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THE NEXUS BETWEEN TECHNOLOGICAL INITIATIVES AND OPERATIONAL PERFORMANCE OF THE SELECTED PUBLIC UNIVERSITIES IN KENYA

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ABSTRACT

Technology can enhance business operations if effectively embraced. Nonetheless, technological research within the university context is limited, indicating the necessity for a study to identify the research deficiencies. The primary aim of this study was to ascertain the correlation between technological initiatives and the operational performance of specific public universities in Kenya. The research was based on the technology acceptance theory. A total of 312 respondents were chosen from a sample frame comprising 15 public universities. A stratified random sampling method was employed to choose the respondents. The study had a sample size of 175. The participants in the study were members of the teaching staff. Structured questionnaires were used to collect primary data. We used the linear regression method to look at the data. There was a strong positive link between technological initiatives and how well certain public universities in Kenya did their jobs (B=0.229; Sig=0.012). It was determined that operational performance within the university setting can be adequately elucidated through technological initiatives. To improve the way public universities in Kenya work, they should focus on technology projects. University management must invest in technological infrastructures and train employees in soft skills to improve service delivery.

BACKGROUND

In the modern context, technology is regarded as a catalyst for competitive organisations. Organisations can navigate the unpredictable business environment only by re-evaluating technology (Ade, Namusonge & Sakwa, 2019). Technology is regarded as a determinant of operational performance within organisations (Alhadid, 2016). Technological initiatives are defined as novel techniques and processes implemented by organisations to improve efficiency and effectiveness (Guinan, Parise & Langowitz, 2019). It involves an organization's ability to create new products, invest in new equipment, train employees in computer skills, and allocate resources for research (Tallon, Queiroz, Coltman & Sharma, 2018). Operational performance refers to an organization's capacity to attain its objectives in a more efficient and effective manner (Alhadid, 2016). The ability of an organisation to effectively utilise limited resources to enhance productivity is emphasised (Nicolaou & Bhattacharya, 2014). Studies have established a correlation between technological initiatives and the operational performance of organisations.

Tallon, Queiroz, Coltman, and Sharma (2018) argue that technology can enhance operational performance in organisations when effectively adopted. The authors assert that companies can reduce operational costs by fifty percent through the adoption of assistive technologies. Conversely, Shin, Lee, Kim, and Rhim (2015) in South Korea note that assistive technologies can improve organisational productivity. The authors argue that automating processes and equipping workers with computer skills can lead to increased productivity. In Africa, researchers have identified a correlation between technology and the operational performance of organisations. Ofori (2010) argues that organisations in Ghana that adopt technology can achieve higher profits and lower production costs. This position is supported by Mannie, Niekerk, and Adendorf (2013) in South Africa, who argue that despite the challenges associated with implementing technology in organisations, it is essential for enhancing enterprise productivity. Angela (2015), along with Jebet and Rotich (2018), argue that an organization's efficiency and effectiveness are influenced by technological initiatives.

The higher education sector in Kenya comprises both private and public universities established under the Universities Act of 1986, which was revised in 2012 (Waithaka, 2012). Public universities in Kenya have consistently witnessed an increase in student enrolment across various academic programs since independence. The demand for higher education services has increased. The government has converted certain tertiary colleges into constituent universities and established quality assurance regulatory bodies, including the Commission for University Education (Commission for University Education, 2018). Despite the growing number of public universities in Kenya, service delivery within these institutions has been a persistent concern for decades, highlighting the necessity to reevaluate technological initiatives (CUE, 2018). This study defines operational performance as a function of technological initiatives when effectively implemented.

RESEARCH PROBLEM

The relationship between technological initiatives and the efficiency and effectiveness of organisations is well-

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documented (Queiroz et al., 2018 & Shin et al., 2015). Despite this, research on technological initiatives within the university context remains constrained. The failure of public universities in Kenya to meet customer expectations presents a significant concern. The management of student information presents a significant concern within public universities, highlighting the necessity for these institutions to reevaluate their technological initiatives (Doz and Kosonen, 2010). Researchers have revealed contentious findings regarding the relationship between technological initiatives and operational performance (Kale, Aknar & Başar, 2019; Kumkale, 2016; Murugi, 2015; Shisia, Sang; Matoke, Omwario, 2014; Ogolla, 2020; Wangasa, 2018; Rotich & Chebet, 2018). The studies revealed both positive and negative results, highlighting the necessity for the current study to clarify the existing controversies. Similarly, several studies have explored both direct and indirect relationships, highlighting the necessity for the current study to investigate the direct connection between technological initiatives and operational performance.Given that the studies implemented various metrics to operationalise the constructs of this research, it was essential to apply dynamic capability theory and technology acceptance theory to elucidate operational performance within the university setting. Moreover, the studies were limited to various contexts and employed distinct methodologies, which presents challenges in generalising the findings within the university setting. The current study aimed to identify and analyse the conceptual, theoretical, and methodological research gaps present in previous studies, focussing specifically on the impact of technological initiatives on the operational performance of selected public universities in Kenya.

