

EVALUATION OF THE IMPLEMENTATION OF BUSINESS INTELLIGENCE SYSTEMS ON SME RESULTS IN LAGOS STATE, NIGERIA

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Abstract: The integration of Business Intelligence Systems (BIS) in SMEs is part of this report. It assessed the influence of the essential success factors found by SMEs on the implementation of BIS on SME efficiency in the study area. This thesis begins with chapter one, which focused on the context of the analysis and the perceived vacuum that the analysis aims to address on the basis of previous studies on the essential success drivers of SMEs in the implementation of business intelligence systems, providing the drive for the conduct of this analysis. This collected knowledge gave rise to the formulation of the research goals and hypotheses.

In Chapter two, prior literature was analyzed to include the definition for the thesis and also to discuss hypotheses that back up this analysis. These theories include the propagation of the theory of innovation which describes how innovation is distributed, the mechanism of innovation-decision, the model of technology implementation and the structure of technology-organization-environment. A forum for designing the conceptual structure was provided by the principles of the analysis and the examination of applicable empirical research was also strengthened. For this analysis, a survey research design was implemented to collect fundamental results, including the use of a questionnaire which was self-administered to the respondents chosen.

This was used as a tool for gathering primary data from 387 respondents, and they are company owners or SME managers in Lagos State, Nigeria. While it reaches the sample size, a limit of 400 copies of the questionnaire were circulated, the explanation being that it would cause a questionnaire to be collected from the sample size, and 392 copies were received. The data collected was analyzed using the Social Sciences Statistical Kit (SPSS) and the Less Square Structural Equation Simulation Component (PLS-SEM).

Keywords: Business Intelligence Systems (BIS), implementation, collect fundamental results.

1. INTRODUCTION

1.1 Background of the Study

Business Intelligence (BI) has multiplied in the 21st century, owing to its contribution to decision making that guides business operations towards expected success (Singh & Singh, 2013). It is paramount for companies to be successful and imaginative in order to deliver value to shareholders in the rapidly evolving market world (Blenkhorn & Fleisher, 2007). For companies to be creative and efficient, it is vital that by using business intelligence techniques such as integrated virtual data visualization, data mining and predictive analytics, they draw the potential greatest benefit from their internal data properties. These methods and strategies are part of the Business Intelligence curriculum (Hawking & Sellitto, 2010). With the advent and advancement of machine intelligence and the idea of big data, due to an rise in the volume of data produced daily, companies are left with no choice but to rely more frequently on external information and expertise to enhance their efficiency and creativity (Benner & Tushman, 2003). For practitioners and scholars, however, this has become an important field of specialization (Chen, Chiang, & Storey, 2012).

Although business intelligence was originally used for decision-making operations, it has increasingly been used for organizational research, enhancing operational performance, and fostering organizational intelligence (Trieu, 2017). To describe Business Intelligence (BI), there is no universal definition used. Several researchers have described it as a broad category of applications, technology, and data collection, storage, access, and analysis processes to help their users make better decisions (Olszak & Ziembra, 2012; Boonsiritomachai, McGrath, & Burgess, 2014). BI defines precisely the data processing, storage, access, and analysis methods, software, and procedures that assist data consumers to make better decisions (Davenport, Harris, & Morison, 2010; Watson & Wixom, 2007). Business intelligence is also a tool used in the decision-making process for interpreting data and providing valuable knowledge to support senior management executives. In other words, market intelligence (BI) has been an important part of supplying organizations with the strategies required to ensure profitability and optimize shareholder capital with regard to critical decision-making knowledge.

In recent times, due to its effect on corporate efficiency, much attention is being paid to the use of business intelligence systems by experts (Richards, Yeoh, Chong, & Popovic, 2017). In recognizing company status, evaluating corporate efficiency, strengthening relationships with stakeholders, and generating viable market opportunities, efficient adoption of the BI framework plays a significant role. Implementation of BI in developed economies has resulted in better resource utilization, enhanced access to accessible information, integrated knowledge management and expanded business growth (Kfourri, 2018).

In Small and Medium Enterprises (SMEs), BI has played a significant role in helping to minimize manufacturing and labor-related costs, made it easier to gather knowledge that is useful in decision-making, increased the productivity and profitability of businesses, and provided a stronger place of strategic advantage for organizations (Kfourri, 2018). BI also enables SMEs to have a clearer and better understanding and an easier comprehension of the market they work, especially as consumer demand shifts (Kfourri, 2018). BI also turns data into insight that is helpful in providing a desirable climate for companies to make successful and rational decisions (Negash & Grey, 2008). In an organization, the importance of BI can be seen as there are radical shifts, such as the acquisition of potential clients, selling items to consumers, finding different markets, and forming partnerships in the enterprise with other companies (Olszak & Ziembra, 2004). In ensuring results, the implementation of BI structures in companies trying to increase productivity or pro-activity in decision-making is very necessary (Lonnqvist & Pirttimaki, 2006).

