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Preamble

In Volume 5 (1) of the African Journal of Business Economics and Industry, we embark on a journey of exploration and innovation, reflecting the dynamic landscape of African economies. As Chief Editor, it is my privilege to introduce this volume, which encapsulates a wealth of research, insights, and perspectives from esteemed scholars and practitioners across the continent and beyond.

Our journal serves as a beacon for rigorous inquiry into the intricate interplay between business, economics, and industry within Africa. In this volume, we aim to foster dialogue on pivotal issues shaping the economic trajectory of the region, from entrepreneurship and sustainable development to emerging trends in technology and globalization.

We uphold the highest standards of academic integrity and relevance, ensuring that each contribution adds value to our understanding of the African business landscape. Through interdisciplinary lenses and empirical investigations, we strive to inform policy, inspire innovation, and advance knowledge for the betterment of African societies.

As we embark on this intellectual odyssey, I extend my gratitude to the authors, reviewers, and editorial team whose dedication enriches the scholarly discourse within the pages of our journal. Together, let us continue to illuminate pathways toward a prosperous and equitable future for Africa.

Chief Editor

EFFECT OF STRATEGIC HUMAN RESOURCE MANAGEMENT PRACTICES ON PERFORMANCE OF PUBLIC UNIVERSITIES IN KENYA – A NEED FOR HR-DRIVEN ADAPTIVE LEADERSHIP

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Abstract

As organizations cope with a myriad of operational challenges driven by the ensuing political and economic trends, the need for strategic human resource management has become pertinent. It is in this context that this study addresses Adaptive Leadership and Societal Development. Like all other organizations, public universities in Kenya have human resource management units, which are meant to ensure optimal utilization of their employees as the most critical asset. However, the extent to which the leadership of public universities creatively adapt and leverage on their human resources towards the achievement of their mandates, should be a matter of great concern for the universities and their stakeholders. The two-pronged objective of this study was to determine the effect of strategic human resource practices (SHRMPs), singularly, as well as jointly, on the performance of public universities in Kenya. The bundle of SHRMPs conceptualized and tested is rigorous recruitment, staff training, reward strategies and performance management. The study was philosophically hinged on positivist ontology, mainly based on the resource-based theory, and designed as a cross sectional descriptive survey. Targeting all public universities in Kenya, data was collected from 31 public universities, aided by a self-administered questionnaire. Out of the 117 questionnaires distributed, 110 were returned, representing a 71% response rate. Descriptive statistics and linear regression analyses were used to analyze the data. There was a statistically significant relationship between each SHRM practice in the studied bundle of SHRMPs, and performance of public universities in Kenya, rigorous recruitment being most impactful of the four practices studied. There is need for public universities to strategically prioritize and leverage more on their human resource management functions as represented by the bundle of four practices studied. This would potentially lead to improved performance, in terms of developing and delivering more and better learning programmes, achieving increased student enrolment rates, attainment of enhanced learner graduation rates, generate more research outcomes, as well as enhancement of the much-sought-after staff career promotion rates. Thus, embracing strategic human resource management potentially presents a means to attaining and sustaining competitive levels of performance, towards becoming autonomously self-supporting, as expected.

Keywords: Strategic Human Resource Management Practices, Performance of Public universities

Introduction

All enterprises exist to achieve certain stakeholder interests and their performance, which is usually measured quantitatively, and often in economic terms, is also now increasingly measured qualitatively. The said performance is said to be achieved when aggregated efforts of employees are realized [1]. Empirically, the relevance of human resource management practices in pursuit of desired enterprise performance has been documented by various authors [2,3]. It is important to note, however, that a majority of studies which had hereto linked human resource management practices with performance of enterprises, seem to contextualize human resource management practices affecting performance, rather than strategic human resource management practices affecting the said performance [4,5]. In practice, the former is more to do with operationalizing human resource management at the functional (department) level, while the latter refers to operationalizing human resource management at the strategic level [6].

It is at the strategic level of human resource management that this study was premised, and undertaken. Strategic human resource management practices refer to the application of a structured bundle of HR-oriented interventions by an organization, towards achieving strategic organizational goals, and therefore, the enhancement of the ability of such an organization to influence its performance [7]. Likewise, the use of HR bundles has been found to enhance employee motivation, and empowerment, towards employee and organizational performance [8]. Hence, based on the scope of typical human resource management practices typically used in most organizations, including in the public universities, this study conceptualized the bundle of strategic human resource practices as; rigorous recruitment, staff training, reward management and performance management.

Literature Review

The study was fundamentally founded on the Resource Based Theory, which suggests a strategic approach by organizations to consider employees as the key resource in strategizing towards achieving competitive edge. The Resource Based Theory became prominent in the 1980s and 1990s, from key contributions of Wernerfelt [9], Prahalad and Hamel [10], and Barney [11] among others, who asserted the need for entities to focus internally and hence, determine the elements of enabling competitiveness, instead on

focusing on searching for the same elsewhere. The recognition of the relevance of strategizing the management of people in an enterprise in seeking to create organizational competitiveness marks the theory's relevance here as it directly resonates with this study which is attempting to empirically investigate the potential relationship between the variables in question.

More specifically, therefore, various studies have linked strategic human resource management practices to the performance of enterprises. For instance, Al-Khaled et al 2020 [12] observed that adoption of strategic human resource management practices (SHRMPs) created a sustaining capacity in attaining organizational goals. Likewise, Eneh and Awara (2016), in a descriptive study on strategic human resource management practices and organizational growth in Nigeria, found that Strategic Human Resource Management Practices (SHRMPs) significantly enabled better use of human resources.

Thus, human resource management practices such as training of employees, human resource planning, prompt rewarding, and selective recruitment, all served as drivers of sustainable competitive advantage for enterprises. However, it is interesting to note that the majority of empirical studies linking strategic human resource management practices to enterprise performance seem to be contextualized in the private sector rather than in the public sector [14]. Nevertheless, and of particular relevance to this study, a descriptive study of eight Nigerian universities demonstrated that using SHRM practices had positively impacted the universities by attracting more research sponsorships, increasing scholarly writings and research-based innovations, among others. Thus, there is need for universities in Nigeria to be more strategic at operationalizing the HR function towards sustainable improvement of the otherwise declining levels of declining performance, as aptly supported by Ojokuku and Akanbi 2015 [7].

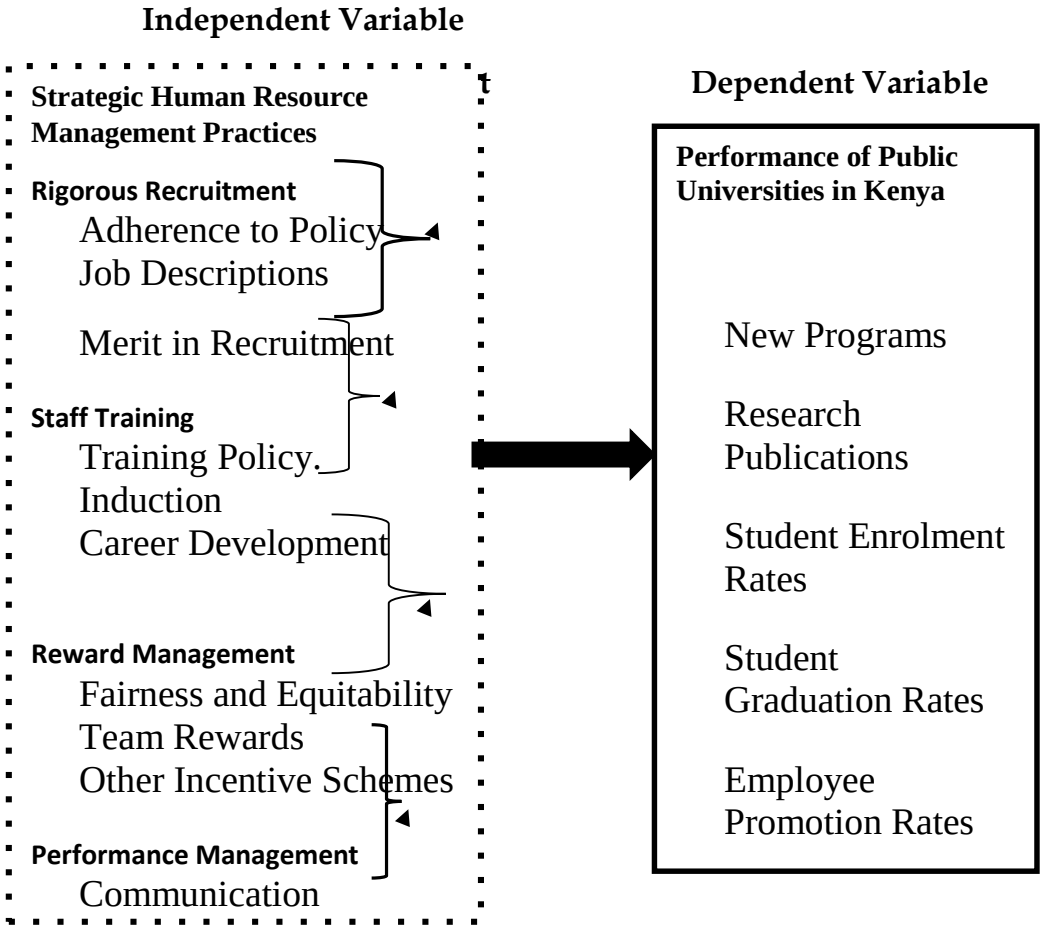
Similarly, in Kenya, a census study targeting public universities by Mutahi and Busienei 2015 [15], revealed that strategic HRM practices positively, including strategic rewarding and training, were key. They relevantly recommended development of appropriate employment policy to encourage job security, urging that the government supports this by basing recruitment and selection in the universities on periodic analysis of employee competencies, and identifying employee training needs for employee growth, among other

interventions. This was empirically affirmed by Naitore and Wanyoike 2019 [16], using a descriptive survey of 13 public universities in Kenya and established that there was a positive and significant relationship between strategic human resource management practices, in terms of HR planning and staffing and, the performance of selected public universities.

From the foregoing, it appears evident that strategic human resource management practices do, indeed positively influence performance in organizations, including public universities. Indeed, and more relevantly for this current study, Kallio et al 2021 [17] used university-specific quantitative indicators, including graduation rates, and enrolment rates, to measure performance. Likewise, Hamadamin & Atan 2019 [18], studied the role of strategic human resource management practices in maintaining competitive advantage in higher education institutions, finding that these practices influenced learner related outcomes as well as the overall performance of the institutions. Elsewhere, Alach, Zhivan 2017 [19], averred, on studying the use of human resource management-oriented performance measures in universities, including student performance, research outcomes and so on. However, and pertinently in this study, there seems to be contradicting evidence from the industry, as well as from empirical research, of declining performance in the same public universities. For instance, according to Commission for University Education reports 2018 [20] reports from the industry indicate that public universities in Kenya declined in performance, in terms of student enrolment rates, graduation rates, and research output. The National Treasury and Economic Planning (National Treasury) Report on Performance Evaluation of State Corporations and Tertiary Institutions (2021/2022) [22], also indicates a declining performance trajectory by public universities, especially with regard to lack of basic facilities, including libraries, internet connection, and inadequate facilitation and development of academic staff.

Even more interestingly, Naitore and Wanyoike 2019 [16], who, as pointed out earlier, studied strategic human resource management in the context of public universities in Kenya, found that lack of adequate consideration for human resource management practices by the universities adversely affected their performance. This was especially because of demoralized and disinterested staff. This was duly supported by Shikokoti et

al (2023) [22], who pointed to the declining performance in public universities, with respect to rates of completion. It is in this context that this study, therefore, sought to empirically investigate and provide a possible explanation for the seemingly apparent contradiction between the expected value of implementing strategic human resource management practices, on the one hand, and the evident declining performance of the public universities as supported by reports from the industry as well as from empirical literature. Figure 1 illustrates the conceptual framework of the study.



