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FACTORS OF THE BUSINESS INTELLIGENCE IMPLEMENTATION IN LEBANESE SMALL AND MEDIUM-SIZED ENTERPRISES

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INTRODUCTION

Background information

Organisations have seen the need to develop a way of acquiring, processing and analysing vast amounts of data from different sources as a way of acquiring new knowledge. Management Information Systems (MIS) also help organisations in some of these tasks. Kroenke, McElroy, Shuman, & Williams, (1986) describe Management Information Systems as ways in which computers help managers in an organisation to make better decisions and increase the efficiency and effectiveness of the firm. Those systems, however, have not been very effective. Some of their disadvantages are: they are slow and cannot make decisions on time; the inability to monitor competition; and ineffectiveness in carrying out constant performance analyses. As a result of the above, there is a need to have a fast management information system that could perform more accurate analyses of business performance and competition. This has led to the adoption of Business Intelligence (BI) to tackle complex activities in an organisation.

Reinnschmidt and Francouise, (2000) define BI as "an integrated set of tools, technologies and programmed products that are used to collect, integrate, analyse and make data available". Cao and Duang, (2014), while desribing BI, observe that “business intelligence and business analytics are based on sophisticated information technologies”. Therefore, Business Intelligence involves businesses using their processes and capabilities to create knowledge from the existing data and information for use in their betterment. The right information should be obtained from the right people at the right time through the right channel. As knowledge expands, new opportunities are created / identified. Consequently, organisations should embrace data-driven culture. A data-driven culture refers to “a pattern of behaviours and practices by a group of people who share a belief that having, understanding and using certain kinds of data and information plays a critical role in the success of their organisation” (Kiron, Shockley, 2011).

The term ‘Business Intelligence’ was probably used for the first time in the eighties. Researcher Howard Dresner proposed ‘Business Intelligence’ as an umbrella term referring to concepts and methods used to improve business performance based on historical and other available data. The concepts of Business Intelligence have however been used since time immemorial evolving through time with changes in technology.

Business Intelligence started from the early days of computing. There were applications that had their own database which supported their functions.

The field of BI has experienced a dynamic growth over the last two decades in various sectors and thus draws increasingly more attention of both practitioners and researchers. Gartner (2009) finds that the field of BI is not fully embraced by different firms and organisations, and it is still insufficiently active in the computer applications in business and the economy. Interest from researchers and practitioners increased when they found that BI systems are an important part of the modern enterprise's information infrastructure, since they play a major role in the success of the enterprise and its competitiveness in the business world (Davenport, Harris, Morison, 2010). Business Intelligence thus gives an organisation a competitive advantage in the market with good stability to maintain its position. Researchers have also noted that technological, managerial, and human factors contribute to the BI problems or failure in an organisation (Moss, Atre 2003; Stangarone, 2014).

According to Cao and Duang (2014), human factors follow all the steps in the BI cycle and therefore they can determine its success or failure. Furthermore, Marchand, Kettinger, and Rollins (2001) point out that human factors such as information behaviour and values are key in ensuring success in the adoption of BI. Fleisher (2008) reports that original thinking and creativity are among the important human factors. Presthus (2014) also observes the fact that both technical and human factors are important in the success of BI systems and describes a BI system as a system that consists of human and technical components that have equal importance. Yeoh and Popovic (2015) report that user-oriented management plays an essential role in ensuring the success of a BI system in an organisation. Yoon, Ghosh, and Jeong (2014) find that organisational climate and social influence affect the human capacity in the organisation, and subsequently the success of the BI system.

The concept of using BI as a competitive strategy by many organisations in the business industry has gathered a lot of attention, particularly with respect to the increase in the use of IT capabilities that are meant to lower costs, and have an advantage in unfavourable economic environments. Many organisations have adopted and implemented IT in their operations in order for them to gain a competitive advantage and better understanding of the integration of BI in the corporate structure. It is due to the

need to have a competitive advantage that many organisations have opted to adopt BI systems. The adoption of BI in many organisations aims to facilitate the evaluation of the strengths and weaknesses of any organisation and have a better competitive position. Access to adequate information by any organisation is really crucial in the adoption of competitive strategies. Therefore, it is important for an organisation to adopt a BI system in order to have a competitive advantage over other organisations in the market.

As an Arab country, Lebanon has the priority in ensuring economic growth, raising standards of living and developing the economy. The country needs to develop its business by emphasising the role of Business Intelligence and information systems, in order to keep up with other countries. According to the Ministry of the Economy and Trade (2014), although the Information and Communication Technology (ICT) sector is based in the capital of Lebanon, the market is growing very fast compared to other neighbouring countries since it is really essential and plays a major role in contributing to and developing an information society and knowledge economy. It is obvious that at the moment, there is a remarkable and considerable growth in the use of computers and the internet in Lebanese companies, and the use of ICT in business activity; however, Business Intelligence is still lagging behind. One of the most serious obstacles to business processes in Lebanon is labour regulations, which are different from other countries (Khoury, 2013). In order to make the Lebanese business sector more developed in terms of vision and strategy, it needs to take on a higher profile. Information systems and accounting practices are poor in the private sector, and this has prevented the sharing of information and cooperation.

Lebanon's quest to build a good environment for entrepreneurs is unquestionable. Numerous initiatives have been launched to encourage and support business people in Lebanon. In 2013, prominent Lebanese entrepreneurs in the diaspora launched the project Lebanese for Entrepreneurs (LFE) to accelerate the development of the technology start-up ecosystem in Lebanon, and the project has achieved notable success (Lebanese for Entrepreneurs).

Lebanon has especially done a lot in providing an enabling the ecosystem for Small and Medium-sized Enterprises (SMEs). The Banque du Liban has subsidised loans, and the establishment of financial companies such as Kafalat and IDAL to offer loans to emerging entrepreneurs has even led to the establishment of many other private

lenders in Lebanon (UNDP). The Banque du Liban has launched an initiative to allow banks to invest in SMEs, which has led to even more start-ups being created.

Most SMEs in Lebanon still use desktop spreadsheets as the tools for generating data analysis. The use of the desktop spreadsheets is mainly attributed to the fact that they are easy to set up and use, as well as being considered as very effective tools for producing fast results. However, according to Jain & Kanungo (2013), they are prototyping tools but not designed for enterprise purposes. It is for this reason that they are rendered ineffective, because any errors in data entry can result in substantial accumulated errors. The errors lead to poor quality and ineffective future decision-making and may influence the performance of the business (Haug, Zachariassen, Van Liempd, 2011). Therefore, understanding the critical driving factors that lead to the successful implementation of BI in SMEs in Lebanon is of paramount importance.

Problem Statement

The implementation of BI in developed countries has led to the better economic management of resources, improved access to diverse information, advanced knowledge management and better market growth. In SMEs, BI has played a major role in providing assistance to lower the costs associated with production and labour, make it easier to collect more information that is useful in decision-making, improve a firm's efficiency and profitability, and create a better and improved competitive advantage position. BI also enables SMEs to have a better and enhanced understanding of the market and easier recognition when there is a change in demand from customers.

BI is a tool that converts present data into knowledge and enables managers to make utilitarian decisions. It can extract, as well as organise, available information in order to assist users to make timely and accurate decisions, with the goal of promoting management, company development, as well as marketing, by using current business information and modern techniques (Rausch, Sheta, Ayesh, 2013). BI also has the capacity to bring improvement to financial performance, as well as service to sustain merit that is competing and bring more benefits economically for the company, by analysing and enhancing up-to-date opportunities, as well as finding possible threats. The BI basic process entails cleaning vital data drawn from diverse sources of data to ensure

that they are valid, and then loading them into the data market or data warehousing, after restructuring and transforming (Rausch, Sheta, Ayesh, 2013).

Therefore, in the business world, BI systems can be used to multi-task several functions such as integration, aggregation, exploration and the multidimensional analysis of information from different sources (Sauter, 2010). From the business perspective, BI systems transform data into useful information that can be used to create a conducive environment for effective decision-making, strategic thinking, and acting in organisations (Negash, Grey, 2008). The value of BI can be expressed or seen in an organisation when there are fundamental changes in the firm, such as acquiring new customers, offering products to customers, creating new markets, and establishing new co-operation with various firms and organisations (Chaudhary, 2004; Olszak, Ziemba, 2004). The adoption of BI solutions in many organisations seeking to improve efficiecy or proactivity in decision-making is very important in ensuring performance (Lönnqvist et al., 2006).

It is common knowledge that being better informed creates value through the early detection of threats and opportunities, and the better use of available resources is possible through the increased awareness delivered by BI. However, SMEs possess limited resources and cannot afford the same sophisticated and expensive BI tools that are within access for large organisations, so SMEs have to weigh their resources for investment in BI against their need for competitiveness and expected benefits. BI has emerged as a really crucial part of any enterprise decision-making tool.

The possible reasons behind the failure to adopt and implement the most advanced technology could be the complex nature of BI, which calls for high maintenance and implementation costs. It is for this reason that many SMEs find it difficult to implement BI and may not afford the systems. Despite the fact that there is a continuous trend in the appraisal in developing BI tools for SMEs, research has proved that the rate of implementation and adoption of BI by SMEs has been slow due to the limited spending on BI. Other SMEs, particularly those that have fewer requirements in the management of complex data, have been reluctant to adopt BI. Spreadsheets are considered very easy to use and may at times produce fast results, they are in essence prototyping tools that were designed for individual productivity use but not for mass work production. Recently there has been an increase in the development of BI and decision aided tools for SMEs, but progress has been very limited.

In Lebanon it is acknowledged that the adoption of IT is still at a low level as a result of limited resources, the lack of support programmes and institutions, low levels of R&D collaboration, inadequate human support, and limited research and statistics (The Ministry of the Economy and Trade, 2014). Despite the fact that many organisations have invested heavily in ERP systems, they do not have a competitive advantage due to the limited resources necessary for capturing information. In addition to capturing information, BI systems enhance the decision-making process for an organisation thus enabling them to stay in competitive positions. The implementation of BI in SMEs is very slow and therefore the transformation of data into understandable information in businesses is still lacking. Cooperation between R&D and companies is still poor.

Very limited research has been carried out on the adoption of BI technology and the technologies that are related to the decision support systems used by SMEs in the context of developing countries. There is also inadequate knowledge or frameworks necessary for predicting and explaining the behaviour of SMEs concerning the adoption of IT. There are no known models that precisely estimate the competitive advantage gained by using BI. This results in the lack of understanding the core factors that have a significant influence and effect on the adoption of technologies that are related to the decision support systems used by SMEs. Consequently, one of the most promising ways of investigating the factors supporting the implementation of BI in Lebanon or developing countries is to elicit some responses from business practitioners experiencing the real need for competitiveness. This forms the basis of the current thesis, projecting the main aim as addressing the lack of any research framework that is designed to explore the adoption of BI in SMEs in Lebanon. The dissertation aims at addressing the state of the implementation of BI in SMEs, and identifying the critical driving factors that affect or influence the implementation of BI.

The aim and relevance of the thesis

The aim and objectives

The main aim of the thesis is to determine the relationship between critical success factors and usage of the BI among SMEs in Lebanon.

To determine the above aim of the thesis, the following specific objectives have been set:

1. To discuss the literature and theories related to the implementation of BI and critical factors that drive BI in an organisation.
2. To determine the relations between corporate information activities and features of small and medium businesses in general and in the context of Lebanon.
3. To determine the potential important problem factors and develop a research model for the problem.
4. To develop a research plan, select and justify the research methods to be used.
5. To perform an empirical research in the community of Lebanon small and medium businesses that are the users of BI technologies.
6. To analyze the results of empirical research and determine the importance of certain factors influencing BI implementation.
7. To produce key conclusions and recommendations, potentially facilitating the successful implementation of BI in SMEs in Lebanon.

Research questions

The following research questions will be answered:

1. How is effectiveness of BI influenced by company motivation to use BI technologies?
2. How is effectiveness of BI influenced by satisfaction of employees with using BI?
3. How is effectiveness of BI influenced by the percieved importance of BI technologies?
4. How is effectiveness of BI influenced by the speed of adoption of BI technologies?

The significance of the thesis

Theoretical significance

This dissertation determines and relates the important factors of the implementation of BI in SMEs, such as the skills the level of acceptance of BI among the employees in SMEs; organisational knowledge and culture among SMEs; the need for and availability of the data to be analysed by BI; and availability of resources to support the adoption and usage of the BI system in SMEs in Lebanon. The features of such factors are potentially important when dealing with the problems of utilizing modern management tools in economies whose level of development is similar to Lebanon, and in SMEs in general. The research will also be valuable material for those desiring to pursue any research related to the adoption and diffusion of innovations within SMEs. The research on BI adoption in SMEs is not fully covered; therefore, this thesis aims at adding value to the existing research. This thesis helps identify factors associated with the implementation of Business Intelligence among Lebanese SMEs to enable involved parties understand the measures they have to take to help Lebanese SMEs embrace BI techniques

Practical significance

The most important factors of the implementation of BI in SMEs (theoretical results) lead to the successful adoption of BI, which facilitates being better informed, making better decisions, taking timely and appropriate actions, and gaining a better competitive position as a result. The findings of the current thesis provide more accurate data and information regarding the current adoption rate among SMEs and pursue the existing academic research on the implementation and adoption of innovations within the context of SMEs. The survey results reveals how many Lebanese companies have systematically organised Business Intelligence activities, and demonstrates whether those organisations or companies practise a systematic way of collecting and disseminating business information.

Business Intelligence is a major trend in the modern business arena and more and more businesses are embracing it since its advantages are quite clear. However, for many countries, especially developing countries like Lebanon, a lot needs to be done to ensure the successful implementation of modern methods such as Business Intelligence. Good

research on factors associated with these methods is the first step in helping such countries to right their wrongs and effectively employ BI and other methods.

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Limitations of the thesis

First and foremost, the sample population is too small to allow any generalisation of the thesis findings. Secondly, the thesis focuses on SMEs in only one country; therefore, there is no comparison with SMEs in different countries to determine the critical factors that drive the implementation of the BI. The third limitation of the thesis is that the period of time to complete the thesis is too short. The fourth limitation of the thesis is that there is a likelihood of the introduction of personal bias in the thesis considering the participants and the nature of their work. Personal bias has the potential of distorting the view, understanding and the interpretation of the collected data. In particular, academic bias tends to affect the manner in which the researcher conducts the thesis and it is particularly difficult to fully understand the experiences of people of differing cultural or socioeconomic backgrounds

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The conceptual Framework

The candidate independent variables are the company motivation, speed of adoption, perceived importance, and the satisfaction. The candidate dependent variables include the internal effectiveness, and the external effectiveness of BI adoption for the company.

1.1. Conceptual framework

The four constructs shown in the Figure 1.1 below which are the company motivation, speed of adoption, perceived importance, and satisfaction, are researched in order to know the most influencing constructs on the dependent variables that are the internal effectiveness and the external effectiveness of BI adoption in the Lebanese SMEs.

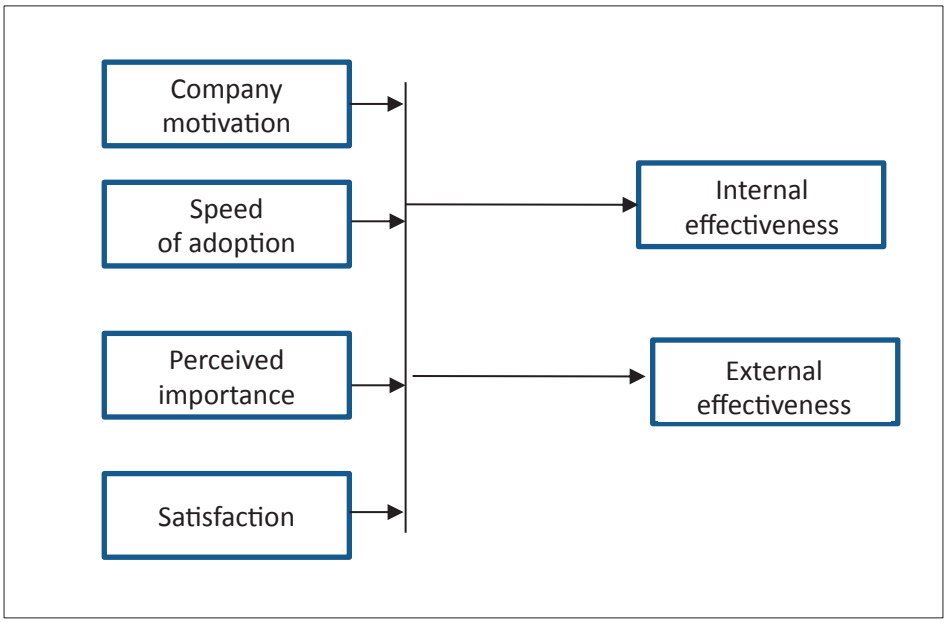

Figure 1.1. Conceptual framework of planned research

The theoretical framework of the thesis

Information is an important factor of production in society (Hannula, 2001). Moreover, a lot of people work in occupations where information is the main focus and an important factor, and where a wide variety of information and communication technologies are used (Sitra, 1998). The evolution of the information needs of individuals, communities and societies requires the contribution from these parties to improve, share, and manage information. Hence, information is found to have a significant role in our present society, and it is very important for the term information to be defined precisely enough for the significance of information to be understood.