Although emerging innovations have decreased the role of economies of scale in many operations, and increased the possible participation of small and medium-sized businesses, this pattern is not accompanied by productivity growth. SMEs are having a hard time tackling those topics. It is therefore important for their survival to boost their competitiveness, and the introduction of BI systems can be counted as one of the drivers of competitive advantages. However, the extent to which the BI systems are implemented differs significantly between large organizations and small businesses around the world (Wong, 2005). Therefore, some of the underlying reasons that promote the degree to which BI innovations are applied need to be tackled so that SMEs can perform favorably within themselves and with other major entities within the same sector.

1.2 Statement of the Research Problem

Over time, business intelligence applications have been implemented by companies to increase performance, obtain a strategic edge, and simplify corporate processes (Kfourri & Skyrius, 2016). The possibility of significant investment needed during its implementation is, however, a major problem associated with BI adoption, particularly for SMEs (Kfourri & Skyrius, 2016). Small and medium-sized firms make up a large part of the businesses of every country. It is no wonder, considering their numbers, that they make a substantial contribution to economic development, job formation and progress in a specific market (Audretsch & Keilbach, 2004). SMEs are the main drivers of economic growth and development of every economy according to Van-Gils (2005), more so because they are present in almost every industry in a country. The ever-growing uncertainties of the world in which small and medium-sized businesses function introduce multiple challenges, covering financial, social, and technical facets, which have a major effect on the performance of SMEs (Rodrigues, Rechiegel, Esteves, & Pereira, 2012). New demands and market prospects emerge among these uncertainties. So entrepreneurs must retain high levels of creativity and change their business models to suit technology dynamics.

Important success factors (CSFs) offer a deep understanding of certain conditions that companies need to consider to maximize the likelihood of new BI initiatives being successful. The performance of BI applications ranges across various entities and industries, in the same way. Researchers have identified a community of more general considerations crucial to the progress of BI initiatives, just as each company and sector offers a clear context. These causes, known as Essential Performance Drivers, include a broad variety of variables such as support for top management, business conditions, source system data consistency, and use of the BI system (Adamala & Cidrin, 2011). In addition, numerous analyses have been performed to investigate the essential performance drivers of market intelligence. The main success factors of business intelligence were defined by Vodappalli (2009) through three dimensions; organisation, technology, process, which is another study by Olszak and Ziemba (2003), four dimensions were established namely; organisation, function, technology, and company as the successful factors on BI. Integration of the BI framework is not a straightforward process that involves only the procurement of a mixture of software and hardware; rather, it is a complicated undertaking that over a long time involves sufficient facilities and services. Although the dynamic BIS market and the uncertainties surrounding BIS implementation, crucial success factors (CSFs) of BIS implementation initiatives remains largely unknown, especially in small and medium-sized enterprises (Yeoh, Koronios & Gao, 2008; Yeoh & Koronios, 2010; Olszak & Ziemba, 2012; Hawking, 2013; Dawson & Van Belle, 2013; Sangar & Iahad, 2013; Boonsiritomachai, 2014; Pham, Mai & Misra, 2016). Effective BIS execution helps organisations' management to make informed decisions. Via improved decision support, the increased contribution of BI to the increasing success of companies has been recognized, particularly for small and medium enterprises (Guarda, Santos, Pinto, Augusto, & Silva, 2013; Singh & Singh, 2013). Recently, BI has become an emerging practice in handling decision-making in order to perform the evolving world (Isik, Jones, & Sidorova, 2013; Chai, Liu, & Ngai, 2013), and learning to exploit possibilities resulting from difficult conditions (Guarda et al., 2013). It should be remembered that not only have SMEs started to use BI to enhance decision support (Guarda et al., 2013), they represent a broad community of BI consumers. In Southwest China, for instance, nearly 85 percent of BI consumer companies are SMEs (Zhi & Guixian, 2010). Precisely, it is obvious that a suitable degree of application of BI and the rigorous role of SMEs have considerable results in enhancing insights among themselves.

