UNIVERSITY OF NAIROBI

SCHOOL OF COMPUTING AND INFORMATICS

ADOPTION OF BUSINESS INTELLIGENCE SOLUTIONS:

A CASE OF KENYAN INSURANCE INDUSTRY

BY

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NOVEMBER 2016

DECLARTION

STUDENT

I declare that this project being presented is my original work and has not been published for the award of any degree by the University of Nairobi or any other university.

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This research project is submitted in partial fulfillment for the degree of Masters of Science in Information technology Management with my approval as the university supervisor.

Signature: _____

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DEDICATION

I wish to dedicate this research project to my wife Abby Josephine Akisa, my three children Shamarah, Shadel & Shaynah and parents Cornel Ipomai & the late Redempta Achobo.

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I thank the Almighty God for giving me the energy, wisdom and strength to work on this project. I'm also extremely thankful to my supervisor Dr. Evans Anderson Miriti for his wonderful guidance throughout the project.

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ABSTRACT

The insurance sector in Kenya is riddled by many challenges among them low penetration levels, low persistency ratios and poor claims payment history. These problems have been persistent for a long time and they are mainly attributed to very low innovation levels across the sector. The low innovation level in the Kenyan insurance sector is mainly due to limited adoption of appropriate technological tools like Business Intelligence Solutions.

The objective of this project was to come up with an appropriate model for adoption of business intelligence (BI) solutions within the Kenyan insurance sector and to validate the proposed model for adoption of BI solutions within the Kenyan insurance sector.

Descriptive survey research type was used in this study. The population of the study consisted of all insurance companies duly licensed to transact in Kenya in the year 2016. Census sampling technique was. The primary data was collected using questionnaires with closed ended questions. The independent variables section of the questionnaire had five sub-sections namely; Users characteristics, Technological characteristics, Environmental characteristics, Organizational characteristics and Key decision maker characteristics. The questionnaires were administered in two ways; personal interview, and mail survey through drop and pick method. Descriptive statistics were used to analyze collected data. Confirmatory factor analysis was used to validate the proposed model.

The regression analysis results showed the relationships between user characteristics, organizational characteristics & key decision maker characteristics and adoption of BI were statistically significant. This is because their p-values were less than 0.05. On the other hand, the relationships between technological characteristics & environmental characteristics and adoption of BI were statistically insignificant since their p-values were greater than 0.05. The findings further revealed that key decision maker characteristics and organizational resources had a significant relationship with likelihood of adoption BI. This is because their p-values were less than 0.05. However, user characteristics, technological characteristics and environmental characteristics were found to have insignificant relationship with likelihood of adoption of BI solutions. These variables had p-values above 0.05.

The study recommended the validated model for adoption of BI solutions to the Kenyan insurance industry IT practitioners to use it as the basis for adoption BI and related technologies.

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ABBREVIATIONS AND ACRONYNMS

BI	Business Intelligence
CEO	Chief Executive Office
ERP	Enterprise Resource Planning
ETL	Extract Transform Load
IRA	Insurance Regulatory Authority
KES	Kenya Shillings
OLAP	Online Analytical Processing
SME	Small and Medium Enterprises
TOE	Technology-Organization-Environment
USD	United States Dollar
VC	Venture Capital

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CHAPTER ONE

INTRODUCTION

1.1 Business Intelligence

Business intelligence (BI) is a technology-driven process for analyzing data and presenting actionable information to help corporate executives, business managers and other end users make more informed business decisions. BI encompasses a variety of tools, applications and methodologies that enable organizations to collect data from internal systems and external sources, prepare it for analysis, develop and run queries against the data, and create reports, dashboards and data visualizations to make the analytical results available to corporate decision makers as well as operational workers, Khan & Quadri(2012). According to Gatner(2015), Business Intelligence and Data Analytics is the most active technology sector in terms of internet based Venture Capital (VC) deals and it will grow to USD 20 billion by 2019.

The probable benefits that can be drawn from the utilization of business intelligence solutions include speeding up decision making process in institutions, making internal processes optimum, improving efficiency in internal operations and processes, refocusing on inventions that will generate new revenues, facilitate invention of new products and services, improving the whole reporting processes in institutions and obtaining competitive advantage over the competition i.e. through proactively spotting business problems that need to be addressed and identification of new market trends & new niche marketing to further both individual and industry growth, Chang(2006).

The data for business intelligence system can be obtained from past records which constitute historical data or data directly obtained from the systems on real time basis. During the invent of business intelligence system, the main users used to be IT professionals who used very complex queries to manipulate data from the source to generate final meaningful reports. However, due to advancement the business intelligence front, better, faster, user friendly and easier to use applications have been developed and increasingly the users of this technologies have become business executives and finance practitioners. According to Daniel Humphries (2014), 63% of the prospective buyers of BI software are business professionals as opposed to a mere 37% IT professionals.

Typical business intelligence solution would have several components including data processing and analysis component, database component, reporting component, visualization component and data extraction component. In some instances, these components would be supplied by different vendors. However, due to development in the recent years, there are vendors nowadays who have specialized in business intelligence solutions hence they supply a complete package of an application with all components seamlessly integrated.

1.2 Kenyan Insurance Industry

Insurance industry is one of the key players in the Kenyan financial sector. Regulated and supervised by Insurance Regulatory Authority (IRA) the industry has a number of entities as tabulated below, IRA(2015);

Table 1.1 Insurance Industry Players

Number	Regulated Entities	Number licensed
1	Insurance companies	50
2	Reinsurance companies	3
3	Insurance brokers	198
4	Reinsurance brokers	4
5	Medical insurance providers	29
6	Insurance investigators	133
7	Motor Assessors	108
8	Insurance Agents	5155
9	Insurance Surveyors	24
10	Loss adjustors	25
11	Claims settling gents	2
12	Risk Managers	8

According to IRA(2015), the insurance sector in Kenya is suffering from the following main challenges;

1.2.1 Low Penetration Level

The Kenyan industry Penetration level was at a mere 2.9 % as at 31st of December 2014, Swiss Re(2015).

1.2.2 Poor Persistency

Persistency is the percentage of an insurance company's already written policies remaining in force, without lapsing or being cancelled by the policy holder. One of the main contributors of poor persistency is the Kenyan insurance industry is insurance agents from different companies fighting in the same traditional markets for the very same clients leading hopping of policy holders from one insurance company to another resulting to no new policy holders within the industry, IRA(2015).

1.2.3 Poor Claims Payment History

As a result of longer claims settlement turnaround times mainly due to internal inefficiencies, insurance industry is negatively perceived by the public as an industry that hardly fulfills its promises. Hence very few individuals are willing to take discretionary insurance policies like individual life policies, investment policies and individual last expense policies, IRA(2015).

1.2.4 Low Level of Innovation

The insurance industry in Kenya is known for perennially relying on conventional (traditional) insurance products, services and distribution channels. Research and developed has hardly been embraced by the industry to aid in identifying new and relevant products for distribution. Further, limited adoption of proper technological solutions by players has led to very low innovations across the industry. As a result the industry is awash with products that irrelevant to the emerging markets like the youth, IRA (2015).

1.3 Problem Statement

Insurance industry is one of the sectors with profound effects in the Kenyan economy. As per IRA(2015), the industry gross premium written in 2014 was KES 160. 4 billion while the asset base for the industry was at KES 430.54 Billion at December 31, 2014. By any standard, the figures above paint a very plum picture about an industry. However, in reality, the Kenyan Insurance sector is riddled by many challenges among them low penetration levels, poor persistency and poor claims payment history. These three problems have been persistent in the Kenyan Insurance industry for a long time and they are mainly attributed to very low innovation levels across the sector. According to IRA(2015), the main cause of low innovation levels within the insurance industry in Kenya is lack of or very limited adopted of appropriate technological

tools like Business Intelligence Solutions which are very essential in spearheading and anchoring innovation.

1.4 Research Objectives

1.4.1 Main Objective

To provide a model for adoption of Business Intelligence Solutions in the Kenyan Insurance Industry

1.4.2 Specific Objective

1. To identify an appropriate model for adoption of business intelligence solutions within the Kenyan insurance industry.
2. To validate the proposed model for adoption of business intelligence solutions in the Kenyan insurance industry.

1.5 Significance of the Research

With a proper model for adoption and effective utilization of business intelligence solutions, the Kenyan Insurance sector may have better uptake of these very useful and innovative tools (BI tools) hence the realization by the Kenyan Insurance industry of the benefits associated with business intelligence tools. This research may however be significant to the following;

1) Insurance companies in Kenya: There may be elaborate model to help them adopt the BI tools
2) Insurance Regulatory Authority (IRA): They may have a framework to help enforce and regulate adoption of appropriate technological tools in the industry.
3) The Kenyan public: As a result of more adoption of BI tools, the insurance industry may be able to come up with innovative products that may match the needs of the public.
4) Kenyan government: Better innovation in the industry may lead to more uptake of insurance hence the industry may have more funds to lend the government to fund its development projects.

CHAPTER TWO

LITERATURE REVIEW

2.1 Business Intelligence

2.1.1 Definitions of BI

According to (Vitt, Luckevich & Misner, 2002), business intelligence is not a very new filed in information systems. Business intelligence field has been in existence for a long time despite it not getting wide spread usage. Business intelligence can be defined in various different ways the determinant being the prevailing circumstances and contexts, (Niu, Lu & Zhang, 2009). The studies of (Gibson et al. 2004; Jagielska, Darke & Zagari, 2003) articulate that most of the works in the business intelligence field actually emanate from the business world. Therefore some of the definitions of business intelligence are borrowed from the business world. Because of such diversifications, there is no currently universally accepted definition of business intelligence. Different scholars through their studies over time have come up with various definitions of business intelligence. These definitions are based on perspectives i.e. Managerial perspective, Technical perspective and Product perspective. Perspective based definition of business intelligence are as elaborated below;

Based on the managerial perspective, business intelligence is viewed as a process that aggregates data from both within and without the organization and transform it in to a state that aid comprehensive, decisive and easier decision making process in institutions. According to (Petrini & Pozzebon, 2009), the managerial perspective based definition of BI focuses so much on creating an information environment within an institution using operational and transactional data so as to forecast the strategic direction of the institution.

From a technical perspective, and borrowing from the studies of (Olszak & Ziemba, 2007; Moss, 2004), Business intelligence is viewed as a conglomeration of advanced software system that aggregate heterogeneous data from diverse source and transforms it into useful and meaning information to aid companies in making decisions. It is further revealed that the conglomeration

of technologies that constitute business intelligence include technologies that store data, mine data, transform data, manipulate data, consolidate data and last but not least display data in a manner that is easier to visualize.

The product perspective definition of business intelligence borrows mostly from (Chang, 2006). This perspective defines business intelligence as end product of a highly intricate process that encompasses data extraction from diverse sources, data transformation, data manipulation and then data visualization. The data to be extracted can be from the institution, external and internal partners or even relevant third parties.

Although the three above definitions are based on different perspectives, they still share the fundamentals of BI. First is all the three perspectives take conscience of data storage and processing aspect of BI. The next aspect that is conspicuous in all the three definitions is the fact that business intelligence is mostly for aiding decision making in institutions. All the three definitional perspectives share those aspects of business intelligence.

None of the above definitions of business intelligence will be adopted in this study. The main reason being that all the three definitions have ignored or paid very little attention to people. According to English(2005), the most important aspect of business intelligence that looks at the processed data and interpret it so as to make meaning out of it or project the strategic direction the institution is taking are people. As such these definitions of business intelligence based on the perspective are deficient and will not be adopted for the purposes of this study.

For the purposes of this research, a definition of business intelligence by Boonsiritomachai(2014) will be used. This is because this definition recognizes the importance of people in business intelligence and the whole process of processing information from diverse and enormous amounts of data. According to Boonsiritomachai(2014), business intelligence is a broad category of processes, people, data and software that are aligned together in order to aid institutions in data collection, data analysis and decision making.

2.1.2 Components of BI

According to Choo(2002) and Thierauf(2001), an effective business intelligence system must have three distinct components that are seamlessly intertwined together into one very effective system. This components include; data extraction component, data transformation &

manipulation component and reporting component. This architecture of BI does not have a data warehousing component. This depicts advancement in this area on information system. Effective business intelligence architecture is as shown below

2.1.3 Effective BI System Component

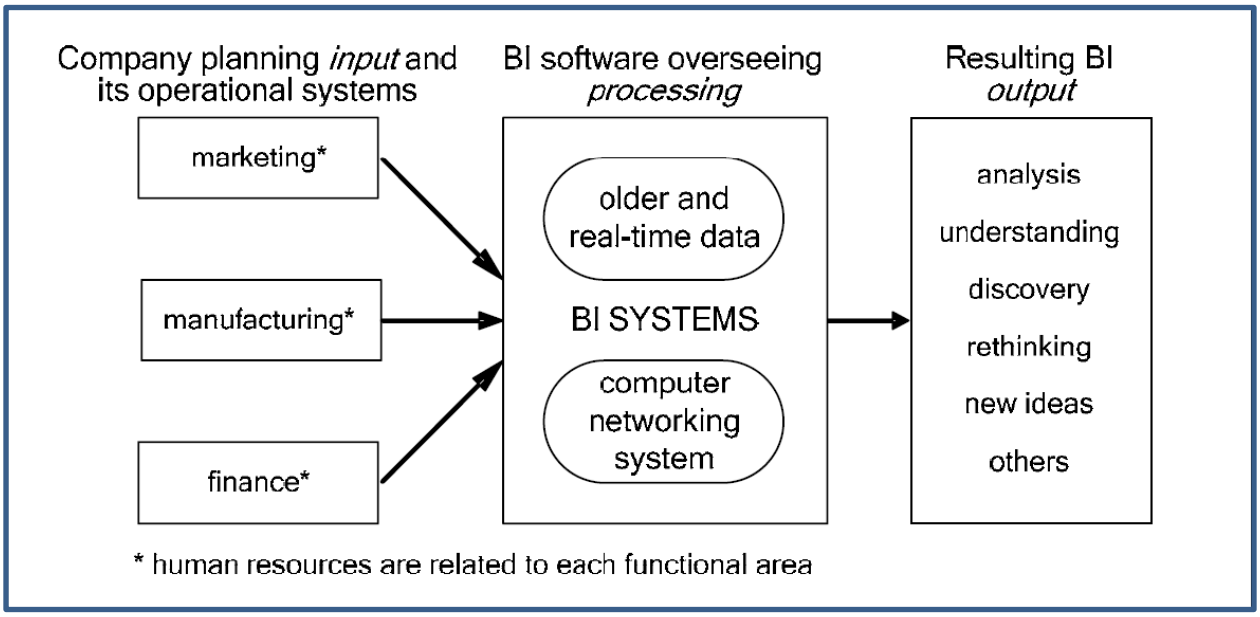

Figure 2.1: *Example of an effective BI system.*

Source: Thierauf(2001)

Before advancement in the area, there was a component that never used to miss on any business intelligence system. This component is a data warehouse. In this architecture, a data warehouse was used to store data that would be extracted from various diverse sources both within and without the institution then store it in huge data banks in the name of a data warehouse. This architecture of business intelligence systems with a data warehouse proved to one of the impediments to proliferation of the usage of business intelligence systems. The reason being, the cost of building a data warehouse was too high, hence very few institutions could build one. The structure of the traditional business intelligence systems with a data warehouse as one of the main components is as shown below;