With reference to the classical definition, information is a well-defined true judgment (Hannula, 2001). It is based on the conception of the theory of knowledge, and it comes from the ideas of Plato and other Greek philosophers (Hannula, 2001). There are three conditions that information has to fulfil. First, that information can be explained, that it can never be a bare claim. Second, everyone always needs to know the truth, i.e. to be informed. The third condition is that erroneous belief cannot be information, and it will be impossible to find the ultimate truth, and the classic definition might set overly strict demands for information.

In the specialist literature, there are several definitions of data, information, knowledge, and intelligence (Davenport, Prusak, 1998; Thierauf, 2001; Silver, 2004). In addition to that, there are many opinions concerning the relationships of these concepts. For instance, there is a hierarchy of information that starts from knowledge as the highest tier, then information, and data, which is understood as the lowest tier.

Intelligence is knowledge and foreknowledge of the world around an organisation, and it is used as a prelude to top-level decision and action (Herring, 1988). The receiver has a way of utilising information and knowledge, in order to solve problems or to carry out an assignment or a task. Intelligence focuses on finding out important and crucial trends and patterns, as well as relationships between customers and an organisation's own activities in order to define significant changes and opportunities and to improve decisions (Thierauf, 2001).

In conclusion, intelligence is not only summarised information, but also active knowledge of how to apply the content of information. Evolution in technology has made it considerably easier to adopt and employ Business Intelligence, since the collection, storing, analysis and presentation of data is much easier with modern technology. Business information is also no longer the privilege of the management class, but every involved party in business can access it, which makes the running of businesses easier. Improvements in technology, however, do not derogate past methods, they only make the implementation of Business Intelligence more complex.

Research methodology and plan

There are some inevitable limitations in selecting the research method. The constraints are set by the availability of research material and the personal characteristics of the researcher. The selection of the research method also relies on the earlier research done in the specific field and on the nature of the research questions (Saunders, Lewis, Thornhill, 2009). The research methods used in the current thesis aim to support specific objectives. In order to meet the challenges of the research questions, several sources were used in the collection of empirical data, such as questionnaires and interview schedule that were distributed to small and medium-sized Lebanese companies and organisations.

The general aim of the theoretical research is to hypothesise and develop conceptual outlines, or systems that in themselves have no significance, but have to serve a specific purpose (Saunders, Lewis, Thornhill, 2009). Conceptual frameworks are needed for describing new phenomena or categorising and organising information.

There is evidence to suggest that the managers of small and medium-sized enterprises in Lebanon are becoming more psychologically prepared to work within the knowledge management, but there is much less evidence to show that this leads to effective innovation in practice at present. It is important to note that Lebanese SMEs have not been successful due to the country's business practises. According to EY's Global Forensic Data Analytics Survey 2014, only 72% of the respondents believed that business management technologies can contribute to better management. Only 70% of the all the participants were even aware of any examples of business technologies (Ernst and Young, 2014). It is evident that there have been many obstacles in the achievement of small businesses success, among which is poor BI. According to Tvrdíková, (2007), SMEs need to be more engaged in information management and technology in order to be more developed. It is necessary for the Lebanese SMEs to acknowledge the impact of information and communication technologies (ICTs) as an economic force.

In this research paper, both quantitative and qualitative methods were applied: 70 questionnaires were distributed among a convenience sample, which consisted of small and medium-sized Lebanese organisations, where data were collected and analysed using SPSS software. Six (6) managers were also interviewed using the interview schedule and data analysed using thematic analysis. Therefore, this thesis will show whether BI is likely to become an integral part of those companies' activities. The result will also indicate whether Lebanon is one of the markets in which Business Intelligence activities are conducted more systematically.

Secondly, the analysis begins with the process of administering questionnaires which are considered as providing primary data. This is because the advantages of using the questionnaire outweigh other forms of data collection such as interview schedules. Questionnaires can be conducted easily and are not time consuming, hence they are frequently employed during research. It is also important to note that questionnaires take a certain amount of time to organise and require effort to decide on how they can be administered to the project participants (Pedhazur, Schemelkin, 1991). Due to the limited

time and resources, questionnaires are helpful since they enable researchers to conduct their theses easily without any considerable difficulty, because they can be administered in different ways.

Questionnaires are easy to administer; moreover, they enable participants to submit honest answers regarding research, and ensure the anonymity of research subjects (Saunders et al., 2009). Anonymity enables the participants to use codes in the thesis rather than their real names thus giving them the freedom to participate in the survey freely and honestly, since they know that the information will be kept confidential between the researcher and him/herself, thereby making the reliability of the questionnaire high. Questionnaires also make the participants feel comfortable since they have the room and freedom to give the response that they deem to be appropriate.

The present thesis aims at evaluating and investigating the factors influencing the adoption and implementation of BI technologies in the context of SMEs through quantitative and qualitative (mixed) methodology. The research also aims to identify the factors that have an influence on the decisions to adopt BI technologies and to provide a clear understanding of the key elements that have an influence on the use of BI technologies. The scope of the research is limited to SMEs using the definition that is approved by the Lebanese Ministry of Industry. Furthermore, the thesis also focuses on the technological diffusion at the organisation level as compared to the normal individual level. The key participants of the thesis are therefore those who work in SMEs for they play a really crucial role in the enterprise and the activities of the organisation.

The structure of the thesis

The thesis is organised into the following sections:

Introduction comprises the background of the thesis, the problem statement, research objectives, research questions, the significance of the thesis, the limitations of the thesis and a research plan.

Chapter One is made up of the Literature Review. This section covers the definition of BI, an overview of the BI, an overview of SMEs in Lebanon, the adoption of BI in SMEs and the critical driving factors, as well as the benefits of the

implementation of BI, the Challenges affecting the implementation of BI in SMEs, and a summary of the chapter.

Chapter Two encompasses Research Design and Methodology: an introduction to the chapter, research design, target population, sample size and sampling procedures, research instruments, data collection procedures, methods of data analysis, ethical considerations and a summary of this chapter.

Chapter Three focuses on data analysis: Descriptive, reliability, exploratory factor analyses, and inferential statistics are conducted to answer the research questions and prove the study hypotheses. The limitations, recommendations, and conclusions of the study are also discussed.

1. LITERATURE REVIEW

This section of the study focuses on the relevant literature that is related to the purpose of the study and supports the problem under investigation. This section covers an overview of Business Intelligence; Business Intelligence technologies in use; the BI implementation phase and its importance; the features of the business environment among SMEs; the adoption of Business Intelligence in SMEs; Factors that influence the implementation of BI systems, and challenges affecting the implementation of BI. The chapter ends with a summary.

1.1 The overview of Business Intelligence

Reinnschmidt and Francouise (2000; in Olszak, Ziemba, 2012) define a BI system as "an integrated set of tools, technologies and programmed products that are used to collect, integrate, analyse and make data available". Olszak & Ziemba (2012) explained that BI system is very important in the organization since it can be used to access, capture, analyse and convert raw data that can be used to make useful decisions in the organization that will help the organization to perform and compete with other organizations. In addition, Wells (2008) described BI system as an important aspect of the company and can be used to determine the capability of the organization through planning, predicting, solving and explaining problems that can be used to effectively to help the organization to achieve its goals and compete healthy with other organizations across the globe. Furthermore, Davenport et al., (2010) and Wixom & Watson (2010), described BI system as technologies, applications and processes that can be used by the organization to collect raw data and convert it into meaningful information that can help an organisation make better decisions that will contribute to an organisation's healthy growth and competition with others. In addition, Vuori (2006) writes that “business intelligence is considered to be a process by which an organisation systematically gathers, manages, and analyses information essential for its functions”. Therefore, it can be concluded that Business Intelligence is a combination of tools, technologies and processes that are needed to create information from data and turn the information into knowledge, which is used to make plans that drive a profitable business action. A

Business Intelligence system can be described as a decision support system that can help an organisation or firm to achieve its goals through an effective decision-making process.

The main objective of BI is usually to create a favourable environment whereby the intelligence users and the CI professionals can have a two-way channel of communication that would aid in the realisation of the organisation's intelligence needs. The most important factor for any intelligence operation is to meet the user's actual needs. It also involves doing it in a manner that the organisation acts on the resulting intelligence (Herring, 1999, Johnston, 2005).

The decision-making process at the management level of an organisation is usually an information-intensive activity that involves solving problems directly by using the complexity of the tasks to produce well-supported decisions that will help the company to produce better results. This can be achieved through a support environment, meaningful communication and group support environments, problem-specific analysis, and the use of a variety of information sources (Power, 2009). The decision-making process is cyclical in nature and requires a number of phases in combination with the experience of the staff (Skyrius, 2006). Similarly, the Business Intelligence process is also cyclical and includes the stages of: information needs, definition, information collection, information processing, analysis, information dissemination, information utilisation and feedback (Turpin, du Plooy, 2004).

A study conducted by Bister (2015) argued that organizations which have implemented BI systems have competitive advantage over others. There is increased interest and demand for improved business analytics, as it challenges organisations to adopt BI technologies that try to answer the needs of business users. Several organisations have also come up with self-service platforms that try to empower businesses with the essence of helping them with the analysis of data and the ability to shorten the development of BI applications (Gendron, 2014; Krawatzeck, 2015; Ng. et al., 2013).

According to Ng. et al. (2013), spreadsheet reports are a traditional and very easily mastered tool for organisations and users to create their own reports that can be useful for organisations in the short term but not for detailed information.

According to O'Brien & Marakas, (2007) BI systems comprise of human computer interaction where raw data are converted to meaningful information that can be

used for knowledge management and decision-making. They went further and found that there is significant correlation between decision support systems (DSS), management information systems, management support systems, and business performance management (O'Brien, Marakas, 2007). The management can use DSS to come up with the meaningful decisions through application of techniques that can be used to analyse information (Glancy & Yadav, 2011). Although BI systems are adopted in an organisation to improve performance and create competitive advantage, the systems also provide a platform that supports various systems and functions that can be used to carry out advanced analysis of organisational data (Glancy, Yadav, 2011; Olszak, Ziemba, 2010a).

1.2 BI technologies in use

The information requirements for users may be of different levels of concern to the providers of the information service. The main objective of any information system, particularly an information retrieval system, is to always supply and deliver information which has a precise and accurate form matching the information requests. Thus the conclusion is that the success of any information service depends on the adjustments made to the service for meeting the specific needs of an individual, as compared to just trying to match the output of the information systems (Tyson, 2006).

Several tools, methods, and applications have been applied in the sphere of Business Intelligence to enable businesses to collect data from external sources and internal systems. Similarly, a system of tools is employed to prepare data for analysis and create reports in different presentations to enable the directors and other stakeholders make sense of it. The data used in Business Intelligence may be historical or fresh data from various sources. Historical data may be retrieved from data warehouses or data marts.

Moreover, advanced technologies and applications have resulted in remarkable changes to traditional business models and operations. BI techniques give businesses a view of the current and past business operations, and at the same time, a predictive view of the future; hence they assist in the overall decision-making process of a business. This

makes a BI system a kind of a decision support system (DSS) as many experts have called it (Edvinsson, Malone, 1997). Techniques used in Business Intelligence include:

Data Analysis: finding hidden patterns in data and processing them to different desired models. This is especially important in fraud detection, client risk assessment, shopping basket analysis, consumer-shopping patterns, etc (Olszak, Ziemba, 2003, 2006, 2010a).

Time-Series Analysis: a predictive technique used to analyse the change in behaviour over time of different elements of a business. It is heavily reliant on historical data (Olszak, Ziemba, 2003, 2006, 2010a).

Online Analytical Processing (OLAP): this visualisation tool enables a user to extract and analyse data from different perspectives (Olszak, Ziemba, 2003, 2006, 2010a).

Statistical Analysis: this technique is the utilisation of mathematical formulae to qualify how significant or reliable the observed trends are (Olszak, Ziemba, 2003, 2006, 2010a).

Data Visualisation: sometimes stored data is hard to interpret. A system of numbers for instance might not present an immediate guess on whether sales are going to improve or decline. Better ways of making data easier to interpret can be employed in such cases, for instance, charts and graphs, typically referred to as Data Visualisation (Olszak, Ziemba, 2003, 2006, 2010a).

Reporting: a report is the final document of the necessary information in a presentable form presenting the BI statistics and sent to a predefined distribution list (Olszak, Ziemba, 2003, 2006, 2010a).

In order to establish the business and market context, a practitioner first performs a Needs Assessment. This enables the planning of research tools and identifying the sources for the acquisition of data. The sources are then evaluated to confirm their suitability. The evaluation of the sources is very important since the data required is key to the future of the business.

After evaluation, the next step is data collection. The collected data then undergo checks to ensure hat they are sufficient and the right data. An analysis of the data then is carried out. After the data has been analysed, it becomes information. The difference

between data and information is that while data is raw, information conveys some meaning that can be understood (Nazari et al., 2012).

Once data becomes information, it is made presentable and presented to decision makers. In the hands of decision makers, information that can meet consumers' unique needs becomes *intelligence*.

In addition to the fact that Business Intelligence is a set of tools used to evaluate data, it could also be used to help in strategic operations decisions. BI is considered as a framework that offers guidance for better understanding of what exactly to look for in volumes of disparate data. The analysis of business is dependent on what is known and how people feel, as well as what they consider to be crucial, while at the same time filtering out the aspects of business that might be considered to be mission critical for the growth of the organisation. The decision on what is important is based on the understanding and assumptions of what customers, suppliers, and competitors deem as important. One of the most renowned benefits of BI reporting is the effective performance of ad hoc reporting that is facilitated through drilling down layers of data pivoting on the rows and columns. A good effective analysis helps to understand the business better so as to challenge conformist wisdom and traditions, as well as what is really to be considered to be the correct analysis.

According to Negash and Grey (2008), BI systems play an important role in an organisation in helping the management to come up with strategic thinking and action, the creation of an environment that enables effective decision-making process and transforms data into information and knowledge that can be used in the organisation to achieve its goals. Chaudhary (2004), and Olszak & Ziemba (2004) report that the value of a BI system in an organisation can be seen in the sense that there is some development of information that may serve as the basis for information sharing and decision-making, the establishment of new cooperation, creation of new markets, acquiring new customers and the provision of products for them.

Business Intelligence has an added advantage since it is usually able to provide clear data, patterns, logic and presentation that can be used to support a new insight in the organisation and also help in decision-making. Present decisions in an organisation depend on proper analysis and insights that promote confidence among employees when taking proposed actions.

The Business Intelligence process involves the definition of information needs in an organisation; information gathering; information processing; analysis; dissemination; and utilisation of the information for decision-making and giving feedback, as shown in Figure 1.2 below.