Source: Research Concept (2022)

Figure 1: Conceptual Framework

Methodology

This study was philosophically inclined towards positivist ontology, and adopted a cross sectional descriptive survey research design. The target population was academic and non-academic employees of 31 public universities in Kenya, whose sample comprised 155 respondents purposively selected from the representatives of the three unions respectively;

(UASU, KUSU, KUDHEIHA), Academic Registrar and HR departments respectively. Data was collected using a self- administered five-level Likert type questionnaire. A 71% response rate was achieved, and descriptive statistics and linear regression analysis were used to analyze the data.

Findings and Discussion

The two-fold objective of this study was to establish whether strategic human resource management practices; individually, and jointly, affected the performance of public universities in Kenya. A five level Liker type scale, numbered 5, 4, 3, 2 and 1, representing strongly agree, agree, neither agree nor disagree, disagree and strongly disagree respectively was used for data collection. Three indicator statements for each of the four strategic human resource management practices were put to the respondents, who were asked to respond accordingly, indicating their perceptions respectively. The descriptive statistics, findings and discussion on each are presented below.

***Rigorous Recruitment*: A** slight majority 44% agreed that their universities strictly adhered to the prescribed or customized recruitment and selection policy in hiring staff. Notably, the 44% majority agreement was minimal, in comparison with the 38% disagreement. Hence, almost as many disagreed, especially in the light of the 18% who were neutral; a majority 52 % disagreed with the statement on whether hiring was based on elaborate job descriptions of the vacant positions by the universities. Thus, a majority of the respondents perceived that hiring was not based on job description and that this negatively impacted them, in terms of their level of commitment, motivation and teamwork; and a majority 67% disagreed with the statement suggesting that merit, rather than nepotism counted in the recruitment processes at their universities. Therefore, although the universities engaged in recruitment, the practice did not appear to be as rigorously implemented, and most likely, not as impactful on performance as desired.

Staff Training: 60% disagreed with the first statement that the universities adhered to an elaborate training and development policy; 72% disagreed with the statement that induction training was strategically provided for new and also promoted workers; while 75% disagreed with the statement that continuous professional career development for all categories of employees was adequately provided. Therefore, based on the three statement

indicators, the majority of respondents in each of the indicators negatively perceived the implementation of strategic training in terms of its impact and adequacy.

***Reward Management*:** 75% disagreed with the statement that job promotion and upward mobility were part of the rewarding mechanisms in the universities; 75% disagreed with the statement that the terms of service were motivating; while 75% disagreed with the statement, that there were other university-driven incentive schemes other than those provided by government. Therefore, based on these findings, it was concluded that though the universities had various rewards for staff, these incentives were not perceived to be of any input by the staff.

Performance Management: 67% of respondents reported that communication was not well done between supervisors and their subordinates in the universities. 72% reported that performance appraisal systems in their universities were not well defined, accurate, fair, objective and reliable, while 74% reported that performance evaluation system in their universities did not provided a linkage to training and development programs and a mentoring system for junior employees. These findings suggest the employee perception that performance management did not achieve the desired impact on the employees on University performance.

Table 1: Responses on Strategic Human Resource Management Practices

NO.	STRATEGIC HUMAN RESOURCE MANAGEMENT PRACTICES		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Total	Mean	Standard Deviation
1.0	**Rigorous Recruitment**	N								
1.1	My university strictly adheres to the prescribed or	110	5%	39%	18%	25%	13%	110 100%	2.95	1.12

	customized recruitment and selection policy in hiring staff									
1.2	Hiring is based on elaborate job descriptions of the vacant positions	110	4%	10%	34%	38%	14%	110 100%	2.41	941
1.3	Merit, rather than nepotism counts in the recruitment process	110	7%	7%	19%	42%	25%	110 100%	2.37	1.04
2.0	**Staff Training**									
2.1	The university adheres to an elaborate training and development policy.	110	4%	18%	18%	44%	16%	110 100%	2.42	1.01
2.2	Induction training is strategically provided for new and also promoted workers	110	4%	7%	17%	55%	17%	110 100%	2.14	.800
2.3	Continuous professional career development for all categories of employees is adequately provided	110	2%	4%	18%	51%	24%	110 100%	1.96	.74

Source: Research Data (2022)

3.0	**Reward Management**									
3.1	Job promotion as well as upward mobility are part of the rewarding mechanisms in the university	110	6%	12%	7%	50%	25%	110 100%	2.16	1.07
3.2	The terms of service and benefits are motivating to employees in the university	110	6%	10%	9%	50%	25%	110	2.10	.100
3. 3	There are other university-driven incentive schemes other than those stipulated by the statutory government scheme	110	2%	8%	14%	53%	23%	110 100%	2.04	.81
4.0	**Performance Management**									
4.1	Communication is well done with appropriate feedback between supervisors and their subordinates in the university	110	3%	15%	15%	41%	26%	110 100%	2.19	1.04

As illustrated on Table 1, it was the employee perception that all the four strategic human

4.2	The performance appraisal system in the university is well defined, accurate, fair, objective and reliable	110	4%	9%	15%	43%	29%	110 100%	2.05	.93
4.3	The performance evaluation system in the university provides a link to the training and development programs as well as a mentoring system for the junior employees	110	4%	8%)	14%	47%	27%	110 100%	1.92	85

resource management practices; rigorous recruitment, staff training, reward management, and performance management, were not as impactful on performance as they ought to be, given the relatively low percentage scores on each. Therefore, although the public universities undertake recruitment, staff training, reward management and performance management, the employees felt that these practices do not significantly input staff or University performances.

SHRMPs and Performance of Public Universities.

Data was also collected and analyzed on performance of public universities, as the dependent variable. Five indicators of university performance were purposely conceptualized, based on empirical literature, among them new academic programmes, research publications, student enrolment rates, student graduation rates, and staff promotion rates.

44% reported that the number of programmes in their respective universities had been increasing over the previous five years, 48% disagreed, 43%reported that student enrollment agreed that student enrollment rates had been increasing for the previous five years, 46% reported no increase in the number of students graduating from their respective Universities in the previous five years and 72% indicated that there was no increase in the number of staff promoted over time. Table 2 presents a detailed descriptive summary of these findings.

Table 2: Descriptive Responses on Performance of Universities

NO.	PERFORMANCE OF PUBLIC UNIVERSITIES		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Total	Mean	Standard Deviation
5.0	**New Programs**	N								
5.1	The number of programs/courses in my university have been increasing for the last five years	110	10%	34%	26%	26%	4%	110 100%	3.21	1.02
6.0	**Research Publications**									
6.1	The number of research publications by faculty have been increasing over the last five years	110	7%	9%	36%	38%	10%	110 100%	2.65	93
7.0	**Student Enrolment Rates**									
7.1	Student enrollment rates have been increasing for the last five years' in my university	110	7%	36%	22%	29%	6%	110 100%	3.13	1.05

8.0	**Student Graduation Rates**									
8.1	My university has been graduating increasing number of graduates for the last five years	110	8%	17%	29%	34%	12%	110 100%	2.75	1.10
9.0	**Employee Promotion Rates**									
9.1	In my university the number of staff promoted has been increasing over time	110	4%	7%	17%	38%	34%	110 100%	2.04	1.01

Overall, the descriptive data on Table 2 seems to be supportive of the various government reports relating to the performance of state entities in Kenya, and in this case, the public universities. For instance; Salaries and Remuneration Commission (SRC) Report (2016) [23], Republic of Kenya, The National Treasury and Economic Planning (National Treasury) Report on Performance Evaluation of State Corporations and Tertiary Institutions (2021/2022) [21], and Kenya National Bureau of Statistics (KNBS) Economic Survey (2022) [24], all of which have reported that public universities in Kenya had been declining in terms of performance, and that the universities faced a myriad challenges that seemed to get worse. These include, lack of research infrastructure and qualified human resources, among others (Commission for University Education (CUE) (2018) [20]. It is interesting to note, however, the only divergent finding on statement 5.1 on Table 2, where only 44% agreed that the number of programs were increasing.

Generally speaking, public universities have tended to increase their programme offerings over time. However, the development of new programmes does not entirely lie in the hands of the universities, but also on government initiatives. It is also true, based on anecdotal evidence that many of the programmes initiated in the public universities have been said to be redundant hence, it is arguable that increasing numbers of programmes in the universities is substantially a decline, rather than a growth in terms of performance. It

is also interesting to note the large number of respondents who neither agree nor disagree in every indicator statement. The fact that so many were undecided, is arguably an indicator that a number of employees do not take keen interest in operations and performance of the Universities.

Regression Analysis

To test the descriptive findings further, regression of performance of public universities on strategic human resource management practices as a composite variable was conducted.

Thus, a rigorous recruitment, staff training, reward management and performance management, on performance of public universities in Kenya, comprising the five indicators; new programmes, student enrolment rates, research publications, student graduation rates, and staff promotion rates. The hypothesis; H01 Strategic human resource management practices, singularly or collectively, do not influence performance of public universities in Kenya, was tested. Regression was undertaken at two levels; first to investigate the likely effect of each of the SHRMPs respectively, and secondly, to measure the total effect for the composite SHRMPs. The general model for linear regression analysis was; $Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4$, where Y = performance of public universities in Kenya, $\beta 0$ = Constant, $\beta_1 - B_4$ = coefficients of the respective SHRMPs (rigorous recruitment, staff training, reward management and performance management).

The model which was used for SHRMPs as a composite variable was $Y = \beta_0 + \beta_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5K_1 + \varepsilon$, where Y = performance of public universities in Kenya, β_0 = Constant, β_1-B_5 = coefficients of the respective independent variables (X_1 rigorous recruitment, X_2 staff training, X_3 reward management and X_4 performance management), X1-X4 = K_1 = interactive term, and e = error term. The results of the regression analysis, based on objective and hypothesis, are presented on Table 3 and 4 respectively.

Table 3: Regression Results Showing effect of Respective SHRMPs on Performance

Model Summary

a. Dependent Variable; University Performance

Model	R	R square	Adjusted R Square	Std. Error of the Estimate
1	0.662	0.439	.417	.60319

Predictors: (Constant), SHRMPs; rigorous recruitment, staff training, reward management, performance management. Dependent Variable – Performance of Public Universities

ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	26.650	4	7.390	20.31	0.001
Residual	37.839	104	0.364		
Total	67.396	108			

Predictors: (Constant) – SHRMPs; rigorous recruitment, staff training, reward management, performance management Dependent variable – Performance of Public Universities

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig
	B	Std Error			
Constant	1.092	0.197		5.542	.001
Recruitment	0.289	0.101	0.031	2.843	.005
Training	0.235	0.124	0.220	1.895	.006
Reward	0.028	0.093	0.031	.305	.007

Performance	0.231	0.089	0.250	2.598	.011
Predictors: (Constant), – SHRMPs; rigorous recruitment, staff training, reward management, performance management Dependent Variable – Performance of Public Universities					

Source: Research Data (2022)

From Table 3, the adjusted R Square is .417, implying that strategic human resource management practices together accounted for approximately 42% of the change in the performance of public universities, implying that 58% of the change in performance may be attributed to other factors other than SHRMPs. The F (4, 104) statistics was 20.311 with a P-value .001 (P value < 0.05). Likewise, the Beta coefficients for the respective SHRMPs in the bundle were 0.289 for rigorous recruitment, 0.235 for staff training, 0.028 for reward management, and 0.231 for performance management. All the respective SHRMPs had a P-value < 0.05. This implied that, for a unit change in the respective SHRMPs, there was likely to be corresponding 29%, 24%, 3%, and 23% changes respectively for SHRMP, on university performance. Notably, therefore, it may be concluded that each strategic human resource management practice was positively and statistically significant, and did affect performance of the public universities. In this case, rigorous recruitment with 29% possible change, may be said to be the most impactful, while reward management, with 3% potential change, may have the least impact. Regression analysis was also undertaken for the joint impact of SHRMPS on performance. Table 4 illustrates.