2.1.4 Traditional Business Intelligence Architecture

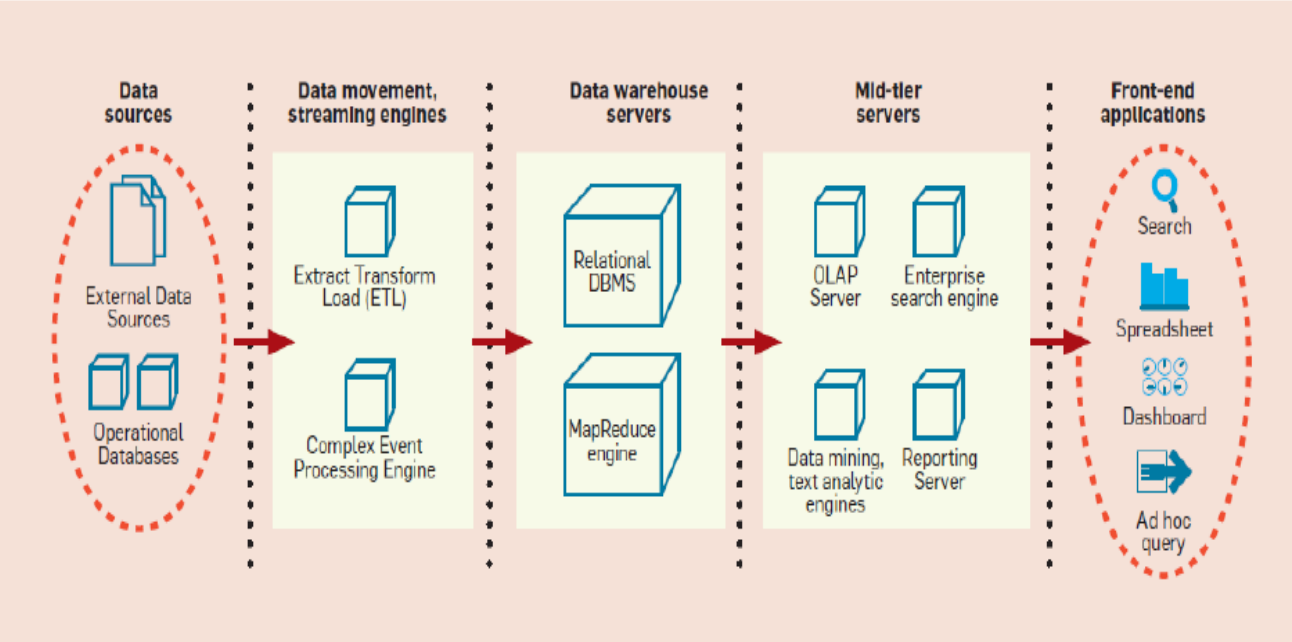

Figure 2.2: *Traditional Business Intelligence Architecture*

Source: Chaudhuri , Dayal & Narasayya(2011)

However, with advancement in developments within the BI area, a more effective, cheaper, less complex three tier architecture for BI system has been invented. This new architecture eliminates the need for construction of a data warehouse; which has always contributed significantly to the high cost of and complexity BI systems. The advancement in this area led to invention of a technology called in memory processing or traditionally called online analytical processing (OLAP). This technology made it possible to business intelligence systems to extract data directly from the various diverse and heterogeneous source, transform the extracted data into formats and standards that were predefined, manipulate it based on the logics built on the business intelligence system and then display in a manner that is easier to the end users to interpret it and make effective decisions for their institutions. The invent of this business intelligence architecture has enabled most institutions to afford these systems since the most expensive component of the system has been eliminated. The architecture is as illustrated below;

2.1.5 BI Three-Tier Computing Architecture

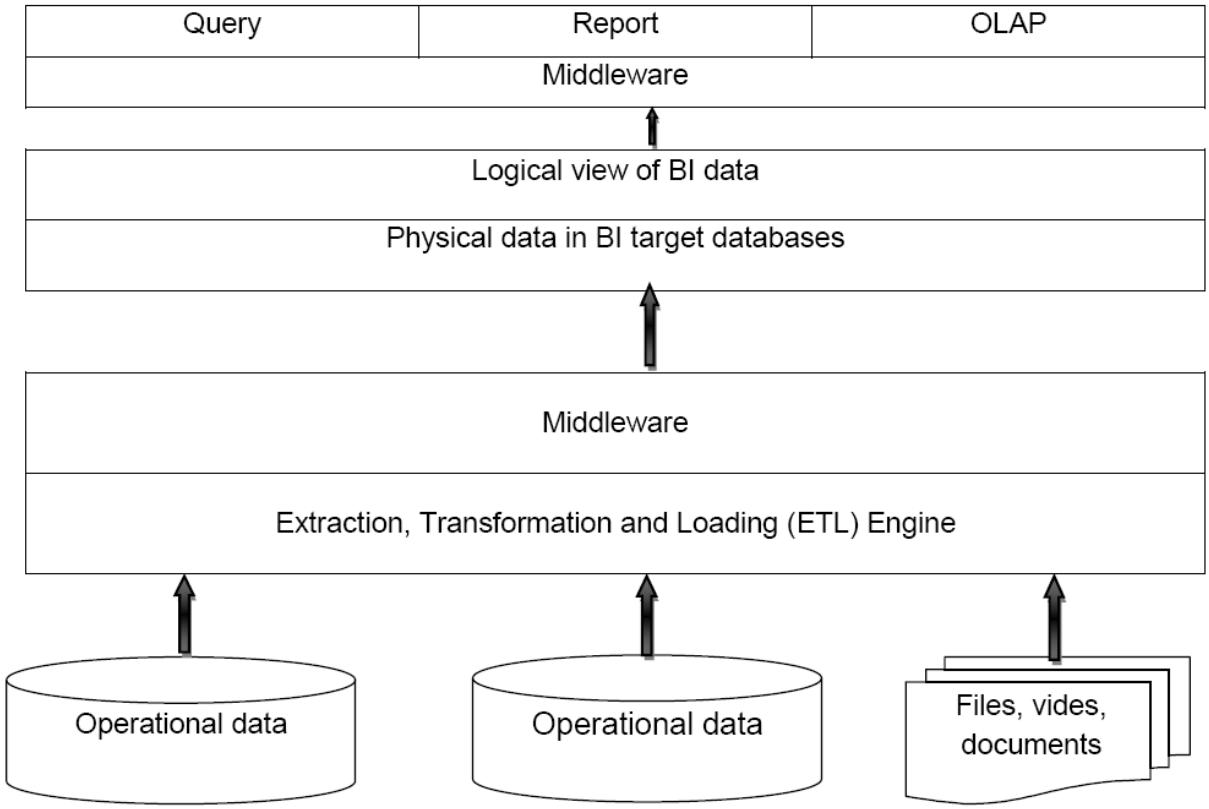

Figure 2.3: *BI Three-Tier Computing Architecture.*

Source: Nyunya(2015)

2.1.6 Benefits of BI

According to (Ko & Abdullaev, 2007; Watson & Wixom, 2007; Ranjan, 2005), institutions stand to benefit so much by implementing business intelligence solutions. The benefits are varied and depend on the perspective upon which the benefits can be looked at. One perspective would classify the benefits of implementing business intelligence solutions as either tangible or intangible benefits. Looking at a different perspective for classifying the benefits of business intelligence system i.e. the one fronted by Liautaud & Hammond(2000), the benefits include improving internal communication, increasing revues, enhancing the benefits associated with implementing ERP solutions and last but not least lowering the costs of operations in institutions.

In this study, we will dwell on the perspective that classifies benefits of business intelligence solutions into tangible and intangible benefits. The benefits under this classification perspective are as elaborated below;

2.1.7 Tangible benefits of BI

Among the benefits that are associated with business intelligence solutions and are tangible of nature include time saving, cost reduction and improved return on investment especially for the investments on ERP systems.

Time saving

According to (Watson & Wixom, 2007), a system will contribute to time saving if it can give the users the information they are seeing within the shortest time possible and with a lot of ease. Business intelligence solutions fit this bill since they are capable of extracting data from diverse sources, process it within the shortest time possible and provide the users with the information they require on time to make the crucial decision they desire to make about the company. This is a tangible benefit of business intelligence systems since the reduction in time taken to transform data from various sources into valuation information is shortened and can be quantified.

Cost saving

According to the study done by Hocevar & Jaklic(2010), the introduction of online analytical processing (OLAP) component in business intelligence solutions architecture has eliminated the need for the most costly component of these systems. This component is a data warehouse. As such the cost of adopting these solutions has come down tremendously. Further, according to Watson & Wixom(2007), implementation of business intelligence solutions effectively eliminate redundant processes within institutions for extraction of data and their analysis thereafter. This in effect reduces the costs of institutions by ensuring that redundancy and duplications are eliminated. Watson, Wixom & Goodhue(2004) claimed that adoption of business intelligence systems do reduce costs of organization by abolishing the need for extra ICT staff that specializes in writing very complex SQL queries for extracting data from various storage source and manipulating it into meaning information.

Return on investment (ROI)

According to the study done by Sahay & Ranan(2008), implementation of business intelligence system will help institution realize a true value of heavy investments in enterprise

resource planning system (ERPs). They argue that include of business intelligence system will put into use the vast data that will be captured and stored by the ERP systems into useful information on real time basis hence aiding the company executives in making sound and insightful decisions.

2.1.8 Intangible benefits of BI

As per the study conducted by Collins, Ketter & Gini(2010) and Matei & Bank(2010), the intangible benefits that can be attributed to business intelligence solutions include; single version of truth, better strategic planning and forecasting and lastly improved customer and supplier statisfaction.

Single version of truth

According to Matei & Bank(2010), business intelligence system aggregate heterogamous data from different sources into one source, transform it, manipulate it and eventually produce reports that are helpful to business executives in making sound business decisions. Since these systems aggregate data from different sources into one and give one output, this therefore present a uniform source for the reports for an institution hence eliminating situations of different reports from different systems with differing information. .

Better strategic plans and decisions

Khan, Amin & Lambrou(2010) articulated in their study that institutions adopt business intelligence solutions so as to improve their level of decision making. This is because business intelligence system provide business executives with refined information that is very useful in making better decisions on planning of the companies and as well as making accurate strategic projects of their companies. Effectively, business intelligence system leads to better planning and strategic forecasting of the company.

Customer and supplier satisfaction

The study by Hocever & Jacklic(2010) elaborated that with business intelligence system, trends about future customer needs can be established hence leading to development of goods and services that satisfy their needs. This in essence leads to better customer satisfaction since their needs are always addressed in time. Marin & Poulter(2004) further stated that business intelligence system enable business executives to equipped with the details of the suppliers' re-order levels hence leading to them being informed on time about the impeding

deliveries. This avoids an ambush to them to supply commodities. This in essence makes supply to better plan their deliveries with low possibility of failure.

2.1.9 Barriers to use of BI solutions

According to Khan, Amin & Lambrou(2010), the main impediments to wide spread use of business intelligence solutions include difficulties in data integration and sharing, poor communication of BI value, complexity of BI systems and high cost of BI system.

Difficulty Data integration and sharing

For a business intelligence system to be effective, extraction of data from relevant sources has to be actualized. This has remained one of the most challenging things to achieve in the implementation of business intelligence system. The reasons that make achievement of this task difficult include heterogeneity of data and data source and lock of permission to access data from the relevant sources.

Communicating BI value

According to Weier(2007), one of the biggest challenges that most practitioners in the business intelligence field face is to communicate clearly to business executives the value imbedded in business intelligence systems. This has led to more often business executives ignoring investing in business intelligence systems since no one can precisely articulate their value addition to businesses.

Complexity of BI

Sahay and Rajan (2008) stated in their study that business intelligence system is a complex system which consists of multiple components from various vendors intertwined together to perform a specific function. Due to this complexity, not so many professional are out there specializing in the implementation of these systems.

Cost of BI

Sandu(2008) articulated that cost is one of the barriers impeding wide spread uptake of business intelligence systems. Xu et L(2009) stated that due to high costs involved in the

implementation of business intelligence system, the adoption of this systems has been and will be a preserve of huge multinational with proper financial anchorings to be able to undertake such implementations.

2.1.10 Levels of BI Adoption

Gibson & Arnott(2005) categorized the level of business intelligence adoption into five levels namely; personal decision support level, executive information systems, data warehousing, intelligence systems and last but not least knowledge management. The level of adoption of business intelligence systems mostly go hand in hand with the maturity of the organization that adopts it. For the case of the Kenyan insurance industry, business intelligence system should be adopted at the levels of knowledge management. This is when the problems facing the industry can be addressed.

2.1.11 Business intelligence maturity models

According to Davis, Miller & Russell(2006), the most commonly used model for to assess the maturity of adoption of business intelligence systems in organizations is the Information Evolution Model (IEM). This model categorizes organizations into five levels based on the usage of information. These levels are as follows; Operate level whereby information is managed by an individual. Next is Consolidate level whereby information is managed by a department. Integrate is the next level and here information is managed at an enterprise level context. Following is Optimize. At this level information is used in an organization to gain insights. Information is becoming very valuable. Last level is innovate where by information is used to improve business growth and revenues. For BI adoption to make the much needed impact in the Kenyan insurance industry; spur innovation, it should be adopted at the highest maturity level which is level five: ‘Innovate’.

2.2 System Adoption Models

2.2.1 Introduction

Following comprehensive and holistic review of Business Intelligence in the earlier section of this chapter, this is section will therefore delve in reviewing theories and models for adoption of BI solutions and technology in general. The section will specifically review the technology adoption models as analyzed by individual researchers in the earlier studies alongside the identified determinants for adoption of BI systems in various industries in different parts of the world. It will also cover the already existing adoption conceptual frameworks. Last but

not least, the section will propose an appropriate adoption models and a conceptual framework to be used in this study;

2.2.2 Technology Acceptance Model (TAM)

This model was developed by Davis in 1986. Technology acceptance model was developed from Theory of Reasoned Actions (TRA) to explain and predict the behaviors of the users of technology in accepting during adoption. The model shows the relationship between the external variables and the internal variables of people such as beliefs, attitudes and intentions of the perceived usefulness of the technology to be adopted and the perceived ease of use of the technology to be adopted. The model is as shown in the diagram below;

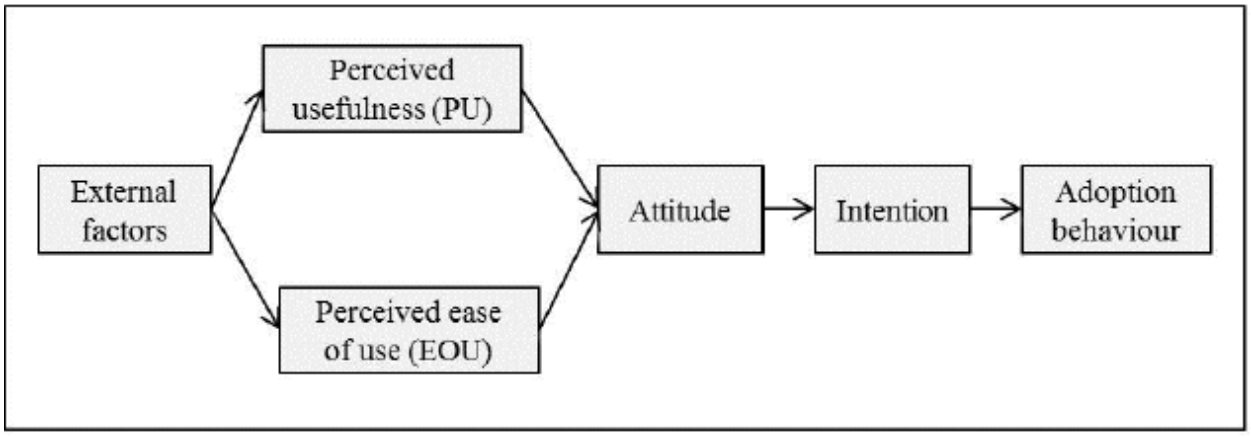

Figure 2.4: *Technology acceptance model (TAM).*

Source: Davis(1989)

As much as the model focuses on key aspects of users to be focused on when adopting technology and specifically business intelligence technology, it failed to put emphasis on other very important aspects of adoption like Users and Key Decision Maker Innovativeness. As such, this model will not be used in this study.

2.2.3 Diffusion of Innovation (DOI) Theory

This model was developed by Rodgers in 1983. It focused mostly of aspects that will determine the uptake to an innovation. Among the things that Rodgers focused on in this model included the innovation itself or technology, the communication channels to be used to communicate the technology to would be users, the passage of time from the when the

potential adopters to the innovation would be hearing about that particular innovation and then ecosystem that the innovation would be provided to the people

As much the DOI model focused on salient aspects of adoption like communication system, time, the innovation itself and social system, it also failed to conspicuously bring out people aspects i.e. Users and Key decision maker innovativeness.

