

Business Intelligence Systems and Service Delivery Performance of Telecommunication Companies in Port Harcourt

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Abstract: *This study inquired into the relationship between business intelligence systems and service delivery performance of telecommunications firms in Port Harcourt, Rivers State, Nigeria. The study adopted the cross-sectional survey and a population of 75 employees of four major telecommunications companies in Port Harcourt were covered. A sample size of 63 employees were drawn from the population and the stratified sampling technique was adopted. Data were collected using copies of questionnaire. The data was analyzed using the Spearman Rank Order Correlation. The outcome of the analysis showed a positive and significant relationship between the dimensions of business intelligence system (reporting intelligence business systems and monitoring intelligence business system) with the measures of service delivery performance (operational efficiency and service quality). The study concluded that business intelligence system helps in boosting the service delivery performance of the telecommunication firms and value creation. It was recommended that business intelligence system should be adopted by telecommunication firms as it will help facilitate user satisfaction and continuous service improvement.*

Key Words: *Reporting Business Intelligence Systems, Monitoring Business Intelligence System, Operational Efficiency, Service Quality.*

1.0 Introduction

Service delivery is the anticipation of the customer(s) and/or users in their purchase of services by the relevant business that offers the services as a reward for remuneration (Shanka, 2012). Additionally, the result is what the value the service provider must achieve because it positively affects the generation of market share and the achievement of competitive advantage (Zwick et al., 2015). To ensure sufficient, successful customer experience, value co-creation and satisfaction, service delivery is incorporated in numerous methods based on the organization and the services that are offered (Ojasalo, 2010). This is true regarding government and commercial businesses. In a cutthroat market, mobile telecommunication services growing more and more crucial as quality, contentment, and loyalty are strategically significant in the struggle to win over consumer preferences and maintain long-term economic benefits in the face of international rivalry (Adamu et al. 2012).

The telecommunications sector in Nigeria had reached over 78 million active users by the latter part of 2010, making it Africa's most rapidly expanding wireless

communications marketplace, according to the Nigerian Communications Commission (2011). South Africa, which has over 43 million subscribers, fell to second position. As of December 2020, there were over 204.6 million telecom users in Nigeria (Nigerian Communications Commission, 2020). Nigerians persist to express bitter complaints about telecom operators' services, including high call rates, high call queue times, high wait times when attempting to reach the customer care, subpar voice signals, the erroneous deduction of airtime, poor reception, connection issues, and poor connections with other networks, notwithstanding the industry's remarkable accomplishments in providing telecommunication services and growing audience. Considering an increase in the amount of data generated regularly because of the development and application of machine intelligence and the concept of big data, organizations are forced to rely heavily on outside knowledge and skills to improve their productivity and innovative thinking (Benner & Tushman, 2003). But for professionals and academics, this has grown into a crucial area of specialization (Chen, Chiang, & Storey, 2012).

Despite being used initially for decision-making processes, business intelligence is now also frequently utilized for organizational research, improving operational efficiency, and developing organizational intelligence (Trieu, 2017). There is not a single criterion used to define Business Intelligence (BI) as Boonsiritomachai, McGrath, & Burgess (2014) characterized it as a broad spectrum of applications, technologies, and data collecting, retrieval, accessibility, and analysis procedures that assist the people who use them to reach improved choices. Experts are paying a lot of concentrate to the adoption of business intelligence systems recently because of how it affects company productivity (Richards, Yeoh, Chong, & Popovic, 2019). Effective implementation of the BI paradigm is crucial for identifying firm circumstances, assessing corporate effectiveness, enhancing connections with consumers, and creating market prospects. In industrialized economies, BI application has led to improved resource utilization, improved availability of information, integrated knowledge management, and increased corporate growth.

Some research has been done on business intelligence systems (Francis, 2020; Lateef, & Keikhosrokiani, 2022; Nithya, & Kiruthika, 2021; Rouhani et al. 2018; Owusu et al. 2017). Francis, (2020) studied the evaluation of the implementation of business intelligence systems on SME results in Lagos State, Nigeria. Again, Lateef, and Keikhosrokiani, (2022) examined Predicting Critical success factors of business intelligence implementation for improving SMEs' performances: a case study of Lagos State, Nigeria. Nithya, and Kiruthika, (2021) also discussed the impact of business intelligence adoption on performance of banks: a conceptual framework. Rouhani et al. (2018) analyzed business intelligence systems adoption model: an empirical investigation. Owusu et al. (2017) again assessed the determinants of business intelligence systems adoption in developing countries: an empirical analysis from Ghanaian Banks. Considering these studies, this research departed from previous work by examining the relationship between business intelligence in terms of reporting intelligence business systems, Monitoring intelligence business system with service delivery performance in telecom firms in Port Harcourt. It is observed that operational inefficiency and poor service quality of the services offered to consumers are the cause of the investigation. More so, the study investigates the reasons behind poor service delivery, which has led to a decline in customer satisfaction.

