Winning Customers in the Era of Cloud Business Intelligence: Key Adoption Factors from a Small and Medium Enterprise perspective

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Acknowledgements
This work marks the conclusion of the first year master’s program in Business Development and Management of Innovation. As the name implies, innovation has been one of the recurrent topic throughout the course. For this reason, I wanted to incorporate an element of newness in the final work, trying order to push forward the knowledge in a particular area. The field of Business Intelligence (BI) is truly an interesting one, that offers multiple paths to investigate. I chose my niche in two ways: from one side, I restricted the study to SMEs, since historically the business intelligence market has been driven by big companies who had the resources to purchase these expensive IT solutions. Even though Business Intelligence in SMEs is not a new research, I regard appropriate to give more consideration to it. On the other side, the element of newness mentioned before is the cloud technology, whose significant commercial distribution started only few years ago. Hence, the focus will be on cloud Business Intelligence in small and medium sized enterprises. I firmly believe that any work of a certain magnitude requires passion as the first element to make it successful. Previous to this research, I was involved in a project outside the university that not only did it give me the competencies necessary to engage on this study, but also motivated me to pursue a subject completely unknown at that time. Having said that, I really enjoyed developing this investigation and I learnt priceless lessons that will stay with me forever. I sincerely hope that the outcomes of this thesis will be helpful both in providing useful insights to marketing managers and in improving the understanding of small and medium sized companies' needs in the domain of Business Intelligence.
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Abstract

Due to the fast development of new technologies, the Business Intelligence market is changing rapidly, forcing vendors to adapt their offerings to the customers’ needs. As the amount of data available to companies has been substantially increasing in the past years, the need of suitable software tools that perform the right analyses became essential, even in the small and medium sized business’ environment. The previous literature, focused on big firms and traditional implementation of Business Intelligence solutions, highlighted the importance of understanding the key factors in successful projects. In the past few years, a new delivery model for Business Intelligence software is taking place: the cloud computing. To date, key factors for adopting cloud Business Intelligence in small and medium sized enterprises (SMEs) have not been systematically investigated. Existing studies have rarely considered these arguments and we lack of a proven framework. This paper is aimed to fill this gap and the structure of the article is subordinated to this objective.

Firstly, the thesis offers an overview of the subject and the terminology used in it with the purpose of facilitating the understanding of a rather complex argument. Therefore, it starts with a short historical overview of the Business Intelligence sector, it defines the term Business Intelligence, and it explains both the characteristics of the Business Intelligence systems (cloud vs on-premise) and the importance of having a business intelligence solution for SME.

Subsequently, the theoretical framework of this study is defined, combining the prior theories and empirical data collected through the interviews with four Business Intelligence vendors and customers. Initially, the existing Critical Success Factors (CSFs) of IT and BI projects proposed by different authors in the literature are reviewed. Afterwards, the evaluation criteria for the cloud software are taken into consideration. By integrating insights drawn from these studies, as well as adding new factors coming from the interviews, a framework has been created and utilized as a basis for the further questionnaire development.

The choice of pursuing both the quantitative and qualitative approaches is aimed at improving the study’s reliability. Empirical data are mainly primary data, collected during a survey and four interviews, supported by secondary data such as general companies’ reports, market and trends analysis from trustworthy sources.

Based on the findings, the author of this thesis has ranked the key aspects of a cloud BI adoption in SMEs. It is revealed the most important key adoption factors that SMEs evaluate when purchasing a cloud BI solution are the level of software functionalities, the ubiquitous access to data, the responsive answers to customer support requests, the ability to handle big amount of data and the implementation cost.

Regarding the managerial implications, the study’s practical relevance consists in offering to BI suppliers' managers, executives and decision-makers interesting areas of discussion for improving the knowledge of SMEs' needs. Moreover, the results of this investigation can be used by Business Intelligence newcomers as a guidance for evaluating solutions available in the market.
Acronyms and abbreviations
BI= Business Intelligence
SME= Small and Medium sized Enterprises
RQ= Research Question
IT= Information Technology
S-a-a-S= Software-as-a-Service
P-a-a-S= Platform-as-a-Service
I-a-a-S= Infrastructure-as-a-Service
CRM= Customer Relationship Management
CSF= Critical Success Factor
KPI= Key Performance Indicators
ERP= Enterprise Resource Planning
HR= Human Resources
CAGR= Compound Annual Growth Rate
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1. Introduction
This chapter includes a short overview of the Business Intelligence market, followed by the problem discussion and the proposed research question.

1.1 Background
The amount of data available for analyses is growing relentlessly and IBM estimates 90% of the data in the world has been created in the last three years (IBM research, 2011; Negash, 2004). In the last thirty years, storage space has been endlessly increasing whereas its cost has followed the opposite trend (Storage Trend study). Nowadays, more and more businesses are realizing the massive potential that lies in their data. Potential that can be leveraged to make better decisions, offer more value to both customers and shareholders, and discover patterns that could be “disruptive” (Scholz et al., 2010; Sheik, 2011; Nyblom et al., 2012). The discipline that specializes in turning data into useful information is called Business Intelligence (BI). Why is important for the economy of a company to have better information?

Answering this question is crucial, as remarked by other authors (Nyblom et al., 2012; Watson and Wixon, 2007). Having access to the right information at the right time increases the likelihood of taking better decisions (Yeoh and Koronios, 2010). This will bring tangible benefits to the organization, which I categorize in Financial and Non-Financial. Revenue and cost are two important metrics for tracking the financial health of a company (Rust, 2002). The importance of any IT solution can be measured in terms of how it affects, directly or indirectly, the two aforementioned metrics (Poston & Grabski, 2001; Tata Consulting Service White paper, 2012). As a consequence, even the benefits of a BI system are measured in terms of “increased revenue” or “decreased costs”. Examples of benefits are the acquisition of new customers, upselling/cross-selling techniques, optimization of resource allocation, lowering operating costs and improve customer service (Vodapalli, 2009). Soilen and Sabanovic (2012) found that a quicker decision-making process was the main benefit users experienced with a BI adoption, which indirectly has a role in improving either the revenue or the cost. Watson and Wixon (2007) do not limit themselves to specify a single benefit, but they claim business intelligence solutions are important in the whole process that leads to better decisions, namely from gathering and storing data to supporting for the accomplishment of strategic business objectives.

Having said that, most of the benefits are difficult to quantify in terms of revenue or cost, since some of them are hidden behind the multiple activities characterizing an organization. All of these benefits are named “Non-Financial” (Raisinghani, 2004).

“In today's competitive environment, Business Intelligence software systems have become a central concept. In the competition that exists, it is important for a company to have efficient and effective software systems to collect, process and store data of various kinds. For example, you have to have a good system for customer management, finance, sales monitoring and many more” (Nyblom et al., 2012).

Therefore, the competitive advantage can be achieved not only through the innovation in markets or products. Storing, collecting and analysing of information have become a new frontier of competitiveness, and some scholars foresee that data will become a new “corporate asset” and main source of revenue (Brown et al., 2011; Raisinghani, 2004). Many CIOs (Chief Information Officers) have been considering Business Intelligence a top priority for their organizations (Gartner, 2013), after many data
analytics best practices proved to offer enormous benefits to enterprises and individuals (LaValle et al., 2011; May, 2009). Moreover, the benefits arising from the collection and analysis of data are not restricted to a specific industry, but they may relate to the majority of organizations (Gangadharan and Swami, 2004; Raisinghani, 2004). Sure enough, many sectors have already gained benefits from data, but a lot of organizations still need to understand how to obtain value from it (LaValle et al., 2011). Below are only few examples drawn from the world of data analytics’ best practises (Raisinghani, 2004):

• The financial services are deeply influenced by the insights coming from data analysis. New spending patterns can emerge, individual credit history can be built, and the money transactions help to analyze different customers behaviours.

• The education sector is definitely a beneficiary of efficient data management. Analyze figures coming from computerize software tests can offer insights that lead to better students test assessment.

• Food and agriculture are two areas of main concern for the governments worldwide, especially due to the ongoing increase in the world population. Predicting the food production trends can reduce waste and spoilage or improve the availability of crop storage.

Historically, the BI systems have been mainly adopted in large and multinational enterprises (Olszak and Ziemba, 2012; Wong, 2005) which could afford the hefty cost required in terms of money, expertise and capabilities. As remarked by other scholars (Søilen et al., 2012; Hwang et al. 2004), the resources necessary to implement a traditional BI tool are not available in most SMEs. Bergeron reports similar findings and suggests that conventional BI systems would not meet the needs of SMEs (Bergeron, 2000; InsidelInfo Whitepaper). Furthermore, despite all the precautions taken, the enormous failure rate that characterizes BI projects, over 50%, (Beal, 2005; Meehan, 2011; Laskowski, 2001; Legodi and Barry, 2010 found in Adamala and Cidrin, 2011) does not encourage SMEs to invest in these risky activities. Although major organisations have led the way in introducing and implementing Business Intelligence solutions, the recent increase of globalization, competition and the amount of data to be processed has been forcing SMEs to evaluate the purchase of BI tools (Olszak and Ziemba, 2012; Wong, 2005). These software applications do help a small business compete with larger ones, increase market share or provide insights and patterns that otherwise can not be seen (Grabova et al., 2010). Olszak and Ziemba (2012) surveyed business-owners and mangers of SMEs, who confirmed the importance of analysing data even in a small company:

"In our companies, as in large enterprises, there is a need for fast and accurate assessment of market needs, effective discovering of market niches and avoidance of unnecessary costs" (Olszak and Ziemba, 2012).

1.2 Problem area
In the last few years, uncertain and turbulent economic conditions have forced companies, small as well as big ones, to find ways for streamlining operations and cutting costs in many areas (Östling and Fredriksson, 2012; Sheikh, 2011). Moreover, the increase in data volume calls for an efficient way to manage the information within an organization, especially of a small and medium size where the use of Information Technology has consistently lag behind (Rath et al.).
The advent of cloud computing could represent a breakthrough for the IT segment, since the advantages brought in by this technology are particularly appealing to SMEs, and it potentially provides a solution for the two issues above-mentioned (Benlian et al., 2009; Rath et al.). Following is an excerpt of the most significant:

- **Limited financial risk:** cloud solutions are generally characterized by low implementation costs, affordable monthly subscriptions that guarantee the use of the service, limited hardware expenses and the possibility to rescind the contract at anytime (Finch, 2007; Sheikh, 2011).

- **An efficient way to manage the information:** cloud computing, supported by the continuous increase in broadband availability (Sheikh, 2011), underlies systems that help managing the information in a ubiquitous and pervasive manner, across different platforms and applications (Doukas et al. 2010).

- **The ease-of-use** of a cloud software removes the technological barriers that might exist in SMEs, which might not have specialized and skilled people able to use complex IT systems. Cloud software can be effortlessly managed by both beginners and advanced users (Sheikh, 2011).

The importance of this technology is also demonstrated by the growth achieved in the recent years. Cloud Software-as-a-service (SaaS) market grew over 17% in 2012, reaching $14.5 billion in revenue and it is expected to hit $22 Billion in 2015 (Bucur, 2012). IDC forecasts that the amount of revenue generated by SaaS BI suppliers will expand three times as fast as the overall BI market for the year 2013, logging a Compound Annual Growth Rate (CAGR) of 22.4% (Deng and Zhang, 2012).

"On-demand computing or Software-as-a-service is the future of software and the future of BI, at least for the small-medium size business market, if not for a majority of standard enterprise reporting applications" - The DataWarehouse Institute, March 2007 (Sheikh, 2011, pp.7).