2.2.4 Technological Organizational and Environmental (TOE) model

This model was developed by Tornatzky & Fleischer in 1990. It categorized the attributes that affected adoption of innovation into three i.e. environmental attributes, organizational attributes and environmental attributes. The model is as shown in the diagram below;

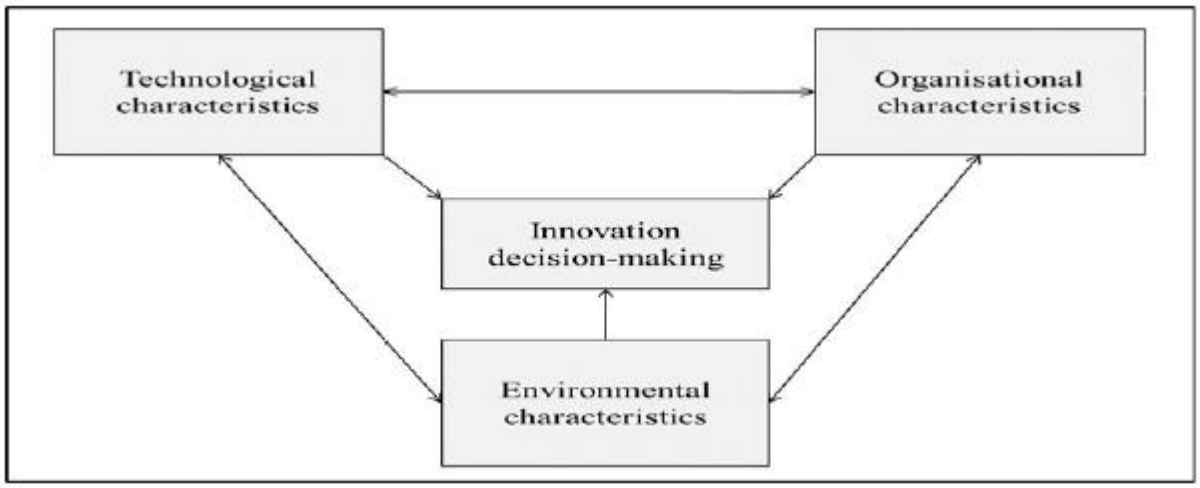

Figure 2.5: *Technology-Organization-Environmental (TOE) model.*

Source**:** Tornatzky & Fleischer (1990)

From the literature reviewed about the on analysis of the TOE by various researchers, it is apparent that the model has brought several variables that are directly liked to people in adoption of technology. However, the model puts less emphasis on the importance of people in adoption of technology by not creating a category to group attributes/adoption variables attributable to people. As such therefore, the model is deficient and cannot be adopted for the purposes of this study.

2.2.5 Information Systems Adoption Model for Small Business

In 1999 Thong developed another adoption model called an integrated perspective framework of IT adoption in SMEs. The model is an improvement of the TOE model whereby other than the three categories of adoption variables as identified by the TOE model, this framework

goes ahead to add a category called CEO. This category is for banding together the adoption attributes associated with the CEO.

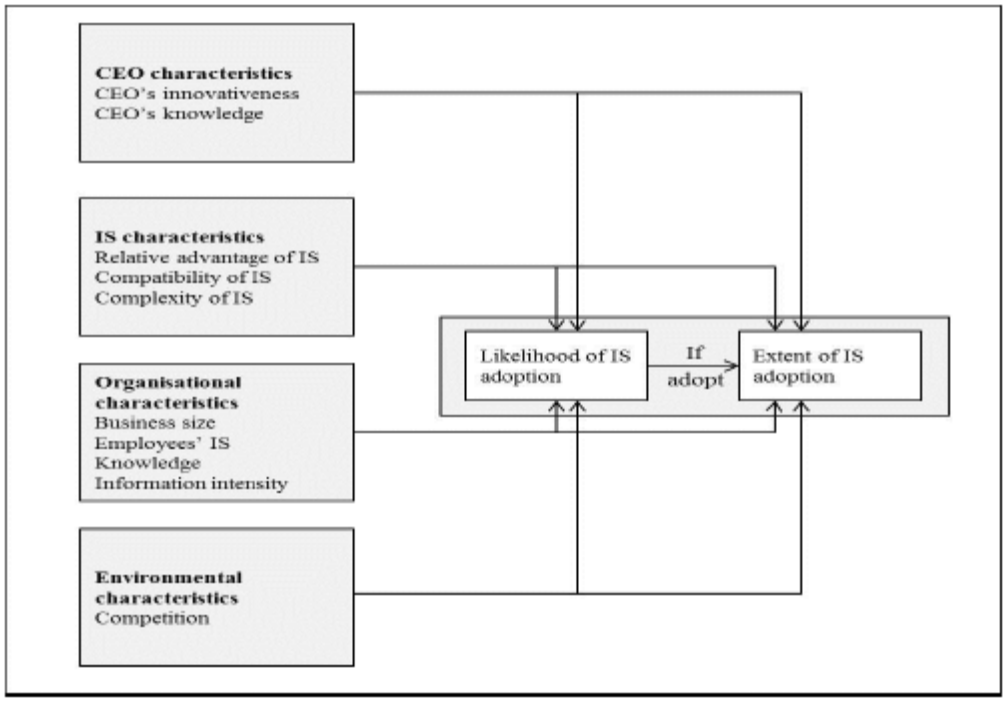

Figure 2.6: *Information systems adoption model for small business.*

Source: Thong(1999)

In spite of the framework being an improvement of the TOE model, the model is still deficient since it has failed to recognize the very important role played by **users** in the adoption of innovation. The model will therefore not be adopted as it is in this study.

2.3 Selected Systems Adoption Conceptual Frameworks

This section of the chapter will present some of the conceptual frameworks for adoption of systems from the previous research works. Various research papers reviewed with conceptual frameworks for adoption of system. One of the frameworks was on Adoption of Enterprise Resource Planning Systems in Kenya: A Case of Selected Manufacturing Firms in Nairobi Metropolitan (Nzuki, Musyimi & Odongo, 2015). The next is on Business Intelligence Systems Adoption Theories in SMEs: A Literature Review of (Nurlydia, et al, 2015). The two frameworks were selected for the purposes of this research because the first was done within the context of Kenya while the second is because it focuses specifically on BIS adoption.

2.3.1 Adoption of Enterprise Resource Planning Systems Model

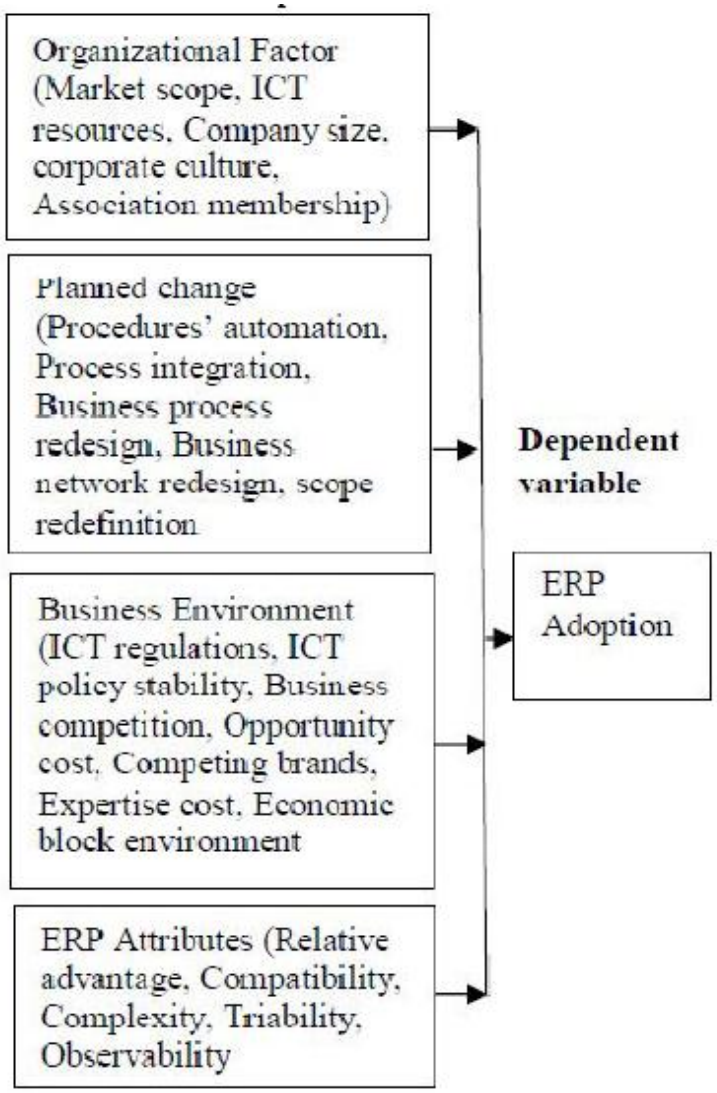

Figure 2.7: *Adoption of ERP system model.*

Source: Nzuki, Musyimi & Odongo(2015)

The framework is very comprehensive since it has taken all the key aspects in to consideration. However, from the prior literature review and also from the definition of business intelligence adopted in this work, 'People' and specifically 'users' are being given more emphasis. Users play a major role in determining the success and usefulness of any technological adoptions in organizations. The model would have been better if it had special focus on the people (Users, Key decision maker: CEO/Board of Directors) by creating two categories called Users and Key decision maker to bundle determinants pertaining to these two categories.

2.3.2 Business Intelligence Systems Adoption Model for SMEs

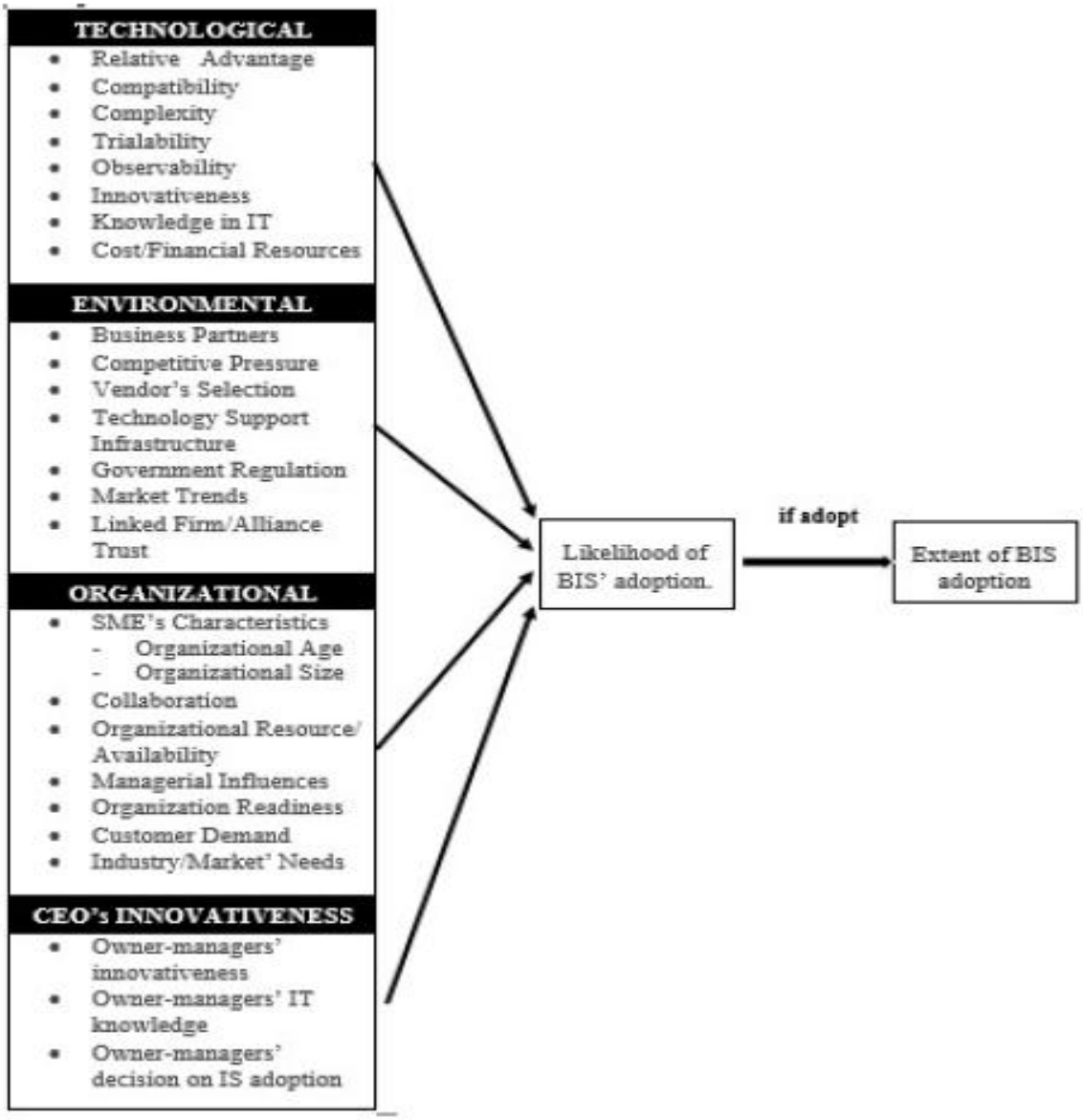

Figure 2.8: *BI systems adoption models for SMEs.*

Source: Boonsitiromachai et al(2014).

This framework has gone a step further in recognizing the importance of people in adoption of system. This is because it has created a category called 'CEO's Innovativeness' to bundle to together the importance of a CEO in adoption of any technology in an organization. However, the model is silent on the 'users' who play a very key role in determining the success and usefulness of technologies adopted by the organizations.

2.4 Literature Review Summary

Users of technology are the key determinants of the level of success or failure of that particular technology. After reviewing literature of several researchers on the determinants of BIS adoption, the following are determinants that are attributable to users; Users knowledge of innovation (JamesY. L. Thong, 1999), Education level and computer literacy (Mehdi Daryaei, Majid Shirzad, Vinod Kumar, 2013), Attitude towards change (T. Oliveira & M. Fraga Martins, 2011), and Perception of strategic values (Puklavec et al). The level of education and computer literacy of the users is another attribute for adoption of innovation that came out during the review

Other than users, specific focus will also be on Technological Category and particularly the architecture of the innovation, and in this case the architecture of Business intelligence solutions. From the review of the architectures of business intelligence solutions, it was evident that data warehousing is one of the key components of the BI system (Chaudhuri, Dayal & Narasayya, 2011). Building a data warehouse is a complex and a very expensive venture. Hence the need to avoid it when adopting BI systems From the earlier literature, it was apparent that need for data warehousing has been eliminating by three tier architecture BI systems (Nyunya, 2015). These systems extract data direct from the source application systems and perform what is called in-memory data processing, analysis and transformation.