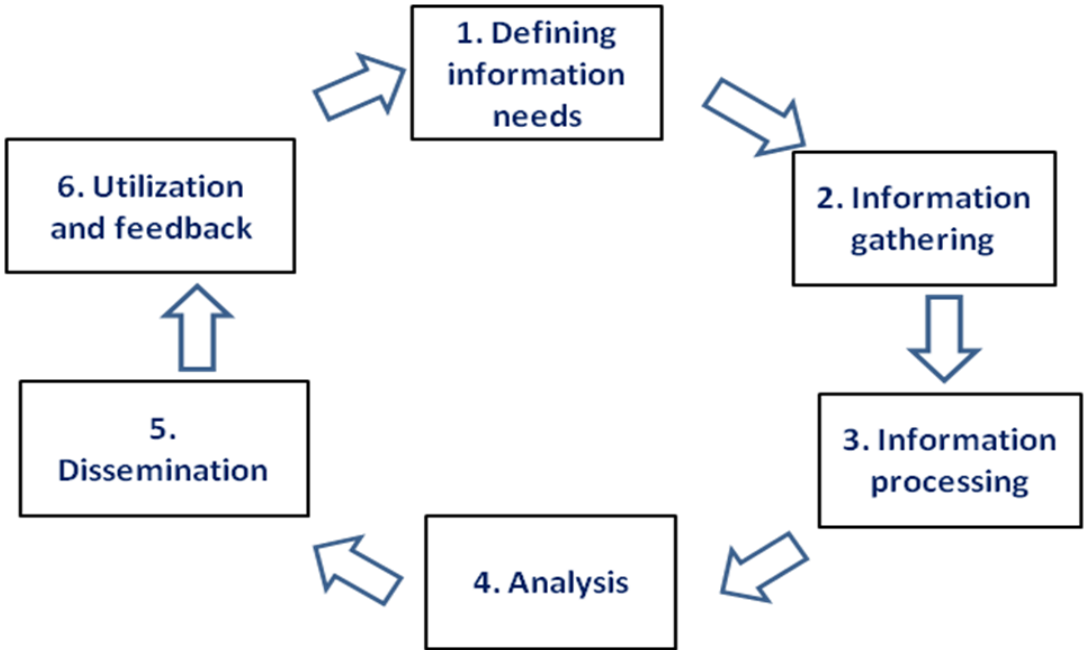

Figure 1.2: A generic Business Intelligence process model (Vuori 2006)

1.3 The phases of the implementation of BI and its importance

The process of the implementation of BI usually involves several steps: First, the organisation should conduct an analysis of the current systems and business needs, different design and development activities, in addition to hardware and software acquisitions (Olszak & Ziemba, 2003, 2006, 2010a). The use of BI within a company should aim at the continuous evolvement of the system by evaluating past projects and fuelling the next steps with the knowledge gained from previous successes and failures. Gangadharan & Swami (2004) go further and state that the phases of the implementation of BI can be divided into high level activities, including analysis, designing, development, deployment, and evolution.

The evaluation and gathering of the business requirements serve as a starting point and initiator of the system implementation (Olszak, Ziemba, 2003, 2006, 2010a). Information required during the data gathering process is usually not collected within a

single iteration; therefore, it can be re-conducted during data modelling and application development phases to collect all the required details, user preferences, required update frequencies, and other significant aspects that need to be defined in the solution (Olszak, Ziemba, 2003, 2006, 2010a; Erno, 2012). It is also important to note that the implementation of BI includes a lot of uncertainty, and it is vital to understand related activities and try to justify the project in the best manner possible before starting to refine the vision of the deliverable and begin the required activities that lead to the deployment ((Olszak, Ziemba, 2003, 2006, 2010a; Moss, Atre 2003; Bister, 2015).

Secondly, Extraction, Transformation and Loading (ETL) processes takes place where the data are loaded into data warehouse (Quist-Aphetsi, Mansah 2015; Côrte-Real, Ruivo, Oliveira, 2014). Once the data has been cleaned and stored, then it can be transformed into static data, which can then be used for analytical and operational purposes. The organisation can then use the BI system to collect and use specific data to create reports, projections, analyses, etc. (Michalewicz et al., 2007; Quist-Aphetsi, Mansah 2015; Côrte-Real, Ruivo, Oliveira, 2014).

The implementation of BI in an organisation usually serves as a starting point for the continuous development where the organisation develops new skills and ways in utilising new technologies adopted by the organisation (Yeoh, Koronios, 2010). The identification and understanding of what is currently happening and what happened in the past is a good goal to initiate the implementation of BI. The organisation should therefore set up the foundation that will support incremental development cycles that gradually raise the capabilities that will support the implementation and planning of BI.

According to Kimball et al. (2008) and Moss & Atre (2003), the phase of the implementation of BI is very important since it enables an organisation to understand the project before starting and justifies the possible approach that will help the organisation to achieve its vision through the implementation of the required activities. The BI implementation phase will also help the organisation to understand the significant business opportunity before exploring the data with the BI tools.

BI covers the transformation of raw data to information that improves the knowledge, decisions, and any action undertaken by people using various technologies, tools and methods to gain profit or boost their business and organisations (Vizgaitytė, Skyrius, 2012). The implementation of BI in SMEs has led to the better economic

management of resources, improved access to robust information, advanced knowledge management and better market growth. Other advantages and benefits related to the implementation of IT in SMEs include SMEs gaining assistance to lower production and labour costs, and a better competitive advantage position (Nguyen, 2009). BI has also enabled SMEs to have a decision support framework (Baars et al., 2008) and generate detailed information which is critical for decision-making (Negash, 2004). The above information is presented in Table 1.1, which highlights the benefits of the phases of the implementation of BI in SMEs.

Table 1.1. Benefits of the implementation of BI

Benefits of BI in SMEs	**Description**	**Supporting literature**
Benefits	• Understanding the project before conception	Kimball et al. (2008); Moss & Atre (2003);
	• Improve knowledge, decisions and any action	Vizgaitytė, & Skyrius (2012); Negash (2004);
	• Better management of resources • Improved access to robust information • Advanced knowledge management • Better market growth • Lower production and labour cost	Nguyen (2009);
	• Decision support framework	Baars et al. (2008).

1.4 Factors that influence the implementation of BI systems

According to Eckerson (2005; in Olszak, Ziemba, 2012) found that support to all users via integrated BI suites, the provision of a robust and extendable platform, the integration of the desktop and operational applications, and fostering rapid development as important critical success factors for the implementation of BI in an organisation include. In addition, Wise (2007) reported that developing a project that is successful is an important factor since it will be able to identify business problem, understanding the delivery of data and choosing a horizontal or vertical solution that will help the

organisation to achieve its objectives. Imhoff (2004) also reports that a strong partnership between the IT department and the business community, well defined business problems and the willingness of the employees in an organisation to accept change are important factors that affect the implementation of Business Intelligence.

Other factors that affect the implementation of BI in an organisation include: identifying the user's specific needs and issues that will help to solve the organisational problem (Watson et al., 2004); understanding the underlying data issues that will affect the implementation of BI and not just the software (Olszak, Ziemba, 2006, 2012); the selection of an easy and low cost application that is appropriate to achieve the organisational goals (Salmeron Herrero, 2005); enhancing responsiveness and flexibility among the employees and users so that they can accept change at the early stages (Salmeron, Herrero, 2005); training the existing staff on the new skills and avoiding hiring new staff and consultants to help the organisation achieve its goals (Wixom, Watson, 2001; Olszak, Ziemba, 2012); and the ability of the management to lead from the top, ensuring that they fully support the implementation of BI in the organisation.

1.4.1 Challenges affecting the implementation of BI

According to Waranpong (2014), Despite the fact that there have been many advantages associated with BI systems, there are barriers that limit the wider implementation of BI in organisations (Waranpong, 2014). According to Olszak & Ziemba (2006) lack of human capital, financial resources and workforce strategies as some of the most prevalent and well-known barriers. Weier (2007) reports four major barriers to the successful implementation and adoption of BI systems which include: the cost of BI, the process of data integration and sharing, as well as communicating BI value and the complexity of BI in an organisation. In addition, Martin (1987) found that lack of control over the data among the users due to interdepartmental sharing of the information is one of the challenges that affects effective implementation of the BI system in the organization since it will lead to conflicts related to ownership.

Weier (2007) found that the proof value of the BI technologies in the market is unavailable thus making it difficult to adopt it in the organization. He went further and stated that BI vendors do not have adequate skills to explain the benefits of BI to the

stakeholders. The different understandings related to BI systems clearly imply barriers that could result in the unsuccessful implementation and adoption of BI systems in organisations and businesses.

Waranpong (2014) reported that BI is a complicated system since it consists of different components from different vendors and as a result the elements do not automatically and regularly integrate well with BI systems, leading to many organisations perceiving the implementation of BI systems as problematic. On the other hand, Sandu (2008) looks at the issue from another perspective claiming that BI is a complex tool that is complicated and difficult to learn and use. The majority of operational workers in departments such as logistics and call centres do not have the necessary skills required to operate and deal with BI software. The reason for their incompetence can only be related to the fact that most BI systems are usually designed to be used by analysts and power users.

1.4.2 Human factors

The human factor is a really crucial aspect of the BI structure. It has a very great impact when it comes to the human choice of technology; its development, and the provision of raw data required by BI systems. In addition, the human factor is responsible for providing a connection from BI to the decision-making process. The shifts that have taken place in the management and the associated speculation with higher meaning terms – for instance, ideas and knowledge – have led to a decrease in the amount of information that is necessary to make a profound decision. In the present world, many managers are currently making critical decisions involving management based on the limited information they receive (Vizgaitytė, Skyrius, 2012). Dhebar (1993); Kling (1996); and Sjoberg (2002) establish that human skills and competencies are key when solving problems and making decisions in an organisation and play an important role in contributing to the organisation's healthy competition.

There are many issues that support human decision-making patterns; however, the organisational decision to implement and adopt a Business Intelligence system should be taken into consideration carefully. Many research studies have indicated that intelligence works best in an environment where group effort is experienced among the individuals

involved. The effort of the group should be carefully coordinated with respect to priority of the procedures involved and the intelligence setup. Business Intelligence can be referred to as a term that is used to refer to the transformation from data to knowledge, insight decision, and the most profitable actions that people undertake using various technologies at their disposal, which may be either certain tools, or methods or processes. The market is rapidly progressing into a more numerous and larger mergers and acquisitions. The human factor is therefore a point of concern that needs to be analysed. With the rapid progress in the market, the only factors that are most likely to thrive are the high-usability and user-friendly solutions that accompany human thinking. The determining factors for the successful implementation of a BI system would be the coordination of intelligence activities among the individuals involved. The coordination of intelligence activities would in some way pave way for an intelligence culture to develop in any organisation (Vizgaitytė, Skyrius, 2012).

According to Skyrius (2008), Johnstone et al. (2004) and Turpin & Du Plooy (2004) found that intuition, perception, experiences and influencing decision-making are some of the important factors affecting human capital and plays a major role in decision-making; and explain that most of the tools in an organisation should be technology-centric and user-centric. Sauter (1999) goes further and states that managerial intuition is a key personal feature in decision-making and plays a major role in ensuring that past decisions, accumulated experiences, and the use of ideas are taken into consideration. It is also reported that accumulation of best practices is critical in ensuring creativity (Waranpong, 2014). Galliers and Newell (2000) reported that knowledge, transparency and truth from the management promotes innovation and creativity in an organisation (Skyrius, 2002).

According to Kfouri & Skyrius (2016), BI awareness is one of the important critical factors for the implementation of BI in an organisation as compared to the technology dimension. Sammon and Finnegan (2000) state that management support in terms of the provision of adequate budgetary allocation for the implementation of BI and integration of the data warehouse are important critical factors for the success of an organisation. Yeoh and Koronios (2010) highlight that clear vision, management support, balanced team work are some of the critical factors that promote and influence the successful implementation of BI.

1.4.3 The availability of needs and data

Availability of the needs and data in organization is key in precipitating the need for the meaningful information from the raw data that will help and guide the management to make a useful insight decision-making that will help the organisation to spearhead its functions and gain a competitive advantage (Skyrius, et al., 2016; Yeoh et al., 2008). According to McAfee and Brynjolfsson (2012) there is need for the organisation to use information needs and data driven approach in making decisions in order to help the organization achieve its goals. This process involves asking the right questions about the business, ability to use the acquired information to be meaningful through analysis and making the right decisions based on the data (Skyrius, et al., 2016; McAfee, Brynjolfsson, 2012; Yeoh et al., 2008; Yeoh, Popovic 2016). They highlight that relying on experience in making decisions should be minimised through the use of data-driven approach effectively when the required data and analysis tools are readily available in the organisation. Skyrius, et al., (2016) argues that the implementation of BI in an organisation will fail if the management or users disregard the data when making decisions.

Skyrius, et al., (2016) highlighted that BI users should avoid using easily accessible data and systems since they might not provide the data related to the specific needs of the organisation that might be useful in management of the business and improve performance.

1.4.4 The availability of resources

To implement and maintain a BI system, immense and complex skilled human capital is required, and this is expensive. The actual costs incurred in the deployment of a large data warehouse to support a BI system are very high for many organisations. Other costs, such as ownerships costs, i.e. the user license costs, make the operational costs very unsuitable for many operational users. According to Khan et al. (2011), even those organisations that are considered as able to adopt and implement BI systems still do shy off from installing them, claiming that BI systems are highly priced. According to Arnott (2008) and Olszak & Ziemba (2012), intellectual and suitable technological resources are key factors in the successful implementation of BI systems in organisations. The

organisation management should also provide a suitable budget and financial resources in order to adopt and implement BI systems (Yeoh et al., 2007; Yeoh, Koronios, 2010).

1.4.5 The organisational culture

Committed management support creates good environmental support that will ensure appropriate and efficient implementation of a BI system in the organisation (Skyrius, et al., 2016; Yeoh, Koronios, 2010; Olszak, Ziemba 2012); Atre, 2003). The management support will help the organisation to provide a conducive culture that will help to overcome obstacles that arise from the BI implementation process. Fully supportive management will be in the forefront in organization in providing necessary information systems that will speed up the decision making process and improve performance of the organization (Skyrius, et al., 2016; Sangar, Iahad, 2013; Cidrin, Adamala, 2011). Suitable organisational culture ensures that there is suitable and effective change management that will help the organisation to effectively implement the BI project (Hawking, Sellitto, 2010). The critical success factors affecting the implementation of BI are presented in Table 1.2.

1.5 A summary of the chapter

This section of the thesis presents a review of related studies according to the research questions. Business Intelligence and the benefits of its phases are also discussed in detail in this section. The BI process that can be adopted by an organisation includes the concepts of information needs in an organisation; information gathering; information processing; analysis; dissemination; and the utilisation of the collected information for decision-making and giving feedback. SMEs in Lebanon have not fully adopted BI intelligence because of several challenges, such as a lack of human skills, resources, and the high costs of implementation and data for analysis. The main factors that are determined in this thesis include human factors, the availability of resources and the availability of data, as well as needs for the successful implementation of BI in SMEs in Lebanon.

Table 1.2. Success factors affecting the implementation of BI, based on the literature review

Critical success factors	**Description**	**Supporting literature**
Human factors	• Effective choice of technology • Development and provision of raw data • Making decisions from BI • Management role in decision-making and provision of support • Problem solving skills • Teamwork effort • Experiences, perception and intuition of BI • Knowledge and truth of the managers • BI awareness • Provision of adequate budgetary allocation • Clear vision	Vizgaitytė, & Skyrius, (2012); Dhebar (1993); Kling (1996); Sjoberg (2002); Johnstone et al., (2004); Turpin and Du Plooy (2004); Sauter (1999); Galliers and Newell (2000); Kfouri & Skyrius, (2016); Sammon and Finnegan (2000); Yeoh and Koronios (2010);
Needs and data	• Presence and availability of raw diverse data • Data driven approach • Information needs of the company • Ability to use the acquired information • Easily accessible data and systems	McAfee and Brynjolfsson (2012); Presthus (2014); Marchand and Peppard (2013); Yeoh et al., (2008); Yeoh and Popovic (2016);
Resources	• Immense and complex skilled human capital • Deployment of a large data warehouse to support a BI system • Ownership and license cost • Operational costs	Khan et al., (2011); Arnott (2008); Olszak and Ziemba (2012); and Yeoh et al., (2007); Yeoh & Koronios (2010);
Organisational culture	• Committed management support • Provision of information systems • Effective change management	Olszak and Ziemba (2012); Yeoh & Koronios (2010); Atre (2003); Sangar and Iahad, (2013); Hawking and Sellitto, 2010.

2. RESEARCH METHODOLOGY

This chapter provides a detailed description of the data required for this thesis, and the appropriate research methods and approaches used to obtain the required data. Furthermore, data sources and limitations of the thesis are discussed in detail to provide information about how the research was conducted.

Research methodology is a systematic approach which helps the researcher to determine and solve the research problem in question. It is therefore very important for the researcher to determine the appropriate research methods so that s/he can be able to solve the thesis problem appropriately. The design process, the approach to be adopted in the thesis, the types of data sources and the research instruments should be defined and discussed in detail so that the researcher understands the process and determines the research question with minimum challenges. Therefore, the current thesis focuses on the primary data from the survey and interview schedule and also relates it to the secondary data that already exist.

