INFLUENCE OF TECHNOLOGICAL CONTEXT ON THE GROWTH OF SAFARICOM PUBLIC LIMITED COMPANY, KENYA

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Abstract: **Safaricom Public Limited Company has embarked on the implementation of open-source technology within its information technology systems in order to facilitate advancements in the execution of its strategic initiatives. Nevertheless, open source adoption for enterprise is relatively low within its Digital IT department and therefore the company is not fully harnessing the immense benefits that come with the adoption and use of open source software. Therefore, this study sought to investigate the influence of technological context on the growth of Safaricom Public Limited Company, Kenya. A descriptive design was employed, involving 679 participants from the Digital IT department of Safaricom PLC in Nairobi, Kenya. Random sampling resulted in a final sample of 252 individuals. The process of collecting data was aided by use of a questionnaire. A pilot test with 25 questionnaires validated the tool, and those participants were excluded from the final analysis. The reliability of the questionnaire was assessed through the split-half technique, alongside evaluations for content, construct, and criterion validity to confirm the questionnaire's accuracy. The analysis of qualitative data was structured around the identification and narrative presentation of themes. To ascertain the significance of every variable, inferential statistics like multiple regressions and correlation analyses were employed. The study revealed that there exists a positive significant relationship between technological context and the growth of Safaricom Public Limited Company in Kenya. The study concludes that the rapid advancement of technology has enabled Safaricom to enhance its service delivery and operational efficiency. The study recommends that Safaricom should organize regular workshops and seminars to educate employees, developers, and stakeholders about the benefits of open-source software.**

Keywords: **Open Source Software, Technological Context, Organizational Growth.**

1. INTRODUCTION

Businesses that can quickly adapt to the changing needs of the modern world and efficiently embrace novel technologies are more inclined to achieve success (Arpaci, Yardimci, Ozkan & Turetken, 2019). According to Lakhwani, Dastane, Satar, and Johari (2020), the integration of innovative technologies empowers an entity to enhance operational efficiency, reduce expenses, elevate customer service quality, and unlock fresh avenues for expansion. Moreover, irrespective of its size, nature, or customer demographic, the adoption of technology within a business can prove pivotal for its progression. Consequently, technology has the potential to expedite processes through the introduction of more adaptable methodologies for task execution.

According to Spinellis and Giannikas (2018), the phenomenon of Open Source Software (OSS) has had a significant impact over the past ten years, extending beyond the software industry to include software-intensive public and private sector organizations. Marsan, Pare and Beaudry (2022) contend that the presence of freely accessible software facilitates

expedited technology adoption, heightened levels of innovation, and decreased expenditures and time-to-market. These prospective benefits have shaped the manner in which organizations procure software, culminating in a substantial integration of OSS products across various sectors. Consequently, OSS plays a significant role in molding the strategies through which organizations innovate and swiftly adapt to evolving market requirements.

Many governments worldwide have embraced the utilization of Open Source Software (OSS) as a crucial element of their strategic plan within the realm of information technology. This decision stems from the potential cost savings in IT investments, alongside aspirations for self-reliance, enhanced security measures, autonomy, and a mechanism to tackle issues related to intellectual property rights enforcement (Baharuddin, Izhar & Shoid, 2018). As posited by Rafiq and Ameen (2021), the integration of OSS in libraries is still in its nascent phase in Pakistan, with only a limited number of institutions taking the initial steps in this direction. The principal obstacles encountered in the implementation of Open Source Software (OSS) within libraries in Pakistan are primarily attributed to social (cultural) disparities, conceptual uncertainties, the digital divide, and shortcomings in technological, financial, and human resource development.

Since 2020, the efforts of the Turkish government have been heightened in promoting the advancement of an open source ecosystem within Turkey through the establishment of an Open Source Platform. This platform brings together approximately 100 public entities and private organizations with the objective of enhancing the adoption of open source software across the country (Yildirim & Ansal, 2021). According to Sowunmi, Misra, Fernandez-Sanz, Crawford, and Soto (2022), the incorporation and utilization of Free and Open Source Software (FOSS) within government agencies in Turkey holds significant importance. This is due to the fact that such a system offers a technically secure and reliable infrastructure, economically viable solutions, and a user-friendly technical foundation that facilitates the execution and management of various e-government initiatives at the grassroots level.