Therefore, if SMEs can find ways to successfully deploy cloud BI systems, it is reasonable to assume that those solutions will boost their market competitiveness and provide a means to manage the information more efficiently. However, despite all of the promising numbers and high expectations, the SaaS Business Intelligence market currently represents only 3% of the total BI turnover and the adoption rate among SMEs is still low (Figure 4; FSN, 2012; Rath et al.; Scholz et al., 2010). A variety of factors might explain this poor result, such as the novelty of SaaS technology, which has still to spread its power, or the fact that applications characterized by a high strategic importance for a company, such as BI, experience a lower adoption in a cloud setting.

Business Intelligence, cloud computing and SMEs are the subjects of extensive discussion in the literature: BI in SMEs (Olszak & Ziemba, 2012; Scholz et al., 2010; Nyblom et al., 2012; Wong, 2005), cloud BI (Sheikh, 2011; Bucur, 2012), adoption factors for cloud computing in SME (Rath et al.) cloud Enterprise Resource Planning systems (Östling & Fredriksson, 2012) to name just a few, but there is still a lack of knowledge on what happens specifically in the area of cloud SaaS Business Intelligence for SMEs.

1.3 Purpose and research question
The volatile market conditions force Business Intelligence suppliers to adapt their offerings to the current customers’ needs. The knowledge of which key factors affect
the decision of a SME to adopt a cloud BI solution is rather unexplored. An ability to investigate it would have some practical and theoretical benefits:

- Understanding the real needs of SMEs in terms of managing the information, through the adoption of BI systems, in a more comprehensive way. The “use” of information has a dramatic influence on the performance of a small and medium sized organization (Lybaert 1998 found in Scholz et al., 2010). In addition, BI systems appeared to be adopted mostly in large and international companies and, thus, previous studies have been focused on those organizations (Scholz et al., 2010; Olszak and Ziemba, 2012; Wong, 2005). Nonetheless, the needs of an SME are quite different than big companies' ones (Scholz et al., 2010; Olszak and Ziemba, 2012).
- Preventing the development of initiatives or projects with poor market appeal or suggesting the BI suppliers to focus on critical issues that otherwise would have been overlooked – resulting in a more compelling offering for the customers.
- Providing a solid grounds for future research by validating and adding new perspectives to the current studies in the field of Business Intelligence. This study is partially built on previous knowledge of the adoption factors of Business Intelligence / IT software. The value of these studies will obviously decline with age, given the rapid advancement of technological innovation (Yeoh and Koronios, 2010). The research would fill gaps in the theoretical field and will provide interesting managerial implications by answering the following Research Question (RQ):

**What are the key factors for the adoption of a cloud BI solution in small and medium sized enterprises?**

The objective of this thesis is to investigate what are the adoption factors for cloud BI solutions and how managers of cloud BI suppliers and SMEs can act on those factors. The paper reviews both the existing CSFs and the software evaluation criteria proposed by various authors in the literature. By combining these two sources of body of knowledge, the author creates a table that guides the identification of possible improvements in the literature and he tests its validity through multiple interviews. Finally, the revised version of the table will serve as a basis for the questionnaire development, whose results help answering the RQ.

**1.4 Chapters alignment**

Many studies deal with complex arguments that may not be easy to follow and grasp for the readers. Hence, it is of primary importance to present ideas in a logical and structured manner. In chapter one I describe the research background, the scope and limitations and the significance of this investigation, whose results can be applicable to a number of different sectors. Regarding the motivations that led me to investigate this domain, I briefly explained them in the acknowledgments section. Next chapter, number two, will serve as an introduction to the argument of Business Intelligence in small and medium sized enterprises. Research works that deal with this type of organizations should provide a definition of a small and medium sized enterprises, since an unique agreement has yet to be found. Therefore, here I will define the boundaries of a SME and then continue with an overview of the business Intelligence subject, its definition, the main characteristics and the comparison between two different delivery models for Business Intelligence solutions.
In chapter three, I present the literature review on Critical Success Factor for Business Intelligence with a focus on SMEs, and the evaluation criteria for IT software and SaaS solutions. Further, there is a description of how I have combined together these two sources of body of knowledge, which resulted in a table used as a bedrock for the following questionnaire (table 4).

In chapter four I will be discussing in detail the research methodology chosen. In particular, the purpose of the study, the research approach and strategy, the sample selection and the implications of my decisions. Chapter five is dedicated to the analysis of empirical data and it is divided into two parts. The first one is a summary of the main discussions that took place in the qualitative interviews, while in the second one I analyze the results coming from the questionnaire.

The last Chapter, number six, ends the overall thesis and provides the conclusions and implications of the study, both theoretical and managerial.

2. Previous research and definition of key concepts

Even though the focus of this investigation is not the explanation of the business intelligence market as a whole, I believe it is worth providing a brief introduction and explanation to the argument, due to the unfamiliarity that many have with some terminologies or processes. In this way, I have the opportunity to clarify some parts and guide the reader toward the focus of the research.

I deliberately decided to divide this section in two distinctive parts, each of them dedicated to the review of a specific area. In the first part I introduce the definition of small and medium sized enterprises (SMEs). The second part is about the Business Intelligence domain. Here, several sub-sections are presente: the history of Business Intelligence; a short explanation of Business Intelligence systems; a comparison between and cloud SaaS vs traditional BI solutions.

2.1 Small and medium sized enterprises

A unique definition of small and medium sized enterprise has not been decided yet (Carter and Jones-Evans, 2006) and, for the purpose of this study, a company is considered a SME if it fulfils the following requirements:

- Up to 500 employees and $25 M in annual revenue in the United States (Carter and Jones-Evans, 2006).
- Less than 250 workers; a maximum annual turnover of €50 million or €43 million in the balance-sheet, for European enterprises (Carter and Jones-Evans, 2006).
- For Asian companies there is not an official definition and it varies greatly from country to country. For instance, Chinese companies with 2000 employees can still be considered medium businesses, whereas in Lao, a company with more than 100 employees is considered a big company (Harvie, 2004; Xiangfeng, 2007).

Since this study encompasses businesses belonging to different countries, I will use all the three the above-mentioned definitions.
2.2 Business intelligence overview

2.2.1 Evolution of business intelligence
Business Intelligence is a term that may seem unknown to some, but it has roots long back in the past. It is commonly agreed the term Intelligence has been coined the first time by IBM analyst H.P. Luhn. He defined it as “the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal” (Luhn, 1958). Therefore, the first decision-support systems were born and further developed in the following years, becoming important IT solutions for supporting the decision-making process. In 1989, Howard Dresner proposed the widely accepted definition of Business Intelligence, still used today; “concepts and methods to improve business decision making by using fact-based support systems” (Watson and Wixon, 2007).

2.2.2 Definition of business intelligence
After a detailed analysis of the literature, there exists so many and different definitions of BI that is fundamental to pick one and stick with it in the whole paper. Hence, with the term Business Intelligence I refer to the “processes, techniques or tools that support the making of faster and better decisions” (Pirttimäki and Hannula, 2003).

Taking as a reference the number of articles being published in the last 24 months, the hype around Business Intelligence has increased significantly, indicating that BI systems represent an important component of a modern enterprise’s information infrastructure, as they contribute to its success and competitiveness (Davenport et al., 2010). Moreover, the possibility to dig deeper into the consumer behaviors by analyzing multiple sources of data has become a central concept and activity within an organization (Nyblom et al., 2012). This study is not aimed at describing the business intelligence software in details, but clarifying some simple concepts related to the main functionalities is crucial to grasp the further sections of the paper. Historically, it was essential to not confuse the terms business analytics and Business Intelligence. They were not interchangeable and the best explanation of the differences has been given by Vesset and McDonough (2007) through the use of a self-explanatory image (Figure 1).

![Figure 1 – Classifications of BI software (Vesset and McDonough, 2007)]
As the figure shows, the BI tools/software represented only a small set of a broader market segment called business analytics. In particular, we refer to the Business Intelligence application as the category involved in querying, reporting and analysis of data through the use of complex techniques.

Things started to change in the last years when the interest around the business intelligence market rose significantly, with a substantial number of new companies entered into this sector. This rapid increase might have caused the misuse of the term Business Intelligence, which has been referred wrongly to other types of software (Søilen and Hasslinger, 2012). Moreover, it is possible to find companies, that claim to offer Business Intelligence products, whose characteristics do not belong to any specific category defined by Vesse and Mcdonough (2007). As a consequence, the business intelligence market has been evolving in a more business homogeneous environment (Søilen and Hasslinger, 2012) where the boundaries defined by Vesse and Mcdonough (Figure 1) have been crossed many times. Given the previous considerations and for the purpose of this study, I consider appropriate to provide a definition of the BI systems:

“BI systems combine data gathering, data storage, and knowledge management with analytical tools to present complex internal and competitive information to planners and decision makers” (Negash, 2004, pp. 178).

2.2.3 BI systems' architecture
Short description of the basic BI functionalities

One of the main benefits offered by business intelligence solutions is the representation of structured and unstructured data in an easy and understandable format. Yet, the use of graphic and visualization tools to “make meaning” of data is only the final result of multiple processes taking place within a complex architecture. Details are not necessary for this research, but I want to provide a schematic overview of these processes.

Retrieving the previous definition of Business Intelligence, the act of taking better decisions is the ultimate stage of a process that starts with the collection of data coming from heterogeneous distributed systems. Then, the data will be consolidated
into a unique model and finally it will be used to feed the front-end applications for driving business analysis, reporting and querying (Vodapalli, 2009). It is possible to categorize all these processes in two main phases. The first one is to take all the data relevant to the company and keep it in specific storage place(s) called data warehouse(s). This process is called Getting data in (Watson and Wixon, 2007). The second step is called Getting data out, namely the action of retrieving all the data and show it in a comprehensible way: charts, table, maps and all visual expedients that make raw data easy to understand (Watson and Wixon, 2007). Therefore, in this brief paragraph I have explained what Business Intelligence is and what are the two main steps that characterize these IT tools: Getting data in and Getting data out.

2.2.4 Cloud SaaS vs traditional BI solutions: part one

From the late 1990s, many companies started using BI systems for two reasons: keep their knowledge stored in a single place and leverage it to gain better understanding of the business environment. Historically, the implementation of a BI software has been mostly a privilege of the big companies, who could afford the high costs that characterize these IT systems (Scholz et al., 2010; Olszak and Ziemba, 2012; Wong, 2005). As a matter of fact, the traditional BI systems were built on-premise, physically installed and run in the building of the company using the software. Therefore, on-premise BI systems were tailored to the specific needs of the company, and this approach often had costs not sustainable for a small or medium sized business. For the sake of clarification, in this paper I will use interchangeably the terms on-premise and traditional BI systems.

In the last years, a new way of utilizing software has been taking place:

“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Feenstra et al., pp. 3).

In general, cloud computing can be classified in three different layers: Software-as-a-service (SaaS), Platform-as-a-service (Paas), and Infrastructure-as-a-service (Iaas) (Zhang et al., 2010, Feenstra et al.), which represent the different delivery models for the cloud services (Östling and Fredriksson, 2012) (Figure 3).

![Cloud Computing Diagram](image-url)
The SaaS model, which will be the focus of this paper, can be defined as “renting” the software to customers who can access it through the web (Sheikh, 2011). During my research, I have noticed some ambiguity surrounding the “cloud” and “SaaS” definitions, which have often been confused. Hoping to shed some light, following is a short explanation:

“Software as a Service (SaaS) is defined as a software application delivery model, where a software vendor deploys and hosts software applications in a multi tenant (cloud) platform for its customers to operate the application over the Internet as services” (Liu et al., 2010).

