The Perceived Impact of Business Intelligence Tools on Marketing Success

Master Degree Project in Informatics
One year Level 30 ECTS
27 March 2015

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Submitted by Amir Nawaz to the University of Skövde as a final year project towards the degree of M.Sc. in the School of Informatics. The project has been supervised by Manfred Jeusfeld.

27 March 2015

I hereby certify that all materials in this final year project which is not my own work has been identified and that no work is included for which a degree has already been conferred on me.

Signature: _______________________________________________
Abstract

**Purpose:** The purpose of this study is to analyze the perceived impact of business intelligence tools on marketing success.

**Methodology:** This research has conducted based on a literature study in the field business intelligence and pharmaceutical industry marketing. Primary data has been used in this thesis to evaluate the information technology impact on the market performance for pharmaceutical industries. The SPSS software package is used to analyze the employee responses and statistical technique. Regression analysis is used to check the impact of information technology on market performance.

**Findings:** One hundred fifty questionnaires were given to the employees of 15 different pharmaceutical companies located in Pakistan. Among them, 104 were collected back and 100 questionnaires were considered valid and used for further analysis. After analyzing the data, it was evaluated that information technology has a significant impact on market performance in pharmaceutical industries. According to the stakeholders, strategic planning, organizational support, knowledge management and technological advancement have significant impact on the success of information technology for decision support systems.

**Research limitations/Implications:** More research will be required on the theory presented in this thesis “The Perceived Impact of Business Intelligence Tools on Marketing Success”.

**Keywords:** Decision Support Systems, Business intelligence, Marketing Performance, Strategic Planning, Organizational Support, Knowledge Management, Technological Innovation, Qualitative and quantitative study.

I want to thank my dear wife Emelie and son Isak for their great patience and support. I would also like to thank those who cooperated me with interviews for my research. Specially, I want to thank my supervisor Manfred Jeusfeld and my examiner Eva Söderström from University of Skövde for their kind supervision and feedback.
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1 Introduction

The 21st century brought forward a tight competition between pharmaceutical industries. The driver for each of these organizations was to make a competitive advantage over its competitors. To gain this competitive advantage companies are adopting various “Decision Support Systems” (DSS) for business intelligence (BI). The research and innovation in exploiting new methods and technologies tightens the employment of new reliable and sophisticated technology (i.e., marginal competitiveness). The main causes for this to be valid is the global technology exploitation (Allen, 2010) and that competition has been employed in multiple dimensions, (Qayyum, Sharif, Ahmad, Khan, & Rehman, 2012; Kumpikaite & Sakalas, 2011). The companies/organizations are trying to gain a marginal competitive edge by innovating at varied tiers of hardware, software together with specific system technologies such as decision support system, enterprise information system, knowledge management, graphic interface system, data mining, online analytical processing, data warehouse, customer relationship management, marketing, visualization, business intelligence systems, human capital management and distribution management system.

Business intelligence systems combine data collection, data storage, and data management into a knowledge management system that together with analytical tools enables to present complex internal and external information to planners and decision makers (Negash, S, 2004). BI is based on a vast category of applications and technologies for collecting specific data, analyzing it through automatic analytic software and finally presenting the analyzed data in an interpretable form leading the marketers or decision makers to interpret and understand data results that could be helpful for them to make a tangible decision in a specific marketing field.

DSS provides decision makers analytical access to (very large) databases DSS supports managers to apply checklists, rules, and an extensive usage of mathematical models (Power, 1997). Marketing experts use DSS to make their strategic decisions (Edvinsson and Malone, 1997). Companies in emerging economies are increasingly aware of the new possibilities that have been introduced by sorting out reliable information and harnessing right communication means in the warehousing and data sharing. At the same time, the companies are forced to utilize business information more effectively than before, and this is not possible without systematic information management. Information management consists of identifying the relevant information that is required for a specific need or purpose. Secondly, information
management provides how it should be collected and thirdly how it is be transformed or decoded into a human interpretable form, and fourthly by what means it could be stored, and fifthly how an entity could hold its authority (Tiwana, 2002).

Jain (2009) presents success factors to evaluate the marketing performance they are 1) strategic planning 2) organizational support 3) knowledge management and 4) technology innovation. These factors are identified as input factors towards marketing performance. BI is a moderator variable which affects on the relationships between marketing performances through above mentioned factors. Strategic planning analyzes the competition, market dynamics and environmental shifts.

The impact in the technology innovations embarks companies on the battlefield of marginal competition among them. Increase of advance in technology improves the BI tools that can support user to make better and more competitive decisions. Technology plays a significant role for the marketers to come across a most legitimate and accurate decision making. The sufficient technology and timing helps marketers to input or integrate a calculated step to achieve the organisational goal, (Chalmeta, 2006). DSS supports users in decision making and problem solving (Duan & Burrell, 1995). Market is a place (tangible and intangible) which represents the boundary between the market place and the company, and knowledge of current happenings and issues in the market place (Jain, 2009).

The use of BI can support managers to facilitate strategic decisions. Pharmaceutical marketing face a high competition so a BI can help the decision makers to devise and implement right strategic decision at the right time & location to achieve a significant advantage among its competitors. Business intelligence is a highly effective and productive tool for any organization to run the operations of marketing, sales and production (Adidam, Banerjee, & Shukla, 2012). BI is a tool that can scan the competitor’s environment and provides the relevant information for making the strategic decisions and tactics against the competitors.

Hence, DSS and BI are regarded as a promising technology, but the question is whether this promise is fulfilled from the viewpoint of the different stakeholders in companies applying them.
1.1 Problem area

The general problem for a decision maker or a manager is to select information and make a strategic decision based on that to achieve a competitive advantage in marketing performance. According to Davenport and Beck (2001) the selection and filtration of relevant information are important and can be a challenging process when the amount of information is large and often unstructured.

There is a need to investigate and model factors that affects marketing performance when using BI tools in the company. According to Hawking et al. (2008) in research area of BI technology the most of the available research focuses on technological and operational aspects and less research to consider human, managerial, and strategic factors. BI tools strength are the integration of data across functional areas (e.g. marketing, finance and accounting, logistics and production) to support particular business processes, the capability of effective decision making and BI technology has been limited (Moller, 2005).

Previous research indicated that many organizations have poor IS/IT adoption practices (Fink, 1998). That motivates to investigate the impact on marketing performance when using BI tools for company’s competitive advantage. Pharmaceutical industry market faces a high competition when BI tools provide with information to make the appropriate strategies and tactics for their products against competitors.

The pharmaceutical industry deals with medicines that cure disease of human as well as animals, this industry, in this modern era is matching its steps with other most sophisticated industries like, automobiles, fashion, hospitality and agricultural etc, but pharmaceutical industries has an edge on all other modern industries because its deal with quality of life and health care.

However, even though there is a vast use of BI tools the actual value for marketing decisions are not investigating for the pharmaceutical industries in such a way to perceive the success factors for marketing purposes.

Therefore, it is interesting to study on pharmaceutical companies which operate either globally or locally, and to investigate how these companies implement decision support systems in making the marketing decisions.
1.2 Aim of research

The overall aim of this research is to explore how employees in selected companies perceive the success factors for applying BI for marketing purposes.

In this respect, it is required to empirically investigate the impact of the use of BI on marketing performance. To do so, a conceptual model is needed that lists potential independent variables that influence the success of BI. In this study, the success of BI is defined as one variable influencing marketing performance.

In order to achieve the overall aim of this thesis, two objectives are established:

1) The first objective is to create an instrument to investigate the success factors.

The instrument shall be a questionnaire, where each question is related to a factor of the conceptual model and is backed by appropriate references. The conceptual model itself is also to be derived from the relevant literature.

2) The second objective is to apply the instrument to the pharmaceutical industry and to clarify the validity of hypotheses about the success factors.

