Software-as-a-Service Business Intelligence: Adoption Criteria and Business Value

Master’s thesis within Informatics
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Jönköping May 2010
Abstract

The area of Business Intelligence (BI) is both broad and multifaceted and is becoming an increasingly pervasive tool utilized within organizations allowing them to gain greater insight into their business operations as well as the way in which their customers interact with them. By enabling businesses to perform powerful, effective analytics and reporting, BI tools allow them to maximize use of their data and facilitate better planning, forecasting and the ability to have a more targeted and efficient value chain. Usage of BI tools allow organizations to not only achieve but leverage their competitive advantage. SMEs are no different in their pursuit for competitive advantage and market share but often is the case that they lack the resources in order to make the substantial investments into the software and infrastructure required to host a solution on-premise. The Software-as-a-Service (SaaS) model of allowing users to have access to powerful tools and services without having to purchase the solutions or the infrastructure needed to host it on-premise allows SMEs an ideal opportunity to perform many or all of the functionalities that on-premise BI provides. SaaS BI is a relatively new concept only a few years old, but improvements in functionality and features, reliability of service levels and lower costs are allowing it to gain traction and it is projected to increase its momentum in the next few years. The aim of this paper is to investigate the factors that lead to adoption/non-adoption, assigned importance and perceived business value of SaaS BI within SMEs. These issues will be addressed through identification of the key decision criteria that influence SMEs to adopt SaaS BI solutions over an on-premise solution and vice versa. Greater insight into the decision making process, usage and value will be investigated with the cooperation of two vendors within the BI field. A two pronged approach targeting both SaaS and on-premise BI vendors and the users is adopted in order to find out the perspective on either end and whether or not they are incongruent. Semi-structured interviews were targeted at both an on-premise vendor and a SaaS vendor and their customers. A questionnaire was deployed to clients of both these vendors. Analysis was then conducted on the findings using an integrated selection model encompassing BI and SaaS theories and concepts outlined in the paper.
Acknowledgement

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Ipsa scientia potestas est.

Jönköping May 2010

Olawale Adelakun and Thomas Kemper
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<td>ACT</td>
<td>Agency Cost Theory</td>
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<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
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<td>ASP</td>
<td>Application Service Provider</td>
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<td>BI</td>
<td>Business Intelligence</td>
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<td>CI</td>
<td>Competitive Intelligence</td>
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<td>CRM</td>
<td>Customer Relationship M anagement</td>
</tr>
<tr>
<td>DSS</td>
<td>Decision Support System</td>
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<tr>
<td>DW</td>
<td>Data W arehouse</td>
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<tr>
<td>EIS</td>
<td>Executive Information System</td>
</tr>
<tr>
<td>ETL</td>
<td>Extract T ransform Load</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>F.I.S.H.</td>
<td>Functional Integrated Selection H ierarchy</td>
</tr>
<tr>
<td>IDC</td>
<td>International D ata Cooperation</td>
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<tr>
<td>IT</td>
<td>Information T echnology</td>
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<tr>
<td>KBT</td>
<td>K nowledge Based T heory</td>
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<tr>
<td>MIS</td>
<td>M anagement Information System</td>
</tr>
<tr>
<td>OLAP</td>
<td>O n-line A nalytical P rocessing</td>
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<tr>
<td>PEU</td>
<td>Perceived E ase of U se</td>
</tr>
<tr>
<td>PU</td>
<td>Perceived U sefulness</td>
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<tr>
<td>RBT</td>
<td>Resource Based T heory</td>
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<tr>
<td>RDT</td>
<td>Resource D ependency T heory</td>
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<tr>
<td>ROI</td>
<td>Return on I nvestment</td>
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<td>SaaS</td>
<td>Software-a-s-ervice</td>
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<td>SLA</td>
<td>Service Level Agreements</td>
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<td>SME</td>
<td>Small and M edium Enterprise</td>
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<tr>
<td>SQL</td>
<td>Structured Q uery Language</td>
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<td>TAM</td>
<td>T echnology Acceptance M odel</td>
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<td>TCT</td>
<td>T ransaction C ost Theory</td>
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1 Introduction

This introductory chapter aims to outline the background of the study. Key concepts pertinent to Business Intelligence (BI) and Software-as-a-Service (SaaS) are defined. The research questions derived from the stated problem are also briefly discussed. Additionally, the purpose of the study and a schematic of the research process are also introduced in this chapter.

1.1 Background

Recent technological advancements have caused a resurgence to an idea that has been popular for over a decade known as Application Service Provider (ASP) and is now about to change the application software market. Adjustments have been made to the business model, a new and catchy name was coined and previous technical challenges have been overcome. High-speed internet and more computing power than ever before make it now possible to run applications on a remote server and rent software instead of purchasing it. SaaS as a modern way of distributing and using software is becoming increasingly popular in various fields. Much of the success of this business model can be traced back to the penetration of the online platform salesforce.com within the Customer Relationship Management (CRM) market. Salesforce was founded in 1999 and has been successful for over ten years which can be seen in constant growth rates and by a customer base of more than 72,000 clients across all industries and markets (CRM available in 16 languages and global players like Siemens, Dell and Starbucks are among their clientele. This indicates that SaaS is not just a fad which will disappear after a short time period but has to be considered as a serious alternative to on-premise software. A study by the Cutter consortium (Kaplan, 2005) shows that 31% of the respondents are already using SaaS and another 34% are currently considering doing so. 82% of the companies currently considering expect to adopt a SaaS solution within the next 6 – 12 months which lead the researcher to conclude that as of 2006 more than 50% of their respondents would be using SaaS. Despite CRM being the most popular SaaS application there are many other functions that can be supported by SaaS applications. Besides CRM, SaaS providers are pushing for the development of applications utilized in other business areas such as Human resources and more recently BI.

2007 has been a year in which the BI market was majorly reorganized and some of the leading BI vendors changed ownership. The market was consolidated through big acquisitions from SAP, Oracle and IBM who acquired Business Objects, Hyperion and Cognos respectively (Daniel, 2007). This pioneered the way for a market concentration and led to the top 5 vendors controlling 75% of the market by 2010 (Felman & MacDonald, 2010). While the market for on-premise BI is now saturated and major players have established their market position, the novelty of BI offerings in the SaaS market has brought along new opportunities and is expanding the available market. As Negash and Gray (2008) state the implementation of an on-premise BI solution usually lasts at least six months which is not only lengthy but with an investment of US$ 2–3 million also very expensive. This is due to various challenges that come along with the BI implementation process ranging from high data volumes to several different data source systems. Data quality, data security, network stability and governance issues are only a few aspects that need to be taken into consideration when implementing a BI solution. Having ubiquitous technologies available anytime
for SMEs which have been previously only available to multinational companies is termed as ‘democratization of IT’ by Phil Wainewright (2009). Taking this investment into consideration indicates that SaaS technology has brought about an era where companies can rent software on a monthly basis without overwhelming costs. The setup time is considerably shorter, the money paid can be accounted into operational expenses rather than capital expenditures and companies can more commonly test the software before making a final decision in demos or on a free trial basis.

The recent financial crisis has played well in favor of SaaS vendors which noticed an increased demand in their offerings due to reduced company budgets and the ongoing need to drive efficiency (Sallam & Schlegel, 2009). Hostmann (2009) sees a strong market growth for SaaS BI predicting for 2010 that “20% of all organizations will have an industry specific analytic application delivered via SaaS as a standard component of their BI portfolio” making SaaS BI a highly profitable market for information aggregators. In Gartner’s 2007 Hype cycle for Business Intelligence and Performance Management, SaaS BI was found to be 2-5 years away from being on top of the hype curve indicating that it will reach the highest attention during 2009 – 2012 before waning (Bitterer, Schlegel, Hostmann, Gassman, Rayner, Chandler, Beyer, Herschel, Radcliffe, White, Payne, Andrews, Newman, 2007). DeSisto (2009) in a recent report stated that the 2009 Hype Cycle still has SaaS BI indicated as 2-5 years away from mainstream adoption showing that, although the SaaS BI industry has been growing, it still has some way to go before it will reach its peak in popularity. However, due to the novelty of SaaS BI it does not yet account for a significant turnover compared to the overall BI platform market which is the reason why it has been mostly left out of sight by the major BI vendors (Hostmann, 2009). This leaves opportunities to a high amount of new start-ups in the market which are trying to make a good case for SaaS and clearly focus on SMEs and local initiatives of bigger enterprises as their target group. The promised advantages are numerous and can as well be reasons to decide for a SaaS solution over an on-premise one. The novelty of this services offerings and its market spurs entrepreneurial actions and many new start-ups are competing for market share. While some are rather successful others have not been as fortunate as can be seen with the example of LucidEra and BlinkLogic in 2009.

1.2 Definition of Key Concepts

On-Premise
As opposed to SaaS, the term on-premise is used to describe purchased or licensed software on which the company holds ownership and which is usually operated on the own Information Technology infrastructure.

Software-as-a-Service (SaaS)
“Software that is rented rather than purchased. Instead of buying software and paying for periodic upgrades, SaaS is subscription based, and all upgrades are provided during the term of the subscription. When the subscription period expires, the software is no longer valid.” (PCMag.com, 2010a).

Application Service Provider (ASP)
ASPs can be seen as the predecessor of SaaS which came up in the 1990’s and did basically the same as SaaS does today. The difference lies in the approach of trying to cater to every customers individual needs and thus losing economies of scale. Today’s SaaS providers fol-
low a one solution fits all approach and make sure that all customers are using the same software. Different models are always accessible for all customers and customization is not necessarily a feature of the service (Levinson, 2010).

**Small and Medium Enterprises (SME)**

According to the European commission an enterprise is considered to be of small or medium size if it falls into certain thresholds in terms of headcount, annual turnover, and annual balance sheet total. The borderlines for headcount lie between 11 and 249 (measured in annual work units), for annual turnover between 2m€ and 50m€, and for annual balance sheet total between 2m€ and 43m€. Enterprises below these measures are considered to be micro- and those that are above large enterprises (European Commission, 2003).

**Cloud computing**

“Using the Web server facilities of a third party provider on the Internet (the ‘cloud’) to store, deploy and run applications. Cloud computing takes two forms. It may refer to ‘utility’ computing in which only the hardware and software infrastructure (operating system, databases, etc.) are offered, or it may refer to ‘software as a service’ (SaaS), which includes the business applications as well. Regardless of whether the cloud is infrastructure only or includes applications, major features are self service, scalability and speed.” (PCMag.com, 2010b).

**Information Technology**

“A firm’s total investment in computing and communications technology. This includes hardware, software, telecommunications, the myriad devices for collecting and representing data (such as supermarket point-of-sale and bank automatic teller machines), all electronically stored data, and the people dedicated to providing these services. It includes the information technology investments implemented by internal groups (in-sourced) and those outsourced by other providers, such as IBM Global Services or EDS.” (Weill & Broadbent, 1998, p. 6).

### 1.3 Problem statement

Obtaining two different perspectives on one common idea or issue helps to broaden the knowledge within that specific domain and in turn enhance ways of thinking on that subject matter. This becomes clear when thinking about the existing information gap between vendors and customers prior to a buying decision. Before the purchase of a system, the expectations have to be discussed as well as responsibilities for both vendor and customer side in order to ensure the desired outcome. The focus on one’s own specific knowledge leads to misleading judgments on both sides due to assumptions and estimates based on little knowledge about the other side. This can be seen as a knowledge gap between the involved parties which for new and evolving technologies, such as SaaS BI, even more substantial. Filling this knowledge gap becomes increasingly important to guarantee the success of the implemented system and to ensure the expectations before the implementation meet the actual outcome after the implementation. Many companies are not yet aware of BI SaaS which in turn means that vendors have to educate their potential customers about the costs and benefits. Moreover, the novelty of SaaS BI raises previously non-existent chances for SMEs if they manage to implement not only the system but also new business processes.

Projects often fail due to a lack of understanding of the real customer needs on the vendor side and an overestimation of the offered solution on the customer side. Due to the novelty
of SaaS BI and the cloud computing environment, many companies exaggerate the use of such systems which leaves potential customers with the belief that these tools will change their businesses dramatically. Gartner identifies cloud computing as one of the technologies at the peak of the hype level (MacManus, 2009).

### 1.4 Research questions

Focusing and comparing two contrary perspectives will allow for an in-depth investigation of the market, its players and potential customers. Working closely together with BI vendors and SMEs which are already using BI as well as potential customers will lead to a comprehensive understanding of the opportunities and competitive advantages that SaaS BI promises to deliver. Special interest will be paid to the comparison between traditional on-premise BI solutions on the one hand and the rapidly evolving SaaS BI solutions on the other. Due to their differences in many factors, such as pricing, implementation time, security issues, etc., it becomes even more important to identify the suitability of one or the other solution for different enterprise characteristics. This research concentrates on the decision factors every company investing into a BI system has to address and furthermore takes the business impact of the BI system into account.

This leads to the following research questions:

- What factors influence an SME to invest in a SaaS BI solution over an on-premise solution and vice versa?
- Is SaaS BI used in the same way as an on-premise system?
  - Were companies able to achieve the desired business value?

### 1.5 Purpose

The International Data Corporation (IDC - Press Release, 2010), in a recent report states that in 2010 SaaS BI will be the hottest segment in BI and that it will experience triple the growth of the market overall. Since Business Intelligence has been a growing sector for several years and is expected to become more and more important for all types of companies regardless of the industry, size or region they act in, this is an extremely young and exciting field to conduct research in. SaaS as a relatively new technology is expected to change the market allowing smaller players to incorporate advanced analytics and reporting in their daily decision making. This thesis aims to cover both vendors’ and customers’ (mainly SMEs) perspectives to investigate the impact of SaaS BI. The new offering of SaaS BI will be compared to the established and prevalent on-premise solutions which have been around for decades evolving from the domain of Decision Support, Executive and Management Information Systems (DSS / EIS / MIS). Special interest will be paid to factors in the software purchasing process which are decisive in helping organizations determine whether to invest into SaaS BI rather than an on-premise system or vice versa. Interest will also be paid to investigating the perceived benefits (tangible or intangible) that were realized as a result of utilizing the system.

The aim is to provide a model for SME adoption of BI with respect to important decision factors they considered and the business value achieved as a result of utilizing their chosen BI solution.
1.6 Disposition

Introduction – This section will introduce the concepts of Business Intelligence and SaaS BI. Also included will be the problem definition and the chosen research questions, purpose of study, delimitations and background.

Literature Research – Research from articles, books, journals and white papers into different BI and SaaS BI concepts such as real-time BI, Competitive Intelligence (CI), Artificial Intelligence (AI), operational BI, real time BI and open source BI. Existing research on issues, challenges and opportunities experienced as a result of BI usage will be reviewed.

Methodology – This section includes a description of the techniques employed to acquire data from the SMEs and the BI vendors and suppliers.

Frame of Reference – Theories and models used to be utilized in the analysis section of the paper will be discussed at length.

Empirical Findings – A presentation of the data obtained by previously discussed methods from the BI vendors as well as their clients.

Analysis – An analysis of the empirical data to investigate trends, patterns and expectations from different perspectives depending on their role within the customer-vendor relationship.

Conclusion – A conclusion derived from the analysis to reveal any possible consistencies and or incongruent trends realized.

Future Work – Recommendations of possible ways in which to build on the existing findings and ideas for further research will be offered.

1.7 Time Plan

The following timeline outlines a schedule for the planned tasks, objectives and activities. The seminars can be seen as milestones to which individual chapters will be completed and previously completed chapters can be revised.
1.8 Delimitations
This research does not aim to give a comprehensive overview of the market in terms of available BI solutions. Rather, it is focused on SaaS BI solutions and touches only marginally related research fields within BI such as competitive BI, real-time BI and artificial BI. Moreover, existing research about IT purchasing processes will be used to analyze the investment process into one or the other BI solution. However, these concepts are only partially applicable since SaaS is a rather new phenomenon and does not compare to a software or system purchase.

1.9 Research decomposition
Figure 1 below explicates the blueprint of thesis. The initial stage consisted of the authors teaming up and determining appropriate topics that would be of interest. Many areas were initially proposed but reflection and deliberation produced a focus which transformed into a title formulation. Exhaustive literature research was conducted in the subsequent stage in order to acquire further knowledge about the field and find out what conclusions had been made within the existing literature. This enabled the authors to identify knowledge gaps within the literature and thereby formulate a problem statement. Research questions were therefore developed based on areas that the authors found to be inadequately addressed. A disposition was developed to create an outline of the thesis as well as a time plan to help to peg the objectives and milestones of the project to the timeframe which would help to easily identify whether the project was on or off track. After review of the theories pertinent to the research objectives, a conceptual framework was developed to help provide a holistic schematic of the concepts to be utilized. The research title, scope and questions were then presented to supervisors and peers to receive comments and constructive critique on the work presented. BI vendors (SaaS and on-premise) were approached and informed on the facilitate our research endeavors. Once the authors solicited the cooperation of QlikTech and YouCalc the thesis gained a practical dimension. The methodology on how best to solicit data from the targeted respondents was determined as well as quality issues such as validity and reliability. Interviews were conducted with key members within QlikTech and YouCalc as representatives of the vendor side and also with a SaaS and an on-premise user to be representative of the client side. A questionnaire was developed to address key factors and concerns and to evaluate the way in which users perceived the impact of the BI solutions. The aim of the survey would be to help identify the reasons in which users adopted SaaS solutions over on-premise BI and vice versa and was deployed to both QlikView’s and YouCalc’s customer base. The results were then analyzed to identify patterns or dissimilarities in the respondents’ data and helped to construct our conclusions. A report draft containing a near-complete version of the authors’ findings and conclusions was disseminated to supervisors and peers to once again receive critique and comments on the development hitherto. The research project culminated in a presentation and defense of the authors’ findings before a panel of supervisors and peers.
Research Team Assembly & Topic Formulation

- Literature Research
- Research Questions Development
- Disposition & Time Plan Development

- Correspondence with BI Vendors & Supervisors
- Presentation of Research Scope
- Develop Conceptual Framework

- Methodology Selection
- Conduct Interview
- Survey Deployment
- Analysis of Results
- Report Draft
- Final Report

- Presentation of Findings

Figure 1: Research Decomposition
2 Literature Review

This chapter aims to introduce and discuss key concepts and terms pertinent to the area of BI and SaaS which have been elicited from the body of literature researched during the process of developing this thesis. An overview of BI, its evolution, differences between SaaS and on-premise concepts as well as SMEs are addressed within the chapter.