However, small and medium-sized companies are distinguished by the restricted potential that limits BI creativity in industries (Ponelis & Britz, 2011), even though it is crucial for new SME decisions. BI is an application guided by the information system (IS), which integrates the mechanism and technologies to enable managers and end-users to make decisions (Miah, 2014). It plays a major role in assessing the economic landscape and facilitating decision-making to achieve strategic advantages arising from environmental change (Burton, Geishecker, Hostmann, Friedman, & Newman, 2006, Isik et al., 2013). According to Kfourri (2018), it is common knowledge that being better informed generates value through early identification of risks and opportunities, and it is possible to make better use of available capital by enhanced awareness provided by BI. Small and medium-sized businesses, however, are still not aware of the expense of BI adoption and the possible tangible and intangible benefits they can gain. Any of those entities fear expensive and time-consuming introduction of BI (Kfourri, 2018). The need for strategic intelligence should not be overemphasized, provided the visible dynamism in the processing of knowledge. However, SMEs have minimal capital and are unable to afford the same advanced and costly BI technologies that are beyond the control of large companies, so SMEs have to balance their BI expenditure capabilities against their productivity needs and anticipated benefits. BI has now arisen as a critical aspect of every decision-making mechanism for businesses (Kfourri, 2018).

The potential explanation for failing to introduce and incorporate the technologically modern technologies is the dynamic design of BI, which requires high cost of maintenance and implementation. This is why it is hard for many SMEs to adopt BI and can not afford the schemes. While there is a continuing trend in the evaluation of the production of BI resources for SMEs, research has shown that the pace of deployment and acceptance of BI by SMEs has been slow due to the small BI investment (Kfourri, 2018). Other SMEs, particularly those with fewer criteria for handling complex data, were reluctant to accept BI. Spreadsheets are known to be very easy to use and can provide good results at times. The introduction of BI in SMEs is very slow and, thus, there is still a shortage of translation of data into understandable market knowledge (Kfourri, 2018). This research aims to address the state of BI implementation in small and medium-sized enterprises and recognize the key success factors of BI implementation that influence SME performance.

1.3 Research Questions

Answered the following research questions in this study;

1. What are the crucial success drivers for SMEs when implementing Business Intelligence (BIS) systems in Lagos State?
2. What are the implications on the efficiency of SMEs in the field of analysis of the essential success factors of SMEs in the implementation of BIS?
3. What are the difficulties of the implementation of BIS by SMEs in the field of study?

1.4 Research Objectives

The general objective of this thesis is to evaluate the crucial success factors of small and medium-sized enterprises in the implementation of business intelligence systems in Lagos State to enhance the efficiency of small and medium-sized enterprises, while the particular aims are to;

1. Study the crucial success factors for SMEs in the deployment of Business Intelligence (BIS) systems in Lagos State;
2. Investigate the impact on SMEs' efficiency in the research area of essential SME success factors in the BIS application; and
3. Assess the problems of the implementation of BIS by SMEs in the field of analysis.

1.5 Significance of study

For all stakeholders of SMEs, this study is of significant significance. It helps managers by allowing enhanced and knowledgeable judgement that will enable them to make better choices, take prompt and effective steps, and also optimize the resources of shareholders. The management of companies is valuable of providing foreknowledge of their organization's success of terms of growth, return on investment (ROI), market share , and profitability. Based on the organization 's results, shareholders and owners would be able to make investment decisions. The skills and the level of recognition of BI among the organization's workforce will be strengthened.

This analysis also acts as an eye-opener for SMEs by presenting them with a comparative edge in the industry in which they compete and, as a result, achieving a better strategic position. Since there is no full coverage of research on the essential success drivers of BI acceptance in SMEs, this study seeks to add importance to existing study and also enables other researchers to concentrate on other facets of BI in terms of entrepreneurship. This study is also a helpful guide for those who wish to conduct other research relevant to adoption and implementation of innovations within SMEs.

1.6 Field of research

This study was performed on small and medium-sized enterprises (SMEs) situated in the state of Lagos , Nigeria. A significant number of SMEs who are technically oriented and have a propensity to make use of business intelligence to access business-related knowledge are told of the choice of region. The product of this research will define and analyze the essential success drivers for the deployment of business intelligence systems in SMEs.

1.7 Constraints of the Analysis

This thesis was performed in Lagos State which is one of the 36 states in Nigeria; hence, the results of this analysis can not generalize. Secondly, respondents were hesitant to suggest the value of their true return on investment (ROI), the value of their asset return (ROA) and the value of their market share, providing a selective view of their ROI, ROA and market share.

1.8 Description in Terms of Operations

i. Small and Medium Enterprises (SMEs): Small Businesses are those firms whose gross assets (excluding property and building) surpass 5 million Naira but not more than 50 million Naira with a total workforce of more than 10, but not more than 49. Medium Companies are those undertakings with gross assets (excluding property and buildings) over 50 million Naira but not more than 500 million Naira and a gross staff of between 50 and 199 workers (SMEDAN & NBS, 2013).

ii. **Business Intelligence:** BI applies to company knowledge gathering, integration, analysis, and presentation tools, software, and activities. The purpose of business intelligence is to support better decision making from operational.