All SaaS is cloud computing, but not all cloud computing is SaaS. In this article, I focus only on SaaS vendors and customers. From this point onwards, whenever I use the term cloud BI, I will refer to the top layer of the cloud infrastructure: SaaS cloud Business Intelligence.

2.2.5 Cloud SaaS vs traditional BI solutions: part two

This section has been created to provide a deeper understanding of the differences between these two implementations models. A two phases framework is created to guide the explanation.

![Figure 5 - Adoption process](image)

The depth reached in the research of IT and BI implementation software is astounding. To explain all the processes involved, different frameworks have already been created (Moss and Atre, 2003; Vodapalli, 2009). Even though the focus of my research is not on the traditional IT implementation, I reckon it is worth to provide a simple framework that will both serve as a guidance throughout the paragraph and explain the rationale behind the choices made in chapter 3.

As figure 5 represents, the adoption of an IT software can be divided into two phases: the first one, which I call diagnose and selection phase, takes place before the software is purchased, while phase two occurs after the acquisition and can be divided into implementation and support. In the diagnose and selection phase, a company evaluates its own business and functional requirements and how the new business intelligence solution could impact the corporate objectives (Moss and Atre, 2003). During this process, the prospect assesses the software’s features and verifies if they fulfil the requirements.
In the implementation phase, the project roadmap is defined and rolled-out. The main activities here are the assessment of the existing infrastructure, the definition of the plan and its milestones, the promotion of acceptance within the company. The latest phase is referred to the after-sales support. The importance of this phase is also crucial. Training, maintenance, performance monitoring and general supporting are the main activities performed in this step.

Having said that, the differences between the cloud and traditional BI are substantial in all three steps. I am particularly referring to the amount of resources required. Evaluating the needs of the company before purchasing any solution is of extreme importance. During a traditional BI implementation, the BI vendors’ representatives work together with the client’s team, in order to understand the company's needs. On the cloud BI side, this process is often carried out by the prospect, who self-evaluates its needs and browse different websites in search of the best solution.

Moving back to traditional BI software, after the prospect has agreed to purchase the solution, the implementation phase starts. Generally, this is the part where the bulk of the time and resources is spent, lasting years in some cases (Watson and Wixom, 2001). There is an iterative process where continuous adjustments are necessary to customize the solution to end users’ requirements. Moreover, overcoming resistance of some employees to accept a new solution is not an easy task and it could hinder the success of the project. For cloud software, the implementation phase does not require much time, since the majority of solutions are pre-packaged, with only few adjustments and customizations available.

After the implementation is completed, the vendors’ responsibility is to make sure the solution is effectively utilized by the employees - through the help of training programs, maintenance activities and performance monitoring. On the other hand, even though some cloud BI vendors offer similar services, the supporting activities are mostly related to troubleshooting and can be carried out via phone or web interactions, with the aim of keeping costs low.

3. Literature review and research design
This chapter reviews the existing evaluation criteria and Critical Success Factors proposed by various authors in the literature.

3.1 Key adoption factors: definition
Before presenting the research works of other authors, a definition of the key factors has been highly recommended. In this investigation, the key adoption factors refer to a combination of critical success factors and software evaluation parameters. According to Rockart (found in Vodapalli, 2009), Critical Success Factors (CSFs) represent a number of areas where the achievement of great results will ensure a competitive position for the individual, department or organization (Anthony, Dearden and Vancil, 1972 found in Olszak and Ziemba, 2012). It is worthwhile remembering that a mere list of key success factor does not automatically imply the success of the project (Adamala and Cidrin, 2011). As remarked by other scholars (Yeoh and Koroniou, 2010), a list of key success factors identified for the development of Information Systems, such as BI, is only a small part of the tasks necessary to ensure the project’s completion. The key factors represent the areas that, if successfully managed, can increase the likelihood of a successful adoption.

Software evaluation criteria refers to making preference decisions over the available alternatives that are characterized by multiple attributes (Jadhav and Sonar, 2009).
3.2 Chapter’s structure
The structure of this chapter has been divided into two sections, using “Figure 5: Adoption process” as a guidance: Evaluation Criteria and Critical Success Factors (CFDs):

![Diagram showing the adoption process with Input: "Diagnose and Selection" leading to Throughput: "Implementation" which leads to Output: "Support".]

Figure 6 - Evaluation Criteria and CSFs in the adoption process

My initial research revealed that the key factors concerning the adoption of a Business Intelligence software have been considerably covered in a number of academic articles (Adamala and Cidrin, 2011; Yeoh and Koronios, 2010; Vodapalli, 2009), both in term of SMEs (Olszak and Ziemba, 2012; Wong, 2005) and Software-as-a-service (Godse and Mulik, 2009). However, the key factors in adopting SaaS Business Intelligence solutions in SMEs are not widely treated. Little has been said regarding the connection between SMEs and cloud BI, therefore there is a lack of a proven framework that could have been used for analyzing the domain. I decided to develop my own one, following a similar approach adopted by other scholars (Scholz et al., 2010; Yeoh and Koronios, 2010).

3.3 Key adoption factors in Business Intelligence
As part of this study, I have extensively researched on the key factors mentioned by other authors in articles, journals, periodicals, reports and executive white papers. Other scholars (Scholz et al., 2010) faced a similar challenge during an investigation traditional BI systems. They developed a framework to link IT software adoption in SMEs, BI adoption and BI success factors. The following are the two areas I will take into consideration in building the framework that helps me answering the RQ:

- Critical success factors: CSFs for IT/BI software implementation: focus on small and medium sized enterprises
- Evaluation Criteria: IT packages and Software-as-a-Service evaluation criteria

The factors belonging to these distinctive areas will be combined, resulting in a table that will be initially refined with the results from the qualitative interviews and then tested with a self-completion questionnaire.
CSFs for IT/BI software implementation: focus on small and medium sized enterprises

Critical Success Factors (CSFs) in BI have been treated by many authors (Eckerson, 2005; Wise, 2007; Yeoh and Koronis, 2010; Olszak and Ziemba, 2012) and they could be considered as “a set of tasks and procedures that should be addressed in order to ensure BI systems accomplishment” (Olszak and Ziemba, 2012). In this paragraph, those factors are reviewed and particular attention will be paid to the ones related to small and medium sized companies. Table 3 summarizes the literature on the argument:

<table>
<thead>
<tr>
<th>Organization perspective</th>
<th>Process perspective</th>
<th>Technology perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate budget</td>
<td>Well defined business processes and issues</td>
<td>Integration between BI system and other systems (Desktop applications, software..)</td>
</tr>
<tr>
<td>Support from senior management</td>
<td>Well defined users’ expectations</td>
<td>Data quality</td>
</tr>
<tr>
<td>Competent BI project manager</td>
<td>Adjusting the BI solution to users’ business expectations</td>
<td>BI flexibility and responsiveness on users’ requirements</td>
</tr>
<tr>
<td>Sufficient skilled staff/team</td>
<td>Understanding how and when data will be delivered</td>
<td>Appropriate technology and tools</td>
</tr>
<tr>
<td>Clear business vision and plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past experience and cooperation with a BI supplier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rolling out training initiatives</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: CSFs for IT/BI software (Olszak and Ziemba, 2012; Scholz et al., 2010; Nyblom et al., 2012; Eckerson, 2005; Wise, 2007; Yeoh et al., 2010; Watson et al., 2004)

The bulk of studies on Critical Success Factors have been heavily focused on large companies and it is believed that not all the factors can applicable to the small and medium sized enterprise environment (Wong, 2005; Bergeron, 2000; InsidelInfo Whitepaper). These studies analyzed traditional and expensive IT/BI projects, commonly characterized by long implementation periods; whereas the typology of BI systems I am going to focus on this study requires a minimal implementation effort (Sheikh, 2011). Given this premise, the use of past research on critical success factors seems inappropriate for the purpose of this study. Indeed, as previously described in the chapter two, there are substantial differences between cloud and traditional BI implementation, in terms of resources, complexity, and architecture. In reality, those research offered me valuable foundations applicable throughout the whole research. Certainly, not all factors present in the table 3 will appear in the final framework and some of them have been adjusted to fit the context of this investigation. Elements such as clear business vision and plan, support from senior management, well defined business processes and issues, sufficient skilled staff are typical of long IT projects, which require multiple interactions between the client and the vendor, given the amount of resources required to roll-out the initiative. The overall process of adopting a cloud Business Intelligence solution is less complex and these factors do not play a major role. Another example is Rolling out training initiatives, which represents a customer support activity. Generally, SaaS BI software is easy to use and the training
support is mainly delivered through online libraries, tutorial videos, 24/7 call center, email services and alike.

**IT packages and software-as-a-service (SaaS) evaluation criteria**

In this section I will discuss the different criteria that are evaluated before the purchase of a software. I will focus on the IT solutions evaluation criteria, with a specific consideration for SaaS cloud factors. Research on the key criteria for purchasing cloud SaaS software has been carried out by some authors (Godse and Mulik, 2009; Benlian et al., 2009; Sheikh, 2011; Sharma et al., 2010; Xin and Levina, 2008; Jadhav and Sonar, 2009). Given the focus of this paper on cloud SaaS software, it is necessary to understand precisely which are the fundamental factors that drive the purchase of these solutions. Table 2 has been originally developed by Godse and Mulik (2009) and groups together, in a simple and comprehensive way, the most important evaluation factors characterizing cloud SaaS software. However, during my research I have found other factors not listed in the original version of the table, which I improved with the new discoveries, resulted in the following:

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Architecture</th>
<th>Usability</th>
<th>Vendor’s reputation</th>
<th>Cost</th>
<th>Risk mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customization of the interface</td>
<td>Integration (API, connectors..)</td>
<td>Simple User – interface</td>
<td>Number of clients/users</td>
<td>Annual subscription</td>
<td>Easy to buy</td>
</tr>
<tr>
<td>Enhance capabilities</td>
<td>Scalability and system response time</td>
<td>Offline support platform</td>
<td>Brand Value and popularity</td>
<td>One time implementation costs</td>
<td>Special contractual agreements</td>
</tr>
<tr>
<td>Embed reports on multiple platform (blogs, web, email.)</td>
<td>Security (Backup, recovery)</td>
<td>Support for Mobile/Tablet Devices</td>
<td>Certificates and standard requirements</td>
<td>Maintenance cost</td>
<td>Flexible subscription</td>
</tr>
<tr>
<td>Ability to deliver ad-hoc business analyses</td>
<td>Reliability</td>
<td>Ubiquitous access</td>
<td>Effective Manuals and Training tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capability of the software package to run on wide variety of computer platforms</td>
<td>Security (Backup, recovery)</td>
<td>Collaborative reporting and analytics</td>
<td>Level of Service offered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Present and display data effectively</td>
<td>Error reporting</td>
<td>Ability to support different combination of user types (beginners, intermediate, advanced)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error reporting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Software-as-a-service evaluation factors (Godse and Mulik, 2009; Benlian et al., 2009; Sheikh, 2011; Sharma et al., 2010, Saugatuck Technology report, 2009, Jadhav and Sonar, 2009)

**Functionality:** “It represents the sum or any aspect of what a product, such as a software application or computing device, can do for a user” (SearchSoa, 2005). One of the main concern that potential customers have, before buying any SaaS product, is to understand the real functionalities. In the previous paragraphs I highlighted some benefits of cloud products. However, by comparing cloud BI and traditional BI’s functionalities, the former comes off worst. The limited customization allowed by a SaaS products is far outdone by traditional solutions, which provide cutting-edge analyses created specifically for the needs of different set of clients.