The following adoption model is therefore being proposed for the purpose of this study;

2.5 Adoption Model

2.5.1 Proposed Adoption Model

The proposed model borrows most of its aspects from the Information systems adoption model for small business. It actually enhances information systems adoption model form SMEs by adding a category called USER (Users of the innovation) so as to bring out strongly the importance of users in adoption of any technology/innovation. The model also adds an attribute called 'System Architecture' under Technological Characteristics category so as to emphasize the importance of system architecture in influencing the cost of technology adoption. The proposed adoption model i.e. with additional attributes to information systems adoption model for small businesses will be validated in this study and it is as illustrated in the diagram below;

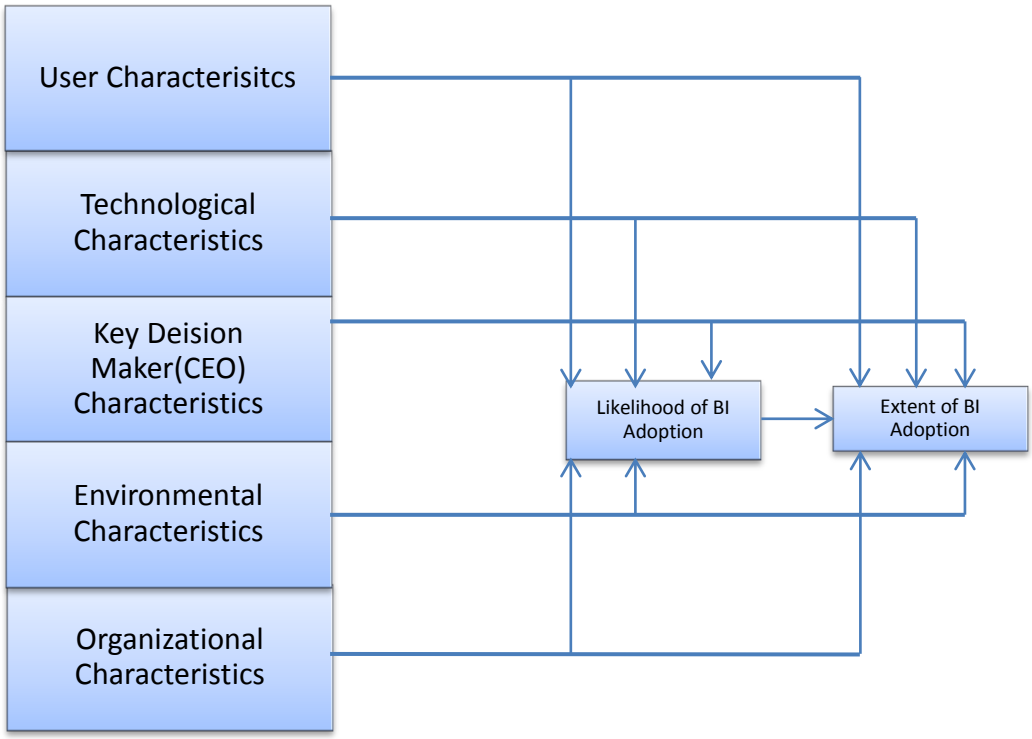

Figure 2.9: *Proposed BI adoption model*

2.5.2 Proposed Adoption model with attributes

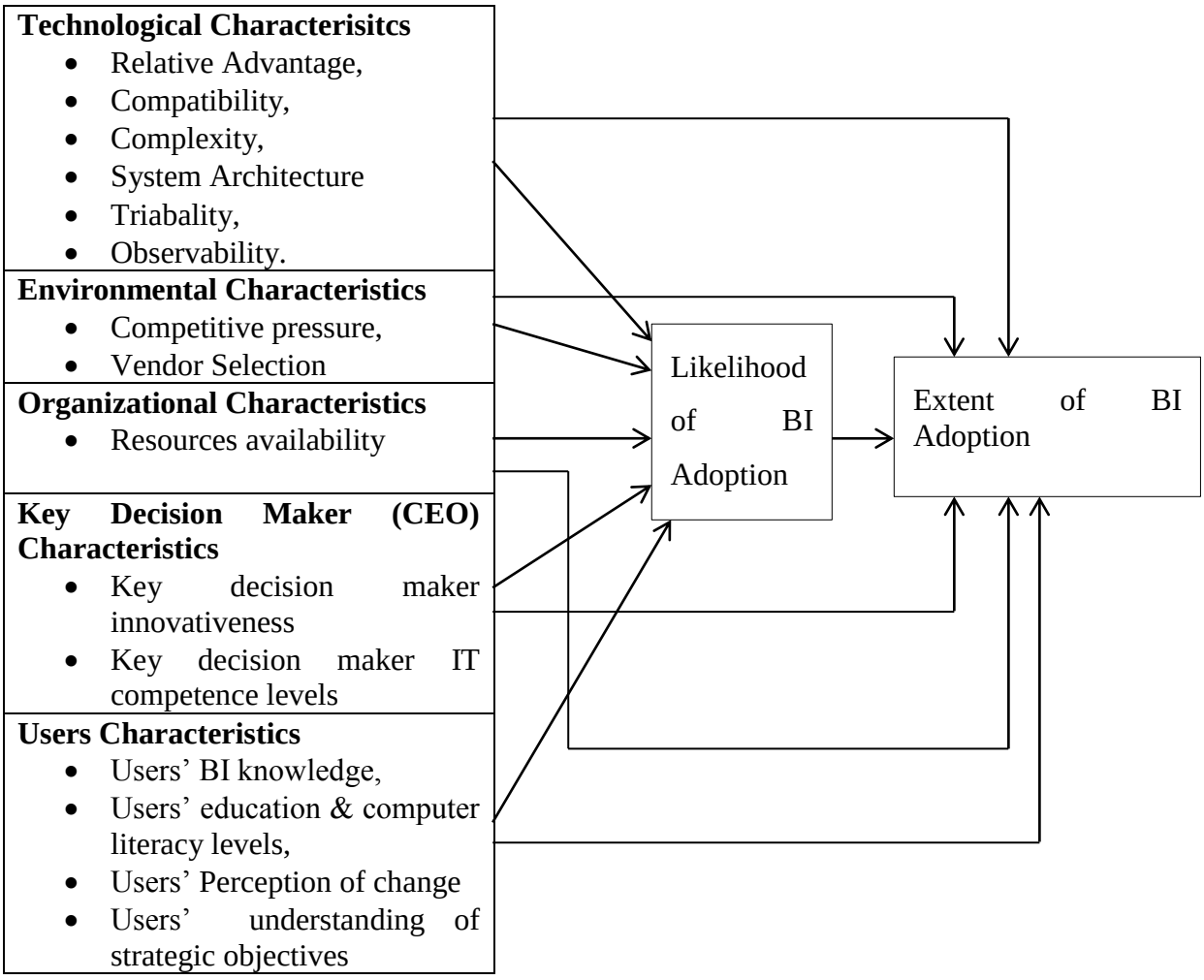

Figure 2.10: *Proposed BI adoption model with attributes*

2.6 Operationalization of the Research Variables

This entails representation of how research variables, sources of data and data analysis will help in achievement of research objective.

Table 2.1 Operationalization of research variables

CONCEPTS	VARIABLES	INDICATORS
Technological Characteristics	Relative advantage	1. Cost reduction 2. Improved decision making 3. Provision of real time solutions 4. Enhancement of strategy
	Compatibility	1) In line with company operations 2) Consistency with believes 3) In line with company infrastructure 4) In line with company practices
	Complexity	1) Difficulty to introduce 2) Difficult to operate 3) Difficult to learn 4) Resistance to learn
	System architecture	1) Data warehouse requirement
	Triabililty	Availability of technology for trial.
	Observability	Technology being seen in use
Organizational Characteristics	Resources Availability	Adequacy of resources
User Characteristics	BI Knowledge	Understanding of BI
	Education and computer literacy levels	User literacy levels
	Perception of Change	Change management awareness and training
	Understanding of strategic values	Strategic values understanding and awareness
Environmental Characteristics	Competitive pressure	Use of technology by competition
	Vendor selection	Vendor characteristics
Key Decision Maker Characteristics	Innovativeness	Support of innovation
	IT competence levels	IT education and literacy

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter described the research methods to be used in this project in order to empirically test the relationship between the independent variables and dependent variable with regard to adoption of Business Intelligence Solutions within the context the Kenyan Insurance industry. The chapter further detailed research philosophy adopted, research design, population sample, sampling method employed, data collection techniques used, analysis of collected data and finally the operationalization of the research variables.

3.2 Research Philosophy

Positivism research philosophy was adopted as the basis of this study due to the following reasons; Quantitative questionnaire survey was used for collecting data and there was use/application of scientific equations/ formulae to empirically establish the relationship between the independent variables identified during literature review & dependent variable which is adoption of BI solutions within the Kenyan Insurance industry.

3.3 Research Type

The research type that was employed in this study was descriptive survey. This design was preferred to because the study was concerned with answering questions such as who, how, what, which, when and how much (Cooper & Schindler, 2003). Therefore, the use of survey procedures helped to establish the interrelationships between the independent variables and dependent variable being studied. Furthermore, this has been necessitated by the fact that survey research was used to obtain a considerable amount of information, which can be generalized, to an entire population. According to Mugenda(2008), descriptive study was used to identify disparities within a community and the type of interventions that a researcher could design and implement to reduce such disparities.

3.4 Population sample

The population of the study consisted of all insurance companies licensed to transact insurance business in Kenya by the government regulator; Insurance Regulatory Authority (IRA). According to IRA(2015), there are fifty (50) licensed insurance companies operating in Kenya. All the 50 insurance companies were included in the survey and were approached.

3.5 Sampling Techniques

Census sampling technique was used in this research. This is because all the entities within the population of study were considered for the survey and may participate in the survey.

3.6 Data Collection

The primary data in this research was collected using two questionnaires with closed ended questions. The first questionnaire was for users of BI solutions and the other one was for IT managers/Project managers. The user questionnaire had three parts 1) contained questions for collecting information about the profile of respondents and insurance company 2) Questions related to adoption of business intelligence solutions in insurance companies in order to establish the extent of adoption of BI solutions in the Kenyan insurance sector 3) questions involving the independent variable i.e. 'User Characteristics' identified during literature review. Likewise, the survey questionnaire targeting IT manager/Project managers had three parts: 1) Questions for collecting information of the respondents and insurance companies profiles 2) Questions related to the existence of BI solutions to establish the extend of adoption of BI solutions 3) questions involving the independent variables identified during literature review for BI adoption. The independent variables section of the questionnaire had four sub-sections namely; Technological characteristics, Environmental characteristics, Organizational characteristics and Key decision maker characteristics. The questionnaires were administered in two ways; personal interview and mail survey through drop and pick method. The mail survey was used where the respondents were very busy or not available. This enabled collection of data that would have been difficult to get. Personal Interview was used where the respondent was able to give appointments and also instances where follow ups were required. The target respondents were mostly IT managers/ Project managers and Users of BI solutions in the sampled companies

3.7 Data Analysis

Descriptive statistics were used to analyze the data because this study was modeled on a descriptive framework. Data collected in respect of demography (part one of the questionnaires) was analyzed using frequency distributions and percentages to determine the profile of respondents. Data collected on the extent of adoption of Business Intelligence solutions (part two of the questionnaire) was analyzed using descriptive analysis techniques i.e. mean analysis to determine extent of adoption of BI solutions within the Kenyan

insurance industry. Data collected on the Relationship between independent variables and dependent variable (Part three of the questionnaire) was analyzed using inferential statistics (correlation analysis and regression analysis) so as to establish how the independent variables identified during literature review affected the dependent variable which was BI solutions adoption within the context of the Kenyan insurance industry. Confirmatory factor analysis was used to validate the proposed model.

CHAPTER FOUR

DATA ANALYSIS, RESULT AND DISCUSSION

4.1 Introduction

This chapter contained details of presentation of data analysis, interpretation and discussion of findings. Descriptive analysis was employed; which includes; weighted mean, frequencies and percentages. Inferential statistics such as correlation analysis and regression analysis was also used to test for the relationship between the variables. The organised data was analysed and interpreted using the Statistical Package for Social Sciences (SPSS v 20). The analyzed data was presented in frequency and percentage tables and charts which enhanced easier interpretation and understanding of the research findings.

4.2 Scale Reliability Results

Table 4.1 Scale Reliability Results

Variable	No of Items	Respondents	α=Alpha	Comment
Technology Architecture	4	7	0.784	Reliable
Relative advantage	4	7	0.782	Reliable
Complexity	4	7	0.790	Reliable
Compatibility	4	7	0.872	Reliable
Triability	4	7	0.814	Reliable
Observability	4	7	0.704	Reliable
Competitive Pressure	4	7	0.889	Reliable
Vendor Selection	4	7	0.963	Reliable
Organizational Resources	4	7	0.923	Reliable
Decision maker innovativeness	4	7	0.947	Reliable
Decision maker IT knowledge	4	7	0.839	Reliable
Use perception of business intelligence	4	7	0.826	Reliable
User education &computer literacy	4	7	0.811	Reliable
User perception of change	4	7	0.818	Reliable
User perception of strategic objectives	4	7	0.774	Reliable

Reliability is an indication of the stability and consistency with which the instrument measures a concept and helps to assess the goodness of a measure. Reliability was measured using Cronbach's Alpha coefficient which was used to measure the internal consistency of the study. It is used to indicate how well the items in the set are correlated with each other.

According to Sekaran(2008), the closer the cronchach's to one the higher the reliability and the a value of at least 0.7 is recommended. According to Sekaran(2006), a reliability coefficient of 0.7 is acceptable. The Cronbach's alpha was calculated in a bid to measure the reliability of the questionnaire. This was done by subjecting the questionnaire to fourteen respondents which included seven top managers and seven users from Pioneer Assurance Company Ltd. All the variables were reliable since their Cronbach's alpha was above 0.7 which was used as a cut-off of reliability for the study.

4.3 Response Rate

Table 4.2 Response Rate

Category	Frequency	Percentage
Returned questionnaires	88	88%
Unreturned questionnaires	12	12%
Total	**100**	**100%**

A total of 100 questionnaires were distributed to all insurance companies registered and operating within Kenya. i.e. two questionnaires per insurance company. Out of which 88 questionnaires were dully filled and returned which represented a response rate of 88%.Full responses were received from 44 out of 50 insurance companies operating in Kenya. According to Mugenda & Mugenda(2003) a response rate of over 50% is adequate for a descriptive study hence a response of 88% was deemed adequate for this study.

4.4 Demographic Characteristics of Respondents

This section contains results on socio-demographic characteristics of the respondents. These characteristics include; gender, age bracket, level of education, work experience and position of the respondent.

4.4.1 Gender of the Respondents

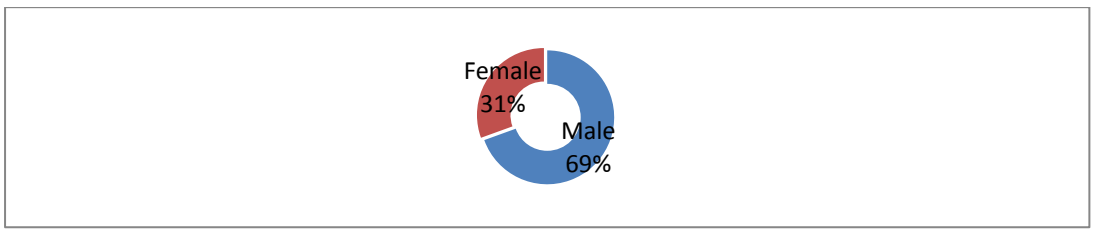

Figure 4.1 *Gender of the Respondents*

The results on the gender of the respondents indicated that 69% of the respondents were male while 31% of the respondents were female. This finding imply that most of the positions of IT manager /Project manager and users of BI in the insurance industry in Kenya are male dominated.

4.4.2 Age of the Respondents

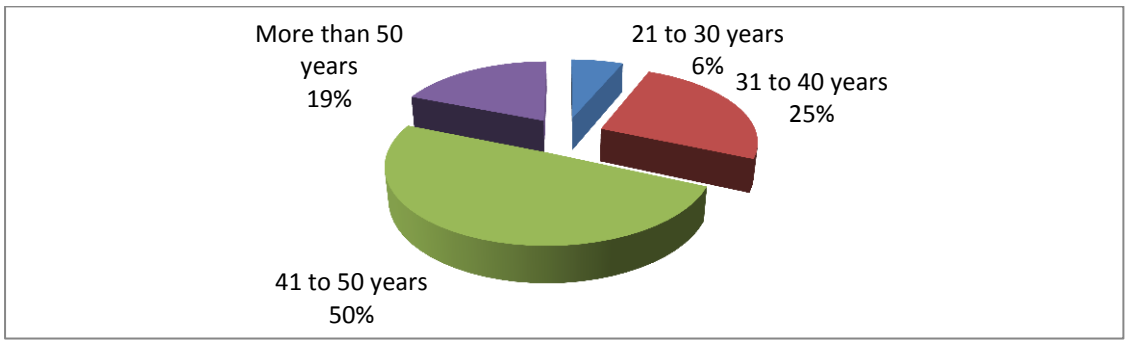

Figure 4.2 *Age Group of the Respondents*

The study was interested in the age bracket of the respondents in the study. The findings indicate that half of the respondents were between 41 and 50 years. Those between 31 and 40 years were 25% while 19% were over 50 years old. Only 6% were between 21 and 30 years old. The findings imply that more than half of people who occupy positions of IT manager / Project manager and Users of BI in Kenya insurance firms are above 41 years. This could be probably because of their experience in insurance that is why they preferred over younger generation.

4.4.3 Education Level of the Respondents

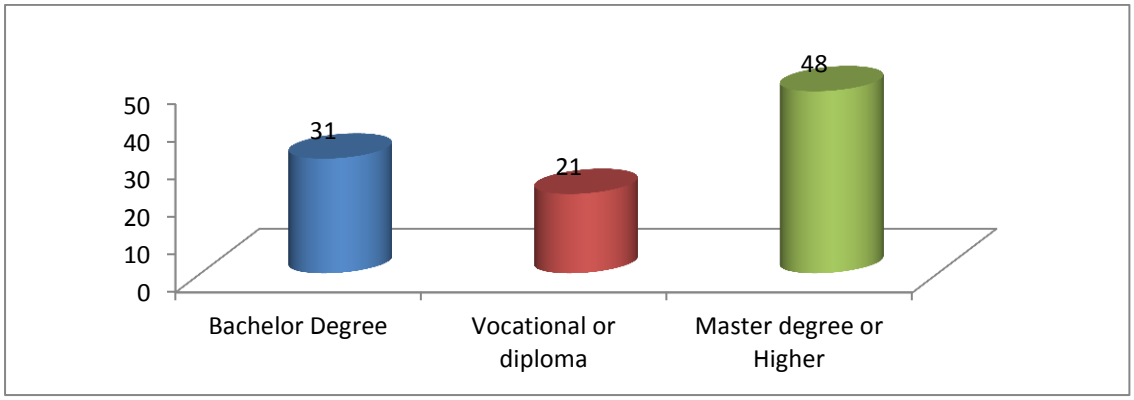

Figure 4.3 *Education Level of the Respondents*

The results of the study further indicated that 48% of the respondents in this study had master's degree level of education. Those who had bachelor degree were 31% while 21% had vocational or diploma level of education. Majority of those with master's degree were occupied managerial positions in their respective firms. These findings imply that the respondents were educated to understand what the study was all about and had no challenges in completing the questionnaires.