Conceptual Framework

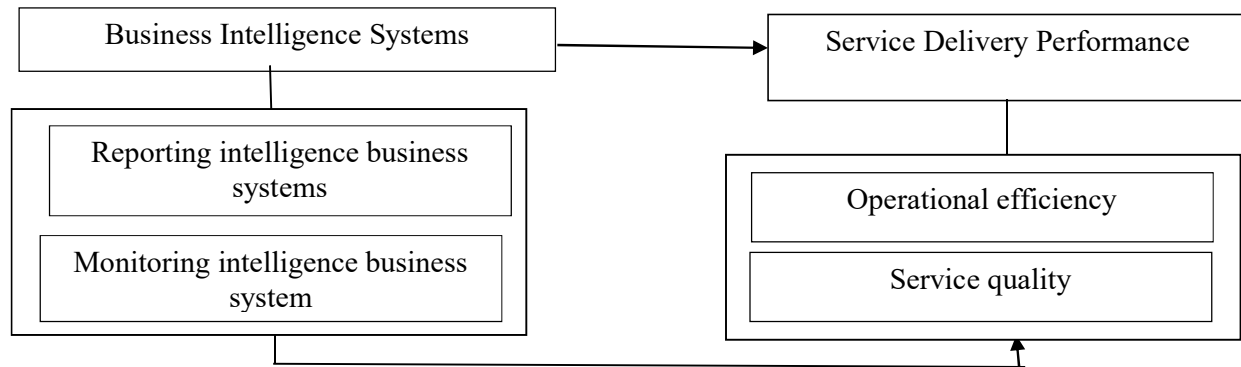


Fig. 1: Conceptual Framework of business intelligence and service delivery performance

Source: Adapted from Gauzelin, and Bentz (2017).

Aims and Objectives of the Study

The aim of this study is to find the empirical relationship between business intelligence systems and service delivery performance of telecommunication firms in Port Harcourt. Therefore, the specific objectives are to:

- i. Examine the relationship between reporting intelligence business systems and operational efficiency of telecommunication firms in Port Harcourt.
- ii. Investigate the relationship between reporting intelligence business systems and service quality of telecommunication firms in Port Harcourt
- iii. Ascertain the relationship between monitoring intelligence business system and operational efficiency of telecommunication firms in Port Harcourt.
- iv. Examine the relationship between monitoring intelligence business system and service quality of telecommunication firms in Port Harcourt.

Research Questions

The following research questions were formulated:

- i. What is the relationship between reporting business intelligence systems and operational efficiency of telecommunication firms in Port Harcourt?
- ii. What is the relationship between reporting business intelligence systems and service quality of telecommunication firms in Port Harcourt?
- iii. How does monitoring business intelligence system relate with operational efficiency of telecommunication firms in Port Harcourt?
- iv. What is the relationship between monitoring business intelligence system and service quality of telecommunication firms in Port Harcourt?

Research Hypotheses

HO₁: There is no significant relationship between reporting business intelligence systems and operational efficiency of telecommunication firms in Port Harcourt.

HO₂: There is no significant relationship between reporting business intelligence systems and service quality of telecommunication firms in Port Harcourt

HO₃: There is no significant relationship between monitoring business intelligence system and operational efficiency of telecommunication firms in Port Harcourt.

HO₄: There is no significant relationship between monitoring business intelligence system and service quality of telecommunication firms in Port Harcourt.

2.0 Literature Review

Theoretical Framework: The SERVQUAL model, promoted by Parasuraman et al. (1985), provided the framework for the study. It describes the methods and procedures in business activity that ensures the capture of customer expectations and opinions prior to business practice. The idea offers five key guidelines that should be implemented and upheld by the company to meet consumer expectations, which are reasonable and realistic since they accurately reflect reality. The theory and the study have close connections because the public telecommunication entity's service delivery assessment towards customer satisfaction in developing the relationships between the organization and the customers seeks to be performed in accordance with the dimensions provided by the service quality model in practice on reliability, assurance, responsiveness, tangibility, and empathy.