According to Dawson (2002), a researcher, in her/his project, is guided by research methodology because it is a tool of the thesis. It is very important for the researcher to come up with the research approach that is going to answer the research questions in the thesis. Therefore, it is very important to indicate that the research methodology enables the researcher to discuss how s/he is going to answer the research questions and prove the research hypotheses.

2.1 Research aim

The main aim of the thesis is to determine the relationship between critical success factors and usage of the BI among SMEs in Lebanon. Therefore, to achieve the above purpose of the study, this study will employ mixed research method where both quantitative and qualitative research methods will be used. Quantitative research method will be used using the survey approach where questionnaires will be used while interviews will be applied in the qualitative research.

2.2 Research philosophy

Roth and Mehta (2002) indicate that the combination of Positivism and Interpretivism is very important in research philosophy and can be used to achieve the aims of the thesis. Positivism has been defined as a means which makes it possible to study reality objectively by employing the methods of the natural sciences (Angus, 1986; Marshall, 1999). Numerous researchers in their studies indicate that positivist analysis enables the researcher to come up with a hypothesis and then evaluate or come up with inferences about the phenomena under the thesis that can be generalised (Roth, Mehta, 2002). It is appropriate to use the positivism philosophy in the current thesis because the research objectives and questions concern the scientific knowledge that is needed to be explored. The researcher intends to use an existing theory to understand the success factors leading to the successful implementation of BI in SMEs in Lebanon. Therefore, the positivism philosophy is appropriate for the current research, because it brings out the reality of BI in SMEs and also helps the researcher to prove the dissertation hypotheses.

The thesis employs this type of philosophy because the thesis aims to determine the close association or relationship between two variables (critical success factors, which make an independent variable, and the internal and external effectiveness of BI system – the dependent variable); these variables are measured by using the Likert scale, and tested by using inferential statistics, such as Spearman's rank correlation coefficient. Therefore, it is relatively easy for the researcher to determine the causal link between the variables reliably, as well as test the thesis hypotheses and answer the research questions.

2.3 Research approach and methods

The deductive approach has been regarded as the most important and frequent approach that scholars have used to carry out their studies (Bryman, Bell, 2007). This approach enables the researcher to carry out the thesis from the general view by narrowing it down to the specific aspects of the thesis. Anderson (2004) indicates that the deductive approach is very important, because it enables the research to start with the theory of the phenomena under thesis, develop the hypothesis related to the thesis and then continue to test the hypothesis and come up with relevant decisions.

For the researcher to obtain the thesis objectives and answer the research question, it is necessary to employ the deductive approach. The deductive approach is reflected in the current thesis, because it is appropriate for understanding the critical driving factors that lead to the successful implementation of BI in SMEs in Lebanon, and because it guides the researcher from theory and hypothesis development to the hypothesis testing and making conclusions regarding the outcome.

The quantitative method is the most commonly used method by researchers in various fields in order to answer the thesis questions. Dawson (2009) indicates that the numerical statistics are usually carried out in quantitative research by using well-structured questionnaires. The deductive approach can only be followed and used in the thesis if the researcher employs quantitative research because it seeks to establish the facts from the thesis, come up with predictions and test the already set hypothesis (McCarthy, 2008). Quantitative research is also very important because it is accurate and enables one to come up with the research findings that reflect the thesis population simply by generalising the results by using the thesis samples easily (Vanderstoep, Johnson, 2009). They go further and indicate that the research results achieved through quantitative research are generated objectively, since the collection and analysis of data are conducted in a quantitative nature.

For the purpose of the current thesis, the research employs the quantitative and qualitative research method to collect quantitative and qualitative data from certain key persons working at SMEs who deal with the implementation of BI. This strategy can substantially contribute to the achievement of the research objective of understanding the critical driving factors that lead to the successful implementation of BI in SMEs in Lebanon. The quantitative data was collected by using survey research and qualitative data was collected using interview schedule. Surveys were employed in this study because they are the best data collection tool that can be used to produce information about attitudes, values, and opinions of individual persons within the same system (Pinsonneault, Kraemer, 1993). For instance, survey was used to measure BI implementation in different departments within the SME sector. According to Pinsonneault and Kraemer (1993) surveys can be used to explore, describe and explain the study problem within the organization. It is mostly used in the business cases because they can be used to create objective and scientific research that can be tested for

reliability and applied in other sectors or areas (Gummesson, 1993). Qualitative method was also employed because they are very useful in capturing the explanations and provide better understanding of the research problem which cannot be captured by the quantitative research methods (Yin, 2003). It is important to determine the phenomena within the organizational context and thus it was applied in this study.

A survey can be described as a "systematic method for gathering information from (a sample of) individuals for the purposes of describing the attributes of the larger population of which the individuals are members" (Enanoria, 2005). Surveys are very important because they help to describe the basic characteristics and the study variables of both small and large populations. Therefore, the findings of the survey can be easily generalised to the general population since the target population usually has the same characteristics.

The survey approach can be achieved by asking the target population questions, through either having interviewers and asking questions, and recording the responses down or by issuing the questions to the participants who will fill in the questions and return them within the stated deadline (Groves et al., 2009).

Survey research is often used to answer the questions raised, solve problems in question, assess the goals of the study, determine whether the set objectives have been met or not, and establish the timeline in which the future comparisons can be made, and how generalisations can be made, and to what extent and in what timeline (Isaac, Michael, 1997).

According to Kraemer (1991), there are three characteristics of survey research. First, the research enables the researcher to quantitatively describe specific aspects of the study through the examination of the variables under the study. Second, the data are collected from the study participants and thus are subjective. Last, the research uses the selected portion of the population where generalisations can be inferred later.

The scope of research is determined by the independent and dependent variables under the study. The researcher must identify a model which predicts the relationship between the variables in the study. Thus the study is usually constructed to test the model against the observations made in the field. A survey is a means of collecting information about the characteristics of a group (Pinsonneault, Kraemer, 1993). The strengths of survey research are that it can be used to collect data from a large sample size, as well as

being suitable for collecting demographic data. Surveys are also inclusive in types and numbers of variables which do not require much investment to develop and administer and make generalisations (Bell, 1996). They can also be used to determine the attitudes which are usually difficult to be measured by other techniques (Salant, Dillman, 1994).

Surveys are applied in most research methodologies that are designed to collect data from a given population or sample. The method uses questionnaires or interviews as instruments. Surveys are used to obtain data from individuals and are based on their personal information and their family life, and this can be applied to a large social institution. The sampling of data using surveys is important because it helps in the collection of data and personal information from individuals. They are also accepted as the main tool for carrying out the application of the basic social science method of study. The use of group interviews and questionnaires is less expensive and easier to carry out when compared to personal interviews.

Such questionnaires allow for confidence and freedom to provide any information that is relevant to the study. The mailed surveys are efficient at accumulating information in a short time period at a cheaper cost to the researcher. The chosen survey method is an instrument that is based on the Likert categories scale to evaluate the implementation of BI in SME's.

Stevens, Loudon, and Wrenn (2002) indicate that primary data are very important in research since the data are collected from the field in order to answer the dissertation questions and objectives and enable the researcher to understand the data correctly. There are two ways of collecting primary information which include observation and collection of information from the sample, or the thesis participants, by interviewing them either using the telephone or face-to-face. Based on the thesis objectives and the research questions, questionnaires are administered to participants by mail who are required to fill them in and return them within a specified period of time for further analysis.

2.4 Analysis of data collection instruments

2.4.1 Questionnaire

According to Saunders et al. (2009), questionnaires are the most common data collection tools which have been used by scholars, and researchers engaged in business

economic and management studies across the globe. Questionnaires can be easily conducted and do not consume much time and effort to administer (Pedhazur, Schemelkin, 1991). Due to limited time and resources, questionnaires have been helpful since they enable researchers to conduct their theses relatively easily without considerable difficulty, because they can be administered in various ways.

Using this method, the researcher will make arrangements with participants on how they will receive the questionnaires, and how the researcher will follow up to be certain that the thesis subjects answer the questions, as well as how they will submit the questionnaires to the researcher. Apart from the method being easy to be administered, questionnaires enable the participants to give honest answers regarding the thesis, and ensure the anonymity of the research subjects. Anonymity enables the participants of the project to use codes rather than their real names, thus granting them the freedom to participate in the survey independently and honestly, since they know that the information will be kept confidential between the researcher and him/herself, thereby making the reliability of the questionnaire high. Questionnaires also make participants feel comfortable, since they have the room and freedom to give the response that they deem to be proper. Questionnaires are very important because of the high response rates as compared to other methods of data collection.

2.4.2 Interviews

According to Seidman (1998), the interview format that will be used in the study involves exploring the knowledge, benefits, obstacles of using BI system in the organization. Merriam described this person to person encounter as the process “in which one person elicits information from another” (2009, p. 88). In addition, Merriam states, “interviewing is the best technique to use when conducting intensive case studies of a few selected individuals” (p. 88). Interviewing also allows the researcher an opportunity to gain understanding of a phenomenon by adding a human element to the study. The interviews will take place in the environment that will make managers comfortable so that they can share their stories and experiences privately (King, Horrocks, 2010). The format of the interviews will be open-ended. Merriam (2009) states, “less structured formats assume that individual respondents define the world in unique ways…. This format allows the researcher to respond...to the emerging worldview of the respondent, and to new ideas on the topic” (p. 90) (See Appendix II).

2.4.3 Questionnaire design

Data for the current thesis were collected using the administered questionnaire, which was used after the questionnaire had been tested during a pilot survey in order to determine whether it was achieving the thesis objectives. The pilot study was conducted on ten study participants who had similar characteristics to the participants who took part in the main study. The questionnaire was designed in such a way that the socio-demographic factors of the participants are captured first, followed by the questions related to the thesis objectives. Relevant questions were developed to answer and review the critical driving factors that affect the successful implementation of BI in SMEs. The questionnaire contains 31 questions: the first two questions are merely for respondents' demographics; the remaining 29 questions are related to the corresponding research questions. A five (5) point Likert scale was used to measure the responses on the strategic planning and organisational performance among the employees of SMEs where the following responses were: "strongly agree", "agree", "neutral", "disagree" and "strongly disagree". The questions were selected based on the research purpose, objectives, questions and hypothesis. The research questions that guided the research in questionnaire development included: What are the skills and the level of acceptance of BI among the employees and how do they affect the successful implementation of BI in SMEs in Lebanon? What role does organisational knowledge and culture play in the successful implementation of BI in SMEs in Lebanon? Do SMEs in Lebanon have data that will require, promote, and support the successful implementation of BI systems? What resources are required to support the successful implementation of BI systems in SMEs in Lebanon? How effective are measures to inform the employees about BI in SMEs in Lebanon?

2.4.4 Data collection procedure

The pretested administered questionnaires were sent via mail to the managers of SMEs in Lebanon and through professional networks and groups. The researcher made sure that the self-administered questionnaires reached as many thesis participants as possible. The self-administered questionnaires were sent to the respondents and the researcher attempted to ensure that the participants mail them back within two to three days. This data collection instrument also offered the researcher the opportunity to

interact with the respondents. Usually a pilot study is conducted to test the appropriateness of the questionnaire and remove any weaknesses; this questionnaire was also piloted among ten participants similar to the respondents of the main study.

I will interview 6 managers regarding their knowledge on BI system, benefits, and obstacles that affects implementation of BI in the organization. The interview will take place in a conducive environment that will help foster the manager's ability to provide honest and adequate information related to the study. The interview will be audio recorded to ensure that the researcher fully captures the information correctly. The process will take approximately 45 minutes. There will be no compensation or reimbursement in terms of gifts given to the participants**.**

2.5 Sampling technique

2.5.1 Target population

The target population of the thesis was the managers of SMEs in Lebanon. According to UNDP (2016) and IRC (2016) it is estimated that there are over 225,000 micros, small and medium enterprises in Lebanon and they are dominantly spread in the Mount of Lebanon and Beirut regions, where 1,3% of these micros are medium size which have 10 employees or more. In addition, and according to Kfouri and Skyrius (2016) there are contradictions between technology advances and lack of organizational framework or guidelines for BI implementation in the Lebanese SMEs. Moreover, according to Kfouri and Skyrius (2016), a Census conducted by the Central Administration of Statistics (CAS) in 2006 showed that there was at that date 199,450 economic units (enterprises). However, there were only 377 units (or 0.2% of the total number of units) with more than 100 employees, while 175,786 units (88% of the total) had less than five employees. An additional 10,687 units (5% only of the total) had between 5 and 10 employees. Other enterprises representing only 3% of the total had between 10 and 100 employees. In addition, the census showed that 61% of the units had less than 100 square meters surface and only 14% had a surface larger than 200 sq. m. In terms of sectorial breakdown, 64% of enterprises were active in the trade and service sectors, 12% in industry, 10% in agriculture and 7% in the tourist sector. On the innovation and technology front, the SMEs sector is seen to lag behind mainly because of

the country's inability to tap into its innovative capacity (UNDP 2011). From here, approximately 100 SMEs use BI system in Lebanon and therefore this study will focus on this target population. According to Mertens (2005, p. 4), the target population is a group of persons who participate in a survey and whose answers are used to generalise the results. In the case of the current thesis, the managers in different departments are involved in data handling and the implementation of BI to improve the performance of their departments so that they can achieve their organisational objectives.

Sample size was calculated using the Yamane's (1967) sample size formula which is an alternative of Cochran's sample size formula.

$$n = \frac{N}{1+N(e^2)}$$

Where

n= sample size

N = Total population size (100 which is the total number of SMEs which use BI system)

e= level of precision or the margin of error permissible in the study (0.05 at 95% confidence interval)

$$n = \frac{100}{1 + 100(0.05^2)}$$

Therefore, n = 80

Thus the sample size for this study was 80 SMEs in Lebanon. But since only 70 out of 80 participants have responded in this dissertation, the sample error here while using the Yamane's (1967) sample size formula will be the following:

e= level of precision or the margin of error permissible in this dissertation (0.0654 at 93.46% confidence interval)

The selection of the sampling method in the study is very important since it helps the research to meet the study objectives by collecting the quality of the data required. To achieve this, the study can employ two approaches of sampling: the two main sampling techniques are probability and non-probability. The first one is known as choosing random sample among large population to participate in the interviews, while the latter one is regarded as purposive sample that is created by targeted members in the population (Cohen, Manion, Morrison, 2007). The qualitative sampling method is

employed in this thesis to obtain the thesis results. Purposive sampling is the qualitative technique, which is applied in the current thesis. This technique is the most appropriate method for the current thesis because it enables the researcher to achieve the thesis objectives. The purposive criterion for the thesis is managers who have experience in the data handling and the implementation of BI in SMEs.

A total of 80 SMEs were invited and 70 responded to the invitation and agreed to take part in the study. They also agreed to take part in the study and the refusal of other managers seemed like they did not want to discuss crucial business matters (Olszak, Ziemba, 2012). Therefore 70 managers from Lebanese SMEs took part in the thesis and submitted their responses through self-administered questionnaires and 6 managers will also be interviewed.

2.5.2 Pilot survey

A pilot survey was conducted to test the questionnaire and help the researcher to test the collected data in order to determine the appropriate statistical analysis and reliability of the tools before conducting the research. The pilot survey was conducted among a smaller sample size (10 participants), which had similar characteristics to that of the sample size of the thesis population. The findings of the pilot study highlighted the following aspects: the questions needed slight restructuring in order to capture the study objectives. The study findings were reliable and therefore they indicated that the main study could be conducted as planned.

2.6 The limitations of the research method

This section of the research methods provides the weaknesses and the limitations of the thesis faced by the researcher when conducting research in the field. The sample size of the thesis was large, because the thesis focused on managers of SMEs in Lebanon and there was no comparison with other sectors and countries.

2.7 Research ethics

The thesis follows all the research ethics in order to minimise harm to the participants. The research made sure that all the participants in the project participated

voluntarily without harassing them or forcing them to take part in the research. All information collected from the thesis was strictly used to support this academic research rather than any other purposes. The researcher asked the participants for their consent whether to participate in the thesis or not. The information collected from the survey is kept confidentially and only accessed by the researcher and used for the purpose of the current thesis. The anonymity of the research participants was enhanced to ensure that the participants are protected. The researcher took care of the potential negative risks that the participants may face and will safe guard the participants from the potential negative risks.

Due to the fact that the thesis involved the workers in SMEs, the researcher made sure that the he guards against coercion and he considers there is no extra vulnerability to the participants when they provide information relevant to the thesis. All the necessary measures had been taken to ensure that the rights and social welfare of the participants are not affected by the study.