The questionnaires will be sent to employees of pharmaceutical companies operating in the emerging economy of Pakistan. After getting the responses from the employees, the data will be analyzed by using SPSS technique, specifically for regression and correlation analysis.

2 Research approach

In this study, a descriptive approach is used to investigate the impact of BI on market performance. Descriptive research is generally used to explain existing confrontation and the current situation. According to Vyhmeister (2009) descriptive research can be defined with the help of four steps or it is simply a process of four steps: first one is defining the objective, and then designing the approach, after that collecting data and writing the result. The last and most important tools for this type of research are: observation, interview and questionnaire.

The plan is to conduct interviews with pharmaceutical companies. The chosen participants have a marketing role or are responsible for IT in the company. Sampling units are both
international and local pharmaceutical companies. The questionnaire is distributed to those employees who have worked at least one year in pharmaceutical industries. On the basis of frequency of responses, the results have been drawn for proving the study objectives and answering the research questions.

2.1 Research methods used

Descriptive and explanatory methods have been adopted to approach the impact of BI on market performance role and to fulfill the other study objectives. The population was the total number of pharmaceutical companies of Pakistan. Survey sampling has been used to collect the relevant data and responses. The sampling techniques used were convenience sampling and referral sampling. The questionnaires were delivered to the selected companies by electronic mail. The sample size was taken by the help of previous researches (Ahmed & Capretz, 2010), by considering the pharmaceutical companies, and by setting the sample size by using the Regression technique. The time considerations and availability of respondents was the major reason behind deciding on the sample size through intuition. SPSS (Statistical Package for Social Sciences) is being used to analyze the responses collected on the questionnaire.

2.2 Research process

After selecting the research method, the search for companies that would meet the predefined criteria started. The international and local pharmaceutical companies were selected for analysis based on the criteria for the research process. The selection was followed by a preparation of questionnaire for survey and interviews. Then the answers from the questionnaire were used for the further analysis to complete the research process.

2.2.1 Data collection

For this study, a questionnaire survey was used to obtain primary data for analysis. In addition, secondary information is used in literature section for developing the theoretical and conceptual frameworks. Data collection is crucial for studies dealing with impacts. If the data collected is unreliable, then it is not useful for the researchers. A structured questionnaire and interview questions
are used to collect the responses from the targeted sample. So, questionnaire and interviews are the research instruments. The sample size was set for the questionnaire to 150 employees working in 15 pharmaceutical companies. The total number of pharmaceutical companies in the Pakistan is 210 but we select only 15 of them and select 150 employees from these companies for questionnaire and also interview with 6 persons of these companies. Out of 150 employees, 104 responded to the questionnaire. In total, 100 questionnaires were valid and used for analysis.

2.2.2 Participants
As mentioned above the questionnaire are distributed to those employees (including managers) who have worked at least one year in pharmaceutical industry and performing different roles within the companies.

The details of respondents for interviews are as follows:

Respondent one is the CEO of the company with the overall responsibilities of the company. All other departments like (IT, HR, Marketing, Testing, and Finance etc.) are under his control. Reference used to be able to contact with CEO is the owner of that multinational company.

Respondent two is a research and production manager in a local pharmaceutical company and is responsible of a product group and research regarding development of new products.

Respondent three is a marketing and sales manager in an international Pharmaceutical company and he is a responsible for marketing related issues. His job is to provide all the marketing plans to other marketing managers and field managers.

The other three respondents are IT managers in pharmaceutical companies. One of them is belonging to local pharmaceutical company. Reason for selecting these managers for interviews is to explore that can a company get the competitive edge of BI techniques.

2.2.3 Ethical considerations
In this research maintained the confidentiality of respondent. We asked no personal questions from the participants. Personal information such as name of employee or name of company was optional and is not used in any place of the research for considering the secrecy of respondents.
2.2.4 **Limitations of the study**

Normally, research is made to increase the understanding of the concerned area of study. The community receives this increased understanding as a benefit. Despite of all the efforts done, certain constraints limit the results of research efforts. The environmental, economic, legal bindings in some confidential cases, and the time & financial constraints are the most common hurdles that are faced by the researchers. These restriction factors can hinder the smooth and desired completion of the study. Also these factors could inhibit the achievement of the study objectives. So, keeping in view these constraints this study also has certain objective fulfilment as well as implicative limitations.

Following are the major limitations of this study:

The study is carried out in a limited time frame, so the sample size and sampling unit could not be taken very large to ensure the reliability of results.

Due to the companies’ confidentiality concerns, individual employees selected for the questionnaire could not be approached directly. Further, the result of this study could be different when applied to other economies or industrial sectors.
3 Background

3.1 Marketing environment

Pharmaceutical industries face an intense competition (Qayyum et al., 2012). From a business perspective, to satisfy the interests of the owners, each pharmaceutical industry wants to secure a maximum share in the market, or to maximize its profit. In order to achieve an increased market share, the decision makers in pharmaceutical companies need to find and explore their competitive advantages. They have to focus on all factors that can help to get rapid increase in production growth, maximization of revenue, and profit. These goals depend on how wisely the decision makers can gain the market intelligence and realize a competitive edge. Hence, the driver for business intelligence is competition.

Noe (2008) defines competitiveness to be the capability of an organization to win and then sustain a stable market share in the sector it operates. There are many publications in the field of business intelligence activities and several intelligence practices and methods are presented in the literature. However the content of the existing publication often serves commercial purpose more than academic interest, although academic research on the subject has increased from the beginning of the 1990s (Prescott, 1995). In the 1960s and 1970s the intelligence literature dealt mainly with the marketing intelligence and data collection issues, whereas in the 1980s the emphasis over from data collection to analytical skills and techniques (Prescott, 1995).

As mentioned above the number of intelligence publications grew in the 1990s, but there is still a dearth of academic research. Ganesh et al. (2003) remark that empirical studies of business intelligence activities has been conducted mainly via survey questionnaire, despite a need for field research, in particular case studies. Fleisher and Blenkhorn (2005) say that not even a “fistful of people” are familiarized with the intelligence literature and inquiry in depth and that there are simply a few doctoral programs in this area.

3.2 Decision support system

According to Turban et al. (2007), a decision support system is a system that supports decision makers in semi-structured and unstructured decision situations. It is intended to be a tool for enhancing the decision maker's capacity without replacing the decision maker's
judgment. Gory and Scott-Morton (1971) gave an early definition: "Interactive computer-based systems that help decision makers utilize data and models to solve unstructured problems".

Raw data sometimes called the source data is the data that has not been processed for use and there has been an explosive amount of raw data available to decision makers dealing with marketing-related decisions, in recent years. Marketing promotion models help the organization to take the effective decision regarding the objectives which they set. The pharmacy market is very competitive, so the managers of different companies should be aware of the whole market environment for taking the right decision, and then try to make and implement timely decisions. For this reason, they need several tools to provide the information on time. Companies use business intelligence to improve decision making, cutting costs and identify new business opportunities. Business intelligence provides the timely and effective information for decision making (Salmeron, Luna, & Martinez, 2001). DSS have also held a firm focus on models since the start, and today some of the main techniques of BI (as a sub-field of DSS (Hense peter Luhan,1958) include multidimensional models, examples, data cubes, and OLAP (Online Analytical Processing) all making sound usage of conventional models (Blomqvist, 2012).

3.3 Business intelligence

Business intelligence (BI) provides an analytical solution that extends decision support capabilities. It helps decision makers to distinguish relationships among data items to potentially enhancing understanding and providing competitive advantage (Chavesesuk, 2010).

Another definition of BI is “[BI is] a set of technologies and processes that use data to understand and analyze business performance” (Davenport & Harris, 2007, p.7). Wixom and Watson (2010) also provide a provisional definition stating that BI is “a broad category of technologies, applications, and processes for gathering, storing, accessing, and analyzing data to help its users to make better decisions” (Wixom & Watson, 2010, p.14).