Table 4 Regression Results for Strategic Human Resource Management Practices as a Composite variable, and performance of Public Universities

Model Summary				
Model	**R**	**R square**	**Adjusted R Square**	**Std Error of the Estimate**
1	0.665	0.421	.302	0.2402496
Predictors: (Constant), SHRMPs; rigorous recruitment, staff training, reward management, performance management. Dependent Variable – Performance of Public Universities				

Anova					
Model	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig**
Regression Residual Total	6.235 7.850 14.085	2 128 141	1.559 0.058	26.002	0.000
Predictors: (Constant) – SHRMPs; rigorous recruitment, staff training, reward management, performance management Dependent variable – Performance of Public Universities					

Coefficients					
Model	**Unstandardized Coefficients**		**Standardized Coefficients Beta**	**T**	**Sig**
	B	**Std Error**			
Constant	1.680	0.130		12.889	.000
SHRMPs	0.325	0.049	0.552	7.795	.000
Predictors: (Constant), – SHRMPs; rigorous recruitment, staff training, reward management, performance management Dependent Variable – Performance of Public Universities					

Source: Research Data (2022)

From Table 4, the adjusted R Square is .421, implying that strategic human resource management practices together accounted for approximately 42% of the change in the performance of public universities, implying that 58% of the change in performance is attributable to other factors other than SHRMPs. The F (2, 128) statistics was 26.002 with a P-value .001 (P value < 0.05). Likewise, the Beta coefficient of the interactive term for the bundle of strategic human resource management practices was positive and significant at .325 with P-value at .001 (P-value < 0.05). This implied that a unit change in the bundle of SHRMPs is likely to cause a 33% corresponding change in university performance. Hence, going by these findings, the combined effect of SHRMPs (K_1) on performance was greater than any of the SHRMPs individually, the results can be summarized as per the regression model: $Y= 1.680 + 0.325K_1+ \varepsilon$.

These findings seem to be consistent with the relevant empirical literature reviewed. For instance, Al-Khaled, Akram and Chung, Jee Fenn (2020) [20], studied strategic human resource management practices and organizational performance, and found that entities which adopted strategic human resource management practices were able to sustainably improve their performance. Hence, although such reports were not contextualized in the public sector, nor in public universities, it is evident that strategic human resource management practices were impactful in all organizations. Seeming to support the same, Ojokuu and Akanbi (2015), studied strategic human resource management practices and performance of Nigerian public universities. The authors reported that using SHRM practices had beneficially impacted the public universities in terms of attracting more researching sponsorships, increasing scholarly writings and research-based innovations, notwithstanding the fact that Ojokuku and Akanbi (2015) [7], was contextualized in Nigeria rather than Kenya. Most relevantly, and in Kenya, Naitore and Wanyoike (2019) [16], used a descriptive survey design to study the impact of strategic human resource management practices on performance of public universities in Kenya and reported a positive and significant relationship between strategic human resource management practices and performance, in terms of HR planning and staffing. The authors however confined their studies to HR planning and staffing practices, as opposed to recruitment, staff training, reward management and performance management as in this study.

Similarly, in Kenya, Mutahi and Busienei (2015) [15], used a descriptive design to investigate the influence of strategic human resource management practice on performance of public universities in Kenya and observed that the practices affected performance of public universities, in terms of strategic rewarding and strategic training. The authors confined themselves to reward and training practices, as opposed to the bundle of four; rigorous recruitment, staff training, reward management and performance management as undertaken in the current study. The findings of this study are also in line with the Resource Based Theory (RBT) [11] which postulated that business entities needed to focus internally to activate resources, the most important one of which is the people within. Thus, it is the people as a resource that would enable such entities to achieve competitive advantage in their operations. In this respect, as deducible from this study, the universities needed to take deliberate measures to determine and select appropriate SHRMPs.

Accordingly, these are most likely, to be valuable, inimitable, and rare and likely to be strategically substitutable, towards ensuring that public universities, like all other organizations, are able to sustainably achieve competitive advantage, in the light of a future where the universities will be expected to be more substantially independent of government benevolence.

Conclusion

Based on the objective and findings of this study, it is concluded that strategic human resource management practices, entailing rigorous recruitment, staff training, reward management and performance management have a positive and statistically significant influence on the performance of Kenya's public universities, collectively as well as singularly. The implication is that the universities have most likely not taken their staff, both academic and non-academic, with the seriousness that they deserve. It would appear that although the public universities have human resource management units, HR policies and systems, including HR staff establishments, the value which is expected to be derived from the HR function, among the other operational functions of the universities, does not appear to come forth.

Recommendations

This study recommends that universities should consider their staff as strategic capital assets, which should drive their competitive advantages. This is especially in the face of the ever decreasing Government support on the one hand, and the ever increasing competitive university sector dynamics, on the other. The leadership of the universities have to be guided by the understanding that the people who work in these universities constitute a veritable means of turning around the current circumstances of the public universities, which seem to get worse, year by year.

More specifically, going by the findings of this study, using a deliberately strategic approach in all matters human resource management, would more than likely enhance the universities' prospects with respect to their performance. Thus, this is more than likely to lead to introduction of more innovative learning programmes, attracting higher enrolment rates from local and international pools enhancing commensurate enrolment-graduation rates, generating more commercially viable research projects and publications, as well as

enhancing the much-sought-after staff promotional career growth rates. In addition, the universities ought to be deliberately strategic at operationalizing HR practices through strict adherence to prescribed or customized recruitment and selection policy in hiring staff – which was found to be most impactful of the four SHRMPs studied, being creative and innovative.

The universities should also embrace use merit, rather than nepotism, adhere to an elaborate training and development policy, embrace induction training for the benefit of new employees and promoted workers. This should be in such a way that continuous professional career development for all categories of employees would be adequately provided for. In reward management, the universities should ensure that Job promotion as well as upward mobility are part of the rewarding mechanisms. They ought to implement the terms of service and benefits of staff and create others innovatively and creatively instituted university-driven incentive schemes other than those stipulated by the statutory government schemes to motivate employees. Likewise, for performance management, the universities should embrace the all-important communication to enhance appropriate feedback between supervisors and their subordinates, while at the same time re-invigorating performance appraisal system to make it well-defined, accurate, fair, objective and reliable.

The universities should also embrace training and reward management to achieve better performance outcomes. One of the key strategies is that the universities' leadership ought to be strategic and proactive in preparing for, and managing the limitations, towards enabling the universities strategically adoptive to the dynamics of an ever-evolving business environment.

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INVENTORY MANAGEMENT PRACTICES, RETAILER-SUPPLIER COLLABORATION AND SUPPLY CHAIN PERFORMANCE OF RETAIL STORES IN NAKURU COUNTY, KENYA

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Abstract

Retail chain stores in Kenya are facing unprecedented change in the external environment disruption affecting supply chains motivating integration of inventory management practices with retail-supply chain collaboration to achieve expected supply chain performance. The objectives of this study were to determine influence of continuous replenishment to establish inventory optimization and supply chain collaboration on supply chain performance in retail chain stores in Nakuru County. The research adopted a descriptive survey research design and surveyed 106 retail chain stores in Nakuru County. Primary data was collected using questionnaires and analyzed using descriptive analysis and inferential statistics techniques, correlation and regression analysis. Results revealed that continuous replenishment contributed significantly (B_1= 0.576, PV = .001<0.05) to supply chain performance in retail chain stores in Nakuru County. There was a strong, significant and positive (B_2=0.307, PV=.001>0.05) relationship between inventory optimization and supplier chain Performance. Combining inventory management practices, continuous replenishment and inventory optimization with retailer-supply chain collaboration resulted in an increase in RSquared of model 1, 0.440 to 0.459 demonstrating that joining continuous replenishment and inventory optimization with supply chain collaboration has a significant positive impact on supply chain performance. Successful continuous replenishment and inventory optimization together with retailer-supplier chain collaboration resulted in supply chain efficiency.

Keywords: Inventory Management Practices, Retailer-Supplier Collaboration, Supply Chain Performance of Retail Stores, Nakuru County, Kenya

Introduction

Supply chain management is a key focus in implementing inventory management systems because customers want products or services available at the right time, at the right place, at the right price, and in the right quantity. Correct supply chain performance crosses both functional lines and company boundaries. Supply chain performance improvement is a continuous process that requires both analytical performance measurement methods [1]. One also need to initiate the process to meet the key performance indicators [2]. Today, the logistics network and supply chain are the security and competitive advantage in business. Thus, effective supply chain management practices are a way to achieve supply chain performance and gain competitive advantage in a competitive world [3]. Product management practice is an important determinant of success that contributes to good inventory management and flexibility [4]. The main task of inventory management practices is to achieve the lowest possible installation costs without compromising the system performance level [5]. Too many products and not enough customer service is good, but not necessary. Assets cannot be limited or insufficient, thus, the purpose of asset management is to determine and maintain the best level of investment assets, which contributes to achievement of the desired objective [6].

The purpose of inventory management is to change the overall and general business objectives of the day-to-day operations of inventory management and to balance investment in products and customer services [7]. This is because companies that have large inventory often bear warehousing costs, such as storage, transportation and administrative costs [8]. Globally, retailers have invested in infrastructure and technology such as the integrated value for managing critical assets and information systems that can improve visibility across the supply chain through supply chain processes such as integration, collaboration, forecasting. and continuous improvement (CPFR) in the vision of weapons and the real supply chain [9]. Modern companies use inventory management practices such as Just-in-Time, Quality Control, Vendor Inventory Management (VMI) and Information Technology to have an overall impact on supply chain performance. Effective inventory management practices in the retail industry can have a significant impact on the company's performance. Demand is driven by various target markets and

support activities to meet customer demands and needs through a lean supply chain [10]. A retail chain company includes many products that must be sold to end users. The retail industry has undergone unprecedented changes as competition grows in the market and the consumer [11]. That VMI has been used widely to improve supply chain performance shows that VMI is an effective tool for improving supply chain operations by reducing inventory and growth-related costs [12]. Customer Service.

Inventory Management Competition in retail stores promotes improvement in all aspects of inventory management, such as flexibility, cost effectiveness, and on-time performance. The purpose of the supplier management system is to provide both internal and external customers with the required level of service through quantitative measures and execution [13]. A good inventory management system provides visibility up and down the supply chain, which reduces inventory costs, product costs and associated capital, shortens delivery times, and - improves supplier relations [14]. Achieving cost efficiency and operational efficiency in retail stores has increased the importance of inventory management practices in the Kenyan retail sector. Stores in the Kenyan retail chain invest in developing VMI practices such as focusing on ICT integration of inventory operations, investing to improve poor practices such as demand management policies, improving product delivery process and focus on adopting supplier management practices.

Statement of the Problem

The retail industry in Kenya faces high competition and complex inventory management [15]. Currently, Kenya has more than 300 retail stores across the country. Many of the retail stores such as Tuskys, Nakumatt, Ukwala and Naivas among others have put retail stores under supervision. Notably, the market share/penetration in retail chains is still low, between 25% and 30%. The level of installation and store breakdown has supported the introduction of inventory management practices and collaboration in the retail chain. Changes in supply chain operations from inventory management requires a study that integrates inventory management requires a study that integrates practices with supply chain collaboration in retail stores to bring efficiencies to the home market in the Nakuru region of Kenya.

Literature Review

Theoretical Review

The lean theory [16] supports the observation that the system is based on the ability to change business production and research during the agile chain. This innovative concept eliminates waste from the development process and brings better results and a better supply chain postulating that stock as the best inventory management tool. This concept explains how suppliers adjust their reference options, reduce processing and closing inventory and reduce inventory due to labor costs. Ntutu et al 2017 [17] analyzed their issue on the reduction of solid level products and observed that the power of descriptive analysis depends on the individual level depending on the situation and scope of the work. Companies that truly develop revenue by implementing systems and processes seamlessly achieve high profitability and customer loyalty. Contingency theory applies to project managers of different work areas. As shown in [18], changes in the parameters of the class lead to the realization of the collected ones. The theory assumes that the relationship and management of shareholders is a determinant of change in management performance in tea management companies. The most important part of the game is a very expensive product. A useful function can be a combination of financial and non-financial purposes [19]. A company's efficient execution and cost-effective expansion can be managed. Organizational performance can be defined from different angles, thus each tea processing company has a new situation, which makes it new to predict the implementation of the project [20]. The role of inventory management is to change the relationship based on the financial and non-financial benefits, the value of the system and the concept of chains that work well.