Ikram, Zhou, Shah and Liu (2019) observe that telecommunication companies in Pakistan have been able to reduce their operational costs, improve efficiency, and enhance their overall performance. Furthermore, open source software allows telecommunication companies to engage in partnerships with other entities and developers, thereby facilitating the exchange of knowledge and resources that can drive innovation and growth. According to Khan, Amin and Lambrou (2020) open source software fosters collaboration and innovation within the telecommunication industry in Pakistan. Companies can contribute to the development and improvement of the software, sharing their expertise and benefiting from the collective knowledge of the open source community. This collaborative approach encourages the exchange of ideas and solutions, leading to the creation of more robust and advanced software solutions.

Open source software offers telecommunication companies in Malaysia greater flexibility and customization options which has enabled these companies to tailor the software to meet their specific requirements and integrate it seamlessly with their existing systems thus improving their operational efficiency and deliver better services to their customers (Chin-Wei, Siong-Choy and Kuan-Yew, 2021). According to Adenle, Sowe, Parayil and Aginam (2022) the adoption of open source software has also fostered innovation within the telecommunication industry in Malaysia. Therefore, by engaging with the open source community, these organizations are capable of accessing a wealth of knowledge and expertise that can help them stay ahead of the competition and develop cutting-edge solutions for their customers.

Miscione and Johnston (2020) suggest that Open Source Software (OSS) holds significant potential for cost savings in developing economies in Africa, as well as for reducing operational expenses and automating business processes. The utilization of such software could prove particularly advantageous during the prevailing period of economic challenges experienced by numerous developing nations. Nevertheless, several African countries have lagged in the adoption of OSS, with many lacking established policies concerning its implementation. Koomson (2022) notes that akin to their counterparts in other nations, stakeholders within the Information and Communication Technology (ICT) sector in Ghana express a strong desire for the establishment of a comprehensive national open source policy framework. This interest stems from the perceived capacity of OSS to drive innovation, enhance productivity, and bolster competitiveness within the global ICT landscape. Despite efforts dating back to 2007, this aspiration remains unfulfilled.

South Africa, being the pioneering African nation to formulate a policy for the acceptance of OSS, is recognized for its progressive stance in strategizing and promoting the utilization of OSS within the public sector (Mtsweni & Biermann, 2018a). As noted by Kshetri (2022), the South African government has formally recognized OSS at a strategic level, with established policies aimed at enforcing and advocating its adoption. Nevertheless, the integration of OSS in South Africa has been sluggish or nonexistent. Hence, It is of utmost importance for the South African government to support and

enable the advancement of low-cost, minimal-infrastructure development solutions provided by open-source software to prevent repercussions like marginalizing the underprivileged and missing out on the numerous purported advantages OSS presents.

The National ICT Policy 2019 in Kenya articulates the government's objective of advancing the application of Open Source Software (OSS) within the domain of public administration. Emphasized in the Policy is the preference for OSS alternatives over proprietary formats. Despite the increasing favorability of OSS, prevailing scholarly works indicate a low rate of OSS integration in developing nations such as Kenya. Within Kenya, a predominant proportion of instances involving OSS were identified within the domain of the private sector (Dibo, 2021). As noted by Kamiru (2015), there exists a notable inclination towards the application of open source software among telecommunications corporations in Kenya, driven by key advantages including cost-effectiveness, heightened software adaptability, and the avoidance of vendor dependency. Consequently, the implementation of open source software presents a viable approach for telecommunications enterprises in managing their expenses and adapting to the competitive landscape in which they operate.

Organizational growth represents a pivotal phase in a company's development, signifying readiness for expansion and exploration of new avenues to boost revenue (Weinzimmer, Nystrom & Freeman, 2018). Taylor (2020) asserts that organizational growth is intricately linked to industry trends, business life cycle, and the owners' pursuit of enhancing equity value. Consequently, many enterprises aspire for organizational growth, irrespective of their size, aiming to fortify their resilience against market volatilities, enhance their influence, and harvest the advantages of economies of scale.

Open-source software pertains to software solutions that are accessible to the general public by the copyright holders for examination, modification, usage, and sharing at no cost (O'Mahony, 2021). As stated by Corrado (2018), open source allows organizations to tailor the technology they are putting in place to meet their unique needs. Additionally, open-source software helps in reducing expenses while enhancing the overall efficiency of the organization that utilizes them, enabling companies to attract top talent and address business challenges while also sharing maintenance costs effectively.

The technological context pertains to the technical elements associated with the technology, including its functionality and compatibility. It is crucial for organizations embracing new technology to have adequate service and support in place to gain a competitive edge (Rossi, Russo & Succi, 2018). Ajila and Wu (2021) highlight that utilizing free software may pose difficulties in accessing technical support, which is a major issue to consider. Therefore, organizations looking to implement open-source software must prioritize ensuring reliable service and support before making any commitments.

