - we are one stop shop and we cover all the angles. But also facing the sort of Treacy and Wiersema's challenges as a consequence. It would be easy to just choose one but we aren't.
61	FD	Yeah.
62	JL	Yeah?
63	FD	Yeah, it's a big company and I'm realizing what you are saying to me. So I think we covered a bit of the third question, which is: "Have you worked on or with business intelligence projects or tools previously?"
64	JL	I would add to sort of this question and general information about the organization. I mentioned insights and data being in my practice. It's a global practice and we have some ten thousands seven hundred employees worldwide working with insights and data, which for your reference is both traditional or core BI. It's big data and analytics and it's also master data and information governance, that's a definition in terms competence and what we are doing.
65	FD	Yeah, great! So, do you maybe know for how long your company had a business intelligence system implemented, or maybe do you know the exact year of the implementation of BI within the Capgemini?
66	JL	That would be one of those question which doesn't really relate to my industry, since we are in the game of implementing for others basically. And as always, the sort of leveling quality of our internal BI is a quite bit south of the sort of general hallmark for our customers. So I think we have less a good BI sort of intelligence solutions around, then our customers that we have serviced. That's typically always the situation that you do sell something and try to be a product leader within the area, but when you turn around and look at your own internal systems and solutions they don't really live up to what we promise others, to be in all fairness. Please don't reference me in your thesis.
67	FD	Okay. So, you know maybe the reasons for why Capgemini implemented the BI systems for itself, not its customers?
68	JL	Well, in an organization covering pretty much every country in the world

		with one hundred and ninety thousand employees, we do not have one BI system. Though I know that the general idea we are having in one enterprise data warehouse single version of the truth sort of thing, isn't really not achieved in that size of operation. So, rather than replying to you explicit question I would like to reply to the implicit question: what sort of general reasons for deploying BI might be relevant, and we have all of those in use. That would have to be my best reply to the question you really didn't ask. So here we go again, another matrix. Also not a Capgemini IP, this is more from sort of my own goods. But, here we go; there are really few things that BI do sorts of values that BI deliver. One is we do integration, a fair amount of integration in its purest form. However, integration is handled by an enterprise service bus. That would be sort of the standard trick if you want integration with no obvious purpose, more sort of a generic infrastructural functionality, you would turn to enterprise service bus. On the other hand, in all BI we heavily rely on need to get in place a fairly high level of harmonization of the terminology. So the way you would design an enterprise data warehouse or even if you build data marts, so you have all your dimensions and the dimensions are in fact the definition of your business objects, relevant business objects of terms. So, the second axis would be harmonization. Now, in its purest form again that would be master data management not really BI. However, every sort of combination between those two tend to be a BI or an application of BI type. Now, putting High and Low onto those two axises I get my favorite form of matrix in 2 x 2. And starting at the combination of low integration requirements and low level of harmonization requirements... Example given here: for instance, if you have a sale system and in terms of organization your audience or your end-users would be sales lead and salesman, and they need to sort of slice and dice the data over job, geography, product types, jodi jodi. So that would be the low level of harmonization because nobody outside sales would be interested in identifying customer for instance, or sales region of whether. You would have something that we refer to as "domain-specific applications". So it's a sort of niche or needlepoint BI rather than broader. And, one of the poster child product vendors for this would be QlikView. This is really their domain land and expands sort of their general strategy and those other types of areas where you can land with QlikView. Now, moving up the ladder in terms of harmonization you will find enterprise reporting quadrant. And enterprise reporting is all about having a high level of harmonization. So, for instance EBIT is EBIT is EBIT wherever you turn the same definition of EBIT. However, you don't necessarily have to have an integrated information model underneath to support it with data. It could be that the sort of to stick your straw into all the different data sources, and you integrate basically in the report by having harmonized definitions across reports. Yeah?
69	FD	Yeah.
70	JL	So that's we have traditional Cognos, or even, if you say, reporting services from Microsoft sort of solution. Yeah, that's the poster child sort of implementation to this. Now, taken into the furthest extent of things you would land in performance management quadrant. So high level of harmonization

		high level of integration spells performance management. So, for instance Norton-Kaplan balanced steering sort of idea from the top level of the group be able to drill down to your sales order line and just panning up and down up and down. That calls typically enterprise data warehousing solutions, with a bit of sort of visualization reporting tools on top. Now, this is what I've been doing for close to 20 years that sort of solutions predominantly. And, after some 10 years I started to look back into history and say: "Okay. So, the things we have delivered so far what was a sort of reception they received when delivered?". And in general terms we managed to live up to the promise to deliver the expected business value. But, there was some 10% maybe 15% of the target audience when users that was not really happy with the solution. And when I started to dig into that sort of pattern, it looked like they pretty much have the same job all the people who weren't really happy. And, it so turned out that they seem to be analysts, or specialists, or business developers. And it makes complete sense, because your enterprise data warehouse are using performance management sort of domain. What it is? It is a system that replicates your current way of operation and your current definitions. If you are a business developer however, you are sort of urged to think outside the box and the tool you got is a rigid box. So it makes perfect sense that they weren't happy, but it took me a while to figure that one. So what is then the option in the last quadrant? That would be… let's call it business discovery for practical purposes. And this comes with a high level of integration but a low level of harmonization. So what you want to do is to be able to connect different data sets, but you don't want to be forced by the definitions of your current dimensions hierarchies, etc. You want to replace "we build your organization" according to: "What if we acquire this new company and we rebuild this and we moved that over there" sort of things and testing your hypothesis. So, that's another ball game. Also, the amount of data in all the other three quadrants is basically the data you have from your internal business processes. But, in the last quadrant it expands to everything that could be found on the web. So this is a sort of explosion. And hence the terms of big data and in order to make sense of big data you can't rely on your eyes or your brain anymore. So then you get all the algorithms of sort of predictive analytics coming into play. Does it make sense?
71	FD	Yes, yes, of course. Thank you!
72	JL	We have all of those, we have only just started on the last quadrant in all fairness, we have sort of pockets of domains where we start to bring in Facebook/Twitter feed sort of thing, data from wearables, etc., to understand rules and deploy that on the market to other customers.
73	FD	Yeah.
74	JL	Yeah?
75	FD	Yeah.
76	JL	But predominantly its first three types of BI that we actually did internally.
77	FD	So maybe we can put the fifth question in the context of when you started to

		look at the big data for the company itself.
78	JL	For internal purposes or towards customers?
79	FD	For internal purposes.
80	JL	So given the fact that I don't have very much history of the organization this is more guess working...
81	FD	Yeah, it's okay.
82	JL	Yeah. But I would say… well, on one hand we have been looking at for the last 5/6 years, saying 2011/2012 sort of thing, more to understand the concept that technology deployed to be able to service our customers. To use it internally, I think and that would probably be around market departments, saying the last couple of years that we actually use that sort of technology to gain insight about our customers, and what they think of us and what sort of the general sentiment of Capgemini. How is a brand appreciated by the market - are we perceived as an OPEX organization or are we perceived as a product leader within specific areas.
83	FD	Yeah, great! I think we kind of touched the sixth question... so, is your BI systems integrated with other systems within the company? If yes, how. If no, why not?
84	JL	See if I get your question correctly. Is our BI system feeding other operational systems, so does it acts as an ODS - I don't know. I sense that there are situations where BI is not the end station. Yes, I'm pretty sure on that. However, as being by trade and architect I have not been asked to turn around internal BI upside down and find out that how it's actually built, so...
85	FD	Okay. So, I know it's hard to define but, is it maybe possible to define like, in which segments of business operations you actually use BI, or for which jobs?
86	JL	So, as I said the three different areas or quadrants, we do… I know that for sure, do the domain specific applications sort of BI specifically around sales power opportunity follow-up sort of thing. We have more traditional sort of enterprise reporting applications for the both regulatory and also for sort of the internal information flow of the predominantly the financial status of operation. And we do have sort of performance management since we have scorecards for oh so many things and incentive models. We are using enterprise warehousing sort of applications and analysis in order to make sure that people get rewarded in the proper way. So those would be the obvious examples, if I could think about the question maybe we can come back and find a couple of more suitable examples, but at the top of my head those would be the areas. So rather generic and standard I would say doesn't differ tremendously from any business.
87	FD	Yeah. I think we can skip the eight question, which is: "How many or which

		departments or units are using the BI tools".
88	JL	It's ubiquitous that's where BI is at today. Is not confined into certain areas. However, as I said, maybe sales and marketing is more of the domain specific when it comes to scorecard and general view of the operations you will find the enterprise warehousing performance management quadrant type of implementation. And the enterprise reporting bit is predominantly for external reporting and regulatory reporting.
89	FD	Yeah, great! So, does your BI system allow you to become familiar with the market trends in the area of your business?
90	JL	Yes it does. To a certain level I should say. I can't say that that we have a full grasp and I think one of the reasons is that we don't have a hundred percent solid definition of products. Being consulting it's harder to follow by doing for example sentiment analysis of Twitter/Facebook, we are business to business organization. So, well, our customers don't tend to tweet a lot about us. And also I think the definition of the market and a customer, I strongly sense that we could have more solid definition of the business object customer, because you have the sort of suspect-prospect gradually turning into action customer. And I think those assets if not rigidly defined to do solid analytics based upon the concept which is just slightly blurred in the edges doesn't give you all that much. But I know sure that we are sort of web crawling over all the major papers and all that to say: "Okay, so how are we portrayed? What is reported about Capgemini?".
91	FD	Yeah, great! So, I know it's not a perfect question for you but… can BI actually determine the return on investment?
92	JL	In insight?
93	FD	Yeah.
94	JL	Absolutely, absolutely.
95	FD	So you can figure out with… Let's put in this way: before BI how hard it was to determine the return on investment and how has it changed?
96	JL	I misread you there, sorry. I thought the question was if used BI to determine the return on investment where the investment wasn't BI, but you are asking can BI analyze itself to define.
97	FD	Yeah.
98	JL	No. By design it's impossible, you can't be both the instrument for measuring and be the instrument being measured sort of. That's an internal conflict in ideas. So I would say no.
99	FD	But for other processes in the company? Yeah, it helps...
100	JL	Absolutely!

101	FD	Great!
102	JL	But, I think to invest in BI you have to be strong in faith. It's more about determination than finance I think. Because, let me put it this way: what is the value of a better decision across your organization? If BI is about making better decisions, what is the value of a better decision, one better decision? It can be said, I mean this could be the reason why you actually do acquire a new organization which is some 80% in size of what you already have. It could be that sort of magnitude in that one decision, or it could be a minute decision with absolutely no relevance. So it's very, very hard to say what sort of payback and return of investment you get on BI. It's also very much a cultural question. Some organizations tend to trust their gut feeling and experience and level of seniority in the market. And they wouldn't care about if the numbers were contradicting their gut feeling they would still go with their gut. But if you are data driven organization however, this could be the complete magic in turnaround, if you trust data. But if you trust your gut, I mean… go with the gut.
103	FD	Yes. So, you explained with the table that you are working with different companies that develop BI systems.
104	JL	Yup!
105	FD	Is that solely... QlikView?
106	JL	Nope! We are a product and sector agnostic implementer of business intelligence. However, we do have partnerships obviously, but we don't let that partnership sort of clutter our judgment of what is a better solution for customer. Because, if you go to your customer and they seem to be spick-and-span Microsoft boutique, they are using the .NET platform for everything sort of thing. If I were to suggest that we should use an Oracle database and this, and let's go with Informatica ETL or whatever, there are so many problems. It might be the better technical solution that I'm suggesting, but given the context of the receiving organization it might be that they don't have that type of resources they would have to spend trillions on education, hire new people just to maintain the damn thing. It also might be that explicitly for that product might be top-notch best of best in breed sort of product. But in Sweden, and that's example Tableau for instance being challenger of QlikView in some respects, to find a vendor who can supply you with Tableau on the Swedish market is problematic. There are very few consultants and even fewer vendors around. So even if Tableau might be the sort of price point best solution, given the number of users, jodi jodi, type of thing, it might have all the sort of bells and whistles in terms of functionality to make this brilliant. But, it's still not a good idea. Because once we built it there will still be a scarcity on the market for competency when we hand it out. So hence, we are product and sector agnostic implementers because we do strongly sense that you need to take those things into consideration having just the best of breed solution, is not necessarily what gives the most value to the customer. Make sense?