2.1 Introduction

In an increasingly globalized world, competition on the markets becomes harder for all involved players and thus boosts the individual need for higher efficiencies and a clearer differentiation from competitors. The manager's gut feeling is becoming more and more insignificant due to a higher need for accuracy on the one hand and the opportunities made possible by the introduction of modern technologies such as DSS and BI on the other. Leveraging these technologies in the right way will lead to smarter decision making and hence to an advantage over the competitors.

BI software arose from ongoing development of DSS as well as EIS which have been very popular in the '80s and '90s helping the user to make better decisions by presenting data in a more comprehensive manner as well as applying simple sensitivity analysis. Many research papers cover the various fields of BI and Competitive Intelligence (CI) which indicates that this research topic is well exploited and well understood. The next step in the BI development is both functional and distributional. As Zaman (2005) proclaims BI is likely to merge with the field of artificial intelligence in the upcoming years adopting the new name of artificial business intelligence and thus will enhance usage, forecasting accuracy, and analytical methods. Besides this functional integration with AI, BI has already ventured into the realm of the cloud and for several years now has been available as SaaS. However, going from DSS to SaaS BI has been a piecemeal journey with SaaS BI just recently being lauded as a serious software solution for companies. Due to various benefits that SaaS offers, it is particularly interesting for SMEs which are looking into BI for the very first time.

Due to the hype BI has experienced in the last 10 to 15 years (Bitterer et al., 2007), there are many different definitions, buzz words and circumscriptions in the literature which led to various conceptions about BI (Turban, Sharda, Aronson, & King, 2008). This research focuses on the most common definitions to make it as universally applicable as possible.

Golfarelli, Rizzi, and Cella (2004) in their article Beyond data warehousing: What's next in Business Intelligence? define Business Intelligence as the process of turning data into information and then into knowledge. Negash and Gray (2003) in their article Business Intelligence, go further on to explain Business Intelligence systems as being responsible for data gathering, data storage and knowledge management with analytical tools to present complex and competitive information to planners and decision makers. Both definitions point to the fact that Business Intelligence is a tool used within organizations to gather precise information about business operations, customers and also competitors which will enable decision makers to make more fact based decisions and leverage their competitive advantage. Howard Dresner coined the term Business Intelligence in the early 90's (Watson & Wixom, 2007). Since then it has become an increasingly pervasive tool being used by companies and has taken many variations.
Walters (2009), defines SaaS BI as a model of software deployment that is provided to customers across the Internet. He discusses that this model frees customers from having to install the application software on their own computers, reducing the burden of software maintenance, installation, configuration, and ongoing operations and support.

Bitterer et al. (2007) describes SaaS BI as BI functions and applications that are supported by a vendor as a service, accessed over the Internet, without the need to deploy and maintain an on-premise solution. SaaS-based BI enables customers to quickly deploy one or more of the prime components of BI without significant IT involvement. These prime components are:

- Analytic Applications
- BI Platform
- Information Management Infrastructure

Hostmann (2009) in a recent Gartner report identified midsized businesses or business units within departments as one of the main patrons of SaaS BI. These enterprises generally have limited resources, less access to IT staff, competencies and BI technology and have a need for rapid deployment of BI capabilities (Weston & Kaviani, 2009).

### 2.2 An overview of BI

Classic BI suites delivered from established vendors are usually on-premise solutions and require the company implementing this solution to fully integrate the new system into the existing IT environment. Contrary to SaaS, the implementation process is more complex and calls for more resources making sophisticated project management crucial. Reliance on the desired functionalities, underlying IT infrastructure of the company and the business processes the system is designed to support, make this a project many IT departments cannot handle on their own. As mentioned earlier, most implementation processes take at least six months and require an investment of US$ 2-3 million as up-front costs (Solomon & Gray, 2008). This must be seen as an investment with capital expenditures which means that many guidelines of various investment theories apply. Additional maintenance, upgrades and staff training are operational expenses that further burden the IT budget in subsequent periods.

The market is well defined and organized, leaving only a few major vendors to take the largest market share. Niche players focusing on industry specific solutions are struggling with advanced generic and highly adaptable products from the industry leaders. Big IT companies such as SAP, Oracle and IBM all offer their own solutions and expertise to mainly large enterprise customers. These solutions penetrate the whole enterprise and offer superior analytics in every domain. They are not intended as departmental solutions coming from local initiatives. This is when smaller vendors, usually catering to medium sized businesses, come into play and can score with a short return-on-investment period and very flexible solutions.

The obstacles in each BI investment decision are well described by Henschen (2009) who identified complexity and costs as the two most important points that hinder an investment into a BI solution. Table 2 gives an overview of the top ten BI roadblocks in accordance to their rank.
Table 1: Top Roadblocks to BI success (Henschen, 2009)

<table>
<thead>
<tr>
<th>BI Roadblocks</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity of BI tools and interfaces</td>
<td>1</td>
</tr>
<tr>
<td>Cost of BI software and per-user licenses</td>
<td>2</td>
</tr>
<tr>
<td>Difficulty accessing relevant, timely or reliable Data</td>
<td>3</td>
</tr>
<tr>
<td>Insufficient IT staffing or excessive software requirements for IT support</td>
<td>4</td>
</tr>
<tr>
<td>Difficulty identifying applications or decisions that can be supported by BI</td>
<td>5</td>
</tr>
<tr>
<td>Lack of appropriate BI technical expertise within IT</td>
<td>6</td>
</tr>
<tr>
<td>Lack of support from executives or business management</td>
<td>7</td>
</tr>
<tr>
<td>Poor planning or management of BI programs</td>
<td>8</td>
</tr>
<tr>
<td>Lack of BI technology standards and best practices</td>
<td>9</td>
</tr>
<tr>
<td>Lack of training for end users</td>
<td>10</td>
</tr>
</tbody>
</table>

2.2.1 Evolution of BI

Generating information out of data for smarter decision making describes BI in its purest form. Although the term BI was coined in the mid 20th century the idea behind it has been in existence for centuries prior and only the IT support in this process is an achievement of modern times (Luhn, 1958). Luhn (1958, p. 314) defines intelligence as “the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal”. Since BI is meant to guide action it is also often referred to as decision support and, before BI systems became popular, DSS were fulfilling mainly the same functions. Taking a closer look at the development steps of computer systems aiming at information provision will outline the important differences between the five concepts of MIS, DSS, EIS, Data Warehousing (DW), and finally BI.

MIS were developed during the 1960s and their major goal was to utilize computer power for managers in order gain faster and more accurate information about their businesses. Efficient data handling and first report functions could be found in these systems. Computer based information storage made it easier to store data and faster to retrieve it when needed. Despite the advantages it delivered, these systems were not really successful which can be traced back to their high costs. Improvements were made in the 1970’s when DSS were introduced. The novelty of these systems was a higher focus on decision support with mathematical and statistical models interpreting data and not just giving out standard reports. It was now possible for managers to gain more useful information out of the database and not just export data about previous periods. A higher degree of usability for the top management was achieved with EIS systems during the 1980s allowing for customized reports and data presentation. Also, the user interfaces got more intuitive so that a broader range of people and managers directly could work with the system. DW are the direct predecessor of BI systems and already encompass the underlying data infrastructure. Inmon (2010) defined DW as “a subject-oriented, integrated, time-variant and non-volatile collection of data in support of management’s decision making process”. A more structured approach to data handling can be found in this definition requiring data to be more consistent and integrated into one common system. DW consist, in a narrow sense, only of a database orga-
nizing data in an efficient way. In a broader sense, analytical and report components can be part of DW as well. Due to an increased process oriented way of thinking in the past decades BI describes the whole approach of gathering, manipulating and presenting data. It starts with the integration of various systems that can be used to extract data which is then often (but not necessarily) loaded into DW or Datamarts and later on accessed with analytical tools in order to evaluate the data. BI is thus not a completely new system but comprises of techniques and tools of earlier development stages as outlined above augmented with new analytical capabilities. This is also the reason why terms like MIS, DSS, and others are sometimes used interchangeably (Uni Hannover, 2010).

2.2.2 Structure and composition of BI

A BI system usually contains of several different subsystems each specifically designed for crucial tasks in order for the BI system to function adequately and according to the specifications. These subsystems handle tasks such as data provision, data analysis or data presentation. Whenever systems have to work together for a common goal, high interoperability is required and the setup should be carefully adjusted so that the whole system can achieve optimal results.

As can be seen by Kemper and Baars (2006) in Figure 2, every BI system consists of three layers and is based on multiple data sources which can be found in both relevant operational systems as well as external data sources. These systems provide the raw data which is absolutely vital for further information retrieval. High precision and accuracy are essential for the outcome of later analyses. Most often the data retrieval from various different systems is a lengthy and difficult process due to discrepancies in the data quality and different data saving conventions. This brings the need for first data manipulation to ensure a high data quality in the data warehouse. The DW is designed to have data ready for fast access and therefore it is often organized as a cube allowing for Structured Query Language (SQL) queries and various On-line Analytical Processing (OLAP) techniques. On top of data sources containing the raw data stand three layers with the task of extracting the data from the source systems, associating numbers with each other and according to preset values, interpreting this data which is then appropriately prepared to be shown in easily comprehensible reports, dashboards and the like. This is where data is turned into information and through this conversion reaches a higher value. The first layer is the data layer handling the data in its purest form and extracting it from various systems along the value chain, organizing it in a uniform storing convention and providing it for further manipulation. Getting the data into a usable format is one of the most challenging and time consuming tasks in the implementation of a BI system. The subsequent analytical tools are consistently developed and well tested but the data comes from systems that have been in use for several years and are often run independently without a major need for integration.

The following logic layer runs first analyses and creates meta data in interpreting the raw data in certain ways. This is where information is generated out of the raw data according to predefined mathematical models and algorithms. Most value is added in this layer and just needs to be properly presented to the right audience which then happens in the access layer. The BI portal consisting of dashboards, fully customizable reports, functionalities for queries, and depending on the BI suite further analytical and graphical tools. The use of a BI system to the company varies with the demands the users have and the solutions, tools, and modules offered by the selected vendor.
What appears simple and easily comprehensible here is a very complex concept in reality. A BI system is usually set on top of other already existing systems that were implemented while the company was growing and whenever new needs were realized. This behavior results today in many companies having a very diversified IT landscape and often is the case that many systems are loosely connected and integration becomes a formidable challenge. This may be due to the fact that earlier stages within the organization’s IT timeline may not have required the systems to be interconnected but then problems arise with the introduction of a BI system that tries to consolidate the disparate systems. The connection of several different operational systems postulates integration strategies and techniques to unify data structures. After a successful integration of the systems and the Extract-Transform-Load (ETL) process, all the data is stored and ready for access at a data warehouse which makes it possible for the BI program to run its analytics. However system integration and data cleansing remain as the two big problematic fields within on-premise BI solutions.

The amount of information a user generates out of the BI systems is dependent on the users' and systems' capabilities. According to Eckerson (2007) BI technologies can be categorized into four different types according to the information value they provide (Figure 3). The very basic technologies only encompass a reporting function giving the user the opportunity to see basic figures and status quo data. This will only show a static image of the data within the system and not allow for any further insights into how past and future events depend on each other. With growing complexity of the technologies the business value rises, allowing for analysis and a deeper insight into the ‘Why’ of using OLAP and other visualization tools. The third type of BI technologies is Monitoring including dashboards and scorecards which aim to provide the user with the information from the underlying categories turned into knowledge in relating it to reference-values. At this point it is possible to
see whether a project or company is on track to reach the preset goals or off track and action needs to be taken. The most complex systems even encompass a fourth category which uses the data to draw prediction and estimate future developments. With increasing complexity the demand on the user’s experience and capabilities rises as s/he has to manage more data in order to turn it into accurate information.

![BI Technology levels (Eckerson, 2007)](image)

**2.2.3 Other related concepts**

The open and very broad definition of what BI actually is allows for it to coincide with other intelligence related concepts. Since the term BI was coined before other technologies merged into the BI field it does not necessarily incorporate newer features that come along with technological advancements. Among these are the combination of internal and external data sources, access to information in real time rather than a system that is updated in cycles as well as improved features and algorithms for the predictive analytics. Some of these terms will be explained for the better understanding of the reader.

**Competitive Intelligence**

As McGonagle and Vella (2002, p. 3) state “Competitive Intelligence involves the use of public sources to develop data on competition, competitors, and the market environment”. This shows a BI approach towards an external environment directed at gathering as much data as possible on competitors’ business situations. “It then transforms, by analysis, that data into information. Public, in CI, means all information you can legally and ethically identify, locate, and then access” (McGonagle and Vella, 2002, p. 40). The use of such data and the information derived from it can be used to strategically position the enterprise in question better against competitors in local and global markets. This is underlined by Negash and Gray (2003) who define CI as a systematic and ethical program for gathering, analyzing and managing external information that can affect your company’s plans, decisions and operations.

Similarities and differences to BI can be seen in the data gathering and information processing phases. While BI utilizes mostly internal data collected from various systems in
the respective field in order to strengthen the own business organically, CI concentrates on external data on external players in order to orientate the company on the competition. It becomes overt that CI has a clear focus on competitiveness as opposed to the general BI idea of leveraging one’s own potential. As seen from Golfarelli et al.’s (2004) definition of BI, it is valid to say that CI is merely a subcategory and is hence integrated in a broader understanding of BI.

**Operational BI**
Moving away from the very strategic approach BI had in the past when mostly tech aficionados were utilizing the analytical tools operational BI aims at short-term operational rather than long-term strategic decision making. In doing so it heavily increases the amount of decisions made and furthermore limits the importance of single decisions. Operational BI is used by a broader user base in their daily work and not as relevant to the top management.

**Real time BI**
Timely information is considered to be a big advantage in many industries. Regular update cycles that run during the night in order not to stress the IT infrastructure during the daily usage are quite common in many companies. This is mainly due to an overburdened IT infrastructure that would be challenged with the workload of intensive data updates from many operational systems into a shared data warehouse during the day. Besides that there might have been no need for real time data at the time of the implementation of the system. However, increasing competition makes a fast information flow indispensable and real time BI becomes a competitive advantage.

**Open Source BI**
The ongoing open-source movement includes not only operating systems as well as standard office software but all types of application software. Therefore it is only logical that there are also some BI tools to be found in the open-source community. The advantage of open-source BI tools is the possibility to integrate them into existing analytical tools or other application software the user is using on a regular basis. Popular vendors are Jaspersoft, Pentaho, and Palo.

**BI with incorporated Artificial Intelligence concepts**
According to Zaman (2005) BI is rapidly evolving and current customers are constantly in the need for more information and more accurate predictions about the impact of certain actions. These challenges might be approached with a merger of the two fields - Artificial Intelligence (AI) and BI. AI will help finding links and relationships in the existing data and provide the user with more information. Depending on the implementation and capacities of the system this is predetermined to take away big parts of the human logic required to interpret datasets and to associate a correct action to it.

**2.3 SaaS concept**
Software-as-a-Service can be understood as a new type of software distribution and utilization technology that is, for various reasons, increasingly popular among SMEs. It involves a shift in responsibilities as observed with traditional outsourcing techniques in which companies pay other parties for a service they are not willing or not able to provide for themselves any longer. Along with this transition of responsibility in terms of installation, maintenance, and support comes a completely different investment model. Using SaaS contracts implies an ongoing agreement between the company and a SaaS vendor which is based on trust with regards to data security, performance, and the hope that the vendor does not dec-
lare bankruptcy. Against these disadvantages stand almost no investment costs and a better idea of sustainable vendor-client relationships since the vendor has a big interest in keeping its customers whereas many traditional software vendors seek to seal the deal and leave the customers alone. Revenues are generated through contracts based on a pay-as-you-go subscription basis (Clair, 2008; Katzan, 2010; Weston & Kaviani, 2009).

2.3.1 Evolution of SaaS

The idea of renting software rather than buying it is not new nor highly innovative as it might have seemed. The ubiquity of the internet promoted the idea of utilizing networks for distributing software and initially vendors of these services were termed Application Service Providers (ASP). However the internet was still slow, requirements on the software became more and more complex, and ASPs failed to generate value through economies of scale. Multi-tenancy can be marked as the crucial development step laying the foundation for a profitable business idea. This concept basically allows one instance of a software to run for multiple clients and, in doing so, is a great enabler in overcoming the pitfalls of ASPs. In doing so the whole functionality is always provided to all users and updates need to be made only once. It is feasible to identify fast broadband internet connection and the multi-tenancy approach as major facilitators of the success and popularity of SaaS today.

The ASP business model was more of a distant hosting of software rather than an approach to build a software that meets the requirements of different companies from different industries. A one-size-fits-all approach was first introduced with the gradual growth of SaaS and from then on allowed the vendors to operate profitably through the generation of economies of scale. This development from ASP to SaaS happened in the late 1990s and from 1999 salesforce.com spread the word about its SaaS Customer Relationship Management tool. This helped to make the concept widely known and soon other companies developed a high variety of tools which are now accessible over the internet. However the biggest steps have been made in recent years which can also be seen in a Gartner’s Hype Cycle for Business Intelligence and Corporate Performance Management (Bitterer et al., 2007) in which SaaS BI is on the rise and expected for mainstream adoption in the next two to five years.