2. LITERATURE REVIEW

This chapter includes a methodological analysis to better clarify the study's principles. It also contains the theoretical analysis that reflects on the hypotheses, the analytical analysis and the methodological context that support this report.

2.1 Conceptual Review

This segment addresses the study's principles. It explores the role of business intelligence and its operational advantages, the essential success drivers of business intelligence implementation, SMEs and their decision climate, the relationship between SMEs and BI, efficiency of SMEs and the significant metrics used to assess performance of SMEs.

2.1.1 The business intelligence (BI) concept

Market intelligence is more than just a set of tactics and devices. To create a information base that serves the enterprise (Olbrich, et al., 2012), it is a multi-dimensional term dealing with the efficient dissemination of organizational structures, activities, and technologies. Business intelligence (BI) is characterized as the process of integrating data from various internal and external sources, using analytical tools and techniques to better understand, make decisions and take action on information (Gangadharan & Swami, 2004). The purpose of Business Intelligence is to classify individuals' knowledge needs or organizations, process the data collected into beneficial managerial knowledge and intelligence (Pirttimaki, 2007).

By recognizing questions as to why BI continues to hold its elevated role and why organizations have not completed the introduction of the BI-led framework, the value of BI can be considered (Bijker & Hart, 2013). The integration of information from different sources, information retrieval, and decision making produces the importance of the BI framework (Gangadharan & Swami, 2004; Dodson, Arnott, & Pervan, 2008; Guarda, Santos, Pinto, Silva, Augusto, & Lourenco, 2012). On the basis of the above, it can be said that BI plays an important role in the management of organizational success (Richards, Yeoh, & Wang, 2011), by arranging the knowledge processing that organisations use to handle the processing of the knowledge constantly changing environment. According to Guarda et al., (2012), organisations need the knowledge be assimilated and processed to predict the degree of impact of certain improvements that which help organizations take the complex decision. Because BI has been amplified, however, due to its usefulness in disseminating, assimilating, and analyzing information companies use to diagnose decision-making problems (Singh & Singh, 2013), it also includes more reliable intelligence practices such as consumer intelligence, strategic intelligence, product intelligence, and others. Effective application of BI offers knowledge to the management of organisations that helps them to make organizational, logistical, and strategic decisions and to enforce management guided by metrics (Pirttimaki, 2007). Metrics-driven management is an strategy that ensures companies meet the corporate goals laid out in their market plans (Lutu & Meyer, 2008).

BI offers the valuable degree of data consistency and security of information for the authenticity of decision-making (Brinkhues, Macada, & Casalinho, 2014), and generates applicable knowledge of which the actual basis of knowledge retrieval is the research historical context and present condition (Olszak & Ziemba, 2006). Awareness explains what has happened, what is going on, and what may happen (Stodder, 2013). According to Olszak and Ziemba (2006), information is the basis for decision making about what to do and how to do it. As far as decision-making is concerned, BI builds market efficiency, consumer support, adaptation improvements and timely responsiveness to strategic conditions (Pourshahid, Richards & Amyot 2011). In addition, decision-making gives companies versatility in infrastructure, the implementation of emerging technologies, and rules on company processes (Harraf, Wanasika, Tate, & Talbott, 2015).

Specific organizations that have expense consequences (Yeoh & Koronios, 2010) are business intelligence programs. Organizations need to monitor, calculate and explain the cost in order to ensure that the knowledge they have satisfies the criteria they set (Lonnqvist & Pirttimaki, 2006). Organizations worldwide typically have the purpose of maximizing benefit from the selling of products and services. With BI, companies can understand systematic market knowledge and guide trading strategies to customer specific demands while at the same time acquiring new consumers and maintaining current value-added consumers (Green, 2007). Guarda et al., (2012) notes, BI acts as a gateway between various

applications and customers involved in accessing information, creating an atmosphere that enables access to the information required for day-to-day operations, facilitating business performance analysis. With BI, companies can integrate powerful tools, evaluate structured documentation, and track structure within a service-oriented model with different measurements, data aggregation, and other features (Eckerson, 2010).