4.4.4 Position of the Respondents

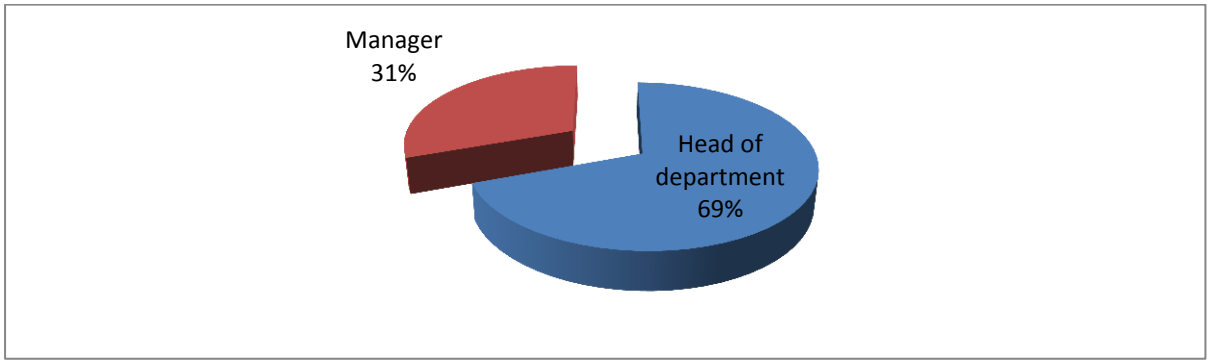

Figure 4.4 *Position of the Respondents*

The study was also interested in the positions held by the respondents in their respectively firms. The findings indicated that 69% of the respondents were heads of department in their respectively firms and 31% had managerial positions. This finding was adequate for this study because all the respondents were well placed to respond to the questionnaires.

4.4.5 Work Experience of the Respondents

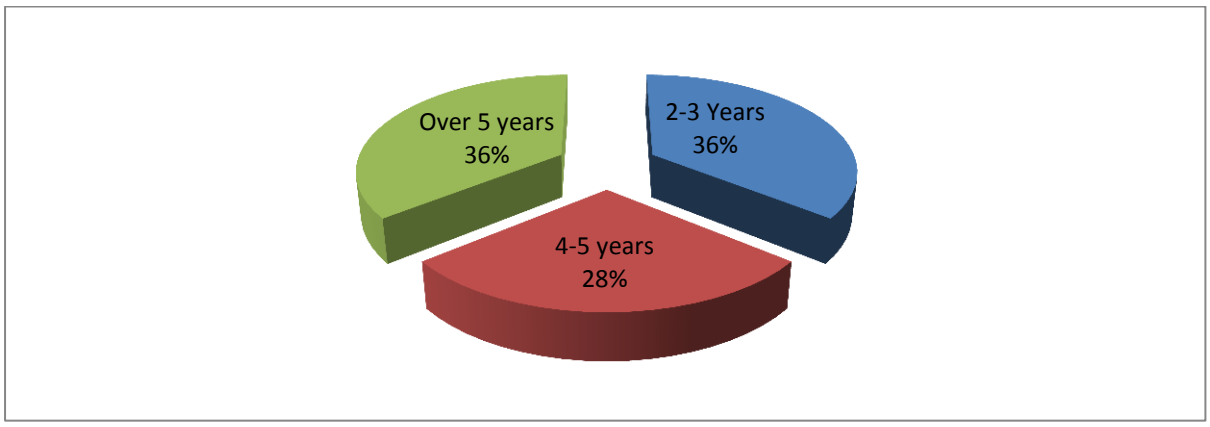

Figure 4.5 *Work Experience of the Respondents*

The study further sought to find out how long the respondents had worked with the insurance sector in Kenya. The findings indicate that 36% of the respondents had worked with the

insurance sector for over 5 years while another 36% had worked for between 2 and 3 years. Those who had worked for 4-5 years were 28%. This finding was also adequate for this study because all the respondents had over 2 years of experience in the insurance industry and were well placed to respond to the questions in the questionnaires.

4.5 Organization Characteristics

This section contains results on characteristics of the organization. These characteristics include; type of the organization, number of employees and number of years the company has been in operation.

4.5.1 Type of Organization

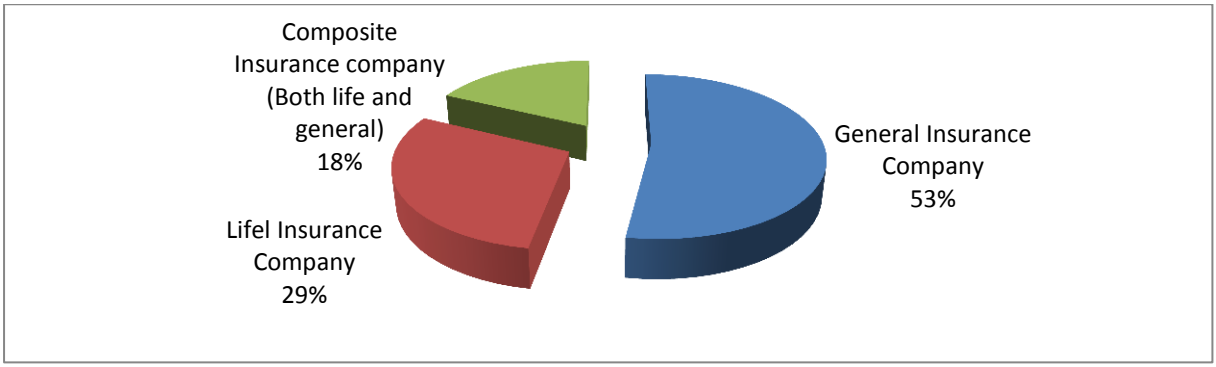

Figure 4.6 Type of Organization

The study sought to find out whether the companies specialized in life insurance, general insurance or engaged in both life and general insurance (composite insurance company). The findings indicate that 53% of the respondents were from general insurance companies, while 29% were from life insurance companies and finally 18% of the respondents were from composite insurance companies. These findings imply that all the insurance line of business were represented in this study hence the findings could be applied to both life insurance companies, general insurance companies and composite insurance companies.

4.5.2 Number of Employees

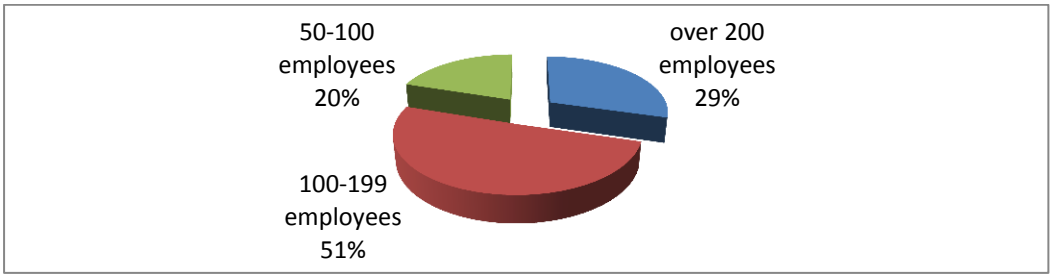

Figure 4.7 *Number of employees*

The study sought to find out the number of employees in each insurance company in Kenya. The findings showed that over 50% of the insurance companies in Kenya had between 100 and 199 employees while 29% of the insurance companies had over 200 employees. Only 20% of the insurance companies had between 50 and 100 employees. The findings imply that most of the insurance companies in Kenya were large companies.

4.5.3 Number of Years the Company has been In Operation

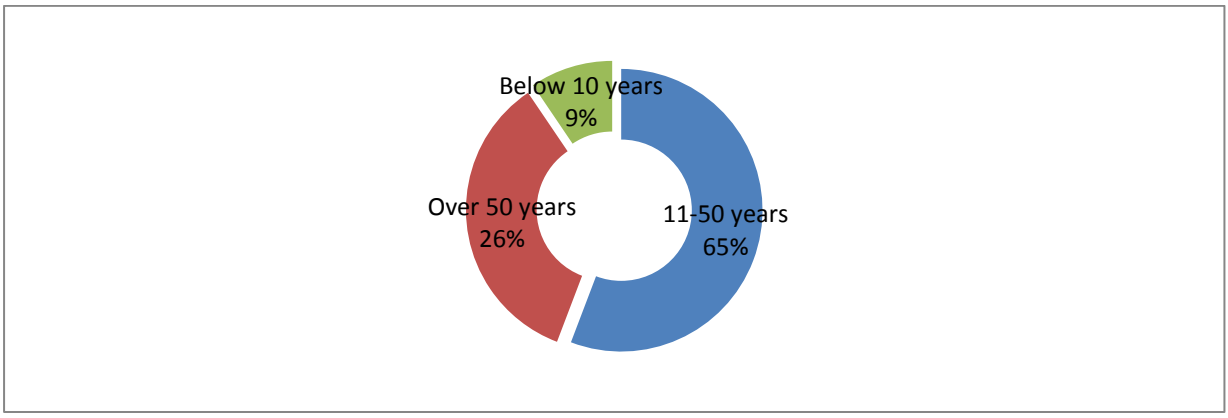

Figure 4.8 *Number of Years the Company has been In Operation*

The results of this study also revealed that over 65% of the insurance companies had been in operation in Kenya for between 11 and 50 years while 26% of the companies had been in operation for over 50 years. Those that had been in operation for less than 10 years were only 9%. The findings imply that the insurance companies had been in operation long enough to have adopted the business intelligence solutions.

4.6 Adoption of Business Intelligence

Table 4.3 Descriptive Results for Adoption of Business Intelligence

Statements	Mean Response	Standard Deviation
Our organisation has a system used to store data	3.01	1.32
Our organisation use BI solutions in managing and processing data	3.12	1.37
Our organisation use BI solutions in decision making processes	3.16	1.35
Our organisation has adopted the use of advanced analytical applications	2.93	1.39
Our organisation uses computer software's in financial accounting	4.22	0.29
Our organisation uses computer software's in Customer Management	2.84	1.33
Our organisation uses computer software's in stock control	2.95	1.42
Our organisation uses computer software's in product development	2.94	1.28
Our organisation uses computer software's in market research	2.86	1.35
Our organisation uses computer software's in strategic analysis, profit forecasting and cash flow analysis	2.63	1.43
Our organisation uses computer software's in sales and staff planning	2.96	1.33

The highest score in this section was 4.22 and the lowest was 2.63. The study sought to find out the level of business intelligence adoption among the insurance companies in Kenya. The study sought to find out whether the insurance companies had systems used to store their data. The mean response of 3.01 indicate that majority of the respondents were neutral of the availability of data storage system in their organization. Majority of the respondents also were neutral on whether their organization had adopted BI solutions in managing and processing data and in decision making processes. This was indicated by the mean response of 3.12 and 3.16 respectively. The standard deviations of 1.37 and 1.35 respectively further indicate a wide variation in the responses.

The study sought to find out whether insurance companies had adopted the use of advanced analytical applications. The statement had a mean response of 2.93 which imply that a significant number of respondents disagreed with the statement. On whether the insurance companies had adopted computer software in customer management stock control, product development, market survey, strategic analysis, profit forecasting and cash flow analysis and in sales and staff plan planning majority of the respondent disagreed. This was indicated by the mean response of less than 3. The standard deviation of above 1 further indicates that the

response varied widely from the mean. There was general agreement among respondents on whether the insurance companies had adopted computer software in financial accounting. This was indicated by a mean of 4.22. These findings imply that most of the respondent indicated that their companies had not adopted business intelligence solutions in their operations. These findings further implied that the level of adoption of business intelligence among insurance companies was low.

4.7 User Characteristics

The study sought to find the effects of characteristics of the users on adoption of BI solutions. Specifically the study intended to find out the impacts of user perception of business intelligence, user's education and computer literacy levels, user's perception of change and user understands of organisation's strategic objectives on adoption of BI solutions.

4.7.1 User Perception of Business Intelligence

Table 4.4 Descriptive Results for User Perception of BI

Statements	Mean	Standard Deviation
It is not easy to understand BI systems	4.39	0.67
BI systems are complex to use	4.39	0.67
It takes a lot of time to adapt and get used to business intelligence systems	3.66	1.20
use of technology in business operations reduces times	4.69	0.46

The highest score in this section was 4.69 and the lowest was 3.66. The findings indicated that majority of users perceived business intelligence as not easy to understand, this was indicated by the mean response of 4.39 which implies that majority of the respondents agreed with the statement. Business intelligence users also perceived it as being very complex as indicated by the mean response of 4.39 and a standard deviation of 0.67. The mean of 3.66 indicate that majority of the users felt that BI needs a lot of time to adapt and to get used to it and finally majority agreed that use of technology in business operations reduces times.

These findings implied that there was bad perception among users on the BI solutions.

4.7.2 Users Education and Computer Literacy Levels

Table 4.5 Descriptive Results for Users Education and Computer Literacy Levels

Statements	Mean	Standard Deviation
I possess high level of education	4.20	0.59
I understand basic and advanced computer programs	4.40	0.49
I use computer in my daily duties at home	4.40	0.66
I use computer in my daily duties at work	4.29	0.78

The highest score in this section was 4.40 and the lowest was 4.20. The study intended to find the education level and computer literacy levels of users of BI among the insurance companies in Kenya. The study particularly sought to establish whether users possessed high level of education, understood both basic and advance computer programs and whether they used computer both at home and at work. The findings showed that users had high levels of education and were computer literate. The mean of above 4 for all the statements indicated that majority of the respondents agreed and strongly agreed with the statement.

These findings imply that user of BI in insurance companies in Kenya had high education and computer literacy levels. The findings support Riddell & Song(2012) who studied the role of education in technology use and adoption. The study found that education increases the probability of using computers in the job and that employees with more education have longer work experiences in using computers than those with less education.

4.7.3 User Perception of Change

Table 4.6 Descriptive Results for User Perception of Change

Statements	Mean	Standard Deviation
Changing business operations system affects performance	4.19	0.76
Use of technology makes life very difficult	4.40	0.49
Technology should only be applied in specific departments and to those willing only	4.40	0.49
Adoption of technology affects people's professional life	4.79	0.41

The highest score in this section was 4.79 and the lowest was 4.19. Perception of change is a very essential component when the need for adoption for any innovation arises. Therefore, this study sought to find out the perception of change among the users of BI in insurance companies in Kenya. The study sought to establish the perception of users on whether changing business operations system affected performance, whether use of technology made work life difficult, whether technology should only be applied in specific departments and to

those willing only and finally whether adoption of technology affected people's professional life. All these statements had a mean response of above 4 which indicated that majority of the respondents agreed.

The implication of these findings was that there was a poor perception of change among the users of BI in insurance firms in Kenya. The findings of this study are consistent with Kohler et al.(2007) who argued that attitude formation is largely a process of comparison against similar others; because this process has little effect among strangers, it occurs largely within the boundaries of social communities and networks. Within a social network, the effects of interpersonal processes depend both on the characteristics of the relationships and on where those relationships fit into the structure of the network.

4.7.4 Users Understanding of Strategic Objectives

Table 4.7 Descriptive Results for Users Understanding of Strategic Objectives

Statements	Mean	Standard Deviation
Strategic objectives of the organization are not exposed to all people	3.99	0.91
Only those concerned should understand the strategic objectives of the organization	4.08	0.69
It is not necessary to understand strategic objectives of the organization	3.89	0.71
Better understanding of strategic objectives is left to those that implement the strategy	4.41	0.66

The highest score in this section was 4.41 and the lowest was 3.89. Understanding of organisation strategic objectives plays a significant role in employees' adoption of any innovation which is directed towards realization of the objectives. This study also intended to find out the whether the users of BI in insurance companies understood the strategic objectives of their companies. The study sought to find out whether BI users were exposed to strategic objectives, whether they felt strategic objectives concerned only a few. The mean response for these statements was about 4 which indicate that majority of the respondents were in agreement with the statements. The results implied that most of the BI users had a low understanding of strategic objectives of the organisation which could be among the reasons why they had a poor perception of BI solutions.