107	FD	Yeah, yeah, of course. So, you have explained that you are working with different BI software vendors, so maybe we can skip those questions like: "Can you name your BI software vendor?" or "for how long have your company worked with those specific vendors?"
108	JL	It would fill up a couple of pages! I don't think it's valuable to you, but I would be happy to supply you with input if you want to. But I strongly sense that being agnostic really means agnostic, so you would pretty much be market definition of BI vendors.
109	FD	So, we can put it in a way that you have a lot of vendors that you are working with in the BI space, right?
110	JL	We are working with everybody where is relevant to our customers. So, we sort of turn the idea around. However, it's not a secret in any way that we work with the big four and their BI stack. In addition to that, Informatica is really relevant when it comes to being a top-notch ETL tool. We are working with QlikView not being one of the big fourth. I think that's rather commonplace, once you say you are agnostic you sort of hand it over to who is performing well on the market, because then you would have the supply of competence all that trailing and then it's feasible for the customer to maintain such a solution. So, no real magic to it, it's more logic applied.
111	FD	Yeah. We have a question of that type, so you touched a bit on it. So, can you refer to your company as a prospector, to the one who is constantly looking for the new BI tools and solutions? And in terms of that, can you refer to your company as a hit seeker, or seeking for a best products or best tools available?
112	JL	Could you give me a bit more of definition of those two stereotypes you gave?
113	FD	I mean, by saying prospector we mean is your company always looking to develop the current BI systems that you are using internally, as well as you are offering your customers?
114	JL	I would say both. The question doesn't really make much sense to me. So, given what I said before about following sort of development of the market, are we on the outlook for sort of new and upcoming? Absolutely! We monitor the BI space very closely, attend all the sort of events and that sort of things… yes! Are we hit seekers, meaning that we are following the logic of money sort of thing? Absolutely! We are in the moneymaking business, I mean...
115	FD	Of course.
116	JL	So, yes to both. But, in relation to what I said before, the first sort of model presented here with the design, build and run being the different sort of formats for making money. If we look at the service, so if we would have a sort of platform as a service, insight as a service, data as a service, you name it… then the choice of technologies is ours. Because a customer choose when

		they make business with us they don't choose technology, they choose service level. So then it's our choice how we decide to industrialize this sort of platform or service towards a customer. When it comes to the client intimacy, we are building the thing we are very much leaning towards what is relevant for the customer. And in this phase they are seeking our advice, so: "Please Capgemini, what would be the sort of market leaders when it comes to statistical analysis, should I choose to go with something which is native R or native Python", for instance. And they would seek our advice, that advice read that in design phase whereas its client intimacy in the build phase, whereas it's operational excellence in the service provisioning. So, yeah, ties it back to the model.
117	FD	Yeah, of course. We also talked a bit about data that you are looking for. So, you explained me that you are... in all sorts of areas that you are doing business, but can you maybe say what type of data is of great interest for your company? Is it internal data or external data... I mean, we'll go back to that model on the left...
118	JL	Absolutely, absolutely! You are absolutely right! I mean, given the sort of main purpose for establishing BI, it differs in dependence. And as we said before, performance management - that's I would say almost 100% internal processes. What goes then on beyond our fence or the premise is not really something which is typically considered in the performance management solution. Whereas in the business discovery environment, you are less concerned with what we are currently doing, that is just sort of a backdrop, but you want to understand what goes down on the market, what is the position we are seeking, what are the possibilities, risks and challenges and then you would turn to external data... I mean, that sort of analysis in the business discovery bit. I think the finance industry has been doing this, they call it risk analysis. They have been doing that for ages. But what we see now is that it is picking up very strongly to use external data. So, in the business to consumer operation, you would like to understand the behaviors and preferences of your consumers, so customers. You would like to do that in business to business but... But also, the thing is that since we started to carry around smartphones and with the rise of Internet of Things so the context of the environment is pretty much digitalized, my behavior is digitalized, I use wearables - this has come to situation where it is pretty affordable to collect intel about your consumer in a way that we couldn't even be perceived seven years ago...
119	FD	Yeah.
120	JL	And, with that sort of development we see that retail industry is very rapidly now grasping the situation. They are turning their physical boutiques into web boutiques, they see the behavior on the web shop, they want to connect it with the preferences on Twitter, in social media sort of preferences of the customer. They want to see by Google Maps how they sort of traverses the city, where they show up, how frequently and long do they stay. So all those bits are getting more and more available. So retail industry they are really

		getting the message. They are moving extremely rapidly. It has taken them a while to understand that, their context has changed dramatically. And also, you see that in distribution I mean traditional letters are going down by the minute whereas parcels are going up by Internet trade. So, you know we have PostNord in Sweden, they are sort of battling with the numbers because they are by legislation required to deliver mail with the sort of maximum delay. And that business is, well it's on diverge to being a negative contribution. So, I would assume that PostNord if they could would like to get out of that situation, so: "Okay, somebody else could carry the mail around because there is no money in it". But let's do parcels, and let's be able to track and trace a customer. You can drop the parcel in front of them regardless of where they are, they can get an instantaneous delivery. Once a parcel is in your area we would find you not leaving it at your door, we will find you on the city in the cafe - "Here is your parcel, Sir. Please sign", right? That's a sort of new game that is traversed into. Banking industry, especially retail banking, traditional customer would visit the bank office once a year to sort of re-sign the mortgage with the new interest rate. So banking industry needs to rethink, "How do we interact with the customer? How do we understand the customer? Could we make use of their purchases understanding their preferences in a new way that will help us to sort of remodel our portfolio of services to tailor it to different segments". So, this is in essence a dramatic change for private business as we understand it also has bearing on public business. But I mean, especially in the moneymaking business this is highly relevant to grasp and I think the organizations that are early adopters of this would benefit dramatically from the head start as opposed to the laggings. You see, I love this game obviously!
121	FD	Yeah. I mean, for someone who is not so familiar with the consultancy, especially with the big consultancy as Capgemini is, it's hard to kind of grasp all the things that are going within the company and how the company is handling the relationships with all the business partners, suppliers, vendors... yeah, it takes a lot for the insights I mean, it's great!
122	JL	Happy to contribute! I mean, you guys being at the university, you have an asset that we lack - you have time to think about things. In the industry, in the consulting game time for reflection is rather scarce. So, in one way I envy you, and you probably envy my salary.
123	FD	Yeah! So, what can you say about… When looking at the external sources and data coming from them, what kind of data is of most significance for the Capgemini?
124	JL	Well, being in the moneymaking business I would turn this into - what is most interesting for our customers. Because what's interesting to them is actually interesting for us. So, if you happy with that twist on your question, I would say any sort of insight on customer behavior. Whether it's from your cell phone, the way you interact in digital channels with our customers, or even how you stay at different venues. That is hot stuff. And just emphasize that this slightly beyond topic maybe, but... Going back in history to the early 1900s in industrial era, we the business, we found out that money is a really

		important asset, I mean it has been forever ever since money was around. But, we started to realize that things like cash flow was important. I mean, before that you had a till - you either had money or you lack money, that was the sort of easy game. But, we started to understand workflow and the sort of behavior of asset. And hence, we started to build as the sort of generic organization the finance department, just to be able to manage this asset. Then, fast-forwarding up to the 1960s, we decided, or 70s maybe… we decided that people - that's a really valuable asset to us. You see where I'm going with this obviously… And hence, before long we started to have standardized sort of diagrams for what an HR department would look like just in order to be able to manage competency and people. Before that HR was basically payroll - somebody sitting at desk and handing out the money and the end of the month, that was it. So, fast-forwarding some 40 years. Again, we are starting to realize that information is a really valuable asset to an extent we never did before. This happened within the last 10 maybe 50 years… I would stay with 10 years. And, I would stand to be corrected, but I would assume… let's reconnect in 10 years and see if I was right, but I think we rapidly are moving into situation where we will have departments solidly focusing on managing the asset of information or data. For instance, you've probably heard there is a new role being coined - being a CDO, chief data officer. Have you heard about that?
125	FD	Not really.
126	JL	It's out there. If you start to scan the ads for new jobs you would sort of see CDO popping up. And that is not just an IT related question any more. We have good data quality in some general sense of the word, but is also the responsibility of how data is actually used. And also, it's about innovation and see how could we use data to create new revenue streams, generally referred to as monetization. We created data for one purpose, but "hey, look here! We have the spin-off business where we can sell data to third-party and getting new revenue stream. Brilliant!". And that would all fall under the bonnet of the CDO to sort of orchestrate this. So, yeah, let's reconnect in 10 years and see if I was right. This is something I sense is happening as we speak.
127	FD	Yeah. So, you can refer to your company as trying to understand all its customers, all its users of their services and products, and then customize its products and services to their needs, right?
128	JL	Mhm. So, the first model again, that is what we do. What we have discusses would fall under the sort of design phase: discussions with the customer, what does it mean for you, how can it be applied, is it feasible, would we like to engage in this any further. Then we would move into build phase where we would maybe do the proof concept than sort of full-scale implementation handed over to. Maybe if we already have a service that could be sort of used for running this in production or we handed over to the more bespoke AM in the organization itself, or it could be offshore...
129	FD	Yeah. So, we kind of move a little bit forward in the future... So, as things

		stand now, in your opinion which processes of current BI systems are the most challenging or are the most… yeah, the most challenging to the company itself? Is it storing of the data, analysis of data, visualization, making insights, making sense of the data?
130	JL	Right. So, I would probably arrive as an answer the end of this. So, with the new sort of creation of data of the explosion of data if you please, it's typically defined as three, four, five V's. I guess you are familiar with to the definition of big data!?
131	FD	Yes.
132	JL	So, the question of volume and the question of variety, those things are pretty mature with the arrival of the established access sort of standard reply to that challenge. So, on the sort of collecting data I would say one of the major areas where we still have many competing concepts would be in the velocity area. So, when you have data… in an instant grasp the data because otherwise it's gone sort of. I think that is probably between the three V's, the area where there are still quite of work to be done. When it comes to insight generation... we call ourselves insights and data and this was the data science... So, descriptive analytics, sort of getting the data into different stacks measuring the height of the stack as a bar chart sort of, we have been doing that for ages. It's over, done and dusted. To generate more of the, sort of predictive insights which is where we are heading in a high pace right now - there is still a couple of different standards we discussed before. Should I go with Python or R type of discussions where the verdict has not been returned. So, there is not really a standardized way of articulating your hypothesis or building your algorithm. There are competing ways of doing it, and I think that is not for the consulting industry, that's for the products vendor side. Also, if you have decided to go with for instance Hadoop, which I said who claimed it was sort of de facto standard. Looking at the ecosystem around Hadoop... I don't know if you sort of just made a search of it, but you would come up with some, I think 40 different logos... Pig, Hive, MapReduce, jodi jodi. And that is way too many tools. It comes with the territory of open source of course, but there are way too many tools to be effective when you give your advice or when you design a solution to contemplate some 15 competing concepts with two different vendors of everything. The task for an architect is overwhelming to make all those sort of well balanced judgments on do we think this component will be on the market for the next couple of years. So, the vendor space is extremely complex when it comes to the big data area. So both on the visualization and analytics side and also the data collecting and storing side. Did I in any way replied to your question? I'm afraid I have forgotten the explicit question.
133	FD	I mean, the question was like… the question is like: "What barriers and weaknesses could you identify in current BI systems, and maybe how can you see it in a future, those barriers can be overcome?"
134	JL	So, that is sort of market majority situation I've described. In terms of architecture on conceptual level, I think there is already a resolution to the chal-

		lenge "should I go with high harmonization or low harmonization?", and the explicit reply to that is given by Gartner: "You should do both". So, Bimodal BI. That's the current sort of best reply to the question. You do need, I think that's a TED talk example from Facebook who decided early on that the only BI they needed was the business discovery sort of Hadoop analytics predictive sort of thing. And they have gradually come to the conclusion that we actually do need traditional BI for performance management, go figure. And most of the more sage or senior organizations who have been around started out with the warehousing bit. And they do realize we need something to add to the type of insights we can draw from our data warehouse. So, I think Gartner has as a very valid point about... they called it Bimodal IT and applies to all sorts of IT, but it also sits very well with the business intelligence or analytics domain.
135	FD	Yeah, great! So, how can you see the BI game and the BI tools in the future? In which direction are developments heading?
136	JL	So, to the best of my understanding we are getting more and more of guided development tools. So, you don't necessarily have to understand coding to do a fair bit of work. You might want to look up Algoryx as an example of very solid platform for doing all sorts of BI. Both the traditional warehousing ETL bit, but also doing the analytics stunts as a good example. Because it's all drag-and-drop, you have the method sitting there that are interchangeable, you just connect the dots sort of thing and bang. One my colleague showed me up half an hour before we met that without knowing… He is a core BI sort of traditional, just like myself. But he showed me, he was all happy about it, that he had done basket analysis and that's all predictive analytics. We look at causalities. He has spent one hour to understand what he was asked to achieve, and he has done the coding in two hours, that sort of thing. And he don't know the first thing about the algorithms operating… well, he knows the first thing, but he is not very knowledgeable in statistics. So the method applied... he has a vague grasp of what it achieves but not how it is done. And I think we are rapidly moving into that terrain. I mean, the BI has been for many many years a domain where people with good coding or theoretical skills, but not necessarily business acumen, have been able to make quite a bit of money in all that I think. Taking this into the future, if you are a BI consultant you are required to understand the business. Because the coding bit has become less complex. I think that's a sort of change we are looking at. So, we focus on training our people but still in technology, but also in understanding the concepts supplied.
137	FD	Yeah. So, we can move to the table as you see. The benefits table.
138	JL	Give me a second.
139	FD	Okay. Can you see it, right?
140	JL	Yeahman!
141	FD	So, these are the twenty measurement items here for measuring the benefits

		that companies have experiences or identified by using a business intelligence system.
142	JL	By whom?
143	FD	I've sent you the name of the author, they are defined by the previous studies. I think it is Elbashir in 2008… that was the name of the article.
144	JL	Yeah. So it's a research piece, not something...
145	FD	No, no, no. It's based on research. So, we have here like the table that we want to… like, capture your opinion on these type of items. So the question is like… The sentence is put like: "Since the implementation BI system, my company achieved following business benefits:".
146	JL	Mhm.
147	FD	So, the first thing as you see is "improved customer service".
148	JL	Yeah! That will be the domain specific application sort of BI. And yes, I strongly agree!
149	FD	Okay. Has it improved the efficiency of internal processes?
150	JL	Absolutely!
151	FD	Great!
152	JL	Is the focus on the efficiency?
153	FD	Yes.
154	JL	Yeah?
155	FD	Great.
156	JL	But not strongly, I would agree.
157	FD	Okay.
158	JL	Because, I mean, it's one thing to get inside the data underpinning that you should sort of commence change. It's another thing to actually deploy the change, and that's a business decision. It is not something automatically out of BI, but you can sort of get data to suggest and hint where you can tune your internal processes. But it doesn't happen automatically, it's a business decision, a way before you actually see the change.
159	FD	Of course. Has it maybe increased staff productivity in some way?
160	JL	Same situation as on the second question really. Just we have examples, I would say specifically in sort of sales situations. You have numerous examples of when you need to prioritize between business opportunities or customers to engage with, you improve productivity tremendously. And think