Ranjan (2008) suggests that directing managers in the strategic path for quality knowledge is necessary for effective business management, with the development of policies and procedures to ensure that the goals of the enterprise are fulfilled. Knowledge on consistency becomes imperative in quality judgments (Ponelis & Britz, 2011; Citroen, 2011). Performance evidence comes from a detailed review of the historical context and the present climate. (Ponelis & Britz, 2011; Citroen, 2011). If the company has an inventory of historical records, both internal and external sources, to enable exploratory study using BI techniques, the ease of historical analysis is encouraged (Sekaran, 2006). Combining the use of historical evidence and BI instruments helps small and medium-sized businesses to take rational actions that act as an essential edge in understanding market processes. In order to combine historical and current data recording, data processing into intelligence, knowledge creation, and its exploitation into decision-making to enhance market effectiveness, BI uses those technologies (Singh and Singh , 2013) (Gangadharan & Swami, 2004; Pourshahid et al., 2011). Therefore, by adapting supply to its consumers, exploring a more efficient pricing strategy, substituting existing markets for new markets, and being more efficient relative to its rivals, it is necessary for companies to develop a strategic culture (Reeves & Deimler, 2009).

Due to a rapidly evolving competitive climate, it can be checked that the information technology standards, industry problems and business conditions encountered by SMEs are not substantially different from those encountered by major businesses. Over time , major corporations have amassed the advantages of BI programs as they can incorporate and manage BI technologies. The amount of data that businesses produce and the shop is currently growing. Several data points exist; among others, consumers, vendors, corporate relations, market analysis. The problem presented to SMEs is to process vast quantities of data and turn it into valuable knowledge. A feasible option for SMEs may be to use Software-as-a-Service (SaaS) technologies, which help businesses to enhance their existing systems and information technology and increase the efficiency of their information systems, offering the organization a competitive edge (Tvrdíkova, 2012). Deprecated technological applications used by SMEs will typically prove to be an enabler for fundamental reform, as SMEs are constantly under strain due to changing economies and technology (Lee, Park, Yoon, & Park, 2012). Thus, BI systems tend to be the best option for SMEs because it helps them to reap advances in information technology (IT), deploy software programs that rather change business processes following software constraints, enabling the convergence of consumer and supplier information flows, redesigning and formalizing business processes. A standard business intelligence system, according to Kfoury and Skyrius (2016), has the following elements;

1. Online analytical analysis refers to the way end-users use different dimensions to work through results.
2. Advanced analytics for evaluating information to forecast and reveal developments using mathematical and other quantitative techniques.
3. A data center that manages the compilation of various aggregation and query service organization documents.
4. Real-time (BI) functions for interpretation and knowledge delivery in real-time.

A BI method is not expected to produce a return on investment, since not all company has been efficient with BI solutions. A appropriate and integrated BI, however, will establish the competitive edge required for the success of SMEs. Therefore, it is critical that SMEs first determine the type of BI solution that will fulfill their business needs , identify the business process , identify the positions of stakeholders, and also define their functional specifications. It is also important to identify the details required for documentation, review, and presentation delivery. SMEs who have implemented the BI method soon discovered they would perform more efficiently in the marketplace, with additional knowledge about their clients, certain trends and criteria, as well as more efficient financial management (Guarda et al., 2012). Essentially, the debate indicates that BI is a leading influence in the decision-making process associated with good information management.

2.1.2 Techniques for Business Intelligence (BI),

Techniques of Business Intelligence (BI) are such initiatives placed in place by organisations to ensure that the knowledge required for business decision-making is obtained. For organisations that embrace Business Intelligence (BI) use, it means they have embraced the use of Business Intelligence tools that are helpful in decision making. Among other aspects, these BI approaches include data processing, business process management (BPM), benchmarking, and text mining.

1. Data mining

Data mining relates to finding and finding new information from a large volume of data related to the law. Data mining helps to identify information, group information, and also helps to shape a hypothesis. To forecast future patterns and habits, data mining techniques are used, allowing the enterprise to make strategic choices and current information in a manner that is readily interpreted by consumers. Thanks to their timely access to data and useful knowledge, several companies in diverse industries use data mining technologies. In several sectors, including marketing, telecommunications, banking, medicine, and so on, data mining technologies have been successfully applied. (Gheware, Tondare & Kejkar, 2014). For example , financial data in the banking and financial sectors is usually accurate and of high quality, which enables comprehensive data processing and data mining, and can also be used in financial data analysis. It can also be used for estimation of loan payments and consumer credit management research in banks.

Data mining makes use of targeted ads in the grouping and clustering of consumers. It also has fantastic uses in the retail sector because it gathers vast volumes of data on pricing, background of customer orders, delivery of goods, market and services. In the telecommunications industry, it is also useful to help detect telecommunications trends, capture illegal operations, make better use of the network, and enhance service efficiency (Gheware, Tondare & Kejkar, 2014).