2.3.2 SaaS BI

An increasing number of SMEs are venturing towards adoption of the SaaS BI model which allows for a cost-effective, on-demand alternative to the on-premise paradigm. The major difference between the SaaS BI and on-premise model is that the services applications, reports and analytics are hosted in the cloud. This model is especially suitable for organizations that have tight IT budgets but still realize the need for business analytics and reporting within their enterprises. It is a comparably young discipline and spinoff from the BI market and offers to its user base low cost and a pay-as-you-go payment model. Young startups account for a large portion of the vendors leaving bigger, more established companies only a small share of the SaaS market. The very novelty of this market reveals that its consolidation has not yet been actualized but can be expected in the not too distant future. On-premise vendors as well as SaaS vendors like Salesforce.com will make a strong move into the market in acquiring knowledge and technologies that have been developed while they missed this technological evolution. Popular SaaS vendors include Panorama, Birst, YouCalc, and data applied just to name a few.
2.3.3 Comparison between SaaS and on-premise concepts

The idea of renting instead of owning assets based on a monthly subscription fee brings along many differences to the traditional way of incorporating software into the IT portfolio of a company. Financial and operational decision factors differ tremendously and various aspects in terms of financing and maintaining the system, compliance with data security policies, legal issues, and service level agreements (SLAs) need to be extensively evaluated before investment decisions can be made. Table 2 gives an overview over the most important issues within the decision process. Both alternatives come along with a certain lock-in effect and supplier dependency which is inherent in every strategic investment. However, due to the substantial differences between SaaS and on-premise software, the vendors package it as different solution offerings. SaaS mainly consists of only the analytical program which is, to a certain degree, comparable to the implementation process a user goes through after buying a standard software suite in a store. S/he is left alone with the installation, customization, and other than consulting a handbook will not find further assistance in operating the program. After sales service is not very common and it is up to the users' own activity to find the best way to utilize the new software. The service offered by on-premise BI vendors is often an already named solution which describes a package consisting of various different items often including consultancy during the whole implementation process, the soft- and hardware which perfectly fit to each other, training and after sales services.

<table>
<thead>
<tr>
<th>Point of difference</th>
<th>On-premise</th>
<th>SaaS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>Software and Hardware reside at the location of the customer</td>
<td>Software and Hardware reside at the premises of the vendor</td>
</tr>
<tr>
<td>In House Staff</td>
<td>Typically complex software implementation and maintenance requirements necessitate hiring of in house IT experts</td>
<td>End user oriented. Non experts can implement and manage the solution with the assistance of the vendor</td>
</tr>
<tr>
<td>Ongoing Maintenance</td>
<td>Customer's responsibility</td>
<td>Vendor's responsibility</td>
</tr>
<tr>
<td>Implementation Time</td>
<td>Possibly months</td>
<td>Days</td>
</tr>
<tr>
<td>Costs</td>
<td>High Upfront Capital Costs</td>
<td>Pay as you go fee structure. Per User per Month fees</td>
</tr>
<tr>
<td>Upgrades</td>
<td>Paid/sporadic</td>
<td>Free/ongoing</td>
</tr>
<tr>
<td>Customizable</td>
<td>Highly customizable</td>
<td>Point to click customization for SMBs</td>
</tr>
<tr>
<td>Remote Access</td>
<td>Works best inside company network</td>
<td>Accessible via the internet on all internet browsers</td>
</tr>
</tbody>
</table>

1 The term assets is used in order to underline that the concepts comprise more than the mere software. The underlying datacenter and network infrastructure are also crucial parts of the necessary IT environment and hence need to be taken into account.
2.3.4 Special SaaS investment considerations

With the above mentioned advantages and disadvantages SaaS brings along, it is of importance to get to know your SaaS vendor before the investment decision is done. Several factors which are not applicable in on-premise software purchase decisions need to be taken into account. As a recent IT World article (Wailgum, 2008) points out there are several questions a potential customer should ask the SaaS vendor in focus. The IT department is often left out of the purchasing decision and hence has no chance in evaluating the software and its value from an IT perspective. Integration with other already existing solutions might become an issue and the IT department is first approached to resolve such issues.

Other integration issues, such as business processes that have to be adapted, and the Total Cost of Ownership (TCO) are further considerations that have to be made. DeSisto (2009) in an report for the Gartner group identified hidden costs that can occur when you give up control over the software development. SaaS software is subsequently developed and software updates are made to the vendors schedule. Since this does not necessarily fit the clients schedule problems are to be anticipated. Furthermore, the TCO of SaaS solutions might rise above that of on-premise systems depending on the actual signed-up users and the contract expiration. As with all external data hosting offerings questions occur about their infrastructure, processes of handling emergencies in the case of system failures, security guidelines, and backup policies. Secure coding standards should be demanded and maybe even external companies verifying these as well as handing out certificates and approving the vendor (R. Madsen, personal communication, 2010-04-27). Furthermore, strong encryption standards should be utilized and the vendor should be forced to stay on top of security issues in updating their systems regularly (Meftah, 2010).

2.4 SME

SMEs are defined by the EU (2005) as companies with less than 250 employees and a maximum yearly turnover of less than €50m. However the sum of SMEs are a major driver of the economy and make up over 99% of all businesses within the EU-27 and compromise 67.1% of all persons employed. In terms of value added the picture changes dramatically as the large enterprises (0.2% in EU-27) are accountable for 42.4% of the share. Due to the limited financial strength of the single SME they are often cost driven and seeking for price efficient solutions in order to run the business as profitable as possible. This also means that SMEs are lacking financial power for big investments and that these are often highly leveraged. This puts them into the need to find alternative ways of financing their assets such as renting and leasing which again makes them likely customers of SaaS offerings. Due to the specifics of SMEs and the peculiarities of SaaS the adoption process looks slightly different than the one of sophisticated on-premise solutions (Schmiemann, 2008).
3 Research Methodology

This chapter aims to outline the research methodology chosen for the thesis and outline why it was chosen. Included is a discussion of the methodology and research approach employed. The chapter also describes the interview structure as well as the design of the questionnaire deployed. Research quality issues are also addressed.

3.1 Research Approach

The thesis will adopt a mixed method approach to solicit data from respondents (BI vendors and SMEs). This means both qualitative and quantitative empirical data will be collected in order to draw conclusions on the posted research questions. Morse (2003, p. 202) states “this measurement enhances the qualitative description or interpretation”. A qualitative approach will be used in the form of interviews and be conducted to solicit empirical data from BI vendors and suppliers in terms of what they project the future will hold for SaaS BI and what challenges exist with the implementation and use of the systems within their organization. This will help develop a clearer perspective on some of the challenges, factors, and opportunities that influence their product offerings as well as the customer satisfaction. A focus will be on factors that led to SaaS BI adoption or rejection, the alignment with other IT applications, issues with post-implementation support services and technology acceptance. A more quantitative approach will be adopted in the form of questionnaires which will be used to gather data from companies actually using BI. The data collection is done with the purpose of finding out about pertinent issues and considerations concerning the investment into BI and underlining (or challenging) the results from the interviews. This will support the interviews with more data and insights from many customers while it contributes to both the reliability and the scope of the study. Using this approach ensures that all contacted companies have to some extent experience with BI and some even with SaaS.

3.2 Data Sources and Data Collection Methodology

Both primary and secondary data will be used to make this study as detailed and comprehensive as possible. Aside from books, scientific journals, articles, newspapers and magazines which serve as secondary data, the authors will collect primary data in the form of interviews and surveys which have been especially developed to match the sole purpose of answering the research questions stated in an earlier chapter.

With the aim for high data quality in the collection of primary data, the authors decided to conduct interviews with representatives from the two major BI vendors to facilitate this research. On the client side most information will be gathered using surveys coupled with two in-depth interviews with one recent adopter of the QlikView BI suite and YouCalc analytics. This will give the research a mainly qualitative orientation since the authors are not basing the study on the quantitative data but on broad knowledge acquired within the conducted interviews which are subsequently supported by quantitative data. For this reason the interviews will be made via phone and questionnaires will be distributed via email.

The research is created in an exploratory design since the main goal is to identify the decision factors in the software purchasing process that are decisive and lead to a preference of SaaS BI solutions. This will show and bring up new ideas which have not been researched
so far and are worth investigating. The Functional Integrated Selection Hierarchy (F.I.S.H.) model which will be discussed in further detail in chapter 4 consolidates factors, concerns as well as benefits of adopting SaaS BI over on premise BI and vice versa. This model is used to design the structure and content of the questionnaire and interviews to enable the authors to elicit trenchant perspectives from the respondents.

The sampling for the qualitative part is done as cluster sampling because of the orientation of the research. This means two companies were selected out of the pool of available BI vendors which, due to their market positioning, can contribute to the thesis with information that is also applicable to other vendors. The authors believe that investigating two companies which represent their market fairly well is sufficient for a first exploratory research within this field. As can be seen from the previous research section, aspects about BI in general have been exploited for several decades of research studies while SaaS BI is still a very young discipline and not much research has been conducted so far. Although advantages and disadvantages of SaaS can be found in many articles (Wailgum, 2008; DeSisto, 2009; Kaplan, 2006) none of them provide information about their decisiveness. In utilizing the contacts from the qualitative part of this research it was possible to contact a wide range of BI customers to collect additional quantitative data. This means that sampling was done in two steps (Figure 4). The first one being convenience sampling with regards to choosing and cooperating with the two previously mentioned vendors from the pool of BI vendors within the market. The second step consists of selecting adequate customers which means subscribed premium and free users on a global scale in the case of YouCalc and Swedish customers from QlikTech. These groups received the survey and were kindly requested to fill it out and send it back. As incentive for their participation the authors offered a copy of the findings and the final report. The exact number of overall targeted customers to which surveys were sent out to cannot be disclosed but lies in the hundreds. However it was possible to collect a total of 29 returned and fully useable questionnaires. It is notable to add that the sampling itself does not claim to be statistically generalizable since this research was done in cooperation with two vendors that have been chosen in a none probabilistic way. A more sophisticated approach including a market analysis, taking many diversified vendors as well as niche players into account would exceed the scope of this thesis. Nonetheless the overall population can be defined as the sum of BI vendors (SaaS and on-premise) in a global scale and SMEs in need of BI.

![Figure 4: Two Step sampling](image-url)
3.2.1 Interview Approach
Qualitative research in the form of semi-structured interviews is the basis to get an insight into the knowledge and future expectations from the vendors within the BI software field. Therefore one interview will be conducted with representatives of each of the respective companies with a duration of about 45 – 60 minutes. This is not only “useful for uncovering participants’ perspectives” but also “facilitates immediate follow-up for clarification” (Marshall & Rossman, 2006, p. 133-135). Difficulties on the other hand lay in dependence on the cooperation of key individuals and the dependence on the interpersonal skills of the researchers (Marshall & Rossman, 2006).

To conform to the requirements the initial interviews will be recorded and transcribed. The interviews will be held via telephone utilizing Skype which has a few disadvantages such as not being able to observe the respondents body language and beyond that, catching nuances in the answers but ultimately the time and cost saving advantages surpassed the disadvantages. Flick (2006) recommends starting the interview with unstructured questions and proceeding via the semi-structured to the structured questions which will reduce the risk of the interviewer being influenced by the interviewees viewpoint.

3.2.2 Survey Procedure
The surveys are designed to be easy to answer and not very time consuming in order to elicit accurate responses throughout the whole questionnaire. In order to make the answering process as convenient as possible, the surveys will be distributed via email in PDF format enabling users to fill them out at the computer and send back via email. This makes it easier to fill out the questionnaire and thus saves time and costs for the respondents while being more environmentally friendly. Other advantages include an accelerated response due to the fact that postal mail service was not utilized. Furthermore, it becomes easier to aggregate the data and potential mistakes in interpretation through unreadable handwriting are eluded.

Advantages of questionnaires can be seen in the geographical reach and easy access to respondents who otherwise could not have been part of the study as well as the ease of manipulating and categorizing data which again allows for conclusions that can be easily generalized. Weaknesses are mentioned as a strong sensitivity to the initial research question. The more specific and detailed the research questions are defined, the better it can be answered by the questionnaire. There is a risk of defining them too broad and covering too many aspects very superficially in the questionnaire. It then will lack the academic standard and barely discover new knowledge (Marshall & Rossmann, 2006).

3.2.3 Survey Design
Two slightly different surveys were constructed in accordance to the special characteristics of the responding groups stemming out of the nature of the used solutions and services (a sample of the survey is attached in appendix 5). Both questionnaires consisted of the same sections with partly different answer options depending on applicability for the approached respondent group. The questionnaire can be decomposed into four major parts collecting information about the company itself in terms of size, active markets and the level of involvement the IT department has in IT investment decisions. The second part surveys the company specific usage patterns of the BI solution, its importance to the business and grasps the importance of distinctive features that played a major role in the purchasing deci-
This is followed by a section evaluating the satisfaction with different concerns (as identified in the frame of reference) and finally a section about the perceived business value of that particular BI solution. Respondents are asked to indicate their satisfaction with the tool in comparison with their pre-implementation expectations. This will indicate which expectations are mostly met and where the solution is lacking to match customers’ demands for functionality.

3.3 Data analysis
The empirical data will at first be analyzed completely separated from each other and in another step the gained knowledge from the questionnaires will be used to support conclusions and information that have been derived from the interviews. The next chapter entails the frame of reference which will introduce the various theories which are key to analyzing the data. Articles and books covering investment and decision making theory as well as frameworks serve as fundamental background to explain and reason for the results derived from the primary data collection.

For the purpose of data analysis five different theories will be applied and used to evaluate the empirical findings. Furthermore they are linked to an analysis framework (F.I.S.H. model) which has been developed from the literature research and will allow to put the results from the interview and questionnaire into relation with previous studies. The Analytical Hierarchy Process, Transaction Cost, Resource Based, Resource Dependency, Knowledge Based, and Agency Cost theories in connection with the Technology Acceptance Model will form the frame of reference for the following data analysis. These theories will be discussed in the next chapter to provide the reader with a better understanding as to why they were selected. Afterwards the theories will be applied to the empirical data and the research questions will be answered with their help. This comparative method of analysis will point out the most significant differences between the two distribution models (SaaS and on-premise).

3.4 Research Quality
Due to the limited time frame of the research as well as the lack of support from some vendors and SMEs we had to cut back on certain issues such as sampling size for the conducted survey and interviews. This affected the results in such a way that they might not be as generalizable as desired at the beginning of the research. Furthermore, the applied convenience sampling approach does not allow for generalizations either.

Close collaboration with one SaaS BI vendor affects the research in such a way that mostly customers of the company in question were approached and their understanding, perception and use of BI was taken into consideration for the research. On-premise BI users are addressed in collaboration with a well established on-premise BI vendor. Having these two partners is considered to give a broad enough picture although many other big companies are not represented in this research. Especially due to a lack of resources and time it is easier and more flexible to work with specialized companies rather than with companies which integrate BI only as a module in their ERP systems. Moreover, since the population consists of companies which are actively using BI or have obviously thought about doing so (which becomes evident in them using a trial version of a SaaS BI solution but not subscribing to a
premium service later on), this biases the research in such a way that companies which have not made this step but are considering BI solutions as well do not have a chance of being in the research.
4 Frame of reference

In this section we aim to discuss some of the theories and models that underscore the decision criteria that leads SMEs to opt for SaaS BI solutions over on-premise offerings and vice versa. Also discussed will be the existing models and frameworks that can measure the effects of implementing the selected solution.

4.1.1 Analytic Hierarchy Process

The Analytic Hierarchy Process model (AHP) depicted in the Figure 5 below is a decision making model utilized for solving complex decision problems, such as whether to select an on-premise or SaaS BI solution. This theory of measurement involves the parallel evaluation of intangible and tangible factors within an organization. Saaty (2008) discusses that utilizing AHP in the decision making process involves decomposition of the decision into four steps which include:

- **Step 1**
  - Problem definition and determination of the nature of the knowledge sought.

- **Step 2**
  - Structure decision hierarchy from top with the goal of the decision, then the objectives from a broad perspective, through the intermediate levels to the lowest level (which usually is a set of the alternatives).

- **Step 3**
  - Construct a set of pairwise comparison matrices. Each element in an upper level is used to compare the elements in the level immediately below with respect to it.

- **Step 4**
  - Use the priorities obtained from the comparisons to weigh the priorities in the level immediately below.
  - Then for each element in the level below add its weighed values and obtain its overall or global priority. Continue this process of weighing and adding until the final priorities of the alternatives in the bottom most level are obtained.

Zahedi (1982) corroborates Saaty’s stance and suggests that the objective at the top of the hierarchy (Figure 6) should have the most macro decision objective whereas the subordinate levels should contain the attributes that contribute to the quality of the decision. The granularity of these attributes increases at the lower levels of the hierarchy.
The adoption factors listed in Table 3 were identified by researching pertinent literature and then determining which of them would be pivotal in helping to ascertain why users adopted SaaS BI solutions over on-premise solutions or vice versa. It encompasses and lists the main factors identified for both SaaS and on-premise models. Users were queried on these factors in the questionnaire (attached in the appendix) deployed in a bid to glean information on which factors were most pertinent to them. In terms of the analytical hierarchy process depicted in Figure 6 above, the adoption factors would play a role in determining which model would be most suitable for the organization concerned. If the major decision was to adopt a BI solution for instance, major attributes or criteria of both on-premise or SaaS would be identified and listed. Priorities could then be established among the selected elements (such as real time capabilities, cost) depending on the needs of the SME. A set of overall priorities can then be aggregated for the different alternatives and their comparison will yield an informed decision.
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Table 3: On-premise and SaaS adoption factors

Furthermore, in order to gain greater insight on the decision making process vis-à-vis SMEs adoption of BI offerings, the authors identified some of the potential concerns of both on-premise and SaaS BI models to find out which concerns were of greater importance. These factors are tabulated in Table 4 below and were made available in the survey deployed to the SMEs utilizing both on-premise and SaaS offerings to help determine which concerns were more pertinent whilst deciding whether to adopt one model over the other.
4.1.2 Transaction Cost Theory

The transaction cost theory (TCT) deals with a comparison between transaction costs described as “an organizations costs” from initializing, negotiating, and maintaining a relationship with a provider” (Glissmann, 2010, p.90) and production costs (costs incurred when products are manufactured in-house). It addresses the costs incurred as a result of an economic exchange decision (Williamson 1975, 1985; Glissmann, 2010; Coase, 1937; Simon 1957). This theory is applicable to SMEs during their decision making process in helping them decide whether their business would be better suited for an on-premise solution over a SaaS solution or vice versa. This is an important consideration as Glissmann (2010) concurs that the idea of adopting a SaaS BI solution over an on–premise solution is far more probable if the production costs exceed the transaction costs. According to Johansson (2004), the primary concern in transaction cost theory has to do with determining the nature of the activities to be performed internally in the organization and which should be handled by an external entity. The transaction cost theory also emphasizes the why question (Johansson, 2004) relating to the relationship between the potential benefits and risks of an organization allowing an external entity to handle risks. Williamson (1975) who postulates...
that an organization has two alternatives for any given service or good, either to produce the services or goods internally or to purchase services or goods from a vendor (cited by Johansson, 2004). He argues that irrespective of whether the organization opts to produce internally or purchase from a vendor, there are two types of costs, namely production and coordination costs. Production costs refer to the costs of employees, capital and material required for production while coordination costs are the costs incurred as a result of controlling and monitoring (Johansson, 2004). In a scenario where the organization is soliciting a product or service from an external entity (vendor) then the coordination costs take the form of transaction costs made necessary due to the need to coordinate activities between organization and vendor (Johansson, 2004).