4.8 Technological Characteristics

This section intended to establish the opinions of the respondents on the technological characteristics of BI solutions. This included technological architecture, relative advantage, complexity, compatibility, trialability and observability.

4.8.1 Technological Architecture

Table 4.8 Descriptive Results for Technological Architecture

Statements	Mean	Standard Deviation
Technology architecture determines the need for data warehouse during implementation	4.20	0.87
Data warehouse is one of the key cost centres during implementing of technology	4.51	0.50
Cost is a key factor in determining adoption and utilization of technology	4.00	0.50
Technology architecture has a direct relation to the cost of implementing technology	4.71	0.46

The highest score in this section was 4.71 and the lowest was 4.00. This section intended to find out how the respondents felt about the technological architecture of BI solutions. On whether technology architecture determined the need for data warehouse during implementation, majority of the respondents agreed indicated by the mean of 4.20. The respondents also agreed that data warehouse was one of the key cost centres during implementation of technology, cost was a key factor in determining adoption and utilization of technology, technology architecture had a direct relation to the cost of implementing technology.

The results of this study concur with those of Batz, Peters &Janssen(2008) who revealed that technology characteristics influenced the rate and speed of adoption. Users evaluated the new technologies available and compared them with their traditional alternatives. They adopted the new technology if its characteristics promised a higher utility than the traditional technology.

4.8.2 Relative Advantage

Table 4.9 Descriptive Results for Relative Advantage

Statements	Mean	Standard Deviation

This technology enables our company to reduce operation cost	3.92	0.71
This technology provides competitive information and support decision making	4.51	0.50
This technology accomplishes tasks that enhance strategy	4.21	0.41
This technology monitors problems and offers real time solutions	2.82	0.99

The highest score in this section was 4.51 and the lowest was 2.82. The study also sought to find out whether the respondents felt that BI solutions provided a relative advantage to the organisation. The results showed that the respondents agreed that BI solutions enable companies to reduce operation costs, provide competitive information and support decision making. They further agreed that BI solutions accomplished tasks that allowed enhancement of business strategies. On the other hand majority disagreed that BI technologies monitored problems and provided solutions in real-time. These findings imply that the respondents felt that BI solutions provided relative advantage to their organizations. Batz, Peters & Janssen(2008) also revealed that the tendency to adopt a new technology was the higher the greater its relative utility which in turn led to a higher rate and speed of adoption.

4.8.3 Complexity

Table 4.10 Descriptive Results for Complexity

Statements	Mean	Standard Deviation
The process of introducing technology was complicated	4.82	0.99
The operation of this technology was considered complex and difficult to implement in our company	4.82	0.99
It was very difficult to learn this technology	3.25	0.82
Considerable resistance existed in our company toward adoption of this technology due to its complexity to use.	3.41	0.92

The highest score in this section was 4.82 and the lowest was 3.25. The section sought to find out how the respondents felt on the level of complexity of BI solutions. The study intended to find out from the respondents on whether they felt that process of introducing BI solutions was complicated. The statement had a mean of 4.82 which indicated that majority of the respondents agreed and strongly agreed with the statement. Majority of the respondents also agreed that operation of BI solutions was complicated to use in their forms. On whether the BI solutions were difficult to learn and whether there existed resistance within insurance firms towards the use of BI due to its complexity, majority of the respondents were neutral.

The finding imply that majority of the respondents felt that the level of complexity was high and that influenced adoption of BI.

4.8.4 Compatibility

Table 4.11 Descriptive Results for Compatibility

Statements	Mean	Standard Deviation
Using this technology fits well with the operations of our firm	3.71	1.18
Using this technology was consistent with our firms values and believes	3.41	0.92
This technology was compatible with our IT infrastructure	4.29	0.46
The changes introduced by this technology were consistent with our operational procedures	3.71	0.46

The highest score in this section was 4.29 and the lowest was 3.41. The study sought to find out the perception of the respondents on the level of compatibility of BI into the operation of the company. The study sought to establish whether the use of BI solutions fit well with how insurance companies operated. The mean response of 3.71 indicated that majority of the respondents agreed while majority were neutral on whether BI solutions was consistent with the firm's values and beliefs. The mean response of 4.29 also indicate that majority of the respondents agreed that BI solutions were compatible with their organizations' IT infrastructure that existed as well as their operating procedures.

These findings imply that majority of the respondents felt that BI solutions was compatible with the existing operations at their companies. Consistent with this findings Rogers(2003) described the innovation-diffusion process as "an uncertainty reduction process" (p. 232), and he proposed attributes of innovations that help to decrease uncertainty about the innovation. Attributes of innovations included five characteristics of innovations: relative advantage, compatibility, complexity, trialability, and observability. Rogers(2003) further stated that "individuals' perceptions of these characteristics predict the rate of adoption of innovations

4.8.5 Trialability

Table 4.12 Descriptive Results for Trialability

Statements	Mean	Standard Deviation
Employees tried this technology before use	4.20	0.67
Employees tried this technology adequately before final decision to adopt it was made	3.21	0.87
T tried this technology before the final decision to adopt it was made	4.25	0.88
I tried this technology adequately before final decision was made	3.80	0.40

The highest score in this section was 4.25 and the lowest was 3.21. The ability to try the innovation out before adoption provides room for improvement and anticipation of the possible effects of the innovation on the existing systems and how to mitigate them. The results further showed that majority of the respondents agreed that employees tried this technology prior to the final decision to adopt it.. This implies that BI were triable and any company can try it before adopting it. This finding concurs with Rogers (2003) who argued that characteristics of innovations such as relative advantage, compatibility, complexity, trialability, and observability affected the rate of adoption.

4.8.6 Observability

Table 4.13 Descriptive Results for observability

Statements	Mean	Standard Deviation
I saw this technology in other firms.	4.71	0.46
I knew the existence of this technology in the market	4.20	0.40
I will not have problems telling other people about the advantages of this technology	4.21	0.41
The result of this technology were known to me before it was adopted	4.31	0.79

The highest score in this section was 4.71 and the lowest was 4.20. The ability to observe how a technology works influences its perceived usefulness and adoption. Therefore, the study sought to find out the extent of observability of the BI solutions and whether it affected adoption. The result showed that majority of the respondents had seen BI solutions work in other organisations; they also agreed that they were aware of the existence of BI solutions in the market. The respondents also agreed that they would have no difficulties telling other about the results of using BI solutions after seeing it in operation and that the results of using BI were apparent to them before it was adopted.

These findings imply that majority of the respondents had interacted with BI by way of observing how it worked and possible results obtained from the BI. This finding concurs with Rogers(2003) who argued that characteristics of innovations such as relative advantage, compatibility, complexity, trialability, and observability affected the rate of adoption.

4.9 Environmental Characteristics

The section intended to find out the some of the environmental characteristics that the insurance companies operate in. These environmental characteristics included competitive pressure and vendor selection.

4.9.1 Competitive Pressure

Table 4.13 Descriptive Results for Competitive Pressure

Statements	Mean	Standard Deviation
The degree of competition forced into the decision to adopt this technology	3.82	0.99
I was aware that our competition was already using this technology	3.62	1.12
Our company needed to use this technology to maintain competitive advantage	3.03	1.28
It was of strategic need to use this technology	4.21	0.41

The highest score in this section was 4.21 and the lowest was 3.03. The intensity of competition in a market affects firm incentives to improve their products and/or reduce unit costs. The result showed that majority of the respondents agreed that degree of competition in the insurance industry placed pressure on their firm's decision to adopt some of the BI solutions. The result also showed that the respondents were somewhat neutral on whether they knew their rivals were using BI solutions. Similarly, the respondents were neutral on whether their firm needed to utilize the BI solutions to maintain its competitiveness in the market. On whether it was a strategic necessity to adopt BI solutions, the mean response was 4.21 which indicated that majority of the respondents agreed.

These findings imply that competitive pressure in the insurance industry played a significant role in the adoption of BI solutions. In his overview, Richard(2006) argues that competition may reduce the incentive to innovate if intellectual property rights are nonexclusive but will foster innovation if they are exclusive. Schmutzler(2010) identifies the countervailing effect of own demand shifts following a competitor adopting a cost-reducing innovation if products are complements, although the effect becomes reinforcing if they are substitutes.

4.9.2 Vendor Selection

Table 4.14 Descriptive Results for Vendor Selection

Statements	Mean	Standard Deviation
The reputation of the vendor was important in the selection of this technology	4.01	0.64
The vendor relation with customers was a key factor	4.31	0.79
History of the vendors of this technology was an important factor	4.60	0.80
Technological competence of the vendor was of key importance in aiding decision making to adopt this technology	4.60	0.80

The highest score in this section was 4.60 and the lowest was 4.01. The study further intended to find out the role of vendor selection in the adoption of BI solutions. The result indicated that majority of the respondents agreed that vendors' reputation was important in selecting BI solutions. The statement had a mean response of 4.01 which reveals that majority of the respondents agreed with the statement. On whether the relationship between technology vendor and customers was important, the mean response was 4.31 which revealed that majority of the respondents agreed with the statement. The result also revealed that majority of the respondents agreed that the capability of the BI vendor to plan and history of Projects completion was important in the decision making. The respondents further confirmed that technological competency of the vendor was significant in their adoption.

The findings imply that vendor selection was a key factor in the adoption of BI solutions by the insurance companies in Kenya. Lao, Hong & Rao(2010) also argued that vendor selection was critical as firms become more and more dependent on their suppliers; the capabilities of those suppliers serve as key resources in the development of the buyer's own capabilities and performance. For example, Gonzalez & Quesada(2004) found that vendor selection was the most influential supply management process for achieving product quality.

4.10 Organizational Characteristics

Table 4.15 Descriptive Results for Organizational Characteristics

Statements	Mean	Standard Deviation
Our firm had the requisite resource to adopt this technology	4.51	0.50
The company had financial resources to adopt the technology	4.51	0.50
Our company met all requirement like user training while adopting this technology	4.51	0.50
There was less difficulty in our company availing the necessary resources required to adopt this technology	4.29	0.46

The highest score in this section was 4.51 and the lowest was 4.29. Under organizational characteristics, the study intended to find out whether organizational resources played a role in adoption of BI solutions. All the statement had a mean response of above 4 which indicated that majority of the respondents agreed and strongly agreed with the statement. These finding imply that for the firms that adopted BI solutions, organizational resources including financial resource, time and human resources were necessary in adoption of BI

solutions. The finding are in agreement with the investment theory which suggests that the propensity to innovate requires a confluence of six distinct resources including intellectual abilities, knowledge, styles of thinking, personality, motivation and environment.

4.11 Key Decision Makers Characteristics

The study further aimed to find out the characteristics of key decision makers in the insurance companies in Kenya. These characteristics included the key decision maker innovativeness and their IT knowledge.

4.11.1 Key Decision Maker Innovativeness

Table 4.16 Descriptive Results for Key Decision Maker Innovativeness

Statements	Mean	Standard Deviation
Our key decision makers introduce new and original ideas	4.00	0.77
Our decision makers introduced and created new ideas	4.00	0.77
Key decision makers in our company always introduced new ideas rather improving existing ones	3.51	0.50
Our key decision makers generated diverse ideas i=on existing problems	3.21	0.87

The highest score in this section was 4.00 and the lowest was 3.21. The results showed that the respondents agreed that their key decision makers introduced new and original ideas since the statement had a mean of 4. The results further indicated that the respondents agreed that their key decision makers generated new solutions and ideas rather than improving existing ones. On the other hand, the respondents appeared neutral on whether the key decision makers created something new than to improve something existing and whether they always had a fresh perspective on old problems. These findings imply that majority of the respondents were neutral on whether the key decision makers in their companies were innovative.

4.11.2 Key Decision IT Knowledge

Table 4.17 Descriptive Results for Key Decision Maker IT Knowledge

Statements	Mean	Standard Deviation
Our key decision makers use computers at home	4.80	0.40
Our key decision makers use computers at work.	4.75	0.50
Our key decision makers attended computer classes in the past	3.21	0.41
Our key decision makers have sound level of IT understanding	4.25	0.60

The highest score in this section was 4.80 and the lowest was 3.21. The study also sought to find out the key decision makers IT knowledge. The finding indicated that most respondents agreed that the key decision makers used computers both at home and at work. The statement had a mean response of above 4 which indicated that majority of the respondents agreed and strongly agreed. The mean response for whether the decision makers attended computer classes in the past was 3.21 which imply the respondents were not sure whether the decision makers had attended computer classes in the past. The findings imply that key decision makers in the insurance companies had good knowledge in IT.

4.12 Summary per Variable

Table 4.18 Descriptive Results Summary per Variable

Variable	Mean	Standard Deviation
Technology architecture	4.35	0.58
Relative advantage	3.86	0.65
Complexity	4.07	0.93
Compatibility	3.78	0.75
Triability	3.86	0.70
Observabiltiy	4.35	0.51
Competitive pressure	3.67	0.95
Vendor selection	4.38	0.75
Organizational resources	4.45	0.49
Decision maker innovativeness	3.68	0.72
Decision maker IT knowledge	4.25	0.47
Use perception of business intelligence	4.28	0.75
User education &computer literacy	4.32	0.63
User perception of change	4.44	0.53
User Understanding of strategic objectives	4.09	0.74
Adoption of BI	2.92	1.35

The highest score for the summary of variables was 4.45 and the lowest was 2.92. The result in the table below contained the average per variable. The findings indicate most respondents agreed that majority of the variables in this model contributed to adoption of business intelligence solutions. The Technology Architecture, Complexity, Observability, Vendor Selection, Organisational resources, Decision maker IT knowledge, Use perception of business intelligence, User Understanding of strategic objectives, User perception of change and User education &computer literacy had a mean response of above 4 which indicated that majority of the respondents agreed and strongly agreed. The mean of adoption was 2.92 which showed that majority of insurance companies in Kenya indicated they had adopted the business intelligence solutions in all the business operations. The standard deviation of less than 1 implies that the response had a slight variation.

4.13 Correlation Results

Table 4.19 Correlation Results

		BI Adoption	organizational resources	User characteristics	Technological characteristics	Environmental characteristics
BI Adoption	r-value	1				
	Sig.					
	N	44				
organizational resources	r-value	.420**				
	Sig.	0				
	N	44	44			
User characteristics	r-value	.457**	.418**			
	Sig.	0	0			
	N	44	44	44		
Technological characteristics	r-value	.397**	0.109	.420**		
	Sig.	0	0.292	0		
	N	44	44	44	44	
Environmental characteristics	r-value	.380**	.510**	.407**	.525**	
	Sig.	0	0	0	0	
	N	44	44	44	44	44
Key Decision Maker characteristics	r-value	.429**	0.118	.340**	.830**	.523**
	Sig.	0	0.254	0.001	0	0
	N	44	44	44	44	44

** Correlation is significant at the 0.01 level (2-tailed).
r=is the Person Correlation Value.

According to Kothari(2004), Karl Pearson Correlation Coefficient is the most widely used method of measuring the degree of relationship between two variables. It ranges from -1 to +1. A correlation coefficient of -1 indicates a perfect negative correlation, 0 indicates no correlation while +1 indicates a perfect positive correlation. It tells a researcher the magnitude and direction of the relationship between two variables. The level of significance in the correlation analysis is 0.05 therefore, $p<0.05$ indicates significant relationship while $p>0.05$ indicates insignificant relationship.

A correlation analysis was conducted to ascertain the association between variables. The results indicate there was strong and significant association between user characteristics and adoption of BI solutions (r=0.457, p=0.000). The result further revealed a strong and significant association (r=0.397, p=0.000) between technological characteristics and adoption

of BI solutions. Environmental characteristics were also found to have a significant association (r=0.380, p=0.000) with adoption of BI solutions and finally organizational characteristics and key decision maker characteristics also showed strong and positive relationships with adoption of BI solutions i.e. at (r=0.420, p=0.000) and (r=0.429, p=0.000). respectively.