2. Business process management

Business process management (BPM) encourages companies to sync internal company operations with client needs and lets administrators decide how to guide, track and quantify organizational capital. Business process management can eliminate costs when correctly implemented, increase performance and output, and mitigate risk and failures, while maintaining and maximizing organizational capital.

3. Benchmarking

Benchmarking is a competitive technique used to compare the success of company processes and goods with other companies' best performance inside and outside the market. It includes identifying and applying the best management practices, whereby managers recognize other organizations' best practices and incorporate those strategies to their corporate processes to enhance the efficiency of the enterprise. Benchmarking is often used to expose efficient market procedures, to encourage the exchange of information, and to achieve comparative advantage. Without a question, the most critical purpose of benchmarking is to boost organizations efficiency.

4. Text Mining

A comparatively modern discipline and a refinement of data mining is text mining. Text mining is the art and technologies used to retrieve information from data databases contained in organized files, database storage facilities, data mining activities and related business intelligence. The goal of text mining is to obtain new knowledge, such as the detection of suspected fraud. Flexible approaches to knowledge processing, study and analysis can be described by text mining. Thus, text mining extends data mining 's fingers into the ability to handle textual resources (Gao, Chang & Han, 2007).

2.1.3 Critical Success Factors (CSFs)

Critical Success Factors (CSFs) symbolize a series of factors in which the achievement of positive outcomes guarantees the individual or company a viable role (Vodapalli, 2009). While companies frequently see business intelligence as a response to technology, the result of BI initiatives is determined by both internal and external influences. The consistency of the data sources, investment financing, the kinds of sectors in which the organisations participate, the level of senior management assistance, and the expertise of the technological personnel are all considerations (Olbrich, Poppelbus, &

Niehaves, 2012). Any variables will have a greater impact on the BI solution than others would, based on the market and form of organisation.

For organisations, the task is to recognize the variables that have the biggest effect on their BI scheme. Significant criterion organisations should rely on when choosing the factors is that for the length of the project they have to have some impact on the factors. The impact may be partially because they can set parameters for how they plan to reach a factor goal, while absolute control determines the goals of precisely what the factor goal is (Olbrich et al., 2012). Organizations may be able to provide a forum for increasing the future performance of IT initiatives by concentrating on these considerations.

Critical success factors (CSFs) are characterized as the limited number of places where satisfactory outcomes for the person or company can ensure good competitive performance (Hawkin, 2013). Several observational research on CSFs have been performed at BI (Yeoh et al., 2007; Hawking & Sellitto, 2010; Yeoh & Koronios, 2010; Olbrich et al., 2012; Presthus, Ghinea & Utvik, 2012). Many researchers presented sixteen CSFs of business intelligence structures, according to Abdel Nasser, Mohamed, and Gawaher (2018), and grouped them into four variables, namely; organization, process, technology, and environment.

i. Support Top Management

Top management support is considered one of the greatest enablers of the introduction of technology because it supports the application of technology and offers improved results (Yeoh et al., 2008; Chaveesuk, 2010; Ifinedo, 2011; Grubljesic & Jaklic, 2015; & Hung, Huang, Lin, Chen, & Tarn, 2016). Top management ought to have a leadership position guided by an adequate contribution to the organisation. Top managers are to provide the requisite services for the BI mission, such as professional personnel, finances, supplies, and also mitigate the possible opposition generated by the organization's internal structure.

ii. Clear Vision

The formulation of the vision is one of the most significant factors in the business intelligence systems (BIS) deployment project. To guide the implementation of BIS, a strategic business strategy is required (Nasab, Selamat, & Masrom, 2015). Yeoh and Koronios (2010) clarified that the establishment of a business case for business intelligence involves a long-term perspective. According to them, the anticipated advantages, projected costs, the timetable, and what is needed by the system should be integrated into the business case. If the company vision is transparent and known, it can affect the business intelligence system's implementation and result. The business case, which was generated from a comprehensive company needs review, would improve the chances of gaining top management support and may facilitate the introduction of a business intelligence method to change the existing monitoring and evaluation processes (Yeoh & Popovic, 2016).

iii. Availability of services

Ressource availability is an important consideration in introducing the BIS. Financial resources, technical resources , human resources, and time can be included in resources (Boonsiritomachai, 2014). Financial resources disclose the money available to an company to make Its investments. Chong, Lin, Ooi, & Raman (2009) said that when money, infrastructure , human resources, and operational time are sufficient to introduce technical advancement, managers would embrace the implementation and introduction of modern technologies.