Conceptualization of Business Intelligence Systems

Business intelligence refers to tools and methods used by organizations to gather, access, and analyze vast volumes of data to make wise decisions (Wang & Wang, 2008). Business intelligence is a readily available instrument with the capacity for information collection, archiving, and processing. To handle information successfully, management must be able to access reliable information more easily when needed (Farzaneh, Isaai, Arasti, & Mehralian, 2018). Strategic management and stakeholders may receive a comprehensive view of the organization via the business intelligence systems, which has the advantage of enabling speedier, more accurate, and more reliable decision-making. Business intelligence is a collection of approaches, procedures, computer tools, and strategies used to modify data in information using cumulative experience, cumulative knowledge, and cumulative intelligence so that various departments may make decisions at various levels. According to Turban, Sharda, Aronson, and King (2008), business intelligence is also an integrated approach to operational process performance, for reaching main goals over timely interaction and gateway to data, and its qualification to provide managers with the requested analysis that analyses historical and present data and compares it to earlier time periods. If properly implemented, the characteristics of business intelligence include timely information delivery, high-quality information, improved support for achieving organizational and strategic goals, and improved organizational performance (Holsapple, Lee-Post, & Pakath, 2014).

Reporting Intelligence Business Systems

Business intelligence solutions make it possible to get insight from operational and financial data to make better decisions with the aim of achieving the efficiency and effectiveness so desperately required in the healthcare sector. It is necessary to turn data into actionable insight to have an impact on financial, operational, and care management. This process begins by realizing how important it is for health care organizations to have ready access to timely, comprehensive, accurate, legible, and relevant information (Wagner, Lee, and Glaser, 2009). Business intelligence technologies are recommended by Ferrand (2010) for the analysis and reporting of quality measures. He goes on to say that their goal-oriented methodology, made possible by business intelligence tools, enables objectivity and diversity across clinical specialties and geographical areas when goals vary from scenario to scenario. Successful businesses employ business analytics to strengthen their competitive advantage, as noted by Frye

(2010). They are aware that the conversion of facts into information and ultimately knowledge yields responses to the questions "what?" and "why?" The business intelligence analysis systems provide information on why an event occurred, while the reporting business intelligence systems concentrate on creating business documents that provide businesses with information about the company activities over a specified time (Vesset & McDonough 2007).

Monitoring Intelligence Business System

Businesses may now keep an eye on information and data in real time. You can take snapshots at any moment to acquire reports that can help you make fast decisions. Dashboards, Key Performance Indicators, and business performance management are tools that fall under this category of business information systems (Sabanovic, & Silen, 2012). Eckerson (2010) asserts that the dashboard tools offer a central spot where actionable and meaningful metrics are stored and graphically depicted, making it simple for users. The performance of a specified specialized project inside a corporation is measured by the key performance indicators (KPIs), for instance, service level management (SLM). Vesset & McDonough (2007) point out that because prediction business intelligence systems are more difficult, most companies use outsourced resources to perform these tasks, however others choose to use software applications that completely automates the procedure.

Service Delivery Performance

According to Kotler & Keller (2009), the service delivery paradigm has two elements, namely contact with physical facilities and human resources. The service marketing system, according to Christopher Lovelock (2011), a different expert, contains service delivery components encompassing interior and exterior facilities, physical facilities, and service personnel. Winner Russel (2004) contends that providing service contacts and service officers is part of providing services to clients. Balaji (2002) made the same argument, arguing that providing equipment, physical facilities, and contact officers can help offer services to clients. The service delivery system, according to Mona & James (2006) and other academics, consists of protocols, physical locations, and organizational structures. Based on the comparison of the concepts, it can be concluded that the notion of service delivery performance in this study is a component of the larger service system that processes inputs, creates the components of

services, assembles the components of the service, and provides the service to the client.

Additionally, the result is what the service provider must obtain because it positively affects the generation of market share and the achievement of competitive advantage (Zwick et al., 2015). Regardless of the industry, service delivery is a practice that may be used in all types of organizations, formal and informal, if there are clients or beneficiaries who need to be helped/supported. The ability to design a strategy that ensures dependability, assurance, tangibility, empathy, and responsiveness in the process of service delivery in businesses operated on a small scale and achieve a significant market share and competitive advantage is embedded in the entities operating informally (Swallehe, 2021). Temba (2013) also makes the argument that the existing private telecommunications companies in the market are being competed with by the public telecommunications company. Service delivery is still impacted by the issue and weakness of network coverage. According to Bujara (2018), there are difficulties the public telecommunications corporation must overcome to carry out its mandate to provide reliable and effective internet services. However, with limited maintenance because of red tape in equipment purchasing, equipment manufacture, infrastructural upgrade and networks take a while to be mended once they go down, which has an impact on the company's ability to supply/render services.