4.1.3 Resource Based Theory

The resource based theory (RBT) recognizes an organization as a set of productive resources (Johansson, 2004) which are categorized by Barney (1991) into four disparate segments of resources namely – human, physical, organizational and financial. Halawi, Aronson, E and McCarthy (2005) state that an organizations resources consists of both tangible and intangible assets. All these four elements have to work together as a cohesive unit in order to facilitate a company maximum leverage of its competitive advantage. Glissmann (2010, p. 90) states that “an organization creates competitive advantage with IT through product differentiation and cost reduction”. This indicates that SMEs lacking the requisite internal resources will more likely opt for adoption of SaaS BI over on-premise BI. Johansson (2004) states that competitive advantage is effectuated as a result of a resource or set of resources, but can only be realized when certain attributes for the resources have been fulfilled. Hedman and Kalling (2002) who argue that resource based theory is premised on method of identifying and exploiting existing resources more effectively within an organization and submits that resources deemed necessary in order for an organization to leverage competitive advantage should be handled internally (cited by Johansson, 2004). The management of the resource according to Barney and Clark (2007) is key in determining whether an organization realizes competitive advantages from it or not. Johansson (2004) postulates that a resource needs to be deemed valuable in order to be regarded as a legitimate resource. Johansson describes valuable in this context refers to the resource enabling the organization to “conceive and or implement strategies that improve efficiency and effectiveness in the organization” (Johansson, 2004, p. 90).

4.1.4 Resource Dependency Theory

The resource dependency theory (RDT) is an open systems theory that postulates the relationship between an organization and actors and entities within that environment (Hessels & Terjesen, 2008). This theory presents an organization’s dependence on external entities in order to realize production of services or goods and differs from viewing an organization from the perspective in which resources are assets and used to leverage competitive advantages (Johansson, 2004). Glissmann (2010) suggests that as a result of this, businesses develop strategies in order to accrue these resources. Central to the Resource Dependency Theory is the notion that the environment changes and resources become scarce (Johansson, 2004). Mudambi and Pedersen (2007) suggest that external entities that control resources are valuable vis-à-vis managing an organization’s relationship with itself and its en-
vironment achieve power within that organization. They conclude that an organization disproportionately depends on the resources these entities control for their survival and/or success. We suggest that in the case of organizations selecting a SaaS solution, the level of importance placed on the resources controlled by the external entity is directly proportional to the impact – negative or otherwise – on the firm’s success/survival. Jayatilaka, Schwarz, and Hirschheim (2003, p. 4-5) identify three factors necessary to assessing the resource decision namely “the importance of the application, the degree to which the ASP company has discretion over the use of the ASP, and the number of alternatives”. These factors are crucial in influencing a company’s decision on whether or not to increase the dependency on an ASP provider.

4.1.5 Knowledge Based Theory
Glissmann (2010, p. 45) refers to Grant (2006) and describes Knowledge Based theory (KBT) by presenting the argument that a company “creates competitive advantage with the creation, storage and application of knowledge”. Osterloh and Frost (2000, p. 3) suggest that the knowledge based theory views the organization from the standpoint of being a “heterogeneous bundle of resources” and argue that organizations that possess resources that are hard to come by or imitate will be in a position to further leverage and sustain their competitive advantage. The Knowledge Based Theory views the organization as an entity where competences are used in an efficient manner. Competences refer to the set(s) of routines and skills and are continuously built, shaped, maintained and protected through a cumulative and strategic process that relies on the management of knowledge (Llerena, 2008). This “knowledge” refers to the IT competencies as in the context of whether to opt for a SaaS BI over an on-premise solution. In light of this, an organization will have a greater proclivity towards adopting SaaS BI over an on-premise solution if the disparity between available and required knowledge is considerable. Glissmann (2010) also argues that an organization will most likely outsource information if the risks to outsource the data are justifiable.

4.1.6 Agency Cost Theory
The Agency Cost Theory (ACT) is described as being developed along two paths namely positivist and principal-agent (Eisenhardt, 1989) and arising out of a conflict of interest (Kasseeah, 2008). The agent which in this context could be the provider of the on-premise or SaaS vendor and the principal which would be the companies that utilize these services. The positivist agency theory deals mainly with situations in which the relationship between the agent and the principal is a relationship between the owners and managers in a certain organization while the principal-agent path can be applied to more relationships due to its general nature (Johansson, 2004). The principal-agent theory is premised on the tradeoff between costs and risks where costs in this context refers to “measuring behaviour and costs of measuring outcomes” (Johansson, 2004, p. 92). Risks in this context refers to the level of apprehension vis-à-vis taking risks on the part of the principal and the agent. The agency theory is concerned with resolving two problems – namely agency problem and risk sharing – that could possibly arise in agency relationships. Agency relationships are formed due to a pursuit of mutual benefit and expect that the relationship will result in an efficient division of labor (Peterson, 2007). The agency problem according to Eisenhardt (1989, p. 58) occurs under two circumstances namely when “the desires or goals of the principal and agent
conflict” and when “it is difficult or expensive for the principal to verify what the agent is actually doing”. The unit of analysis of the agency theory is the contract (Johansson, 2004). The contract can either be behavior-based — referring to when an organization has control of its assets internally — or outcome-based — referring to when an organization allows its assets to be both controlled and influenced by an external entity. The contract can be representative of and control the relationship between the agent and the principal (Johansson, 2004).

4.1.7 Business Value Measurement

According to Pirttimäki, Lönnqvist, and Karjaluoto (2006), measuring of the effects of BI is a very crucial aspect in helping to determine the systems efficiency, efficacy and effectiveness but difficult to carry out in practice. Pirttimäki et al. (2006) discuss in their article Measurement of Business Intelligence that there are two main reasons to measure BI. The first justification is in order to substantiate whether or not it is worth the effort while the second reason is in line with measurement of BI activities in order to help manage a BI process. They present these main purposes and comparisons between them in their article which is tabulated below (Table 5). Elbashir, Collier and Davern (2008) refer to Barua, Kriebel and Mukhopadhyay (1995) and argue that the BI system’s performance cannot be fully understood by analysis only at an organizational level or only at a business process level. The measurement of BI regardless of whether it is SaaS or on-premise helps to justify the investment and ensures that it is realize the set out objectives as intended. This has become increasingly necessary in an economic climate in which prudent spending on IT necessitates investment into systems and tools that are actually capable of adding value to the business.

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<th>Purpose for Measurement</th>
<th>Main users of measurement information</th>
<th>Expected benefits</th>
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<td>Ability to prove that BI services are worth the effort and demonstrate the actual effects of BI</td>
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<td>BI service providers</td>
<td>Increased credibility of BI as a managerial tool</td>
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<td>Improved rigor in BI research</td>
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<td>Management of BI process</td>
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Table 5: Measurement of BI (Pirttimäki et al., 2006)

Pirttimäki et al. (2006) suggest that value is a very crucial concept in the process of justifying and determining the need for an investment or its continuation, but is ultimately very subjective. They bolster this stance by stating that “the perceived value varies depending on the subjective appreciation and need the person to whom the question is addressed” (Pirttimäki et al., 2006, p. 85). Zhuang and Lederer (2003) state that financial performance in itself is only a part of a broader performance objective and bolster this position by referring
to Segars and Grover (1998) who state that IT offers many benefits that are simply intangible. The authors’ objective within this paper is to view value (both tangible and intangible) from the perspective of the SME using the SaaS and on-premise BI solution as well as the soliciting the perceived usefulness from individuals within these organizations. With regards to the measurement of value, Pirttimäki et al. (2006) state that a prime starting point would be to consider the resources demanded in a BI process and the benefits achieved by the BI activities. Table 6 below identifies 29 benefits that can be realized as result of companies utilizing either on-premise or SaaS BI solutions. These benefits are included within the survey to be deployed to SMEs utilizing on-premise solutions from QlikView or SaaS solutions from YouCalc to help ascertain the level at which these benefits were perceived by the users.

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<td>Increased staff productivity</td>
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<td>Reduced operational costs</td>
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<td>Reduced time to market products/services</td>
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<td>Improved coordination with business suppliers/partners</td>
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<td>Increased responsiveness to/from suppliers</td>
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<td>Increased inventory turnover</td>
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<td>Increased efficiency of utilizing assets</td>
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<tr>
<td>Increased value of assets</td>
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<td>✓ ✓ ✓ ✓</td>
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<tr>
<td>Leveraged the advantages of IT upgrades, improvements and/or new developments in back end IT systems</td>
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<tr>
<td>Increased revenues, services provided</td>
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<tr>
<td>Reduction of lost sales/lost services provided</td>
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<td>Increased responsiveness to/from suppliers</td>
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Kemper-Adelakun Research

30
### Table 6: Benefits of BI activities

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<tr>
<th>Benefit</th>
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<tbody>
<tr>
<td>Increased geographic distribution of sales/services provided</td>
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<td>✓</td>
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<tr>
<td>Enhanced profit margins</td>
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<td>✓</td>
</tr>
<tr>
<td>Increased Return on Investment</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Improved competitive advantage</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Clearer and more accurate cost prediction</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reduction of project initiation costs</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Accessibility from remote locations</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Easy implementation, maintenance and upgrades</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Greater ability to focus on core processes</td>
<td>✓</td>
<td>✓</td>
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</table>

The process of calculating the costs of BI is a lot less complicated than measurement of the benefits the investment provides. They suggest that even though the financial factor is still very pertinent, non-financial and intangible benefits such as improved customer service are even more numerous. Pirttimäki et al. (2006) propose an approach to measure the effects of BI through a subjective measurement of effectiveness which would be premised on perceived customer satisfaction. The authors have adopted this model of soliciting the perspective of the user (which are in this case SM Es) with regards to their perceived satisfaction. This entails soliciting information about the perceived usefulness and efficacy of the system. One of the main advantages of using this method of subjective measurement according to Pirttimäki et al. (2006) is that the results reveal how effective the users consider the BI offering which is applicable in both the scenario of a SaaS or on-premise context.

Elbashir et al. (2008) identify three dimensions of business process benefits namely Business supplier/partner relation benefits, internal process efficiency benefits and customer intelligence benefits and state that they are consistent with metrics used in previous IT payoff studies. Pirttimäki et al. (2006, p. 85-86) refer to (Lönnqvist, 2004; Tuomela, 2000) and argue that “balanced performance measurement frameworks can be used to identify the factors to be measured and, at the same time, define the components to be used to determine performance”.

#### 4.1.8 Integrated Model

The Functional Integrated Selection Hierarchy model in Figure 7 below is based on the five aforementioned outsourcing theories. The model reflects a composition of elements from the transaction cost theory, resource based theory, resource dependency theory, knowledge based theory and agency cost theory. Investigation into these theories has helped to identify key metrics with regards to the benefits, risks and factors that help to influence SM Es decisions to adopt a SaaS BI solution over an on-premise one and vice versa. Also included within this model are metrics to measure the business value experienced as a result of the BI investment made. The model is designed to help the authors provide a graphical depiction of the theories and give a better overview of the metrics used to determine what factors, issues and benefits organizations take into consideration before making their investment. Identified in this framework are eight main categories of factors risks and benefits. These factors include SaaS BI factors, on-premise BI factors, SaaS BI risks, and on-premise...
BI risks. Certain factors such as level of usage and deployment risk mitigation are considerations that are pertinent to both on premise and SaaS factors. The benefits are quantifiable benefits, indirectly quantifiable benefits, unpredictable benefits, and intangible benefits (Ritacco & Carver, 2007). It is of importance to note that the authors do not claim that the model is comprehensive but including many of the factors and criteria believed to be pertinent to helping organizations to decide whether or not to adopt SaaS BI over on-premise BI at all. It is also of importance to state that not all factors within the model necessarily apply and the selection may vary from one SME to the next. The unpredictable section with the F.I.S.H. model does not contain any elements within it due to the fact that it is hard to forecast and it is based on the ingenuity of the individual organization. “Unpredictable benefits are the result of discoveries made by creative users” (Ritacco & Carver, 2007, p. 16).

Figure 7: The Adelakun-Kemper Functional Integrated Selection Hierarchy (F.I.S.H.)

4.1.9 Technology Acceptance Model

The Technology Acceptance Model (TAM) presented by Davis (1986, 1989) depicted in Figure 8 argues that two major constructs within the model namely Perceived ease of use (PEU) and Perceived Usefulness (PU) are major determinants in affecting a users intention to use a system. Davis (1989) refers to perceived usefulness as people’s tendency “to use or not use an application to the extent they believe it will help them perform their job better”
(Davis, 1989, p. 320). He argues that despite the fact that “potential users believe that a given application is useful, they may, at the same time, believe that the systems is too hard to use and that the performance benefits of usage are outweighed by the effort of using the application” (Davis, 1989, p. 320) a variable that would be embodied within the Perceived ease of use construct. Davis states that the marriage of these two constructs would ultimately influence usage. This usage or intention to use serves as the intermediary between PU, PEU and actual system use. This theory is applicable within this paper to help underline that the benefits and business value that can be realized as a direct or indirect result of utilizing SaaS or on-premise BI can and will only be fully realized if users actually utilize the system.

![Technology Acceptance Model (Davis, 1989)](image_url)

**Figure 8**: Technology Acceptance Model (Davis, 1989)

### 4.1.10 Theory Critique

Critics of the Analytical Hierarchy Process such as Watson and Freeling (1983) and Dyer (1990) have identified rank reversal as a major shortcoming, citing that the rankings produced with this method are arbitrary. Dyer (1990, p. 252) describes rank reversal as a phenomenon in which “the ranking of alternatives determined by the AHP may be altered by the addition of another alternative for consideration”.

Ding, Akorie and Pavlovich (2009) refer to Yan (2000) by stating that one of the major limitations of the transaction cost theory is that there is sole emphasis on the importance of the transaction and dereliction on the part of other relevant opportunities and advantages such as integrated competitive abilities and value creation that occur as a direct result of utilizing this method.

Knowledge based theory is limited according to Ding et al. (2009) by the dependency on the strategic potential of knowledge on certain characteristics. They refer to Barney and Clark (2007) by stating that an organization can only achieve above normal returns only if the knowledge is simultaneously valuable, difficult to imitate and limited in prevalence among competitors.
Grant (1991) mentions two recurring issues that surface within literature regarding Resource based theory. Firstly, is the organization itself and the question of whether they solely focus on their core business and neglect all other opportunities? The second issue has to do with how the relevant strategic timeframe which deals with the length of time in which the resources and capabilities present within the organization will provide a competitive advantage over the competitors.

Altholz (2010) states that one of the major problems with resource-dependency theory is the ensuing uncertainty that may arise if one, or many, elements of the external environment cease to exist. This would prompt a change in the established environmental framework (Altholz, 2010). They go on to state that when a certain number of these environmental elements disappear, a particular company will be excluded from its resources for a certain period of time, during which it will try to adapt to the new circumstances. If it is unable to adapt to these circumstances, failure becomes imminent.

A major problem of the agency cost theory according to Mudambi and Pedersen (2007) occurs when the agent which in this case is the SaaS or on-premise provider and the principal or the organization requesting the services experience a divergence in their interests. Once the interests between the vendor and the organization patronizing are incongruent, the relationship has the potential to become strained. Mudambi and Pedersen (2007) state the monitoring is a widely used solution to overcome this issue.

4.1.11 Summing up the theory discussion
The theories discussed in this section help to identify and underpin the decision making process and identify the criteria utilized by SMEs for a SaaS solution over an on-premise solution and vice versa. The five outsourcing theories discussed earlier in the section help to define and categorize the benefits, risks and factors. They were seen to overlap in some areas in terms of what they encapsulate and many metrics were seen to be applicable for two or more of the theories. Ding et al. (2009) for instance state that the knowledge based perspective can be used as an alternative to the resource based view. The section also identifies and discusses several performance measurement metrics used for investigating the efficacy, effectiveness and efficiency of the system as well as its ability to leverage competitive advantage. The theories discussed in this section helped to identify and categorize the factors, concerns and business value metrics utilized in the F.I.S.H. model. These metrics are also useful in helping to justify the investment into the selected solution. Theory on the perceived business value within the organization as well as metrics identified from various literature sources indicate that value is not necessarily in terms of quantifiable metrics such as Return on Investment (ROI), but rather has arguably more in-tangible dimensions (such as improved customer service) involved and due to the fact that much of the value is perceived, it suggests that a great deal of the benefits realized are subjective based on the perception or show in indirect productivity gains such as more time to concentrate on the core capabilities. The section also discusses the Technology Acceptance Model and its role in affecting actual system use.
5 Empirical Results & Analysis

This section will give a short overview about the two companies supporting this work and present as well as analyze the collected empirical data. Results from the interviews and questionnaires will be presented separately and later on mashed together to be able to support the conclusion derived from the interviews with the results of the questionnaire. In this step the previously explained theories will be applied to the findings of the empirical data collection.

5.1 Company Overview

This section will provide a short overview over both companies so the reader knows about their size and market positioning.

5.1.1 QlikTech

QlikTech is a Business Intelligence company based in Lund, Sweden established in 1993. QlikTech’s flagship product, QlikView is a comprehensive in-house developed software suite used for business analysis and reporting needs for all organizations. The company had $120 million in revenue and 50% growth in 2008. Furthermore QlikTech has over 560,000 users and 12,500 customers in 95 countries. The company has offices in 12 countries and over 530 employees. The competitive advantage which makes QlikView unique in the market is the patented in-memory associative technology which also allows the users to build their own applications and thus makes analytics easier and faster. For companies which do not want to host the system, a version for amazon’s EC2 cloud has been developed and is in the market (QlikView Business Intelligence (BI) Reporting Software Solutions | QlikView, 2010).