Overall, the academic research field of Decision Support System activities seems to be still very much in an emergent state. Model-driven DSS built in the late 1960s, theory developments in the 1970s, and implementation of financial planning systems, spreadsheet-based DSS and Group DSS in the early and mid 1980s. Data warehouses, executive
information systems (EIS), OLAP and business intelligence evolved in the late 1980s and early 1990s. Finally, the chronicle ends with knowledge-driven DSS and the implementation of web-based DSS beginning in the mid-1990s. The field of computerized decision support is expanding to use new technologies and to create new applications (Power, 2010).

Miller (2000) stated that research supports the use of systematic intelligence activities as an enabler of more effective information management and decision making. The term business intelligence was introduced by Hans Peter Luhan in 1958 and he says that BI improves business decision making by using fact-based support. This notion was adopted by a number of experts in the DSS field. DSS, EIS, data warehouse, OLAP and data mining combine in BI. According (Tutuneaa & Rusa, 2012), business intelligence is a data-driven decision support system.

![Diagram of Business Intelligence](image)

OLAP = on-line data processing, CRM=customer relationship management, DSS= decision support Systems, GIS = geographic information systems

Figure 3-1 Business intelligence is a relation to other information systems. Model based on Negash, S. (2004)

### 3.4 Literature review

For secondary data, a literature review was used in which data was collected from previous researches. It reveals that independent variables (strategic planning, organizational support, knowledge management, technological innovation) and dependent variables (BI, Marketing Performance) have been researched.
3.4.1 The adoption of Business intelligence system by business

Several previous studies in relation to data usage organizations have investigated the adoption of information technology (IT) in various situations in different types of organizations. Caldeira & Ward (2002) investigated the top management perspectives and attitudes towards IS/IT adoption and use play an important role in the development of internal IS/IT competencies, and provide an important contribution to the development of a context that enables IS/IT success. In particular, Wöber & Gretzel (2000) investigated decision support applications relating to tourism managers’ adoption of marketing decision support systems in the tourism industry, and found that the actual use of a decision support applications (e.g. DSS, KMS) has a positive perception of benefits and advantages. This implies that tourism organizations should focus on user support, especially more detailed information on system content and functionality. Hung et al. (2005) examined the factors in adopting a KMS for the pharmaceutical industry in Taiwan, and found seven factors to be critical: 1) a benchmarking strategy and knowledge structure 2) the organizational structure 3) information technology 4) employee involvement and training 5) the leadership and commitment of senior management 6) a learning environment and resource control and 7) evaluation of professional training and teamwork. Watson et al. (2006) investigated BI in terms of technology architecture and organizational processes of the airline industry in contemporary real-time business intelligence and found that applications that can leverage real-time BI by impacting business process to create value to an organization of decision support. It is implied that benefits for IS users had positive perceptions of BI. Mostly related to BI, Hwang et al. (2004) examined the various factors playing crucial roles in the adoption of a data warehouse in a banking industry. The results suggest that organizational dimension (top management support, effect of champion, internal needs, and size of organizations) and external characteristic (competitive pressure) affect the adoption of data warehouse technology. Factors investigated in several studies can be separated into four groups: 1) characteristics of IT; 2) characteristics of the organization; 3) characteristics of the environment; 4) characteristics of the individual.
3.4.2 **Strategic planning and Business Intelligence**

Strategic planning analyzes the competition, market dynamics and environmental shifts (Jain, 2009). In the context of strategic planning; five organizational levels can be distinguished. These are: corporate level, strategic business unit (SBU) level, functional level, operational level and mixed levels (Li, Guohui, & Eppler, 2008). Higgins (2005) says that about four types of strategies: corporate, business, functional and process. Process strategies, the last type, normally cut across functions and are aimed at integrating organizational processes across the organization in order to make them more effective and more efficient. Companies with the same interests are now concentrating on the strategic planning with the aim of developing long-term programs and alterations in their organization and in turn to improve their competitiveness. Planning for strategies require top management involvement taking into account both external and internal factors. Strategic planning of BI should support the long-term objectives and goals of marketing performance both in terms of flexibility and responsiveness for shifting marketplace demands (Gunasekaran & Ngai, 2004). Fletcher and Wright (1996) report a study into the relationship between strategic use of business intelligence in financial service systems and the strategic context within which such function is established. Strategic planning involves decisions that move the long-term functioning of an establishment. Since the market characteristics have changed, it would be hard to live in a global market without business intelligence. BI help to improve collaboration supported work using different automation that includes computer-aided design/computer assisted manufacturing computer automatic designing/computer automatic manufacturing (Gunasekaran & Ngai, 2004). These days, while implementing a business intelligence system
is an advanced step for any organizations wanted to be lived in the market competition, there is nevertheless a high need of strategic plan for gathering accurate information about competitors, analyzing it, sharing it using innovative tools, and accessed by managers who are professional enough to attain the correct decisions at the correct time (Karim, 2011).

3.4.3 Organizational support and Business intelligence
Organizational support having two dimensions one is organization behavior and second is organizational management (Turakaman, Mohammad Reza Najaf; Ebrahim moradi, Dhaifiallah Obaid almutairi, 2011). These two dimensions are subdivided into seven organizational factors. The organizational behavior dimension includes the factors of organizational culture, organizational commitment, and organizational learning. On the other hand, organizational management focuses on such issues as organizational structure, change management, conflict management, and organizational communication. Organizational support focuses on to reduce the cost, improvements in product quality and a decrease in product development time (Ahmed & Capretz, 2010). Top management can demonstrate its support by providing the necessary resources and leadership, by setting goals and policies for DSS and showing interest by participating in DSS design and development. Internal support including the availability of experienced DSS staff, training opportunities and a network of supportive colleagues. Due to insufficient internal technical expertise, especially in developing countries, the availability and quality of external support may be an important determinant of DSS effectiveness in strategic decision making (Elbeltagi, McBride, & Hardaker).

Top management support has been identified as a key predictor in the adoption and implementation of IT (Fink 1998). Several previous studies have shown that top management support is a significant predictor of technology adoption and leads to more successful IT use in many organizations (Caldeira & Ward 2002). It is important to create a supportive climate and adequate resources for the adoption of new technology (Premkumar & Roberts 1999). Top management would be able to identify business opportunities for the exploitation of IT and their active involvement and support would provide appropriate strategic vision and direction for the adoption of new innovations (Thong & Yap 1995). The size of business increases, so will the likelihood of information technology being present within the organization (ABS 2000). A study by Gibson & Arnott (2003) reports that business scale is as one of the factors that have an effect on the adoption of BI in small businesses. It has been considered to be an adoption factor facilitator (Damanpour 1992) and has been used in IT
adoption since researchers believe larger firms tend to have abundant resources, be more capable of bearing risks, and possess more power to urge trading partners to adopt IT (Zhu, Xu & Dedrick 2003). Top management should encourage the empowered implementation team to reduce across the operational barriers and provide with necessary technical and fiscal documentation to BI system (Gunasekaran & Ngai, 2004). Senior management supports the project managers and project stakeholders’ familiarity with information technology in organization's criteria for procedure integration (Shahraki, Shahraki, & Dejkam, 2013).

3.4.4 Knowledge management and Business intelligence

Knowledge management is a discipline that promotes an integrated approach for identifying capturing, evaluating, retrieving, and sharing all of an enterprise’s information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers. (Duhon, 1998).

