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User's Capabilities In Business Intelligence And Performance Of Mobile Service Providers In Kenya

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Abstract
The mobile service providers play a critical role in the knowledge-led service enterprises though faced with unstable trends in their growth. The Quality-of-Service (QoS) report by the Communication Authority of Kenya indicated that all the mobile service providers have been fined by their regulator for failing to achieve the 80 percent minimum threshold set for compliance since the year 2014. Generating and diffusing new knowledge through innovation activities based on the use of Business Intelligence (BI) can boost performance. This study investigated how BI users' capabilities influenced the performance of mobile service providers in Kenya in terms of level of skills, ability to utilize data, willingness to optimize BI and level of integrity of the BI users The study was anchored on Technology-Organization-Environment framework and Technology Acceptance model. The study adopted an explanatory non-experimental design research targeting Safaricom limited, Telkom and Airtel. Secondary panel data for the period 2010-2019 was collected after which descriptive statistics and panel regressionwere carried out. The study findings established that user's capability had significant influence on performance of mobile service providers in Kenya. The study recommended that usefulness and ease-of-use of BI capabilities should be carefully considered by the management of any organization.

Key words*: Business Intelligence, Quality of service (Qos) standards, Average Revenue per User (ARPU), Users' Capabilities, Mobile service providers*

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I. Introduction

Research has established that the mobile service providers are the main growth pillar for other sectors of the economy as well as a major enabler to the enterprise growth of regions (Venkatram & Zhu, 2012). The economic growth of a country is enhanced through adoption of mobile service providers by connecting not only the international financial market but also the domestic financial market and commodity market. Badra*n et al*., (2012) postulated that for a majority of new frontiers, mobile service providers are key sources of revenue for national treasury. Considering the telephone density and its effect on the business environment, International Finance Corporation and World Bank, (2013) reported that as the world wide telephone density (density of telephone users) grows by 10 percent, the global gross domestic product (GDP) should go up by 6 percent.

Shollo and Constantiou (2013), asserted that for an organization to develop competitive advantage in business environment, the accessibility of reliable and adequate information in a timely manner is paramount. In the contemporary knowledge-based economy, innovation activities, which generate and diffuse new knowledge, have become major research topics (Karlsson, 2014). This cannot be achieved without use of current Business Intelligence (BI), ICT and digital networks. Business Intelligence is a combination of methods and concept geared to enhancing decision making in the business to arrive at a fact based support system for the firm (Irtaimeh et al., 2016).

BI applications (Olaru, 2014) play a significant role in the mobile service providers due to the availability of large volume of data and the rigorous competition in the industry. Globally, mobile network technology has progressively spread worldwide positively impacting lives. Despite the tremendous growth, the mobile service providers still face challenges. There is a shortage of growth in traditional mobile services in developed countries. As of 2017, 2.3 billion people in developing countries did not use mobile services and 3.9

billion did not have access to the mobile internet (Kenney & Pon, 2011). Emerging markets are also witnessing decreasing growth rates and lower voice ARPU (Average Revenue per User).

Meanwhile, India boasts of being the second-largest market for Telecommunications products globally, with around 1.19 billion members on the close of September 2018. African mobile telecoms have witnessed massive growth over the last decade; subscriptions in terms of Compound Annual Growth Rate (CAGR) reached 3.3 percent during 2012-14 and 4.2 percent 2015-17 (Deloitte & Touche, 2014). Large countries with high subscription growth or comparatively higher Average Return per User (ARPU) levels continue to be viewed as high-growth markets. In much of Africa, there is evidence of limited network penetration and access coverage remains a major block for universal mobile internet acceptance. In Kenya, mobile broadband access has had a penetration rising to 12.7 million in 2016 from 7.2 million in 2015. The mobile firms offer vast possibilities for investments and possible partnerships (Maitai & Omwenga, 2016). The Kenyan administration has made it a universal right to access ICT which is a major objective of Kenya's Vision 2030 which is aimed at propelling Kenya from a least developed nation to a middle-income country.