		that's the best example I could pull out the hat.
161	FD	Yeah. So I guess that you agree on that?
162	JL	Yeah, I would say strongly. But it is all given, if the activities actually are data driven, and in sales they are tremendously data driven. What do we known about the customer, do we have good match with our product...
163	FD	Yeah, you have explained before. So, did it help in reduction of the cost of effective decision-making?
164	JL	Absolutely! Strongly agree!
165	FD	Great! Has it maybe reduced the operational costs?
166	JL	Well, to the area supplied. Again, probably more domain specific then in broader general terms. I would say I agree. And, you would look at indirect cost and indirect spend sort of thing. You would make adjustments, you would renegotiate with your vendors depending on how much call upon the services, you would argue that "Okay, this is the actual volume that we buy from you"... That sort of examples could be pulled.
167	FD	Yeah. Does BI have reduced marketing costs, since the company has implemented it?
168	JL	Well, not really. And the reason for that is set up until this point it is about to change, but up until this point in marketing we were using gut feeling. We think that this would be a good channel to communicate in, we think we get our money's worth by spending X, Y, Z millions on TV commercials getting the sort of brand recognition, we think. And then after we sent off the message, we are looking at the order book and see do we see an increase. And if we see an increase we assume that it's related to the message we broadcasted. But, is not really a positive relation is just assumed and… please don't quote me here... But I mean, marketing would spend whatever money they can get their hands on. There is nobody in marketing who would decrease their budget by design. Even if they could do things more efficiently in sort confined areas of the marketing task, they would move that sort of budget over to other activities. So, I don't think that we could positively measure and say that this is a fact, but it comes more from these sort of the characteristics of the trade than anything else. But then again, since we are starting to interact with our customers in channels allowing us to see a direct lineage between the broadcasting message "click here" and it showed up and actually bought something. It could in future very well reduce costs dramatically, but since marketing is still heavily relying on broadcasting rather than needlepoint communication, so micro segmenting all that is it is on the verge of breaking through and being a new standard. But still I would say the vast majority of the costing from marketing department would be to do their rights in traditional media, we don't have a lineage. So hence, not to very big extent.
169	FD	Yeah. But you can see that changing in the future maybe?

170	JL	Yes.
171	FD	Yeah, great! So, has it reduced the customer return handling costs?
172	JL	So, with dead on arrival and flawed products sort of... Again, it's business decision that actually reduce the cost defining the data, when it comes flawed products, or products not having the sort of actual quality that was promised, yes. But that goes back to sort of early identifying that we have situation here. So, within the mobile phone industry I've been part of deploying solutions where one of the main reasons for implementing BI was to be able to make sort of early warning. Releasing a new phone to the market when you see that "Okay. So, we have a massive increase of customer complaints coming in regarding the specific model in this specific area flashed with this software, jodi jodi", and pinpointing. And then linking it back to production you could actually see the identity of the phone and see what production line it came out of. Because it's not necessarily a generic fault to the model, it might be that is produced on factory X rather than Z, or the components in this specific batch actually came from another vendor that we typically use sort of thing. So, yes.
173	FD	Okay. So, has it reduced the time to market products? I mean, has it changed from before to after the implementation of BI? Or is it hard to measure?
174	JL	There are two way to generic components operating on that question for me to give a good answer. One thing is a you all depends on what sort of service. And, the second one is again the situation where it calls the business decision to act upon the data shown. But, could we show data that could speed up the process of designing, developing the right products, could it be used to do a sort of limited test on the product for market segment to see whether or not is ready to be released? Yes.
175	FD	Okay.
176	JL	But, not a sort of an instant connection, there is a business decision in-between. So again, if it's a gut feeling organization not so much, if it's a data driven organization, yes.
177	FD	Of course. So, what about the reduction in the cost of transaction with business partners or suppliers?
178	JL	Tremendously! So, just by taking your sort of accounts payable, just by that mere action. So, it's a limited set of tables in your ERP system, you would put that into BI and you will start to do traditional BI spend analytics. You could consolidate the number of vendors you have, you could use a volume as an argument to get better deal sort of things. So yes, absolutely!
179	FD	Great! Has it improved the coordination with the business partners or suppliers?
180	JL	Yes!
181	FD	Great! Has it increased the responsiveness to or from suppliers as well?

182	JL	Yes! So one example given and again going back to accounts payable... You typically negotiate for number of days payable when the invoices is payable. We help numerous customers with that type of solution and it so shows that quite a few organizations tend to pay their invoice before they had to, with a negative impact on the cash flow. So, by using the actual same number of days payable to better extent you would get better efficiency of your economy. So yeah, absolutely!
183	FD	Okay. Has it reduced the inventory levels?
184	JL	Yes, absolutely! Absolutely! So, in retail today we are doing quite a few sort of inventorial warehouse predictive analytics to decide your order point in time rather than having your sort of physical minimum levels. We are using predictives to say "okay, here is a pattern of how people buy jeans", for instance. So, this would be the right point in time to do reorder and also calculating where do I get the best discount given, how long I would store that amount of money on the shelf before it is actually turns into revenue. Yeah, definitely!
185	FD	So, has it increased the efficiency of utilizing assets?
186	JL	Physical assets?
187	FD	Yeah.
188	JL	We are getting there. So, example given here; For instance, if you run a hospital you would have wheelchairs, you would have a sort of drip stand and all sort of things that has a tendency to end up in a room where it shouldn't be and tends to be forgotten sort of, and then we find a shortage we buy new things. So, by deploying there is a new set of technology referred to as Beacons or iBeacons. So, by putting Beacon on that and putting a receiver in each and every room for instance, you could instantly see where you have your assets laying around. Extremely relevant for instance, for hospitals. So yes, this sort of thing is increasing also the same set of technologies are actually used by quite a few companies when it comes to meeting rooms, like our business. Meeting rooms is always in shortage for some reason. Well, the obvious reason it's booked but not utilized, or somebody have booked a twelve seat room and sitting there alone taking conf-call. Now, by using Beacon technology and requiring people to have the in-office app which is beacon aware, we could reconnect that to the booking system, we can see if it is actually utilized, we can even start to take the booking out of 50 minutes if you're not here - "it's available". So, that type of things which is not by design I would say BI. Both those examples given are more in the range of IoT. But, then the aftermath of the conf room example, when you start to analyze 2, 3 years of utilization of meeting rooms in your office space. And you are to renegotiate the sort of area your office should have with your landlord. You might find yourself in a situation where we can scale down on the numbers square meters and a number of meeting rooms. And that is being done as we speak, sort of implementation. So, yes! Has not been so much historically when it comes to when large assets like a production line and that has

		been done forever. But, when it comes to less digitalized or less heavily costly assets, this type of technologies being deployed and by the feed of data analyzing it over time you might make business decisions that you wouldn't have trusted your guts to just scale down and say: "Okay, we have to make do with 10 rather than 15 meeting rooms".
189	FD	Yeah. So, has the BI system leveraged the advantages of IT upgrades, improvements and/or new developments in back-end IT systems? I mean, has it maximized the advantages?
190	JL	Just let me read the question again. So we are talking about if BI has... Slightly hesitant about the term of "leverage". What it actually means?
191	FD	It's maximized, used to the max. I mean, used to a high extent, like use the advantages of IT upgrades…
192	JL	I think the BI has been driving upgrades, improvements, rebuilding processes sort of thing. But, has BI leveraged... The way I read and understand the question - no, I don't think so. Maybe I misunderstand the question completely, but...
193	FD	Okay.
194	JL	What would be an example of, to the best of your understanding, situation where BI actually has leveraged an IT upgrade or... I can't really see what it means, sorry. Could you help me out with an example, do you have a rough idea of what it could mean?
195	FD	I mean, I agree with you that it's a constant relationship with IT and BI systems, because BI system – as you said, drives upgrades or improvements in IT in order to BI to be successful, right?
196	JL	Yeah. It's a fact suggesting change in the IT, absolutely. But making use of the changes, no.
197	FD	Yeah, okay.
198	JL	I rather not reply to the question since I sense I don't understand it, but if I had to leave an answer, I would say I disagree.
199	FD	Okay. So moving on to the next one is: "Has it increased the revenues or services provided?"
200	JL	Yes. Then again depending on the services we discuss, and also in relation to business decisions to act on the data available.
201	FD	Yeah, but putting it in general, like before BI and after the implementation of BI, has it changed something in your revenues or services provided? That is the meaning behind the question.
202	JL	Yeah, has absolutely indicated where there is the potential to change.

203	FD	Yes, great! Has it maybe got the reduction of lost sales or lost services provided?
204	JL	Absolutely!
205	FD	Great!
206	JL	In sort of risk analysis sort of things, yes.
207	FD	Yeah. Has it increased geographic distribution of sale or services provided?
208	JL	Very much a business decision I would say. Could BI generate or has generated that sort of data suggesting that we should move the distribution points, set up a shop somewhere else… yes, several examples of that. And more oftenly where we shouldn't have an office I would say, rather than being progressively as going the other direction. The reason for that is that there have been counters, the controllers in finance department of an organization are very much the ones who are guessing this sort of input. And, please don't quote me... but I have never seen an economist or a controller in my organizations earn a penny. They are all about saving, they don't make money. They might be able to save the penny or few. And that's a reason why I'm replying the way I did... I've seen it used to argue for taking one or few offices off the market rather than the opposite.
209	FD	Yeah. So, has the BI enhanced the profit?
210	JL	Yes. Yes, in numerous ways. Predominantly by reducing the cost. But again, this is sort of a tool that your business controller would get his head around instantly once is presented. "Okay, so let's see", and they are all about chasing cost rather than increasing revenue unfortunately, because that is business development typically.
211	FD	Yeah. We discussed previously about the return on investment and is it actually possible to determine the return on investment, which you replied that it is. So, putting in this way, has it increased the return of investment? Yeah, referring to BI.
212	JL	So, applied to has it increased the return of investment for the business, yes absolutely!
213	FD	Yeah. And in terms of competitors, has the BI helped to gain advantage and sustain the advantage within your competitors?
214	JL	So, this is the business development quadrant to me. And I think to very limited extent that is true. I mean, we are looking at the win rate, we are looking at who we lose out to, we gain intel on the sort of competition, in that respect. But, we haven't taken it to the full Monty by using intel about the competitor in sort of the more common terms. We are still very much looking at our internal processes when it comes to the competition. That's the huge area for improvement I think, to look beyond the fence of your premise, rather than just seeing the effects of what's happening on the market - actual-

		ly looking at the competitor market.
215	FD	So, put in a way like, today if you didn't have the BI system in any sorts, would you be able still to exist on the market?
216	JL	No. No, I don't think so. Because you would leave us to situation where we had to rely on our gut feeling and in operation of 190,000 individuals. It's way too many guts! I put it that way. So, we need to have a commonly agreed word view. And BI is crucial to that. Otherwise it would be way too opportunistic to exist or to draw the benefits of the sheer size of Capgemini.
217	FD	Yeah. You talked a lot about trust in your guts and trusting the data. So, do you think that making the business decision is somewhere balanced in the middle, or in let's say one of those quadrants is maybe more on data where the decisions are being made.
218	JL	Well, the performance management quadrant is absolutely the area where most hard facts are considered. Mean finance people they are really gutty in that way, it's all about the data. The marketing department and sales is very much a domain where historically they have trusted their gut, "I have a hunch, I have a good feeling about this". And that brings the sort of change of culture around, and I think that's probably one of the reasons why sector market has fully embraced the possibilities of business intelligence. For some reasons they liked their gut feeling rather than hard facts, and it might be even down to that finding hard facts has always been a challenge. In that area what data can be trusted, there's always something to contradict the data, you got something.
219	FD	Yes, of course! So, before we conclude our interview, can we go again through the table just capturing your answers to this benefits. So, you see on a scale from 1 to 5 you have: 1 is "Strongly disagree", 2 is "Disagree", "Neutral" or hard to measure, 4 is "Agree", and 5 is "Strongly agree". So, for the first item - what is your response?
220	JL	It was four, wasn't it?
221	FD	Yeah, I think it was. So, for the second one?
222	JL	Five.
223	FD	For the third one?
224	JL	You need to go back to the tape I guess. Yeah, I would agree on that one. So, four.
225	FD	Okay. On the fourth one?
226	JL	Five.
227	FD	Okay. On the fifth one? Operational costs.
228	JL	It does, it's dependent on the business decision sort of. It's not the data itself

		that does the magic. So, I'm thinking to stay around three to four. Four.
229	FD	Okay. For the sixth I think you disagreed with this before when we spoke.
230	JL	Yes, we are just moving into that sort of domain because of gutty people sort of. So yeah, two.
231	FD	Okay. So, for the seventh?
232	JL	There was an example given. So, I strongly agree with that!
233	FD	Great! For the eighth?
234	JL	Four.
235	FD	Okay. For the ninth item?
236	JL	Reduction in cost of transactions with business partners... Both nine and ten I strongly agree with, that was a referenced to you. For instance, accounts payable.
237	FD	Okay, yeah. So, for the eleventh?
238	JL	Yeah, that's part of the same. So, five.
239	FD	Yeah. For reduced inventory levels?
240	JL	Yeah, five.
241	FD	Great! For the thirteenth?
242	JL	The possibility was there, so the hospital sort of example. However, the number of cases which I could turn to today and say "Okay, since it's already here, it's already done". I think we have the proof for it would increase the efficiency of utilizing assets. But, there I would stay with the four, because it's… yeah.
243	FD	Okay. So the one on the fourteen, it's hard to define.
244	JL	I stay with I don't understand the question.
245	FD	So we can say three, right? Neutral.
246	JL	Yeah, unless you can't leave it blank, because I don't know what really to reply. So, it's up to you gathering the data, isn't it. You are responsible of data quality.
247	FD	Okay. So, for the fifteenth one?
248	JL	Well, setting the need for business decision... So, I would say four.
249	FD	Okay. So, for the sixteen which is "reduction of lost sales"?