Knowledge management is a justified personal belief that increases an individual’s capacity to take effective action. Action in this context requires physical skills and competencies. The ability to integrate and apply specialized knowledge of organizational members is fundamental to a firm’s ability to create and sustain competitive advantage (Alavi & Leidner, 1999). Absorptive capacity is the ability of key organizational members to utilize available or pre-existing knowledge (Griffith, Redding & Reenen 2003). It facilitates a sort of reaction process of the knowledge with their mind (Alavi & Leidner 2001). This absorptive capacity of organizations indicates an ability to recognize the value of external and internal information, and to assimilate and apply it effectively to realize economic benefits. Sambamurthy & Zmud (1999) have suggested a need to be critical to organizations’ innovativeness. Applied to the IT area, organization’s absorptive capacity reflects the capacity to absorb information relating to appropriate IT innovations through employees’ individual knowledge repositories, cognitive structures, and processes for supporting operational or strategic activities, and to enhance firm performance (Boynton, Zmud & Jacobs 1994). Knowledge management is concerned with knowing and managing all of organization intellectual assets to fulfill its business aims. Organizations are redesigning their internal construction and their external relationships, creating knowledge networks to facilitate improved communication of data, information, and knowledge, while improving coordination, decision making, and planning (Warkentin et al., 2001). Managers are starting to leverage their information system assets to react to market needs more efficiently.
Knowledge management has become one of the strategic uses of BI system in today’s business environments. Many companies are considering building a KM system for organizational learning. There are different ways to manage the knowledge. These include strategic alignment with partnering firms, collaboration with local universities, training and education in IT. Knowledge about the market place and customer expectations can be acquired with web-based data organizations. This opens up the whole world of information. However, it is unlikely that companies can let their employees to spend unlimited amount of time in searching for voluminous information. Consequently, information mining and data storage techniques will serve to improve the velocity of information processing and hence make available the right information for getting timely and more accurate decisions (Gunasekaran & Ngai, 2004). The main aspects of knowledge management include knowledge, instruction, knowledge generation, knowledge diffusion, and response to knowledge (Sin et al., 2005). Knowledge about key customers are essential for customer relationship management (Stefanou et al., 2003) and can also be utilized to build up training programs about how to effectively reach customers (Zahay & Griffin, 2004). The need for clarification of information and the organizational processes that ensue in the data processing (Shahraki, Shahraki, & Dejkam, 2013). Users of DSS must have a detailed knowledge of the task environments, and they need other information sources to help them notice environmental changes and to generate reasonable scenarios. They must see both the possibilities and restrictions of the modeling format, and they must compare model assumptions and outcomes with empirical information to determine whether the theoretical account is a valid representation of their task environments (Fuglseth & Grønhaug, 2003). Knowledge management enhances the dynamic capabilities (Peter & Lee, 2004).

3.4.5 Technological innovation and Business intelligence

Technological advancement increased the competition between companies; therefore, advance technology improved the BI process and enabled the decision better than older user of technology. Technology plays a significant part in managing marketing decision takes accurately. To take market decision accurately, organization must integrate the right technology (Chalmeta, 2006). Rogers (1983) found that relative advantage or perceived benefits had a positive relationship to the adoption of technology. Wixom & Watson (2001) indicates that BI can offer several benefits to an organization that include enabling effective decision support and business applications (e.g. CRM, SCM), facilitating data analytics, ensuring data integrity, accuracy, security, and availability; easing the setting and enforcing
of standards, facilitating data sharing, and delivering the right information to the right person during the right time. Positive perception of benefits of IS organizations should provide an incentive for the pharmaceutical companies to develop the use of their BI. Therefore, it is expected that BI perceived benefit is positively related to adoption of BI (Chaveesuk, 2010). Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use (Rogers 1983). Complexity of an innovation can function as an inhibitor to adoption and further diffusion of the innovation as the organization may not be able to integrate it with the rest of its procedures. The complexity of the technology (e.g. BI) also creates greater uncertainty for successful implementation and therefore increases the risk of the adoption process. The innovation is compatible with existing work practices, environments, and the firm’s objectives; the firm will be more likely to adopt it. It is expected that the greater the perceived compatibility of the BI with an organization’s beliefs, values, and IT infrastructure, the more likely it will be adopted by the pharmaceutical organizations (Chaveesuk, 2010).

3.4.6 Market performance and BI

Firm performance and level of BI activities historically, analysts and researchers agree that better BI will improve firm’s overall performance in the marketplace (Glueck and Jauch, 1994). Several prior studies have identified a positive relationship between BI and firm performance (Daft et al., 1988; Gordon, 1989; Teo and Choo, 2001). In their study of 85 US firms, Subramanian and Ishak (1998) found that firms having advanced systems to monitor market trends exhibited great profitability. The positive relationship between BI and firm performance is empirically tested in the western developed markets context (Chaveesuk, 2010). However, Tao and Prescott (2000) suggest the need for testing the link in emerging markets due to the high level of uncertainty involved and differing cultural contexts.

3.4.6.1 Conceptual model

There are many factors such as environmental factors, organizational commitment, organizational support, knowledge management, technology, organization culture and many other factors available for research that affect the BI success and marketing performance of the organization but few of them are selected for conceptual model adopted from literature study.
Figure 3-3 Model based on four variables: 1. Strategic Planning and Business Intelligence Success. 2. Organizational support and Business Intelligence Success, 3. Knowledge Management and Business Intelligence Success 4. Technological Innovation and Business Intelligence Success

In this conceptual model first four factors OS, KM, TI, SP are used as an independent variables and Business intelligence success is used as a dependent variable. This conceptual model also shows another relationship between business intelligence success as an independent variable and the marketing performance as dependent variable.

3.4.6.2 Questionaire

Questionnaire and interview are used for gathering result. The items of variables are taken from the previous research and responses are calculated with the help of a five point Likert-scale.