THEORETICAL REVIEW

This study was informed by dynamic capability and technology acceptance theories. Theory of dynamic capabilities was formulated by Teece (1997), whereas the technology acceptance theory was initiated by Davis (1989). The dynamic capability theory posits that organisations in a fluctuating business environment must continually adjust their plans to match with evolving market trends. To ensure strategic survival, organisations must implement suitable technology to improve their competitiveness. Organisations can only compete effectively in the global business environment with transformative leadership, technology, and knowledge management. Conversely, technology acceptance theory posits that organisations can only improve efficiency and effectiveness if the technology is totally embraced by employees. The resistance of employees to adopt suitable technology renders organisations reactive to risks and opportunities, resulting in stasis in change management. This study utilised dynamic capability theory and technology acceptance theory, positing that universities can only improve operational performance by adopting technological initiatives, including library automation, website development, and staff training in computer skills. Given that change is a perpetual aspect of the business landscape, colleges can only handle it effectively by adopting ICT infrastructure and service delivery methods.

EMPIRICAL REVIEW

Technological initiatives refer to novel insights, methods, processes, and techniques that organisations adopt to attain both short-term and long-term objectives (Guinan, Parise & Langowitz, 2019). Technology is regarded as a catalyst for organisational performance when effectively adopted (Guinan, Parise & Langowitz, 2019). The effective use of technology in organisations can lead to reduced operational costs, enhanced service delivery, and increased employee motivation (Kwamboka 2016). Organisations that implement suitable technology are likely to see a decrease in operational costs (Mulinge, 2014), enhanced customer service reliability (Mulinge, 2014), and an increase in profits (Mueni, 2014). Shisia et al. (2014) examined strategic innovation within public universities. The regression analysis indicated that the performance of public universities in Kenya is contingent upon technological initiatives. A positive correlation exists between technological initiatives and the performance of public universities in Kenya; however, the mechanisms through which these initiatives influence operational performance in this context remain poorly understood. Similarly, it has been noted that the majority of studies have focused on commercial banks (Mulinge, 2014) and the manufacturing sector (Yusufu, 2013).

Guyo (2014) examined the relationship between technology and the performance of commercial banks. A statistically significant relationship was identified between technology and the operational performance of commercial banks through the regression method. The study focused on technology as an isolated variable, failing to illustrate how its interaction with other variables can impact the operational performance of commercial banks. Additionally, it is observed that the context of the previous study involved commercial banks, which differs from the context of this study. The study's findings are inconclusive due to contextual gaps, indicating a necessity for further research to address these knowledge deficiencies. A sample of 384 respondents was utilised, employing stratified random sampling and regression analysis, which revealed a significant statistical relationship between innovation and organisational performance. Process innovations, along with product and market developments, positively influenced the performance of public sector entities (Wangira, 2018). In contrast to the present study, various theories including innovation theory, the innovation cycle model, the innovation-decision process theory, the theory of disruptive innovation, and both technology push and market pull theories were employed to guide the research, thereby limiting the generalisability of the findings in the current study. The present study will draw upon transformational leadership theory, technology acceptance theory, and knowledge-based theory to address existing theoretical knowledge gaps.

CONCEPTUAL MODEL

Figure 1 depicts a conceptual framework that shows the direct link between the predictor variable (technological initiatives) and dependent variable (operational performance). The predictor variable (technological initiatives) is measured using selected indicators such as website functionality, library automation and staff computer literacy while The dependent variable (operational performance) is evaluated using selected

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parameters such as revenue maximization, product/service cost and customer satisfaction.