The mobile mass telephony valued service providers in Kenya is comprised of three firms; Safaricom Limited, Airtel Networks Kenya and Telkom Kenya Ltd. These firms offer a wide range of services which include voice, data, cloud computing, mobile money transfer and mobile money banking. Safaricom Kenya Limited has the largest market share in an intensively competitive market of 71 percent as at December 2017. The second largest operator by market share is Airtel at 15 percent. This is closely followed by Telkom with a market share of 9 percent. (www.ca.go.ke). Most organizations do not have the skills and organizational commitment for managing, implementing and supporting significant cross-functional BI projects. The firm's knowledge of where key complementary skills are located, specially without the firm is an important requirement for this case: "the kind of skill set of who understands what, who may assist with your issue, or who may be able to utilize new data" (Jayawardhana & Weerawardena,2014).

According to the Kenya Economic report (2017), the ICT sector, in which the mobile service providers are the main players, was the lowest contributor in terms of GDP rating at 6.1 percent by end of 2017, failing to achieve the set target of 8 percent as per the second medium term plan of vision 2030, (Kenya Economic Outlook 2017), (http://www.kippra.org,). In addition, the Communications Authority of Kenya has penalized the mobile market players since 2014 for failing to achieve the 80 percent minimum threshold set for compliance thus failing to adhere to the standard procedures (CAK, 2017), (Www.coastweek.com). Further, the market performance in the internet and mobile service providers fail to indicate stable trends in their growth (Communications Authority of Kenya, 2018). This is a clear indication that the mobile service providers are not performing as expected by their regulator and in the set standards of the Vision 2030.

The Firm's focus should be directed to BI user's capability which extends to competence and provision of insights by applying data management, infrastructure and people capability to grow the enterprise into a great force. Caseiro and Coelho, (2018) revealed that learning happens when individuals share their information, data, and information. Njuru, Julius (2015), found out that although many managers knew of existence of BI systems at their companies, they did not know of their capabilities. In this consideration of the outcome, the current study sought to investigate the influence of BI Users' Capabilities on performance of mobile service providers. Njenga, Wanja, Mohamed and Angaga, (2012), in their study to investigate the application of data mining in the Telecommunications industry in Kenya, recommended that relevant staff in these firms should be further trained on the concept of data mining and application of business intelligence, in order to enhance the adoption of the right data mining methodologies, coupled with allocation of additional resources to this effort. The reviewed studies showed that previous studies have focused on different measures of performance of mobile service providers and also failed to analyze the effect user's capabilities on performance.

1.1 Statement of the Problem

According to the Kenya Economic report (2017), the ICT sector, in which the mobile service providers are the main players, was the lowest contributor in terms of GDP rating at 6.1 percent by end of 2017, failing to achieve the set target of 8 percent as per the second medium term plan of vision 2030, (Kenya Economic Outlook 2017), (http://www.kippra.org,). In addition, the Communications Authority of Kenya has penalized the mobile market players since 2014 for failing to achieve the 80 percent minimum threshold set for compliance thus failing to adhere to the standard procedures (CAK, 2017), (Www.coastweek.com). Further, the market performance in the internet and mobile service providers fail to indicate stable trends in their growth (Communications Authority of Kenya, 2018). This is a clear indication that the mobile service providers are not performing as expected by their regulator and in the set standards of the Vision 2030.

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II. Literature Review

2.1 Theoretical Foundation.

Two theories underpinned this study: The Technology Acceptance Model (TAM) and the Technology-Organization-Environment (TOE). The Technology Acceptance Model (TAM) was authored by Davis in 1989 andaims at explaining the behavior of ICT usage. The TAM prediction of the user acceptance of any technology is based on perceived usefulness and perceived ease-of-use. Inside the TAM, the Perceived Usefulness (U) is characterized as the degree to which a given client accepts that utilizing a framework will upgrade his/her exhibition. On the other hand, Perceived Ease-of-Use (EOU), is defined as the extent to which a given user believes that by using a given system, his/her efforts will be reduced (Davis, 1989). Both the perceived usefulness and the perceived ease of use are based on the perceptions of the user's belief about the system. According to the TAM, Perceived Usefulness (U) and Perceived Ease of Use (EOU) impacts significantly on a user's attitude towards the use of a system. The perceived ease of use is highly related to the training and skills that the employees possess. The mobile service providers should train their staffs on the implementation of the systems to enable them apply the technology effectively and efficiently.