250	JL	Five.
251	FD	Great! Seventeenth is "increased geographic distributions of sale or services provided".
252	JL	If you would have read "changed graphical distribution" I would say five. If it's all a question about increased sort of penetration or availability in graphical matters. Because then you have decided that only the positive outcome of the analysis should be counted. And given the fact that the bean counters of organization are so powerful typically they are part of the audience for this type... yeah, put me "Neutral" there. But, you also have some sort of my argument for why I put as "Neutral".
253	FD	Yeah, I will discuss it later within our thesis. So, for the eighteenth which is "enhanced the profit"?
254	JL	Absolutely! So, five.
257	FD	Great! What about nineteenth and "increased return on investment"?
258	JL	Four.
259	FD	Okay. And for the last one, is "improved competitive advantage".
260	JL	Four.
261	FD	Okay, great! Perfect! Thank you!
262	JL	Thank you.
263	FD	Do you have any concluding remarks or questions for me?
264	JL	Nothing, we had a good spread. I hope the model side sort of presented gives a backdrop to why I perceive the world the way I do. Since I trust your judgment in handling my input in relevant way, I'd be happy to see the outcome of your thesis. Not only for discovering my name in relation to statements but also to see what sort of conclusion you arrive at. So please update me, you are conducting how many of those interviews?
265	FD	We are aiming at three or four interviews, but with companies from different fields. So we have like, you - consultancy, we have ----- and other companies.
266	JL	So, it's very much qualitative sort of...
267	FD	Yes. So it's understanding every business and how BI helped in their business. So. in your way, BI is included in all sorts of businesses and operations that you do. So maybe for the other companies it won't be the same. But we are trying to figure out what is the final outcome, what is the same for all companies. Can we find some pattern of whether the BI is really successful and really can help the companies nowadays? Or we can voice our opinion on maybe in this sort of field it can not help or helped to some extent. So,

		that's what we are aiming for to be our output of our thesis. Not only focusing on consultancies.
268	JL	May I suggest that I can send the article to you, it's Gartner. I don't know whether Gartner is considered to be sort of said to academic.
269	FD	Yeah, it is.
270	JL	They have a… I don't know… I just show you few graphics in order to state my case. Hang on a second here. They have defined something they call "The digital business technology platform", which to me makes a tremendous amount of sense. Sort of all the change in the BI space from just being sort of performance management and here it has transcended into something different within the sort of digital transformation era. Comes into place for me in this model, and you might want to consider it as a sort of backdrop in your thesis, so here we go. It's easy reading, loads of graphics, somewhat 20 pages. So, is something you could sort of sprint through within half an hour, but you could ponder the statements done for couple of days probably.
271	FD	Okay. So, can you send it to my e-mail?
272	JL	I will, but I will sort of briefly... This is what Gartner states then: that you have four different sort of ellipses for your platform to support a business in the digital era. So one being sort of client or consumer facing, they branded it as employee, I would much rather call it internal. Because this is all sort of ERP centric in your current business processes. Then you have one facing your partner or your ICA system on the supply chain left hand side. And then of course you have the IoT popping up everywhere today. And, what they do is they describe the domain bit by bit. So, what are the type of systems that sort of falls under one of those areas or another, and… I'm just going to take us to the sweet spot of it all. But, at the end of the day this is without any sort of arguments necessary I think. The reason why me as a BI guy love this is this. At the centre is Venn diagram, so in the intersect of all four that's where you find BI. And then you say there is sort of four different standardised capabilities to service each and every one, that makes solid sense to me. And the core competence in the middle would then be the sort of traditional BI and also the algorithmic side of it. So, I would urge you to sort read it just to have another backdrop to what is sketched out here.
273	FD	Yeah, great! So, can you send it to my email?
274	JL	Yeah.
275	FD	Yeah, great! So, I would like to take a picture of the things you showed me on the whiteboard. Great! So, we can conclude this interview right now. I want to thank you again for your time. Thank you for explaining everything to me. We are not so used to speaking with guys like you, from practice, it's all about theories and from those perspectives, so it's really nice for me and for my colleague to hear from your side what are the thoughts about BI systems, what are the things that are missing, how you are operating and all sort

		of things. So thank you for that!
276	JL	Yeah, I hope I gave you... I mean there is a limited time, but I hope at least I managed to give the outline of the sort of operation and the competing game and what we are all about and how we perceive the world. So...
277	FD	Great!
278	JL	Brilliant!
279	FD	Great and thank you!
280	JL	Thank you!

Appendix 4 Interview 2 Transcription

Time and Date: 13:00h, 02nd of May, 2017
Location: Lund, Sweden
Duration: 57 minutes
I**nterview format:** Face-to-face
Researcher 1: Filip Dakic: FD
Researcher 2: Kristijan Markovski: KM
Interviewee: Kept anonymous: INT1
Company: Kept anonymous. Referred to as Multinational Technology Company
Transcribed by: Filip Dakic
Transcription checked by: Kristijan Markovski
Transcription date: 4th of May, 2017

Row	Speaker	Text
1	FD	So, let's start. So, as you see in front of you, before we start this interview we would like to know whether you want your and/or your respective company's name to be kept anonymous for the purpose of this study.
2	INT1	Yeah, let's keep it anonymous.
3	FD	Okay. Both, right?
4	INT1	Yeah, both.
5	FD	Okay, great! So, are you okay with the interview being audio recorded?
6	INT1	Yeah, that's fine.
7	FD	Great! So, as we settled this down I will give a brief introduction to our thesis. So, as you see I'm here just today. My thesis partner is unfortunately not here. So, we are doing the master thesis at Lund University. Our subject is business intelligence systems and we trying to assess the benefits that companies have experienced after implementing and using the business intelligence. That is the objective of our research. So, as you see, we have like 25 general questions and at the end you will see the table of 20 items. So, this 20 items have been take from the article on the Internet. The article originally has 22 measuring items or benefits, but we have skimmed down to 20 just. So, are you okay with starting with the questions?
8	INT1	Yeah, yeah sure.
9	FD	Okay. Can you tell us a bit about the company you are working for? Without revealing the name of it, of course.

10	INT1	Well, the company I think is one of the biggest companies in the world in the software business. Not only in software, as you might now. And we deliver basically to wide variety of users. And for that reason business intelligence is very important to us to understand how the users use our products, and what can we improve, and so on. But it will go on with another questions as well.
11	FD	Okay, perfect! Can you tell us a bit about you? Like, what is your position within the company, and for how long have you been working here at the company and this specific position?
12	INT1	Yeah, currently I am data scientist in one of the teams. This position is like, very much connected to the BI. And, I'm on this position since over a year now right now. Previously I was in a quality assurance.
13	FD	So, you haven't worked in a business intelligence, strictly business intelligence before this, right?
14	INT1	No.
15	FD	Okay, great! Yeah, that was like the third question: "Have you worked on or with business intelligence projects or tools previously".
16	INT1	The tools yes, because you know, it is a part of all of the quality team, we also use the business intelligence to understand what's going on in the market. So, well some reporting with the BI stuff, yeah sure. But, like strictly with focus on the BI and, but not only on BI but all the data science are ENTITLED than for last year.
17	FD	Okay, great. So, you mentioned that the company is serving as a software as well. So, can you bit explain about the company in the BI surrounding or in the domain of BI. Is the company using BI for itself as well as for the customers, or just for the customers or just for itself?
18	INT1	Both, and there is a third factor as well I think. We also provide the BI tools and services for the customers, in general. So the customers can use our tools or such to create their own solutions. We have internal BI on our own products and the customers have insights to our BI as well.
19	FD	Yeah. So it's the word about a big company in the BI domain, yeah?
20	INT1	Mhm.
21	FD	Great! So, in this interview we will focus a bit about how your company specifically is using the BI. We are not interested in how are you vendoring your system to the other companies.
22	INT1	Mhm, okay. Well I can tell you the way how we use it here, only in the department I'm involved with.
23	FD	Okay, great!
24	INT1	Because, you know, the company is huge, there are different teams...

25	FD	Yeah I know. We are just focusing on Sweden or specific department.
26	INT1	Mhm.
27	FD	So, do you know maybe for how long the company had the BI system implemented? Or maybe do you know the exact year of implementation?
28	INT1	No, that was far far before I joined the company. So, it's years, it's a long years...
29	FD	Okay, okay.
30	INT1	But of course, you know, it has changed the technology and the way how data is collected has changed over the years.
31	FD	Yeah, great. Can you maybe, like… since you don't know the year of the system being implemented, can you maybe guess the reasons for implementing BI within this company? What BI brings to the table?
32	INT1	It shouldn't be difficult to guess. I think the most important factors like, at least to understand how users are using our products. That's the one factor, so you know, in order to make the products better for the user. And the second factor is act to mining toward the quality of the products. So, we know what's going on there on the market. And if something is seriously wrong we can react quickly and then help users to fix issues.
33	FD	Is the BI system integrated with other systems within your company in some way?
34	INT1	Yeah, it is very much integrated. It's in like, basically in… well, I cannot tell you if it's in every product we deliver because I simply don't know, but it's at least in products I was involved… it was included, it's in the platform, it's in the products themselves, it's... well, there is plenty of tools around it, there is plenty of tools exposing it to the customers as well. So, yeah.
35	FD	Yeah, ok great! So, do you maybe know like, in which segments of business operations or for what specific jobs BI is being used in your company?
36	INT1	That's also wide variety, I would say so. Definitely all the data science, because that's normal. We, our culture has also changed through even, for the last I don't know, year or maybe two years or so on. I don't know how old are the other parts of the company, but I only know the department I'm involved with. There is a strong push towards being data driven. So, you know, whatever the PM's are doing is also based on business intelligence. So, everything about PM, everything about… like, data science is like provider for the data here and also like partially involving implementing the solutions. Design as well, that's a lot of input we give to the design, and how user use the products and what can we improve and so on. What else… Yeah, of course all partially development as well, but that goes through PM. I have no visibility over marketing and all things like that, that I simply don't know.

37	FD	Okay.
38	INT1	But those are like quality assurance as well, because it's shifted towards like, listening to users and actually trying to run a lot of internal in-house testing. So, all the quality assurance… No, not all, but the majority of quality assurance goes through the BI as well.
39	FD	So, we can conclude that the BI is being heavily used within the company, right?
40	INT1	Yes.
41	FD	Yeah, okay. Great! This is like more specific question if you see in front of you. Like, the tenth question is, like: "Does the BI allow you to become familiar with market trends in area of your business?"
42	INT1	This is a tricky question. It definitely helps us to understand how we perform, because we have a data from our own platform and tools. We can understand it, well... for generic market trends… than I simply don't know. I don't have any visibility if we have an information, like competition or things like that. For sure we are not tracking the competition or so. And we have a very very strict privacy and security rules here. So, only people who need to know have access to certain pieces of data.
43	FD	Yeah, of course.
44	INT1	I simply don't know that. We can detect trends definitely about the way how our tools and products deal on the market, that's for sure.
45	FD	Okay, great! Do you maybe know, like… if you have an access to it, do you know if or how can the BI determine the return on investment?
46	INT1	Again, I don't have data on that because here in the data science teams we don't work on that level of information. But, our whole work, like the whole culture around now is around user and user activity and user… like, providing what the user wants and needs. So, the more our deliverables are pleasing the users the better is for the whole company. And I guess it relates to the return of investment. But, in some places we don't… like, we don't really… no, the care is maybe a wrong word here… We don't relate directly between the particular feature versus the money. We care about whole usability of the whole platform and then the money comes from by completely different places. But, we want to deliver the whole...
47	FD	Packages?
48	INT1	Exactly! The whole package. So, something to please the user to engage the user with platform, and if the user likes the platform in general then there might be some money flow from different parts, but now exactly from that particular feature.
49	FD	Okay, great! So, you mentioned before that you are both… your company is being also the vendor, and… You see, like the twelfth question is, like: "Are