2.8 Potential outcomes of the research

This section provides an outline on the process of obtaining the results of the thesis, as well as on their relevance. The thesis describes the research questions and the level of the expected results. The research is expected to provide an overview picture of the critical driving factors that lead to the successful implementation of BI in SMEs in Lebanon. Finally, the thesis provides appropriate conclusions and recommendations concerning the successful implementation of BI in SMEs in Lebanon in order to contribute to the development of the SMEs sector in Lebanon and other countries in their efforts to achieve their aims and objectives and improve performance.

2.9 Validity and Transferability of the results

The external validity of the results of the study refers to the extent to which the results obtained during research can be applied beyond the thesis, i.e. the results can be used by SMEs to improve their performance. The external validity of the thesis proves the appropriateness of the research method, as well as its applicability in other studies. The validity of the thesis will be tested by the managers who took part in the survey in

order to confirm that the findings are based on the information they had provided, and that no alterations have been made. The factor analysis is also conducted to determine whether the findings meet the assumptions and if further analysis can be conducted.

The reliability of the study refers to the extent to which the results of the study can be replicated or used in another study using the same research methods and approaches in a different area. The reliability of the thesis depends on how the findings of the results are analysed and interpreted so that they can make meaningful results and reflect that the thesis is original. Reliability analysis is also conducted where Cronbach's alpha is used to determine whether the results are reliable.

The results of the thesis can be transferred and used by other SMEs, because the thesis fully describes the implementation of BI in SMEs and determines the factors that affect its successful implementation in order to improve the organisational performance. Such deep and thorough description of the critical driving factors that affect the implementation of the BI in SMEs in order to improve their organisational performance is very important and thus can be applied to other studies.

2.10 Research hypotheses

The following research hypotheses are tested in the thesis:

1. A null hypothesis: There is no significant relationship between the external effectiveness of BI system and company motivation, speed of adoption, perceived importance, and satisfaction of BI system technologies.

   An alternative hypothesis: There is a significant relationship between the external effectiveness of BI system and company motivation, speed of adoption, perceived importance, and satisfaction of BI system technologies.
2. A null hypothesis: There is no significant relationship between internal effectiveness of BI system and company motivation, speed of adoption, perceived importance, and satisfaction of BI system technologies.

   An alternative hypothesis: There is a significant relationship between the internal effectiveness of BI system and company motivation, speed of adoption, perceived importance, and satisfaction of BI system technologies.

2.11 Data analysis

Descriptive analysis is conducted to compute the mean and standard deviations for the thesis variables. Correlation analysis employs the Pearson correlation coefficient and regression. The findings are reported in appropriate Tables and Figures followed by an interpretation of the results.

Descriptive statistics enable researchers to demonstrate what the characteristic of the sample population was and how it can relate to the results (Yin, 1994). In quantitative research, demographic aspects of the participants such as age, occupation and marital status are only a few of the variables that are considered important (Baker, 1994). However, for this survey, the most important demographics are the department in which the respondent works and the role undertaken in their job position (Jha, 2008). However, the role position is standardised at management level for the sample population as it is believed that this is the right respondent who can give adequate and unbiased information about the status and prospects of Business Intelligence Systems (BIS) at the firm. The demographics of the department in which a respondent works discloses the closeness of the respondent to the use and vitality of BIS, thereby enabling the researcher to draw conclusions that can help in decision-making regarding the company, as well as assisting in the accurate and proper evaluation of the objectives.

While there are numerous descriptive statistics that could be analysed, such as the mean, median, standard deviation, range, mode, skewness, maximum, minimum and many others, the proportions of percentages stand out to be most helpful in understanding the number of participants in each category of the data (Welman, Kruger, Mitchell, Huysamen, 2005).

Summary

The chapter Research Methodology briefly describes how researchers are able to conduct their theses and also how the results of the thesis can be generalised. The current thesis applies the positivism approach and both quantitative and qualitative method to achieve the thesis objectives. It is also important to note that the thesis focuses on the managers in SMEs (participants in the survey) who work with data handling and the implementation of BI in order to improve the performance of SMEs. Purposive sampling is used and ethical considerations are adhered to.

3. RESULTS AND FINDINGS

The main aim of the thesis is to determine the relationship between the factors and the usage of the BI among SMEs in Lebanon. The data was collected from 70 managers in SMEs using questionnaires and 6 managers using interview schedule. The sample size was small because of the few companies that are using Business Intelligence in the Lebanese SME's, from here, it was hard for the researcher to find more than 70 managers who are involved in the implementation of the business intelligence tools in their SME's as a sample. The response rate of the study was 87.5% since 70 respondents took part in the study out of 80 that were invited. SPSS version 23 was used to carry out quantitative analysis where descriptive statistics, frequencies, percentages, mean and standard deviation are used to measure the central tendency and distribution of the variables. Reliability, exploratory factor, and correlation analyses were also conducted. Thematic analysis was conducted on qualitative data collected.

3.1 Reliability analysis

Cronbach's alpha test is conducted in order to establish the internal consistency and reliability between the Likert survey questionnaire's items used in this dissertation. The reliability tests of the company motivation, speed of adoption, perceived importance, satisfaction, and internal effectiveness were tested and the results are acceptable and can be used for inference analysis since they range from 0.70 to 0.95 (Bland, Altman, 1997; DeVellis, 2003) as shown in Table 3.3 below.

Table 3.3. Reliability statistics

Category	**Variables**	**No. of Items**	**Cronbach's alpha**
Company motivation	1. In general, is it necessary to have Business Intelligence information in your firm?	2	0.939
	2. Do you agree that your organization need to provide more information on Business Intelligence to employees?		
Speed of adoption	3. In my organization, staff adapt quickly to the use of BI.	3	0.926

Category	Variables	No. of Items	Cronbach's alpha
	4. Employees in your company agreed that they responded quickly to the need of Business Intelligence information?		
	5. Employees in your company agreed that they adjusted quickly to the use of Business Intelligence information?		
Perceived importance	6. Employees in your company pay how much attention to Business Intelligence information?	2	0.802
	7. Do your employees react positively if there is a presence of Business Information needs?		
Satisfaction	8. I am content with the system of skills acquisition for BI provided by my organization	5	0.945
	9. With the new strategy of Business Intelligence in place, I am excited about working as I am convinced that my firm is more competitive than our rivals		
	10. The BI tools I use have made my work easier so that the day goes by quickly		
	11. BI helped you achieve joint goals with other employees and create an intelligence culture in the company?		
	12. I trust BI tools that I use in meeting my needs?		
External effectiveness	13. The presence of Business intelligence in firm will help my firm to remain competitive	1	-
Internal effectiveness	14. Apart from the IT department, very few members of staff have knowledge of Business Intelligence	4	0.734
	15. Employees are very well informed on BI		
	16. The measures to inform the employees about BI in your organisation are effective?		
	17. BI tools assist employees well in meeting their goals?		

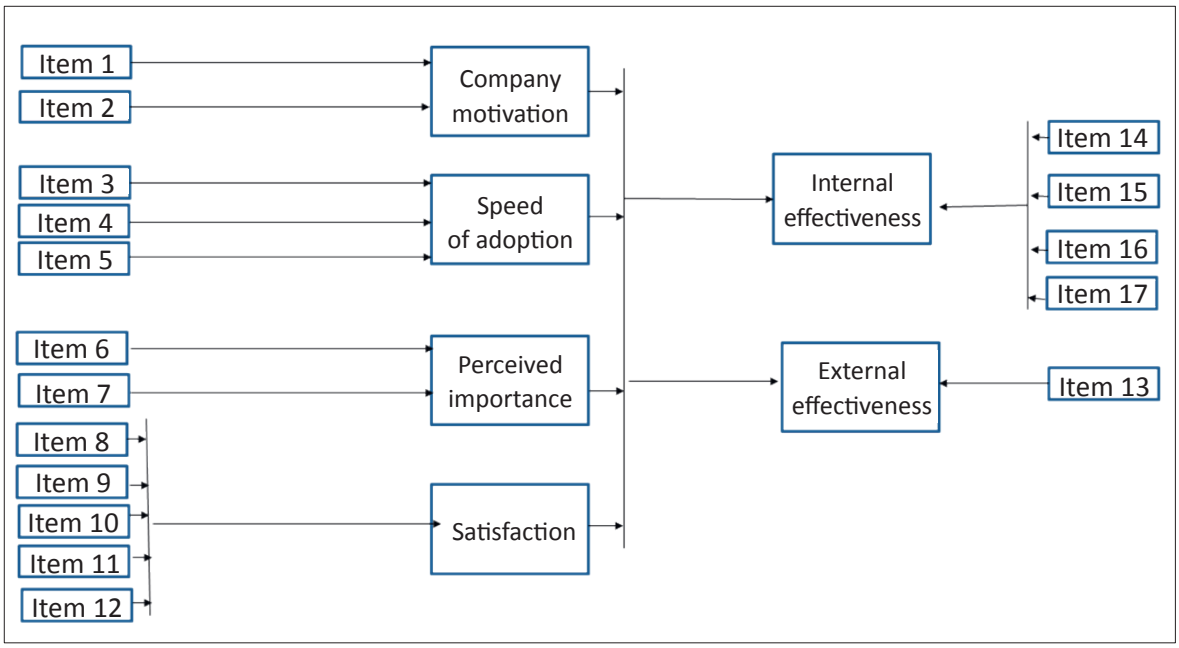

Figure 3. The relation of questionnaire items and research constructs

The above figure shows the linkage between different study factors and questionnaire items covering them. Company motivation is answered with two items; speed of adoption three factors; perceived importance answered with two items; satisfaction is answered with 5 items; external effectiveness with 4 items while internal effectiveness with one item.

3.2 Descriptive statistics

The percentage proportions always fall under the frequency measures that show the number of appearances of an occurrence in relation to the total number of occurrences. As seen in Table 3.4 below, the respondents come from seven categories of departments, namely: accounting, administrative, operations, sales, IT, manufacturing, and other. The responses were coded according to the likely outcomes.

There were initially 18 variables to be chosen for the department by a respondent. These included: Accounting, Administrative, Customer Service, Marketing, Operations, Human Resources, Sales, Finance, Legal, IT, Engineering, Product, Research and Development, International, Business Intelligence, Manufacturing, Public Relations, and other. These were coded in data analysis from 1 to 18 in their order of listing on the

questionnaire. However, because many of them had zero frequencies, only those that had occurrences are presented in Table 3.4. According to the result, 15.7% of the respondents come from the Accounting department (n=11), 30% come from Administrative (n= 21), Operations have 2.9% participants (n=2), just like the Sales department that shows one respondent (n=1). The other departments that also have respondents are the IT that has 11.4% (n=8), Manufacturing at 5.7% (n=4), and other departments that have 31.4% (n=22) out of the total sample size of 70 participants. Therefore, other departments have the most respondents at 31.4% followed by the Administrative at 30%. The Business Intelligence department lacks a respondent but IT has a 11.4% appearance.

Table 3.4. Departments in which the respondents belong by frequencies

		Frequency	**Percentage**
Which department do you work in?	Accounting	11	15.7
	Administrative	21	30.0
	Operations	2	2.9
	Sales	2	2.9
	IT	8	11.4
	Manufacturing	4	5.7
	Other	22	31.4
	Total	70	100.0

The principal research question was about what tools and technologies employees at SMEs use to be better informed about their activities and environment. There is a total of seven options under this as shown in Table 3.5 below. This question explores the extent of the integration of BIS in the companies that took part in the survey. The answers reveal the situation concerning the use of BIS, which also indicates the level of appreciation of the system in the working environment. The responses were described using descriptive statistics, as shown below in Table 3.5. What is significant is that a single business can have multiple answers as long as the types of BIS exist in the workplace. The majority of the businesses use local information systems. Only one business used all of the elements of BIS, followed equally by data-related ones, namely data analysis and data warehousing, with each having only 11 businesses integrating them into their use. The Online Analytical Processing (OLAP) is used by 28 businesses. Other descriptive statistics such as the mean, median, mode, and standard deviation are presented in Table 3.5.

Table 3.5. Tools and technologies in SMEs

Items		Frequency	Percent
Spreadsheets			
	Yes	64	91.4
Reporting and querying software: tools that extract, sort, summarize, and present selected data			
	Yes	48	68.6
OLAP			
	Yes	28	40.0
Digital dashboards	Yes	0	0
Data mining			
	Yes	15	21.4
Data warehousing			
	Yes	15	21.4
Local information systems			
	Yes	50	71.4
All of the Above			
	Yes	1	1.4

The majority of the participants (37.14%) strongly disagreed with the statement that their organisation does not have a Business Intelligence system; followed by 21.43% of the participants who agreed; 20% who were neutral; 18.57% strongly agreed; and 2.86% disagreed.

Table 3.6 shows the descriptive analysis between various departments and evaluation of the usage of BI technologies. It is evident from the ANOVA analysis that there is a significant difference in the evaluation of the usage of BI tools with the F-value = 14.681, $p<0.001$. Post hoc analysis was conducted; the results are shown in table 3.7 below.

Table 3.6: Descriptive statistics between department and evaluation of usage of BI technologies

What department do you work in?	Mean	N	Std. Deviation
Accounting	4.00	10	1.633
Sales and administrative	3.30	23	1.020
Operations and manufacturing	3.40	5	.548
IT	4.36	11	.505
Other	2.10	21	.301
Total	3.21	70	1.203
F-value			14.681
P-value			0.000

Table 3.7: Post hoc analysis between department and evaluation of usage of BI technologies

(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Accounting	Sales and administrative	.696	.340	.257	-.26	1.65
	Operations and manufacturing	.600	.492	.740	-.78	1.98
	IT	-.364	.392	.886	-1.46	.74
	Other	1.905*	.345	.000	.94	2.87
Sales and administrative	Accounting	-.696	.340	.257	-1.65	.26
	Operations and manufacturing	-.096	.443	1.000	-1.34	1.15
	IT	-1.059*	.329	.017	-1.98	-.14
	Other	1.209*	.271	.000	.45	1.97
Operations and manufacturing	Accounting	-.600	.492	.740	-1.98	.78
	Sales and administrative	.096	.443	1.000	-1.15	1.34
	IT	-.964	.484	.283	-2.32	.40
	Other	1.305*	.447	.037	.05	2.56
IT	Accounting	.364	.392	.886	-.74	1.46
	Sales and administrative	1.059*	.329	.017	.14	1.98
	Operations and manufacturing	.964	.484	.283	-.40	2.32
	Other	2.268*	.334	.000	1.33	3.21
Other	Accounting	-1.905*	.345	.000	-2.87	-.94
	Sales and administrative	-1.209*	.271	.000	-1.97	-.45
	Operations and manufacturing	-1.305*	.447	.037	-2.56	-.05
	IT	-2.268*	.334	.000	-3.21	-1.33

*. The mean difference is significant at the 0.05 level.

57.1% agreed that: “in general, is it necessary to have the business intelligence information in your firm”; and 62.9% agreed that: “your organisation need to provide more information on Business Intelligence to employees” as shown by table 3.6 below.

Majority of the respondents (24.3%) agreed that in their organization, there is a quick adaptation to the use of BI; 38.6% agreed that employees have quickly responded to the need of business intelligence information in the firm; and 35.7% agreed that the speed of employee adjustment to the use of business intelligence information is good as shown by table 3.7 below.

Table 3.8: Company motivation

		Frequency	Percent	Mean	SD
In general, is it necessary to have the business intelligence information in your firm	Strongly disagree	2	2.9	3.67	1.018
	Disagree	11	15.7		
	Neutral	6	8.6		
	Agree	40	57.1		
	Strongly agree	11	15.7		
Do you agree that your organisation need to provide more information on Business Intelligence to employees?	Strongly disagree	2	2.9	3.79	0.931
	Disagree	7	10.0		
	Neutral	6	8.6		
	Agree	44	62.9		
	Strongly agree	11	15.7		
	Total	70	100.0		

Table 3.9: Speed of Adoption

		Frequency	Percent	Mean	SD
In my organization, there is a quick adaptation to the use of BI	Strongly disagree	7	10.0	3.26	1.293
	Disagree	15	21.4		
	Neutral	16	22.9		
	Agree	17	24.3		
	Strongly agree	15	21.4		
Employees agreed that they have responded quickly to the need of business intelligence information in the firm	Strongly disagree	8	11.4	3.13	1.250
	Disagree	18	25.7		
	Neutral	9	12.9		
	Agree	27	38.6		
	Strongly agree	8	11.4		
Employees agreed that they have adjusted to the use of business intelligence information	Strongly disagree	2	2.9	3.31	1.149
	Disagree	21	30.0		
	Neutral	11	15.7		
	Agree	25	35.7		
	Strongly agree	11	15.7		
	Total	70	100.0		

Most of the employees (27.1%) pay much attention to business intelligence information; and 32.9% of the respondents strongly agreed that employees react positively if there is a presence of Business Information needs.