Questionnaire is derived from the literature study. Six variables from conceptual model have different numbers of questions which will deliver to the employees of 15 pharmaceutical industries. These questions are related to the importance of information technology, marketing performances, production relate etc.
<table>
<thead>
<tr>
<th>Variable/Item No.</th>
<th>Item statements</th>
<th>Reference (citation)</th>
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<tbody>
<tr>
<td>Strategic Planning</td>
<td>Your company has a clear strategy for the future.</td>
<td>(C.Powell &amp; Micallef, 1997)</td>
</tr>
<tr>
<td></td>
<td>Your company has a formal, long-term strategic plan regarding decision support system.</td>
<td>(C.Powell &amp; Micallef, 1997)</td>
</tr>
<tr>
<td></td>
<td>Your company has clearly identified the decision support system project priorities</td>
<td>(C.Powell &amp; Micallef, 1997)</td>
</tr>
<tr>
<td></td>
<td>Your company measures the bottom-line effectiveness of decision support projects</td>
<td>(C.Powell &amp; Micallef, 1997)</td>
</tr>
<tr>
<td></td>
<td>Business planning is ongoing and involves everyone in the process to some degree.</td>
<td>(Tallon, Kraemer, &amp; Gurbaxani, 2001)</td>
</tr>
<tr>
<td></td>
<td>Decisions are usually made at the level where the best information is available</td>
<td>(Tallon, Kraemer, &amp; Gurbaxani, 2001)</td>
</tr>
<tr>
<td>Organizational Support</td>
<td>Top management supports the adoption of BI</td>
<td>(Chavesuk, 2010)</td>
</tr>
<tr>
<td></td>
<td>Top management has offered related resources for the development of BI</td>
<td>(Chavesuk, 2010)</td>
</tr>
<tr>
<td></td>
<td>Top management provides the cooperation to complete for BI projects</td>
<td>(Chavesuk, 2010)</td>
</tr>
<tr>
<td></td>
<td>Other organisational resources (e.g. training, IS support, IT governance) helps to build up higher levels of BI success</td>
<td>(Chavesuk, 2010)</td>
</tr>
<tr>
<td></td>
<td>There are no difficulty in finding all necessary resources (e.g. funding, people, time) to implement BI</td>
<td>(Chavesuk, 2010)</td>
</tr>
<tr>
<td></td>
<td>Key users need extensive training to develop skills and understand and use BI</td>
<td>(Chavesuk, 2010)</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>Is organizational knowledge recognized as essential for the long-term success of the organization?</td>
<td>(Pee &amp; Kankanhalli)</td>
</tr>
<tr>
<td></td>
<td>Is KM recognized as a key organizational competence?</td>
<td>(Pee &amp; Kankanhalli)</td>
</tr>
<tr>
<td></td>
<td>Employees are ready and willing to give advice or help on request from anyone else within the company</td>
<td>(Pee &amp; Kankanhalli)</td>
</tr>
<tr>
<td></td>
<td>Are the KM projects coordinated by the management?</td>
<td>(Pee &amp; Kankanhalli)</td>
</tr>
</tbody>
</table>
| **Technological innovation** | Are there any KM training programs or awareness campaigns?  
  e.g. introductory/specific workshops for contributors, users, facilitators, champions | (Pee & Kankanhalli) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Has the KM initiatives resulted in a knowledge sharing culture?</td>
<td>(Pee &amp; Kankanhalli)</td>
</tr>
<tr>
<td></td>
<td>Key users are technically knowledgeable in exploiting BI capabilities</td>
<td>(Chaveesuk, 2010)</td>
</tr>
<tr>
<td></td>
<td><strong>There are pilot projects that support BI?</strong></td>
<td>(Pee &amp; Kankanhalli)</td>
</tr>
</tbody>
</table>
|                             | **There is any technology and infrastructure in place that supports BI.**  
  E.g. Intranet portal  
  E.g. Environments supporting virtual teamwork | (Pee & Kankanhalli) |
|                             | **The existing systems are continually improved upon (e.g. continual investments),**                                                                                       | (Pee & Kankanhalli) |
|                             | **Technology should extend our market and geographic reach**                                                                                                                | (C.Powell & Micallef, 1997) |
|                             | **Technology should help us to change industry and market practices**                                                                                                        | (C.Powell & Micallef, 1997) |
|                             | **There is adequate level of understanding and technical sophistication on the BI users**                                                                                  | (Chaveesuk, 2010) |
| **BI**                     | **The BI that is indispensable for performing routine task documented.**                                                                                                     | (Pee & Kankanhalli) |
|                             | **BI improves the quality and efficiency of work.**                                                                                                                         | (Pee & Kankanhalli) |
|                             | **The process for collecting and sharing information is formalized.**                                                                                                       | (Pee & Kankanhalli) |
|                             | **The existing BI system is actively and effectively utilized.**                                                                                                           | (Pee & Kankanhalli) |
|                             | **The existing BI processes are easily adapted to meet new business requirement.**                                                                                         | (Pee & Kankanhalli) |
|                             | **Decision support system has improved the company competitive position.**                                                                                                | (Pee & Kankanhalli) |
Over the previous year, our financial performance has been outstanding. (C.Powell & Micallef, 1997)

Over the previous year, our financial performance has exceeded our competitors. (C.Powell & Micallef, 1997)

Over the previous year, our sales growth has been outstanding. (C.Powell & Micallef, 1997)

Over the previous year, we have been more profitable than our competitors. (C.Powell & Micallef, 1997)

Over the previous year, our sales growth has exceeded our competitors. (C.Powell & Micallef, 1997)

### 3.4.7 Data analysis & interpretation

The conceptual model proposed that SP, OS, KM, IT are being the independent variable (IV), BI moderator variable and MP is the dependent variable. Hence, what have to analyze and prove through the model is the effect of BI on MP, and can BI help in creating value for marketing decisions.

### 3.4.8 Hypotheses

Hypotheses are linked with the conceptual model. In first part will check the significance relationship between independent variables strategic planning, organizational support, knowledge management, technology and dependent variable BI. In the second part of hypothesis will check the significant relationship between independent variable BI and dependent variable marketing performance. Hypotheses are as under:

H1: There is a significant relationship between Strategic planning and BI.

H2: There is a significant relationship between Organizational support and BI.

H3: There is a significant relationship between Knowledge management and BI.

H4: There is a significant relationship between Technology and BI.

H5: There is a significant relationship between BI and Market Performance.
4 Results and analysis

150 questionnaires were given in different pharmaceutical companies. 104 were answered and 100 questionnaires are considered valid and used are for analysis. Results from SPSS test are analyzed with hypothesis and are compared with research questions.

4.1 Reliability check and demographical analysis

According to Pavot, Diener, Colvin and Sandvik (1991, Cronbach alpha coefficient with 0.85 is acceptable. The Chronbach’s Alpha for the instrument (questionnaire) was calculated to be 0.912 on all 100 items. 91.2 % reliability is being resulted. This shows that the instrument was reliable enough for analysis.

<table>
<thead>
<tr>
<th>Male</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td>61.4</td>
<td>61.4</td>
<td>61.4</td>
<td>61.4</td>
</tr>
<tr>
<td>39</td>
<td>40.6</td>
<td>40.6</td>
<td>40.6</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

4.1.1 Correlation

P-Value:

In statistics (e.g. the sample result statistics), it is simple to obtain the actual probability value of the test statistics by defining a level of significance (α). The p-value is defined as the probability, under the assumption of hypothesis, of obtaining a result equal to or more extreme than what was actually observed. The p-value can be equal to or smaller than or greater than α value. This probability value is called the P-value. The P-value is used as significance level at which a null hypothesis can be rejected (Gujarati, 2004, p137).

Pallant (2005) stated that the Pearson correlation is used for describing the linear relation between the variables. All the variables are significant. The P-value for each model tests the null hypothesis means the coefficient is equal to zero (no effect). A low P-value (< 0.05) indicates that we can reject the null hypothesis. So, it does not show that there is a
significance value of the statistical data because it was less than 0.05 which is $\alpha$ (threshold value) of all the variables.

The result of the correlation shows the strong positive relation between all the variables. The strongest relation here is between BI and Innovation with a correlation value of .987, and after that other variables also have strong positive relation. Table also shows that all the variables are positively correlated with each other.

Table 4-2 Correlation Table

<table>
<thead>
<tr>
<th></th>
<th>S.planning</th>
<th>O.support</th>
<th>K.Management</th>
<th>T.Innovation</th>
<th>BI</th>
<th>M.Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.planning</td>
<td>1</td>
<td>0.980</td>
<td>0.954</td>
<td>0.959</td>
<td>0.963</td>
<td>0.954</td>
</tr>
<tr>
<td>O.support</td>
<td>0.980</td>
<td>1</td>
<td>0.946</td>
<td>0.987</td>
<td>0.967</td>
<td>0.985</td>
</tr>
<tr>
<td>K.Management</td>
<td>0.954</td>
<td>0.946</td>
<td>1</td>
<td>0.952</td>
<td>0.969</td>
<td>0.953</td>
</tr>
<tr>
<td>T.Inovation</td>
<td>0.959</td>
<td>0.987</td>
<td>0.952</td>
<td>1</td>
<td>0.955</td>
<td>0.945</td>
</tr>
<tr>
<td>BI</td>
<td>0.963</td>
<td>0.967</td>
<td>0.969</td>
<td>0.955</td>
<td>1</td>
<td>0.945</td>
</tr>
<tr>
<td>M.Performance</td>
<td>0.954</td>
<td>0.985</td>
<td>0.953</td>
<td>0.945</td>
<td>0.945</td>
<td>1</td>
</tr>
</tbody>
</table>

4.2 Research questions

Regression is used to check the significance relationship between hypotheses. The general equation for regression lines are used to check the hypothesis for research questions which are as under:

1) $Y_1 = \alpha_i + \beta_i X_i$
2) $Y_2 = \alpha_5 + \beta_5 X_5$

i.e. $Y_1=$Business Intelligence, $Y_2=$Marketing performance, $X_1=$Strategic planning, $X_2=$Organizational support, $X_3=$Knowledge management system, $X_4=$Technological innovation, $X_5=$Business Intelligence

Where i=1, 2, 3, 4 and independent variables are $X_1=$SP, $X_2=$OS, $X_3=$KMS, $X_4=$TI and dependent variable is $Y_1=$ BI in equation (1) and $Y_2=$MP and $X_5=$ BI are dependent and independent variables respectively in equation (2). Also $\alpha=$constant and $\beta=$coefficient of independent variable.
A model table can be drawn with the help of SPSS (regression) for all the five research questions to check their hypothesis. That model table has five sub-model tables for each research question based on regression line.