Operational Efficiency

To deliver high-quality goods and services to customers in the most practical, cost-effective, and timely manner, operational efficiency is viewed as one of the few strategies and tactics (Neil, 2019) used to accomplish this crucial task. Researchers claim that asset utilization, production, distribution, and inventory management are the most widely shared viewpoints of operational efficiency. According to Ndolo (2015), the main factor influencing whether a business can survive in the long run is its operational efficiency. According to Kalluru & Bhat's (2009) theories, an organization's operational efficiency is determined by its capacity to reduce undesirable factors and enhance asset capacities to provide clients with high-quality goods and services. A company's operational efficiency is influenced by a variety of factors, including skilled and capable employees, governance framework, and supply chain management, among many others.

To effectively respond to constantly changing market dynamics in a more cost-effective manner, operational efficiency is typically achieved through streamlining the center operations of businesses. In other words, businesses can increase operational efficiency by reducing repetition and waste, harnessing the resources that ultimately lead to their success, and making the most of their staff, innovation, and company operations. Operational efficiency reduces internal expenses, which helps businesses compete more successfully in fiercely competitive markets and achieve better profit margins.

Service Quality

Service Quality is the combination of two distinct words: "service" and "quality". "Any activity or benefit that one party can offer to another that is basically intangible and does not result in the ownership of anything" is what is meant by "service". Quality is now seen to be a tactical instrument for improving operational effectiveness and corporate performance. Service quality is the capacity of a service provider to

efficiently please customers to enhance business performance. Quality is a crucial component for corporate success in the service industry as well. The favourable correlation between it and earnings, a larger market share, and customer happiness has been realized. According to Reeves and Bednar (1994), there is no one, concise, or comprehensive definition or model of quality. However, the traditional idea that quality is determined by the customer's opinion of the service's perfection is the definition that is used the most frequently (Parasuraman et al., 1985). Therefore, the difference between what customers expect from their service and how they experience it is what is meant by "service quality." This definition is based on the presumption that customers judge the quality of a service based on how well it performed for them. Therefore, the view of the client determines how well a business provides services. This strategy for service quality is embraced by many studies. According to Grönroos (1988), service quality is typically characterized as a difference between the level of service that an organization provides and the level of service that its customers anticipate. In Lewis (1994), a consumer's assessment of perceived service quality is determined by contrasting their expectations for the quality of the service with how they believe it performed. According to Parasuraman et al. (1988), service quality is conceptually described as a general opinion or attitude about the general quality or superiority of the service.

Empirical Review

Irenaeus, Ikechukwu, and Ndubuisi, (2021) investigated competitive intelligence and organizational performance in small and medium enterprises in South-East Nigeria. In this study, a survey research design was used. For the study, 9731 registered small and medium-sized business (SME) owners in Nigeria's five south-eastern states were used. Using the Freund and Williams statistical procedure for estimating sample size, the population was sampled down to 328 people. To disperse the sample size among the five south-eastern states of Nigeria, Bowley's proportional allocation formula was used. Using the Pearson product moment correlation coefficient, the hypotheses were tested. According to the study's findings, technological intelligence and return on investment in SMEs in south-eastern Nigeria have a substantial positive association. It was determined that organizational performance in SMEs in south-eastern Nigeria had a favourable link with competitive intelligence. The study advocated, among other things, that companies, even SMEs, teach in all of their employees the fundamental values of comprehending and meeting consumer wants as well as the necessity of consistently looking for new business prospects.

Lateef, and Keikhosrokiani, (2022) studied the predicting critical success factors of business intelligence implementation for improving SMEs' performances: a case study of Lagos State, Nigeria. A sample size of 165 respondents from the workforce of SMEs who deployed business intelligence tools was used in the quantitative research approach. The acquired data were examined using structural equation modeling with partial least squares. According to the study's findings, business intelligence adoption in SMEs is impacted by several critical success factor elements, including knowledge management, technology orientation, market intelligence, and entrepreneurial orientation. The other variables, including organizational resources, management style, and organizational culture, were shown to have no bearing on how well business intelligence was implemented in SMEs. The major success elements for the adoption of business intelligence, which influence company outcomes, are well understood by this study. The results of this study will help business owners and academics build

business intelligence systems that can increase organizational efficiency generally in a dynamic business environment. Successful business intelligence deployment will improve decision-making, spur business growth, encourage innovation in fields like fintech, and boost output and performance of companies.