**Architecture:** In this category we refer to the security, reliability, scalability and integration of the IT architecture. Security is a crucial aspect that every SaaS vendors should address, clarifying doubts that companies have in letting third-parties manage...
confidential and sensitive information (Godse and Mulik, 2009). Scalability refers to the ability of the product to maintain the same performance despite the increase in utilization. Reliability indicates the product’s ability to work and remain available to the users under specific environmental conditions for a given amount of time. Finally, a product is easily integrated if it can be combined with other applications. Usability: this section refers to all the features that facilitate the interaction between the user and the software. Examples are the user-interface and all the tools that support the customers in troubleshooting (Godse and Mulik, 2009). Even though the SaaS products are generally easier to use than traditional software, there are different levels of “usability”.

Vendor reputation: This specific attribute is valid for all software purchases, irrespective of the product’s features and architecture. Therefore, my initial assumption is that it should be taken into consideration also for cloud solutions.

Cost: The total cost of ownership is composed of two elements. The consulting and configuration services go under the name of implementation cost. The monthly or annual fee that is due to the supplier in exchange of the right to utilize the software is named subscription cost (Godse and Mulik, 2009).

Risk mitigation: In these section I grouped all the activities that facilitate the transition to a new product.

The next step would be to combine the two tables (table 2 and 3) and improve the results with up-to-date information gathered from the qualitative interviews. I do not present the final result here, but it can be found in chapter 5 (table 4).

4. Research methodology

In this chapter, I will offer a detailed explanation about the research process as a whole, the strategy and approach adopted throughout the study and the sample selection. Overall, the aim of this chapter would be to describe the measures adopted to assure reliability and validity.

4.1 Research purpose

As explained in the Vodapalli’s article (2009), the objectives of an academic study can be categorized as:

- **Exploratory**: if the study is aimed at discovering “what is happening; to seek new insights; to ask questions and to assess phenomena in a new light” (Saunders et al., 2000 cited in Vodapalli, 2009).
- **Descriptive**: if the goal is to describe a process, event or a situation (Vodapalli, 2009). There is no need to clarify the problem, which is already defined.
- **Explanatory**: Studies that seek to find and explain relationships among variables.

My study is mainly exploratory as I wish to explore, through data collection, the key adoption factors in cloud Business Intelligence. Given the previous considerations, a mixed approach will be used regarding the research design.

4.2 Research design

The research follows a two-stages approach, qualitative and quantitative.
Stage one: qualitative – Define precisely the previous theories, gain up-to-date market insights and categorization of key factors.

Primarily, extensive literature review in two main domains has been conducted and the result has been summarized in a draft table (Not included here). The subsequent step involved the analysis of the table, aimed at identifying possible weaknesses or improvements agreed by BI experts, daily BI users and BI vendors. Indeed, some previous theories explain the factors in generic terms, while this investigation is aimed at representing the key adoption factors for SME in a detailed way. This process is done through four interviews and this research assumes that experts' judgments and experience could add important value in situations where theory is incomplete or obsolete (Yeoh and Koronios, 2010). The number of qualitative interviews has not been decided beforehand, but after four discussions I considered sufficient the amount of data gathered. Moreover, further understanding of the current market situation was not worth, given the time and resources' constraints. Finally, the factors coming from the literature review, improved with the interviews’ data, were consolidated into a single table (table 4).

Stage two: quantitative - Empirical assessment of the model

Due to the limited academic literature, the stage one was used to provide a solid grounds for the following analysis. Here, the preliminary table (table 4), resulting from the qualitative interviews was further assessed and validated with a quantitative method. Based on this table, all the content was carefully shaped into a survey (further details provided in section 4.2). This research instrument was used to capture respondents’ perceptions and empirically classify the importance of the factors. A pool of candidates, who fulfilled the following requirements, has been selected: “SMEs’ employees who use a cloud Business Intelligence solution”.

It is important to highlight that all the participants did not have any relationship with the author.

4.3 Research approach

According to Bryman & Bell (2011), epistemology is a theory of knowledge and concern of what is considered as acceptable knowledge in a particular discipline. As remarked by the two authors, “methodologies justify methods, and methods produce knowledge, so methodologies have epistemic content”. Thus, the first point of every research should start with a decision of our epistemological position (Carter and Little, 2007) and I consider important dedicate some space of the methodology section to discuss this matter.

From the perspective of epistemological positions, quantitative studies are more related to the positivism and not to the interpretivism, which is the basis for qualitative research, as it leverages social science methods to understand human behaviours, sentiments and beliefs (Bryman & Bell, 2011). Given the previous consideration, both a positivist (mostly) and interpretivist (to a certain degree)
approach helped me in choosing the right methodologies to capture all the nuances involved in Business Intelligence decisions.

As explained in table 1, this study is divided into two parts but there is only a single final objective: Understand the key factors for the successful adoption of a cloud BI solution in small and medium sized enterprises, according to the opinions provided by Business Intelligence consumers. To reach this aim, it was necessary to rank the key factors in a mathematical way and therefore the study can be classified as quantitative. However, to make sure the final results truly represent the reality of the cloud BI adoption process, I also leveraged four qualitative interviews, which laid the ground for the main analysis.

According to Hammersley (1996, found in Bryman & Bell, 2011), mixed-approaches can be divided into three categories: facilitation, triangulation and complementarity. Facilitation is referred to the use of a particular research strategy as an aid to the other research strategy (Bryman & Bell, 2011). In this case, the empirical facts and the prior theories complement, validate and reinterpret each other, resulting in a more reliable investigation. Even though Bryman and Bell (2011) claim the choice of a mixed approach is still considered controversial by some scholars, they also mention it has grown steadily from the past years and more and more studies rely on it. However, being aware of the critics raised to mixed approaches, careful considerations were made and following is an explanation of why I chose the facilitation approach. During the literature review process, I strived to consider the most up-to-date resources, given the fast-changing nature of cloud technology (cloud technology growth outpaces the overall IT industry, Gartner, 2013). For this reason, the qualitative interviews have been necessary in order to validate and, if needed, enhance the results found by other scholars with up-to-date primary data. The outcome of this process is a framework (table 4), which has been used as a basis for the questionnaire development.

4.4 Research strategy

The research strategy was not clearly defined from the very beginning, since discoveries throughout the process led to changes and improvements. Having being influenced by articles who treat similar subjects (Godse and Mulik, 2009; Adamala and Cidrin, 2011), my first hypothesis was to conduct exclusively a quantitative research and understand in a measurable way what are the factors that play an important role, for a small and medium sized enterprise, in the decision of purchasing a SaaS cloud BI product. At first sight the method made completely sense to me. In spite of that, after listening the advice of supervisors and being inspired by some principles found in Bryman and Bell’s book (2011), I made the decision to modify the approach and include the explorative interviews. This combined procedure resulted in a more effective understanding of the current BI market situation and improved the reliability of the study (Bryman and Bell, 2011). In order to offer solid contributions to a new field of research, I believe a mixed approach is the most effective one. This statement has been reinforced by Onwuegbuzie & Leech (2005) who affirm “mono-method research is the biggest threat to the advancement of the social sciences”.

4.5 Literary sources

The theories used for the analysis of the empirical findings are structured around two themes which describe the key adoption factors for Business Intelligence software in an organization. Since SaaS Business Intelligence in SMEs is a rather new field of research, the sources of information I used are quite disparate. First and foremost, as
suggested by Bryman and Bell (2011), I leveraged online databases and scientific journals such as ABI inform, Google Scholar, Journal of Computing, Journal of Intelligence Studies in Business and Journal of Accounting, to name just a few. These sources offered the right overview of the Business intelligence market. Another step, whose importance has been remarked by previous scholars (Bryman and Bell, 2011), was the careful choice of keywords. The most used in my research were: cloud, cloud software, Business Intelligence, Business Intelligence SME, SaaS Business Intelligence SME, cloud Business Intelligence, success and choice factors BI (SMEs), implementation factors SaaS BI, selection criteria IT software, evaluation criteria BI in SMEs. Once an article was found, close attention has been paid to the references, and this snowball approach allowed me to find other valuable sources unknown at that point. Articles focused on the success factors proved to be particularly useful, such as Adamala and Cidrin (2011) and Olszak and Ziemba (2012), while Søilen’s studies offered a constant guide throughout the project. Regarding the structure and language of my study, Vodapalli (2009) and Yeoh & Koronios (2010) have been a great source of inspirations.

4.6 Empirical material
To deepen the understanding and assure a certain level of reliability, three different data sources were used:

Secondary data
Being the IT a fast changing market, paper older than five years could offer outdated information that lead to the wrong conclusions. I can not overstate enough the importance of leveraging up-to-date information in studies related to fast changing markets. Therefore, throughout the paper not only do I use books or publications, but I also extensively rely on recent research papers and analyses made by trustworthy professional firms (Gartner, Aberdeen group and IDC) or directly by Business Intelligence suppliers, which proved to be useful for gaining information about market forecasts and trends. These sources also proved to be valuable for other scholars who studied Business intelligence (Søilen et al., 2012). The main underlying reason of leveraging multiple resources was to gain an overview of the companies involved in the market and a better understanding of the latest trends that characterize this business segment.

Qualitative interviews
The purpose of the interviews has been previously explained. According to Bryman and Bell (2011), interviews can be conducted in three different ways: unstructured, semi-structured and structured. The choice among them depends both on the research question and the type of study conducted. In this paper, a semi-structured approach was chosen given the explorative aim of the interviews, as suggested by other scholars (Barriball & While, 1994); gain additional insights on the latest trends in the BI market, leverage the interviewee’s first-hand experience in using BI software and specify previous theories in the context of cloud BI for SMEs. The semi-structured interviews were designed in accordance to the guidelines in Bryman and Bell’s book (2011).

All interviews started with the appreciation for the time allocated, followed by an introduction of the author and the project. Warm-up questions were prepared in advance, and then a discussion was built upon interviewees’ answers. If the interviewees’ answer started becoming too vague and not focused on the main
argument, I made sure to bring back the discussion to the right track, by asking open-ended questions related to the six categories listed in table 4. Examples are “Could you tell me which functionalities are more requested by the customers?” or “How could the total cost of ownership influence the ultimate decision to purchase a solution”. Extensive research of the interviewees’ background and their companies has been performed beforehand, aimed at spotting common areas of discussion and create a pleasant atmosphere to facilitate the talking (Bryman and Bell, 2011). All interviews were held through Skype and notes have been taken for future reference. Even though face-to-face interviews are preferred for in-depth studies aimed at grasping nuances in the interviewees’ behaviours, video-calls through Skype also represent an effective way, given money and distance constraints (Hay-Gibson, 2009). It is worthwhile remembering that investigators should weigh the pros and cons of every research method, according to their specific study (Wilson, 2012). The first BI expert is the co-founder of RJ Metrics (www.rjmetrics.com), a Philadelphia based company that sells cloud Business Intelligence/Analytics solutions, with a focus on e-commerce organizations. The other knowledgeable person in the area of Business Intelligence is the Marketing Manager of Insightsquared (www.insightsquared.com), whose main offering is centered on sales analytics, optimization and forecasting. Both companies deal repeatedly with small and medium sized business owners, and the information provided during the conversation were of great helpfulness. Given their significant experience and the job roles, these two people could be considered suitable for offering an up-to-date view of the key adoption factors in the BI market. Regarding the BI users’ point of view, the first interview has been conducted with the marketing director of a mexican company with less than 150 employees, which provides solutions for Human Resource departments (anonymity has been preserved according to his wishes). The second was an interview with the head of the analytics department of Soliditet, a 100+ years old Stockholm based company with 250 employees, market leader in providing credit and business information for companies based in the nordic regions. In all cases, the author was evaluating the importance of particular factors drawn from the literature and he further investigated the areas repeatedly mentiones by the interviewees.