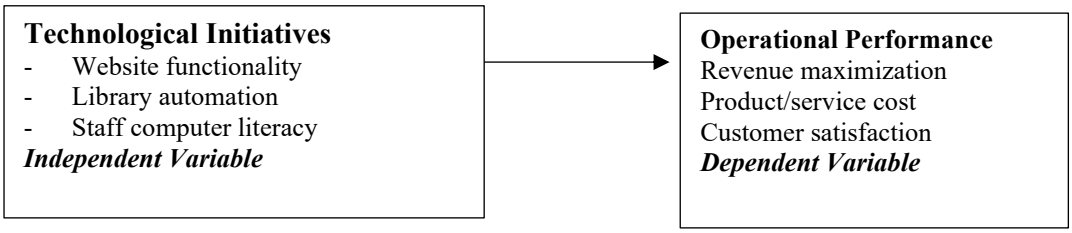


Figure 2.1: Conceptual Framework

METHODOLOGY

A descriptive research design was employed as it allows researchers to uncover new knowledge, thereby facilitating the prediction and control of phenomena.

A total of 31 public universities were utilised in the study. Due to the extensive number of public universities, a selection of 15 public universities was made to establish the sampling frame from which the study's respondents were drawn. The respondents were sourced from the university's teaching staff. The respondents were sourced from 15 public universities in Kenya that have been operational for over 15 years. The 15 public universities are anticipated to adopt strategic agility practices to improve operational performance.This study will involve a total of 312 respondents. The participants in the study were university lecturers possessing over 10 years of teaching experience within the school of business. Lecturers in the School of Business were deemed suitable due to their expertise in strategic agility practices. The respondents included lecturers, senior lecturers, associate professors, and professors. A stratified random sampling technique was employed to select participants from a total population of 312 respondents. The optimal sample size of 175 respondents for this study was determined using the formula proposed by Israel (2009), expressed as: $n = N / (1 + N(e)^2)$.

Primary data were collected through structured questionnaires that included both open and closed-ended questions. A pilot sample comprising 10% of the total population was conducted; however, this piloted sample was excluded from the final sample, as recommended by Fisher (2010). The face and content validity of the research instrument were assessed using scholars from public university administrations.Cronbach's Alpha coefficients were employed to assess the reliability of the items in the research instrument. Variables were considered reliable if their Alpha values exceeded 0.7, while those with Alpha values below 0.7 were classified as unreliable (Mertler & Vannatta, 2010). Statistical analysis, both descriptive and inferential, was performed. Descriptive statistics, including mean scores, percentages, frequency distribution tables, and standard deviations, were employed for the fundamental characterisation of the data. Diagnostic tests, including assessments of normality, linearity, homogeneity, and multicollinearity, were performed to validate the assumptions of the statistical data. A linear regression method was employed to determine the statistical relationship between the variables. R-square, F-Tests, and T-Tests were employed to assess the statistical significance between the predictor variables (technological initiatives) and the dependent variable (operational performance of selected public universities in Kenya). The analyzed data was presented in form of Tables and Figures. The regression model was of the form: $\mathbf{Y= \beta o+\beta_1 X_1 + \varepsilon}$

Where;

Y= Operational performance of selected public universities in Kenya

β_0= Y-intercept

β_1 = regression coefficient

X_1 = Technological Initiatives

ε= Other factors not included in the model (Error Term)

RESEARCH RESULTS

Table 1: Technological Initiatives

Technological Initiatives	N	Mean Score	Standard Deviation	CV (%)
I interact with the university website regularly	175	3.79	.622	16.4
My university has a user-friendly website	175	2.74	.751	20.1
My university has a student database	175	3.54	.854	24.1
My university has a fully-automated library	175	2.51	.790	22.5
My university has invested in ICT tools such as desktops and projectors in computer labs	175	1.51	.854	24.3
I teach using ICT tools such as laptops and projectors	175	2.49	.790	22.5
My university has a staff biometric system	175	2.36	.811	24.1
My university develops new academic programs periodically	175	1.36	.731	14.1
Grand Mean Scores		**2.413**	**6.203**	**21.013**

Source: Research Data (2025)

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Table 1 results indicate that generally majority of the respondents disagreed with most of the parameters of technological initiatives in public universities in relation to operational performance with an aggregate mean of 2.41 and coefficient of variation (CV) =21.01%. The results of 2 of the 8 items of the technological initiatives reveals an aggregate mean score above 3.00. The statement 'I interact with the university website regularly' was highly rated with a mean score of 3.79 (Std. Dev = 0.622, CV = 16.4%) while the statement 'my university has a student database' was rated with a mean score of 3.54 (Std. Dev = 0.854, CV = 24.1%).