5.1.2 YouCalc

YouCalc is a Copenhagen based vendor that offers an on-demand or SaaS analytics platform catering to SMEs as well as private users. YouCalc started as a vendor of analytics in 2008. There are currently 10,000 users of YouCalc services worldwide. The vendor provides over 150 readymade apps catering to services such as sales, marketing, web, service and project analysis and reporting. YouCalc connects with other SaaS systems such as salesforce.com, Google analytics and Basecamp and performs analytics on them without importing the data from these systems (youcalc.com – On-demand analytics for CRM, marketing and project management, 2010).

5.2 Interview Results

Mashing up the important parts of the interviews gives a good understanding of what BI is today, how customers utilize it and where the development for future functionalities is headed. Mathias Carnemark (personal communication, 2010-04-19), Senior Manager in the partner development department at QlikTech, as well as Rasmus A. Madsen (personal communication, 2010-04-27), CEO and founder of YouCalc, both see the SaaS BI market as rather young and still rapidly developing. This is underlined by the IDC (IDC - Press Release, 2010) who see the SaaS BI market growing three times as fast as the overall BI market. This comes due to several different reasons which are based on the advantages that SaaS has over on-premise solutions, the broad targeted SME market with many companies craving for an affordable BI solution and more business insights and the hype SaaS BI is currently experiencing (Bitterer et al., 2007). Both interviewees see one of their competitive
advantages in the high flexibility and adaptability of the product. Jack Bauer (personal communication, 2010-05-10) a YouCalc user stated that the solution has the flexibility to allow them to build their own applications to better cater to their customers’ needs. In general both vendors are not tailored to suit any specific industry or requirement but made to handle general data. As Rasmus Madsen (personal communication, 2010-04-27) says the traditional BI market is highly competitive with only a few big vendors that split most of the market share among themselves and hence make it very difficult for new entrants. Nonetheless QlikTech has made its move and established itself as a challenger with great potential (Feiman & MacDonald, 2010). YouCalc initially dealt with an on-premise BI solution which was distributed before the SaaS solution was developed and brought to the market. Due to the difficulties of entering the traditional BI market and the significant potential for SaaS, Rasmus Madsen (personal communication, 2010-04-27) decided to venture into a new market and offer the services as on-demand and online. Both of the interviewees see SaaS as a strong and evolving technology that in a few years will mature and will be more accepted by the market. Mathias Carnemark (personal communication, 2010-04-19) even sees SaaS solutions as something that might mature into something similar to what QlikTech is doing now and thus might become a competitor of on-premise BI solutions. Contrarily Rasmus Madsen (personal communication, 2010-04-27) states that SaaS BI and on-premise BI cater to two completely different market segments and that companies having their data in-house are unwilling to move their data outside the firewall in order to be able to run SaaS BI analytics on them. They would rather invest into an on-premise BI solution. This is backed up by Mathias Carnemark (personal communication, 2010-04-19) who has not experienced customers asking about switching from a QlikView to a SaaS solution. However he continues to explain that one single BI solution might not serve all the needs in one company so that many companies do actually have one big solution and then one to a few solutions besides it to fill those specific gaps that could not be addressed with the enterprise solution. This can also be a chance for smaller vendors catering to specific business needs and seeking their niche in the lacks of the enterprise solutions.

The high interest in SaaS solutions can also be seen by the attempt of the established on-premise vendors to move into this market and make their solutions available in the cloud. QlikTech for example has a QlikView version that runs on Amazon’s EC2 cloud. As the literature review shows QlikTech is not the only vendor undertaking this step in order to be present in the growing SaaS BI market (Richardson, Schlegel, Sallam, & Hostmann, 2009). There are initiatives to get into the cloud computing business as well as a rather newly established small part of QlikTech that focuses on finding suitable business models for smaller companies. All this underlines the attractiveness and potential of the SME market. But QlikTech is also focusing on growing into the enterprise market since it historically catered more to departmental solutions. In terms of revenue and profit the enterprise market is the place in which most money can be made once one is established as a big vendor. Going into the enterprise market, however, requires the most sophisticated tools and solutions comprising of and excelling in all four levels of complexity as described in Figure 3 by Eckerson (2007).

The implementation process looks quite different between the two models. While QlikTech sends consultants to understand the whole business of the customer and work on the integration of various operational systems in order to set up a data warehouse YouCalc focuses on the analytics and is not concerned about where the data comes from. Jack Bauer (personal communication, 2010-05-10) stated that the setup process was almost imme-
YouCalc offers multiple interfaces to connect to many other SaaS companies. Hence the data does not necessarily come directly from the customers' systems but rather is usually already in the cloud and used with some other services. Also, YouCalc's services do not encroach into data warehousing and cleansing as Rasmus Madsen (personal communication, 2010-04-27) sees strength in this business model since it is very focused on solely analytics.

However, it is important to mention that YouCalc is the only SaaS BI vendor that does not host data. Offering analytics without a data warehouse enables YouCalc to run analytics in real-time and also cuts out parts of the ETL process since the data is readily available from the systems YouCalc connects to. Jack Bauer (personal communication, 2010-05-10) stated that YouCalc's solutions have the ability to access data hosted on multiple locations in the cloud. This functionality renders void the need to aggregate data into one central repository in the cloud. It is fair to say that YouCalc focuses on the logic-and data layer and is not really concerned with data storage and preparation (Figure 2). Other competitors decided to offer hosting and storage of their customers' data which eradicates, or at the very least, mitigates the dependence on other SaaS providers but also adds complexity to their business model and requires the customers to trust the vendor explicitly with their data. This is especially a big concern for customers which will be further explained in the analysis of the gathered empirical data from the customers using the Agency Cost Theory. Nonetheless ease-of-use and the time to get started are major selling propositions of SaaS BI offers. According to Rasmus Madsen (personal communication, 2010-04-27) YouCalc has a rapid startup and it only takes a few minutes to register and get an application from the app-gallery to get started and analyze data. The ease-of-use and intuitive way of navigating through the applications makes it a nice working experience for the customers. The biggest difficulty both BI vendors are facing is Technology Acceptance from a customer point of view. Many customers do not understand the need and the capabilities of the software products and hence are apprehensive towards using it. This is the experience Jenny Claesson (personal communication, 2010-05-05) has also had within the Jönköpings Kommun. This also reflects on the work of Davis (1986, 1989) within the Technology Acceptance Model. Perceived ease of use and perceived usefulness can explain why or why not employees refuse to work with a new system. This will also be further explained in the theoretical analysis.

Furthermore QlikTech's customers are often surprised by the quality and capabilities of QlikView. “We often deliver more than they expected” says Mathias Carnemark (personal communication, 2010-04-19) and justifies this with a very strong product (QlikView) that offers a lot of functionalities. This explains QlikTech’s “exceptionally high degree of customer satisfaction” (Richardson et al., 2009). YouCalc’s appbuilder also enables the users to develop applications which specifically meet their particular requirements in terms of analytics. This customization also sets YouCalc apart from its competitors and is conceived as a competitive advantage. Advantages of BI use does not necessarily become visible on the balance sheet directly as it also provides business value in terms of improved efficiency and thus frees up time that can be spent focusing on core competencies that actually generate revenue. Customers highly value the ease of use and the ability to create and leverage competitive advantage with this tool.

Mathias Carnemark (personal communication, 2010-04-19) and Rasmus Madsen (personal communication, 2010-04-27) both agree that BI solutions, regardless of the delivery model, in the near future will need to be able to incorporate more data sources and integrate them into the analytics, reporting and forecasting functions. Most of BI data today comes
from inside the company but, like CI already does, it also needs to be able to analyze data from public sources and “around-the-world-information” (M. Carnemark, personal communication, 2010-04-19). But integration also has to go further with other non-data source systems. As Rasmus Madsen (personal communication, 2010-04-27) points out that SaaS BI solutions need to be integrated into the companies IT landscape which means they should be accessible with a single log-on and should be able to easily transfer data between applications. Jenny Claesson (personal communication, 2010-05-05) underlines this from a user perspective in saying that it was previously (before QlikView) a hassle in getting data out of a multitude of various legacy systems with many different logins in order to analyze the data accordingly. This brings issues of security to the surface which needs to be resolved since the company is opening their systems to outside services which directly connected to servers behind the firewall. Another strength of SaaS is also the ability of being able to mash up data coming from on-premise systems with data hosted in the cloud. Being able to do this on-premise would need a download of the relevant data from the cloud onto internal servers.

5.3 Survey Results

Taking different ways of approaching SMEs via company contacts with both close customer interaction (QlikTech) and no direct customer interaction at all (YouCalc) and sending the survey to SMEs without any previous knowledge about their BI infrastructure the authors were able to collect a total of 29 responses of which all were useable. The highest returned rate came from QlikTech customers and can be traced back to their close customer contact and high customer satisfaction.

5.3.1 QlikTech

The interview with a representative from QlikTech as well as the survey point out a highly diversified customer base. There is no concentration in terms of industry, size of the company or in time they have been using BI solutions. Some of the customers just recently invested into QlikView while others have been using other solutions before and hence have been using BI solutions in general for over a decade. IT decisions are made with slightly greater influence on the business side rather than the IT department. This is where the need and thus the initiative for the system comes from. However most companies integrate the IT department into the decision making process and not a single company indicated the IT department as the driving factor in the BI investment decision. Based on the elicited data, focus on the evaluation process lean towards system reliability, followed by security and expandability. During the decision making process most companies undertook vendor comparisons (11 out of 18) while only a few also conducted a risk assessment (3 out of 18).

The need for BI is evident since most companies indicated that it is important and partly crucial for the business. Only one company perceived it as interesting but not crucial for the daily business. During the implementation process most companies partly relied on external consultants. The efficiency of the system is perceived as satisfactory. There has not been an increased responsiveness of the company or at least the pre-implementation expectations were not reached.

Current users were lacking detailed budget and forecasting tools and are requesting more up-to-date data through multiple updates a day. Inefficient training is also an issue which needs to resolved.
5.3.2 YouCalc

The survey points out that companies using YouCalc are relatively small consisting of 1-125 employees and the management is mostly responsible for BI decisions. In some cases the management even decided without conducting the IT department at all. The majority of the companies just recently adopted BI and no company has been using it for more than four years. They have experience with other solutions though. The most critical factors for the investment were ease of use, costs and the rapid startup. Risk mitigation and risk deployment did not play a major role and are hence to be neglected. The investment decision is made quickly and not a lengthy process. Cost/benefit analyses, project plans or risk assessment does not belong to the investment decision process. Vendor comparisons were made sometimes. The importance of the BI solution is in some companies crucial for the daily business while other companies gain some business insights but do not depend on it. However, it is of relevance to all of them. Companies do have experience with other BI tools and some utilize more than one solution at the same time. The interest in customized apps is rather high but not all companies were able to utilize this feature as anticipated. Especially the free users have not tried to build their own apps. Consultants play a minor role and most companies do not need them. However, some hire consultants to build them customized apps. As additional features the recipients value the remote accessibility of the service. Users are majorly satisfied with the systems capability in order to: improve customer service, cost reduction in decision making, reduced inventory levels, reduced time to market, reduced cost of transaction, reduction of lost sales, increased ROI, more accurate cost prediction, and accessibility from remote locations.

5.4 Theoretical Analysis

From the above described results of the survey the authors were able to draw the subsequently following conclusions and identify certain differences between the customers of the two different concepts. Applying the F.I.S.H. model which was derived from several selected theories is a practical approach of assessing and analyzing the results.

From the general sections of the questionnaires it becomes obvious that, within the sample group, QlikTech customers are considerably larger in size and YouCalc customers are belonging without exception to the group of SMEs. However this is not surprising since the companies have different market positions and a completely different target group of customers. Other factors that influence the IT investment decisions depend on whether the decision is made by one individual or a whole decision group. Such a group might consist of representatives from several different departments as well as stakeholders of the potential new system. An enterprise wide system must prove to match all the different requirements within a large organization while SMEs, due to their size, do not have all these functions within their organization which means that the decision process is a lot easier. This means that within SMEs one individual has a higher responsibility for a broader area of expertise. Some SMEs might not even have an own IT department but fulfill these needs along the way with the daily operational business. SaaS BI users indicated that the investment decision was made on the business side and the management was the driving factor for the BI adoption. On-premise users took the IT-department into the buying team and laid out functional requirements before the final investment decision was made.

Comparing the average usage times (time since adoption) of BI software between the two respondent groups reveals that most SaaS users just recently started to use SaaS BI functio-
nalities although the technology has been on the market for a few years already. This indicates that the SaaS market is still growing and has not matured yet. This also becomes evident when comparing the different types of documents that were created during this process. While on-premise users created project plans, made vendor comparisons and detailed budget plans, SaaS users mostly stayed away from these pre-implementation issues and made the decision more impulsively. This can be explained with the lower risk that is attached to SaaS solutions. No long term commitment is made and usually all contractual boundaries with the supplier can be cut off within a month. But it can also be explained with a shortage of resources in order to undertake sophisticated cost/benefit measurements and compare a multitude of different solutions.

The lock-in effect enacted with sophisticated on-premise BI solutions binds the customer for a longer period to one vendor. In terms of experience with multiple solutions this is a major setback since an investment into more than one system is only justifiable if the additional systems compensate for the shortcomings of the predominant system. As Mathias Carnemark (personal communication, 2010-04-19) pointed out many of QlikTech’s customers utilize more than one BI solution which are customized to fit certain business requirements. However, the end-users are likely not to be in contact with both systems since these are often running in different departments. SaaS BI users also often have experience with at least one other solution. Due to their smaller company size and the lower switching costs between SaaS BI suppliers they tend to keep looking for a solution that matches their requirements better than the one before.

Analytical Hierarchy Process
In each investment decision which is done on a comparative basis between viable alternatives the analytical hierarchy process is applied. As described in the theoretical frame of reference the various important attributes are taken into consideration and subsequently broken down in several levels until, on the lowest level, decision alternatives are reached. As can be seen from the questionnaires on-premise users went through a slightly different process in valuing attributes of the feasible alternatives compared to the SaaS customers. From the parts of the questionnaire requesting input on the importance of benefits and concerns attached to the chosen delivery model, results reveal that on-premise users ranked system reliability, data security and expandability the highest. SaaS users on the other hand ranked ease-of-use, costs and rapid start-up (in the respective order) as the most important. This alludes to the fact that the decision makers ran through the process of comparing different attributes which were of different importance to the decision maker until the optimal alternative was reached.

Transaction Cost Theory
Having the aim to minimize transaction costs it is often a make or buy decision to find the best solution with the minimal costs attached. Since SaaS solutions are bought/rented on a monthly pay-as-you-go basis there are no high up-front investment costs to be considered. However, depending on the usage and registered users the SaaS solution can turn out to be more expensive in the long run. Most of YouCalc’s users are using the free service which gives them access to some but not all tools. For the unlimited access to all tools and services

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2 i.e. when a company has many registered users the accumulated costs can surmount the cost of an on-premise system. For details consult DeSisto (2009).
a fee of US$19.95 has to be paid per user and month. The decision making process during the investment process will likely consist of a cost comparison over a 3 or 5 year range. If it turns out that the SaaS solution is indeed the cheaper option the company will be more inclined to opt for this alternative. Due to the size of SME by definition they do not consist of more than 250 employees of which only a fraction will be in need of BI tools it becomes clear that SaaS options have the scale advantage on their side. From the results of the SaaS BI questionnaire respondents we can see that the average number of people using BI is eight which in the case of YouCalc would translate to costs of less than US$2000 per year for the company.

**Resource Based Theory**

The same argument used for the aforementioned TCT can be used to justify the RBT as well. Since RBT seeks for the best way to allocate available resources in the four segments (human, physical, organizational, and financial) and the scarcity of resources is ubiquitous a company has to decide for the cheapest alternative that satisfies the business needs. Besides the financial segment the company might also be lacking human resources to implement and maintain a sophisticated on-premise solution or even the physical infrastructure necessary to be able to run such a complex system. Proof for this can be found in the use of consultants during the implementation phase which shows that most of the on-premise customers did not have the necessary expertise in-house. Compared to the SaaS customers they were using consultants far more extensively in order to get the system up and running. Among the SaaS respondents only one company indicated that it used external consultants for the implementation process which is a strong indicator for the simplicity of the SaaS BI solutions.

**Resource Dependency Theory**

Whenever a company invests into external resources it contracts itself to the external provider. Depending on the three factors already outlined in the frame of reference (number of alternatives, relevance of the application, and extent to which the external service provider has control over the client) the client locks itself in and has to face high switching or exiting costs. Drawing from the amount of customization a company has to do in order to run a BI systems efficiently it is to say that the more customization is done the higher the switching costs because these customizations will have to be repeated with another vendor. So whenever consultants are used to implement or customize a system it becomes harder to simply change this in favor of another system. This means that the degree of utilized external consultants correlates with the complexity of the system and results in a high degree of dependency on the vendor. The vendor has to make up for this dependency in offering a service the client cannot find somewhere else. This tight relationship shows that all on-premise solution providers must have a better service offering than the SaaS providers in order to sustain. If the client is able to receive the same service with a lower supplier dependency s/he will likely switch.

**Knowledge Based Theory**

Since companies create competitive advantages through knowledge on which they take action BI tools are considered as enablers to extract this knowledge out of the data a company has in its systems. BI just helps to organize and categorize this data in a comprehensible way so that information is easily generated out of it. As both Mathias Carnemark (personal communication, 2010-04-19) and Rasmus Madsen (personal communication, 2010-04-27) stated, BI vendors have to further educate potential customers about the possibilities and capabilities of BI systems. People do not know what kind of insights they can get from
the systems and are hence reluctant to invest. Both interviewees see this still as an ongoing challenge.

**Agency Cost Theory**
As explained within the frame of reference it is feasible to identify the customer as principal and the SaaS vendor as agent who acts on behalf of the principal. This requires some trust from the principal towards the agent since s/he has to give the agent full access to the company’s data in order to provide the agent with the necessary tools to do his work. Rasmus Madsen (personal communication, 2010-04-27) pointed this out and although YouCalc can be seen as a slightly different case since it does not host data itself but still needs the access to their customers’ data in the cloud in order to run the analytics. The customer has to trust YouCalc in terms of data security that they do not misuse the data and store the login information safely on their servers. This two sided relationship can well be explained using the ACT because both sides depend on each other in order to be successful.