Web-based questionnaire

Another source of primary data comes from the self-completion questionnaire. The purpose of the questionnaire was to rank the importance of the factors listed in table 4. As aforementioned, the limitations posed by the RQ highly restricted the available representative sample. Being aware of this difficulty, I made sure to have a pool of respondents large enough to draw some insightful conclusions. Following is a description of the various steps adopted to achieve the consensus of a company to participate in the study.

- A list of Business Intelligence vendors has been created, combining different web-sources (Start2Cloud.com, Entrepreneur.com, TCS.com, Gartner.com, Slideshare.net).

- Today several companies use an @info email address, which collects all the secondary requests (Søilen and Sabanovic, 2012). By using info@ address there is a concrete risk of no response at all (Saunders, Lewis and Thornhill, 2007 found in Søilen and Sabanovic, 2012). This explains the importance of finding the right person in a company, who can provide insightful information
useful to reach the research’s objective. The method I used for collecting "good" email addresses was to browse the vendors’ website and visit the section clients/customers, where is possible to find a list of customers, successful stories, case studies and often a reference person. I used that as a primary source of customers’ information. In addition, similar studies conducted within the field of cloud BI has been searched.

- Given the limited number of resources to find available customers and the skepticism around surveys (Bryman and Bell’s book, 2011), I preferred to not send all the questionnaire in one batch. As remarked by other scholars (Bryman and Bell, 2011; Saunders, 2007 found in Soilen and Sabanovic, 2012), a compelling and appealing introductory text is important to increase the response rates and therefore I tested the effectiveness over two rounds. In the first one, three different texts have been created and each of them sent to three email addresses. The email’s script with the highest response (33%) has been selected for further improvements. In the second round, three other text has been build around the selected script and the same approach was repeated, by only increasing to five the number of email addresses.
- The most effective script achieved two responses out of five (40%), and it served as a default script.

A testing approach is recommended prior to conduct any real questionnaire or interviews (Bryman and Bell’s, 2011). It helps revealing whether the words, structure or presentation are clear to the recipient. There is not a rule of thumb applicable to all types of questionnaires, but I have used some common practices aimed at improving the response rate (Oracle research, 2012). Regarding the measurements used in the survey, following is a description of the approach.

The surveys' rating scales are either unipolar or bipolar (Bryman and Bell, 2011). An unipolar scale induces a respondent to think about the presence or absence of a quality; a bipolar scale persuades the respondent to balance the response according to two poles. Despite the opinions of some scale enthusiasts, there is not an empirical evidence that demonstrates the superiority of a precise number of scale points in every situation (Oracle research, 2012; Krosnick, 1999). According to the findings of professor Krosnick (Krosnick, 1999), a 5-point scales are suitable when rating against one attribute, whereas 7-point scales are recommended when rating against polar opposites. Hence, for the purpose of my survey, the respondents’ perceptions were captured using an unipolar five-point scale, since I need to measure only the key factors, and therefore is implicitly assumed a positive connotation. The scale ranges from “Not important” to “Critical” as shown below:

- 1 - Not important
- 2 - Slightly important (Good-to-have)
- 3 - Moderately important
- 4 - Very important
- 5 – Critical

It is worthwhile noting that every number has been associated to verbal labels, since respondents are more accustomed with rating scales and verbal labels (Krosnick, 1999). This scale was then grouped into three levels – Not fundamental, important, essential. Not fundamental comprised the “not important” and “slightly important” scales; “moderately important” and “very important” were denoted important; and “critical” was marked as Essential.
The structure of the questionnaire's questions, the language used in formulating them, and all the others recommendations made by Bryman and Bell’s (2011) have been highly taken into consideration. Nine questions have been asked, both open-ended and with multiple choices, with a preference for the latter. Indeed, Bryman and Bell (2011) remark that closed-questions are more suitable for comparison among variables, which represent the nature of my research.

4.7 Sample and limitations
Regarding the sampling part, the RQ and the framework represent the most important delimitation criteria for the sampling choice (Miles and Huberman, 1994). The cloud BI subject, accounting for only a small portion of the total BI market, restricted from the beginning the sampling procedure. In addition, the available sample was further restricted by considering other criteria such as the size of the companies (SMEs) and the actual utilization of a cloud BI software. Out of the total population composed of 388 BI customers, 342 “good” addresses were selected, which constitute the total sample. The rest of the contacts were either info@ addresses, phone numbers or e-form compilation which have been discarded. After completing the e-mail collection, a web-survey was created and published online. An email, including the link to the questionnaire, was sent to all 342 addresses and a time limit was set to 60 days. 19 emails were automatically received with the notification of maternity leave, job change, not availability or wrong address. 36 responses were received, generating a ~10% response rate. According to Braun Hamilton (2003, found in Søilen and Sabanovic, 2012), the average response rate for web survey is roughly 13 percent, but he affirms that this number could vary.

This result could be seen in two ways. From one side, Bryman and Bell (2011) affirm that the absolute size of the sample carries the most weight and comparing my number to previous Business Intelligence studies, it is clear that the sample is far smaller. Nonetheless, the two authors also claim that there is not a standard procedure for evaluating sample size. “It depends on a number of considerations and there is not a definitive answer” (Bryman and Bell, 2011). Returning to the results achieved by this study and considering the year 2012, the cloud BI segment represents 3% of total market (Figure 4; FSN, 2012; Rath et al.; Scholz et al., 2010), hence the available representative sample was significantly lower than other researches conducted on traditional Business Intelligence (adjusted for the revenue difference).

To get hold of companies that could provide valuable inputs for this study, I decided to adopt the following techniques:

Terminology
The term business intelligence is not completely understood by some companies (Søilen & Sabanovic, 2012). Even organizations that own these IT solutions, are not used to name them business intelligence. The same problematic situation has been encountered in this study, where a definition of Business Intelligence was requested few times. In order to avoid any misunderstanding, in the questionnaire I decided to not use the term Business intelligence alone, but along with Decision support system or “software for analysing data”. The choice of using Decision support system has ancient roots, since the first business Intelligence systems were called in this way (Luhn, 1958). With this expedient, I tried to improve the rate of questionnaire's respondents and hence improve the study’s reliability.
**Validity and reliability**: One of the most important part to consider during the research process is assuring the internal and external validity and the internal and external reliability (Bryman and Bell, 2011). External reliability refers to the degree of replication of the study (Bryman and Bell, 2011). As remarked by the two scholars, even though there exist techniques to improve external reliability, qualitative interviews pose some difficulties in replicating the same scenario. Regarding the interviews conducted, I would suggest to use the same guidelines previously described; whereas the replication of questionnaire does not pose a serious issue. Internal reliability refers to the agreement between the researchers over the observed events (Bryman and Bell, 2011). The choice of conducting this study lonely has been carefully weighed ahead of time, well-aware of its pros and cons. During the interviews, in order to minimize the lack of a partner’s judgment, I often asked confirmation questions such as “According to your last statement, you think that..” or “Am I correct by saying that your opinion is..”. Internal validity is guaranteed when the researcher’s observations match with the ideas he develops (Bryman and Bell, 2011). In this study, the questionnaire results have been properly analyzed and could be double-checked at any request. the notes from qualitative interviews have been transcribed, saved and confirmed by respondents. Lastly, external validity represents the degree of generalization the final results could be applied to (Bryman and Bell, 2011). On this area I would say that 36 questionnaire responses are not a sufficient number for solid statistical conclusions. Nonetheless they can offer insightful guidance for future research, also given the information gathered during the four interviews.

**Limitations**
The representative sample is not limited to a specific industry or geographic area because I believe that all the above factors have little or no impact on the objectives of this study. The same consideration has been drawn by other authors who studied Business Intelligence in SMEs (Nyblom et al., 2012). However, I set a strict and not-negotiable limitation regarding the sample size: this investigation only represents companies who have already purchased a cloud BI solution and therefore they were more likely to understand the domain researched. The perceptions or feelings of companies that are still evaluating the purchase of a Business Intelligence solution could represent an untrue picture of the reality. By focusing on companies that have bought a cloud BI solution, they are more likely to be knowledgeable about BI than companies not familiar with this sector. All these techniques have the only aim of increasing response percentage since other studies proved that BI is a complex area and some companies are reluctant to give out personal information (Nyblom et al., 2012).

**5. Results and analysis**
*This section is divided in two parts. The first one is dedicated to the validation, improvement and categorization of the success factors according to the empirical data gathered. The outcome is a table where the key adoption factors are classified in six areas. The second section describes the empirical data gathered through the questionnaire, which has been built on the concepts expressed in part one’s table.*
5.1 Stage one: categorization of key adoption factors and discussion
By combining the previously mentioned factors, the author then created a table that has been assessed and refined with empirical data. The result is presented in this chapter. The development of this framework has been necessary to reach the objective stated earlier in chapter one. The process of categorization revealed to be a difficult one. On the one hand, the authors who have previously studied BI suggest to divide critical success factors in four categories: Technological, Organizational, Process and Environmental (Yeoh and Koronios, 2010). On the other hand, scholars who have studied the cloud computing software have used a different approach, as shown in table 2 (Godse and Mulik, 2009).
Since this research combines multiple aspects, previous suggestions are not fully applicable to this investigation. Others have recognized the limitation of pre-defined frameworks (Vodapalli, 2009). I decided to categorize and label the key factors according to both the author’s previous experience and the results from the interviews. The decision to not apply other authors’ categorization is not a refusal or denial of their studies, but rather it has been necessary due to the nature of this research. Others have recognized the limitation of pre-defined frameworks (Vodapalli, 2009).
The result of the process is shown in table 4, whose concepts will be used as a guide for the questionnaire development.
On a side note, not all the factors listed in tables 2 and 3 will appear in table 4, for a simple reason: not all the factors found by other authors are applicable to this study. They have definitely served as a good basis, but the development of technology always requires for a continuous check of their validity (Yeoh & Koronios, 2010), which has been done through qualitative interviews. Moreover, it is also true that some previous studies present the factors in general terms, while this research is focused on a particular niche of the BI market.
In creating this table, I prioritized the factors that have been discussed across all the interviews. Other factors, that represent a specific view of one or more interviewees (not all), have been included in the table only after a careful evaluation, trying to separate the subjective and objective views. The insights generated from the discussions reveal some differences with the information found in the theories. I am going to discuss the three most important ones and then provide a summary of each interview.