The Technology-Organization-Environment (TOE) structure is the second theory that informed this study because it recommends that the mechanical setting, authoritative setting, and condition setting are three significant components that impact the procedure by which associations receive and execute developments (Tornatzky and Fleischer 1990). The Technological setting identifies with the advances accessible to the association and portrays both the current advances being used and the new innovations important to the firm. The authoritative setting portrays the hierarchical structures and procedures that can encourage or compel development reception and utilization. It alludes to hierarchical attributes, for example, extension, size, and the measure of slack assets accessible inside. The ecological setting envelops outer components including industry/administrative conditions that may impact innovation reception. It incorporates the field where the firm directs its business, rivals, Government and so forth. These three settings present limitations and open doors for mechanical development (Tornatzky and Fleischer, 1990).

Since BI usage possesses specific characteristics in three contexts that necessitate examination, integrating TOE framework into this study guided the research. First, the unique technological characteristics possessed by BI implementations can significantly influence their usage. As BI outputs rely on quality input data, the motivation to use BI depends on the output and this output is in turn dictated by the back-end IT infrastructure that supports quality data creation. Second, prior research suggests that capital intensive investments like BI need some critical mass as is available in large organizations and hence studying organizational characteristics is required. Thirdly, the BI can effectively position the firms to react to marketplace changes, studying the influence of market characteristics like environment dynamism and if they motivate BI usage are vital areas to examine.

2.1 Empirical Literature Review

Fletcher, (2008) opines that Business Intelligence system technology allows the users to respond quickly and understand complex information to make better and faster decisions to realize business goals. BI can possibly convey esteem if the clients are equipped for using data picked up and transform them into sound business choices. The clients must have inside and out aptitudes of business procedures and activities so as to follow up on the aftereffects of the investigator. Numerous purchasers essentially don't have time, tendency or expected information to employments of the BI frameworks. Along these lines, quality clients with various arrangement of abilities, for example, specialized, business and scientifically are required so as to perform essential errand.

Njenga, Wanja, Mohamed and Angaga, (2012) carried out a study to investigate the application of data mining in the Telecommunications industry in Kenya. Specifically, the researchers sought to determine the level of awareness of the concept of data mining, and if the firms were applying data mining in the traditional application areas of network management, sales and CRM, fraud detection, and, as identified in literature. They surveyed all the four firms in the industry. The study established that though data mining is a new concept, all the firms were aware of it, and that they had recently carried out a data mining exercise. They all indicated that they applied the knowledge gained, and that they improved the processes and techniques of data mining in subsequent exercises. The study produced useful insights into the current appreciation and utilization of business analytics in the firms in the Kenyan mobile industry, with the research data pointing to these firms as being classified in Stage 4 of Davenport's stages of analytical competition among organizations: they have the vision of data mining, and are close to achieving it, they are competing on the basis of analytics, but also on the basis of other factors. They recommended that relevant staff in these firms should be further trained on the concept of data mining and application of business intelligence, in order to enhance the adoption of the right data mining methodologies, coupled with allocation of additional resources to this effort. The current study tested the effect of level of skills and integrity and how they influence users' capabilities of BI tools on the performance of mobile service providers in Kenya.