		your company developing the BI software or are you just using the provided by another vendor?"
50	INT1	Yeah. We are developing the software. I am not saying that we only use our own software. There are places when we use some third-party products, I guess. Especially for reporting and so on. But we have our own solutions which we actually leverage more and more. And I guess the only reason other tools are used are some kinds of legacy things or maybe, like a bit easier integration in some places. But in general, we use our own solutions. Both for data gathering, data mining, machine learning, and things like that. And also like reporting and so on.
51	FD	Okay, great! Let's summarize it. So, you both use your own BI system as well as develop the one for yourself and your customers, right?
52	INT1	Whatever we develop for ourselves sooner or later is exposed to the customer anyway. So, it's not that we run some internal projects and keep it for ourselves. It's usually you know, something which we really do for the users but we use it… like, for dogfooding, you know we also use our own… eat our own food. So, just like, we use the same tools basically which we offer to the users. And I think it's a great idea, great way to make sure that the users get what they need and it's something in good quality level as well.
53	FD	Yes, great! Because you confirmed that your company is developing the BI software, so in that sense it's not using the software provided by another vendor we can skip the next three questions.
54	INT1	Mhm.
55	FD	So, can you refer to your company as a prospector? In the means that your company is being the one who's constantly looking for the new BI tools and solutions on the market.
56	INT1	That would be a good question to the department who actually develop those tools. I don't want to give any false impressions here. I would say that we are in some cases we are trendsetters as well. Because, you know, looking at the level of, like the amount of information, the amount of data we collect or manage - it's something we excel in I would say so. I'm not sure if there is… I just don't know if there is anyone looking on what's on the market. We try to set the trends. But you know, it's like we are in everything, you always look… maybe not the competition but whatever is going on there in the field. So, probably yes, but from my point of view we… rather like a trendsetter than the follower I would say so.
57	FD	Okay. But, in a sense like, referring to your company as a hit seeker.... You explained me that you are not familiar with other departments especially the ones who are developing the BI system, but can you maybe… make an assumption if your company is actually a hit seeker. When there is something present on a market and at the best price and best of brands, do you think that your company is pursuing that… It's in the sense of being a hit seeker. You

		mentioned that you can refer to your company as a trendsetter, but can you relate something… those two terms in between hit seeker and trendsetter?
58	INT1	You know it would be… We are not to fill the holes. So if there is something which the users need and it's provided by some other companies I guess that we try to fill the hole as well. But, I think the amount of data we process puts us in a rather unique place. So it's rather close to the trendsetters here.
59	FD	Okay.
60	INT1	Sorry. Once again - to get the proper answer to that question you would have to talk to the BI department and the department which actually develops those tools.
61	FD	Okay. So I think we have like, interesting question for yourself. This is the question regarding the data collection process. What do you think, what type of data, in sense of coming from internal sources or external sources or the mix of both is of great interest to you company, and why is that?
62	INT1	Both, I would say so. We do process internal data so we know… Actually we've been exactly using exactly the same tools, so you know, there is no difference between internal and external data. So we use the same tools to check our own processes, our own development progress, our own way how the development tools works internally, if there is, like any quality issues, and there are liability issues, performance issues, and everything like that. That's collected with the same tools and that's purely internal. And well, of course there is much more data coming from the fields… which of this data is more valuable is hard to say, but of course we value customers, that's what we really we are crazy now about. Everything here is centralized about pleasing the customers...
63	FD	So we can say that a little bit of external sources are a bit more valuable to you since you are marking you customer as a main advantage of your company and focus of your company, right?
64	INT1	Yeah. If we can say like the customer is an external source in this case, then yes the external sources are bit more. But we do value both and we do use both and we quite often mix both in… like, single set of reports and things like that.
65	FD	Okay. So can you maybe develop a bit about external sources. So, which information coming external sources are you specifically looking for and why?
66	INT1	Well, of course all the data about the usability and reliability and performance of our deliverables. So, we need to know how we perform, if user like our solutions, if there is some serious issues about them on less use, whatever… and problems which might user experience with our deliverables. Then, we do try to understand our users, you know, like activity data is sort of important as well. So, it's not for spying or like… it's for understanding how users use the product in order to make the product better. So it's not like that

		we track particular user, we collect like aggregated information about the way how the products are used and then you know, that can be used for different machine learning algorithms… you can like cluster the user in certain way, you can get some… like hidden knowledge from the data stream and to understand things you could not even think… you know, why you are designing or the stuff. So, it's basically all over the engineering process right now. So it's both in pre-planning, design, development, then like the quality monitoring and maintenance, everything. It's everywhere right now. So, that's good.
67	FD	Perfect! Do you maybe know where the collected data is stored? Is it in-house or on cloud or somewhere else?
68	INT1	That's a tricky question. Because we do on the cloud as well. So, it's in the cloud but it's the in-house cloud. But still, this is the same cloud which we provide to...
69	FD	Customers right?
70	INT1	Exactly! Well, just define it how you would like… it's in the cloud but this is the in-house, this is our own cloud, so the in-house cloud.
71	FD	Yes of course. So, like internal cloud for just the company, right?
72	INT1	Well, yes and no. Because it's hosted on the… like, there is huge data centers which are basically hosting this data we collect. And those data centers are also hosting the same functionality for external users.
73	FD	Okay, great! Do you maybe know what kind of analytical tools for data processing are being used?
74	INT1	Any particular kind of tools you are interested in or?
75	FD	No… Whatever you want to say on this question, it's up to you.
76	INT1	Well, definitely we use a lot of machine learning. We do provide also like the machine learning tools for the customers so we use those tools as well. We do use a lot of, like internal programming with languages like Python or R. We do use the simplest approaches to just do aggregation with. We have a sort of extended version of CQL language which you can operate on the large data sets, like terabytes of data efficiently and do aggregation and then based on the aggregations on that data we can CQL-ize it as well and just us it as a normal… like a source for normal reporting. Like the simplest scenarios is like collect the data, aggregate it and then just integrate to the standard power BI… I mean some reporting services and just create a visualization cycle out of it. But then of course all the machine learning layer on top of that as well. Other tools… Apart from the standard like, sort of telemetric tracking there is like a lot of user research, there is a lot of user feedback which is like either initiated by the users themselves or we ask users users what they think about us. So there is a lot of like.... not the standard teleme-

		tries in the data which we process as well. And that's process both manually and automatically with machine learning tools as well. So, like the sentiment checks and...
77	FD	Yeah, sentiment analysis.
78	INT1	Exactly! So yeah, there is a lot of tools. It's a really really huge set of tools that we have available here. Both we develop internally and like the open source ones. Yeah.
79	FD	Great! So you have mentioned the visualization process. So I'm interested in knowing what type of visualization tools are being used when presenting results to your associates or partners.
80	INT1	Well the standard BI tools I guess. So something you can like build set of charts based on CQL databases or some other data sources, it doesn't have to be CQL. So, it's not a single tool, there is like a… set, and it depends on preference on the person who is actually creating those visualization. That's one thing. Secondly, the place where it should be put it's like a online service or it's like a one time report or whatever. But we do use those tools quite a lot. Most of those tools are online though, but sometimes there is like even like a simple things like Excel for quick checks. Or sometimes we just use export data from analytics tools we use. Either from a machine learning algorithms or from… yeah, there is another solution we provide to the users as well which is not the CQL like but it's also like query language which also allows you to generate some visualizations so you can both get like tabular data or you get histograms or time charts or things like that. So you can those data basically with a couple of instructions you can extract the visualizations from terabytes of data easily without building a huge solution. So, like one time only things it's very very nice. Yeah, so okay.
81	FD	Okay. So you mentioned that the visualization process, you described it as very useful and very simple nowadays. So, I have a question like: "In your opinion, which process or processes of current BI systems are the most challenging. Like is it the process of collecting the data, storing the data, making sense of the data, maybe visualization process...
82	INT1	First thing is… what could be challenging is to understand upfront what we want to learn. So before we actually deliver something we need to learn the metrics we want to follow later on and instrument the code in the way we would like to get the data later on. Because, you know, the whole process of collecting the data and creating a visualization is quite straight forward, we understand it very well. It could be time consuming in some cases, like if you have a stream of data and you want to correlate something which originally was not thought that it should be correlated. If there is this gap in the planning phase than there is a lot of work later on. So, it's more about that. Okay, someone can kick us out of the room soon. Or maybe not. But, collecting… I think we have mastered it quite well, so there is no problem there. Processing depends if we have properly defined it up front, if not then you know there it might take some time to build proper correlations and so on to extract the data. Well, visualization it's, usually is not a problem. I would say planning,

		understanding what we want to learn up front, that's sort of most challenging.
83	FD	In the beginning the most challenging thing is determining what is actually of relevance for the company, which data to pursue, right?
84	INT1	Yeah, you know it's everything has like… well, the simplest answer is "yes" on everything, but first of all there is privacy and security concern so we can't and we don't want to send everything. Secondly, there is amount of data is just to… we even currently are not collecting everything… Hey! Booked? Okay, then we… another room.
85	FD	Okay. Okay, so, you are good with continuing the interview?
86	INT1	Yeah, let's continue!
87	FD	So we talked about the difficulties and current processes. So, this is a similar question, like: "What barriers or weaknesses could you identify in the current BI systems and how do you think that these barriers could be overcome in the future?"
88	INT1	I will start from the simple things like still some… let's say some functionality is missing from the tools we use even though we use wide variety of tools. But, very simple things like… at least for myself, I would like to change, like have more impact on the way how visualizations are created to be able to express the stories behind the data. Some tools are not very flexible. Sometimes I miss some statistical… maybe not tools but like some measures which could make my work easier, but that's just a question of development and I'm pretty sure that it will change in the near future so that will just be better, because we provide feedbacks and that tools get updated basically monthly based on that feedback. But the biggest barrier which used to be here but I don't think that it exist anymore was, like implementing this culture of being data driven. Previously it was like really like what the PMs think we we need to deliver, what the PMs think the user need. And we had to change this culture into like let's first ask the users, listen to the users how they use the current products and how to improve it or how to they would like the product to be. So, before we start planning something, before we start designing the feature or something let's build the story around the user. But that barrier has been overcome I guess, you know everyone is now like "yeah, let's first do the user research, then like run some demos for a limited set of users, then gather telemetry from the wider audiences and so on, and then follow what's going on". That's great.
89	FD	So we can conclude that before quite a while the top management been following their guts and nowadays they are trusting the data they are getting from users.
90	INT1	Yes. That has changed completely and that has changed for good. And I think even the market sees the change, it's visible the way how the company is perceived on the market has changed quite recently. That I think is great. Yeah!

91	FD	Okay. So we have like… the last question is like general thoughts about how can you see the BI in the future? In which directions are developments being headed to?
92	INT1	Well, BI is here to stay definitely. So, BI will be a very important feature for… I'm not talking about my company here but the market in general. And that's not only about the software market, basically everything will be connected sooner or later and that's I think the only way to provide value for the customers. And that's, in some cases, even the cheapest way, I guess. So, whatever the industry - it will rely on some way of BI. Either it's direct telemetry, either is from questionnaires, whatever you know, anything, but it will be based on the real data because otherwise it's...
93	FD	Yeah, not useful so much.
94	INT1	Exactly! You would have to have a lot of lag and a really good intuition to come up with idea which some users would like, or if you have find your niche in some way, because there is a lot of people around the world which is only you can find someone, but if you are delivering to the mass market you have to listen to the users. And the direction here is… well, I think it would get a lot more automated. Currently, like all the machine learning algorithms is something which drives some insights here. But the thing how to use it, how to manage the data, how to process it, how to push it through the algorithms… there is still a lot of manual work here and expertise which is needed. Probably in few years from now a lot of this will be automated. So you know, the tools will become smart enough, algorithms will become smart enough so they will learn from the data the way what are the algorithms are applied to it and, you know… will create visualizations automatically and it would be much easier for data scientists, but in some case where data scientist might be no more needed in the BI but in designing and maintenance of those small algorithms which will provide that. But, fortunately it's still a couple of years to go so I am not afraid of my position.
95	FD	That's great! So we have finished the first part of the interview which is those 25 questions that you see and we are now moving into the most important part for our study. So as you can see this is the table of benefits you have in front of you. You have mentioned that your position is data scientist so we will come up with the benefits that you might not be familiar with or you haven't get in touch with directly. So as you see in front of you, we have 1 to 5 statements, where 1 is "Strongly Disagree" with the benefit or the saying, "Disagree", "Neutral", "Agree" and "Strongly Agree". So, I would like from you to give your opinion on the benefits on the side, and as well if you can build on it somehow. So, as you see like: "Since the implementation of business intelligence system my company achieved the following business benefits". So the first one is "improved the customer service".
96	INT1	But in case I have no information about it we can skip it or?
97	FD	No, "Neutral". You can say "Neutral".
98	INT1	Okay, yeah. Well, so the first thing the customer service is "Strongly Agree",

		because I can see it, like within that year in which I was involved with that I can see the difference already. So it's like twelve months and there is like huge huge change. We do build new features around the user feedback, we do react to user problems very quickly...
99	FD	Than before?
100	INT1	Yeah, much quicker than before. You know, the turnaround time is sometimes like… days and in some cases hours if it's something really really critical. So, definitely! That's a strong agree.
101	FD	Okay, great! So, since the implementation of BI has the system improved the efficiency of internal processes?
102	INT1	Yes, definitely as well! That's also "Strongly Agree" here, because it's both… there is no huge discussion anymore, you know about like "Yeah, what to build? How the feature should look like?"... it's no more, it's a simple answer, let's check from the data, just like query. And on top of like BI here is also experimenting, we do a lot of experiments as well right now, it's also like process through the same pipeline basically. We have some idea how to improve something and there is usually several permutations of that idea and we just like to test it on real users so we get the actual feedback what's good and what's wrong. And in many cases we had like a bad… so we had to change the idea or even abandon the idea completely. But, that's definitely improved, like the process efficiency because we don't build things we don't have to build. So, that's great.
103	FD	Yeah, great! Has it maybe increased the staff productivity? Solely BI.
104	INT1	Yes. First of all, we don't have to look for the data anymore. We, as a data team for example, we are providers of the data and everyone knows where to look for the data. So, if someone needs something extra just ask us we deliver. But, in most of the cases we already have what people need. So we have metrics provided, there you are. Well, I would still put "Strongly Agree" here also for the reasons that we are not building stuff, we don't need… we quickly can validate the ideas and so on. Yeah, definitely. And also like internal processes here, because we measure the reliability of the internal tools, we measure performance of the process and everything is also measured so we also have insights of that and we can have fixes there so… Yes!
105	FD	Okay, perfect! What about the reduction and cost of effective decision making? Has the BI have the power to change that in some way?
106	INT1	Yes, definitely! All the PMs even on the high level they are looking at the data and they are requesting the data. They define the KPIs which we need to follow and they base their decision on those KPIs. And I already heard a couple of times commands that the decisions made on the data, even there were sometimes might be surprising one, are much than those made on the guts feelings before.