Support: All the four interviewees pointed out that supporting activities are becoming more and more crucial in establishing a good client-vendor relationship. This area has been emphasized both by the customers and the suppliers of BI software. Here is a quote from Jake Stein, RJ metrics co-founder:

“Support is fundamental. Company are ready to even pay a premium price in exchange of a hassle free service. This is the reason why we manage everything of our customer, from data warehouse to backup and recovery”

In the table 2 there is a mention to the level of service offered, which is a quite broad statement that might also include the support activities. However, after the interviews

<table>
<thead>
<tr>
<th>Performance-Functionality</th>
<th>Ability to share reports through the software web interface</th>
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<tbody>
<tr>
<td></td>
<td>The level of functionalities and capabilities offered by the product</td>
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<tr>
<td></td>
<td>The speed of the product in performing analyses</td>
</tr>
<tr>
<td></td>
<td>The ability to handle data in real time</td>
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<tr>
<td></td>
<td>The ability to manage different amount of data</td>
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<td></td>
<td>Ability to offer actionable insights</td>
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<td></td>
<td>The effort required to deploy the product on a large scale basis</td>
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<tr>
<th>Integration</th>
<th>Tablet and mobile integration</th>
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<tbody>
<tr>
<td></td>
<td>Ability to handle multiple sources of data (Excel, google documents, etc.)</td>
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<td></td>
<td>Level of integration with other BI applications or databases</td>
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<tr>
<th>Flexibility</th>
<th>The level of flexibility in terms of contract agreements and conditions</th>
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<tbody>
<tr>
<td></td>
<td>The simplicity of the interface</td>
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<tr>
<td></td>
<td>The level of skills needed to perform meaningful analyses</td>
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<td></td>
<td>Web-data analysis</td>
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<tr>
<td></td>
<td>The level of customization and personalization</td>
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<tr>
<td></td>
<td>Ubiquitous access to data</td>
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<tr>
<td></td>
<td>Offline access to data</td>
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<tr>
<td></td>
<td>The payment method</td>
</tr>
<tr>
<td></td>
<td>Functional or Industry needs</td>
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</table>

<table>
<thead>
<tr>
<th>Reliability</th>
<th>Provider’s brand reputation (including partners, suppliers and testimonials)</th>
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<tbody>
<tr>
<td></td>
<td>The level of security guaranteed by the vendor (Backup, recovery and privacy)</td>
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</table>

<table>
<thead>
<tr>
<th>Support</th>
<th>Vendor’s clarity to customer support requests</th>
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<tbody>
<tr>
<td></td>
<td>Responsiveness to general support requests</td>
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<tr>
<td></td>
<td>The level of support offered by the vendor (Chat, 24hour)</td>
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<table>
<thead>
<tr>
<th>Cost of ownership</th>
<th>The amount of Implementation cost (Training, setup..)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The amount Subscription cost (Monthly or yearly fee)</td>
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</table>

*Table 4: Categorization of key adoption factors for SaaS BI*
I considered appropriate to create the category Support (table 4), that provides a more detailed representation of different elements.

**Flexibility:** flexibility has been mentioned by previous scholars as a critical factor for the BI adoption and implementation (Olszak and Ziemba, 2012; Sheikh, 2011). The interviews revealed that flexibility spans over multiple areas and customers pay attention to most of them before purchasing the solution. The marketing director of the Mexican company properly explained why BI software’s flexibility is important in the current fast-paced economy:

“The BI product should adapt quickly to answer new questions that invariably come up over time. Moreover, the product should be able to present the same results in different views, according to the recipient of the data. CEO needs a specific format, while sales reps need different information.”

In addition to that, a discussion around the social network and web-data analyses came up multiple times. The increasing influence of social networks on the customers’ opinion seems to have attracted the attention of companies, who monitor closely what happens throughout the web. The flexibility of a BI software to analyze not only common data sources (Eg. Csv or Excel), but also unstructured data (Text and social media content) seems highly demanded.

**Integration:** According to previous theories (table 3), the integration between the BI software and other applications already situated in the customer’s organization represents a critical area. During one of the discussions, the interviewee linked me to a market study carried out in 2012 by an independent advisory firm and a well known authority in the area of Business Intelligence (Dresner Advisory Services, 2012). It revealed that over 66% of companies taking part in the study, rely on two or more BI tools at the same time. Therefore, integration is also referred among different BI applications. However, given the focus of this investigation on small and medium sized enterprises, I would say the integration among BI tools is more related to big and multinational companies with various business units.

### 5.1.1 Key factors from the qualitative interviews

**RJ Metrics’ co-founder**

During the interview many factors have been discussed and I will categorize them in four areas. The functionalities took a substantial part of the discussion, and he emphasizes their importance for SMEs. In particular, he explained that the majority of customers are not interested in having a vast number of features across different domains, but they prefer a software able to perform few analysis, but of high quality. For example, RJ Metrics provides a software mainly to e-commerce companies, where cohort analyses and trends spotting represent two essential functionalities.

“Companies look at how to segment their customers according to which pages they visit first, what they buy, who buy repeatedly and all the analyses that offer hidden insights and pattern on customers’ behaviours” (RJ metrics)

With the advent of social networks, collaboration and sharing have become pillars of many applications since they encourage users to communicate and work together. The interviewee mentioned that customers are not very keen on using multiple software tools at the same time. They prefer to have everything in one place and this is one of
the main factor they look for before buying the software (Eg. “Can we share reports within the software?”).

Cost and deployment time have been mentioned together and they do influence the final decision. RJ Metrics takes seven days to deploy the overall solution and customers really appreciate this short installation time. Not only does it reduce the overall cost, but it also minimizes the number of problems typical of the implementation phase. Supporting activities are not only restricted to the after sales customer support (Figure 5), but they represent the overall ability to assist users in using the software and to provide a detailed explanation to doubts or questions. This includes the area of security, where prospects perform a very detailed due diligence before letting external parties to manage sensitive data.

Marketing manager of a mexican company
The marketing department of the company uses BIRST software. The conversation lasted almost one hour and it was very detailed. After a brief introduction of his company’s operations and analytics activities, we discussed his perspective on the key adoption factors. The ability to produce fast analyses was the first area of the dialogue. As previously mentioned, his company provides solutions for Human Resource (HR) departments, and payroll management is one of the most important service. Payroll activities are characterized by remarkable seasonal trends, since the bulk of the work is done at the beginning and at the end of each year. In these two periods, the interviewee explained, the company runs a lot of promotional campaigns, mainly delivered through the website. He personally has a six weeks time window to tweak the advertising material according to real time data response, delivered on a daily basis.

The ease of implementation was another concern he had before purchasing the solution, which has been deployed in three weeks. A long implementation time could reduce the overall ROI generated by the BI investment, and generally prospects pay close attention to this aspect and evaluate the track record of the BI suppliers in previous projects.

Flexibility has been vastly debated. In his department, the users analyze data for different purposes, including tracking campaigns’ results, evaluating new opportunities and measuring the customers’ satisfaction. The employees in charge of each analysis, examine data and present results in different ways. The BI software should be able to accommodate all the users’ needs. In addition, he mentioned the importance of offering insights to the customers. Often BI solutions not only provide an answer to many questions, but also leave users with new doubts.

“If revenues are declining, the company wants to know the reasons. By analysing the data, turns out that a specific product has lost 20% market share. This fact will take users to ask another question. Why is that happening? As you can see, it is an ongoing process and BI software needs to be flexible and adapt to new situations” (Marketing Manager).

Head of analytics department at Soliditet
Soliditet’s analytics department makes use of two BI tools. One is SPSS software for statistical calculations, while for the cloud part it uses a Microsoft product, whose name has not been recalled by the interviewee. The conversation started with a brief overview of the Business Intelligence market and how Soliditet is trying to exploit some opportunities through analyses of the company's spreadsheets. The discussion
became particularly interesting since the beginning, when the interviewee mentioned that Soliditet is looking for another BI solution and it is in the process of evaluating different options. One of the main requirement was "We want a solution well-integrated with tablets", which is one of the main tools used by the company to interact with the customers. Therefore, this type of integration was important not only for the company itself, but also for fostering the relationship with customers and prospects. The integration aspect came out again when he made clear that SPSS software will remain the main tool used by the business analysts and both solutions should perfectly work together.

Then the discussion moved towards the cost of ownership, which seemed to be an important point for the company. The interviewee was well aware of the costs for different BI solutions and he also explained that SPSS software was chosen as a compromise to the expensive, although powerful, traditional BI applications.

Another area that got considerable attention was the reliability of the software. The company is looking for a solution that fits the budgetary requirements, but it does not want that the financial limitations would lead to purchase a solution with limited value for the company.

**Marketing manager of InsightSquared**

The Simplicity was undoubtedly the central point of the discussion, since he claims InsightSquared acquired many customers primarily by luring them with an easy-to-use software. Indeed, the software sold by the company takes only 48 hours to be installed and it is very intuitive. But then he explains why simplicity is an attribute appealing to SMEs in particular:

"Traditionally, the big BI software have been very difficult to implement and to get up to speed on. Especially for SMBs, who don't have the time and resources to spend on learning/setting up/implementing a complex BI solution, they are looking for turn-key, out of the box, plug-and-play solutions" (Marketing Manager).

According to him, it is difficult to create a general list of the most important functionalities for a cloud BI software, because it is highly dependent on the industry segment. However, he did think that few of them should represent a cornerstone of every BI software. Ease-of-use has already been mentioned. Configurability is another one, since companies have their own way to use/view data, which is often unique. Hence, the level of customization for the cloud software is fundamental. Nonetheless, provided the limitations of cloud technology, customization can not certainly reach the same levels of the traditional BI implementations. However, the software has to be able to accommodate different users’ needs, not only in subtleties such as color or font preferences.

Moving to a different area of discussion, the marketing manager claims that a very simple software, such as Facebook or Twitter, simplifies the activities related to the customer service.

"The best way to deliver top customer service is to never need it in the first place" (Marketing Manager).

By creating a self-explanatory product, there is a little need of online tutorials or pop-up guides. However, he agrees that technical problems do occur and a great customer support team is essential to promptly solve some targeted questions. For instance,
each screen of InsightSquared software is equipped with an "about this report" section to guide users when they need a little more information on how certain calculations are made.

Integration also came out as an interesting part of the dialogue and the interviewee provided very insightful information. He states that his company often receives questions related to the integration with third party data source solutions. For this reason, InsightSquared is currently dedicating a good amount of resources to improve the offering on this area. Nonetheless, he points out very clearly that it is complex to find a tradeoff between the financial investment necessary to develop a new integration and the total number of integrations available. Indeed, the development of new connectors is important, but scaling up the product is also a crucial aspect. It is not possible to satisfy all the customers and therefore is fundamental to prioritize and integrate the most popular systems such as CRM and ERP solutions.

Lastly, flexibility was the last argument of the discussion. Surprisingly, not only has InsightSquared not built the software around flexibility, but it has also put some limits on the level of flexibility.

“Too many other BI tools put customization at their core, providing complicated options to pull ad hoc reports. Our philosophy is to really analyze the needs of our customers and put out reports that can answer 99% of their questions, without ad hoc reporting. This also helps smaller companies understand the right ways to look at their data. Instead of requesting a custom report that only addresses a portion of what they actually need, our standard reports give best practices on looking at their data cultivated over years of working with the top companies in their space” (Marketing Manager).

5.2 Stage two: findings and discussion
In this section I will present and discuss the findings of the quantitative analysis. Further, I will provide a personal opinion regarding the implications these results might have, both practically and in future research. The section begins with the analysis of the overall results and then it focuses on the comparison between the categories mentioned in the table 4. Due to the inability to draw solid statistical conclusions from the data gathered, the analysis will be centered on polar results or, to be more precise, on results that scored extremely well or poor in the questionnaire.