25.7% of the employees agreed that they are content with the system of skills acquisition for BI provided by their organisation; 27.1% of the employees strongly agreed that: "with the new strategy of business intelligence in place, I get excited about working as I am convinced that my firm is enjoying competition over the rival firms"; 24.3% agreed that: "the BI tools have made my work easier that the day go by without me noticing"; 37.1% agreed that: "BI helped you achieve joint goals with other employees and create an intelligence culture in the company"; and 25.7% agreed that: "I trust BI tools that I use in meeting my needs".

Approximately 30% agreed that: "presence of business intelligence information in my firm will help me to remain competitive" as shown by table 3.10 below.

40% of the respondents agreed that apart from the IT department, very few members of staff have knowledge of Business Intelligence with a mean of 3.84; 30% agreed that employees are being informed on BI is good (mean= 3.31); 37.1% agreed that: "the measures to inform the employees about BI in your organisation are effective" (mean = 2.99); and 25.7% agreed that BI tools assist employees well in meeting their goals (mean = 3.29) as shown by the table 3.11 below.

Table 3.10: Perceived performance

		Frequency	Percent	Mean	SD
Employees agreed that they pay attention to business intelligence information	Strongly disagree	8	11.4	3.19	1.300
	Disagree	16	22.9		
	Neutral	14	20.0		
	Agree	19	27.1		
	Strongly agree	13	18.6		
Employees react positively on the presence of Business Information needs	Strongly disagree	14	20.0	3.26	1.567
	Disagree	13	18.6		
	Neutral	7	10.0		
	Agree	13	18.6		
	Strongly agree	23	32.9		
	Total	70	100.0		

Table 3.11: Satisfaction

		Frequency	Percent	Mean	SD
I am content with the BI system skills acquisition that my organization offers.	Strongly disagree	12	17.1	3.21	1.382
	Disagree	9	12.9		
	Neutral	16	22.9		
	Agree	18	25.7		
	Strongly agree	15	21.4		
With the new strategy of business intelligence in place, I get excited about working as I am convinced that my firm is enjoying competition over the rival firms.	Strongly disagree	8	11.4	3.29	1.364
	Disagree	14	20.0		
	Neutral	17	24.3		
	Agree	12	17.1		
	Strongly agree	19	27.1		
The BI tools have made my work easier that the day go by without me noticing	Strongly disagree	15	21.4	3.07	1.407
	Disagree	8	11.4		
	Neutral	17	24.3		
	Agree	17	24.3		
	Strongly agree	13	18.6		
BI helped you achieve joint goals with other employees and create an intelligence culture in the company?	Strongly disagree	14	20.0	2.99	1.302
	Disagree	11	15.7		
	Neutral	13	18.6		
	Agree	26	37.1		
	Strongly agree	6	8.6		
I trust BI tools that I use in meeting my needs	Strongly disagree	6	8.6	3.29	1.309
	Disagree	18	25.7		
	Neutral	12	17.1		
	Agree	18	25.7		
	Strongly agree	16	22.9		
	Total	70	100.0		

The data from Tables 3.8 – 3.13 are further summarized in the Table 3.14 below, ranking by the added values of "Agree" and "Strongly agree" in diminishing order to round up the questions that have gained most positive answers.

From Table 3.14, it can be seen that the questions that have gained most positive answers are, on one hand, the ones regarding the expectations of employees towards the value of BI, and at the same time the lack of required knowledge to utilize BI potential.

Table 3.12: External effectiveness

		Frequency	Percent	Mean	SD
Presence of business intelligence information in my firm will help me to remain competitive	Strongly disagree	8	11.4	3.23	1.265
	Disagree	13	18.6		
	Neutral	16	22.9		
	Agree	21	30.0		
	Strongly agree	12	17.1		
	Total	70	100.0		

Table 3.13: Internal effectiveness

		Frequency	Percent	Mean	SD
Very few staffs mainly from the IT department have knowledge on business intelligence	Strongly disagree	2	2.9	3.84	1.016
	Disagree	5	7.1		
	Neutral	15	21.4		
	Agree	28	40.0		
	Strongly agree	20	28.6		
Employees agreed that their level of being informed is satisfactory	Strongly disagree	8	11.4	3.31	1.314
	Disagree	13	18.6		
	Neutral	13	18.6		
	Agree	21	30.0		
	Strongly agree	15	21.4		
The measures to inform the employees about BI in your organisation are effective	Strongly disagree	14	20.0	2.99	1.302
	Disagree	11	15.7		
	Neutral	13	18.6		
	Agree	26	37.1		
	Strongly agree	6	8.6		
BI tools assist employees well in meeting their goals	Strongly disagree	6	8.6	3.29	1.331
	Disagree	18	25.7		
	Neutral	14	20.0		
	Agree	14	20.0		
	Strongly agree	18	25.7		
	Total	70	100.0		

The majority of the respondents agreed that the word “INNOVATIVE” describes the planned implementation of Business Intelligence information in their firm “slightly well” (25.7%); followed by “extremely well” (22.9%); “very well” (22.9%); “moderately well” (18.6%); and “not at all well” (10%) with a mean of 3.23. Approximately 24.3% of the respondents agreed that the phrase “HIGH QUALITY” illustrates this new service of

BI in their organisation “moderately well”, and “extremely well” followed by “very well” (21.4%), “slightly well” (15.7%), and “not at all well” (14.3%) with a mean of 3.26 as shown in Table 3.12 below.

Table 3.14: Responses of Likert scale questions

Questions	Agree	Strongly agree
1. **Do you agree that your organisation need to provide more information on Business Intelligence to employees?**	44	11
2. **In general, is it necessary to have the business intelligence information in your firm**	40	11
3. **Very few staffs mainly from the IT department have knowledge on business intelligence**	28	20
4. Employees react positively on the presence of Business Information needs	13	23
5. Employees agreed that their level of being informed is satisfactory	21	15
6. Employees agreed that they have adjusted to the use of business intelligence information	25	11
7. Employees agreed that they have responded quickly to the need of business intelligence information in the firm	27	8
8. I trust BI tools that I use in meeting my needs	18	16
9. I am content with the BI system skills acquisition that my organization offers	18	15
10. Presence of business intelligence information in my firm will help me to remain competitive	21	12
11. BI tools assist employees well in meeting their goals	14	18
12. In my organization, there is a quick adaptation to the use of BI	17	15
13. Employees agreed that they pay attention to business intelligence information	19	13
14. BI helped you achieve joint goals with other employees and create an intelligence culture in the company?	26	6
15. The measures to inform the employees about BI in your organisation are effective	26	6
16. With the new strategy of business intelligence in place, I get excited about working as I am convinced that my firm is enjoying competition over the rival firms.	12	19
17. The BI tools have made my work easier that the day go by without me noticing	17	13

Table 3.15: Relating "Innovative" and "High Quality" to BI

		Frequency	Percent	Mean	SD
How well does the phrase "INNOVATIVE" describe the planned implementation of business intelligence information in your firm?	Not at all well	7	10.0	3.23	1.332
	Slightly well	18	25.7		
	Moderately well	13	18.6		
	Very well	16	22.9		
	Extremely well	16	22.9		
How well does the expression "HIGH QUALITY" illustrate this new service of BI in your organization?	Not at all well	10	14.3	3.26	1.369
	Slightly well	11	15.7		
	Moderately well	17	24.3		
	Very well	15	21.4		
	Extremely well	17	24.3		
	Total	70	100.0		

Most of the employees (30%) use the BI service "slightly often", followed by "extremely often" (24.29%), "moderately often" (21.43%), "very often" (17.14%), and "not at all often" (7.14%), as presented in Figure 3.5 below.

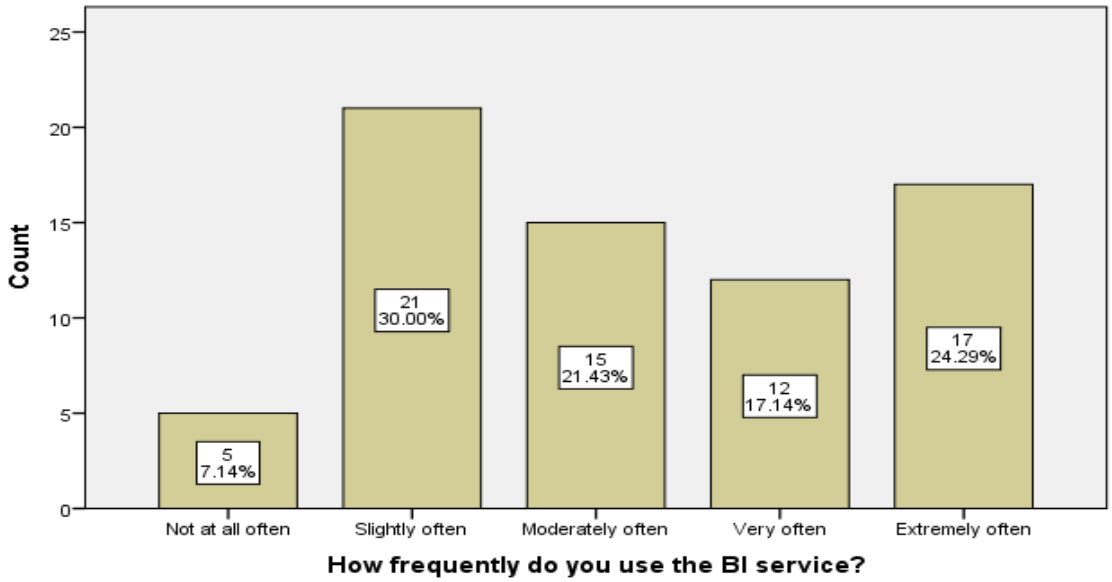

Figure 3.4: The usage of BI service

Approximately 38.57% of the respondents thought that a BI service is a "need", followed by those who think that it is a "want" (32.86%), and "both equally" (28.57%).

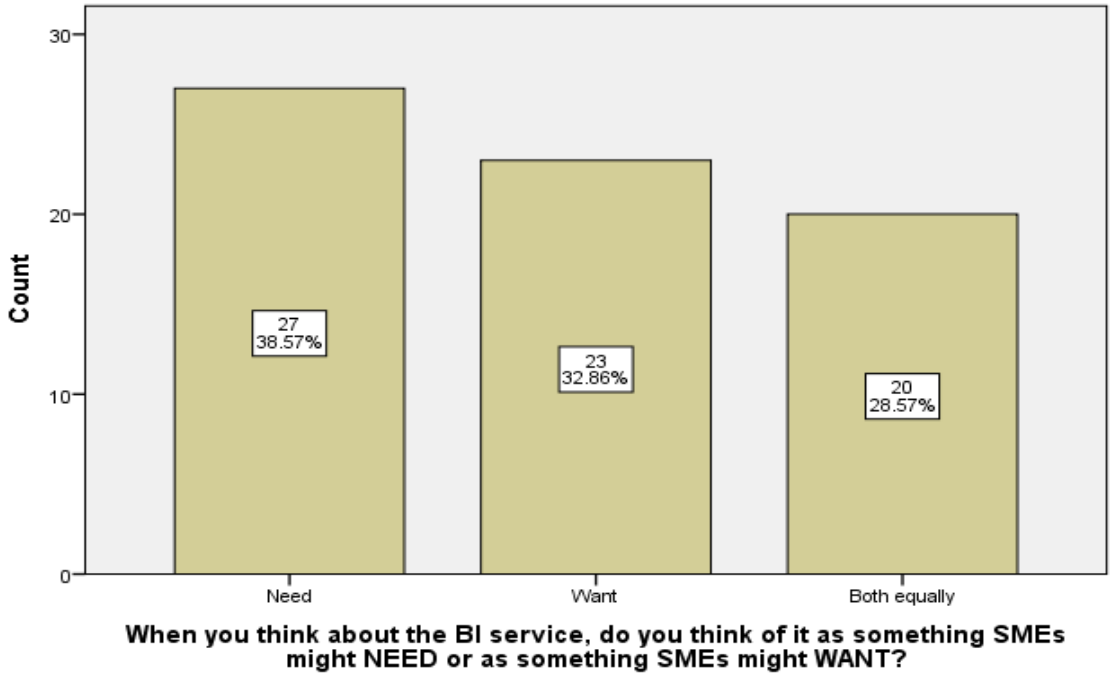

Figure 3.5. The need and want of a BI service

A one-way analysis of variance (ANOVA) is normally used when we what to test the significant mean differences between the categorical independent variable (with two or more categories) and a normally distributed interval dependent variable. For instance, ANOVA test was conducted to determine the significant difference between various departments (categorical variables) and the different dependent variables in the study (normally distributed variables).

From the analysis it is evident that there is significant mean difference between department and speed of adoption with the F-value = 35.119, $p<0.001$; perceived importance with F-value = 35.841, $p<0.001$; satisfaction with F-value = 54.693; $p<0.001$; external effectiveness with F-value = 10.277, $p<0.001$; and Internal effectiveness with the F-value = 35.977, $p<0.001$. Tukey HSD post hoc analysis was conducted and it is as shown in the table 3.17 below.

Table 3.16: Descriptive analysis between department and other variables

Department	Company motivation			Speed of adoption			Perceived importance			Satisfaction			External effectiveness			Internal effectiveness		
	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median
Accounting	3.90	.876	4.00	4.33		4.33	4.40	.615	4.50	4.46	.19	4.50	4.30	.95	4.50	4.40	.13	4.50
Sales and Administrative	3.91	.733	4.00	3.38	.93	3.33	3.37	.98	3.50	3.26	.84	3.20	3.09	.95	3.00	3.46	.80	3.25
IT	3.55	1.036	4.00	4.33	.29	4.33	4.55	.27	4.50	4.45	.16	4.40	4.27	.91	4.00	4.27	.21	4.25
Operations and Manufacturing	4.20	0.837	4.00	3.47	0.18	3.33	3.60	.42	3.50	3.44	.52	3.00	3.40	.55	3.00	2.90	.14	2.75
Other	3.43	1.121	4.00	1.92	.66	2.00	1.71	.75	1.50	1.71	.58	1.40	2.29	1.23	2.00	2.38	.44	2.25
Total	3.73	.947	4.00	3.23	1.15	3.33	3.22	1.32	3.50	3.17	1.23	3.20	3.23	1.26	3.00	3.36	.933	3.25
F-value			1.259			35.119			35.841			54.693			10.277			35.977
P-value			.295			.000			.000			.000			.000			0.000

Table 3.17: Tukey HSD post hoc analysis

Dependent Variable	(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Company motivation	Accounting	Sales and administrative	-.013	.356	1.000	-1.01	.99
		Operations and manufacturing	-.300	.515	.977	-1.74	1.14
		IT	.355	.411	.909	-.80	1.51
		Other	.471	.361	.689	-.54	1.48
	Sales and administrative	Accounting	.013	.356	1.000	-.99	1.01
		Operations and manufacturing	-.287	.464	.972	-1.59	1.01
		IT	.368	.344	.823	-.60	1.33
		Other	.484	.284	.436	-.31	1.28
	Operations and manufacturing	Accounting	.300	.515	.977	-1.14	1.74
		Sales and administrative	.287	.464	.972	-1.01	1.59
		IT	.655	.507	.697	-.77	2.08
		Other	.771	.468	.472	-.54	2.08
	IT	Accounting	-.355	.411	.909	-1.51	.80
		Sales and administrative	-.368	.344	.823	-1.33	.60
		Operations and manufacturing	-.655	.507	.697	-2.08	.77
		Other	.117	.350	.997	-.86	1.10
	Other	Accounting	-.471	.361	.689	-1.48	.54
		Sales and administrative	-.484	.284	.436	-1.28	.31
		Operations and manufacturing	-.771	.468	.472	-2.08	.54
		IT	-.117	.350	.997	-1.10	.86