Inventory Management Practices Deployed in Retail Chain Stores

Continuous improvement is an inventory management practice that retailers can use. The purpose of the ongoing innovation is to improve the efficiency of the equipment and the transmission system, so the pipeline stock can be significantly reduced. Sustainable practice uses environmental information system of retail stores to identify sustainable interests through SCP development. A continuous innovation model is designed to accommodate this development by creating an end-user base using continuous investment

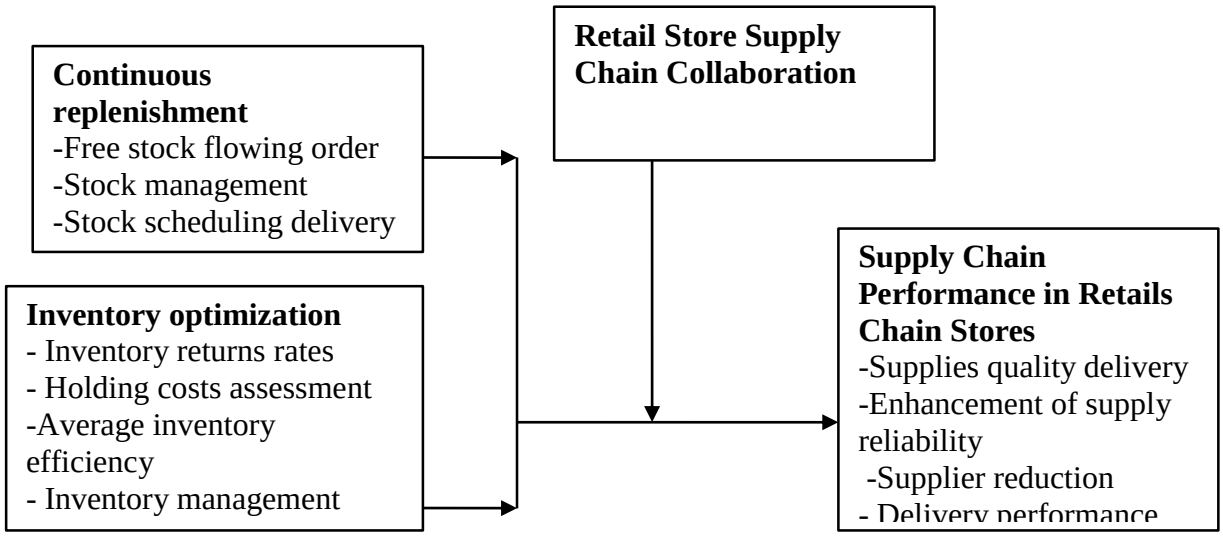
strategies combined with adaptation through operational planning, taking into account the connection between, package security and robot analysis. [21]

Inventory management can be defined as a strategy and process that deliberately identifies and manages inventory and the quantity they will deliver. Integrated decisions are required regarding the magnitude of the demand, the time it takes to deliver, and the total cost incurred [22]. In the strategic plan of the connection, the decision about the level of security and the area of the relationship is necessary to meet the needs of customers [23]. Effective delivery management, when implemented in any organization, creates efficiency and provides a competitive advantage over other organizations. This is especially true for charities that depend on the success of their resource management. Cao and Zhang [24] explored different concepts for improving supply chains including; infrastructure, logistics, resource management, media and infrastructure wile elsewhere the importance of applying technology in the supply chain as a factor that improves SC performance has been emphasized [25]. In order to remain competitive and important in the global market, many retail stores have started supplier partnerships [26] to improve supply risk management and meet strict performance expectations. Important relationships in the supply chain focus on improving supplier capabilities, sharing new products, shared generation strategies, developing marketing strategies, and creating cost-effectiveness [27]. Many researchers have studied supply chain collaboration, and its benefits, such as cost savings through lower levels of inventory and smaller warehouses and distribution centers, are some of these factors emerging from the intervention process. Companies that work together can improve their performance; improve customer satisfaction, increase market share and generate revenue while fostering positive relationships with supply chain partners [28].

Therefore, the performance of the supply chain (SCP) is determined by product turnover, distribution costs, and top management's support for the firm's strategy and sales force [29]. Supply Chain Performance (SCP) can be measured using parameters such as quantity, flexibility, schedule, quality, price, customer satisfaction, return on investment (ROI), market value percentage, and current value [30].

The relationship between information sharing, asset management and customer satisfaction has been investigated by Ethiopian garment industry and a positive relationship was established between information sharing, product management and customer satisfaction [31]. Pearson correlation coefficient of distribution information and customer satisfaction was 0.850 ** Pearson correlation coefficient of distribution information and Inventory = 0.864** and Pearson correlation of product management and customer satisfaction is 0.814**. The study concluded that strategic collaboration and information sharing between suppliers and customer value collaboration lead to higher levels of customer satisfaction.

Conceptual Framework



Independent variable **Dependent variable**

Figure 1: Conceptual Framework

Research Strategy

Research Approach

Descriptive research is suitable for research design including generalization, analysis and interpretation of results. Descriptive analysis methods are used to facilitate integration of different data collected and provides a better understanding of the research problem [32]. Descriptive research helps researchers combine the different aspects of qualitative and quantitative research methods and application of data analysis techniques to answer broad questions at the level of the research topic. The target population is a list of items, people, or things that have the same characteristics and are being studied [33]. The target of this

study are 32 shops operating in Nakuru. This study is exploratory, so we use a quantitative approach that includes all selected stores.

Participants/Respondents

The respondents of the survey represent 106 employees of 32 retail stores in the region, among them purchasing managers, supply managers and material managers.

Data collection methods used for the study.

Procurement Managers, Finance Managers, Infrastructure Managers, ICT Managers and Relationship Managers were assigned to each of the 106 selected officials in Nakuru County. A pilot study was conducted to test the validity and reliability of the instrument. The overall reliability of the instrument showed that the instrument was reliable with a Cronbach's value of 0.814. expert opinions that are taken into account when collecting data Statistical analysis

Data was analyzed using statistical methods of means and standard deviations. The study also used cognitive, logical and interactive methods to identify inventory management practices and supplier collaboration in retail supply chain performance. The study used t-test to test whether the hypothesized sample was significant at the 0.05 level. F-test was used to test the goodness of fit of regression models.

Discussion of Results

Descriptive analysis

This section provides data on the influence of supplier collaboration on supply chain performance of supermarkets in Nakuru County.

Table 1: Continuous Replenishment

Continuous Replenishment	Mean	Std Dev
The supermarket achieve free flowing order fulfillment	4.142	.649
Reduction in line inventory	4.573	.489
Timely inventory replenishment	3.869	.841
Reduction in frequency of ordering	4.676	.578

Identification of real time demand due to up-to-the-point-of-sale information	4.281	.451
Achievement of store ready packaging	4.548	.476
Achievement of stock listing efficiency	4.467	.501
The supermarket achieve stock controls	4.503	.765
The supermarket achieve logistic networks	4.074	.683
Attainment of accurate forecasting of capacity requirement	4.002	.813
Average	4.3135	0.6246

Based on the results on Table 1, the store of the retail chain makes frequent replenishment, as the respondents agree (Mean=4.3135, SD=0.6246) that the experience of the store is reduced frequently to 4.573. The company has achieved inventory management, quality product manufacturing, real-time demand identification for sales information, and a free-flow system for integration into the distribution network. The respondents explained that supermarkets have adopted sustainable supply as a means of management in order to achieve success and efficiency in the installation in Nakuru County. It is supported by observations that supplier managed sales (VMI) improves the variety by responding to unmet customer needs and makes sales and better performance [30].

Inventory Optimization

The study sought to understand the extent to which inventory optimization influences supply chain performance in retail chain stores. The results are presented on Table 2

Table 2: Extent of Inventory Optimization in Retail Chain Store

Statement related to Inventory Optimization	Mean	Std Dev
Increase inventory control	4.564	.51874
Quality controls of supplies	4.442	.87985
There is foster supplier quality improvement	3.767	.49889
There is increase in flexibility to cope with changes	4.396	.46482
There is efficient sourcing	4.690	.52185
Efficient distribution of goods due to time-phased requirements schedules	4.557	.46482

There is enhanced network with the customer service requirements	4.515	.90000
There is optimal stock requests and supplies in the supermarket	4.531	.52136
There is controls the supermarket logistics operations	4.283	.52762
There is increase in retail supply data accuracy	3.891	.7624
Increase in supplier collaboration	4.041	.9218
There is more channel of communication to foster information sharing	3.793	0.801
Average	4.2892	0.6486

In terms of inventory optimization, respondents agreed with 4.2892 and a standard value of 0.6486 that retail stores are flexible and that flexibility increases inventory control, and efficiency of distributing products. In addition, the store chain achieves supply chain management through product optimization, manufactures quality products, achieves inventory control in stores, and improves supplier support.

Supplier collaboration in Retail Chain Stores

Out of 106 questionnaires administered,91 (85%) responded in time for data analysis. This rate was considered appropriate to derive the inferences regarding the objectives of the research.

Table 3: Extent of Deployment of Supplier collaboration in Retail Chain Stores

Extent of Deployment of Supplier collaboration in Retail Chain Stores		
We improve of risk sharing to improve suppliers commitment	4.3088	.87360
The retail stores gain flexibility	3.7647	.66928
We increase supplier contract performance	3.7794	.55366
The enterprises share information that foster their decision making	3.7426	.60854
The retail store report Improvement in the accuracy of forecasts	3.7574	.43027
There is incentives for partners in supply chain	4.1397	.57185
The retail store are able to resolve critical supply chain risk	4.2426	.63824

Accelerating and managing demand plans, direct material procurement and fulfillment throughout the supply chain	4.7794	.41618
The retails stores make joint decision making with ease	3.8162	.44225
Average	4.0367	0.5782

Results on Table 3 clearly show that retailers use a collaborative approach to achieve the best installation performance. On average, respondents believe that retail stores use supply chain coordination to accelerate and manage demand planning, direct sales and fulfillment through the supply chain, and in a 4.0367 way with a standard deviation of 0.5782. It can facilitate shared decision-making, increase supplier efficiency, achieve stability and redundancy, and improve return on investment.

Supply Chain Performance

Table 4: Supply Chain Performance in Supermarkets

Supply Chain Performance measures	Mean	Std Dev
Improvement in Level of supplier output	4.2700	.70861
Provision of error-free products in sales volume	4.5700	.62044
Improve Supply chain cost efficiency	4.1800	.41145
Improve order-to-delivery lead time	4.4500	.55732
Improve customer satisfaction	4.5400	.73745
Improvement in quality of chemical products	4.0400	.76436
Supply chain flexibility	3.5200	.46883
Supply chain response time	4.2600	.71943
Delivery performance	4.1732	.49237
There is improvement in supply cycle time	3.935	0.672
Average	4.19382	0.615226

The study investigated the extent to which retail stores receive supply chain services. On average, the respondents agreed that the sales force supports supply chain performance by 4.19381 and the value of 0.615226. This clearly shows that retail stores in Nakuru County are achieving a certain level of delivering flawless products, increasing sales value,

improving customer satisfaction, providing quality products, improving delivery time, response time supply, cost effectiveness, and improving the delivery system. time. This result agrees with previous reports [9] that the inventory management system contributed to delivery cycle time and delivery performance.

Correlation analysis

Table 5: Correlation between Inventory Management and Supply Chain Performance

Correlation coefficient

Pearson Correlation		Supply Chain Performance in Retail Chain Stores
Continuous replenishment	R	.712**
	Sig. (2-tailed)	.000
	N	106
Inventory optimization	R	.736**
	Sig. (2-tailed)	.002
	N	106

Results on table 5 show that there is a strong, significant and positive relationship between continuous supply and Market performance in Nakuru County, Kenya based on coefficient r=0. 712 PV = 0.000 < 0.01). The results predicted a strong and positive relationship between supply and demand for shop operations in Nakuru area. There was a strong, significant and positive relationship between inventory optimization and installation performance in stores in Nakuru District, Kenya based on coefficient r=0. 736, PV=0.002 < 0.01). This result predicts a significant positive relationship between inventory optimization and supply chain performance in stores in Nakuru region.