Gaardboe *et al.,* (2017) empirically tested the DeLone and McLean's IS Success Model on a Business Intelligence System applied to human services data Systems at 12 open clinics in Denmark. The reason for the examination is to explore which variables add to BI Success. A sum of 1351 end-clients answered to the poll, and the reaction rate was 32 percent. Eight connections in the model were tried, and four connections were seen as huge. No huge relationship was found between Information Quality and Use (H1) in either Model 1 or Model 2. This demonstrates higher Information Quality doesn't naturally prompt more prominent utilization of BI. There is a positive and huge connection between System Quality and Use of the System (H3). In this manner, if the BI framework is anything but difficult to utilize and simple to learn, workers will utilize it more. With respect to System Quality, the thing 'The data in BI is straightforward' was appraised most noteworthy by the clients. The clients found that the framework was anything but difficult to utilize, and in last spot, it was anything but difficult to learn. Framework Quality is emphatically and fundamentally connected with Use and User Satisfaction. In this study, the expertise of users was explored as a measure of BI users' capability in relation to the performance of mobile service providers in Kenya.

Njiraini, Gachanja and Omolo, (2018) used a Probit econometric model to analyze factors that affect Micro and Small Enterprises (MSEs) decision to innovate or not. Stratified sampling techniques were used to collect data. The information was broadly delegate as the review utilized the Kenya National Bureau of Statistics (KNBS) 2012 Census of Business Enterprises. The KNBS Census had 6147 firms that had in excess of five representatives and another 3717 firms with five or less workers. Further than the complete firms in the Census, the review met 720 firms with in excess of five representatives and another 360 firms with five or less workers. The review's unit of study was the physical foundation where the venture administrators were met. Results from the examination show that the normal number of long stretches of instruction for a generation laborer, physical capital force, age of a MSE, access to back and measure of a MSE are significant components impacting MSEs advancement choices. Higher outside possession and chief's experience were found to go about as deterrents towards MSEs' choice to enhance. In view of the discoveries study obviously human capital information and a MSE's asset blessing emphatically impact MSEs imaginativeness. From a hypothetical point of view, there is requirement for aptitudes division to separate human capital abilities that are generally significant for invigorating MSEs imaginative exercises. The current study explored skills and more dimensions of users' capability and their influence on performance within the mobile service providers in Kenya.

Caseiro and Coelho, (2018) proposed a model to research the immediate impacts of Business Intelligence (BI) on execution, and the aberrant impacts, through system learning (NL) and inventiveness (INNOV). The examination depended on an example of 228 new companies from various European nations. The specialists investigated the proposed connections utilizing Structural Equation Modeling. The consequences of this investigation indicated constructive outcomes among the various factors and presumed that Business Intelligence limits affect arrange learning, ingenuity and execution. Learning happens when individuals share their information, data, and information. From these discoveries, it tends to be contended that some consideration must be made to the business knowledge limits in new companies, given the effect it can have on firm execution. Likewise, the system learning impact through BI is huge and presents a positive impact in execution. As new companies for the most part are battling with absence of assets and the group faces numerous consideration requests it appears that proposing business insight rehearses is another test to survived, however as data is a secret weapon for better basic leadership it can result. This study explored learning as an indicator of users' capability in influencing the performance of mobile service providers in Kenya.

These studies confirm existence of an empirical gap in the field of BI user's capability and firm performance. This study therefore sought to advance the existing literature by investigating the effect of BI users' capabilities on the performance of mobile service providers in Kenya.Based on the literature reviewed, the study proposed the following hypothesis:

H_0: Users' capability has no significant effect on the performance of mobile service providers in Kenya.

III. Research Methodology

The study embraced Positivism research approach as the study is quantitative and is associated with testing of hypothesis. Positivists hold that facts do exist and can actually be measured. Explanatory non-experimental study design was used for this study where the mobile service providers were involved. An explanatory research seeks to establish causal relationship between variables and a non-experimental research is systematic empirical inquiry in which the researcher does not have direct control of independent variables because their manifestations have already occurred (Sekaran and Bougie, 2011).