**Business Value Measurement**
Determining the business value of an investment is an important and crucial step within each investment decision. It helps justifying the occupied resources (money, time, assets, …) and links them to the potential gain for company. Every investment needs to be measured against the value it delivers for the business which makes it interesting to investigate whether SaaS adopters and on-premise adopters achieve the same business value despite possible biases in the results stemming from the functionalities of the systems. Moreover it is very difficult to quantify the derived value from a BI solution since it does not directly show in the profit and loss statement. Benefits are often gained in efficiency and due to that more time to focus on core processes which then allows for a higher return.

YouCalc customers mentioned more accurate cost prediction as the most satisfying factor measured against their pre-implementation expectations. Other factors in which customers perceive business value are the accessibility from remote locations of YouCalc’s services and reduction in lost sales. Factors with the lowest degree of satisfaction were increased value of assets and increased geographic distribution.

On-premise users saw the improved efficiency of internal processes as the most value adding factor, followed by more accurate cost prediction and accessibility from remote locations. The second and third factor are similar to the ones of SaaS users. The most unsatisfying were increased responsiveness, reduces initiation costs, and reduced transaction costs.

This analysis shows that, although the different user groups were satisfied with almost the same set of benefits, differences exist in the specific solutions’ shortcomings and the corresponding user satisfaction.

**Technology Acceptance Model**
As Jenny Claesson (personal communication, 2010-05-05) explained, technology acceptance is still a big concern for BI adopting companies. When users are ordered to use a new system they are more likely to resist to this change as they are if they initiated it on their own. Many systems are perceived to be too complex and employees often do not see the potential outcome and benefit of applying the new technology. Since the actual use of the system indirectly depends on the perceived usefulness and ease of use it is easy to understand why Rasmus Madsen (personal communication, 2010-04-27) sees ease of use as the most
important selling proposition. A high degree in this category will smooth the adoption process and thus increase YouCalc's chance of success. Henschen (2009) supports the idea that systems need to be as simple as possible in indentifying complexity of BI tools and interfaces as the number one roadblock for BI adoption (Table 1).

**YouCalc**

Review of the results from the YouCalc clients revealed that most respondents selected Accurate cost prediction as the business value that they were most satisfied with. Accessibility from remote locations, Increased ROI, Reduction of lost sales and services, reduced inventory levels, reduction in the cost of decision making, and improved customer service all ranked equally high after accurate cost prediction. Mapping these business value results to the F.I.S.H. model discussed in chapter 4 reveals that the criteria was split between quantifiable and intangible benefits. The benefits in which users felt were realized the least within their business include increased value of assets, increased geographic distribution of sales/services and leveraged advantages of IT upgrades, improvements and developments.

**QlikView**

The results obtained from the QlikView respondents indicated that organizations were mostly satisfied with improved efficiency of internal processes. Clearer and more accurate cost prediction as well as accessibility from remote locations were ancillary to improved efficiency but still ranked high amongst the users. These results when mapped to the F.I.S.H. model indicated that QlikView users had a greater proclivity towards intangible benefits. Increased responsiveness to and from supplier was ranked as the lowest amongst respondents followed closely by reduction in project initiation costs and reduced cost of transaction. It should be mentioned however that the differences between the benefits that respondents were most and least satisfied with was not sizeable and the sentiment was generally towards satisfaction vis-à-vis realization of the business value.
6 Conclusion

This chapter aims to summates the thesis by providing conclusions on the research questions implications and considerations of the study and the field at large. Limitations, reflections and future areas of research are also identified and discussed.

As the analysis has shown SaaS BI technologies are on the rise and although covering most of the BI needs (reporting, analysis, monitoring, prediction) they do not compete directly with on-premise solutions. Major adoption drivers during the investment decision differ between SaaS and on-premise solutions as well as the use and application of such systems.

The theoretical analysis has shown that companies act after the chosen theories in multiple ways. The knowledge based-, knowledge dependency-, and the value measurement theory focus on the need and potential coming along with a BI investment decision. These theories also contribute to the factors and considerations that serve as input for the analytical hierarchy process, decision-, and agency cost theory. Investment decisions are hence made in an – at least – two step procedure comprising of the need analysis and afterwards the selection decision.

This allows us to answer the previously stated research question of this thesis:

RQ 1: What are the factors leading to the decision to invest in SaaS BI rather than into an on-premise BI system?

The key decision drivers in favor for a SaaS BI solution are ease-of-use, costs, and rapid startup. Ease-of-use describes the system’s in-build simplicity that allows managers even without deep IT knowledge to easily set up and utilize these systems for their purposes and generate value for their daily work. Companies are driven by costs and hence the second driver is not very surprising but very essential. SaaS adopters are very price conscious and monitor the financial burden the investment puts on their budget carefully. The cheaper a solution the higher the chances of it becoming adopted. A rapid-startup and time to value are valued high because most SMEs cannot afford to spend money for non-core business investments which will at first start being beneficial after a long time period. Having capital occupied like that takes away flexibility and the chance of growth in other sectors.

RQ 2: Is SaaS BI used in the same way as an on-premise system?

As already outlined SaaS BI is not a competing technology to on-premise solutions and thus will automatically fill a different gap in the company’s IT infrastructure. Companies already using on-premise solutions are not likely to adopt a SaaS solution. Although it could be used to augment the current solution and leaks could be filled it would also mean that data has to be moved into the cloud and that is often a major drawback. However big companies might use SaaS but then the decisions come from local initiatives and are made on a department level rather than companywide. This shows a bottom-up approach rather than top-down with the management enforcing the usage of a new system in the company.

Moreover due to the low investment required for a SaaS BI solution the users do not feel urged to utilize it and if the systems turns out to be not as beneficial as anticipated it is easily abandoned.
RQ 2b: Were companies able to achieve the desired business value?
SaaS BI systems have an overall very positive effect on the business value. The impact on cost-based measures were often perceived as satisfying while the enhancement on sales measures was not as satisfying but not unsatisfying either. Some companies reengineered their processes in order to fully leverage the impact of the system on the business.

6.1 Discussion / Implications
Throughout the thesis it became clear that SaaS BI is a new and highly popular field within the BI industry. In Kim and Mauborgne’s (2005) terminology this creation of a new market could be seen as a blue ocean strategy which involves a new product delivered to customers that were previously unthought-of. The high number of different players within this industry increases the likelihood for a consolidation if SaaS BI turns out to be a profitable business. Although some SaaS BI vendors are not yet profitable they do believe in the strength of the SaaS model and are expecting to be acquired by major players in the SaaS field in the near future.

The authors share this point of view but expect more SaaS BI vendors to default before the market saturation will start. Many SMEs still need to be educated about the functionality and use of BI for their business which will be a milestone for the SaaS BI adoption and hence for its success in the BI market. As observed, major BI vendors are developing their own cloud solutions which indicates that this is an attractive market for them. This spurs the thought that they are likely to broaden their offerings and, in an attempt to eliminate competition and acquire technology, for that purpose will acquire smaller SaaS BI vendors. Hence the line between established on-premise vendors and SaaS vendors will become more blurry with many actors in the BI market offering the same solutions and services.

With increased functionality also comes a higher attractiveness to bigger companies. Not only SMEs will utilize SaaS BI services but also local initiates and departments from bigger companies.

In conclusion the authors are convinced that SaaS BI is a promising business model which is here to stay.

6.2 Limitations & Reflection
In the course of planning and subsequently writing the thesis the authors noticed some limitations that would have an effect on the final results and hence on the outcome of the report. Finding cooperative SaaS BI vendors proved to be the first challenge since many of those are young start-ups operating on tight budgets and thus simply do not have the time to support a students’ thesis. Their opinion might have contributed to the scope of this thesis and would have drawn a contrary picture on the storage issue within the SaaS business model. Furthermore the questionnaires’ response rates were very low which resulted in the necessity to either approach a big sample group or shift the research towards other empirical methodologies. However, the conducted interviews were very useful in the analysis of the original research questions. Due to the mixed method approach in collecting primary data it was possible to get a deep insight into the vendors’ and customers’ point of view as well as backing information up with further customers’ opinions. We are convinced that the use of a mixed method approach was very valuable for our results and also contributed to the scope of the thesis. Replacing the questionnaires by further interviews would have
taken a considerable amount of time since every interview is unique and would have to be handled individually. Replacing the interviews with further questionnaires, on the other hand, would have endangered the results of the thesis due to the risk of low response rates.

Right from the onset of this study, the authors had the idea of bridging the lack of knowledge regarding information of important factors to consider when facing an investment decision. For the customers, this thesis provides a broad and comprehensive checklist that should be taken into consideration especially from managers and key decision makers that do not possess extensive knowledge about SaaS technologies. Vendors profit from this study because they will understand their potential customers considerations and concerns better. This helps with further product development as well as it allows to direct marketing campaigns more specific.

### 6.3 Future Research

Based on the interdisciplinary nature of the SaaS BI field future research can be directed into SaaS BI directly or into either one of the fields it is composed of. However more research is to be done and the authors suggest the following topics:

**Research within SaaS BI:**
The integration of SaaS BI with on-premise BI solutions should be further researched since it is not much known about the complementary factor that SaaS BI solutions have on a departmental level. Furthermore, coming from local initiatives, they serve as solutions to come up for the shortcomings of the big BI (ERP with BI modules) suites.

What are the limits for SaaS BI constraint through computing power, broadband connections, data warehouse updates, and others and how close does SaaS BI come to sophisticated on-premise solutions? Will it reach a level where only data security remains an issue?

The market shows more potential than actually capitalized on and companies will try to grow further and enhance their market share. This makes it interesting to investigate how further expansion and thus the pervasiveness of SaaS BI will continue.

**Research in the SaaS field:**
Since SaaS is still rapidly growing many of the topics researched today (market data, major players, service offerings, and others) will still be interesting for research in the coming years. This market is highly active and fast evolving which allows for a high flexibility and many changes in a short time. As Rasmus Madsen (personal communication, 2010-04-27) predicts there will be a market saturation within the next few years. Predictions for this might contain an outlook on how the market will look after the M & As are done could be an interesting field of study as well. Which fields will be predominantly affected and which companies will switch the owner.

**Research within the BI field:**
Many topics are hyped around BI in recent years such as real-time BI, competitive Intelligence, and the ongoing desire for better predictive models automatically requires further research. Zaman (2005) forecasted a field that connects BI and AI and thus will deliver more accurate numbers and information. According to Mathias Carnemark (personal communication, 2010-04-19) integration between systems and elucidation about the benefits of BI for the companies are increasingly important. Especially the attempt to make users understand that BI only delivers information on which basis the users have to take action is ongo-
ing and needs more sophistication. Research needs to be done in order to find out how BI can best be leveraged in companies and which additional modules would add value.

Another big field is also open source BI. Like in many other open source areas the innovative models for the generation of revenue have to be found. The future of this phenomenon is also a highly interesting field of research in investigating how sustainable and profitable such offers will be. We also propose future enhancements to the F.I.S.H. model to encompass metrics that we may have overlooked and that would add value to defining the BI adoption process of SMEs.
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Appendix 1 - Interview with QlikTech

Interviewee: Mathias Carnemark
Date: 19.04.2010
Duration: 60 minutes

Can you give us an overview of your role within QlikTech and describe your working area, which department you are working for and what your work looks like.

I’ve been working for QlikTech for nine years now and could be considered a senior from that perspective. I started out as a consultant and have been working a lot with presales and currently I am working mostly with our partners. As part of our alliance team my main task is to support the partners in the partner development which includes support for our existing partners and partners to be in helping them to find their business model around QlikView.

We want to find out what you think about SaaS BI. First of all whether you think it is more a competitive technology or something that would complement on-premise BI.

SaaS is still very young and in my opinion will mature into something similar to what we are doing now. Salesforce as an example is very accepted nowadays but I don’t think that SaaS BI is there yet. However it will be more accepted in the future when early adopters spread the word and are satisfied with the solutions.

Does QlikTech have any intentions to offering SaaS solutions?

There are a lot of thoughts and initiatives around SaaS solutions in our partner community and QlikTech has come to offer QlikView in amazons elastic compute cloud. This makes it feasible to have QlikView running in the cloud meaning you don’t have to invest into expensive IT infrastructure and thus can shift capital expenses to operational expenses.

Do you receive a lot of wishes from your customer to go into this direction or are they completely satisfied with the on-premise solution?

Our existing customers are not actually asking about SaaS offerings. They are satisfied with their solution and don’t speak about downgrading.

What would you say are the major strength against SaaS solutions that on-premise solutions offer?

Besides technical differences and sufficient knowledge about these new technologies there are concerns in terms of work processes, security issues and IT policies which could go both ways. Let me give you an example: If you have an IT policy that makes it hard for you to move data in the cloud then it might not be feasible at all to implement a SaaS solution into your current IT infrastructure. On the other hand you might have an IT policy which facilitates openness and thus encourages you to have data accessible everywhere and at all times.

But with the growing acceptance of the SaaS business model this might become easier. One problem in the traditional (on-premise) way is that you chose one BI platform for your main purpose and after you found out that it is not capable of supporting all your need you end up getting a smaller solution on the side. Therefore many customers have differentiated
environments often comprising of more than one BI platform. Other reasons for this are local initiatives and due to these two opportunities QlikTech has taken its market share because we can do things that others can’t. SaaS business models should be more focused on solutions with special functions such as profitability analytics, profitability efficiency or cash management or something else. The customers are buying from us are improvement packages for one year including the BI solution with the software, services, management consulting and things like that. Basically we bundle all this into one offer and software is only one out of several components.

It’s like a Service-oriented architecture (SOA) then?

Yes, exactly. It could be like that. More like a total solution.

Can you say in which industries your customers mostly operate in or is that completely divers? Are there concentrations somewhere?

We have customers in all areas. QlikView is a product that is very differentiated in the market. It has no specific focus on an industry. It could be used in hospitals or in process industries or in any other area. So where we have most market penetration is more based on what focus we had had and what success we had had. When I started out in Sweden we were very small and no one had heard about us. What we did is the following: We went to manufacturing companies and they, for some reasons, found it good, and so we became very strong in the manufacturing industry. Building on this success we are now very strong with government officials and hospitals and so on, utilities, banking, insurance, all areas. Especially when there is a need to handle a lot of data, a lot of transactions and good transparency in the big volumes of data. So banking, insurance, retail and are major markets but we are present everywhere.

Is there a minimum size a company needs to have in order to run QlikView?

Small companies with less than 200m Swedish kronor turnover are not our main focus but we have a small part of QlikTech focusing on smaller companies and trying to find suitable business models for them which is a rather new initiative from our side. Otherwise our focus is on middle size market and enterprise market. The enterprise market being turnovers of 10 billion an up or 20 billion Swedish kronor and up.

Is QlikView usually used as an enterprise wide solution or is it usually on a business unit level? How does it work with the larger enterprises?

Historically we offered only departmental solutions and enterprise wide solutions are rather new. We have of course enterprise solutions and we are very, very focused on getting stronger in this market. You could say that we are growing into that and we have reference customers with such solutions. We do have the initiative and focus on becoming much stronger in the enterprise market now.

Are your contact persons within your customers’ company mostly working in IT departments or upper management or a combination of both?

That’s different and depends on the customer but of course the management is involved. Without management you don’t have the commitment, you don’t have the money for the investment and as you know BI is all about business value. The BI solution needs to be assigned and defined by the business side to see what values will you get on this and then we have to work with the IT department to make this happen. So IT is not often buying the BI and they don’t own it – they just make it happen.
Can you say what your customers value most about your solutions? Is it QlikView, the program itself, or maybe more services, training, or the whole package deal you offer?

It is the total value experience and with QlikView you have a very short time to value when you go from firm initiative to experienced value. This enforces more and more initiatives which again add value. We call this the wheel of excellence and it's important for us to get that spinning. The worst thing that can happen is an initiative that cost money for a long time before you have any return on investment and that is not good for anyone. What you get with QlikView is a fast return on investment and in my opinion that is what the customers experience with QlikView is like. More information can be found in an IDC report we have been incorporated in.

How much data would you say that you process for an average company?

That is a good question. You can separate it a little bit. In QlikView you can build what we call 'QlikView applications' and an application is one data set. Put together from one or many systems and one or several transaction systems and whatever other source systems. QlikView applications are building up on this and display the information in a comprehensive manner. We have customers that have more than 400 QlikView applications and that all together is very much information, very much data. But every single one maybe not that big. And then we have other customers that have 3-4 applications were one application is gigantic with one billion rows of data. This makes it very difficult to say because it's different depending on the purpose. But it is a lot of data since we are working with retail and banking and if you do that you need to be able to handle a lot of data.

In what ways does the implementation of QlikView change the customers business? Does the customer grow faster after implementing QlikView or do they have to conduct a lot of business process reengineering? What does the implementation process look like?

The implementation process of QlikView starts in most cases with the resources. Most of the customers hire one of our implementation partners to have them implement QlikView on their side. Our partners are working very closely with the business side of the customers helping them develop applications for QlikView. We often conduct something we call conference room development where you can sit together with the business side and create on the flight feasible solutions or even try prototyping the solution. And then you can settle it perfect later. But the opportunity to be able to create a prototype of the solution in a very efficient way is something that we value very strongly with QlikView as a product. And this is the approach that we try to implement more or less everywhere, this very hands on development process.

That means that QlikView is completely adaptable to the business processes the customers have and the customers barely have to change anything of the business to suit QlikView as a program?

QlikView is just a general software. It is not pre-made for anything, except handling data. You have the source systems that hold all the data accordingly to the business processes or not accordingly to the business processes or a mix of it. The trick is to get all this together and to create a solution out of all of this that can be used by the normal user, the management, the experts and the very non experts. In order to be able to do this you need to work very, very close between the different competences needed to create a comprehensive solution.
What would you say is the most costly part of the implementation process?

The most costly process is also the most time consuming when we try to understand the company’s structure and to get all data into the correct format. That means that you have crappy data, you have data quality issues, you have bad mappings, you don’t have the structure of the information that you actually need to be able to follow your process in a correct way and give the correct information. That is the most time consuming process and you have to take it as a cost that occurs before you can start delivering something valuable. But if you can deliver something without that habit as a first step and then work parallel to fulfill your requirements you can seriously improve your solution. Then it does not necessarily seem like a cost, it seems more like an investment while work is in progress. However it takes the most time to get things right and to know what the true value of BI is and what you will get from these different solutions.