Hypothesis Testing

Relationship between Continuous Replenishment and Supply Chain Performance

The study hypothesized that continuous replenishment has no significant relationship with supply chain performance in retail chain stores in Nakuru County. This was tested using a partial regression model $Y = \beta_0 + \beta_1 X_1 + \varepsilon$

Table 6: Model Summary of relationship between Continuous Replenishment and Supply Chain Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713[a]	.507	.505	1.45742
Continuous Replenishment				

ANOVA Results

Table 7 present results on the goodness of fit of the regression model.

Table 7 ANOVA Results on relationship between Organizational innovations and Growth of DTSACCOs

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	381.391	1	381.391	92.480	.000[b]
	Residual	428.729	104	4.124		
	Total	748.857	105			

Independent Variables: (Constant), Continuous Replenishment

Dependent Variable: Supply Chain Performance

Table 8: Beta Regression Coefficients of Relationship Between Continuous Replenishment and Supply Chain Performance

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	6.901	1.145		6.027	.000

Continuous Replenishment	.576	.159	.565	3.626	.007

Dependent Variable: Supply Chain Performance

The R-squared of 0.507 shows that there was a difference or relationship between continuous supply and continuous input that has no significant relationship with the input performance of the building in retail market in Nakuru County. The sample analysis results in Figure 6 show that R2 is 0.507, Std Error= 1.45742, which shows that there is a significant difference of 50.7% in the closing order with no significant relationship in Nakuru County in the installation of retail stores showing that the F. -ratio of the model is 92.480, P = 0.000 < 0.05. These results confirm that the regression model $Y = \beta 0 + \beta 1X1 + \varepsilon$ adopted in this study has a good fit. The results were given a univariate regression model:

Y=6.901+0.56X1+è.

Results on Table 8 showed that continuous supply has a positive effect on the performance of retail stores in Nakuru County as B1= 0.576, PV = 0.007<0.05, t= 3.626). The results show that the increase in the supply sector continues to lead to a significant increase in the installation performance of supermarkets in Nakuru County B1= 0.576. Therefore, the condition is: $\beta 1 \neq 0$ where the sum of the constant filling is not zero, P= 0.000 < 0.05, so the study rejects the null hypothesis and accepts the alternative hypothesis accepted; $\beta 1 \neq 0$, indicating that continuous supply has a positive effect on the performance of retail stores in Nakuru town.

Relationship between Inventory Optimization and Supply Chain Performance

The study hypothesized that inventory optimization has no significant relationship with supply Chain Performance in Retails Chain Stores in retail stores in Nakuru County. This was tested using a partial regression model $Y = \beta_0 + \beta_2 X_2 + \varepsilon$

Table 9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	.844[a]	.714	.771	1.11168

Inventory Optimization

Table 10: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.060	1	53.060	42.928	.000[b]
	Residual	127.308	103	1.236		
	Total	180.368	104			

Independent Variables: (Constant), Inventory Optimization

Dependent Variable: Supply Chain Performance

Table 11: Beta Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	11.717	.509		22.999	.000
proactiveness	.307	.0898	.301	3.416	.001

Independent Variables: (Constant), p inventory optimization

Dependent Variable: Supply Chain Performance

R-squared of 0.714 shows that there is a difference or relationship between resource optimization and installation performance in retail stores in Kenya. The results of the sample analysis in Table 9 show that R2 is 0.714, Std Error= 1.11168, indicating that there is a significant difference of 71.4% between the production and optimization of goods and retail stores in the state of Hug up. The results shown in Table 10 show that the F value of the model is 42.928, P=0.000<0.05. These results support the regression model adopted by this study, $Y = \beta 0 + \beta 2X2 + \varepsilon$ with a very good quality as F=42.92 8. The regression results showed that inventory optimization has a positive and positive effect on the performance of retail stores in Nakuru County (B2= 0.307, PV = 0.001<0.05, t=3.416). The results suggest that one-unit increase in inventory optimization leads to a significant increase in the installation performance of supermarkets in Nakuru County according to factor B2=0.307.

Therefore, the condition β2≠ 0, where the number of product optimization is not zero, P= 0.000 < 0.05, so the study rejects the null hypothesis and accepts the alternative hypothesis, which is accepted that there is a significant relationship between product optimization and power supply between chains stores in Nakuru County. The results confirm [15] that better inventory management helps to improve supply network and reduces costs.

Testing for Moderating Role of Retail Suppliers Collaboration

Multivariate Regression Analysis

The study performs multiple regression analysis to determine whether there existed a significant variation between selected inventory management practices (Continuous replenishment and Inventory optimization) and supply chain performance in supermarkets in Nakuru County, Kenya.

Table 12: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.663[a]	.440	.438	.41590

Predictors: (Constant), Continuous replenishment and Inventory optimization

b. Dependent: Supply Chain Performance in Retails Chain Stores

Table 12 provides a summary of results of several simulations. R-Squared showed that there is a significant gap between continuous supply and inventory optimization and supplier engagement and installation performance in retail stores in Nakuru County and r =0.663 as the standard deviation is 0.05. The revised R2 is known to be proactive in identifying and revealing differences in supply chain performance across major markets in Nakuru County. From the collection of samples in table 6, the adjusted R2 value is 0.438. This shows that 43.8% of the installation work in Nakuru county supermarket is not working due to changes in product management practices which are improvement and optimization.

Table 13: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.784	2	1.892	10.937	.000[b]
	Residual	28.429	103	.173		
	Total	24.000	105			

a. Dependent Variable: Supply Chain Performance in Retails Chain Stores

b. Predictors: (Constant), Continuous replenishment, and Inventory optimization

On Table 13, the total variance (24,000) is the difference between the independent variable (Sample) and the independent variable (Error). The ANOVA results examine whether the regression model was successfully obtained. It examines whether all the variables independently have a complete or combined effect on the installation performance of the retail store. Analysis of variance (ANOVA) showed that total samples were statistically significant and regular implementation and inventory optimization were significant factors for installation performance in retail stores in Nakuru County. The calculated F-value of 10.937 0.000 < 0.05 is higher than the F-critical 1.527. This clearly shows that there is a good correlation between inventory management system and installation performance in retail stores in Nakuru County. The results confirm that independent variables are valid predictors for the installation performance of supermarkets in Nakuru County, Kenya.

Table 14: Beta Coefficients

Coefficients a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.431	.689		5.623	.000
Continuous replenishment	.274	.0359	.265	7.626	.000

Inventory optimization	.486	.0898	.461	5.416	.001

a. Dependent Variable: Supply Chain Performance

The resultant multivariate regression model as indicated as substituting the beta coefficient was

$Y = 0.431 + 0.274X_1 + 0.486X_4 + \varepsilon$

Results Table 14: Cost regression results show that continuous supply has a positive effect on supply performance of supermarkets in Nakuru County as B1= 0.274, PV = 0.000<0.05, t=7.626. The results show that increasing the supply ratio always leads to a significant increase in the installation performance of supermarkets in Nakuru County B1= 0.274. The results show that increasing continues to increase the supply chain's workload. Inventory management systems help in the efficiency of the tea industry. Regression results showed that inventory optimization has a positive effect on supply chain performance in supermarkets in Nakuru County (B2= 0.486, PV = 0.001<0.05, t=5.416). The results show that a one-unit increase in inventory optimization leads to an increase in the installation performance of stores in Nakuru County according to factor B2=0.486. The results confirm reports of [20] that better inventory management helps to improve the supply network and reduce costs.

Table 15: Moderating effect

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.663[a]	.440	.438	.41590
2	.677[a]	.459	.453	.61484

Predictors: (Constant), Predictors: (Constant), Continuous replenishment and Inventory optimization

Predictors: (Constant), Predictors: (Constant), Continuous replenishment and Inventory optimization, Inventory Management practices *Suppliers Collaboration

b. Dependent: Supply Chain Performance

Results presented on Table 15 show that when the salespeople were presented with the relationship between the product management system and supply chain performance, the

R-squared was positive from 0.440 to 0.459. This shows that 45.9% of the chain's performance is explained by inventory management practice that continues to provide in the development of products and the beginning of cooperation with suppliers.

Summary, Conclusion and Recommendations

Summary of Findings

Results showed a positive relationship between delivery and continuous installation in a supermarket in Nakuru County, Kenya. The regression results show that supply continues to have a positive effect on the performance of retail stores in Nakuru region. This shows that continuous replenishment helps to reduce the frequency of processes, organize channels, improve the success of ready-to-pack, and the impact of supermarkets to achieve inventory control and thus improving efficiency in the supply chain. The results show that the store has improved inventory and actual demand identification as a result of sales information and free entry. The study showed a strong, significant and positive relationship between product optimization and installation performance. The regression results also showed that the increase in inventory optimization led to a significant positive increase in the installation performance of retail stores in the Nakuru region. This shows that the increase in flexibility in the supply chain makes the store more flexible, increases inventory control, and the efficient distribution of products due to the need for cycle time affects the performance of the installation in the retail store. Prioritizing quality deliveries time, improved supplier productivity, supply chain efficiency, improved delivery service, improved chemical product quality and improved supply cycle time. The results show that supplier collaboration has a positive effect on the performance of retail stores. The correlation results show a strong, significant and positive relationship between supplier relationships and performance of retail stores. Supplier collaboration promoted long-term cooperation, increased product coordination and development of information between suppliers and retailers.

Conclusion

The study concluded that regular replenishment contributes significantly and positively to performance of supermarkets in Nakuru region. Continuous improvement leads to reduction of repetitive processes, reduction of production lines, development of ready-to-

use packaging, improvement of product management and development of suppliers, as well as improvement of efficiency and timely identification of products. Appreciating the information obtained from vendors, or building a complete system for free, creating a network of weapons, creating an accurate capacity policy, improving the production time of the supermarket - contributing to taste. Delivery efficiency, reduced supply cycle time and increased delivery cost efficiency equipment optimization decisions lead to positive and efficient growth in the installation performance of supermarkets in the Nakuru region. Through inventory optimization, supermarkets have increased supplier flexibility, better inventory management, better product distribution for scheduling, accurate inventory requirements, and increased customer service and management control, and -Increase customer satisfaction - delivery time, scheduling. supplier productivity, improving supply chain costs, increasing delivery efficiency, improving chemical product quality and increasing delivery cycle times.

5.3 Recommendations

Management of retail chain should develop and implement measures to promote continuous supply to improve supply chain performance, which is important for supermarkets in the Nakuru region. Continuous replenishment can be achieved by using frequency, increasing ready packaging, increasing inventory control and improving suppliers, improving product quality, identifying requirements in time, sending information and fulfilling for free up to the point of sale, building a logistics network, improving the opportunity for accurate forecasting of the capacity and facilitating the closing of stocks in time in the store up to the level which helps in increasing delivery efficiency, reducing supply cycle time and improving supply chain. The study suggests that the management of the retail store needs a method to increase suppliers, improve product management, improve product distribution through on-demand scheduling, best-in-class software and network optimization. This would improve the delivery process turnaround time, production speed, increase the cost efficiency of the delivery, delivery efficiency, availability of quality products, and increase the supply cycle time.