iv. Ethos of Organisation

Organizational culture is characterized as the pattern of common values and beliefs that lets individuals understand the roles of the organization and offer them behavioral norms within the organization. The communication between the culture of the enterprise and the knowledge infrastructure is deemed crucial for organisations to benefit from the system's future benefits (Nasab et al., 2015). To prevent employee opposition to the introduction of the new technologies (BIS), there must be a strong degree of encouragement within the organization for ongoing learning and development , the company must promote teamwork and coordination through teams or divisions, and management must embrace the "perform-and-reward" ethos within the organisation.

v. BIS compliance with Corporate plan

All strategic intelligence plans should be matched with corporate policy to remain a profitable and effective enterprise (Mungree, Rudra, & Morien, 2013). Through aligning BI and business strategies, business strategies will not only result in BIS growth and advancement within the company, it will also lead to a shift in business objectives and a reorientation of them.

vi. The Element of Method

The workflow area applies to user-centered progress management techniques, the composition of the champion and healthy team, and project management. This process management group needs techniques for change management that rely on consumers. Kfour and Skyrius (2016) proposed that this can be enabled through the users' structured intervention to create an iterative user-driven solution to evolving specifications.

3. METHODOLOGY

The methods implemented for the analysis are listed in this chapter. It looks at the test architecture, research study field, study population, sample size and sampling technique, data sources, questionnaire design, and analytical framework used to determine the critical success factors (CSFs) of the Business Intelligence (BI) application in selected SMEs in the state of Lagos.

3.1 Research Design

A survey analysis method was utilized in this report. Data on these firms were gathered in other businesses to provide ample information via the primary data collection channel (questionnaire). The data were analyzed using descriptive and inferential analysis. This was obtained with the use of the Social Sciences Mathematical Kit (SPSS) and Partial Least Square Dynamic Equation Modeling (PLS-SEM).

3.2 Field of Research

Lagos State, Nigeria, is the sample area for this report. This field of research is situated in Nigeria's south west geopolitical region. Among the 36 states, Lagos State has the smallest area of 3,557 km² (1,381 sq mi) and it is the country's most economically active state. It has 20 Areas of Local Government (LGAs). It has been stated that the state has an approximate population of 17,552,942 in 2012 and is situated within the 6° 35'N 3° 45'E coordinates, according to the Lagos State Government. A large number of SMEs dominates the region.

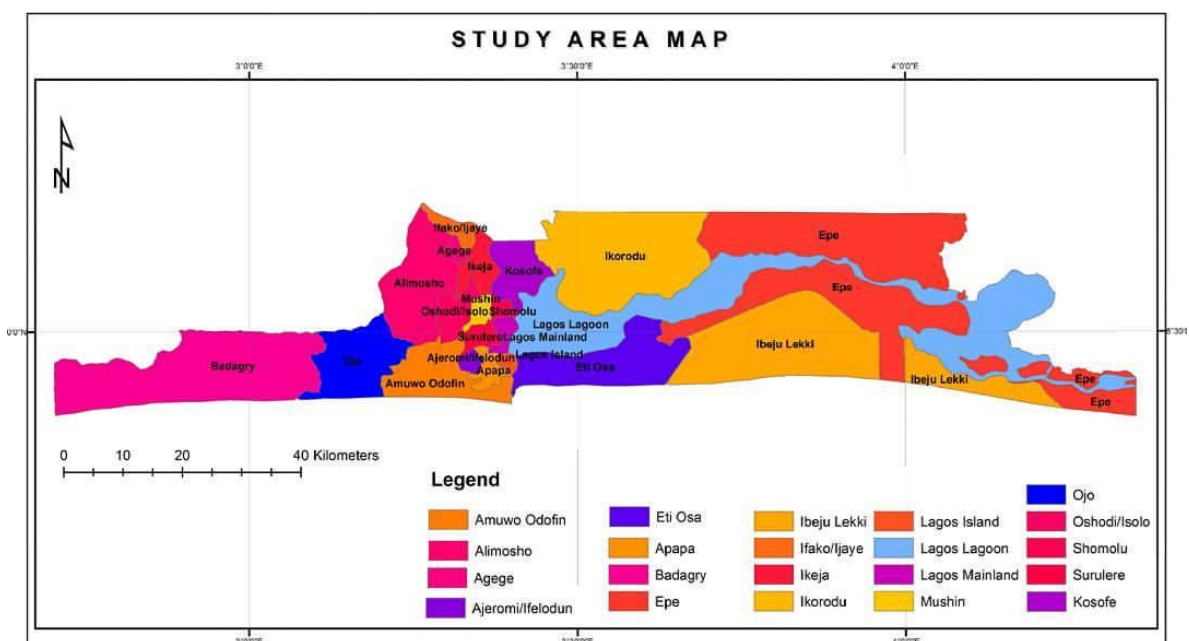


Figure 3.1: Map of Lagos State

3.3 Population of the Study

The research target population was composed of selected small and medium-sized businesses in the state of Lagos. Of 11,663 small and medium enterprises, Lagos state has the largest number of SMEs (SMEDAN & NBS, 2013). SMEs is listed on the basis of the following industries: agriculture, oil and gas, real estate, health, information and communication, education, entertainment, building, engineering, design, hospitality, operation, finance and transport & logistics (SMEDAN and the National Bureau of Statistics 2013 joint survey).