Nzomoi *et al.*(2007) also sought to establish the factors influencing technology adoption in the horticultural sector in Kenya. The study concluded that the level of education, low and inconsistent participation of the government, poor financial resources and poor perception influenced technology adoption. On the other hand, Hall & Khan(2003) in their study on adoption of new technology suggested that the obvious determinants of new technology adoption are the benefits received by the user and the costs of adoption.

4.14 Validation of the Proposed Model

This chapter contains assessment of the proposed model and validation of the model by testing the research hypotheses. The study used structural modelling technique to validate the model. Confirmatory factor analysis was also conducted to establish the model fitness. The study used SPSS-Amos to carry out these statistical tests.

4.14.1 Regression Weights

Table 4.20 Regression Weights Results

Relationship			Estimate	S.E.	P-value	Decision
Likelihood Adoption of BI	<---	Technological characteristics	-.011	.060	.853	Insignificant relationship
Likelihood Adoption of BI	<---	Environmental characteristics	.007	.039	.864	Insignificant relationship
Likelihood Adoption of BI	<---	Key Decision Maker characteristics	.163	.058	**.005**	significant relationship
Likelihood Adoption of BI	<---	Organisational resources	.150	.050	**.003**	significant relationship
Likelihood Adoption of BI	<---	User characteristics	.030	.048	.532	Insignificant relationship
Adoption of BI	<---	Technological characteristics	.012	.026	.644	Insignificant relationship
Adoption of BI	<---	Environmental characteristics	-.011	.017	.508	Insignificant relationship
Adoption of BI	<---	Key Decision Maker characteristics	.096	.025	**.000**	significant relationship
Adoption of BI	<---	Organisational resources	.082	.022	**.000**	significant relationship
Adoption of BI	<---	User characteristics	.058	.021	**.006**	significant relationship

The results from the structural model conducted are shown in Table 4.17 below. The p-value of below 0.05 implies that the relationship was statistically significant. While the p-value of above 0.05 indicated that the relationship was statistically insignificant. The result shows that the relationship between User characteristics, Organizational characteristics, Key Decision Maker characteristics and adoption of BI solutions was statistically significant. This is because the p-value was less than 0.05. On the other hand, the relationship between technological characteristics and environmental characteristics was statistically insignificant since their p-value was greater than 0.05.

The study also tested the relationship between the variables and the likelihood to adopt the BI solutions. The findings revealed that key decision maker characteristics and organizational characteristics had a significant relationship with likelihood to adopt BI solutions, however, user characteristics, technological characteristics and environmental characteristics were found to have insignificant relationship with likelihood to adopt BI solutions. These variables had a p-value of above 0.05.

4.14.2 Model Fitness Summary

To assess the model fitness the study used confirmatory factor analysis. The results for CMIN/DF and RMSEA that were used to test the goodness of fit of the model are given below.

Table 4.21 CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	17	213.757	11	.000	19.432
Saturated model	28	.000	0		
Independence model	7	276.109	21	.000	13.148

CMIN is a Chi-square statistic comparing the tested model and the independence model to the saturated model. CMIN/DF, the relative chi-square, is an index of how much the fit of data to model has been reduced by dropping one or more paths. The value of CMIN/DF is above the threshold of 5 meaning the model had good fitness.

Table 4.22 RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.443	.392	.496	.000
Independence model	.359	.322	.398	.000

The Root Mean Square Error of Approximation (RMSEA) estimates lack of fit compared to the saturated model. RMSEA of .05 or less indicates good fit, and .08 or less adequate fit. LO 90 and HI 90 are the lower and upper ends of a 90% confidence interval on this estimate. PCLOSE is the *p* value testing the null that RMSEA is no greater than .05. The χ_2 statistic for model fit is significant, meaning that the null hypothesis of a good fit to the data can be rejected. The RMSEA likewise suggests that the fit of the model is good. The value of .443 exceeds the .05 suggested as a cut-off for accepting the model fit.

4.14.3 Validated Proposed Model

The overall model fit appeared quite good. The χ_2 test yields a value of 3.757 which, evaluated with 11 degrees of freedom, has a corresponding p-value of .178. This p-value is too high to reject the null of a good fit. The findings imply that the model had good fitness.

Table 4.23 Model Notes

Result (Default model)
Minimum was achieved
Chi-square = 3.757
Degrees of freedom = 11
Probability level = .178

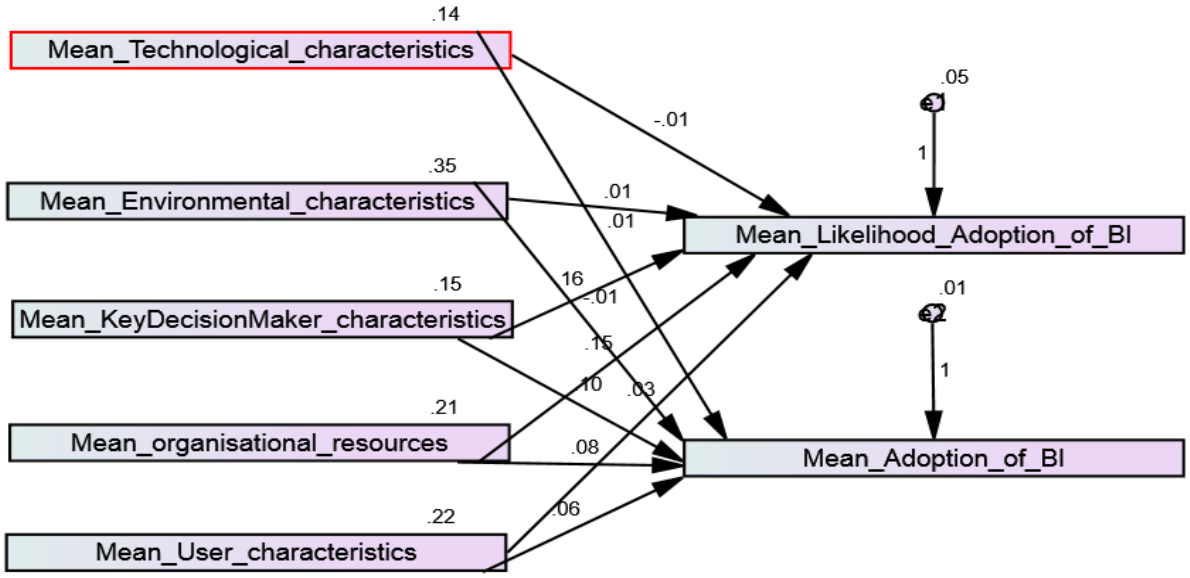

Figure 4.9 *Validated Proposed Model*

The result in the validated model indicated that technological characteristics accounts for 14% of the variation of adoption of BI, environmental characteristics accounted for 35% of the variation in adoption of BI, key decision maker characteristics accounted for 15% of the adoption of BI solutions in insurance companies in Kenya. Organizational characteristics accounted for 21% of the adoption of BI solutions in insurance companies in Kenya. Finally the findings showed that user characteristics accounted for 22% of the adoption of BI solutions in insurance companies in Kenya.

4.15 Validated Model

The validated model contained variables that had significant relationship after the validation process. Key decision maker characteristics and environmental charactristics were signficantly related to the likelihood of BI adoption while user characteristics, organizational charactristics and key deicision maker characteristics were signifcantly related to adoption of BI. The optimal model for adoption of BI solutions in the context of the Kenyan insurance industry is as shown below.

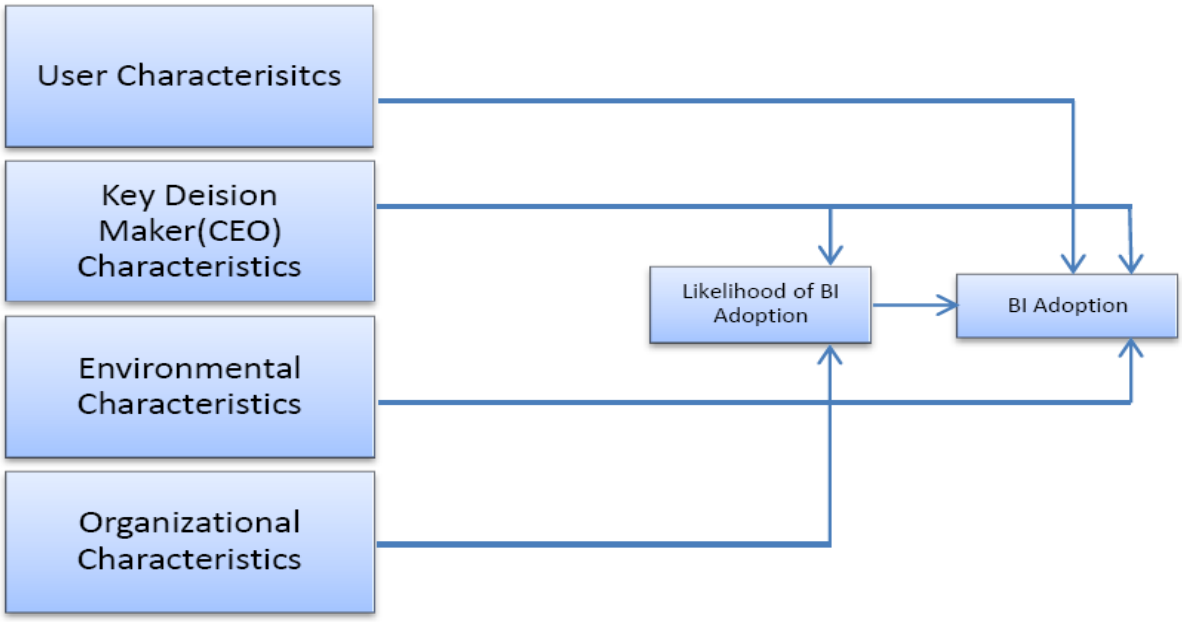

Figure 4.10 *Validated Model*

4.16 Discussion of the Results

The findings of this study indicate that the relationship between user characteristics, organizational characteristics, Key Decision Maker characteristics and adoption of BI solutions was statistically significant. This is because the p-value was less than 0.05. On the other hand, the relationship between technological characteristics and environmental characteristics was statistically insignificant since their p-value was greater than 0.05.

The findings support Riddell & Song(2012) who studied the role of education in technology use and adoption. The study found that education increases the probability of using computers in the job and that employees with more education have longer work experiences in using computers than those with less education. The findings of this study are consistent with Kohler et al.(2007) who argued that attitude formation is largely a process of comparison against similar others; because this process has little effect among strangers, it occurs largely within the boundaries of social communities and networks.

The results of this study concur with those of Batz, Peters & Janssen(2008) who revealed that technology characteristics influenced the rate and speed of adoption. Users evaluated the new technologies available and compared them with their traditional alternatives. They adopted the new technology if its characteristics promised a higher utility than the traditional technology. Consistent with this findings Rogers(2003) described the innovation-diffusion

process as “an uncertainty reduction process”(p.232), and he proposed attributes of innovations that help to decrease uncertainty about the innovation. Attributes of innovations included five characteristics of innovations: relative advantage, compatibility, complexity, trialability, and observability. Rogers(2003) further stated that “individuals’ perceptions of these characteristics predict the rate of adoption of innovations.

These findings agrees with the findings of Bett(2012), Wang & Potter(2007), Karake(2014) and Nyongesa(2013) who investigated adoption of technology and found that perceived usefulness, technology awareness and perceived ease of use which comprise user characteristics were important factors in adoption of different technology.

The findings of this study also concur with the Technology Acceptance Model (TAM) developed in 1989 by Fred Davis. The model advances two aspects which influence the level of technology acceptance which are perceived usefulness and perceived ease of use.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section contains the summary of the study findings, conclusion of the study and recommendations based on the study findings that the study made. The section also provided suggestions for future studies.

5.2 Summary

The purpose of this study was to identify an appropriate model for adoption of business intelligence solutions within the Kenyan insurance industry and to validate the proposed model for adoption of business intelligence solutions in the Kenyan insurance industry. The study sought to investigate the influence of user characteristics, environmental characteristics, technological characteristics, organizational characteristics and key decision maker's characteristics on adoption of BI solutions.

The descriptive research design was employed in this study. The population of the study consisted of all insurance companies licensed to transact insurance business in Kenya by the government regulator; Insurance Regulatory Authority. Census sampling technique was used therefore all the 50 insurance companies were included in the study. The primary data in this research was collected using questionnaire with closed ended questions. The mail survey was used where the respondents were very busy or not available. The target respondents mostly were IT managers & Project managers in all the insurance firms in Kenya and users of BI solutions in the insurance companies. Data collected in was analyzed using frequency distributions and percentages using SPSS version 20. Model validation was done using confirmatory factor analysis using SPSS Amos software.

The proposed model borrowed most of its aspects from the Information systems adoption model for small business. It enhanced Information systems adoption model for small business by adding a category called User (Users of the innovation) so as to bring out strongly the importance of users in adoption of any technology/innovation. The model also added an attribute called 'System Architecture' under Technological Characteristics category so as to emphasize the importance of system architecture in influencing the cost of technology adoption.

The result showed that the relationship between user characteristics, Organizational resources/characteristics, Key Decision Maker characteristics and adoption of BI solutions was statistically significant. This is because the p-value was less than 0.05. On the other hand, the relationship between technological characteristics and environmental characteristics was statistically insignificant since their p-value was greater than 0.05. The findings further revealed that key decision maker characteristics and organizational resources had a significant relationship with likelihood to adopt BI solutions, however, user characteristics, technological characteristics and environmental characteristics were found to have insignificant relationship with likelihood to adopt BI solutions. These variables had a p-value of above 0.05.

The result in the validated model indicated that technological characteristics accounted for 14% of the variation in adoption of BI, environmental characteristics accounted for 35% of the variation in adoption of BI, key decision maker characteristics accounted for 15% of the variation in adoption of BI solutions in insurance companies in Kenya. Organizational characteristics accounted for 21% of the variation in adoption of BI solutions in insurance companies in Kenya. Finally the findings showed that user characteristics accounted for 22% of the variation in adoption of BI solutions in insurance companies in Kenya. The overall model fit appeared quite good. The RMSEA likewise suggested that the fit of the model was good. The value of .313 exceeded the .05 suggested as a cut-off for accepting the model fit. The value of CMIN/DF was above the threshold of 5 meaning the model had good fitness.

5.3 Achievements

The objectives of this study were to to identify an appropriate model for adoption of business intelligence solutions within the Kenyan insurance industry and to validate the proposed model for adoption of business intelligence solutions in the Kenyan insurance industry. The study proposed a model that enhanced the Information systems adoption model for small business by adding a category called USER (Users of the innovation) so as to bring out strongly the importance of users in adoption of any technology/innovation. The model also added an attribute called ‘System Architecture’ under Technological Characteristics category so as to emphasize the importance of system architecture in influencing the cost of technology adoption. The proposed model was validated using confirmatory factor analysis and regression models. The overall model fit appeared quite good. The RMSEA likewise suggested that the fit of the model was good. The value of .313 exceeded the .05 suggested as

a cut-off for accepting the model fit. Further, a validated model was born from the study. The model contained only attributes with significant relationship with either BI Adoption or the Likelihood of BI Adoption or both. The study recommends this model to the Kenyan insurance industry to be used in adoption of BI solutions.

5.4 Conclusions

Based on the findings of this study, the study concluded that in adoption of a technology, key decision maker characteristics, user characteristics and environmental characteristics were very essential components for adoption of BI. User characteristics such as users' education level and computer literacy determined the speed of adoption of a technology. On the other hand, environmental characteristics such as competitive pressure also influence the level of adoption of innovation. The intensity of competition in a market affects firm incentives to improve in all aspects hence the need for technological adoption. Finally, key decision makers of the organization make the final decision on whether to adopt a technology or not. Therefore, decision makers' level of computer education and innovativeness plays a key role in adoption of a technology.

5.5 Suggestions for Future Research

This study focused on proposing and validating a model for adoption of business intelligence solutions in the Kenyan insurance industry. Future research should focus on establishing the relationship between BI solutions adoption and financial performance of insurance companies in Kenya.

5.6 Recommendation for Practice

This study recommended the validated model i.e. 'the BI adoption model in the Kenyan insurance industry' to all IT practitioners and professional within the insurance industry in Kenya. The model should be used as the basis for adoption of BI and other related technologies.

REFERENCES

Arnott, D & Pervan, G. (2005), 'A critical analysis of decision support systems research', *Journal of Information Technology Cases & Applications*, vol. 20, no. 2, pp. 67-87

Bernard, H.R. (2012), Social research methods: qualitative and quantitative approaches, 2nd edn, Sage Publications, California.