An empirical model was used to test the statistical significance of the relationship involving the independent and dependent variables. A rating likert scale ranging from 1=strongly disagree to 5=strongly agree was used to measure the indicators of the independent variable (users' capability) and the dependent variable of performance of mobile service providers measured by Average revenue per user (ARPU) and Quality of Service (QoS) standards. This study focused on three mobile service providers in Kenya namely; Safaricom limited, Airtel and Telkom Kenya. This was based on the Communications Authority of Kenya (CA) list of mobile service providers within the Telecommunication industry that have been active and operational in the period under study (2010-2019) without changing ownership (CA, 2017).

The study adopted a census approach and therefore all three (3) mobile service providers were studied. Secondary data was utilized which was collected via document review from sector statistical reports from the Communication Authority of Kenya (CA); mobile service providers audited published financial statements and annual data from the Kenya National Bureau of Statistics (KNBS) for the period between 2010 and 2019. Data collected was analyzed using descriptive statistics and panel multiple regression analysis. The study ensured that ethical standards were upheld by seeking permission from the relevant authorities prior to the commencement of the study. The data collected was strictly kept private and confidential with use only for academic research, ensuring privacy of the firms from which data was collected.

IV. Results and Discussions

4.1. Descriptive Statistics Results

The study sought to establish the effect of BI user's capabilities in mobile service providers by analyzing the skills, ability to utilize data, willingness to optimize BI and level of integrity capabilities. Table 4.1 presented the descriptive results of the user's capabilities which include percentages, mean and standard deviation.

Table 4.1 Users' Capabilities in mobile service providers in Kenya

	Very Unsatisfactory	Unsatisfactory	Moderately Satisfactory	Satisfactory	Very Satisfactory	Mean	Std Dev
Skills	6.7%	20.0%	30.0%	33.3%	10.0%	3.20	1.10
Ability to Utilize Data	23.3%	3.3%	36.7%	23.3%	13.3%	3.00	1.34
Willingness to Optimize BI	13.3%	13.3%	20.0%	36.7%	16.7%	3.30	1.29
Level of Integrity	6.7%	13.3%	33.3%	16.7%	30.0%	3.50	1.25
Overall Mean score						3.31	

Source: Research Data (2020)

The results in table 4.1 showed that the level of skills of BI users in mobiles services providers were satisfactory (33.3 percent), moderately satisfactory (30.0 percent) while 20.0 percent were found to be unsatisfactory. On average, 43.3 percent of the users (33.3 percent satisfactory and 10 percent very satisfactory) had satisfactory level on the level of skills imparted on them to manage BI related activities. This percentage was slightly below half of the users which indicated low level of training and motivation towards use of BI tools. In addition, 26.7 percent were unsatisfied with the level of skills attained in using BI tools.

The study further sought to find out whether BI users had the ability to utilized data. The results showed that majority, as indicated by the mean of 3.00 had moderate ability to utilize data. It is evident that only 36.6 percent (23.3 percent satisfactory and 13.6 percent very satisfied) of the users were satisfied with the

abilities achieved in making use of data in the firms while 26.3 percent were unsatisfied. In comparison to the other indicators of users' capabilities, the ability to utilize data scored the lowest mean of 3.00 though above average. The ability of the users to utilize data was not fully developed for maximum output of the firms in the area of a Business Intelligence.

The willingness to optimize BI users' capabilities was also tested and the results indicated that the majority of the BI users were moderately willing to optimize BI capabilities as represented by the mean of 3.30. In addition, 16.7 percent of the users were very satisfied and 36.7 percent were satisfied with their willingness to optimize BI capabilities. This adds up to 53.4 percent level of satisfaction of the users which is the highest as compared to the other indicators of users' capabilities considered in the study. This percentage of the users is above average which indicated that most of the users were willing to make use of BI tools and effectively optimize BI information.

The last indicator of Users' capabilities was the level of integrity within the users. The results showed that slightly below half ,46.7 percent (16.7 percent satisfactory and 30.0 percent very satisfactory), of the users had satisfactory level of integrity while 33.3 percent were moderately satisfied with their level of integrity in the use of BI tools. A mean of 3.50 indicated that the users of BI tools had moderate level of integrity in their work output.