Figure 9 represents the overall results and it can be understood that the higher the value in the bar chart, the more important is that specific key adoption factor, according to the survey’s respondents. Hence, in table 7 and figure 7, I represent the key adoption factors in descending order.
Figure 7 – Key adoption factors – descending order

Figure 9 – Key adoption factors - Mean Values
Table 7: Key adoption factors - descending order

<table>
<thead>
<tr>
<th>Order</th>
<th>Key adoption factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The level of functionalities and capabilities offered by the product</td>
</tr>
<tr>
<td>2</td>
<td>Ubiquitous access to data</td>
</tr>
<tr>
<td>3</td>
<td>Responsiveness to general support requests</td>
</tr>
<tr>
<td>4</td>
<td>The ability to manage different amount of data</td>
</tr>
<tr>
<td>5</td>
<td>The amount of Implementation cost (Training, setup..)</td>
</tr>
<tr>
<td>6</td>
<td>Ability to share reports through the software web interface</td>
</tr>
<tr>
<td>7</td>
<td>The speed of the product in performing analyses</td>
</tr>
<tr>
<td>8</td>
<td>The effort required to deploy the product on a large scale basis</td>
</tr>
<tr>
<td>9</td>
<td>The level of customization and personalization</td>
</tr>
<tr>
<td>10</td>
<td>The amount Subscription cost (Monthly or Yearly fee)</td>
</tr>
<tr>
<td>11</td>
<td>Level of integration with other BI applications or databases</td>
</tr>
<tr>
<td>12</td>
<td>Ability to offer actionable insights</td>
</tr>
<tr>
<td>13</td>
<td>The level of security guaranteed by the vendor (Backup, Recovery and privacy)</td>
</tr>
<tr>
<td>14</td>
<td>Vendor’s clarity to customer support requests</td>
</tr>
<tr>
<td>15</td>
<td>Provider’s brand reputation (Including partners, suppliers and testimonials)</td>
</tr>
<tr>
<td>16</td>
<td>The simplicity of the interface</td>
</tr>
<tr>
<td>17</td>
<td>The level of skills needed to perform meaningful analyses</td>
</tr>
<tr>
<td>18</td>
<td>The level of flexibility in terms of contract agreements and conditions</td>
</tr>
<tr>
<td>19</td>
<td>The ability to handle data in real time</td>
</tr>
<tr>
<td>20</td>
<td>Ability to handle multiple sources of data (Excel, Google documents, etc.)</td>
</tr>
<tr>
<td>21</td>
<td>Web-data analysis</td>
</tr>
<tr>
<td>22</td>
<td>Offline access to data</td>
</tr>
<tr>
<td>23</td>
<td>Tablet and mobile integration</td>
</tr>
</tbody>
</table>

**Overall results**

From the analysis of the questionnaire’s results, the single most important factors is represented by the *software functionalities*. Other authors discuss this element in their works (Sheikh, 2011; JadHAV and Sonar, 2009), but without paying particular attention to its importance. From these results, it is clear that cloud BI’s customers care about the software’s functionalities. Even though it is quite normal that a prospect pays attention to the functionalities of an application, the highest score achieved could be explained in the following way. As previously mentioned, in the past years the number of Business Intelligence vendors increased greatly. Some of them specialized in a particular niche of the market; for instance RJ metrics provides solutions for e-commerce businesses. Therefore, the customers expect a software that effectively addresses most of the problems in a specific domain. In this regard, figure 8 supports the previous statement, since it is clear that clients expressed their preference towards solutions built for industry segments.

I will not analyze minutely all the other key factors, but it is certainly intersting to provide a more detailed picture of the most and least important ones. *Ubiquitous access to data, responsive answers to customer support requests, handling big...*
amount of data and implementation cost earned their position in the highest end of the table (table 7) deserving the label of essential (chapter 4.5). All of these factors belong to different categories, resulting in four different categories for the first five elements. This is a remarkable discovery and stresses the significance of excelling in multiple areas and not focusing on a single one. Ubiquitous access to data is an important factor that confirms the results of previous studies (table 2). In addition, with the increasing access to the Internet and the internationalization of many companies, BI customers know that their data reside on multiple locations and thus expect the BI software to connect all the sources together. In this way, data accessibility from anywhere and at anytime (Sheikh, 2011) becomes not only feasible, but also necessary to have a better understanding of the overall company’s performance. The cloud computing and its technological architecture foster data accessibility whenever a connection is available. The users do not have to worry about different data formats or computer platforms (table 2), since the files containing the data are stored on a separate location (“the cloud”). In order to offer the customers a real ubiquitous access to data, I suggest cloud BI vendors to focus on two aspects: web browsers and multiple devices integration. It is true that the cloud technology works whenever a connection is available, but users have different preferences regarding web browsers (Oh and Lee, 2011). As a consequence, it is the vendors’ duty to make sure that data is represented in the correct way, irrespective of the web browser used by the customer. Moving to the devices integration, Gartner research (2013) forecasts a shift from desktop PCs to mobile devices in the following years. This escalation of smartphones and tablets’ sales undoubtedly promotes ubiquitous data accessibility, provided that cloud BI sellers are able to show the same results on multiple devices.

Responsive answers to customer support requests achieved the third highest position (table 7 and Figure 7). This factor does not represent a specific software functionality but is more related to the perceived experience that customers have during and after the product’s purchase. This result gives evidence to the importance of serving customers in a professional way, in addition to offering a valuable software. If we look at the other key adoption factor belonging to the category “Support”, it scored slightly above average and strengthened the importance of providing a good customers service in the decision process of choosing a cloud BI software.

Why is the customer service so important? It might be that small and medium sized enterprises can rely upon a limited number of resources in comparison with big enterprises. The latter often have an appropriate department responsible for solving IT-related problems while SMEs might not have the technical or financial capabilities to deal with complex problems. This could explain why SMEs rated so high the importance of the customer service.

Without any surprise, a software capable of handling big amount of data is a fundamental requisite for the customers. Given the rapid growth of data available (IBM research, 2011), a cloud BI software should be able to combine millions or even billions of data points and detect valuable trends or patterns. Doing this operation within an acceptable time span represents a challenge from the technological point of view and BI suppliers should dedicate resources to address this important matter.

Finally, the total implementation cost is the last factor that scored 4 or above. Cost is definitely one of the main benefit offered by SaaS products and customer still pay attention to this aspect (table 2). However, what is interesting to highlight is the highest rank achieved by the implementation cost rather than the subscription cost. By looking at the traditional BI implementation projects, the implementation phase is the
most critical one and it may last even for years (Watson and Wixom, 2001),
demanding important resources. Despite the cloud BI implementation is not a process
as critical as in the traditional BI, customers may still be worried and this can explain
why the one-time implementation cost scored higher than subscription costs.
Moving to the opposite side of the table (table 7), three factors stand out for their poor
score (< 3): tablet and mobile integration, offline access to data and web-data analysis.
In light of the precedent analysis pertaining the ubiquitous access to data, the position
reached by tablet and mobile integration seems totally counterintuitive. Given the
previous considerations and the Gartner research (2013), analyzing data through
multiple devices should have been an obvious necessary functionality. Nonetheless,
this research reveals that this factor bears the lowest value. On the one hand, the
representative sample of 36 respondents is not sufficient to draw a general conclusion
and, as aforementioned, the results of this study can only provide a direction for more
in-depth research. On the other hand, it is possible that SMEs are not fully interested
in displaying data on multiple devices. If they have a business restricted to a limited
region or if they dispose of only a single office, the utility of having data everywhere
loses some importance since there is no need to bring data around and display it on
multiple devices. Alternatively, the purchase of a cloud BI software might be the first
data analysis solution adopted by some SMEs. Hence, they would be more interested
in basic functionalities and overlook others of minor importance. In any case, these
are only tentative explanations and only represent the authors’ perspective.
Offline access to data is the second least important key adoption factor. I have not
found this element mentioned in the previous literature, but it came out during the
qualitative interviews. The interviewees mentioned that one of the drawback of the
cloud technology is its dependence from the availability of the Internet connection. It
does not represent a problem in most western countries, but in the developing world it
might be. This is the reason why offline access to data has been included in the study.
However, the result speaks for itself. Customers are not interested in accessing data in
offline mode and this could have been foreseen in advance to some extent. Indeed,
when the decision of buying a cloud BI solution is made, the customer is well aware
that most of the interactions with the software require an Internet connection.
The last element that scored poorly is the ability to analyze data coming from web-
sources. Despite the social networks' popularity experienced rises and falls in the
early 2000s (Ellison, 2007), in the past years it gained enormous attention all over the
world. Initially these social platforms were used only as a means to communicate with
friends, but soon after many organizations understood the enormous potential behind
them. In fact, spontaneous customer feedback quickly spreads throughout the social
networks, blogs, newsgroups and it represents a potential source of information for
the Business Intelligence tools (Gamon et al., 2005). Recently, the techniques
developed to analyze this unstructured data have made great progress and I would
have expected a different score for this factor. Most of the unstructured data belongs
to web-content and a recent report released by MYOB Business Monitor reveals the
overall online social presence for small and medium sized companies is rather low
(Stafford, 2012), even though it is an upward trend. This result can partially explain
why the analysis of web-data sources scored poorly in the questionnaire. However,
given the benefits achieved by those who extensively use social media channels and
the expected growth in this domain (Milman, 2013), the rank achieved by this key
adoption factor may change substantially in the future.
Three factors have been represented separately (Figure 8), given their different nature:

Figure 8- Payment method, customer service and type of preferred solutions
By looking at this figure, the first thing that immediately stands out is the staggering preference for solutions built towards the industry’s needs. Therefore, from this result is clear that customers prefer to buy applications that deliver analyses only relevant to a specific market sector, and not industry-wide. Indeed, buying a fit-all product offers minimal value. For instance, the type of analyses required in the supply chain industry differs from the ones needed by insurance companies. In the former, customer will be more interested in spotting opportunities for cost reduction throughout the chain, by analyzing performance level or by adjusting manufacturing production according to the different requests (Baars et al., 2008). In the latter, insurers can gain significant value by detecting frauds through the cross-analysis of multiple sources of data, such as fraud patterns, accidents, social networks, and medical and criminal records (Brat et al., 2013).

However, given the focus of my study on small and medium sized organizations, where the boundaries between departments may not be well-defined or even exist, the result makes more sense. SMEs want a solution that offers benefit for the whole company, not merely for a single business department. This conclusion could differ for big organizations, where the hierarchical structure is usually more rigid.

A second element appears clearly: customers prefers to pay the subscription costs either on a monthly or a quarterly basis. At first sight this factor seems not very important and I have not found any theory that discusses it in detail. However, it came out two times during the explorative interviews and it was included in the questionnaire. The common sense would suggest that paying a software on a monthly basis is a daunting process for a company. Nevertheless, small and medium sized enterprises prefers not to lock in with a single product for a long time and they reserve the right to resign the contract anytime if the solution does not deliver the expected value. It is worthwhile remembering that for some SMEs the purchase of a cloud BI solution has never happened before and therefore there is an element of uncertainty and skepticism. By paying on a monthly or quarterly basis, having the freedom to resign the contract without losing money becomes an important element and it could explain the outcome of the survey.

Lastly, it does not come without any surprise that phone and email are the most preferred methods for interacting with the customer support. I included this question in the survey because various vendors extensively promote the availability of the live chat and the 24/7 support in their offering. Even though my data set is not representative for the total population of SMEs, there is an initial indication that customers still rely on traditional communication media.

In the following paragraph I analyze the results for each category, referring to figure 9. As aforementioned, I can only draw tentative but interesting conclusions by looking at the opposite results. There are three categories that got a similar score: Support, Cost of Ownership and Functionality-Performance.

Customer support is definitely an essential part that has to be incorporated into the product offering. During the traditional BI implementations, the support is given through training initiatives, consulting services and other activities (table 3). Hence, there are often face-to-face interactions between the supplier and the customer. With cloud BI solutions, it’s very likely that most of the services will be delivered online, including the customer support. For this reason, is crucial to adhere to certain quality standards and make sure the customer receive a good service.