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ROLE OF EDUCATIONAL TECHNOLOGY IN BEHAVIOUR CHANGE AMONG STUDENTS IN PRIVATE UNIVERSITIES IN KIAMBU COUNTY, KENYA

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Abstract

Educational technology plays an important role in improving classroom pedagogy in many institutions of higher learning. It enhances sharing of information among lecturers and students and reduces instructional time wastage. However, educational technology has been abused by students leading to behavior change. Many students get distracted from their academic work, rarely concentrate in class but are constantly on their mobile phones attending to issues not related to their academic activities. This study sought to assess the extent to which educational technology has influenced behavior change among students in private universities in Kiambu County, Kenya. The study was guided by the theory of planned behavior. The study adopted a mixed methodology and applied a concurrent triangulation research design. The research targeted 6996 respondents comprising 349 lecturers, 113 Heads of Departments, and 6534 students which a sample of 379 respondents (30 lecturers, 12 HoDs, and 337 students) was determined using Yamane's Formula. Qualitative data was analyzed thematically along the objectives and presented in narrative forms. Quantitative data was analyzed descriptively using frequencies and percentages and inferentially using Pearson's Product Moment Correlation Analysis in Statistical Packages for Social Science (SPSS 23) and presented using tables. The study established that, despite the noble role of technology in improving teaching and learning activities, 56.9% of students in private universities in Kiambu County have witnessed a change in their behavior. Over 65.8% of the students rarely concentrate on class activities with over 80.1% constantly busy with their mobile phones. There is need for students to embrace responsible use of educational technology for their academic benefit and spend little time on non-academic issues. The university management should formulate and enforce ICT policies that restrict the use of technology gadgets such as mobile phones during lectures.

Keywords: Behavior Change, Educational Technology

Introduction

Technology is becoming more and more prevalent in today's education system and its use has improved classroom pedagogy. Learning institutions are striving to provide their students with a computing devices, such as a laptop or tablet, for the students to access the internet, digital course materials as well as digital textbooks [1]. According to a recent survey that was given to New York students, ranging from age 12 to 15, every student surveyed had some form of screened device, and 97% of them also had a cell phone [2]. With this information, it is clear that the direction of education and society is changing rapidly. During the 2019-2020 school year, during the COVID-19 pandemic, the world got a taste of just how quickly the education system is shifting to more technology-based and virtual schooling experiences. Though the use of educational technology has been hailed as noble and timely in improving teaching and learning activities, it has had its fair share of negative effects on the behavior patterns of students, especially those in institutions of higher learning.

A report by Saunders and Vallance (2017) [3] shows that screen time is deleteriously associated with numerous health indicators in child and youth populations, including obesity, aerobic fitness, quality of life, self-esteem, prosocial behavior, academic achievement, depression, and anxiety. Technology in the classroom can also be used to report on students' disciplinary issues such as tardiness and negative behavior [3]. Strong evidence shows how students gain a stronger sense of control by tracking their behavior and have an easier time recognizing when they fall into negative patterns. In Canada, a study by Faught et al (2017) [4], found that many students manifest instances of behavior change with quite a number getting distracted from academic work, rarely concentrating in class but constantly on their mobile phones attending to issues not related to their academic activities. Faught et al (2017) [4] revealed that, in institutions of higher learning, 68% of surveyed educators admit that digital tools make students take shortcuts, instead of investing any effort in writing, 67 % report students have difficulty reading and comprehending complicated texts, and 46 % say that digital tools make students write fast and carelessly.

In many countries in Sub-Saharan Africa, the scenario is the same with the use of technology being at the epicenter of classroom instruction. A study carried out in Ghana [5] revealed that 79.4% of institutions of higher learning have embraced use of technology in teaching and

improving interactions between lecturers and students and that technology has changed the basic idea of education and helped to achieve perfection in the educational field since it has helped teaching staff as well as students in achieving new techniques and ideas of teaching and learning. Similarly, Ng'ambi, et al (2016) [6] undertook a study in a sample of 9 tertiary institutions in KwaZulu Natal Province in South Africa and revealed that educators were worried that the use of technology in the educational field would divert students mind and they will lose concentration on learning, though it improved students' interest and desire to discover new ideas in every subject.

In Kenya, Waithaka et al (2018) [7] opined that the use of technology has become an integral part of every student's academic and social life and observed that the use of technology in teaching is stress-free and the classrooms are energetic and full of positive vibes. In other words, there is an immense change in student's behavior toward learning and the way they look at education has changed. However, with the advent of technology, the behavior patterns of many students in institutions of higher learning with many spending too much time on their mobile phones and the internet thus lowering their time for concentration in academic activities. Private universities in Kiambu County are no exception with technology being considered a milestone in shaping the education and behavior of students.

A study carried out in tertiary institutions in Kiambu County found that, from smartphones and social media to TV and tablets, students are constantly inundated by technology. The authors noted that, while it is important for students to develop an aptitude for technology, after all, they will use computers their whole lives, and too much technology use can have detrimental health and physical effects. The authors observed that many students in private universities in Kiambu County have witnessed a change in their behavior with a majority not able to concentrate on class activities. Despite this, empirical studies are yet to interrogate the extent to which the use of educational technology influences behavior change among students in private universities, hence the study.

Statement of the Problem

Educational technology plays an important role in improving classroom pedagogy in many institutions of higher learning. It enhances the sharing of information among lecturers and

students and reduces instructional time wastage. However, in private universities in Kiambu County, the situation is quite different since many students have demonstrated some degree of behavior change. Many students get distracted from academic work, rarely concentrate in class but are constantly on their mobile phones attending to issues not related to their academic activities. Despite these observations, few empirical studies have interrogated the extent to which educational technology has impacted behavior change among students in private universities, hence the study.

Objectives of the Study

The study sought to assess the extent of behavior change and the extent to which educational technology influences behavior change among students in private universities in Kiambu County, of Kenya.

Literature Review

Theoretical Framework

This study was guided by the technology acceptance theoretical model (TAM) by Davis (1989) [9] and was anchored on the fact that users' technology acceptance intention is directly affected by perceived usefulness (PU) and perceived ease of use (PEOU), which had a positive effect on perceived usefulness. The author observed that user's acceptance of technology is influenced by both intrinsic and extrinsic motivators, which include PEOU and PU respectively. Davis' TAM was adapted from Fishbein and Ajzen's (1975) theory of reasoned action (TRA) and planned behavior [10] which explained people's actions by identifying the causal connections between some components as beliefs, attitudes, intentions, and behavior. According to Ajzen (1991) [11], TPB is a linear model that discusses attitudes, perceived norms, and perceived control which directly influence behavioral intentions, which, in turn, affect behavior. In other words, under TPB, norms and attitudes moderate the influence of perceived behavioral control on intentions. In the context of this study, this theory was particularly relevant to behavior change as occasioned by the use of educational technology by students in private universities in that beliefs and values about technology strongly influence the decisions students make about their behavior.

The Conceptual Framework

In this study, the conceptual framework was based on the use of educational technology which constituted the independent variable whereas behavior change among students in private universities constituted the dependent variable. Intervening variables were; government ICT policy and stakeholders' support as shown in Figure 1:

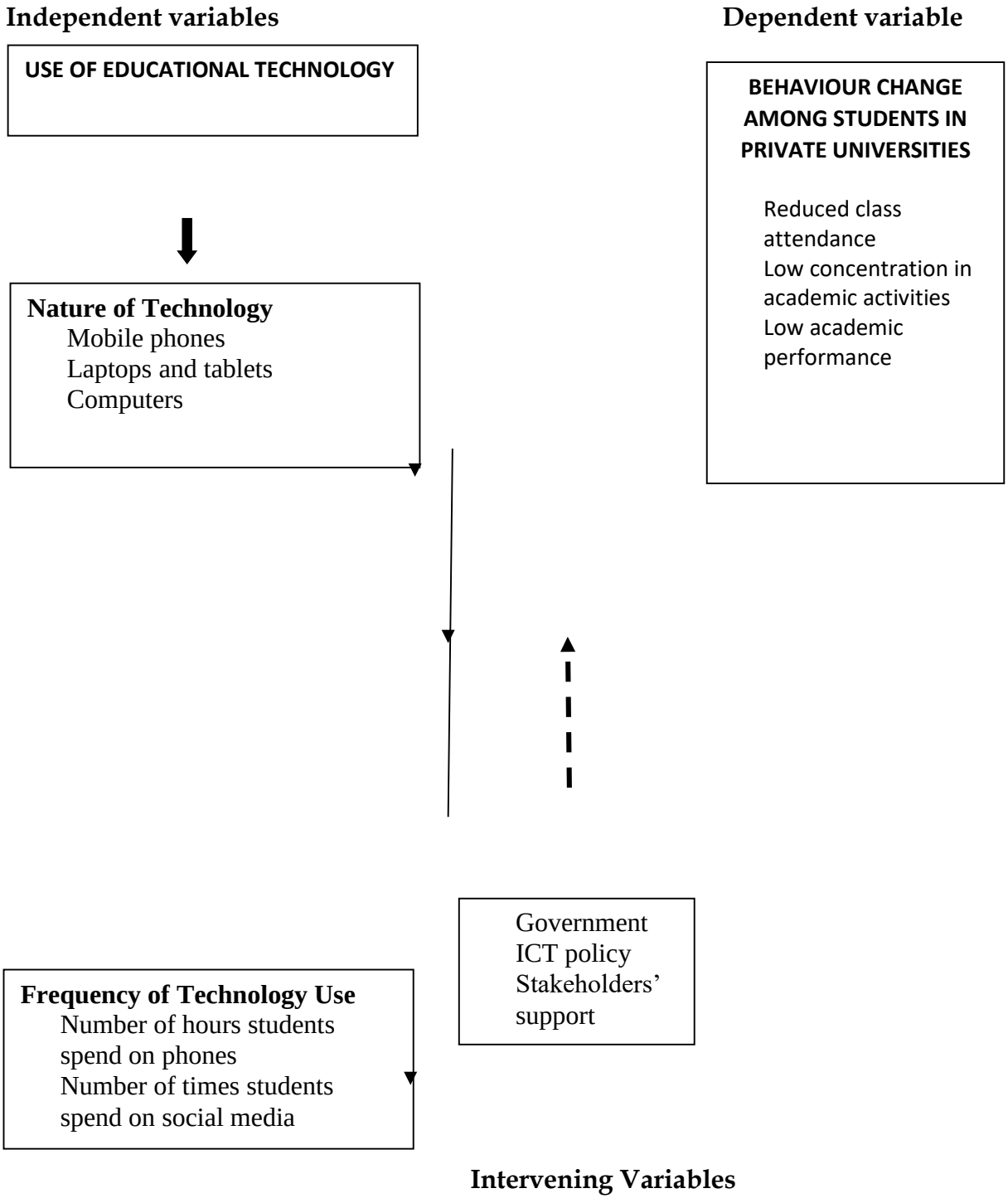

Figure 1: The Conceptual Framework

Source: Researcher (2023)

Research Methodology

The study adopted mixed methodology and applied concurrent triangulation research design. The research targeted 6996 respondents comprising 349 lecturers, 113 Heads of Departments and 6534 students which a sample of 379 respondents (30 lecturers, 12 HoDs and 337 students) was determined using Yamane's Formula. Questionnaires were used to collect data from students whereas interview guides were used to collect data from HoDs and lecturers. Qualitative data was analyzed thematically along the objectives and presented in narrative forms. Quantitative data was analyzed using descriptive statistics such as frequencies and percentages and inferentially using Pearson's Product Moment Correlation Analysis with the help of Statistical Package for Social Sciences (SPSS Version 23) and presented using tables.

Results and Discussions

This section presents the findings of the study based on the objective. It also outlines the methods of presentation of the study findings and discussions.

Response Rates

In this study, 337 questionnaires were administered to students out of which 331 were filled and returned. 10 Heads of departments and 26 lecturers were interviewed. This yielded response rates shown in Table 1;

Table 1: Response Rates

Respondents	Targeted	Participated	Return Rate (%)
Heads of Departments	12	10	83.3
Lecturers	30	26	86.7
Students	337	301	89.3
Total	**379**	**337**	**88.9**

Table 1 shows that heads of departments registered a response rate of 83.3%, lecturers 86.7% and students giving an average response rate of 88.9% which is consistent with the assertions of Creswell (2014) [12] that a response rate above 75.0% is adequate. This information was important since it enabled generalization of the study outcomes to the target population.