3.4 Sampling Technique and Sample Size

The sampling methodology used in this analysis is the basic random process of probability sampling. Using Yamane (1967) Formula, i.e., the sample size was extracted.

$$n = N / 1 + N (e^2)$$

Where;

n = sample size

N = population of the study

e = error margin which is always 0.05

1 = constant

Therefore,

$$n = 11,663 / 1 + 11,663 (0.05)^2$$

$$n = 11,663 / 1 + 11,663 (0.0025) 52$$

$$n = 11,663 / 1 + 29.1575$$

$$n = 11,663 / 30.1575 \therefore$$

n = 386.74 Approximately, the sample size, n, is 387.

3.5 Method of Data Collection

A standardized questionnaire is the key method used for primary data collection that has been developed, checked for validity, and transmitted to respondents in order to extract the required information from them, thus rendering the research quantitative. The questionnaire was closed-ended and divided into four parts, including respondents' demographic information, essential success factors, SME results, and business intelligence application challenges. A 5-point scale from 1, strongly disagree to 5, strongly agree, is the Likert style scale.

3.6 Model Specification/Measurement of Variable

The model used for this analysis is the Multiple Regression Model, where essential success factors (independent variable) and SME output (dependent variable) are the variables of interest. Mathematically, this model is given as;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + E$$

Where;

β_0 is the model's constant

β_1 to β_4 are the model's coefficient of variables 53

Y represents SMEs performance

X1, X2, X3, and X4 represents the operational factor, the operation factor, the technical factor and the environmental factor

E is the word for errors

Y is calculated using the financial output drivers, which include investment returns, asset returns and market share.

3.7 Data Validity and Reliability

The constructs' durability was tested using composite durability. On the basis of their contribution, the preference of this approach for checking the stability of the constructs is due to its consistency in assigning weights to each construct. The constructs' validity was also tested using convergent validity and discriminant validity.

3.8 Method of Data Analysis

Data analysis was carried out using the descriptive statistical approach such as occurrence counts, percentages, mean rating, and standard deviation and the inferential statistical method. The results of these data analysis techniques were introduced with the use of the Statistical Kit for Social Sciences (SPSS), which made it possible to present results with statistical tables, ratios, and the use of partial least square structural equation modeling (SmartPLS3.0) to evaluate the relationship between variables for regression analysis. Using descriptive statistics, the first and third objectives of this analysis were analyzed and its findings were reported in frequencies, amounts, mean ranking and standard deviation, while the second objective was analyzed using inferential statistics, i.e. multiple regression study by PLS-SEM. Hypotheses were tested at a substantial amount of 0.05 where the alternative hypothesis was accepted at the stage where $p < 0.05$ was accepted.

4. CONCLUSION

The aim of this analysis was to evaluate the impact of SMEs' essential success factors (CSFs) in the implementation of business intelligence systems (BIS) on SME efficiency in Lagos State, Nigeria. The crucial success factors of SMEs in the implementation of Business Intelligence Systems (BIS) were investigated in the first objective. The results showed that the environmental factor is the most important factor for performance since it is external to the company, while the technological factor was ranked second, process factors were ranked third, and lastly, organizational factor. The second goal was used to search for the hypothesis and the effect of the BIS program CSFs on output of SMEs in the research area was investigated. Path analysis results found that environmental factors, technological factors, and process factors have a major influence on the performance of SMEs in the study area while the last model, organizational factors, has no impact on the performance of SMEs in the study region.

Finally, the third goal was directed at evaluating the difficulties of applying BIS to SMEs in the field of research. This has been done by the descriptive study and rating of the difficulties by understanding which one has the highest rating and/or the lowest. The outcome showed that all SMEs in Lagos State are unique to such challenges. This allowed the third goal to be accomplished, and it was concluded that the main obstacle facing SMEs in applying BIS is the high cost of implementing BIS, while the least prominent obstacle is the lack of owners' awareness about the tangible and intangible benefits of applying BI.

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