107	FD	Yeah. We have discussed this before in questions. So, we can put "Strongly Agree"?
108	INT1	Yeah.
109	FD	Okay. So what about... has it reduced operational costs?
110	INT1	That's something I can't reliably answer to because I don't know the costs. I know that of course there is a cost around the gathering and processing the data here as well. So, you know it's not like free suddenly. And especially the amount of data we are processing here… it generates a lot of costs, really really terabytes of data daily and amount of processing units needed to process it further, like aggregate it and so on. That costs a lot! But all I know it there is a good return from that I believe so, it's justified. But, I can't really say what's the overall reduced operational costs. I can only guess that it's… I would put like "Agree" or "Neutral" here, because if it wasn't beneficial we wouldn't be running all the show here.
111	FD	Of course. So this is just aimed like… I mean, we would like to get the precise information, but we are more interested in your opinion, from your perspective has these benefits somehow are reflection the implementing and using the BI. So, it's not about precise information, it's just about you sensing if the benefit did happen or not.
112	INT1	Okay. So in that case "Agree".
113	FD	Great! Has it reduced the marketing costs? This is… applies the same thing as before.
114	INT1	Sorry, I have to put "Neutral" here. I just have no visibility on marketing costs at all. I am pretty sure that marketing is using also the data we provide. But, how does it affect it… I don't know sorry.
115	FD	Okay, great. So do you maybe know like, has it reduced the customer return handling costs?
116	INT1	Again, I have no visibility here. But I would say I "Agree" here because I know about couple of cases when we reacted quickly to issues which could prevent. I think it prevented like return costs here so...
117	FD	Sorry for interrupting you, in the discussion part you mentioned something related to that you acted quickly towards the request of your customers. So, in the aspects of time for the decision to be made and the company to react to the customers we can say that the BI has the big influence that.
118	INT1	Oh yeah. But I'm thinking about return handling costs… like in this case, in majority of the cases, not all, we deliver software. So return is more handful for the hardware business and we are in the hardware business as well. I know all the cases when the data provided insights that there is something going on, either that hardware was quickly redesigned or there were like software fixes for some either driver issues or so on. Definitely like "Agree", but with no visibility on that exact...

119	FD	So you, in this case, following the gut feeling, right?
120	INT1	Yeah. You know, we are people.
121	FD	So, what do you think about has it reduced time to market products or services?
122	INT1	Oh yeah. That's "Strongly Agree" on this. Because it's no more like… the whole process, the whole culture has changed. It's no more like waterfall, like if the PM's have the gut feeling like "yeah let's do this", and then for 2 years develop and then suddenly we publish something which like user like "yeah, fine but we don't need it" right. But now everything is around the users. We know what the users want. We think we know what the user want, we build features, we deliver quickly, it's basically like monthly cadence right now… it's yeah, it's very quick.
123	FD	Okay, perfect! So what about the reduction in the costs of transaction with business partners or business suppliers? Has it affected that in some cases?
124	INT1	I'm trying to figure out some examples which I know but… Sorry, "Neutral". I have no data on this, nope, I just don't know.
125	FD	Okay. Has it maybe improved the general coordination with business partners or business suppliers?
126	INT1	I have no visibility on that. And there is also a one case of privacy thing… only need to know data so I have to access to business partners / suppliers, things like that. So, I don't know.
127	FD	Okay. What about has it increased the responsiveness to or from suppliers?
128	INT1	That's still gut feeling would be. I would say "Agree", because it improved all the other aspects I know about, but it's just gut feeling. But, if you don't mind I would say "Agree" here.
129	FD	Yeah okay, that's great! So what about has it reduced the inventory levels? So optimizing levels of inventory...
130	INT1	I have no visibility on that. We are in the hardware business as well so I can only guess it is the case. But, again, I have no visibility… and I don't feel like putting anything but "Neutral" here. Because, in the previous question, the previous value I have something I can rely on, like project data from interactions with the users to the suppliers and so on. But here on the inventory levels… no, I just don't know.
131	FD	Okay, so it's "Neutral"?
132	INT1	"Neutral", yeah.
133	FD	Has it increased the efficiency of utilizing assets?

134	INT1	Oh yeah! Definitely. That's "Strongly Agree", because as I told you, we are trying to build only things which users want. That's not that we are like immediately cut off of every waste. On the contrary, sometimes we do create waste purposely. I mean, we do experiment on different ideas and majority of those will never end up in production. But that allows us to understand users better, understand our products better and also give us fresh view and new different directions. The more different things you try the better products become at the end. So, all in all, the efficiency is much increased, but thanks to that we also have a room for waste, but that's purposeful waste.
135	FD	Yeah, experimental. Okay, great! So me move on to the next page… So, has the BI leveraged the advantages of IT upgrades, improvements and/or new developments in back-end IT systems?
136	INT1	Oh yeah! Everything is depending on that. Definitely! There is like beck-end… well development in the platform itself. The way how all the data is gathered and send, and so on… development in the back-end, there is a huge huge cloud behind it. There is great set of tools to be able to manage that amount of data, to process it quickly… you know I can query terabytes within seconds which is really impressive. And that's all thanks to the developments in the back-end and IT systems.
137	FD	Okay, great! Since the BI has implemented and being used in a company, has it increased the revenues or services provided?
138	INT1	Once again, no visibility on that. You can try reading some quarterly reports. They are quite verbal, so if you want to go through that you can find some information about that. But, I assume so, but I have no data. "Neutral".
139	FD	Okay. What about the reduction of lost sales or lost services provided?
140	INT1	Lost sales, I have no idea about. Lost services… yes, we had cases when we through the BI we realized that there are services broken, like integration is broken in some cases because the whole infrastructure of the deliverables we here we provide is kind of complicated. There might be issues you can't see before it's released, and BI gives us visibility on that. Let's say, like that second part of that question "lost services provided"... yeah, well, reduction in that, yes I "Strongly Agree", but then… I don't know, I agree strongly.
141	FD	We can just focus on services as well as for the 16th and the 15th as well, which you voiced that you would like to stay "Neutral".
142	INT1	Yeah, the services provided and increased services… No, I will still say "Neutral" with the 15th because here, even tho we build like everything on the user activity and what users need, like to steal the services. Well, it's hard to track the service you don't have, right? It's based on the PI then on the user research and use feedback. So, I still like stay with that, but here… let's put "Agree" on reduction of the lost services.
143	FD	Okay. So what about the increased geographic distribution of sales or services provided?

144	INT1	I have no idea if we have… We do have demographic data of course, but what's the impact of the data on high level decision, PM decision on distribution of services on different markets. I have no idea. Sorry, "Neutral".
145	FD	Okay. Has it enhanced the profit?
146	INT1	Again, "Neutral". I would say so, because otherwise it does not make sense to keep us here in the data science team. And we have proven in lot of cases when we really provide value for the customers. But, how it translates to money... no.
147	FD	So what about, has it increased the return on investment?
148	INT1	That's the same I guess. I can't comment on it, sorry. But I'm sure… it's "Neutral", but at least my feeling doesn't even go with anything to "Disagree" or "Strongly Disagree" here, so I would say if there is anything that should be in plus… so there is no… of course, there is cost around everything here, but… we have to consider one thing because we are also providing the services for customers, so if we use the same services it's like we spend money on it but we also make those services better for the customers which pay for those services. There is like a second revenue flow here, so...
149	FD	So, this is the last one. Do you think that the BI has an influence or has been a factor for the company to improve their competitive advantage?
150	INT1	Definitely! That's a "Strongly Agree", definitely. And I think, how I commented it before already, even the market is changing our approach. That's pretty certain it comes from the change of the focus and the availability of the data.
151	FD	Yes, great. Perfect! So now we have done the interview part. So, just for concluding thoughts, do you have anything to comment or anything more to add on the questions or the table?
152	INT1	No, I think we covered quite extensively the subject so - no.
153	FD	Yeah, that's perfect! So, once again, I want to thank you for your time. Thank you for being my interviewee today. And I will send you, if you want, the transcription of our interview so you can have a look of it. Okay, great!
154	INT1	And if you finish your thesis one day, if you can publish it, I would really love to have it… because it's the part of your… you know, it's interesting.
155	FD	Yes, of course, I will send it to you. No problems.
156	INT1	Cool!
157	FD	Great! So that's it. Thank you once again!

Appendix 5 Interview 3 Transcription

Time and Date: 10:00h, 14th of May, 2017
Location: Skype
Duration: 24 minutes
I**nterview format:** Skype call
Researcher 1: Kristijan Markovski: KM
Researcher 2: Filip Dakic: FD
Interviewee: Kept anonymous: INT2
Company: Kept anonymous. Referred to as Small Swedish Technology Company
Transcribed by: Kristijan Markovski
Transcription checked by: Filip Dakic
Transcription date: 15th of May, 2017

Row	Speaker	Text
1	KM	Okay. So, before we start the interview, we would like to know whether you want, I mean your name and the name of your company to be kept anonymous?
2	INT2	I mean, not a problem for me, you can decide this. With me it's fine.
3	KM	Okay. Are you okay with the interview to be audio recorded?
4	INT2	Yes, sure, no problem.
5	KM	Okay. So, as an introduction will say that I'm working with my colleague Filip Dakic who is not involved in this interview.
6	INT2	Okay.
7	KM	Our topic is "assessing the benefits from implementation of BI tools within companies". And for that purpose we have created the questionnaire which is consisted of 25 questions and table consisted of 20 benefits. These benefits are taken from an article which is taken from Internet, and this article is actually a base for our research. So, this is the introduction for our thesis. Can we start with the questions?
8	INT2	Yes, sure!
9	KM	Okay. The first question is: "Can you tell us a bit about the company you are working for?"
10	INT2	Yes. I'm working in a Swedish company, but we are like growing up so we are like being like international. We work with IT, engineering, in different domains and we are like almost two thousands employees.

11	KM	Okay.
12	INT2	Yeah?
13	KM	The second question would be: "What is your position within the company, and for how long have you been working for the position?"
14	INT2	So, I'm working as a business intelligence architect. I have been working in this position for like one year and a half almost.
15	KM	Good. Have you worked on some business intelligence projects or tools previously?
16	INT2	Yeah, I've been working in Ericsson and IKEA with QlikView and... yeah, with different business intelligence tools.
17	KM	Perfect! Do you know for how long your company had the business intelligence system implemented? And do you know the exact year of implementation maybe?
18	INT2	Maybe four years, something like that. Yeah. But I mean, they started this project before I joined them. So yeah, I'm talking now about this specific project because I worked with like different BI projects. So, I'm going to focus, because I saw your questions, so I'm going to focus on one project that we will keep talking about. It's like kind of financial project I would say.
19	KM	Okay.
20	INT2	Yeah.
21	KM	So, can you please tell us what were the reasons for implementing BI within your company, if you know?
22	INT2	Yeah, I mean like from how we use it now? We have like different systems: ERP's, CRM, different... yeah, like data coming from all units. So, SPLIT to, connect, and integrate these data together, do kind of analytics. Because, it's like create huge amount of data every day. So, we want to get kind of value or knowledge of this huge amount of systems and data.
23	KM	Okay. So, is your BI system integrated with other systems within your company? If yes, how. If not, why not?
24	INT2	Yeah, sure. I mean, how? We bring data from different sources, clean the data little bit to fit like with each other, and then… yeah, bring it into business intelligence tools and self-service BI tools.
25	KM	Okay. The seventh question would be: "In which segments of business operations you use business intelligence? More specifically, for what purposes?"
26	INT2	I would say for like mainly management, economy, business controllers, are

		the ones who use this specific system. And all unit managers, they need to go through it and see how they are doing this month, last month, etc.
27	KM	Perfect! Very specific answer. So, how many or which departments or units are using the business intelligence tools within your company?
28	INT2	My department, I would say all departments and all units. Yeah.
29	KM	Okay. Do you know how many users does your BI system have, or how many users are using the BI system within your company?
30	INT2	Maybe, you know like users who use it like daily - I would say ten, maybe five to ten. But, users who will like use it many times in a month - maybe thirty to forty.
31	KM	Okay.
32	INT2	Also, the managers. I mean, the project managers and unit managers. But, the ones who use it like every day all the time are business controllers, CFO, and… yeah.
33	KM	Okay. Does your business intelligence systems allow you to become more familiar with the market trends in the area of your business?
34	INT2	I would say so, for sure!
35	KM	For sure! Okay. Does business intelligence help you to determine the return of your investment? I mean, if yes in which way?
36	INT2	Yeah. You know like, in this system for instance we calculate how much we are like spending on different things, and then how much like… yeah, returns and profit we are making. So, of course, it helps us to determine the return on investments.
37	KM	So, I would ask sub-question here: Is it worthy to invest in BI systems?
38	INT2	From this situation or the cases I have seen - yeah, it's worthy. I can tell you from my works and the companies I work with, they make of course value of implementing BI system. I don't know about other companies, maybe they have implemented system that didn't work for them or they did something wrong, but in the cases I work with - yeah, it's definitely a good value.
39	KM	Okay. So, are you or your company developing BI software or are you just using software provided by a vendor?
40	INT2	Okay. I don't know what you exactly mean, but of course we are using Microsoft BI tools, like server integration service for BI, integration server ice cubes, etc. But then we use this tool as a framework to build our own system. And at the end we need to do a lot of work. So yes, we build it in a way but we use some tools that already exist on the market.
41	KM	Okay. So you said that the BI software vendor is Microsoft, right?