The headquarters of Kenya's publicly traded mobile network operator, Safaricom Public Limited Company (PLC), are situated at Safaricom House in Nairobi. It is recognized as one of the most profitable enterprises in East and Central Africa and is the top telecom provider in Kenya. In 2022, Safaricom market share stood at 65.35%, with its MPESA platform having 30 million active monthly customers (Safaricom PLC, 2022). Safaricom PLC is currently undergoing a digital transformation journey to cater to the digital lifestyles of its customers. This involves reevaluating and digitizing various aspects of its operations, products, and services. The organization is concentrating on the digitalization of its marketing, customer care, and sales departments, aligning them with new digital models. As a result, there is a greater emphasis on online marketing, as a significant portion of Safaricom customer base is now online. Additionally, the organization has improved its self-service platforms, including the mySafaricom App, with a user base exceeding 700,000 daily. Voice Biometrics has experienced a substantial enrollment of more than 1.5 million users, and the Chatbot has attracted 102,000 distinct users. Additionally, Safaricom has implemented sales force automation in over 200,000 outlets. These efforts have collectively led to increased efficiency within the company (Safaricom PLC, 2020).

2. STATEMENT OF THE PROBLEM

It is necessary for the telecommunications industry to keep its adaptability to keep abreast with the swift progress in technological advancements. This industry is confronted with a multitude of trends, including an increasing demand for connectivity, fierce competition, continuous security threats, relentless innovation in devices and services, shifting expectations of customers, and the necessity for cost reduction (Amah, Ogunnaike, Ayeni & Ojo, 2017). In light of these trends, Safaricom has initiated the adoption of open-source technology within its Information Technology department, aiming to enhance the execution of its strategic initiatives. Nevertheless, open source adoption and use for enterprise is relatively low within its Digital IT department and therefore the company is not harnessing the immense benefits that come through the adoption and utilization of open-source software. As an illustration, the company still uses proprietary software from major technology vendors like Oracle, Cisco, Microsoft, Huawei, and Genesys to run its core services. This

result in high licensing costs on using proprietary software, rigidity, lack of agility, the absence of innovation, coupled with insufficient security enhancements, represent among other challenges, significant obstacles.

3. LITERATURE REVIEW

Theoretical Literature Review

Technology Organization Environment Framework

Tornatzky, Tchell, and Alok (1990) created the Technology Organization Environment (TOE) framework in order to provide a thorough explanation of how innovation is implemented and its behavioral intentions within a company. Its ability to consider a variety of internal and external factors in the adoption decision-making process technologies sets it apart from other behavioral models. Three contextual groups technology, organization, and environment are used to group these factors. The firm's current technological setup and any potentially relevant new technologies are included in the technological context. The company's characteristics, pertaining to its size, scope, and resources, are the subject of the organizational context. Furthermore, the environmental context considers the wider business environment within which the firm functions, including the industry, competitors, and government regulations.

A comprehensive collection of contextual applications is encompassed within TOE. Hashimy, Jain, and Grifell-Tatjé (2023) offer a detailed examination of the adoption process of blockchain technology from various perspectives, including organizational aspects (competence and support from top management), competitive pressure, and technology (relative advantage and complexity). Using the TOE framework, Tajudeen, Jaafar, and Ainin (2018) found that the environment (such as institutional pressure), organization (such as support from top management and an entrepreneurial orientation), and technology (such as relative advantage and compatibility) each of these factors greatly influenced the utilization of social media in comprehending customer requirements and enhancing organizational communication and public relations. Moreover, Chatzoglou and Chatzoudes (2020) showed that TOE antecedents, factors such as information technology infrastructure, proficiency in internet usage, the size of the firm, and government support are the elements that drive the adoption of e-business.

The data were organized using the Technology-Organization-Environment (TOE) framework, and themes and patterns in the data were found using thematic analysis. Cost, performance, and positive attitudes were found to have a significant impact on the adoption of open source software (OSS). Businesses have examined the impact of technological, organizational, and environmental factors on Open Source Software adoption using the TOE (Technology, Organization, and Environment) framework.

Technology-Organisation-Environment (TOE) framework oncerning the deployment of open-source software for enhancing organizational development argue that it may not adequately capture the unique characteristics and challenges associated with open source software adoption (Malik, Chadhar, Vatanasakdakul & Chetty, 2021). Mudzana and Kotze (2023) observe that TOE framework primarily focuses on the technological aspects of implementation, such as the compatibility and complexity of the software, while overlooking the social and cultural factors that are crucial in open source software adoption. Open source software often requires a significant shift in organizational culture and practices, as it promotes collaboration, transparency, and community-driven development. These social and cultural aspects are not adequately addressed in the TOE framework, which may limit its applicability in the context of open source software implementation.