The overall mean of 3.31 implied that majority of the users had moderate capabilities in utilization of the business intelligence in mobile services providers in Kenya. Lack of skilled, competent and capable users limits the effective of companies in use of BI capabilities. This finding agreed with Kiron *et al.,* (2014) who highlighted that BI capability definition extends to competence and provision of insights by applying data management, infrastructure and people capability to grow the enterprise into a great force. Ross *et al*., (2013) who argued that companies focus should be directed to building a formidable capability, which yield unmatched abilities by existing competitors by empowering their user of these technologies to be able to effective use to derive value for the companies.

4.2. Inferential Statistics

Panel data analysis was conducted to examine the influence of BI user's capabilities on the performance (QoS) of the Kenyan mobile service providers. The model adopted by the study was multiple regression analysis. Hypotheses were tested at a 5 per cent significance level. Tables 4.2, 4.3 and 4.4 below presented the results.

Table 4.2: Model Summary for BI User's Capability and Performance

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
QoS	0.569	0.324	0.306	13.69

a Predictors: (Constant), BI User's Capability

The model summary results indicated that BI User's capability accounted for 32.4% of the variation in performance (QoS) (R^2= 0.324). The results established that BI User's capability was a good predictor of performance of mobile service providers in Kenya.

Table 4.3: ANOVA for BI User's Capability and Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
QoS	Regression	3409.723	1	3409.723	18.193	.000
	Residual	7121.911	38	187.419		
	Total	10531.63	39			

b Predictors: (Constant), BI User's Capability
Source: Research Data (2020)

The ANOVA results for regression models fitted for BI user's capability and performance (QoS) were all statistically significant as indicated in Table 4.3. The finding indicated that regression models were significant in predicting the influence of BI user's capability on performance of mobile service providers in Kenya (F=18.193, p=000 (QoS).

Table 4.4: Regression Coefficients for BI User's Capability and Performance

		B	Std. Error	Beta	t	Sig.
QoS	(Constant)	7.623	5.092		1.497	0.143
	BI User's Capability	7.042	1.651	0.569	4.265	0.000

Source: Research Data (2020)

The results further established that BI user's capability had a positive and significant influence on performance (QoS) (β=7.042, p=0.000). The findings indicated that an increase in BI user's capability would result to increase in performance. These implied that, an increase in user capability, increases the user's efficiency which in turn enhances higher measures in the key indicators of performance in terms of quality of services. This study finding concurs with those of Ross *et al.,* (2013) who argued that companies focus should be directed to building a formidable capability, which yield unmatched abilities by existing competitors by empowering their user of these technologies to be able to effective use to derive value for the companies.

V. Conclusion and Recommendation

The study concluded that the BI capabilities were important and that the real impact on firm performance depended on usability of the BI capabilities as indicated by the results of the correlation analysis. The firms should enhance effective training and development of the users of BI tools in order to boost the level of skills and increase the abilities to utilize BI data within the firms. The firms that invested in the right BI users' capabilities stood to benefit more than those that invested in non-consequential BI users' capabilities.

The study recommends that usefulness and ease of use of BI capabilities should be carefully evaluated by management of firms that intend to invest in BI capabilities. Failure to guarantee usefulness and ease of use of BI capabilities would result to dismal performance.

VI. Suggestions for Further Studies

A cross sectional approach was followed in this study to determine the BI users' capabilities influence on performance of mobile service providers in Kenya; future studies can adopt a longitudinal approach in order to provide a broad generalization of the results. The performance of mobile service providers might be affected by the services provided by the mobile service subscribers e.g. one service provider might offer more services than the other; a future study can focus on a comparative study to analyze if there are any differences in the BI users' capabilities between the different mobile service providers. Since level of skills has been found to be a factor influencing the performance of mobile service providers, it would be interesting to do a comparison of the type and depth of training offered by these different mobile service providers and see their impact on the performance. Further study can be conducted covering a large sample size in order to bring out more relevant and reliable results that will reflect the telecommunication industry as a whole.

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