Boonsiritomachai, W, McGrath, GM, Burgess, S, (2014), ‘A research framework for the

Cavana, R, Delahaye, B & Sekaran, U (2001), Applied business research: qualitative and quantitative methods, Wiley, Queensland

Chang, E. (2006), 'Advanced BI technologies, trust, reputation and recommendation systems', paper presented to the 7th Business Intelligence Conference, Sydney, Australia.

Chaudhuri, S, Dayal, U & Narasayya, V (2011), 'An overview of business intelligence technology', Communications of the ACM, vol. 54, no. 8, pp. 88-98.

Choo, C.W. (2002), Information management for the intelligent organization: the art of scanning the environment, 3rd edn, Information Today Inc, Medford, New Jersey.

Conference on Decision Support Systems: Decision Support in an Uncertain and Complex

Cooper, D. & Schindler, P. (2003). Business research methods (9thed). New York: McGraw-Hill/Irvin

Davis, F.D. (1986), 'Technology Acceptance Model for Empirically Testing New End-User InformationSystems: Theory and Results', Ph.D. thesis, Massachusetts Institute of Technology, Massachusetts, USA.

Davis, F.D. (1989), 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', Mis Quarterly, vol. 13, no. 4, pp. 319-40.

English, L.P. (2005), Business intelligence defined, Beyenetwork, viewed 03 March 2012, for Empowering Knowledge Societies, IGI Global, Hershey, Pennsylvania, USA, pp. 237-57.

Gartner. (2015). Management, Business Intelligence & Information. Retrieved from http://www.gartner.com/technology/research/business-intelligence.jsp

Gibson, M, Arnott, D, Jagielska, I & Melbourne, A (2004), 'Evaluating the intangible benefits of business intelligence: review & research agenda', paper presented to the International

Guba, EG & Lincoln, YS (1994), 'Competing paradigms in qualitative research', in NK Denzin & YS Lincoln (eds), Handbook of qualitative research, Sage Publications, Thousand Oaks, California, vol. 2, pp. 105-17.

Hackathorn, R (1999), 'Farming the Web for systematic business intelligence', paper presented to the5th ACM SIGKDD international conference on Knowledge discovery and data mining, San Diego, California, USA.

Hannula, M & Pirttimaki, V (2002), 'Investigating business information management practices in large Finnish companies', *Frontiers of e-Business Research*, vol. 2002, pp. 121-35.

Howson, C (2007), Successful business intelligence: secrets to making BI a killer app, McGraw-Hill, New York.

IRA Annual Report (2014), Released in July 2015 extracted from: http://www.ira.go.ke/

Khan, R., & Quadri, S. (2012). Business Intelligence: An Integrated Approach. Business Intelligence Journal, 5(1), pp. 64-70.

Lonnqvist, A & Pirttimaki, V (2006), 'The measurement of business intelligence', Information Systems Management, vol. Winter, no. 1.

Luhn, H. P., A Business Intelligence System, IBM Journal of Research and Development, Vol. 2, No. 4, 1958, pp. 314-319.

Marakas, G (2003), Modern Data Warehousing, Mining, and Visualisation: Core Concepts, Prentice Hall, New Jersey.

Marshall, B, McDonald, D, Chen, H & Chung, W (2004), 'EBizPort: collecting and analysing business

Mugenda A. (2008). Social Science Research. Theory and Principles. Published by Applied Research and Training Services, Nairobi

Neuman, WL (2006), Social research methods: qualitative and quantitative approaches, 6 edn, Pearson/Allyn&Bacon, Boston.

Nurlydia, N M & Hatta (2015), Business intelligence systems adoption theories in SMEs

Nzuki, D. M. & William O. O, (2015). Adoption of Enterprise Resource Planning Systems in Kenya: A Case of Selected Manufacturing Firms in Nairobi Metropolitan

Obonyo Ishmael Nyunya (2015), Open source implementation of Business Intelligence system for Kenyan Universities: Case of the Technical University of Kenya.

Oliveira, T & Martins, M.F. (2010). 'Firms patterns of e-business adoption: evidence for the European Union-27', Electronic Journal Information Systems Evaluation, vol. 13, no. 1, pp. 47-56.

Olszak, CM & Ziemba, E (2003). 'Business intelligence as a key to management of an enterprise', paper presented to the Informing Science Institute Informing Science, Pori, Finland.

Olszak, CM & Ziemba, E (2004). 'Business intelligence systems as a new generation of decision support systems', paper presented to the 2nd International Conference on Politics and Information Systems: Technologies and Applications, Orlando, USA.

Olszak, CM & Ziemba, E (2007). 'Approach to building and implementing business intelligence systems', InterdisciplinaryJournal of Information, Knowledge & Management, vol. 2, pp. 135-48.

Petrini, M & Pozzebon, M (2009). 'Managing sustainability with the support of business intelligence: integrating socioenvironmental indicators and organisational context', Journal of Strategic Information Systems, vol. 18, no. 4, pp. 178-91.

Popovic, A, Turk, T & Jaklic, J (2010). 'Conceptual model of business value of business intelligence systems', Management, vol. 15, no. 1, pp. 5-30.

Power, D. J., A Brief History of Decision Support Systems, DSS Resources, (2007), Retrieved 11/11/2010, from <http://DSSResources.COM/history/dsshistory.html>, version 4.0.

Puklavec, B, Oliveira, T & Popovič, A (2014). 'Unpacking Business Intelligence Systems Adoption Determinants: An Exploratory Study of Small and Medium Enterprises', Economic and Business Review, vol. 16, no. 2, pp. 185-213.

Sacu, C & Spruit, M (2010), 'BIDM: the business intelligence development model', paper presented to the 12th International Conference on Enterprise Information Systems, Funchal, Maderia-Portugal.

Sahay, BS & Ranjan, J (2008), 'Real time business intelligence in supply chain analytics', Information Management &Computer Security, vol. 16, no. 1, pp. 28-48.

Swiss Re's Sigma (2015). Report- Retrieved from http://www.swissre.com Technology, vol. 55, no. 10, pp. 873-91.

Thierauf, R. J. (2001). Effective business intelligence systems, Greenwood Publishing Group, New Jersey.

Thong, J & Yap, CS (1995). 'CEO characteristics, organizational characteristics and information technology adoption in small businesses', *Omega*, vol. 23, no. 4, pp. 429-42.

Thong, J (1999), 'An integrated model of information systems adoption in small business', Journal of management information systems, vol. 15, no. 4, pp. 187-214.

Tornatzky, LG & Fleischer, M (1990), The process of technology innovation, Lexington Books, Massachusetts.

Vitt, E, Luckevich, M & Misner, S (2002). Business intelligence: making better decisions faster, Microsoft Press, Redmond, Washington. World, Caulfield East, Victoria

APPENDICES

Appendix I: Introduction Letter

Date……..

Dear Sir,

RE: VOLUNTARY PARTICIPATION IN DATA COLLECTION

My name is Robert Ipomai a student from University of Nairobi. I am conducting a study on "***adoption of business intelligence (BI) solutions: a case of Kenyan insurance industry***". Your feedback and views on the mentioned will help in compiling my research. The data collected is for research purposes only and it takes the form of a survey which should take no more than 15 minutes of your time. All responses received are anonymous and information collected will not be distributed to any other party.

Thank you for taking time to complete this survey.

Yours Sincerely,

Robert Ipomai

Appendix II: IT/Project Managers Questionnaire

Section I: Information about the respondent

Please tick the box that best describes yourself and your organisation.

Sub-section One: - About yourself.

1. Gender

□Male

□ Female

2. Age group (Years)

□ 18-20

□ 21 to 30

□31 to 40

□41 to 50

□ More than 50 years old

3. Highest level of education

☐ High school or equivalent

☐ Bachelor Degree

☐ Vocational or diploma

☐ Master degree or Higher

4. Position in your organisation

□ Head of department

□ Manager

□ Supervisor

□ Other (Please specify) _____

5. For how long have you worked with your organisation (Years)

☐ 0-1

☐ 2-3

☐ 4-5

☐ Over 5 years

Sub-section two: - About Your Organisation.

1. Organization type

☐ Life Insurance Company

☐ General Insurance Company

☐ Composite Insurance company (Both life and general)

2. Number of employees employed in your company

☐ 2-9

☐ 10-49

☐ 50-100

☐ 100-199

☐ 200 and above

3. Number of years your company has been in business

☐ Less than 1 year

☐ 1-5

☐ 6-10

☐ 11-50

☐ Over 50

Section II: Level of BI implementation and usage in the organization

	Category 1: adoption and Utilization of BI	Strongly disagree	**disagree**	Neutral	Agree	Strongly Agree
1	Our organisation has a system used to store data	1	2	3	4	5
2	Our organisation use BI solutions in managing and processing data	1	2	3	4	5
3	Our organisation use BI solutions in decision making processes	1	2	3	4	5
4	Our organisation has adopted the use of advanced analytical applications	1	2	3	4	5
5	Our organisation uses computer software's in financial accounting	1	2	3	4	5
6	Our organisation uses computer software's in Customer Management	1	2	3	4	5
7	Our organisation uses computer software's in stock control	1	2	3	4	5
8	Our organisation uses computer software's in product development	1	2	3	4	5
9	Our organisation uses computer software's in product development	1	2	3	4	5
10	Our organisation uses computer software's in market research	1	2	3	4	5
11	Our organisation uses computer software's in strategic analysis, profit forecasting and cash flow analysis	1	2	3	4	5
12	Our organisation uses computer software's in sales and staff planning	1	2	3	4	5

Section III: Technology characteristics affecting adoption of BI solutions

Please indicate the extent to which you agree or disagree with each of the following statements regarding adoption and utilization of technology in your organization

Circle **(O)** a number from 1 to 5 that best represents your level of agreement with the statement, where 1 = 'strongly disagree', 2 = 'disagree', 3 = 'Neutral', 4 = 'agree' and 5 = 'strongly agree'

Note: The term 'technology' refers to the most advanced analytical application that your organisation has implemented as mentioned in Question four of section II.

	Category 2: Technological characteristics affecting adoption and Utilization of BI	Strongly disagree	**disagree**	Neutral	Agree	Strongly Agree
	Technology architecture					
1	Technology architecture determines the need for data warehouse during implementation.	1	2	3	4	5
2	Data warehouse is one of the key cost centres during implementing of technology	1	2	3	4	5
3	Cost is a key factor in determining adoption and utilization of technology.	1	2	3	4	5
4	Technology architecture has a direct relation to the cost of implementing technology	1	2	3	4	5
	Relative advantage					
1	This technology enables your company to reduce the cost of operations	1	2	3	4	5
2	This technology provides competitive information and improves decision-support.	1	2	3	4	5
3	This technology accomplishes tasks that allow enhancement of business strategies.	1	2	3	4	5
4	This technology monitors problems and provides solutions in real-time.	1	2	3	4	5
	Complexity					
1	The process of introducing this technology was complicated.	1	2	3	4	5
2	The operation of this technology was considerably complicated to implement and use within your firm.	1	2	3	4	5
3	This technology was difficult to learn.	1	2	3	4	5
4	Considerable resistance existed within the firm towards the use of this technology due to its complexity.	1	2	3	4	5
	Compatibility					
1	Using this technology fits well with how the company operates.	1	2	3	4	5
2	Using this technology is consistent with our firm's values and beliefs	1	2	3	4	5
3	This technology is compatible with the organization’s IT infrastructure.	1	2	3	4	5
4	The changes introduced by this technology are compatible with existing operating practices.	1	2	3	4	5

	Trialability					
1	Company employees were able to try this technology before the adoption decision was made.	1	2	3	4	5
2	Company employees were able to adequately try this technology before final decision to adopt it was made.	1	2	3	4	5
3	I was able to try out this technology before the adoption decision was made.	1	2	3	4	5
4	I was able to try out this technology adequately before the adoption decision was made.	1	2	3	4	5
	Observability					
1	I have seen this technology used in other firms in the industry.	1	2	3	4	5
2	I was aware of the existence of this technology in the market.	1	2	3	4	5
3	I would have no difficulty telling others (employees, business partners) about the results of using this technology after seeing it in operation.	1	2	3	4	5
4	The results of using this technology were apparent to me before it was adopted.	1	2	3	4	5

Section IV: Environmental characteristics affecting adoption of BI solutions

	Category 3: Environmental characteristics affecting adoption and Utilization of BI	Strongly disagree	**disagree**	Neutral	Agree	Strongly Agree
	Competitive pressure					
1	The degree of competition in our industry placed pressure on the firm's decision to adopt this technology.	1	2	3	4	5
2	I knew that my competing rivals were already using this technology.	1	2	3	4	5
3	The firm needed to utilize this technology to maintain its competitiveness in the market.	1	2	3	4	5
4	It was a strategic necessity to use this technology.	1	2	3	4	5
	Vendor selection					
1	The vendors' reputation was important in selecting this technology.	1	2	3	4	5
2	The relationship between technology vendor and customers was important.	1	2	3	4	5
3	The capability of the technology vendor to plan and history of Projects completion was important in our decision making.	1	2	3	4	5
4	The technological competency of the vendor was significant.	1	2	3	4	5

Section V: Organizational characteristics affecting adoption of BI solutions

	Category 4: Organizational characteristics affecting adoption and Utilization of BI	Strongly disagree	disagree	Neutral	Agree	Strongly Agree
	Organizational resource availability					
1	The firm had the technological resources to adopt this technology.	1	2	3	4	5
2	The firm provided financial resources to adopt this technology.	1	2	3	4	5
3	Other organizational resources (e.g. training, IS support) contributed to build higher levels of this technology adoption.	1	2	3	4	5
4	There were no difficulties in finding all of the necessary resources (e.g. funding, people, time) to implement this technology.	1	2	3	4	5

Section VI: key decision makers characteristics affecting adoption of BI solutions

	Category 5: Key Decision maker characteristics affecting adoption and Utilization of BI	Strongly disagree	disagree	Neutral	Agree	Strongly Agree
	Key decision maker innovativeness					
1	Our key decision makers introduce new and original ideas.	1	2	3	4	5
2	Our key decision makers always look for something new rather than improving something existing.	1	2	3	4	5
3	Our key decision makers always create something new than to improve something existing	1	2	3	4	5
4	Our key decision makers always have fresh perspectives on old problems.	1	2	3	4	5
	Key decision maker IT knowledge					
1	Our key decision makers use computers at home.	1	2	3	4	5
2	Our key decision makers use computers at work.	1	2	3	4	5
3	Our key decision makers attended computer classes in the past	1	2	3	4	5
4	Our key decision makers have sound level of IT understanding	1	2	3	4	5

Appendix III: Users Questionnaire

Section I: Information about the respondent

Please tick the box that best describes yourself and your organisation.

Sub-section One: - About yourself.

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Section III: User characteristics affecting adoption of BI solutions

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Note: The term 'technology' refers to the most advanced analytical application that your organisation has implemented.

	Category 1: User characteristics affecting adoption and Utilization of BI	Strongly disagree	Disagree	Neutral	Ag	Strongly Agree
		1	2	3	4	5
	Users perception of business intelligence					
1	It is not easy to understand business intelligence systems	1	2	3	4	5
2	Business intelligence systems are very complex to use	1	2	3	4	5
3	It takes a lot of time to adapt and get used to business intelligence systems	1	2	3	4	5
4	use of technology in business operations reduces times	1	2	3	4	5
	Users education and computer literacy levels					
1	I possess high level of education	1	2	3	4	5
2	I understand basic and advanced computer programs	1	2	3	4	5
3	I use computer in my daily duties at home.	1	2	3	4	5
4	I use computer in my daily duties at work	1	2	3	4	5
	Users perception of change					
1	Changing business operations system affects performance	1	2	3	4	5
2	Use of technology makes life very difficult	1	2	3	4	5
3	Technology should only be applied in specific departments and to those willing only	1	2	3	4	5
4	Adoption of technology affects people's professional life	1	2	3	4	5
	Users understanding of strategic objectives					
1	Strategic objectives of the organisation are not exposed to all people.	1	2	3	4	5
2	Only those concerned should understand the strategic objectives of the organisation.	1	2	3	4	5
3	It is not necessary to understand strategic objectives of the organisation.	1	2	3	4	5
4	Better understanding of strategic objectives is left to those that implement the strategy	1	2	3	4	5