These findings imply that public universities adopted technological initiatives to a moderate extent. Further, the results of the 6 of the 8 items of the technological initiatives reveals an aggregate mean score above 2.00 implying that technological initiatives were not adopted in the selected public universities in Kenya. The results depict that even though technological initiatives were considered to enhance operational performance of public universities, universities did not have user-friendly websites, fully-automated library, lecturers were not teaching using ICT tools such as laptops and projectors as well as staff biometric was not available. Further, it was revealed that public universities had not invested in ICT tools such as desktops and projectors in computer labs as well as development of new academic programs was not a periodical practice.

Table 2: Correlation Coefficients Matrix

		Operational Performance	Technological Initiatives
Operational Performance	Pearson Correlation Sig. (2-tailed)	1.000	
Technological Initiatives	Pearson Correlation	.601*	1.000
	Sig. (2-tailed)	0.042	
* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).			

Source: Research Data (2025)

As shown in Table 2, the results depict that there existed a significant positive relationship between technological initiatives and operational performance of selected public universities in Kenya ($r= 0.601$, $p<0.05$).

Technological Initiatives and Operational Performance

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.335	.245	.023	.53479

a. Predictors: (Constant), Technological Initiatives

Source: Research Data (2025)

As shown in Table 3 the R value of 0.335 displayed a positive linear relationship between technological initiatives and operational performance of selected public universities in Kenya. The R^2 value revealed that the explanatory power of the independent variables was 0.245. This meant that 23.0% of the variation in operational performance was explained by the model $Y= \beta_0 + \beta_2 X_2 + \varepsilon$.

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.655	1 219	.655	17.719	0.000
	Residual	50.274		.357		
	Total	50.929	144			

Dependent Variable: Operational Performance
Predictors: (Constant), Technological Initiatives

Source: Research Data (2025)

Table 4 results on the analysis of the variance (ANOVA) showed that F statistic of 17.719 indicated that the overall model was significant as it exceeded the critical F value of 3.88 with (1, 219) degrees of freedom at the P=0.05 level of significance. The P value of 0.000 was less than 0.05 depicting that the coefficient in the equation fitted was not equal to zero, therefore suggesting a good fit thus appreciating the simple regression fitted, technological initiatives had an effect on operational performance of selected public universities in Kenya.

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Table 4.15: Regression Analysis for Technological Initiatives and Operational Performance

	Unstandardized Coefficients		Standardized Coefficients		
		Std. Error	Beta	t	Sig.
(Constant)	**B** 0.475	0.127		27.523	0.000
Technological Imitative Dependent Variable: Operational Performance	0.229	0.028	0.078	6.207	0.012

Source: Research Data (2025)

Table 4.15 show the results of coefficients to the model Y= 0.475+ 0.229X_2 estimates were significant at the 0.05 level of significance. This was because the significance was 0.012, which was less than 0.05. The constant term indicated that a unit increase of technological initiative will result to an increase on operational performance of selected public universities in Kenya at a magnitude of 0.229 units. The coefficient of 0.229 reflect that improvement of technological initiative by one unit will lead to an increase in operational performance of selected public universities in Kenya by 0.229 units.

CONCLUSION AND RECOMMENDATIONS

This study concludes that even though technological initiatives are viewed as enhancers of operational performance in organizations, it was concluded that public universities did not adopt technological initiatives. It was noted that most of the libraries of public universities were not automated, there was no biometric systems in public universities and public universities did not develop new academic programs periodically. Further, it was concluded that public universities did not invest in ICT tools such as projectors and laptops to facilitate learning.

Recommendations

The study disclosed that public universities did not adopt technological initiatives to a larger extent. Therefore, this study recommends that public universities should appreciate the value of technological initiatives in enhancing operational efficiency. Public universities should partner with ICT firms as well as invest in ICT tools in lecturer halls. Projectors should be installed in lecturer halls as well as biometric systems. Libraries should be automated and at the same time universities should employee adequate ICT staff to support students as well as the teaching staff. Universities should expand their financial budgets and invest in research-oriented projects. Internet connectivity within the university premises should be enhanced to facilitate student research and timely access of information.

Future Frontiers

Limitations in this study were inevitable. However, future studies should seek to examine other factors which can enhance operational performance of public universities such as higher education policies. Future scholars should seek to test the moderating role of higher education policies on the relationship between technological initiatives and operational performance of public universities to assess the whether the findings can replicate. Structural equation models can be used to assess whether different results can be generated in the same context.

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