Dependent Variable	(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Speed of adoption	Accounting	Sales and administrative	.95652*	.25234	.003	.2485	1.6645
		Operations and manufacturing	.86667	.36488	.135	-.1571	1.8905
		IT	.00000	.29107	1.000	-.8167	.8167
		Other	2.41270*	.25595	.000	1.6945	3.1309
	Sales and administrative	Accounting	-.95652*	.25234	.003	-1.6645	-.2485
		Operations and manufacturing	-.08986	.32872	.999	-1.0122	.8325
		IT	-.95652*	.24421	.002	-1.6417	-.2713
		Other	1.45618*	.20107	.000	.8920	2.0203
	Operations and manufacturing	Accounting	-.86667	.36488	.135	-1.8905	.1571
		Sales and administrative	.08986	.32872	.999	-.8325	1.0122
		IT	-.86667	.35931	.125	-1.8748	.1415
		Other	1.54603*	.33150	.000	.6159	2.4762
	IT	Accounting	.00000	.29107	1.000	-.8167	.8167
		Sales and administrative	.95652*	.24421	.002	.2713	1.6417
		Operations and manufacturing	.86667	.35931	.125	-.1415	1.8748
		Other	2.41270*	.24795	.000	1.7170	3.1084
	Other	Accounting	-2.41270*	.25595	.000	-3.1309	-1.6945
		Sales and administrative	-1.45618*	.20107	.000	-2.0203	-.8920
		Operations and manufacturing	-1.54603*	.33150	.000	-2.4762	-.6159
		IT	-2.41270*	.24795	.000	-3.1084	-1.7170

Dependent Variable	(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Perceived importance	Accounting	Sales and administrative	1.03043*	.28664	.005	.2262	1.8347
		Operations and manufacturing	.80000	.41448	.312	-.3630	1.9630
		IT	-.14545	.33064	.992	-1.0732	.7823
		Other	2.68571*	.29075	.000	1.8699	3.5015
	Sales and administrative	Accounting	-1.03043*	.28664	.005	-1.8347	-.2262
		Operations and manufacturing	-.23043	.37340	.972	-1.2781	.8173
		IT	-1.17589*	.27741	.001	-1.9543	-.3975
		Other	1.65528*	.22840	.000	1.0144	2.2961
	Operations and manufacturing	Accounting	-.80000	.41448	.312	-1.9630	.3630
		Sales and administrative	.23043	.37340	.972	-.8173	1.2781
		IT	-.94545	.40815	.153	-2.0907	.1997
		Other	1.88571*	.37656	.000	.8292	2.9423
	IT	Accounting	.14545	.33064	.992	-.7823	1.0732
		Sales and administrative	1.17589*	.27741	.001	.3975	1.9543
		Operations and manufacturing	.94545	.40815	.153	-.1997	2.0907
		Other	2.83117*	.28165	.000	2.0409	3.6214
	Other	Accounting	-2.68571*	.29075	.000	-3.5015	-1.8699
		Sales and administrative	-1.65528*	.22840	.000	-2.2961	-1.0144
		Operations and manufacturing	-1.88571*	.37656	.000	-2.9423	-.8292
		IT	-2.83117*	.28165	.000	-3.6214	-2.0409

Dependent Variable	(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Satisfaction	Accounting	Sales and administrative	1.19913*	.22884	.000	.5571	1.8412
		Operations and manufacturing	1.02000*	.33090	.024	.0916	1.9484
		IT	.00545	.26397	1.000	-.7352	.7461
		Other	2.74571*	.23212	.000	2.0944	3.3970
	Sales and administrative	Accounting	-1.19913*	.22884	.000	-1.8412	-.5571
		Operations and manufacturing	-.17913	.29810	.974	-1.0156	.6573
		IT	-1.19368*	.22147	.000	-1.8151	-.5723
		Other	1.54658*	.18234	.000	1.0350	2.0582
	Operations and manufacturing	Accounting	-1.02000*	.33090	.024	-1.9484	-.0916
		Sales and administrative	.17913	.29810	.974	-.6573	1.0156
		IT	-1.01455*	.32585	.022	-1.9288	-.1003
		Other	1.72571*	.30063	.000	.8822	2.5692
	IT	Accounting	-.00545	.26397	1.000	-.7461	.7352
		Sales and administrative	1.19368*	.22147	.000	.5723	1.8151
		Operations and manufacturing	1.01455*	.32585	.022	.1003	1.9288
		Other	2.74026*	.22486	.000	2.1094	3.3712
	Other	Accounting	-2.74571*	.23212	.000	-3.3970	-2.0944
		Sales and administrative	-1.54658*	.18234	.000	-2.0582	-1.0350
		Operations and manufacturing	-1.72571*	.30063	.000	-2.5692	-.8822
		IT	-2.74026*	.22486	.000	-3.3712	-2.1094

Dependent Variable	(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
External effectiveness	Accounting	Sales and administrative	1.21304*	.38627	.021	.1292	2.2968
		Operations and manufacturing	.90000	.55854	.496	-.6672	2.4672
		IT	.02727	.44556	1.000	-1.2229	1.2774
		Other	2.01429*	.39180	.000	.9150	3.1136
	Sales and administrative	Accounting	-1.21304*	.38627	.021	-2.2968	-.1292
		Operations and manufacturing	-.31304	.50318	.971	-1.7249	1.0988
		IT	-1.18577*	.37383	.019	-2.2347	-.1369
		Other	.80124	.30779	.082	-.0624	1.6648
	Operations and manufacturing	Accounting	-.90000	.55854	.496	-2.4672	.6672
		Sales and administrative	.31304	.50318	.971	-1.0988	1.7249
		IT	-.87273	.55002	.511	-2.4160	.6705
		Other	1.11429	.50744	.194	-.3095	2.5381
	IT	Accounting	-.02727	.44556	1.000	-1.2774	1.2229
		Sales and administrative	1.18577*	.37383	.019	.1369	2.2347
		Operations and manufacturing	.87273	.55002	.511	-.6705	2.4160
		Other	1.98701*	.37955	.000	.9221	3.0520
	Other	Accounting	-2.01429*	.39180	.000	-3.1136	-.9150
		Sales and administrative	-.80124	.30779	.082	-1.6648	.0624
		Operations and manufacturing	-1.11429	.50744	.194	-2.5381	.3095
		IT	-1.98701*	.37955	.000	-3.0520	-.9221

Dependent Variable	(I) What department do you work in?	(J) What department do you work in?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Internal effectiveness	Accounting	Sales and administrative	.94348*	.20312	.000	.3736	1.5134
		Operations and manufacturing	1.50000*	.29371	.000	.6759	2.3241
		IT	.12727	.23430	.982	-.5301	.7847
		Other	2.01905*	.20603	.000	1.4410	2.5971
	Sales and administrative	Accounting	-.94348*	.20312	.000	-1.5134	-.3736
		Operations and manufacturing	.55652	.26460	.231	-.1859	1.2989
		IT	-.81621*	.19658	.001	-1.3678	-.2646
		Other	1.07557*	.16185	.000	.6215	1.5297
	Operations and manufacturing	Accounting	-1.50000*	.29371	.000	-2.3241	-.6759
		Sales and administrative	-.55652	.26460	.231	-1.2989	.1859
		IT	-1.37273*	.28922	.000	-2.1842	-.5612
		Other	.51905	.26684	.304	-.2297	1.2677
	IT	Accounting	-.12727	.23430	.982	-.7847	.5301
		Sales and administrative	.81621*	.19658	.001	.2646	1.3678
		Operations and manufacturing	1.37273*	.28922	.000	.5612	2.1842
		Other	1.89177*	.19958	.000	1.3318	2.4518
	Other	Accounting	-2.01905*	.20603	.000	-2.5971	-1.4410
		Sales and administrative	-1.07557*	.16185	.000	-1.5297	-.6215
		Operations and manufacturing	-.51905	.26684	.304	-1.2677	.2297
		IT	-1.89177*	.19958	.000	-2.4518	-1.3318
*. The mean difference is significant at the 0.05 level.							

In the table above, low levels of Sigma denote significant differences in how respondents from different departments provide their responses. It is interesting to note that frequent differences are observed between the departments of *IT* and *Sales and administrative.* This can be explained by the opinions of IT department as a service provider, who see BI issues from the technical possibility point of view, as opposed to Sales and administrative

department that deals with business process needs on a daily basis. Moreover, the assorted other departments unified under the name "Other" have constant significant differences with all other departments that directly participate in the value chain.

3.3 Regression analysis

Relationship between External effectiveness and independent variables

Regression analysis was conducted to determine the relationship between independent variables (Company motivation, speed of adoption, perceived importance and satisfaction) and the dependent variable (external effectiveness).

Table 3.18: Model summary of independent variables and external effectiveness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.711[a]	.505	.475	.91660	.505	16.584	4	65	.000	1.963

a. Predictors: (Constant), Satisfaction, Company motivation, Perceived importance, Speed of adoption

b. Dependent Variable: External effectiveness

All independent variables predict external effectiveness by 50.5% as shown by the table above.

Table 3.19: ANOVA of independent variables and external effectiveness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.733	4	13.933	16.584	.000[b]
	Residual	54.610	65	.840		
	Total	110.343	69			

a. Dependent Variable: External effectiveness

b. Predictors: (Constant), Satisfaction, Company motivation, Perceived importance, Speed of adoption

From the ANOVA table above it is established that r and R2 is significant as an F statistic with the F-value (4, 65) = 16.584, $p<0.001$. Therefore, we can conclude that there is statistically significant variability between the variables, so the test is good fit for data, and regression analysis can be conducted successfully.

Table 3.20: Regression coefficients of independent variables and external effectiveness

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.920	.509		3.769	.000	.903	2.937		
	Company motivation	-.224	.120	-.168	-1.866	.067	-.464	.016	.942	1.061
	Speed of adoption	-.300	.263	-.272	-1.141	.258	-.824	.225	.134	7.482
	Perceived importance	.102	.223	.106	.458	.649	-.343	.547	.142	7.049
	Satisfaction	.879	.269	.851	3.262	.002	.341	1.417	.112	8.949

a. Dependent Variable: External effectiveness

The relationship between satisfaction and external effectiveness of the BI system is positive (0.879) and significant with the t-value = 3.262, $p<0.01$. In addition, there is insignificant positive relationship between external effectiveness and perceived importance (0.102), and negative relationship with speed of adoption (-0.300); and company motivation (-0.224). Therefore, the linear equation will be:

$y= x_1 (-0.224) + x_2 (-0.300) + x_3 (0.102) + x_4 (0.879) + 1.920$

Where

y = external effectiveness
x_1 = company motivation
x_2 = speed of adoption
x_3 = perceived importance
x_4 = satisfaction

From the analysis it is evident that the collinearity tests indicate that the values range from 1-10 indicating that there is no multicollinearity effect on the predicting variables. Thus, we can conclude that satisfaction positively influences the external effectiveness of the BI system. The company should ensure that employees are satisfied with the BI system in the organization in order to increase external effectiveness of the

BI system and increase the performance of the company. The next step has been conducted with variables “Company motivation”, “Speed of adoption” and “Perceived importance” omitted because of low Sigma levels. The results are presented below in Table 3.21.

Table 3.21: Regression between satisfaction and external effectiveness

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.010	.312		3.237	.002	.516	1.849		
	Satisfaction	.700	.92	.678	7.610	.000	.533	1.455	1.000	1.000
	R square	0.475								
	F-value	30.315								
	P-value	0.001								

a. Dependent Variable: External effectiveness

The regression analysis indicates that speed of adoption and satisfaction predicts 47.5% of the external effectiveness. The r and R^2 are relevant and significant for the F-statistics. The relationship between satisfaction and external effectiveness is positive (0.7) and significant with the t-value = 4.307, $p<0.001$. Therefore, the linear equation will be:

$y= 1{,}010 + x_1 (0.7)$

Where

y = external effectiveness

x_1 = satisfaction

Therefore, we can conclude that satisfaction predicts significantly the external effectiveness of the BI system in the SME sector.

Relationship between Internal effectiveness and independent variables

Regression analysis was also conducted to determine the relationship between independent variables (Company motivation, speed of adoption, perceived importance and satisfaction) and the dependent variable (internal effectiveness).

Table 22: Model summary of independent variables and internal effectiveness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.931[a]	.866	.858	.35158	.866	105.246	4	65	.000	2.221

a. Predictors: (Constant), Satisfaction, Company motivation, Perceived importance, Speed of adoption

b. Dependent Variable: Internal effectiveness

All independent variables predict internal effectiveness by 86.6% as shown by the table above.

Table 23: ANOVA test of independent variables and internal effectiveness

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.037	4	13.009	105.246	.000[b]
	Residual	8.035	65	.124		
	Total	60.071	69			

a. Dependent Variable: Internal effectiveness

b. Predictors: (Constant), Satisfaction, Company motivation, Perceived importance, Speed of adoption

From the ANOVA table above it is established that r and R2 is significant as an F statistic with the F-value (4, 65) = 105.246, $p<0.001$. Therefore, we can conclude that there is statistically significant variability between the variables and thus the test is good fit for data and thus regression analysis can be conducted.

Table 24: Regression coefficients of independent variables and internal effectiveness

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.036	.195		5.301	.000	.646	1.426		
	Company motivation	-.027	.046	-.027	-.579	.564	-.119	.065	.942	1.061
	Speed of adoption	.467	.101	.575	4.634	.000	.266	.668	.134	7.482
	Perceived importance	.047	.085	.067	.553	.582	-.123	.218	.142	7.049
	Satisfaction	.240	.103	.315	2.320	.023	.033	.446	.112	8.949

a. Dependent Variable: Internal effectiveness

The relationship between satisfaction (0.240) and speed of adoption (0.467) and internal effectiveness of the BI system is positive and significant with $p<0.05$. In addition, there is insignificant positive relationship with perceived importance (0.047); and negative relationship with company motivation (-0.027). Therefore, the linear equation will be:

$y= x_1 (-0.027) + x_2 (-0.467) + x_3 (0.047) + x_4 (0.240) + 1.036$

Where

y = internal effectiveness

x_1 = company motivation

x_2 = speed of adoption

x_3 = perceived importance

x_4 = satisfaction

From the analysis, it appears that the collinearity test values range from 1-10, indicating that there is no multicollinearity effect on the predicting variables. In addition, taking into consideration the Sig. value, we can conclude that satisfaction positively influences internal effectiveness of the BI system, for instance, an increase in the satisfaction among employees on BI system will directly affect the internal effectiveness of the system in the organization. The company should ensure that employees are

satisfied with the BI system in order to increase internal effectiveness of the BI system. Therefore, company motivation, speed of adoption, and perceived importance should be dropped out and test the regression between satisfaction and internal effectiveness.

Table 3.25: Regression between satisfaction and internal effectiveness

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.184	.136		8.689	.000	.691	1.598		
	Satisfaction	.686	.040	.901	17.085	.000	.604	.766	1.000	1.000
	R square	0.811								
	F-value	291.885								
	P-value	0.001								

a. Dependent Variable: Internal effectiveness

The regression analysis indicates that company motivation and satisfaction predicts 81.1% of the internal effectiveness. The r and R^2 are relevant and significant for the F-statistics. The relationship between satisfaction and internal effectiveness is positive (0.686) and significant with the t-value = 17.085, $p<0.001$. The relationship between company motivation and internal effectiveness is positive and insignificant. Therefore, the linear equation will be:

$y= 1.184 + x_1 (0.686)$

Where

y = internal effectiveness

x_1 = satisfaction

Therefore, we can conclude that satisfaction predicts significantly the internal effectiveness of the BI system in the SME sector, and the data variation of internal effectiveness depends on the data variation of the satisfaction.

3.4 Qualitative analysis

Six managers from different SMEs have been interviewed. From the 6 questions used during the interview, four themes were developed using the thematic analysis. The process of thematic analysis involved:

1. Familiarization with the data: This process involved reading through the transcripts obtained from the interview process so that to be familiar with the data.
2. Coding is the next step which involves developing or generating codes that identify important features of the data and are relevant in answering research questions of the study. This involves coding entire data set and extracting all the codes for further analysis.
3. Searching for themes involves developing of potential themes by examining codes extracted from the data.
4. Reviewing themes: this step involves double-checking of the themes developed and determines whether they can actually give a story depending on the data and answer the research questions.
5. Defining and naming themes: This step involves developing a detailed analysis of all the themes developed and coming up with an informative name for each theme.
6. Write up: This is the last phase of thematic analysis that involves narrating the story from the themes using data extracts and answering the research questions.

Themes developed were as follows: Importance of reliable information in business; Knowledge about BI technologies and tools; Benefits of BI tools in the organization; and obstacles and barriers to successful usage and implementation of BI tools in the organization as shown by table 3.22.