Nithya, and Kiruthika, (2021) ascertained the impact of business intelligence adoption on performance of banks and in the study, the author attempted to add value to the existing views on business intelligence adoption (BIA) by developing a conceptual framework to quantify the influence of BI adoption on bank performance. The literature review methodology was also used to identify the clear gap in the field of BIA. The study also included Customer Relationship Management as a moderating variable of the proposed framework in place of the modern banks' substantial customer base. This would sharpen the focus of BIA in respect to all the incorporated variables, enabling a bank to set policies based on the studied variables' discovered relationships. To conceptualize a model that may be used in the future to monitor the influence of BIA on bank performance under the jurisdiction of customer relationship management, the literature on all the variables was reviewed, and the research gap was found.

3.0 Methodology

A cross-sectional survey was adopted in this inquiry as its research design to access the research materials at a certain moment. The population covered 75 employees of four major telecommunications companies in Port Harcourt, namely MTN, Globacom, Airtel, and 9Mobile. A sample size of 63 employees were drawn from the population using the Krejcie and Morgan (1970) table. The stratified sampling technique was adopted, and copies of questionnaire were administered in gathering data from the respondents. Business intelligence was measured using reporting intelligence business systems and monitoring intelligence business system. 5 items were used in measuring each of the dimensions. The criterion variable (service delivery performance) was measured using operational efficiency and service quality and 5 items each were used in measuring each of the variables. All the items were rated on a 4-point Likert scale, with 1 indicating strong disagreement, 2 indicating disagreement, 3 indicating agreement and 4 indicating strong agreement. Statistical Package for Social Sciences (SPSS) version 21 aided the analyses of the bivariate hypotheses using the Spearman Rank Order Correlation to ascertain the relationship between the variables.

Table 1: Validity Test

	Average Variance Extracted	Monitoring Intelligence Business System	Operational Efficiency	Reporting Intelligence Business Systems	Service Quality
Monitoring Intelligence Business System	0.517	0.719	-	-	-
Operational Efficiency	0.565	0.401	0.752	-	-
Reporting Intelligence Business Systems	0.560	0.298	0.238	0.748	-
Service Quality	0.513	0.304	0.247	0.309	0.716

The average variance extracted (AVE) of all the constructs are greater than 0.5 which signifies the presence of convergent validity. The diagonal values (in bold) are greater than the AVEs, thus confirming that each construct is distinct from any other one. Therefore, the model endorsed discriminant validity for all the constructs.

Table 2: Reliability Test

	Cronbach's alpha	Composite reliability
Reporting intelligence business systems	0.797	0.811
Monitoring intelligence business system	0.771	0.824
Operational efficiency	0.718	0.815
Service quality	0.731	0.819

The Cronbach's Alpha reliability and Composite reliability values for each of the constructs were greater than 0.7. Therefore, our constructs are reliable.

4.0 Result and Discussion

Testing of Hypotheses

In this study, a total of two hypotheses were proposed earlier and tested statistically with Spearman's Rank Correlation Coefficient.

Hypothesis One

HO₄: There is no significant relationship between monitoring intelligence business system and service quality of telecommunication firms in Port Harcourt.

Table 1: Reporting intelligence business systems and operational efficiency

			Reporting Intelligence Business Systems	Operational Efficiency
Spearman's rho	Reporting Intelligence Business Systems	Correlation Coefficient	1.000	.893
		Sig. (2-tailed)	.	.000
		N	63	63
	Operational Efficiency	Correlation Coefficient	.893	1.000
		Sig. (2-tailed)	.000	.
		N	63	63

** . Correlation is significant at the 0.05 level (2-tailed).

Source: Field Survey Data, 2023, SPSS 23 Output.

Decision: From Table 1, the Spearman Rank Correlation Coefficient is 0.893 while the p value is 0.000. This shows that there exists a strong and positive relationship between reporting intelligence business systems and operational efficiency of telecommunication firms in Port Harcourt.

Hypothesis 2

Table 2: Reporting intelligence business systems and service quality

			Reporting Intelligence Business Systems	Service Quality
Spearman's rho	Reporting Intelligence Business Systems	Correlation Coefficient	1.000	.613
		Sig. (2-tailed)	.	.000
		N	63	63
	Service Quality	Correlation Coefficient	.613	1.000
		Sig. (2-tailed)	.000	.
		N	63	63

** . Correlation is significant at the 0.05 level (2-tailed).

Source: Field Survey Data, 2023, SPSS 23 Output.