42	INT2	Yeah, I can say Microsoft. Yes.
43	KM	Okay. For how long have your company worked with your BI software vendor? I mean, for how long you are using only Microsoft software?
44	INT2	We are not only using Microsoft software, we use in like different systems other tools, but in this project we use only Microsoft, and we are X but to Microsoft, so I think we have worked with them forever.
45	KM	Okay. What are the reasons for selecting that specific vendor for that project, if you can tell?
46	INT2	Okay. So yeah, it's the huge amount of data, and then you know, Microsoft provide database engine, cubes, self-service tool… So, it's like yeah, it does different things, Qlick has only self-service BI for correct X, like really about the database usage. But, what we found this like yeah, like provider Microsoft - it has all the tools that we need. From that there is ERP tools, there is interface, there is integration tools, and all of them are well established, well developed and easy to use. So, yeah.
47	KM	Okay. Can you refer your company as a prospector, the one who is constantly looking for new BI tools and solutions?
48	INT2	Yeah, I would say that. Yes!
49	KM	Okay. Can you refer your company as a hit-seeker?
50	INT2	I'm not sure I understood what you mean by hit-seeker.
51	KM	Yeah, I mean like, if you find another software which has lower price, are you trying to use it in some way?
52	INT2	Yeah, but it's difficult to change after you implemented your system. It will cost more money than to build using a new tool.
53	KM	You want to say that it depends on your infrastructure or resources, or something like that, right?
54	INT2	If we are building a new system from scratch, yeah we can consider different choices, no problem. But, if we have a system that works and we keep supporting it and it has been there forever, so it's not easy to rebuild it.
55	KM	Of course. Regarding the data collection process, what type of data is of great interest for your company, and why?
56	INT2	So, it's internal sources, the financial transactions, the internals, you know? That's kind of data that we are analyzing.
57	KM	Okay. So, basically you are using only internal sources as I heard?
58	INT2	Yes.

59	KM	Okay. Which information coming from the external sources are you looking for? Maybe if you were using external sources in some way.
60	INT2	No. At the moment, we have enough amount of data coming from this different systems. As I said, it's almost two thousand employees, a lot of transactions, customer projects... So, we don't have any external data sources at the moment.
61	KM	Okay, thank you! So, the next question would be: "Do you know where the collected data is stored? Is it stored in in-house or in cloud or somewhere else?"
62	INT2	Yeah. You know, it's like kind of sensitive data, and we have some rules that are not easy to break. So, it's like in-house, in some databases.
63	KM	So, you have your own databases?
64	INT2	Yes. It's not easy to move to the cloud when we have such sensitive information.
65	KM	Of course, yeah. Do you know what kind of analytical tools for data processing you are using?
66	INT2	You mean like user interface and self-service BI, right? Or?
67	KM	Yup. Yup.
68	INT2	Okay. So, we have been using server reporting servers for a while, and we are starting to use BAR/POWER BI right now, Microsoft Pro BI. Yes.
69	KM	Okay, that's the answer. What type of visualization tools are being used for presenting the results to your associates or partners?
70	INT2	I don't know… But yeah, we are using BAR/POWER BI and server reporting service. Servers can send the reports to managers by like... maybe end of each month and then like business controllers use BAR/POWER BI to make their own charts that they want to see.
71	KM	Okay.
72	INT2	And we use Cubes, multidimensional Cubes by Microsoft. So, maybe this is the real description.
73	KM	Okay. So, in your opinion, which processes of current BI systems is the most challenging, and why?
74	INT2	Okay. Good question! I have to see… Maybe, you know… okay. Sometimes you understand something but the business controller means something else. I'm just a business intelligence developer, right?
75	KM	Okay.
76	INT2	So, I would build something in a way or like collect the data in a way that

		doesn't fits in PLAN, of course. I would say integration part, when you have like, saved data but like saved differently in different systems and you want to bring them together, and put them together, this is a difficult part as well.
77	KM	Okay. What barriers or weakness would you identify in the current BI systems and how do you think those barriers could be overcome in the future?
78	INT2	Right now we are suffering a little bit from loading time. It's like five hundred million rows, and loading time is really difficult. And yeah, kind of supporting storage changing dimensions, sometimes the system might crash, and so on. So, we are looking for some improvements maybe.
79	KM	Okay. How you see BI in the future? In which direction are developments being headed to?
80	INT2	In storing in two ways, I would say. The first way is about enabling the end-user, business users to use BI easily and without any technical knowledge. And other direction is going into big data, so current use would not be enough, maybe soon. And yeah, going into Hadoop and nosql unstructured data, and so on. So, two different ways I would say.
81	KM	Okay. So, we are moving to the second part of our interview which is the benefits, the table. I think… I mean you have it in front of you, right?
82	INT2	Yes, I have.
83	KM	Okay. So, I would like you to give us an opinion about each benefit, and an assess for every single benefit. Can we start with the first one?
84	INT2	Yes.
85	KM	So, the first one is "improved customer service".
86	INT2	Improved customer service, I would say "Strongly agree".
87	KM	Strongly agree?
88	INT2	Yes.
89	KM	And what is your opinion? Why do you think that… I mean, why you strongly agree with this benefit?
90	INT2	You see like how we are worked in with this customer, which areas he is looking for, when you delivered most last year for instance then you know that this month maybe you will get new request from this customer... and yeah, I mean everything that goes between... I mean, in this system at least everything that goes between you and this customer is register and lies. So, for sure, yeah… it helps you to support this customer better in the future maybe.
91	KM	Okay. The second benefit is "improved the efficiency of internal processes".

92	INT2	Okay. I would say "Strongly agree" to that one.
93	KM	Okay. Opinion?
94	INT2	We have some key performance indicator for different units and different domains. So, this system... we calculate this KPI's every month and see how it's moving or being better or worse. Then, of course, with data we go to every unit and tell them: "You are doing well" or "Maybe you can improve". So, for sure… yeah, it helps.
95	KM	Okay, thank you. The third benefit is "increased staff productivity".
96	INT2	Maybe "Agree".
97	KM	Agree?
98	INT2	Yeah, I mean… I don't know, there might be some way to "Strongly agree", but I don't find direct connection.
99	KM	Okay. The fourth benefit is "reduction in the cost of effective decision making".
100	INT2	Yeah, for sure! When you have knowledge, you can make better decisions and faster decisions.
101	KM	Okay. The fifth benefit is "reduced operational costs".
102	INT2	Operational costs… "Neutral", I would say.
103	KM	Sorry?
104	INT2	"Neutral".
105	KM	"Neutral"? Okay. You don't have any data about that?
106	INT2	No.
107	KM	Okay. What about "reduced marketing costs"?
108	INT2	Maybe in a way "agree".
109	KM	"Agree", okay. "The reduced customer return handling costs", do you have any opinion about that?
110	INT2	Customer return handling costs… I mean, it gives you knowledge about all what you are doing with your customer or your projects and units. So, in a way yes, but maybe in some of this items like more use from them... other items.
111	KM	Okay, so what is your assess here?
112	INT2	Which one was it? Number seven?
113	KM	Yup.

114	INT2	"Agree".
115	KM	"Agree", okay. The eight benefit - "reduced time to market products or services"?
116	INT2	Yeah, maybe "agree".
117	KM	"Agree"?
118	INT2	Yes.
119	KM	Okay. The ninth benefit is "reduction in the cost of transactions with business partners or suppliers".
120	INT2	Reduction in the cost of transaction?
121	KM	Yeah.
122	INT2	What do you mean by "cost of transaction"?
123	KM	Like you are lowering the transactions, you save money from using BI.
124	INT2	Yes, "agree".
125	KM	You agree?
126	INT2	Yeah.
127	KM	Okay. "Improved coordination with business partners or suppliers"?
128	INT2	Yes, "strongly agree".
129	KM	"Strongly agree". And what is your opinion here?
130	INT2	I mean, like I can see for this customer how we work with him, which projects we did, which tools we used, and how much we made, how much is left... like everything.
131	KM	So, this is connected to the reporting thing, right?
132	INT2	Yeah.
133	KM	Okay. The next benefit is "increased responsiveness to or from the suppliers".
134	INT2	"Neutral" I would say.
135	KM	"Neutral"?
136	INT2	Yeah.
137	KM	The next one is "reduced inventory levels".

138	INT2	Reduced, you mean like...
139	KM	You are not buying a lot of resources or raw materials, you are buying only the ones that you are needed for example for current process.
140	INT2	Maybe "neutral".
141	KM	"Neutral"?
142	INT2	Yeah.
143	KM	Okay. The next one is "increased efficiency of utilizing assets".
144	INT2	Yes, "strongly agree".
145	KM	And what is your opinion here?
146	INT2	I mean, it's like which employees are working and having many projects, which ones have lower work load… and yeah, then we can maybe know like next months or like in every minute who have been working in this domain, or like this person need new project, etc. So yeah, for sure.
147	KM	Okay. The next one is "leveraged the advantages of information technologies upgrades, improvements and/or developments in back-end IT systems".
148	INT2	Can you explain?
149	KM	Sorry?
150	INT2	Can you explain this one?
151	KM	I didn't heard, if you can repeat again.
152	INT2	Yeah, can you explain this one, I'm not sure...
153	KM	So, by using BI system can you use the IT upgrades more than previously?
154	INT2	"Neutral" I would say.
155	KM	"Neutral"?
156	INT2	Yeah.
157	KM	Okay, the fifteenth one is "increased revenues or services provided".
158	INT2	Yes, "strongly agree".
159	KM	And your opinion?
160	INT2	Yeah, I mean, by using BI we see where the market going for instance, and where we have to invest more, where we have to focus on when we talk to our customers, or when we build our like, customer and use data for instance, where to focus our marketing… and yeah, that makes more money for sure.

161	KM	Okay. So the next one is "reduction of lost sales or lost services provided".
162	INT2	Same answer as before - "strongly agree".
163	KM	"Strongly agree" and with the same opinion.
164	INT2	Yeah.
165	KM	Okay. The next benefit is "increased geographic distribution of sales or services provided".
166	INT2	Geographic distribution of sales... I mean, no, I'm not sure.
167	KM	"Neutral", right?
168	INT2	Yeah, "neutral" maybe.
169	KM	Okay. What about "enhanced profit"?
170	INT2	Yeah, "strongly agree".
171	KM	"Strongly agree", and the opinion?
172	INT2	I mean, you always need to know where you are going and what you are doing. And then when you know what you are doing you can learn how to do it better in the future and enhance the profit.
173	KM	Exactly, yeah. The next benefit is "increased return of investment".
174	INT2	Yeah, "strongly agree" as well. I mean, it's connected to my answer before, and yeah… many other items as well.
175	KM	Okay.
176	INT2	"Strongly agree".
177	KM	Okay. And the last one is "improved competitive advantage".
178	INT2	Yes, for sure!
179	KM	And can you tell us the opinion?
180	INT2	The same answer as well. I mean, when you know how you are doing and what you are doing wrong then you can improve and you get better competitive advantage, as well.
181	KM	Okay. So, this was the last question from my side, do you have something else to add here at the end of this interview?
182	INT2	No, I'm fine with this.
183	KM	Okay, thank you!

184	INT2	Yeah.
185	KM	Thank you for this interview, and thank you for the time taken for making this interview!
186	INT2	Yeah, you are welcome and good luck with your thesis!
187	KM	Thank you!

Appendix 6 Table of Benefits

Company / Benefit	**Capgemini**	**Company 1**	**Company 2**
Improved customer service	5/5	5/5	5/5
Improved the efficiency of internal processes	4/5	5/5	5/5
Increased staff productivity	5/5	5/5	4/5
Reduction in the cost of effective decision-making	5/5	5/5	5/5
Reduced operational costs	4/5	4/5	3/5
Reduced marketing costs	2/5	3/5	4/5
Reduced customer return handling costs	5/5	4/5	4/5
Reduced time to market products/services	4/5	5/5	4/5
Reduction in the cost of transaction with business partners/suppliers	5/5	3/5	4/5
Improved coordination with business partners/suppliers	5/5	3/5	5/5
Increased responsiveness to/from suppliers	5/5	4/5	3/5
Reduced inventory levels	4/5	3/5	3/5
Increased efficiency of utilizing assets	4/5	5/5	5/5
Leveraged the advantages of IT upgrades, improvements, and/or new developments in back-end IT systems	3/5	5/5	3/5
Increased revenues/services provided	5/5	3/5	5/5
Reduction of lost sales/lost services provided	5/5	5/5	5/5
Increased geographic distribution of sale/services provided	3/5	3/5	3/5
Enhanced profit	5/5	3/5	5/5
Increased return on investment (ROI)	4/5	3/5	5/5
Improved competitive advantage	4/5	5/5	4/5

References

Akkerman, S., Admiraal, W., Brekelmans, M. & Oost, H. (2008). Auditing quality of research in social sciences. *Quality & Quantity*, *42*(2), pp.257-274.