Can you take us through what a regular implementation process looks like? If a client comes to you and they want analytics on their customers about what they buy or their habits? What would the process for that be?

The first thing we do when we enter a customer is to really understand the customers goal. Then we conduct a need assessment on different individuals and different roles of the customer so we understand the stakeholders and the individual needs. That provides us with a good picture of the overall understanding of the need. Then we need to have an understanding of the data, what do we have to work on and the resulting underlying possibilities. We need to know if the customer has goals which he/she cannot achieve with the provided data. So we go and conduct interviews and talk to people. We want to show the possibilities to the customer so that they really understand the value of it, so we do something we call ‘seeing is believing’ which we have a little bit packaged and that could be a session of two days or five days or ten days depending on the case. We usually do this in a first workshop where we develop the first prototype and show how we work, how the product works and how the development process works. Then we try to do the development in very iterative steps which allow us to go fast forward. So don’t do too much for every delivery. If you manage to do a 80% solution that is in most cases something that is good enough for production. However everything should of course be correctly implemented. Maybe there are some KPIs you haven’t been able to finish yet, then you leave that out but you publish the rest.

And then we try to have this iterative process where you can take the next step and add more functionality or add more sophistication into the solution.

What are the challenges that your customers face during this implementation process, if any?

Of course there are multiple challenges. One issue that could be a challenge is to get the right individuals from the customer side to engage in this because we need them. We need two people to be able to create this in a good way (Business and IT people). And then you have the challenge to have an organization that takes the solution and uses it and gets people start using it. It is very important to use the information the system provides you with and take action. BI only delivers information which then must be put into action in order to gain some value out of it. We can create the coolest BI solution with the best applications ever but only we understand that and we need to get it out there. We need to convince people and get them into using the solution and this is something that I think we can become better in. All companies in the industry. From our perspective we deliver very
sophisticated BI solutions, very easy to use, very much information but some people expect the reports but you need to engage people to get them to form that. Instead of getting a finished report on the desk the people have to get that information themselves out of the system. That's of course one challenge. Technically it's not very often very difficult problems. Of course there are challenges but they are not that big and you can always solve it somehow.

When a customer approaches you and asks you for a BI solution. They come with certain expectations and in how far do you meet this expectations after the implementation process? Is it often that customers thought about BI in a different way or where expecting more or far less and you surprise them with your capabilities?

From my experience we often deliver more than they expected. I think that we mostly manage to do that. But QlikView is much more known now and we have a good reputation and the expectations are very high at QlikView today. So I guess it gets harder and harder to surprise the market but I think that QlikView is a very strong product with a lot of strong functionalities, capabilities and it's not very hard to over perform. We often manage to do that.

What do you think is the future development of BI? Where do you see BI in 2-3 years? What are fields you're working on right now? What are fields to improve? What services are your customers asking for? What are they lacking?

I think that data used will be increasingly external data and creates some demand to the BI solution. You need more around-the-world-information and also some interaction with external data. Then you have to integrate more systems and try to create some sort of intelligence around it and also mash ups with other solutions and data sources (web-based and external information). Let me give you an example: You have your sales by customers but you also have all other information about your customers and maybe even people working at the customers so you might even be able to include the hobbies of the CIO of the company into your solution. From my perspective things like that add information and the new generation has a different way of collection information anyway.

The private market is a much earlier adopter to innovations and changes and I think this behavior will one way or another also go into business behavior but it takes longer time. And then of course mobile devices and other solutions that allow you to use the technology while you are on the go. But maybe also on SaaS. You wouldn't need a lot of power to have instant access to all this information and if that's going to be on-premise power or if you will have external power which you can have in a SaaS solution. That won't make a big difference.

Thank you for the interview.
Appendix 2 - Interview with Jönköpings Kommun

Interviewee: Jenny Claesson
Date: 05.05.2010
Duration: 60 minutes
This interview was not recorded and the transcription was based on the recollection of the interviewers.

What role do you play within the Jönköpings Kommun?
I am responsible for development, support, admin, training for executives, and all other QlikView related activities. This encompasses system integration, information provision as well as user guidance.

What industry do you operate in?
In the public service sector we deal with administration and provision of services that include education, elderly and children care, social services, cultural and leisure activities and the like.

How many employees are there in your organization?
We currently have around 11,000 employees.

How many users utilize QlikView solutions?
About 600 expert users and executives within Jönköpings Kommun utilize QlikView for their analysis and reporting.

What services do you utilize QlikView for?
At first we integrated five systems with QlikView in order to get reporting on HR, economy, children/elderly care, education, and the disabled. Within these fields the users have access to all the information necessary in order to carry out the daily processes effectively.

Why do you feel there is a need for BI?
Previously before the BI integration we had 600 disparate systems that made it very difficult to integrate and even more difficult for the users to get the information they needed when they needed it. Reports were made manually and the data gathering process took a considerable amount of time.

How was the decision process to adopt and on-premise solution?
We launched a public tender offer to all interested BI vendors and then selected the vendor that obtained the highest points in line with our criteria. We also involved the end users during the whole decision making process by organizing a sample of end users to obtain a realistic evaluation of their preference. We also build on the expertise from other municipalities which implemented a BI system in the past. Valuable insights and important evaluation criteria could be derived from this.

Since when have you been utilizing QlikView services?
We have been QlikView services since 2006.
Do you a similar solution to QlikView in parallel?

No, QlikView is the only BI system we are currently using.

What is the average frequency of usage for the end users?

This is difficult to say since some users don’t really use QlikView so far and others use it depending on their needs. This could be daily or less frequent weekly or monthly. It also depends on the available data for that specific user. Unfortunately around 15% have not made use of it at all.

What do you value most about the services that on-premise solutions provide?

Since we have no experience with SaaS or on-demand analytics we cannot compare to those systems but the following points of QlikView have been very valuable to us. Firstly, it enables the users to have just one login compared to multiple logins with different systems as was previously in case. Also users have the ability to drill down from more general data presentation to very specific overviews. Furthermore the need to merge data from several systems is no longer existent. It gives a great overview of all the relevant data and thus allows for easy and fast report generation while cutting down the time spent to gather the data from disparate sources. Additionally it allows for easy identifications of problems which reduces response time to make corrections. Lastly, it enables users to focus more on their core operations and activities.

Do you consider SaaS BI as a feasible alternative?

No, we actually did not look into this option. Due to the heavy amount of data, coming from multiple barely interconnected source systems and a lack of knowledge within the implementation of BI systems did not allow for a SaaS BI solution.

Has usage of an on-premise solution changed your organization? If so, in what ways?

Operations were adjusted but it allowed for better flow of information and forecasting which greatly improved the decision making process.

How do you measure QlikView’s business impact?

Due to the fact that we a governmental institution we do not focus so much on the bottom line but rather on intangible benefits such as quality of the services.

Could you explain to us what the implementation process looked like?

Once we acquired QlikTech as the vendor of choice we worked in connection with their consultants to identify our needs and requirements. The total implementation time was 30 days. Development of new applications is constantly ongoing either by ourselves or with the support of QlikTech partners.

Did your require consultant services / staff training?

We utilized consultants both during the implementation phase as well as afterwards and I personally conducted training for the end users within our organization.

Did you face any formidable challenges during the implementation and go-life phase?

Technology acceptance on the part of the end users was a major challenge. At present 15% of the end users have not made use of QlikView services. Also integration of the different
data sources was a major challenge. The culture within the organization and many of the users’ unwillingness to change also proved to be a challenge.

To what extent was a correlation between your initial expectations and the eventual outcome achieved?

So far QlikView is used in about 60 different municipalities throughout Sweden. This gives us a great resource base to gather information about potential benefits and drawbacks such a system may encounter. Therefore we had a pretty good idea of what we are going to receive. Derivations only occurred in terms of implementation time and the experience needed to develop sophisticated applications by ourselves was slightly underestimated.

Are there any services or functionality that you feel would enhance the usage and effectiveness of BI?

The only function I feel could be enhanced is the user interactivity which would enable the user to dynamically input data into the GUI.
Appendix 3 - Interview with Jack Bauer

Interviewee: Jack Bauer
Date: 10.05.2010
Duration: 20 minutes

This interview was not recorded and the transcription was based on the recollection of the interviewers and the name of the interviewee was changed due to an anonymity request.

What role do you play within the within your organization?
I am the CEO of my organization

What industry do you operate in?
My organization operates within the financial industry.

How many employees are there in your organization?
There are 14 employees within my organization

What services do you utilize YouCalc for?
I use YouCalc for sales analytics and web analytics within my organization but also make it available for my customers so that when they log into their account they have with us, they will have the ability to utilize applications that we have built using YouCalc.

How was the decision process to adopt and on-premise solution?
We looked at different vendors and ultimately decided that YouCalc was the best solution to go with. It was flexible and allowed us to make the modifications that we wanted to with relative ease.

Since when have you been utilizing YouCalc services?
We have been using YouCalc's services for about a year now.

Do you use a similar solution to YouCalc in parallel?
No we don't use any other BI solution.

What is the average frequency of usage for the end users?
It depends. We conduct analytics on sales at least once a month. But we also check the level of customers' usage of our service more regularly. Some of our customers use our services.

What do you value most about the services that on-premise solutions provide?
I like the fact that even though I have my data hosted on different sites and locations, I can get my data analyzed. The ability to also customize the app to be more specific to what we do adds value to the service.

How do you measure YouCalc's business impact?
We don't actively measure the business impact that we got from using YouCalc, but it has allowed our customers to have a more interactive experience with our services and greater
flexibility in finding out information that they want to know. On the flip side, it also allows us to learn more about our customers and what they want.

Do you consider SaaS BI as a feasible alternative?

No, we didn’t really consider getting an on premise program at all.

Why not?

We didn’t need anything heavy and YouCalc’s services gave us the functionality that we needed to get the analysis that we and our customers needed to get done.

Could you explain to us what the implementation process looked like?

There was no implementation process at all. We signed up for the service and it was up and running almost immediately.

Did your require consultant services / staff training?

No

To what extent was a correlation between your initial expectations and the eventual outcome achieved?

I was mostly satisfied with the service and feel that our needs and expectations were met. We were able to start using the service immediately and didn’t have problems having our data analyzed.

Are there any services or functionality that you feel would enhance the usage and effectiveness of BI?

One of the problems that I experienced and area in which I feel can be improved with regards to the SaaS solution I’m using is the pricing plan. Currently, I don’t have a price plan that takes into consideration the fact that my users are also using the YouCalc services. So if I have 500 customers and have to pay the standard price for a unique login for each one every month, for a small organization like us, it starts to get expensive.
Appendix 4 - Interview with YouCalc

Interviewee: Rasmus A. Madsen
Date: 27.04.2010
Duration: 45 minutes

First of all we would like to know which role you play at YouCalc?

I’m one of the founders and also the CEO.

Since when is YouCalc in business?

The company was founded in 2003 and YouCalc was launched in January 2009.

Those were six years of previous development or what has happened before YouCalc was launched?

Yes, primarily product development but we also had an on-premise product that we were commercializing since 2005 which is kind of predecessor of youcalc.com and was the main platform but then we discontinued the on-premise product when we launched YouCalc. So we did actually do some business on the same technology but selling it as an on-premise installable product until January 2009.

Since the service is rather new, we found a lot information about SaaS BI vendors which are kind of new in the market and a lot of them are still struggling with profitability like the ASPs had in the 1990’s. Can you give us an insight whether YouCalc hit the return on investment yet and whether it is actually working profitable?

I can’t give you exact numbers, those are confidential. But we are not profitable yet and we are not supposed to be profitable yet either. We are a venture capital backed company, so the whole idea was to have some more years of negative cash flows and then start making money in a couple of years or be acquired by someone before that happens. So we are generating revenue but we are not profitable yet.

Could you give us a brief schematic of the YouCalc business model?

Sure. The business model is that we offer analytics on data from a SaaS application, so we are entirely focused on analytics and data lying in the SaaS application (in the cloud). We don’t do analytics on on-premise data. You need to move your data to somewhere in the cloud so we can access it or you have it already in a SaaS system. And if you want to analyze that data you pay 19.95$ user/month to do that using YouCalc. Per user means per user of YouCalc not per user of the source system. So you might analyze data from salesforce.com, you have a hundred users on salesforce.com but you only have five users analyzing data, so you pay for five YouCalc users. That is the basic business model and if you like to use that term it is a Web 2.0 business model. We don’t have a sales team, we don’t have a sales channel. The users go in, they find YouCalc, they read about what we do, they take a free trial for 30 days, they want to continue, they enter their credit card information into the system and then we charge them on a monthly basis and they can manage their account and add more users or downgrade to less or add more services. We offer different premium services online which users can chose from. We are trying to have zero contact with the customers and we try to have them do everything themselves online. Of course we have customer support and presales but it’s very limited, it’s only email and we only do phone based
or physical meetings if its major accounts or partners. So it’s a volume business mainly aiming at small and midsized companies which is where also the majority of the SaaS business users are. So most companies that are using SaaS are SMEs, that’s where you find the volume of the business and that is what we aim for with our pricing and where we see our market. This is the basic business model today.

**How many employees are in YouCalc?**

Seven employees.

**What markets are you mostly active in?**

We operate globally but mostly in North America. I don’t think we have a lot of customers in Denmark. If you go to YouCalc you can’t really see that we are a Danish company unless you really go into the details. And since the majority of the SaaS business users are North American, that’s also where we get our customers. But we actually have customers all over the world. We have them pretty much everywhere.

You just said that you are trying to avoid contact with your customer and want them to do everything on their own. But if required do you offer consultancy services or training with your apps?

Sure. We have that and we mainly do it if it’s a major project or we can generate some significant revenue or if it’s an alliance. Someone wants to redistribute or promote our products, then we do this mostly online again with WebEx, online training and online phone calls, and then we charge our customers either with a fixed price if it’s a custom implementation or per hour if it’s more support. And then we try to build up a partner channel so there are consultants out there that know our platform and can provide services to end users instead of us having to do it. So the end goal is that we don’t have any customer contact and contact would only be handled through our partners.

**How much does this kind of service contribute to the revenue you are making? Is it significant or rather neglectable?**

The services are very limited, it’s maybe around 25% but it’s decreasing since we are adding more and more paying customers.

**Is there still a focus on it though?**

Well there is only a focus since we have to have it to gain customers right now because we don’t have the partners to do the services but we really don’t want to have it. We want to scale to thousands and hundreds of thousands of customers and you can’t do that with close customer interaction. It will take many years if you want to do that with direct customer interaction and direct customer support.

**How many customers does YouCalc currently cater to?**

Currently there are about 10,000 companies in the world that have signed up for a YouCalc account. Those are either on a trial or they are running a free account. I can’t say that they are all active and I actually don’t have a number on how many are active. This data goes back to January 2009 but we know that there are a lot of companies out there that use our free applications.

**Could you give us some reasons why YouCalc doesn’t host data?**
To us it’s a matter of market focus, there are pros and cons about hosting data but if people already have their data hosted somewhere in the cloud we don’t believe it makes a lot of sense to move it to yet another cloud storage and then to analyze it. We might as well leave it where it is and analyze it where it is so customers don’t have to trust us with their data. If you go to a data warehouse provider you have to trust them that they can actually store your data safely and that they back it up and then restore it if it’s down. We don’t have all those issues because we don’t have customers’ data. It stays at salesforce or Google or wherever the data is today. So we only give them access to analyze their data and not to store it. There is a lot less complication in it and there is no hassle for the customers to synchronize it between the source systems and the data warehouse. We do the synchronization even in real time because we connect to the data in real time. So our core strength is not storage. There are a lot of companies out there doing storage, storage on demand, data warehouse on demand or data bases on demand and we don’t believe that we can compete in that. Our core skill is analyzing data and we stick to that.

How much is it a problem with the ETL process? Is there an issues for data integrity? Is that a problem?

When you choose a strategy you focus on something and you prevent yourself from offering other types of services. So obviously when we don’t offer data warehouses there are certain things that we can’t do. But by not offering a data warehouse there are also certain things that we can do that the data warehouse provider cannot do, i.e. the real time analyses which you can’t do with a data warehouse. So if you want to analyze huge amounts of data, we’re talking terabytes (classical retailers) and you’re running millions of transactions in your shops every day and you want to analyze that data a data warehouse is the only approach. You don’t want to do that real time because it’s an awful lot of number crunching during the night just to get your pivot tables ready, your cubes, you need to do some cleaning and all types of ETL transformation, so you need a warehouse. So obviously we can’t do that. But we don’t think it makes sense to attack that market so if you are one of those big retailers you probably already have very complex on-premise BI solutions from SAP, Business Objects or Hyperion.

Can you give us a short overview of your main competitors? What actually is threatening your market share and where you overlap in your service offerings or where you see a niche and differentiate?