Manifestation of Behavior Change among Students in Private Universities

The study sought to assess how often students in private universities have manifested behavior change with the advent of educational technology. Results are shown on Table 2;

Table 2: Extent of Behavior Change among Students in Private Universities

Indicators of Students' Behavior	Number of Students					
	Often		Rarely		Never	
	f	%	f	%	f	%
Use of technology such as mobile phones	241	80.1	35	11.6	25	8.3
Class attendance	134	44.5	160	53.2	7	2.3
Concentration in class	84	27.9	198	65.8	19	6.3
Impressive academic performance	132	43.9	166	55.1	3	1.0

Table 2 shows that 241(80.1%) of the students in private universities often use technology gadgets such as mobile phones, 35(11.6%) rarely use while only a paltry 25(8.3%) stated that they never used technology. On class attendance, 134(44.5%) of students often attend class, 160(53.2%) rarely attend class while 7(2.3%) never.

The study further showed that 84(27.9%) of the students in private universities often concentrated in class, the majority, 198(65.8%) rarely did whereas 19(6.3%) never concentrated in class. A fair proportion, 132(43.9%) of the students often register impressive academic performance, slightly more than half, 166(55.1%) rarely do while a paltry 3(1.0%) never performed well. During the interviews, the heads of departments and lecturers also stated that students use technology gadgets such as mobile phones. The head of the department, HoD1, noted;

Almost all students in my department and the entire university have mobile phones or other forms of technological gadget. Most of them are constantly on their mobile phones chatting. This has often distracted them from academic activities.

On their part, the lecturers also noted that many students are constantly on their mobile phones, and tablets chatting or engaged in internet activities outside their academic programs, sometimes even during lectures. The interviewees noted that students miss class on many occasions, and rarely concentrate on class activities which has occasioned a decline in their academic performance. These findings lend credence to the findings of Agyemang et al (2019) [5] that, in Ghana, 79.4% of institutions of higher learning have embraced the use of technology in teaching and improving interactions between lecturers and students. These findings further support the assertions of Waithaka et al (2018) [7] that, in Kenya, the use of technology has become an integral part of every student's academic and social life. These findings point to the fact that the use of technology has become part and parcel of a student's life, though with a net negative effect on their behavior patterns.

Educational Technology and Behavior Change among Students in Private Universities

The study sought to establish how the use of educational technology influences behavior change among students in private universities. Descriptive data were collected from teachers and results are shown on Table 3.

Table 3: Students' Views on the Influence of Educational Technology on Behavior Change among Students in Private Universities

Test Items	Ratings in %				
	SA	**A**	**U**	**D**	**SD**
The use of technical gadgets such as mobile phones, laptops, tablets, and computers has become a common phenomenon among students in private universities	78.7	9.6	2.3	4.3	5.1

The frequency with which students engage in their technological gadgets has affected their levels of concentration in academic activities	66.8	10.6	3.3	8.6	10.7
Behavior changes among students such as reduced class attendance have been occasioned by increased use of technology	64.8	9.3	5.3	16.3	4.3
In private universities, students' academic performance has gone down since they spend much time on social media and non-academic internet sites	82.7	8.3	2.7	1.7	4.6

Table 3 shows that 237(78.7%) of students were in strong agreement with the view that the use of technical gadgets such as mobile phones, laptops, tablets, and computers has become a common phenomenon among them in private universities 29(9.6%) agreed, 7(2.3%) were undecided, 13(4.3%) disagreed whereas 15(5.1%) strongly disagreed. These findings corroborate the findings of a study carried out in Ghana by Agyemang et al (2019) [5] which established that 79.4% of institutions of higher learning have embraced the use of technology in teaching and improving interactions between lecturers and students. The authors observed that technology has changed the basic idea of education and helped to achieve perfection in the educational field since it has helped to teach staff as well as students in achieving new techniques and ideas of teaching and learning.

Elsewhere, Waithaka et al (2018) [7] noted that, in Kenya, the use of technology has become an integral part of every student's academic and social life and that the use of technology in teaching is stress-free and the classrooms are energetic and full of positive vibes. These findings are indicative of the fact that the use of educational technology has become the in-thing among students as a critical tool for improving pedagogy and learning. Slightly more than two-thirds, 201(66.8%), of the students strongly agreed with the view that the frequency with which students engage in their technological gadgets has affected their levels of

concentration in academic activities while 32(10.6%) agreed. However, 10(3.3%) were undecided, 26(8.6%) disagreed whereas 32(10.7%) strongly disagreed.

These findings support the observations of Faught et al (2017) [4] that, in Canada, many students manifest instances of behavior change with quite a number getting distracted from the academic work, rarely concentrating in class but constantly on their mobile phones attending to issues not related to their academic activities. The authors further observed that institutions of higher learning, 68% of surveyed teachers admit that digital tools make students take shortcuts, instead of investing any effort in writing, 67 % report students have difficulty reading and comprehending complicated texts, and 46 % observed digital tools make students write fast and carelessly.

The majority, 195(64.8%), of the students strongly agreed with the view that behavior changes among students such as reduced class attendance has been occasioned by increased use of technology while 28(9.3%) agreed. However, 16(5.3%) were undecided, 49(16.3%) disagreed whereas 13(4.3%) strongly disagreed. Table 3 shows that most of the students, 249(82.7%), strongly agreed with the view that, in private universities, students' academic performance has gone down since they spend too much time on social media and other non-academic internet sites whereas 25(8.3%) agreed. At the same time, 8(2.7%) were undecided, 5(1.7%) disagreed whereas 14(4.6%) strongly disagreed. These findings lend credence to the assertions of Waithaka et al (2018) [7] that, in Kenya, the use of educational technology has occasioned an immense change in student behavior. This implies that behavior patterns of many students in institutions of higher learning have changed with many spending too much time on their mobile phones and internet thus lowering their time for concentration in academic activities.

In summary, these findings affirm the fact that, though, crucial for improving classroom pedagogy and mastery of content among students, technology has led to negative changes in behavior with a majority of the students rarely attending class, rarely concentrating on their

academic activities which have occasioned low performance in formative and summative assessments.

Inferential Analysis

To verify the influence of the use of educational technology on behavior change among students in private universities, data was collected from the 10 sampled HoDs on how often students spend time on their mobile phones while in class (Very Often = 5, Often = 4, Sometimes = 3, Rarely = 2 and Never = 1) and the number of hours they spend in class activities on a day. Results are shown on Table 4:

Table 4: How Often Students Spend Time on their Mobile Phones while in Class and the Number of Hours they Spend in Class Activities in a Day

How Often Students Spend Time on their Mobile Phones while in Class	Average Number of Hours Students Spend in Class Activities in a Day
5	1
1	8
4	1
5	1
5	8
2	5
5	3
1	7
5	2
2	6

Table 4 shows that students in private universities frequently spend most of their time on their mobile phones while in class which has affected the number of hours they spend in class activities. In other words, the data on Table 4 show that, the higher the frequency of time spent on mobile phones by students, the fewer hours they spend on academic activities in

class. These results were subjected to Pearson's Product Moment Correlation Analysis and the results are shown on Table 5:

Table 5: Pearson's Product Moment Correlation Analysis Showing the Relationship between Educational Technology and Behavior Change among Students in Private Universities

		How Often Students' Spend Time in Mobile Phones in Class	Number of Hours Students Spend in Class Activities
How Often Students' Spend Time in Mobile Phones in Class	Pearson Correlation	1	-.659*
	Sig. (2-tailed)		.038
	N	10	10
Number of Hours Students Spend in Class Activities	Pearson Correlation	.659*	1
	Sig. (2-tailed)	.038	
	N	10	10

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

Data on Table 5 indicates that there exists a negative correlation between the frequency of use of technology and behavior change among students in private universities ($r(10) = -0.659$, $p = 0.038$ at $\alpha = 0.05$). This implies that, with the introduction of technology as a tool for classroom instruction, there has been a net negative effect on students' behavior.

From the study findings, students spend too much time on technology gadgets such as mobile phones, miss classes, and rarely concentrate on academic activities which has led to a decline in their academic performance.

Thematic Analysis

During the interviews, however, the heads of departments and lecturers also responded in favor of the view that the use of technical gadgets such as mobile phones, laptops, tablets, and computers has become a common phenomenon among students in private universities. Head of Department, HoD2, stated;

In my department, almost every student has a mobile phone or tablet which he or she uses either for communication or learning activities. Most of the students get notes from the internet owing to a limited number of course books available in the physical libraries in the university.

On their part, the lecturers indicated that, in the current world, learning takes place through the internet and every student is required to have a technology gadget such as a smartphone or tablet with internet connectivity to get more learning materials. Lecturer, L1, observed;

In my lecture, much of the learning takes place through the internet and I recommend sites where my students can get good notes to supplement what I provide them in the physical class.

These views point to the vitality of educational technology in improving classroom instruction and the need for every student to possess a gadget for accessing online information. However, the interviewees noted that the frequency with which students engage in their technological gadgets has affected their class attendance, and levels of concentration in academic activities as well as lowering their academic performance. Just as noted in quantitative findings, these qualitative findings affirm the fact that, despite its noble role in improving classroom teaching and learning activities besides enhancing mastery of content among students, technology has led to negative changes in behavior with the majority of the students rarely attending class, concentrating in their academic activities which have occasioned low performance in formative and summative assessments.

Summary of Findings and Conclusions

From the study findings, it is evident that the use of technology has become a common occurrence in many private universities to improve classroom delivery among lecturers and enhance mastery of content among students. It makes it easier for students to access a lot of information for learning faster. Thus, many students frequently use technological gadgets

such as mobile phones and tablets for academic reasons. However, the integration of technology has had a net negative effect on the behavior patterns among students in private universities.

Many students spend too much time on their gadgets accessing social media information that may not be relevant to their academic activities. They frequently miss class and rarely concentrate on their academic undertakings which has occasioned low academic performance.

6.0 Recommendations

The study recommends that students should embrace responsible use of educational technology for their academic benefit and spend little time on non-academic issues. The university management should formulate and enforce ICT policies that restrict the use of technology gadgets such as mobile phones during lectures.

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INVESTIGATING THE ROLE OF EDUCATIONAL TECHNOLOGY IN BEHAVIOUR CHANGE

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Abstract

This study suggests that for the perceived change of behavior due to technology, one has to use it regularly. The study focuses on the impact of technology on students and personnel in various levels of education and seeks to expose the behavioral changes due to integration of educational technology. Apparently, integration of educational technology has brought about both pedagogical and behavioral changes desirable to education systems. Technology is thus used to ameliorate learning. However, there is unequal access to technological achievements. Not all schools have trained ICT teachers hence the resulting different sets of behaviors. This paper explored the disparity between the technological advancement and behavioral reasons for the lack of universal technological behavioral changes and the reason for low competency in technological issues. Due to technology, motivation is enhanced, students look forward to the next lesson, learning becomes exciting, efficiency and effectiveness is increased, performance is enhanced, research is enhanced and it helps the users to understand the world better. Qualitative research was used to explore the behavior changes due to technology. Both interviews and questionnaires were used to explore the benefits of technology in schools. The paper expounded the link between educational technology and behavioral changes and how technology can be incorporated into everyday classroom practice.

Keywords: Education, Technology, Behavior, Behavior Change, Interactions.

Introduction

In the contemporary world, integration of educational technology has impacted behavior in both students and educational personnel. Thus, a number of scholars (Donbus and Gurol 2014 [1], Cox and Mcleod 2014[2], OECD, 2019 [3], Wouters et al 2013[4] agree that technology has impacted positive behavior change to a larger extent. Thus, technology has brought about both pedagogical and behavioural changes desirable to education system and contributes to effective and efficient teaching and learning. Cox and Mcleod (2014) [2] postulated that "students found integration of social media (whats up, facebook, twitter) in their education interactive and easy to use, whilst Facebook and twitter increases their motivation". Educational technology thus contributes immensely to teaching and learning environment thereby increasing motivation and performances of both tutors and students.

According to Hussain (2009) [5] "behavior is any action, conduct and interaction that supports or deflects teaching and learning". Behaviour and technology are interdependent and Technology can influence positive behavior change in teachers and students alike.