Decision: From Table 2, the Spearman Rank Correlation Coefficient is 0.613 while the p value is 0.000. This shows that there exists a strong and positive relationship between reporting intelligence business systems and service quality of telecommunication firms in Port Harcourt.

Hypothesis 3

Table 3: Correlation Analysis Showing the Relationship between monitoring intelligence business system and operational efficiency

Correlations

			Monitoring Intelligence Business System	Operational Efficiency
Spearman's rho	Monitoring Intelligence Business System	Correlation Coefficient	1.000	.856*
		Sig. (2-tailed)	.	.000
		N	63	63
	Operational Efficiency	Correlation Coefficient	.856*	1.000
		Sig. (2-tailed)	.000	.
		N	63	63

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Field Survey Data, 2023, SPSS 23 Output.

Decision: Table 3 above reveals a Spearman Rank Correlation Coefficient of 0.856 and probability value of 0.000. This result indicates that there is a strong and positive relationship between monitoring intelligence business system and operational efficiency of telecommunication firms in Port Harcourt.

Hypothesis 4

Table 4: Correlation Analysis Showing the Relationship between monitoring intelligence business system and service quality
Correlations

		Monitoring Intelligence Business System	Service Quality
Spearman's rho	Monitoring Intelligence Business System	1.000	.337*
	Correlation Coefficient		.001
	Sig. (2-tailed)		63
	N	63	63
	Service Quality	.337*	1.000
	Correlation Coefficient	.001	
	Sig. (2-tailed)		
	N	63	63

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Field Survey Data, 2023, SPSS 23 Output.

Decision: Table 2 above reveals a Spearman Rank Correlation Coefficient of 0.337 and probability value of 0.001. This result indicates that there is a strong and positive relationship between monitoring intelligence business system and service quality of telecommunication firms in Port Harcourt.

Discussions of Findings

The first and second hypothesis (H₀₁) looked at the connection between reporting intelligence business systems and the measures of service delivery performance at Port Harcourt telecom companies. The statement was put to the test utilizing analysis tools for the Spearman Rank Correlation Coefficient, and the results showed a significant relationship between reporting intelligence business systems with operational efficiency and service quality with a rho value of 0.893 and 0.613 respectively. This portrayed that enhancing reporting intelligence business systems will help boost the wellbeing of the organization in terms of improving their service quality performance. Drawing from the outcome of the analysis of hypotheses 3 and 4, it was observed that monitoring intelligence business system relates significantly with operational efficiency with a rho value of 0.856 which indicated a high correlation among the variables. Furthermore, monitoring intelligence business system relates significantly with service quality with a rho value of 0.337. the null hypotheses were rejected, and the alternate hypothesis were accepted. These results support those made by Nithya, and Kiruthika, (2021) which observed that business intelligence adoption does impact on the performance of banks. It also aligns with the work of Lateef, and Keikhosrokiani, (2022) where they maintained that business intelligence implementation improves SMEs' performance outcomes.

5.0 Conclusion and Recommendations

Business intelligence systems have a transformative impact on service delivery performance in telecommunication firms. They optimize resource allocation, enhance

customer satisfaction, enable real-time decision-making, and foster a proactive approach to service level management. With a robust Business intelligence system in place, telecommunication companies can adapt to dynamic market conditions, improve operational efficiency, and position themselves as industry leaders in delivering high-quality services to their customers. Based on the above findings and conclusions, this research recommends that:

- i. Telecommunication firms should create a clear and well-defined business intelligence strategy aligned with their business goals and objectives. This strategy should clearly outline the key areas where business intelligence can add value. Documentation of service catalogues, service level agreements, showcasing the data sources, the desired analytics capabilities, and the expected outcomes. Having a well-defined strategy ensures that business intelligence initiatives are focused, measurable and can deliver tangible results with more room for continuous improvement.
- ii. The telecommunication should ensure that they maintain proper company record and make optimal use of relevant information that can help them enhance their operational efficiency.
- iii. Telecommunication firms should invest in real-time data quality and governance as high-quality data is crucial to the success of business intelligence system. They should invest in governance initiatives to ensure that data from various reporting and monitoring sources are accurate, consistent, reliable and has capacity to improve user experience and boost customer satisfaction. Establishing a data governance policies and practices will help maintain data integrity and enhance service improvement.

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