Because it is an essential tool for businesses aiming to incorporate open source software into their operations to enhance their growth and competitive edge, the framework is significant to the study. Through an examination of the framework's technology, organization, and environment dimensions, organizations are empowered to formulate a holistic strategy for the integration of open source software within their processes, thereby fostering innovation and success.

Empirical Literature Review

Charles (2019) investigated how technological innovation affects the expansion of organizations. The study employed survey research methodology, utilizing a questionnaire as the primary research tool alongside primary data. The subjects of the study were 137 workers from Nestle Foods Nigeria Plc. To test the four hypotheses formulated for this investigation, various statistical techniques such as Analysis of Variance (ANOVA), Pearson's Correlation, regression analysis, and correlation were employed. The study's conclusions showed that marketing aptitude and strategic planning

both individually and jointly affect organizational growth. The growth variables interact with each other in a positive manner. The study primarily focused on Nestle Foods Nigeria Plc.

Mavuti examined the case of M-Kopa, which is located in Nairobi, Kenya, in a study that was carried out in 2022 with the goal of determining the impact that IT assets have on the expansion of businesses. During the course of the study, a semi-structured questionnaire was used to collect the primary data, and a descriptive survey was used as the methodology. The semi-structured nature of the questionnaire provided a balance between flexibility and structure, allowing for in-depth responses while still maintaining a level of consistency in data collection. Additionally, the descriptive survey format allowed for the exploration of trends, patterns, and relationships within the data. The research confirmed that M-KOPA staff possessed computer skills, received thorough training, and successfully utilized the computer software to meet organizational goals. Moreover, M-KOPA employees were proficient in managing electronic procurement systems and various online applications. But the study employed a convenience sampling technique.

The impact of technological advancement on the operational performance of Kenyan telecommunications companies was investigated in a 2019 Mudogo study. The research employed a descriptive study design and utilized a structured questionnaire to survey all 26 firms within the telecommunication industry. Notably, all of these companies were headquartered in Nairobi, making the study exclusive to the city. Innovations and telecom company performance were found to have a significant positive correlation in the findings. Specifically, product innovations were found to have a greater influence compared to process innovations. Additionally, the study highlighted a lack of adequate budget allocation for training, which was deemed an essential component.

4. RESEARCH METHODOLOGY

A descriptive design was employed, involving 679 participants from the Digital IT department of Safaricom PLC in Nairobi, Kenya. Random sampling resulted in a final sample of 252 individuals. The process of collecting data was aided by use of a questionnaire. A pilot test with 25 questionnaires validated the tool, and those participants were excluded from the final analysis. The reliability of the questionnaire was assessed through the split-half technique, alongside evaluations for content, construct, and criterion validity to confirm the questionnaire's accuracy. The analysis of qualitative data was structured around the identification and narrative presentation of themes. To ascertain the significance of every variable, inferential statistics like multiple regressions and correlation analyses were employed.

5. FINDINGS

The descriptive statistics results on technological context are presented in Table 1.

Table 1: Technological Context

Statement	M	SD
Routine task automation leads to cost savings.	4.71	.707
Effective communication with customers, suppliers, and partners is enhanced.	4.41	.808
Building customer trust through security measures positively impacts business relationships.	4.73	.680
Professional software development and security measures attract customers.	4.35	.935
Usability testing improves product efficiency.	4.67	.752
Usability tests ensure that the product meets user expectations.	4.70	.689
Aggregate mean and standard deviation score	**4.59**	**.762**

The mean score was 4.59 with a standard deviation of 0.762, indicating strong consensus among participants on the positive impact of technology on Safaricom in Kenya. The high mean reflects a consensus on the critical role of technological advancements in the company's growth and success, while the low standard deviation suggests similar views among respondents. These results align with Charles (2019) research which highlighting technology's transformative effects on business operations and competitive advantage. Therefore, companies that adopt innovative technologies often see improved efficiency, customer engagement, and market share. Overall, the strong agreement on technology's impact underscores its importance as a catalyst for expansion and sustainability within the industry.