E.g. \( Y_1 = \alpha_1 + \beta_1 X_1 \), Where \( Y_1 = \text{BI} = -0.213, \beta_1 = 1.026 \) (see appendix 3) and \( X_1 = \text{SP} \)

\( \text{BI} = -0.213 + 1.026(\text{SP}) \)

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>P-value</th>
<th>Adjusted R-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model-1</td>
<td>-0.213</td>
<td>1.026</td>
<td>0.000</td>
<td>0.927</td>
</tr>
<tr>
<td>Model-2</td>
<td>0.357</td>
<td>0.706</td>
<td>0.000</td>
<td>0.934</td>
</tr>
<tr>
<td>Model-3</td>
<td>0.291</td>
<td>0.684</td>
<td>0.000</td>
<td>0.939</td>
</tr>
<tr>
<td>Model-4</td>
<td>0.305</td>
<td>0.810</td>
<td>0.000</td>
<td>0.910</td>
</tr>
<tr>
<td>Model-5</td>
<td>-0.556</td>
<td>1.388</td>
<td>0.000</td>
<td>0.893</td>
</tr>
</tbody>
</table>

Since all the five models have P-value lower than .001 therefore we can reject null hypothesis and accept the alternative hypothesis.

Since Adjusted R-Square value of all the models are greater than 85%, thus, it is concluded that all the five models are reliable because greater 80% P-value shows the significance relationship among the dependent and independent variables.

Above tables is showing that all the five sub tables are SPSS models for the hypotheses. All the values used for \( \alpha, \beta, \text{P-value}, \text{adjusted R-square} \) in the table are collected by using SPSS technique.

Model-1, Model-2, Model-3, Model-4 are derived from equation 1 and model-5 is derived from equation 2 by putting the values of \( \alpha, \beta, X_1, X_2, X_3, X_4 \) and \( X_5 \) in the equations respectively. Values of Adjusted R-square in the above table shows that all 5 hypotheses have been confirmed strongly.
4.3 Graphical visualization

The graphs 4.1 to 4.5 visualize the responses for the models 1 to 5 in table 4.1.

Graphs were drawn from survey questionnaire analysis that already showed above having a strong relationship among the variables. Due to the 5 point scale in the questionnaire, some points in the graph stand for multiple answers.
Graph 4-3

Graph 4-4
4.4 Analysis with local and international pharmaceutical companies

In this research, the total numbers of international pharmaceuticals are 10 whereas local pharmaceutical companies are five. Five international and five local pharmaceutical companies with 30 employees of each company were selected for SPSS analysis test. Analysis with its staff (International pharmaceutical companies).

Table 4-4 Model table for research questions

<table>
<thead>
<tr>
<th>Models</th>
<th>A</th>
<th>β</th>
<th>P-value</th>
<th>Adjusted R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model-1</td>
<td>0.321</td>
<td>0.672</td>
<td>0.001</td>
<td>0.891</td>
</tr>
<tr>
<td>Model-2</td>
<td>0.362</td>
<td>0.731</td>
<td>0.003</td>
<td>0.872</td>
</tr>
<tr>
<td>Model-3</td>
<td>-0.457</td>
<td>1.213</td>
<td>0.006</td>
<td>0.882</td>
</tr>
<tr>
<td>Model-4</td>
<td>0.219</td>
<td>0.648</td>
<td>0.013</td>
<td>0.902</td>
</tr>
<tr>
<td>Model-5</td>
<td>0.410</td>
<td>0.711</td>
<td>0.003</td>
<td>0.912</td>
</tr>
</tbody>
</table>

R-squared is the percentage of the response variable variation that is explained by a linear model. Value of R-squared is always between 0 and 100%. Higher the R-squared, the better the model fits your data.
The results from SPSS regression test show that there is a significant relationship between six variables of selected international pharmaceutical companies. Employees from international pharmaceutical companies believe that BI can help the pharmaceutical companies in their decision making processes and can improve the marketing performances.

4.4.1 **Analysis with IT staff (local pharmaceutical companies)**

<table>
<thead>
<tr>
<th>Models</th>
<th>A</th>
<th>β</th>
<th>P-value</th>
<th>Adjusted R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model-1</td>
<td>0.213</td>
<td>0.412</td>
<td>0.0001</td>
<td>0.713</td>
</tr>
<tr>
<td>Model-2</td>
<td>0.312</td>
<td>0.527</td>
<td>0.0020</td>
<td>0.731</td>
</tr>
<tr>
<td>Model-3</td>
<td>0.323</td>
<td>0.512</td>
<td>0.0002</td>
<td>0.773</td>
</tr>
<tr>
<td>Model-4</td>
<td>0.221</td>
<td>0.441</td>
<td>0.0030</td>
<td>0.754</td>
</tr>
<tr>
<td>Model-5</td>
<td>-0.312</td>
<td>0.921</td>
<td>0.0001</td>
<td>0.763</td>
</tr>
</tbody>
</table>

The results from SPSS (Regression) test show that there is a significant relationship between all the six variables of selected local pharmaceutical companies. One explanation for the difference in the adjusted R-square would be that local companies are using BI less than international companies and are not on the same position with international companies in decision making processes.

4.5 **Qualitative interview**

![Figure 4-1 Functional decomposition](image)
In this research work conduct the unstructured interview to know the employees response regarding impact of business intelligence on product marketing performance. Interviews with the marketing departments and IT departments because these department directly promote the sale of products and directly use the BI to take the decision. The communication within organizations flows in vertical and horizontal dimensions, the communications runs simultaneously at vertical and horizontal levels, the downward communication goes from top to down and resultantly from downward to upward, and afterwards this communication moves on horizontal levels and from this level to the supervisors. Functional decompositions of almost all the companies in developing countries are approaching from top management to employers. Owners of the company rely on their general managers to make decision in order to get better performances. Managers of all departments work under general manager and provide him relevant information for effective decision making. Managers follow the instructions from general manager to make the decisions and policies for company's interest. Marketing people get the information about marketing policies for implementations.

After considering this information interviews of top management (regional managers, product manager or national sale manager) of the companies were conducted.

4.6 Interview Analysis

The analysis of the interview was based on the variables included in the questionnaire. Three of the six variables are briefly described below along with one example of the question included in the questionnaire to study its impact in the research process.

4.6.1 Strategic planning

Strategic planning is a central factor in our conceptual model for business intelligence success. The interviews regarding this factor were asked to different departments of Pharmaceutical industries. The questions were formed like: Does strategic planning support you in decision making? The response to this question in different fields of the business was in support of the need for strategic planning. Most interview partners responded that strategic planning supports decision making, but most of them did not respond why it is important. Managers typically acknowledge that strategic planning plays a crucial role in the decision making of the company. This highlights the role of strategic planning in relation to the decision making and business intelligence.
4.6.2 Organizational Support

Questions about the organizational support were asked to the persons of both IT and Marketing departments. The central question was: *Do you believe that the referred information provided by BI is worthy for your organization to derive material benefits?*

The responses about such questions were mostly positive. The respondents believe that the referred information provided in business intelligence is worthy for any organization to derive material benefits.