As expected, the cost of ownership revealed to be an important area that SMEs pay attention to. The previous literature recognizes its importance, as shown both in table 2 and 3. In fact, a minor financial risk is one of the main benefits offered by the cloud
technology (Finch, 2007; Olszak and Ziemb, 2012). This is very appealing for small and medium sized enterprises (Benlian et al., 2009). Hence, to some extent this result confirms previous theories. Moreover, by going into the details, it can be seen that both the subscription cost and the implementation cost achieved similar results. This is important because it implies that customers are not lured by cheap offerings that address only one part of the total cost of ownership, but they pay equal attention to all the parts of the financial investment. Therefore, cloud BI vendors should carefully balance their price regarding the total cost of ownership.

The last area with a relevant score is the functionality. This result also strengthens the previous analysis, where a key adoption factor that belongs to this category reached the first position in the survey. Functionality is a very big area that encompasses items quite different from each other. Despite this difference, all the elements scored similarly in the questionnaire, except handling data in real time which is well below the average. Generally, the real time data comes from web-sources which are characterized by a quick spread of information: an article, an opinion or a statement. Therefore, handling data in real time and the ability to analyze data coming from web-sources are closely related and can explain the poor results achieved by both of these factors. In any case, functionality play a big role for SMEs, and this may not come as a surprise because every company is supposed to be interested in this category. However, common knowledge about cloud BI would suggest that often the functionalities and performance do not reach the high standards of traditional BI. This is due to two reasons. On average, cloud solutions costs less than traditional ones and the overall quality might be affected as a consequence. In addition, traditional BI solutions are built and customized specifically around the needs of the clients and the functionalities will be more accurate than a “universal” tool. Despite these premises, the results of the study indicate that SMEs have high expectations in terms of performance and are not willing to pay a cheap solution who does not add any specific value to the organization.

On the opposite spectrum, the category that did not score as well as expected is the Integration. As remarked by the interviewees, one of the very first question asked by a potential customer is “How well does the solution integrate with my applications?”. Thus, I would have definitely expected a much higher consideration. Nevertheless, by looking only at the average result, the conclusions we would draw may be misleading. If we pay attention to figure 8, the score of each element belonging to the integration category differs substantially. The general level of integration is positioned very well and it partially contradicts the previous conclusion about Integration. The two key adoption factors that lowers the average result are mobile devices integration and the ability to handle multiple sources of data. I talked about the former in the previous section while it is necessary to think about the result achieved by the latter. As remarked by Gamon (Gamon et al., 2005), the potential sources of information for Business Intelligence are growing exponentially. Valuable data are found not only in traditional spreadsheets, but also in blogs, social networks, activity logs and many places. Therefore, if an organization is willing to have an overview of its customer base, it is necessary to analyze multiple sources of data. There is a possible explanation of why this is not the case for SMEs. Small and medium sized enterprises still rely heavily on data stored in traditional spreadsheet (Eg. Excel) and more than 80% of them use desktop spreadsheet as the only analytical tool in the company (Maguire and Magrys, 2007; Ashrafi and Murtaza, 2008). This might partially explain why they are not interested in analysing different data formats, but prefer to have a product for spreadsheet analysis such as excel.
6. Conclusions

Based on the research findings, there are five key adoption factors that scored ≥ 4 (essential) and therefore are classified as the most important:

- The level of software functionalities
- The ubiquitous access to data,
- Responsive answers to customer support requests
- Handling big amount of data
- Implementation cost.

As reflected in the analysis section, each of this factor addresses a specific area that customer pay close attention during the adoption process of a cloud BI solution. The importance of handling different amount of data, the software functionalities and the implementation cost confirm what has been found in the previous works, both for traditional and cloud BI. On the other side, the score reached by the other two factors can be tightly connected to the cloud technology. Providing an excellent customer service becomes important where the face-to-face interactions are kept at minimum. Finally, the increasing spread of data and the process of globalization calls for an ability to access data everywhere.

In terms of the categories, the results do not show any important dominance in a specific area, but rather there are 3 categories that reached a similar level: Support, Cost of Ownership and Functionality. This outcome strengthens the statement that SMEs look for a software that is complete on multiple areas and do not stick to one in specific.

6.1 Practical implications

This study has several important managerial implications, by providing more information and knowledge about the key factors for successful adoption of cloud BI software in SMEs. Managers and head of departments can leverage the findings in order to craft better value propositions or to prioritize the areas of development according to what customers value the most. I would suggest BI suppliers the following areas of discussion:

- It is commonly agreed that cloud software will become a cornerstone of almost every business (Sheikh, 2011). This revolution has already started: from email services to traditional systems like CRM, they are more being adopted in an On-Demand way (Sheikh, 2011). The classic concept of delivering goods to customers is being overcome by the idea of providing an ongoing service in exchange of a monthly fee (Östling and Fredriksson, 2012). Therefore, even the sales process has to change from the “one-time” selling to the development of long-lasting relationships, with the attitude of offering value to clients on an ongoing basis. One of the most effective and successful way to address this issue is to meet the customers expectations related to the software. From the questionnaire’s analysis is clear that successful cloud BI products excel in multiple areas, from the functionality to the reliability, going through the customer support and a fair price-quality ratio. Hence, balancing the resources in the most appropriate way becomes an important matter, avoiding to overlook some areas or focusing too heavily on others. Moreover, it is critical to shift the mentality from selling goods to delivering value to customers by building solid relationships (Östling and Fredriksson, 2012).
Whenever the customer perceives that there is not cooperation, the relationship will likely interrupt. This means the rescission of the contract and a loss of money for the BI provider.

- BI Vendors’ marketing managers should create material that reflect what customers really want. In this particular case, is fundamental to promote a BI solution as a very comprehensive package that delivers high value at a fair price point, supported by an excellent customer support service. Alternatively, it is also effective to mention the five most important key adoption factors and stress their importance.

- One of the main reason that motivates small and medium sized enterprises to embrace the cloud solutions is the perspective of lowering IT costs (Östling and Fredriksson, 2012). This common perception is supported by real data and real companies who did experience a decrease of hardware and maintenance costs by adopting cloud technology (Perry et al., 2009). The importance of costs is also reflected by the results of this study, but there are other areas of equal significance from the customers’ perspective. One of them is definitely the customer support. In the past years, outsourcing has been grown steadily and became a global phenomena (Rao, 2004). With the improvements of telecommunications infrastructure, IT operations can be managed efficiently in countries where labor cost is lower (Rao, 2004). Even though the financial benefits are immediately clear, the quality of the service can damage the reputation of the company, if it does not reach high standards. Given the previous premise of a model shifting towards a customer-relationship focus, I would suggest to think carefully before outsourcing the customer support activity for cloud BI software. It is fundamental that requests are handled by experienced people, who knows the software throughly and can make specific recommendations to solve an issue. This would definitely help building trust in the relationship.

The results of this research can be also leveraged by small and medium sized enterprises. They can certainly benefit from a more comprehensive understanding of the factors that are critical for a successful adoption of a cloud Business Intelligence solution. On the opposite side, the factors that are not important can pose a serious threat to the achievement of adequate satisfactory levels. Unlike the majority of previous studies, this investigation proposes five factors which are specifically tied to the needs of small and medium sized enterprises, providing a solid ground for future empirical research on this domain.

The proposed set of key adoption factors is itself important, because it can act as a list of items to be checked during the evaluation process (Wong, 2005). This helps to ensure that essential issues and factors are covered when an organization plans to adopt a cloud BI solution for managing the information (Wong, 2005). Moreover, it is of primary importance for Business Intelligence newcomers, who are evaluating the purchase of these solutions for the first time and may be confused by the amount of different alternatives available in the market. Therefore, the results of this study can provide a guidance and a basis for evaluating and comparing different solutions.

6.2 Theoretical implications
This study has also interesting implications for future academic research. The literature highlights the necessity to study more thoroughly Business Intelligence in small and medium sized enterprises (Benlian et al., 2009), since the majority of
studies were focused on big organisations and the same results may not be applicable to the SME’s landscape. I found two areas where the contribution is substantial. First and foremost, the results expand the body of knowledge related to small and medium sized companies. They confirm that the needs of SMEs, in terms of BI software, differs from large organizations, at least on certain areas (InsideInfo Whitepaper): Multiple sources of data, tablet and mobile integration and real-time data analysis. Moreover, it provides new information of how SMEs evaluate a certain typology of IT software.

In addition, this investigation adds knowledge in connection to an up and coming technology: cloud computing. In particular, it focuses on a specific context in which this technology is used, the SMEs’ domain, which has been poorly explored in the past. As mentioned by Yeoh and Koronios (2010), in the market sectors highly influenced by technological innovations, such as cloud services, the value of previous discoveries declines over time. By using recent primary data, future research on Critical Success Factors will be more reliable.

6.3 Suggestions for further research

The commercial availability of cloud solutions dates back only few years ago, especially cloud BI, which is still in the early phase of the growth curve (Bucur, 2012). The implications of adopting a novel technology may not be fully understood yet. Therefore, the respondents’ answers reflect this particular industry situation.

A further research in three or four years time is suggested, when the adoption rate of cloud BI software will likely be higher and the sample of suitable candidates will be larger. It would be interesting to see if, in the future, the key factors for adopting a cloud solution will differ and understand the underlying motivations. A research focused on the explanation of why some factors scored exceptionally well or bad could provide further insightful information. Nonetheless, the statistical power of this study is low, and it would not be appropriate to dismiss all the other factors.

Secondly, the survey represents only the companies that have BI software applications already in place, for the reasons already provided. Yet, according to Gartner research (Gartner, 2013), 55% of companies are currently evaluating an adoption of a BI system. It could also be interesting to find out which are the main factors relative to companies who have not purchased any cloud BI software yet and therefore the focus will be mainly on evaluation criteria.

6.4 Shortcomings of the study

The scope of this project is limited to the finding of the key adoption factors, through interviews and a questionnaire. The boundaries of this project has been clearly defined by both the Research Question and the chosen subject. Throughout the study I tried to incorporate all the techniques at my disposal to improve its reliability, but at the end is necessary to step back and look at the results with an external perspective. Would have the results been different, not necessary better, if I had adopted a different approach?

There are two areas that could have influenced the study. As explained in chapter 4, the survey’s respondents have been selected by browsing BI vendors’ website, particularly the “featured successful stories”. Even though customers have certainly agreed to being nominated in these websites, the perception and the way success is measured could vary substantially between a the vendor and the customer (Adamala & Cidrin, 2011). Hence, the line between propaganda and truth is subtle. The choice of this research approach might be considered a serious sampling error, but, given the
current stage of development for this technology, I consider it the most efficient one. On the other side, 36 questionnaire’s respondents does not allow to draw statistically solid conclusions. The results of this study are preliminary, but I hope they stimulate a discussion and further research. More respondents are necessary and the positive forecasts for cloud adoptions will broaden the available sample. In addition, more respondents can help removing further the biases or the emotional responses, which are inevitably found in the study of this type of technology.

7. Bibliography


FSN (2012). Gartner says BI (Business Intelligence) in the cloud not living up to the vendor hype. Retrieved December 14, 2012 from http://www.fsn.co.uk/channel_bi_bpm_cpm/news/gartner_says_bi_business_intelligence_in_the_cloud_not_living_up_to_the_vendor_hype#.UWbJRmTbq3E.


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Östling, F., & Fredriksson, J. (2012). *Adoption factors for cloud based enterprise resource planning systems: And how system vendors can act on these.* (Doctoral dissertation, KTH)


Rath, A., Mohapatra, S., & Thakurta, R. (Unknown). Decision points for adoption Cloud Computing in SMEs.

Rust, R. T., Moorman, C., & Dickson, P. R. (2002). Getting return on quality: revenue expansion, cost reduction, or both?. *The Journal of Marketing*, 7-24


Figure 4 – SMEs Business Intelligence adoption