There is no one else who does what we do and that could be either because we are bold or because we are totally stupid. So there is no one providing a real time analytics solution without a warehouse. The one we consider as direct competitors, obviously you could start naming all the BI vendors in the world, but we try to look just at the pure under main vendors, the SaaS vendors. You can find it in a Forrester report also, there are Birst, cloud9 and Gooddata and those kind of players. And everyone, except for YouCalc, who started a SaaS BI offering took the following approach: They said BI is a data warehouse with a database querying and filtering and sorting and pivoting technologies on top of it. So what we do is we set up a data warehouse in the cloud and then we wrap the BI tools that are already available in a web browser so that people can use it in a web browser and then we add some collaborative aspects because it’s now in the cloud we make it easier people to share their analyses because they can obviously have different people logging in to their browsers to see the analyses or even work together on building the analyses. So that is the main value proposition and approach of these vendors. So they have a data warehouse and classical BI tools. Classical BI consists of tools that a database allows you to do, so that is mainly querying, it’s sorting the data/filtering the data and pivoting is the big thing. totals, group total, sub-
totals on subgroups and that is basically what you can do with the BI tool. And in addition
if you look at these vendors you will see that they have either a very narrow or very broad
focus. One vendor, i.e. cloud9 exclusively focused on analyzing data from salesforce, that is
all they can do. They might have a new product that can do some Oracle analyses but they
are very system specific. Whereas companies like Birst and Gooddata have generic tools for
analyzing data from any type of system. They are also including a focus not only on on-
demand data but also on on-premise data. So one of their pitches is “Upload your on-
premise data to us and then you can easily analyze it” and my counter pitch to that is “Why
would you want to upload when you already have it with the tools behind the firewall”. But
that is their approach, they are targeting a broader market then we do. What we can do
with our technology is the querying, the filtering, the pivoting that you can do with a BI
tool but in addition to that we have the mathematical modeling tools that allow you to
build the same type of custom analytics and custom metrics calculation as you are able to
do in a spreadsheet and this is something the other vendors don’t have. So at Birst and
Gooddata you can do your pivoting but if you want to have custom KPI you have to export
your data into a spreadsheet and build a spreadsheet model on top of it. We have a spread-
sheet tool as part of our integrated platform. So we can provide the custom analyses that
you would need to do in a spreadsheet we provide that from inside the browser. Those are
the main differentiators. And obviously there are advantages to each approach so you can’t
say that one is better than the other but as in any market there is an overlap where we are
competing for the same type of customers and solutions and there are areas where we are
not competing because each party cannot offer what the other does. If your requirement is
real time analytics forget about the rest, they can’t do it. But there are a lot of companies
that don’t need real time analytics so they can as well use Gooddata and Birst but they
might find it a hassle updating their data into the warehouse so they might end up using
YouCalc, not because of the real time aspect but because it’s easier or something else.

What would you highlight as the major strength against on-premise BI?

It’s an odd comparison because we are not competing with them. If you have your data on-
premise I would use on-premise tools anyway. I would not want my confidential data in
the cloud if I can keep it behind my firewall. So it’s not a market we are competing with.
There is one area where we might do some competition if you want to mash aggregated da-
ta from on-demand with on-premise (i.e. if you’re using salesforce for your sales) and you
have an ERP system on premise (Microsoft dynamics or something else) and you want to
aggregate data across these two systems because you want to have some kind of profitability
analysis. You want to have forecast from salesforce and the revenue pulled out of the ERP
system then we have a connector that you can install locally that will push data on-demand
or will push it to our platform so we can mash that data. So you would either need to ex-
tract all your salesforce data and download it behind your firewall and perform your analy-
sis on it or you could use a tool like YouCalc to do the mashing or one of the other compa-

Do you know of any challenges or any concerns of customers/potential customers
about adopting YouCalc analytics to use it for their business?

The main concern remains security. So you have to enter your credentials to analyze your
source data. You don’t have to store it with us but you still have to give it to us because
otherwise we can’t access the data on your behalf. And that will always remain in issue for
customers whether they can really trust us that we are not misusing their credentials. You
had the same issue if you’d be running a warehouse, then people have to trust you with
their data. You don’t have to trust us with your data, they have to trust us with their login to their data. So it’s two slightly different concerns but it’s the same domain. And I think that’s one of the main concerns and the second concern is “can this do what I need it to do” and that is a big challenge for us to communicate that. To make sure that people understand what it can actually do and which kind of problems we can solve for them and there is no easy way to communicate that. It’s a huge challenge. So you can tell customers you can do any type of analysis but they won’t believe you. You can tell them you can do customer analytics, you can do this and that, they won’t believe you until they see it. You need to illustrate that and you need to show it to them and make case studies and customer testimonials etc. so you can provide some credibility to the whole thing and they start believing you.

What do you know about your customers? Industries, size of their companies?

We are very interested in our customers but we are not keeping data. We don’t ask people to tell us the size of their business or the industry or anything. They just enter their contact information and credit card information (paying customers) and that kind of stuff. But we’re not yet asking them more stuff. If you run this web 2.0 approach you want to make it super easy to sign up and start using us. If you start asking people too many questions they get tired of filling out this form so you don’t want to put in too much hassle. So we don’t know a lot, we know that we have quite a lot of users analyzing Basecamp and Highrise data. Basecamp is a project management application and Highrise is more a CRM application. We know that we have a lot of users analyzing Adwords data and Google analytics data. Those are our main customer segments.

Do you keep track of weekly logins and usage statistics?

Sure, it’s not only weekly, it’s real-time. That is our business. So we know exactly how many users are in there, which kind of apps they are using and how much they are using them, which type of account they have and everything you want to know. That’s where we are optimizing the conversion from going into the website and converting into a free account, upgrading to business account and finally converting into a paying customer at the end of the trial. And then sometimes you have customers who dropped out and stopped paying. We monitor those numbers very closely and try to see what we can do to optimize all that.

Can you say how many of your customers are active and come back regularly?

We don’t have those numbers ready to hand them out but we could get them out of the system. An estimate is about 30% are active and using the system and then it is very diverse. Some of them come in daily and maybe multiple time per day and some of the users once per month. So it is entirely depending on the use and what type of data you are analyzing and what the purpose is. Sometime we see more users on Mondays because people have their Monday morning sales meetings and they want to look at those reports and then nothing happens the rest of the week and sometimes it’s once per month. It’s entirely dependent on how they use the reports obviously.

What would you say customers value the most about YouCalc services?

Ease of use. It’s easy to get started and easy to use. When you go to YouCalc if you find something in our app gallery consisting of about 150 apps that meets at least 80% of your needs you can get running in one minute. So within one minute you can be using this tool to analyze your data. That is entirely unique. If you go to warehouse vendors you might not
even have a demo online and if you say you want to try this they might contact you within 24 or 48 hours and will give you some kind of login where you can start uploading your data. So you have to go to your source systems and start extracting the data and uploading it and make sure it is the right format and then you can go and build your analysis. So we are talking about a week before you have anything and you're still working on it. To do your custom analysis, on YouCalc you have these 150 apps, that you can get started with in one minute. So that is unique and for a small business time to return on investment is pretty important even if we are talking about small amounts of money you want to see that you can get value out of this. So we are hoping that is one of the key differentiators and then in the longer term it will be the customization. You can use our tool to customize our apps but we haven't really promoted that yet and it is not user-friendly enough yet so we don't have a lot of users building custom apps. But once we made that easily enough you can see that as a key differentiator as well.

Are you planning on launching APIs?

Doesn't make sense because we don't have any data. A lot of customers ask us “Do you have an API?” and we reply that the API is on the other side, the API is on the data source side. There is no data on YouCalc, we are totally transient, we don't have a database. The only database we have is the database where we keep out users, the usernames and the logins. But we don't store any data so you can't access us via an API and extract data. What we do have is a plan for an universal interactive app where you can build a service so that you can expose the analysis model that you have build as an API and then you can call it from other applications. So let's say you are inside some workload application and you have some data you want to analyze, you build the model for analyzing it on YouCalc and you expose it as an API and then from inside this workflow application you simply send the data to the API and YouCalc returns the calculated result and you use that inside your application. But that is a longer term feature, we don't have it yet.

What about the business value of the customer?

It's basically all about insights about how your business is performing so we talk about performance management or performance insights. Whether you are analyzing financial data, project management data, sales data, marketing data everything is about finding out how we're performing and where we're not and then trying to use that knowledge to improve your business. So it's all about extracting insights about performance in order to make better and faster decisions.

And in what ways do you think that would help improve their business?

So for instance this campaign that I'm running is not as efficient as that other campaign that I'm running then obviously I want to move my campaign budget from the lower performing campaign to the higher performing campaign and the faster I can do that the more efficient I'm spending my marketing dollar. So if you're running Adwords campaigns and sometimes you'd be surprised that there are companies out there that are spending millions of dollars per month on Adwords. We are talking about huge companies obviously but those companies are spending an awful amount of money and we are talking down to the minute it makes a difference where they spend their money, which keywords, ... and they want to know exactly how should they spend the marketing budget. And the same goes for sales, this product is not selling particularly well, there is a good margin on this product or this region they are selling better and why is that? They promote the price and if other regions would promote the price they'd be selling better. So you can provide them better topline, you can provide them better bottom-line and you can provide them with time spend
on figuring out how they are performing because they have it with a click in their browser instead of digging out and using different spreadsheets. Sometimes you won’t see it on the balance sheet but you will see it in your free time to work on other things.

So in terms of the implementation process it doesn’t take more than a few minutes to set up YouCalc?

If you use one of our standard apps from the galleries it takes less than ten minutes. If you want to have a custom solution built you can build it either yourself or we build which can take anything from a day to two weeks. But we’re not talking about months or year projects. It’s a week and if it is a big project it’s weeks.

You said that you were previously running an on-premise solution. Why did you discontinue?

This was a way to see whether there is a market for our technology and the on-premise BI market is extremely mature and it is very competitive. So we were competing with some huge companies in there and some of them have big market shares and it was very difficult to go in with a new product. Very few vendors have done it actually. QlikTech is one of the few that have actually penetrated that market but one of their challenges is that they are a point solution so they can only do a limited aspect of the BI scope. They can’t do everything and often you will end up in a situation in which you want to have SAP or Oracle or something because they have the full suite that they need. They don’t want to have a patchwork of different solutions of which QlikView is one. So they get kicked out even if they have a point solution that is by far the best for that particular thing that it does but because it doesn’t belong to the a of applications. That is what we found with our on-premise solution. We have a fantastic piece of technology and we can do wonders on-point solutions for specific needs but it can’t do everything so it is a very high market to penetrate. The SaaS user market is a very virgin, it’s rapidly growing and there is very little competition out there even if you found a Forrester report that lists twenty vendors and probably you find a hundred BI SaaS vendors but they’re all new, they’re all start-ups and small and they’re all fighting for their market share. So it’s more like a combat and a lot more room for growth as there is in the on-premise market — for new vendors at least.

Do you face any integration issues with customers that host their data on any amount of locations? Are there any problems integrating that in the apps?

No, this is not an issue. This is something we are really good at. You can real-time, simultaneously connect to multiple data sources and mash that into one analysis. So let’s say you’re using salesforce and you’re using Adwords, so you’re running marketing on AdWords and that’s driving traffic to the website and then on the website people are filling out forms to buy products. That information goes afterwards into your CRM system which is salesforce. Then you start generating revenue which is registered in your CRM system and then you want to analyze, for every dollar you spent on this marketing campaign in Adwords, how much revenue you’re generating based on what is registered in your CRM system. You obviously need to do some mashing and both of those systems expose their data by a very structured API. We can connect to those data sources and we could even connect to five different data sources at the same time and mash it all up into one analysis. So it’s something we’re trying to focus on because we are really good at it. A challenge is often a lack of mapping so that the customer ID’s in one system are not identical to the customer ID’s in other systems. So how do you map the customer in the marketing system with the customer in the sales system. So you need some kind of mapping table and we provide some features that allow customers to set up mapping tables also. Either in their source system or in
Appendix

After a third party system and then we use those mapping tables to do the mapping. And then there is sometimes a need for some kind of data transformation, i.e., skipping double entries and the like but we have features in our tools that allow for this also. You need to model it though and set it up for the specific type of analysis but it’s totally feasible to do that. If you look at the alternative to this with three different SaaS systems and you want to mash it using a warehouse vendor and extracting all your systems from Salesforce, extract all your data from Adwords, extract all your data from your email marketing system and what you want to mash with. Then upload all that data to your warehouse, make sure that it is synchronized, make sure that it is mapped and then you start working on your data. It’s an awful amount of data around if it exists already elsewhere. We can get you running within minutes and the other approach will take you an hour talking to each before you have that running.

Where do you think SaaS BI or on-demand analytics is heading in the future?

I think integration is the big thing. One of the things that warehouses solve is to integrate data from many different enterprise systems (ERP, production, finance, etc.), that is one of the key things that it actually solves and then making it easy to access and query that data. That will be a big challenge also for on-demand BI and some will use a warehouse approach to it and some will use our real-time approach to it, then you mash it and run the analysis. I think security and the connection with security, qualifications on security in terms of certifications that certify that people can safely use it without any threat to their data. And in that connection also integration with their existing permission management systems, so you want to make sure not only that your data is safe but also only selected people have access to the data so that the sales representative can only see his own sales data or the data for his team but he cannot see sales data for the entire region. Maybe you have a policy for that only the sales manager can see all the data. You need to set people to different commission levels. So how do you manage that and how do you manage that when it is spread across multiple data sources and you need to find a way to integrate that with your existing permission management model. (single sign on, access management applications on-premise) So that if you’re logged in to the network you automatically get access to all the different systems in the enterprise. And it obviously would be nice if you have the same online once you sign in to your online or on-demand system you get access to all kinds of different applications with the specific admission level.

Do you expect a lot of M & A activities in the close future?

Oh yes, that’s what we are here for. We are here to be acquired. If you go back to 2007 and part of 2009 you will see that almost every single independent BI vendor was acquired. So Hyperion, Business Objects, Cognos, you name it, everyone who was in the market and doing well they were acquired by IBM, SAP, Microsoft or Oracle. That was because it is a very good add-on value to their enterprise offering so I expect the same thing to happen on on-demand. Maybe not in the short term but in a couple of years so that the big enterprise on-demand vendors will be acquiring on-demand BI vendors to complete their offering.

Thank you very much for the interview!
Appendix

Appendix 5 - Survey

Client Questionnaire

In the course of our master thesis with the topic "Role and efficacy of SaaS Business Intelligence Systems in SMEs" we are investigating the impact of Software-as-a-Service (SaaS) Business Intelligence (BI) solutions on the market and trying to identify decision factors which are decisive for an investment into a SaaS BI solution over an on-premises solution and vice versa. Due to the assistance of Qliktech we were able to identify your company as an user of an on-premises BI solution and would very much appreciate your support by answering this questionnaire in order to help make our master thesis a success. Thank you very much!

Personal information about the respondent:

1) What industry does your organization belong to?
   Please Select:

2) What role do you play in your organization? (BI user or IT department?)
   Please Select:

Company Information:

3) What is the size of your company in:
   a. Number of employees:
   b. Turnover (in USD):
   c. Active markets (local or global):

4) Where are IT investment decisions made – more towards management or IT department (the middle is indicating a shared responsibility)?
   Management: 
   IT department: 

5) Which departments rely most on BI solutions for their operations?
   Please specify:

   1 | Page
Usage of Business Intelligence:

6) Since when have you been using BI within your company? (in years)

7) Is Qlikview the only BI solution you’re using at the moment?
   a. If not, which other solutions are used? (On-premise or SaaS)
      Please specify:

8) Did the company use other solutions before?
   Yes  No

9) How many people rely on BI tools in their daily work?
   Please indicate:

10) How much data is analyzed using Qlikview?
    Please indicate: GB

11) How would you perceive the importance of BI for your company?
    1. Not so important
    2. Interesting business insights but not a driving business factor
    3. Important
    4. Absolutely crucial for daily business

The following section aims to investigate the pre-implementation phase and determine which evaluations were made prior to implementing a BI solution.

13) Please indicate by rank which factors were most important for the decision to invest into an on-premise BI solution? (1 being most important, 10 being least important)

   1. High scalability
   2. Data security
   3. Remote accessibility
   4. Expandability
   5. Reliability of the system
   6. Availability of real-time BI
   7. Reduction of deployment costs
   8. Predictable IT operating budget
   9. Deployment risk mitigation
   10. Data Center Infrastructure
   11. Other (Please specify):

13) Which documents were created during the investment decision?
   a. Project plan with detailed timing
   b. Feasibility study of an on-premise system
   c. Cost-benefit analysis (Taking into account operational as well as capital expenditures and increased revenue in sales)
   d. Risk assessment
   e. Vendor comparison
   f. Other (Please specify):

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Appendix

Please rate the level of satisfaction you have on the following issues (NA for Not applicable / Don’t know)

1. Security risks in terms of both data integrity and the application itself
2. Integration of the BI system with other systems
3. BI customization, control and configuration of the application and data
4. Internet connectivity availability
5. Employee technology acceptance
6. Service Level Agreement (SLA)
7. Cross platform compatibility
8. Permissions and password protection
9. Mobile compatibility
10. Upgrades
11. Scalability

After the system was successfully implemented it is of interest whether and how the predetermined goals were achieved.

14) Which of the following aspects of your Total Cost of Ownership were most substantial?
   - Support cost
   - Upgrade cost
   - Server cost
   - Database cost
   - Training costs
   - Other

15) Did you have to conduct any Business Process adjustments in order to allow for effective usage of your BI solution?
   - Yes
   - No

16) How did you use consultants during the decision process adopting your BI solution?
   Please Select
The following benefits have been realized within my organization as a result of the implementation of a BI solution. (NA for Not applicable/Don’t know)

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<thead>
<tr>
<th>Benefit</th>
<th>Not Satisfied</th>
<th>Very Satisfied</th>
<th>NA</th>
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<tr>
<td>1) Improved customer service</td>
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<td>2) Improved the efficiency of internal processes</td>
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<td>3) Increased staff productivity</td>
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<td>4) Reduction in the cost of effective decision-making</td>
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<td>5) Reduced operational costs</td>
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<td>6) Reduced inventory levels</td>
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<td>7) Reduced marketing costs</td>
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<td>8) Reduced customer return handling costs</td>
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<td>9) Reduced time to market products/services</td>
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<td>10) Reduction in the cost of transactions with business suppliers and partners</td>
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<td>11) Improved coordination with business suppliers/partners</td>
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<td>12) Increased responsiveness to/from suppliers</td>
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<td>13) Increased inventory turnover</td>
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<td>14) Increased efficiency of utilizing assets</td>
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<td>15) Increased value of assets</td>
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<tr>
<td>16) Leveraged the advantages of IT upgrades, improvements and/or new developments in back-end IT systems</td>
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<td>17) Increased revenue, services provided</td>
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<tr>
<td>18) Reduction of lost sales/lost services provided</td>
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<td>19) Increased geographic distribution of sales/services provided</td>
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Appendix

Future Improvements
In what ways if any would you like to improve the current capabilities of your BI solution?

Would you be willing to have your company name mentioned in our final report?

Yes: ☐  No: ☐

If yes, please state your company name here:

Responses to this survey are considered confidential and hence individual responses will be made anonymous before the results will be published unless the respondent agrees to have the company name mentioned.

In participating in this survey, the participant recognizes that the information provided on this survey will be used in an master thesis for academic purposes and therefore grants the students unrestricted use to this information.

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