Participants in the study showed strong agreement on key factors for successful business operations, particularly in customer trust and operational efficiency. They emphasized the importance of enhancing customer trust through security protocols, reflected in a mean score of 4.73 and a standard deviation of 0.680, indicating consistent support for security measures that foster customer loyalty. Additionally, participants recognized the financial benefits of automating routine tasks, with a mean score of 4.70 and a standard deviation of 0.707, highlighting the belief that automation can streamline operations and reduce costs. The significance of usability testing in product development was also noted, with a mean score of 4.70 and a standard deviation of 0.689, indicating a consensus on its role in aligning products with user needs and improving customer satisfaction.

The study participants agreed on the importance of effective communication in enhancing relationships with stakeholders, achieving a mean score of 4.41 (SD = 0.808). This indicates that prioritizing clear communication fosters better collaboration and outcomes. Additionally, participants valued professional software development and robust security measures, with a mean score of 4.35 (SD = 0.935). This suggests that customers increasingly seek products developed with professionalism and strong security, enhancing trust and satisfaction. In summary, organizations should focus on effective communication and delivering secure, high-quality software to build successful partnerships and ensure customer loyalty in a competitive market.

Inferential Statistics Results

Table 2: Correlation Analysis

		Technological context	Growth
Technological context	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	206	
Growth	Pearson Correlation	.775**	1
	Sig. (2-tailed)	.002	
	N	206	206

The analysis showed a Pearson's correlation coefficient of 0.775 with a significance level of 0.002 in the technological context. The high Pearson r value suggests a strong relationship, indicating that as technological integration within organizations increases, so does their overall effectiveness and efficiency. These findings align with the conclusions of the study conducted by Mavuti (2022), which likewise documented a robust positive correlation between technological progress and organizational performance.

Regression Analysis

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.901	0.812	0.796	1.0012

The analysis identifies key metrics for evaluating the model's performance. The correlation coefficient (R) is 0.901, indicating a strong positive relationship between the variables. The R square value is 0.812, meaning the model explains about 81.2% of the variance in the dependent variable, reflecting a good fit. The Adjusted R square is 0.796, accounting for the number of predictors and showing that 79.6% of Safaricom Public Limited Company's growth in Kenya is influenced by technological, environmental, and organizational factors, leaving 20.4% attributed to unexamined variables.

Table 4: Analysis of Variance

Model		Sums of Square	df	Means Square	f.	Sg
1	Regressions	310.564	1	310.564	405.802	0.002
	Residual	156.123	204	1.5224		
	Total	466.687	205			

The findings presented in the ANOVA table reveal a statistically significant disparity among the groups under examination, characterized by a mean value of 310.564, an elevated F statistic of 405.802, and a minimal significance level of 0.002. Because the model is statistically significant, these results suggest that the independent variables under investigation have a significant impact on the dependent variable, necessitating additional research and analysis.

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.756	0.314		2.408	0.003
	Technological context	0.886	0.228	0.0647	3.886	0.002

The findings suggest that growth of Safaricom Public Limited Company Kenya would be 0.756 if technological context would be held constant. The regression coefficients indicate that an improvement in technological context would lead to improved growth of Safaricom Public Limited Company Kenya by 0.886. The following is the regression equation obtained.

Growth = 0.756 + 0.886(technological context).

The Beta coefficient for the technological context is recorded as 0.0647. This value indicates that for every increment of one unit in the technological context, the outcome variable is expected to increase by approximately 0.0647 units, assuming all other variables remain constant. This indicates a positive relationship, meaning that as the technological context improves or increases, the outcome variable also tends to improve. Additionally, the significance level associated with this Beta coefficient is recorded as 0.002. This value is significantly lower than 0.05, indicating statistical significance of the relationship. Mudogo's (2019) study, which found a significant positive correlation between innovation and telecommunications company performance, is in line with this conclusion.

6. CONCLUSIONS

The study recommends that Safaricom should organize regular workshops and seminars to educate employees, developers, and stakeholders about the benefits of open-source software (OSS). Highlight successful case studies and demonstrate how OSS can enhance productivity and reduce costs. Establish internship programs that allow students to work on real-world OSS projects within Safaricom, fostering hands-on experience and encouraging innovation. Ensure that open-source solutions can seamlessly integrate with existing proprietary systems. This can reduce resistance to change and facilitate smoother transitions.

7. RECOMMENDATIONS

The study recommends that Safaricom should organize regular workshops and seminars to educate employees, developers, and stakeholders about the benefits of open-source software (OSS). Highlight successful case studies and demonstrate how OSS can enhance productivity and reduce costs. Establish internship programs that allow students to work on real-world OSS projects within Safaricom, fostering hands-on experience and encouraging innovation. Ensure that open-source solutions can seamlessly integrate with existing proprietary systems. This can reduce resistance to change and facilitate smoother transitions.

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