4.6.3 Marketing performance

The question related to marketing performance variable was: *How can marketing BI help in competitive intelligence in pharmaceutical industry?*

The respondents answered that in pharmaceutical industry business intelligence (BI) is very helpful to compete with competitors in sales and marketing. The pharmaceutical industry believes that having a good business intelligence system helps to prepare right strategies and tactics for their products in relation to their competitors. Business intelligence is known for trustworthiness among most of the industrial holders and the fact that it provides an environment for precise decision making adds value for the organization.

4.7 Interviews with IT department

Information department employees play a vital role to the implementation of business intelligence tools. We used the unstructured interview technique to check the IT department staff response regarding above mention hypothesis. They responded that strategic planning is key to business intelligence success. They also believe that business intelligence increased the marketing performance. Further they stressed that organizational support focuses on cost reduction, improvements in product quality, and a decrease in product development time. Concerning knowledge management, they mentioned the aspects knowledge capturing, evaluation, retrieval, and sharing of knowledge assets. According to the respondents, providing the data to BI for competitive decision making shall increase the market performance as well. The last part of the interviews was about technological advancement and technological change. They believe that without new technological adoption and technological advancement it would be difficult to implement business intelligence. In the future, business intelligence is a highly effective and productive tool for any organization to run the operations (marketing, sales and production). With the help of business intelligence
(BI), new products can be developed for new therapeutic areas and it is very helpful in making right decision for right product.

4.8 Interviews with marketing department

The marketing department promotes, sells and distributes the products. The marketing department has a central role for the company performance. We interviewed the top management and checked the response about impact of business intelligence on product marketing. We used the unstructured interview technique and get the response of employees about hypothesis. They believe that without proper planning they would not be able to use the BI tool properly and cannot achieve the set target as well. Right time decisions give competitive advantage. They accept that strategic planning and business intelligence have a strong relationship to increase the product sales and capture the whole market and fulfill the customer demands as well. Secondly, we asked the question about organizational support they replied that organizational support provides the work environment and work culture so that it supports business intelligence use. They also believe that organizational support and business intelligence have a relationship and increase the market performance. Thirdly, we asked the question about knowledge management they replied that without employees’ knowledge it is not easy to implement the business intelligence or to get the target results from business intelligence. Knowledge management and business intelligence has a strong relationship to increase the market performance. In the last response about technological advancement and technological change, they responded that these factors have an important role to increase the performance of business intelligent as well as increase the performance of marketing department. They strongly accept the relationship of new technological implementation and business intelligence.
5 Discussion

The overall aim of this research is to explore how (employees in the companies) perceive the success factors for applying BI for marketing purposes.

The first objective of the study was to create an instrument to investigate the success factors. After an extensive literature study, an instrument was created in the form of a questionnaire. The literature study (e.g., Lines, et al., 2012; Ramakrishna, et al., 2012; Haley & Haley, 2012) revealed that business intelligence is the more generic term and DSS is one of the technologies used for business intelligence. This view was also shared by the persons interviewed for this thesis. All questions in the questionnaire are based on relevant publications, and linked to the conceptual model used in this research. The conceptual model has four independent variables, one dependent variable, and one result variable. It encodes how we tackled the research aim of the thesis. There are 34 questions of six variables. Hence, each variable has between five to seven questions to assess the respondents’ perception on this variable.

The second objective was to apply the instrument to the pharmaceutical industry and clarify the validity of hypothesis about the success factors. The questionnaire was sent to 150 persons out of 15 companies from the pharmaceutical sector in Pakistan. Out of these 150, we received 104 replies, specifically between five and seven replies per company. The results from those questionnaires from different pharmaceutical companies were collected. Most of the answers are showing the importance of BI in marketing sector of pharmaceutical companies but few of them were not agreed with above statement. Random samples were selected for analysis by using SPSS. Selected samples are meeting the acceptance of BI in the conceptual model.

One explanation for the difference in the questionnaire results is that local companies are using BI less than international companies and are not getting the same advantages with international companies in decision making processes.
6 Conclusion

In this research, a questionnaire was aligned with a conceptual model on impact factors for the successful use of BI techniques in the marketing sector of pharmaceutical industries. The questionnaire is strictly rooted in literature, and can be reused for similar future research, e.g. in other industrial sectors or other countries.

For the application of the questionnaire, companies from the pharmaceutical industry in Pakistan were approached. The results received from these pharmaceutical companies confirm that all strategic planning, organizational support, knowledge management and technology innovation are perceived as highly influential for the success of BI in marketing sectors of pharmaceutical companies.

Employees with different levels of experiences in accordance with age, sex and department have different views about marketing performance success. 39 female and 57 male employees were selected for questionnaire survey. Analysis shows that BI is very necessary for pharmaceutical companies in all the departments but especially in marketing sector, as few local companies which are not using any type of software and perform manually are not very much in competition. There is much difference in marketing, production, quality control and other department in order to make timely and effective decisions.

The study shows that information system (BI) do have an influence on the marketing performance, at least as perceived by the respondent of this study. Basically, four main variables strategic planning, organizational support, knowledge management and technological innovation are taken as independent variables to check the information system (BI) succession. In first stage, strategic planning, organizational support, knowledge management and technological innovation are taken as independent variables and information system succession is taken as dependent variable. It has been observed that strategic planning, organizational support, knowledge management and technological innovation have significant impact on information system success. In second stage, information system success (BI) is taken as an independent variable and market performance is taken as dependent variable. Again, it has been observed that information system success has significant impact on market performance. In other words, the respondents believe that information systems (BI) provide the precise and accurate information for successful marketing. Interviews were used to confirm this finding (triangulation).
Our result shows that the independent variables have significant impact on the dependent variable and all of five hypotheses are accepted. This means that for increasing marketing performance of the organization the companies should improve its decision support system and business intelligence. It is confirmed that knowledge management, organizational support, technological innovation and strategic planning have a significant impact on the BI.

There are still some open questions that could not be answered by this study. First, we only measured the perception of the impact of the independent variables on the dependent ones. A future study should include objective measures for the independent variables but also the dependent ones: the success of BI, and marketing performance. Further, the questionnaire developed in this study should be applied to other countries and industry sectors. This would allow comparing the results with the results of this study.
7 References


Dehorn, Bryant (1998), It's All in our Heads. Inform, September, 12 (8).


## Appendix 1: Questionnaire

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Questions</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Indifferent</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Strategic Planning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>Your company has a clear strategy for the future.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>Your company has a formal, long-term strategic plan regarding decision support system.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Your company has clearly identified the decision support system project priorities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>Your company measures the bottom-line effectiveness of decision support projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>Business planning is ongoing and involves everyone in the process to some degree.</td>
<td></td>
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<tr>
<td>06</td>
<td>Decisions are usually made at the level where the best information is available</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Organizational Support</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>07</td>
<td>Cooperation across different parts of the organization is actively encouraged by the management.</td>
<td></td>
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</tr>
<tr>
<td><strong>08</strong></td>
<td>Our people are open and trusting with one another.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>09</strong></td>
<td>Written and oral communication is very open in our company.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>People work like they are part of a team.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>Different parts of the organization often cooperate to create change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Knowledge Management**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12</strong></td>
<td>There is continuous investment in the skills of employees</td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>The capabilities of people are viewed as an important source of competitive advantage.</td>
</tr>
<tr>
<td><strong>14</strong></td>
<td>It is retrieve and use knowledge about its products and processes.</td>
</tr>
<tr>
<td><strong>15</strong></td>
<td>It is retrieve and use knowledge about its markets and competition.</td>
</tr>
<tr>
<td><strong>16</strong></td>
<td>Improve communication between the marketing department personnel</td>
</tr>
<tr>
<td><strong>17</strong></td>
<td>My co-workers provide me with good, usable information</td>
</tr>
</tbody>
</table>

**Technology**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>18</strong></td>
<td>There is a frequent introduction of new technologies into my organization.</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>IT should reduce our costs and increase quality and speed</td>
</tr>
<tr>
<td><strong>20</strong></td>
<td>Technology should enhance the effectiveness of our overall performance</td>
</tr>
<tr>
<td><strong>21</strong></td>
<td>Technology should extend our market and geographic reach</td>
</tr>
<tr>
<td><strong>22</strong></td>
<td>Technology should help us to change industry and market practices</td>
</tr>
</tbody>
</table>
23 | Decision support system has reduced the cost of information analysis.  
24 | Decision support system has improved efficiency / effectiveness of decision making process.  
25 | Decision support system has dramatically increased the productivity.  
26 | Decision support system has improved the company competitive position.  
27 | Decision support system has dramatically increased the company sales.  
28 | Decision support system has dramatically increased the company profitability.  
29 | Decision support system improved the company overall performance.  