Table 3.26: Themes and codes for qualitative analysis

Research Question	**Theme**	**Codes**
Success factors affecting implementation of BI system in SME	Importance of reliable information in business	Reliable information
		Robust decision making
		Management of resources
		Determine the gaps in the market
		Reduce the production costs
	Knowledge about BI technologies and tools	System for decision making
		Software for data analysis
		Technologies for analysis of raw data
		New concept in the SMEs
		Technology for planning, predicting, solving and explaining problems
	Benefits of BI tools in the organization	Improvement of decision making process at the management level
		Improved access to meaningful information
		Better market approach and growth
		Lower costs of production
		Better management of resources
	Obstacles and barriers to successful usage and implementation of BI tools	Lack of human capital
		Financial resources
		Cost of BI implementation
		Lack of control over data

Table 3.27: Interview results

	Important	Very important
How important is the insightful and reliable information to your business? For general informing and for decision making	2	6
How well are you aware of Business intelligence tools and techniques? Do you have experience with them?	3	3
Do you think BI tools and techniques would be important to you? Justify your answer	4	2
Do you agree that the implementation of the Business intelligence tools and techniques would enhance the decision making in your organizations? Why?	2	4

Six (n=6) highlighted that reliable information is very important while two (n=2) stated that the information is important. Managers understand that knowledge of BI techniques and tools is important (n=3) and very important (n=3). Four managers understand that BI tools and techniques are important while two managers stated that tools and techniques are very important. Two managers stated that BI tools and techniques are very important in enhancing decision making in the organization while four managers stated that it is important. Reasons behind the explanation is provided as below.

Importance of reliable information in business

All the managers agreed unanimously that reliable and robust information is essential in business since it plays a major role in making meaningful decisions that will help the organization to grow and compete with other organizations. They also stated that reliable information helps to manage resources in a rational way, determine the gaps in the market and reduce the production costs.

One manager stated that:

> "*Our SMEs have been relying on the reliable information in making decisions since we been able to penetrate the market easily using the information*."

Another respondent stated that:

> "*Reliable information is essential since it has enabled us to manage the resources in the organization easily without any challenges and distribute the resources adequately in different departments thus enhancing efficiency*."

Knowledge about BI technologies tools

Most managers had diverse opinions regarding BI technologies. Three out of the five managers had good knowledge of BI technologies while the other two were not very well conversant with BI.

One participant stated that:

> "*Business Intelligence system is a system that can be used by the management to make decisions based on the results obtained from the data analysis conducted by the introduction of the use of software in the organization*."

Another participant stated that:

"*BI technologies can be referred to as technologies that can be adopted by the company to help the organization to successful collect, analyze and interpret the readily available raw data into meaningful information that can be used for decision making by the management*."

"*BI technologies is a new concept in the SME sector since most of the SMEs are still using spreadsheets and reporting tools but do not have up to date database that can help them to make decisions based on the available data*." (Manager 3)

"*BI system is an important aspect of the company that can be adopted by the company in order to help the SME to determine the capability of the organization through planning, predicting, solving and explaining problems that can be used to effectively to help the organization to achieve its goals and compete healthy with other organizations across the globe*." (Manager 4)

Benefits of BI tools in the organization

It was quite evident that managers linked BI tools to the improvement of decision-making process at the management level, improved access to meaningful information, better market approach and growth, lower costs of production and better management of resources.

"*BI technologies help the organization to have a competitive advantage over other organizations since the analyzed information from the relevant raw data helps the management to make decisions on best approaches that will help them gain market strength and thus compete better with other organizations*."

Another manager highlighted that:

"*Application of the BI technology is very helpful in the organization since it enables the management to understand the usage of resources across different departments and therefore have the mechanisms to reduce resource wastage and invest wisely*."

Another participant stated:

"*Understanding the performance of organization using the relevant and meaningful information is key to success and better management of the organization*."

"*Most organizations which have implemented BI technologies have been in the forefront in ensuring that they have lower costs of production and increase their returns and profits to enhance their growth*." (Manager 5).

Obstacles and barriers affecting implementation of the BI tools in the organization

Managers had different opinions regarding the implementation of the BI technologies in their organization. They highlighted that lack of human capital, financial resources, cost of BI implementation, and lack of control over data.

One manager highlighted that:

"*In my SME it is difficult to implement BI tools because currently I do not have adequate financial resources to adopt the system, train or hire skilled employees who can work with the system with minimal supervisions and support*."

Another manager stated that:

"*We have not adopted the BI system in our organization or SME because we do not have skilled human capital who can operate and help the organization achieve its goals through the adoption of the new system*."

Another respondent stated:

"*Lack of control over data is one of the challenges and obstacles to the implementation of the BI system. The system requires enough and large quantity of data that can be analyzed into meaningful information that can be used to make decisions in the organization*."

"*Cost of BI technologies is far from our reach because we have faced stiff challenges and our business is not making enough profit and returns to allow us to invest in a new technology which is associated with different costs such as purchase costs, training and hiring of new skilled staff among others*." (Manager 4)

In conclusion, we can note that in all interviews there is an expressed need to utilize BI potential, whose benefits are clearly understood. Having adequate knowledge about BI technologies and tools enables employees to understand the importance of reliable information in business, get the better perception about the benefits of the BI tools in the organization. The need to utyilize BI potential is complicated by obstacles and barriers such as lack of human capital, financial resources, cost of BI implementation and lack of control over quality of data – all these issues impair the implementation of BI systems.

3.5 Conclusions, Recommendations and Limitations

3.5.1 Conclusions

1. The analysis of the published research on the selected problem area has shown that, although business intelligence is a recognized approach for value creation in business, its role in small and medium businesses is significantly under-researched. This is even more specific for Middle East countries like Lebanon, where the specifics of conducting business add their own features to the problematic of BI implementation in SMEs.
2. The study, based on the results of empirical research, established four important factors that are critical to the successful implementation of BI technology in SMEs in Lebanon. These are company motivation, perceived importance, speed of adoption and satisfaction.
3. The level of acceptance and usage of BI system in SMEs is low, as it is shown from the analysis that only 23.21% and 16.07% participants agreed and strongly agreed that companies use technologies that are recognised as BI technologies. This indicates that majority of the companies still use traditional IT systems of simple information reporting and data storage, traditional information systems and approaches, such as spreadsheets.
4. The survey has established that several tools, methods, and applications are applied in Business Intelligence to enable businesses to collect data from external sources and internal systems. Most surveyed organizations that have adopted BI system understand it as a tool for decision making and creation of a favourable information environment.
5. The survey found that special analytical skills are needed to properly utilize BI system, as agreed by 33.9% of the respondents. It is also evident that very few members of staff have knowledge on BI system (40%); 25.7% agreed that they are content with the system of skills acquisition for BI provided by their organisation. The finding collaborates with Dhebar (1993), Kling (1996), and Sjoberg (2002) who stated that human skills and competencies are key when solving problems and making decisions in an organisation and play an important role in contributing to the organisation's healthy competition. Managers in the

interview also indicated the lack of skilled personnel as one of the challenges affecting their SMEs in the adoption of the BI technology in their organizations.

6. The majority of the respondents perceive that the presence of Business Intelligence information in their firm will help the firm to remain competitive. The main competences that will help the firm to remain competitive due to the presence of Business Intelligence include better understanding of the core competences of the company, analysing collected data, better understanding of the needs and wants of the customers and better decisions as a result.
7. From the regression analysis it is evident that there is a significant relationship between the independent variables (Company motivation, speed of adoption, perceived importance and satisfaction) and the dependent variable (external effectiveness). Out of the four independent variables, the relationship between satisfaction and external effectiveness is positive (0.994) and significant with the t-value = 4.307, $p<0.001$. Thus, we can conclude that satisfaction positively influences the external effectiveness of the BI system. The management should work together with IT staff to ensure that employees are satisfied with the BI system in the organization in order to increase external effectiveness of the BI system and increase the performance of the company.
8. Based on the results of regression analysis, it can also be concluded that there is a significant relationship between the independent variables (Company motivation, speed of adoption, perceived importance and satisfaction) and the dependent variable (internal effectiveness). The relationship between satisfaction (0.240) and speed of adoption (0.467) and internal effectiveness of the BI system is positive and significant with $p<0.05$. As in the previous conclusion regarding the external effectiveness, satisfaction positively influences internal effectiveness of the BI system, and the management should ensure that employees are satisfied with the BI system in order to increase internal effectiveness of the BI system.
9. In interviews, managers agreed that BI tools are important in the organization since they help the top management to understand resource management and distribution in other departments, reduce the cost of production and also understand the gaps in the market and come up with the strategies to gain the competitive advantage over other companies. The inability to use BI system in the

organization were as a result of lack of human capital, adequate resources, costs implications as indicated by the managers as the main obstacles or barriers to the usage of BI in the organization.

10. The joint conclusion of the dissertation is that for small and medium enterprises in Lebanon, BI implementation is seen as a contemporary management technique that has a considerable potential to support better decisions, and increase competitiveness, effectiveness of business processes and use of resources as a result. However, the limiting factors are the size of required investment into BI systems and required levels of BI competence. For further research, it is assumed that the results may be transferrable to other economic environments related to Lebanon in terms of structure and tradition.

3.5.2 Recommendations

The followings are the recommendations of the dissertation:

1. The management of SMEs need to establish a BI vision and create awareness among the key stakeholders, business partners and the organisation, since it is evident from the findings of the dissertation that the majority of the participants have expectations to have the Business Intelligence information in their organisations.
2. The management should determine the overall role that BI will play in driving business strategy, enhancing the business vision and specifically helping them to remain competitive in the business world. The limited financial strength of SMEs directs the decision to invest into BI towards a match between most acute intelligence information needs and affordable yet effective BI technologies.
3. The management should invest in human resources by employing skilled personnel and build the capacity of the already existing employees, in terms of trainings and workshops on the effective management of the chosen BI system, in order to help them handling, utilizing and making decisions that help the organization to remain competitive since the BI use requires complex and analytical skills.

4. Perceived performance and satisfaction contributes heavily in the effectiveness of the BI system in SMEs sector. Therefore, it is recommended that the management should ensure that the employees know the importance of the BI system and they are satisfied with the system in order to achieve the maximum output of the BI system implementation. As well, the management of SMEs should ensure that their firms and businesses are aligned with technical development teams by joint application development sessions to bring the two groups together and gain a common understanding. This will help organisations to achieve their mandate and continue with their daily business.
5. Since Business Intelligence is a new idea and the majority of the firms still use the traditional approach to data management and information systems, the management should build the capacity of the staff through training sessions, workshops, or seminars so that when they develop their strategy, it can be easily implemented and monitored in order to increase the performance of their organisation.
6. Future scholars can use the approach of this dissertation and increase the number of participants so that they can have an adequate number of research subjects in order to come up with the generalised findings and results that can be used in future by other researchers.
7. Future studies can also include more than two countries and thus make it possible to understand the challenges affecting the successful implementation of BI, as well as to compare the findings.

3.5.3 Limitations

The main purpose of this dissertation is to identify the factors influencing the implementation of BI in SMEs in Lebanon. The findings of the present dissertation were analysed using the SPSS software version 23 from the sample consisting of 70 small and medium-sized Lebanese organisations. Although the objectives of the dissertation have been met, the following are the limitations of the dissertation:

First and foremost, the sample population is too small to allow broad generalisation on the findings of dissertation. The sample size is small, since it

encompasses only 76 (70 participants took part in quantitative study while 6 participants took part in qualitative study) participants. Therefore, future research should include a more adequate number of research subjects in order to come up with more generalised findings and results that could be used in future by other scientists.

Secondly, the dissertation focuses only on one country and therefore there is no comparison with other countries and no information whether other countries are implementing BI effectively, what challenges they face, and how effectively they develop their SMEs.

The third limitation of the dissertation is that the time period allocated for the completion of the dissertation was too short; the longer the period, the better the results and validity of the findings.

The fourth limitation of the dissertation is that there is a likelihood of an introduction of a personal bias considering the participants and the nature of their work. Personal bias has the potential of distorting the view, understanding, and the interpretation of the collected data. In particular, academic bias tends to affect the manner in which the researcher conducts the research, and it is particularly difficult to fully understand the experiences of people of different cultural or socioeconomic backgrounds. This is especially complicated by the tendency of scholars to adopt a perspective that differs from the one prevalent among the participants due to differing schemes of perceptions, norms and values.

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APPENDIX

1. Questionnaire

1) What is your gender?
    a) Male
    b) Female
2) How old are you (in years)?

    _____
3) What department do you work in?
    a) Accounting
    b) Administrative
    c) Operations
    d) Sales
    e) IT
    f) Manufacturing
    g) Other (Please specify)
4) In my understanding, my organisation does not have a Business Intelligence system.
    a) Strongly disagree
    b) Disagree
    c) Neutral
    d) Agree
    e) Strongly agree
5) My company uses technologies that are recognised as BI technologies.
    a) Strongly disagree
    b) Disagree
    c) Neutral
    d) Agree
    e) Strongly agree

6) Which types of software do you use as BI technologies?

Items	Yes	No
Spreadsheets		
Reporting and querying software: tools that extract, sort, summarize, and present selected data		
OLAP		
Digital dashboards		
Data mining		
Data warehousing		
Local information systems		
All of the above		

7) My firm still uses a traditional IT system for information reporting and data storage.

a) Strongly disagree

b) Disagree

c) Neutral

d) Agree

e) Strongly agree

f)

No.	**Variables**	SD	D	N	A	SA
	I am content with the system of skills acquisition for BI provided by my organisation					
	A BI system requires special analytical skills					
	Apart from the IT department, very few members of staff have knowledge of Business Intelligence					
	In my organisation, staff adapt quickly to the use of BI.					
	Employees agreed that their level of being informed is satisfactory					
	Employees agreed that they have responded quickly to the need of business intelligence information in the firm					
	Employees agreed that they pay attention to business intelligence information					
	Employees agreed that they have adjusted to the use of business intelligence information					
	The presence of Business Intelligence information					

No.	**Variables**	SD	D	N	A	SA
	in my firm will help my firm to remain competitive					
	With the new strategy of Business Intelligence in place, I am excited about working as I am convinced that my firm is more competitive than our rivals					
	The BI tools I use have made my work easier so that the day goes by quickly					
	The measures to inform the employees about BI in your organisation are effective					
	BI helped you achieve joint goals with other employees and create an intelligence culture in the company					
	Business Intelligence is applied very well in your firm					
	BI tools assist employees well in meeting their goals					
	I trust BI tools that I use in meeting my needs					
	In general, is it necessary to have Business Intelligence information in your firm					
	Employees react positively on the presence of Business Information needs					
	Do you agree that your organisation need to provide more information on Business Intelligence to employees?					

8) If the presence of Business Intelligence information in my firm helps my firm to remain competitive, what will be the main competences supported by this information?
   a) Analysing collected data
   b) Better understanding of the needs and wants of the customer
   c) Better understanding of the core competences of my company
   d) Other
9) How well does the word "INNOVATIVE" describe the planned implementation of Business Intelligence information in your firm?
   a) Not at all well
   b) Slightly well
   c) Moderately well
   d) Very well
   e) Extremely well

10) How well does the phrase “HIGH QUALITY” illustrate this new service of BI in your organisation?
    a) Not at all well
    b) Slightly well
    c) Moderately well
    d) Very well
    e) Extremely well

11) How frequently do you use the BI service?
    a) Not at all often
    b) Slightly often
    c) Moderately often
    d) Very often
    e) Extremely often

12) When you think of the BI service, do you think of it as something SMEs might NEED or as something SMEs might WANT?
    a) Need
    b) Want
    c) Both equally

Thank you

2. Interview Schedule

Before conducting key in-depth interviews, the primary investigator/researcher will confirm that participants selected for the interviews have completed and turned in consent forms. The primary investigator will also review the consent form with the students at the beginning of the interviews to ensure that they fully understand what it means for them to agree to participate in the study. Privacy and confidentiality will be adhered to and the interview will take approximately 45 minutes.

Questions

	Strongly unimportant	Unimportant	Neutral	Important	Very important
How important is the insightful and reliable information to your business? For general informing and for decision making					
How well are you aware of Business intelligence tools and techniques? Do you have experience with them?					
Do you think BI tools and techniques would be important to you? Justify your answer					
Do you agree that the implementation of the Business intelligence tools and techniques would enhance the decision making in your organizations? Why?					

What benefits would insightful and reliable infromation bring to your company?

What to your opinions, are the largest obstacles and problems in adopting business intelligence?

Any other recommendations or questions?

Thank you for participation