Alton, L. (2017). 5 Ways Business Intelligence Can Improve Customer Service. *MyCustomer*. Available Online: http://www.mycustomer.com/community/blogs/larryalton/5-ways-business-intelligence-can-improve-customer-service [Accessed 30 April 2017]

Antia, K.D. & Hesford, J.W. (2007). A process-oriented view of competitive intelligence and its impact on organizational performance. *Journal of Competitive Intelligence and Management*, *4*(1), pp.3-31.

Azvine, B., Cui, Z., Nauck, D.D. & Majeed, B. (2006). Real time business intelligence for the adaptive enterprise. In *E-Commerce Technology, 2006. The 8th IEEE International Conference on and Enterprise Computing, E-Commerce, and E-Services, The 3rd IEEE International Conference on* (pp. 29-29). IEEE.

Baars, H. & Kemper, H.G. (2008). Management support with structured and unstructured data-an integrated business intelligence framework. *Information Systems Management*, *25*(2), pp.132-148.

Baker, J., Jones, D.R. & Burkman, J. (2009). Using visual representations of data to enhance sensemaking in data exploration tasks. Journal of the Association for Information Systems, 10(7), p.533.

Bantleman, J. (2012). The Big Costs of Big Data. *Forbes*. Available Online: https://www.forbes.com/sites/ciocentral/2012/04/16/the-big-cost-of-big-data/#77877fc15a3b [Accessed 19 May 2017]

Bhattacherjee, A. (2012). Social Science Research: principles, methods, and practices.

Brinkmann, S. & Kvale, S. (2005). Confronting the ethics of qualitative research. *Journal of constructivist psychology*, *18*(2), pp.157-181.

Brynjolfsson, E. & Hitt, L. (1996). Paradox lost? Firm-level evidence on the returns to information systems spending. *Management science*, *42*(4), pp.541-558.

BusinessDictionary.com (2017). *What is leverage? definition and meaning - BusinessDictionary.com*. Available Online: http://www.businessdictionary.com/definition/leverage.html [Accessed 30 April 2017]

Buytendijk, F. (2014). Hype Cycle for Big Data, 2014. *Gartner*.

Carver, A. & Ritacco, M. (2006). The Business Value of Business Intelligence. A Framework for Measuring the Benefits of Business Intelligence. *Business Objects*, p.33.

Chaudhuri, S., Dayal, U. & Narasayya, V. (2011). An overview of business intelligence technology. Communications of the ACM, 54(8), pp.88-98.

Chen, H., Chiang, R.H. & Storey, V.C. (2012). Business intelligence and analytics: From big data to big impact. *MIS quarterly*, *36*(4), pp.1165-1188.

Côrte-Real, N., Ruivo, P. & Oliveira, T. (2014). The diffusion stages of business intelligence & analytics (BI&A): A systematic mapping study. *Procedia Technology*, *16*, pp.172-179.

Creswell, J.W. (2007). Qualitative enquiry and research design: Choosing among five approaches. *US: Sage publications Ltd*.

Davenport, T.H., Barth, P. & Bean, R. (2012). How big data is different. *MIT Sloan Management Review*, *54*(1), p.43.

Devens, R.M. (1868). *Cyclopaedia of Commercial and Business Anecdotes: Comprising Interesting Reminiscences and Facts, Remarkable Traits and Humors... of Merchants, Traders, Bankers... Etc. in All Ages and Countries...* D. Appleton.

Elbashir, M.Z., Collier, P.A. & Davern, M.J. (2008). Measuring the effects of business intelligence systems: The relationship between business process and organizational performance. *International Journal of Accounting Information Systems*, *9*(3), pp.135-153.

En.wikipedia.org (2017). *Business Intelligence*. Available Online: https://en.wikipedia.org/wiki/Business_intelligence [Accessed 23 May 2017]

Fayyad, U., Piatetsky-Shapiro, G. & Smyth, P. (1996). From data mining to knowledge discovery in databases. *AI magazine*, *17*(3), p.37.

Fisher, C.W., Chengalur-Smith, I. & Ballou, D.P. (2003). The impact of experience and time on the use of data quality information in decision making. *Information Systems Research*, *14*(2), pp.170-188.

Foss, B., Stone, M. & Ekinci, Y. (2008). What makes for CRM system success-Or failure?. *Journal of Database Marketing & Customer Strategy Management*, *15*(2), pp.68-78.

Gibson, M., Arnott, D., Jagielska, I. & Melbourne, A. (2004). Evaluating the intangible benefits of business intelligence: Review & research agenda. In *Proceedings of the 2004 IFIP International Conference on Decision Support Systems (DSS2004): Decision Support in an Uncertain and Complex World* (pp. 295-305). Prato, Italy.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The qualitative report*, *8*(4), pp.597-606.

Griffith, T.L., Northcraft, G.B. & Fuller, M.A. (2008). Borgs in the org? Organizational decision making and technology. In *The Oxford handbook of organizational decision making*.

Gummesson, E. (2003). All research is interpretive!. *Journal of business & industrial marketing*, *18*(6/7), pp.482-492.

Hall, J. (2004). Business intelligence: The missing link in your CRM strategy. *Information Management*, *14*(6), p.36.

Hendricks, K.B., Singhal, V.R. & Stratman, J.K. (2007). The impact of enterprise systems on corporate performance: A study of ERP, SCM, and CRM system implementations. *Journal of operations management*, *25*(1), pp.65-82.

Hesford, J. & Antia, K. (2006). *A process-oriented view of competitive intelligence and its impact on organizational performance*. Working Paper. Richard Ivey School of Business, The University of Western Ontario.

Hopkins, M.S., Townend, A., Khayat, Z., Balagopal, B., Reeves, M. & Berns, M. (2009). The business of sustainability: what it means to managers now. *MIT Sloan Management Review*, *51*(1), p.20.

Hočevar, B. & Jaklič, J. (2008). Assessing benefits of business intelligence systems–a case study. *Management: Journal of Contemporary Management Issues*, *13*(2 (Special issue)), pp.87-119.

Hutchison, P.D., Farris II, M.T. & Anders, S.B. (2007). Cash-to-cash analysis and management. *The CPA Journal*, *77*(8), p.42.

Imhoff, C., Galemmo, N. & Geiger, J.G. (2003). *Mastering data warehouse design: relational and dimensional techniques*. John Wiley & Sons.

Ireland, R.D. & Webb, J.W. (2007). Strategic entrepreneurship: Creating competitive advantage through streams of innovation. *Business Horizons*, *50*(1), pp.49-59.

Jancic, Z. & Zabkar, V. (2002). Impersonal vs. personal exchanges in marketing relationships. *Journal of Marketing Management*, *18*(7-8), pp.657-671.
Kandampully, J. & Duddy, R. (1999). Competitive advantage through anticipation, innovation and relationships. *Management Decision*, *37*(1), pp.51-56.
Kosara, R. & Mackinlay, J. (2013). Storytelling: The next step for visualization. *Computer*, *46*(5), pp.44-50.
Kvale, S. (2006). Dominance through interviews and dialogues. *Qualitative inquiry*, *12*(3), pp.480-500.
Kvale, S. & Brinkmann, S. (2009): *Interviews: Learning the Craft of qualitative research interviewing*. 2nd ed. Sage, Thousand Oaks, CA.
Manovich, L. (2011). Trending: The promises and the challenges of big social data. *Debates in the digital humanities*, *2*, pp.460-475.
Marketing MO (2017). *Marketing ROI Formula - Return on Investment Calculator*. Available Online: http://www.marketingmo.com/campaigns-execution/how-to-calculate-roi-return-on-investment/ [Accessed 19 May 2017]
McAfee, A., Brynjolfsson, E., Davenport, T.H., Patil, D.J. & Barton, D. (2012). Big data. *The management revolution. Harvard Bus Rev*, *90*(10), pp.61-67.
Michalewicz, Z., Schmidt, M., Michalewicz, M. & Chiriac, C. (2006). *Adaptive business intelligence* (pp. 37-46). Springer Berlin Heidelberg.
Leung, L. (2015). Validity, reliability, and generalizability in qualitative research. *Journal of family medicine and primary care*, *4*(3), p.324.
Myers, M.D. & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and organization*, *17*(1), pp.2-26.
Negash, S. (2004). Business intelligence. *Communications of the Association for Information Systems*, Vol. 13, Article 15. Available Online: http://s3.amazonaws.com/academia.edu.documents/30925515/businessintelligence.pdf?AWSAccess-Key-Id=AKIAIWOWYYGZ2Y53UL3A&Expires=1491176483&Signature=LBAY5h0YLuGJ7K7DLzguYuqj%2FJA%3D&response-content-disposition=inline%3B%20filename%3DBusiness_intelligence.pdf [Accessed 04 March 2017]
Ngwenyama, O.K. & Bryson, N. (1999). Making the information systems outsourcing decision: A transaction cost approach to analyzing outsourcing decision problems. *European Journal of Operational Research*, *115*(2), pp.351-367.
O'Leary, D.E. (2000). *Enterprise resource planning systems: systems, life cycle, electronic commerce, and risk*. Cambridge university press.
Ong, I.L., Siew, P.H. & Wong, S.F. (2011). A Five-Layered Business Intelligence Architecture. *Communications of the IBIMA*.
Pant, P. (2009). Essential Components of a Successful BI Strategy. *Information Management*.
Peppard, J. (2000). Customer relationship management (CRM) in financial services. *European Management Journal*, *18*(3), pp.312-327.
Petrini, M. & Pozzebon, M. (2009). Managing sustainability with the support of business intelligence: Integrating socio-environmental indicators and organisational context. *The Journal of Strategic Information Systems*, *18*(4), pp.178-191.
Polkinghorne, D.E. (2005). Language and meaning: Data collection in qualitative research. *Journal of counseling psychology*, *52*(2), p.137.
Popovič, A., Coelho, P.S. & Jaklič, J. (2009). The impact of business intelligence system maturity on information quality.

Powell, T.C. & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic management journal*, pp.375-405.

Provost, F. & Fawcett, T. (2013). Data science and its relationship to big data and data-driven decision making. *Big Data, 1*(1), pp.51-59.

Ranjan, J. (2009). Business intelligence: Concepts, components, techniques and benefits. *Journal of Theoretical and Applied Information Technology*,*9*(1), pp.60-70.

ReadyRatios (2017). *Asset management ratio*. Available Online: https://www.readyratios.com/reference/asset/ [Accessed 30 April 2017]

Recker, J. (2013). *Scientific research in information systems: a beginner's guide*. Springer Berlin Heidelberg.

Reddy, G.S., Srinivasu, R., Rao, M.P.C. & Rikkula, S.R. (2010). Data Warehousing, Data Mining, OLAP and OLTP Technologies are essential elements to support decision-making process in industries. *International Journal on Computer Science and Engineering*, *2*(9), pp.2865-2873.

Reinschmidt, J. & Francoise, A. (2000). Business intelligence certification guide. *IBM International Technical Support Organisation*.

Rouhani, S., Asgari, S. & Mirhosseini, S.V. (2012). Review study: business intelligence concepts and approaches. *American Journal of Scientific Research*, *50*(2), pp.62-75.

Rouibah, K. & Ould-Ali, S. (2002). PUZZLE: a concept and prototype for linking business intelligence to business strategy. *The Journal of Strategic Information Systems*, *11*(2), pp.133-152.

Sabherwal, R. & King, W.R. (1991). Towards a theory of strategic use of information resources: an inductive approach. *Information & Management*, *20*(3), pp.191-212.

Sheth, J.N., Sisodia, R.S. & Sharma, A. (2000). The antecedents and consequences of customer-centric marketing. *Journal of the Academy of Marketing Science*, *28*(1), pp.55-66.

Sørensen, H.T., Sabroe, S. & Olsen, J. (1996). A framework for evaluation of secondary data sources for epidemiological research. *International journal of epidemiology*, *25*(2), pp.435-442.

Sun Microsystems (2005). *Business Intelligence and Data Warehousing (BIDW): Transform Raw Data into Business Results*. Sun Microsystems, Inc. Available Online: http://docshare02.docshare.tips/files/5104/51044374.pdf [Accessed 19 May 2017]

Thomas Jr, J.H. (2001). Business intelligence–why. *eAI Journal*, *2001*, pp.47-49.

Thompson, O. (2006). *Business Intelligence Success, Lessons Learned*. Process ERP Partners, LLC.

Treacy, M. & Wiersema, F. (1997). *The discipline of market leaders: Choose your customers, narrow your focus, dominate your market*. Basic Books.

Vassiliadis, P. (2009). A survey of Extract–transform–Load technology. *International Journal of Data Warehousing and Mining (IJDWM)*, *5*(3), pp.1-27.

Watson, H.J. (2014). Tutorial: Big data analytics: Concepts, technologies, and applications. *Communications of the Association for Information Systems*,*34*(1), pp.1247-1268.

Watson, H.J. (2015). Tutorial: Mobile BI. *Communications of the Association for Information Systems*, *37*, pp.605-629.

Watson, H.J. & Wixom, B.H. (2007). The current state of business intelligence. *Computer*, *40*(9).

Williams, S. & Williams, N. (2003). The business value of business intelligence. *Business Intelligence Journal*, *8*, pp.30-39.

Wixom, B.H., Yen, B. & Relich, M. (2013). Maximizing Value from Business Analytics. *MIS Quarterly Executive*, *12*(2).
Yeoh, W. & Koronios, A. (2010). Critical success factors for business intelligence systems. *Journal of computer information systems*, *50*(3), pp.23-32.