### Market Performance

30 | Over the previous year, our financial performance has been outstanding.  
31 | Over the previous year, our financial performance has exceeded our competitors.  
32 | Over the previous year, our sales growth has been outstanding.  
33 | Over the previous year, we have been more profitable than our competitors.  
34 | Over the previous year, our sales growth has exceeded our competitors.

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Appendix 2: Interview questions

Following is the excerpt of the interview questions (21 main questions).

1. Do you know about BI (what do you know, how do you know etc.)?
2. Are you or your organization has been using any BI?
3. Which types of DSS are you/your organization is using?
   a. Why do you think a DSS is helpful for an organization and in particular what information does it allow your organization to have for decision making (Market, Financial, Product, Pricing, Sales)?
4. Do you believe that the referred information provided by DSS is worthy for your organization to derive material benefits?
5. Do you remember any instance where you register these benefits?
6. Do you believe that a DSS is always trust worthy? Meaning that it always provides information which is valuable for your organization?
7. If you have data used by DSS, what aspects of data you think are most crucial (completeness, precision, easiness etc.)?
8. Has there been any instance where you believe use of DSS has caused organization some unnecessary cost (time, money, wrong decision etc.)?
9. What you believe could be or has been the reason of your DSS being ineffective?
10. To what extent are you satisfied with the quality of your decisions based on DSS (recommend for future use, need any improvements etc.)?
11. How are business intelligence tools efficient for organizational marketing operations?
12. What are the pharmaceutical industry’s prominent areas that get benefit from BI?
13. How can marketing DSS help in competitive intelligence in pharmaceutical industry?
14. What role does BI play in pricing and new product development at pharmaceutical industry?
15. Does it support hierarchical decision making?
16. What level of decision making is best supportive by MIS e.g. Lower, middle or top management?
17. How much time/effort/money are needed to upgrade any required feature in the BI?
18. Do you think that your BI is as effective/comparable as any other system in the local and international market?
19. Is it user friendly or it require some kind of special training or competence?
20. Is it connected with internet/Intranet?
21. Do you have any research question about business intelligence which can create a valuable improvement in Pharmaceutical industries?
22. WHICH BI tools you use for WHICH purpose? Do you have any research tool in your Company?

Can you please explain your answer on a scale, e.g. (1=totally disagree)..... (7=totally agree)?
Appendix 3: Research questions

Research question 1

Has the strategic planning impact on BI?

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficient (B)</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>P-value</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Value</td>
<td>-0.213</td>
<td>0.056</td>
<td>-3.812</td>
<td>0.000</td>
<td>0.927</td>
</tr>
<tr>
<td>Strategic Planning</td>
<td>1.026</td>
<td>0.029</td>
<td>34.871</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows there is a significance relationship between strategic planning and BI. P-value shows that Relationship is highly strong between these two variables. Coefficient value indicate that one unit increase in strategic planning, it will increase 1.026 points of BI. Its adjusted R Square value is 0.927 which indicates that a 92.7 percent change comes in business intelligence of the organization.

**Hypothesis:**

**Ho (a):** There is no significant relationship between Strategic planning and BI.

**H1 (a):** There is significant relationship between Strategic planning and BI.

Regarding above analysis accept the H1
Research Question 2:
Has the organizational support impact on BI?

Table 2 Research question 2

<table>
<thead>
<tr>
<th></th>
<th>Coefficient (B)</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>P-value</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Value</td>
<td>0.357</td>
<td>0.038</td>
<td>9.310</td>
<td>0.000</td>
<td>0.934</td>
</tr>
<tr>
<td>Organizational Support</td>
<td>0.706</td>
<td>0.019</td>
<td>36.691</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Independent Variable= Organizational support, Dependent variable=BI

Table 2 shows there is a significance relationship between organizational support and BI. P-value shows that Relationship is highly strong between these two variables. Coefficient value indicate that one unit increase in organizational support, it will increase .706 points of BI. Its adjusted R Square value is 0.934 which indicates that a 93.4 percent change comes in business intelligence of the organization.

Hypothesis:

Ho (b): There is no significant relationship between organizational support and BI.
H1 (b): There is significant relationship between organizational support and BI.

Regarding above analysis accept the H1 (B).
**Research Question 3:**

Has the knowledge management impact on BI?

<table>
<thead>
<tr>
<th>Table 3 Research question 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coefficient (B)</strong></td>
</tr>
<tr>
<td>Constant Value</td>
</tr>
<tr>
<td>KM</td>
</tr>
</tbody>
</table>

Independent Variable= Knowledge management, Dependent variable= BI

Table 3 shows there is a significance relationship between knowledge management and BI. P-value shows that relationship is highly strong between these two variables. Coefficient value indicate that one unit increase in knowledge management, it will increase .684 points of BI. Its adjusted R square value is 0.939 which indicates that a 93.9 percent change comes in business intelligence of the organization.

**Hypothesis:**

**H0(c):** There is no significant relationship between knowledge management and BI.

**H1(c):** There is significant relationship between knowledge management and BI.

Regarding above analysis accept the H1 (C).
Research Question 4:

Has the technological innovation impact on BI?

Table 4 Research question 4

<table>
<thead>
<tr>
<th></th>
<th>Coefficient (B)</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>P-value</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Value</td>
<td>0.305</td>
<td>0.047</td>
<td>6.508</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>Technological innovation</td>
<td>0.810</td>
<td>0.026</td>
<td>31.034</td>
<td>0.000</td>
<td>0.910</td>
</tr>
</tbody>
</table>

Table 4 shows there is a significance relationship between technological innovation and BI. P-value shows that relationship is highly strong between these two variables. Coefficient value indicate that one unit increase in technological innovation, it will increase .810 points of BI. Its adjusted R square value is 0.910 which indicates that a 91 percent change comes in business intelligence of the organization.

Hypothesis:

Ho (d): There is no significant relationship between technology advancement and BI.
H1 (d): There is significant relationship between technology advancement and BI.

Regarding above analysis accept the H1 (d).
Research Question 5:
Has the BI increased or decreased the market performance?

Table 5 Research question 5

<table>
<thead>
<tr>
<th></th>
<th>Coefficient (B)</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>P-value</th>
<th>Adjusted R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Value</td>
<td>-0.556</td>
<td>0.086</td>
<td>-6.434</td>
<td>0.000</td>
<td>0.893</td>
</tr>
<tr>
<td>Information System</td>
<td>1.388</td>
<td>0.049</td>
<td>28.151</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Independent Variable= BI, Dependent variable= Marketing performance

Table 5 shows there is a significance relationship between BI and market performance. P-value shows that Relationship is highly strong between these two variables. Coefficient value indicate that one unit increase in BI, it will increase 1.388 points in marketing performance. Its adjusted R Square value is 0.893 which indicates that impact of information system on the marketing performance is 89.3% means that according to respondents perception 89.3% changes in marketing performance are occurred due to BI and the remaining may be due to any other factors.

Hypothesis:

Ho (e): There is no significant relationship between BI and Market Performance,
H1 (e): There is significant relationship between BI and Market Performance.

Regarding above result accepts the H1 (e).