Although Education technology has become an integral part of a teacher and a student, some tutors find it a bit challenging to integrate technology into education due to inadequacy of competence in technology. This does not take away the benefits of technology to behavior change.

Michel (2018) [6] observed that "with technology, students can consult different books from different authors" easily- either by downloading on Google scholar or by using Amazon and the like. These are big search engines which help the students to perform better in class.

Background

According to Mackenzie (2005) [7] Educational technology is a "conscious effort made for the development and promotion of our powers'', a lifelong process by which a person develops ability to adjust their overall personality and ability to adjust to their environment. Technology entails incorporation of machines and electronic devices in order to produce a competent student with all the necessary skills, values and knowledge. Today technology has

advanced to unprecedented levels with Young ones, middle aged and the old are all catered for by technology through use of smart phones/watches, laptops, desktops, decoders, projectors among others. These gadgets are being used by people as young as 2 years and as old as 90 years. These same gadgets are found in many educational institutions although some fail to use them due to inadequate preparations and socialization.

The degree of technical complexity differs with age. Thus, younger tutors are more technologically enabled than old tutors while the highly educated tutors are also better prepared technologically than ordinary university or college graduates. Thus, while many schools are incorporating ICT in their learning even those found in villages, However, some might fail to secure the gadgets or find a competent computer technology teacher prompting the teachers to teach only theory-based technology without practice. Forbes (2019)[8] observed that "sophisticated learning materials are still a scarce resource in some developing and even developed parts of the world" hence more needs to be done to acquire appropriate gadgets.

According to Hussain (2009) [5], "there is need for another level of innovation which requires schools to question… how technology can be used to support teaching and learning in this era of ubiquitous learning."

Benefits of Educational Technology

Technology has led to more accessibility, low costs and personalized learning experiences making education easy hence young ones and adults can advance their education without hindrances. Online learning has become handy for distance learning and during the times of the pandemics like covid 19 when online learning proved to be a crucial way of learning in such difficult times. Learning is no longer a hustle since students can access information any time of the day even up to midnight. Thus, long as one has a smartphone or a laptop together with the internet, studying is no longer limited to library times and reserve books can now be accessed through the internet.

Images and videos can send the message home with less difficulty. Gabbiadini and Greitemeyer (2017) [9] stated that "video gaming has been associated with enhanced working

memory, performance, task related cortical activity as well as training of emotional skills like self-regulation practices." Thus, if the ministry of education or health wants to embark on educating students on dangers of drug abuse for example, they can use pictures and videos to drive the message home with more impact than just giving a speech. Donmus and Gurol (2014) [1] agreed that learning has been more positive when teaching materials are enhanced by technology.

According to Anita et al (2021) [10] technology is a learning and teaching tool and it impacts on social status, self-esteem, mental health and wellbeing of children and young people. Thus, digital devices are more widely used by young ones which makes their learning process easier. Hoge et al (2017) [11] argues that technology enhances learning, socialization and creativity and broadens their horizons. Tutors and students become more socialized than before due to technology. Students can talk to their tutors anytime of the day. They can ask for clarity on homework and certain assignments either during the weekends or in the evenings. Phone calls, messages and emails are the order of the day. Classrooms have been brought closer home. Students from different districts, areas, countries can convene in one google classroom due to technology. Introverts now have a platform to shine and showcase their talent than in a physical classroom. Technology gives everyone a chance to prove themselves worth! It makes the teaching and learning processes effective. Introduction of technology to education leads to global exposure. Students become abreast with current global issues as students no longer live in vacuums but instead are able to break the circle and understand the world beyond their own world.

How Technology Changes Behaviour

Emotions

According to Szaniszio, (2018) [12] "blogs, forums, online comment sections-are all replete with bold expressions of raw sentiment, encompassing displays of love and adoration… but also hate, disgust and revulsion". The internet and social media have changed the behavior of most students and their tutors both positively and negatively. Thus, through technology,

students can read and learn stories about other students who are doing well irrespective of their backgrounds and economic status. This can encourage them to do the same. It can ward off the negative emotions they may have towards school, teachers and parents. However, if technology is misused, it can contribute to negative emotions, feelings of worthlessness and even lead to suicidal tendencies among the youth. This has been rampant in this 21st century, which Szaniszio (2018) [12] calls the "era of feelings or emotions. Cognition is inherently embodied in emotions. Hoge et al (2017) [11] argues that frequent engagement with social media by young ones has led to some negative outcomes for example anxiety and depression. This has been noticed in some young ones.

Perceptions

According to Disiree (2019) [13] technology engages the six senses of human perceptions; that is hearing, touch, sight, taste, smell and mind. Our perceptions of rhythm and mobility are integrated in technology also through the use of audio/video apps to cell phones and tablets. Technology has thus, changed the way many people, including students and teachers view education and life in general. Some students who view reading books to be monotonous are more motivated to read them online thereby contributing to better grades, thus, technology has facilitated mental rewiring in terms of perceptions.

Research

Smith (2022) [14] argues that "adding technology to the mix reduced the potential for human error and increased the speed of the research process. Thus, it has become easier for students and teachers to do research. Answers are always on their fingertips. According to Forbes (2019) [8] "students are always on the quest for more knowledge due to the vast learning resources." Teachers can go into the classrooms with more knowledge and the same happens for students which has now contributed to more participatory behavior during lessons. However, it has led to a more dependency syndrome on "Hey google… which hinders the reasoning capacity. People no longer want to think neither reason but instead rush for the easiest way to find answers using google! Fintel (2011) [15] argues that "with technology,

students have many teachers and advisors" therefore they become more open minded as they no longer operate in a vacuum as before.

Attitudes

Technology has enabled working hours to be extended. Maddon and Jones (2008) postulates that … blackberry users find it harder to forget about work at home and weekends." The same happens to teachers and students. They can be working anytime of the day due to technology. However, technology can increase stress levels due to the amount of information and communication being received (Maddon and Jones, 2008) [16]. Numerous messages and communications can make it harder for the students and teachers to focus on learning objectives since teachers may lose focus as they respond to phone calls, facebook posts and WhatsApp messages as soon as they hear the alerts on their phone, hence the temptation to glance at the phone and possibly respond immediately. At that juncture, learning is disturbed. School counselors have to deal with the results of negative attitudes emanating from use of technology 24/7.

Inclusivity and Participatory Behaviour

Hillier and Rizk (2022) [17] argue that technology gives support to the children with disabilities to participate more in classroom activities". It increases the participatory behavior of all students including those who feel that they do not measure up to the standards of other students. Thus, those with disabilities can access special education resources thereby improving academic outcomes. Literal books can be limited in the library but the internet can be accessed from every corner, thereby giving students equal access to research which motivates them to participate in class since they will be having background knowledge about the subject. Luppicini (2005) [18] postulates that "educational technology is a goal-oriented problem-solving approach, utilizing tools, techniques, theories and methods from multiple knowledge domains to design, develop and evaluate human and technical resources efficiently and effectively in order to facilitate and leverage all aspects of learning". Therefore, with technology, knowledge problems are solved and students can participate effectively.

Collaboration

It is imperative for teachers and students to embrace technology in education since it facilitates collaboration. Teachers and students and parents collaborate in order for education to move forward. Class and individual work spaces can be created. All of them can contribute to their work space making learning easier and fast. Discussion forums can be created on online platforms for both parents and students. "Users can interact by sharing computer screens, a conference can have a brainstorming screen on which all members can write on from their computers' ' (Drew.C,2023) [19]. Teachers do not need to wait for weekends or holidays to finish in order to give feedback to students. Thus, through google classroom, teachers can give timely feedback to students and the students can correct themselves before they forget. Whatever questions they have will be clarified in time through the work space.

Learning a New Language

When families migrate to new places both parents and children are faced with an insurmountable task of learning a new language. However, with the advent of new technology, it is even much easier to learn through google translator and other language translators like French translators, Portuguese translators and the like. Homework given can be easily accomplished through such translators and students learn the language faster. For teachers, the load becomes lighter since the translators will do some of their tasks.

Self Esteem

Technology is a confidence booster especially to weaker students (Osborne, 1997) [20]. It stimulates their self-esteem and offers them some feelings of pride and encouragement thereby leading to academic achievement. This is a mutual feeling between teachers and students. Both of them develop self-esteem due to the use of technology. Most teachers did not have technology in their initial training but as they learn to use it, their confidence is boosted. They feel that they are better teachers than before. Students become more participatory in class activities and interact better with classmates.

Role Models

Technology enables students to access real world examples which assist them in promoting their critical thinking skills (Hussain 2009) [5]. They can read about hard working people and how they succeeded. This motivates them to work harder and even better.

Communication

There is more interaction through mass educational technology between the student and teacher, among students themselves and between teacher and parents. Technology enhances communication through such applications and google classroom through which teachers can post assignments to students and students can send responses to the teacher using the same application to deliver messages back to the teacher" instantly.

Mounting CCTV cameras in classrooms can assists in controlling the behavior of the students and the teachers since one would want to be seen on camera misbehaving or miscommunicating. This has the capacity to limit disciplinary cases hence learning time is fully utilized.

Literature Review

Technology impacts on socialization, self-esteem and the demonstration of specific behaviors like social isolation. Thus, those who intensely engage in technology perform better than those who use digital technology moderately (OECD, 2019) [3].

According to Wouters (2013) [4] "video games have been reported to be effective when supplemented with other pedagogical methods and played in groups. They support creativity, play and related cognitive, emotional and social development used, students become active, curious and interested in the lesson which will improve their performance and the outcomes. Students like visual aids more than anything else regardless of their age. Learning becomes more attractive and interesting. According to Walsh (2010) [21] "meaning should be communicated through combinations of two or more modes. Thus, students should

not see the lecturer as the only source of knowledge but should be able to regulate their own learning.

Caplan and Turner (2007) [22] are of the view that electronic communication can actually facilitate empathy as they provide access to people in distressing situations. Notably, virtual empathy contributes to real world empathy and improves communication among students. Elsewhere, Hillier and Harrison, (2007) [23] suggested that adolescents who communicated more online had greater clarity of "self-concept, which is the ability to understand who they are in a clear and stable way. Peter et al, (2005) [24] argued that technology can increase the opportunity of developing friendships online. Through education there is sharing of ideas among students and offering support to each other thus, Wood et al (2016) [25] observed that online communication can enhance friendships and decrease loneliness.

However, technology can also have adverse effects on the young people in school. Thus, Bandura (1986) [27] hypothesizes that children imitate what they see, hence, violent video gaming would stimulate aggression in children and young people and may lead to some bullying other students in class. Because of content observed online, students have reportedly beaten or used vulgar language to others. In such cases, parents need to be involved because this kind of rowdy behavior is not learnt from school rather it is learnt through entertainment at home hence the need for parents to control what their children watch at home. Predictably, educational technology can fulfill its purpose without any hindrance if students show discipline at home.

Methodology

The study used qualitative research approach to compare people's attitudes, feelings and views.

Results

Almost all educational personnel at Gacuba 11 TTC agreed that technology involves the use of techniques, skills, machines and digital tools to produce good results and that methods and

tools enable application of scientific knowledge to perform activities easily, quickly and efficiently.

The respondents explained human behavior as a way of being, way of living, a manner of doing things and a way people act when they interact with the environment. An expression of the capacity of a human individual.

All the respondents agreed that technology is interesting and good despite a few negative points hence rightly applicable a good intervention in the classroom. They observed that technology is interlinked to human behavior, influences how people behave, judge others and can shape behavior positively or negatively when managed well. They observed that technology encourages more interaction and has replaced the traditional way of meeting face to face, that it is time saving and less expensive and that students can be motivated to work hard in school so as to be like the role models they watch on television or internet.

They observed that there is now easy transmission of information through emails, what's up, twitter, Instagram and facebook and that way of communication has been made easy hence improving the way of learning and communication. Arguably, use of projectors during learning motivates students to participate more than usual which helps in the improvement of skills. Thus, according to Fintel (2011) [15] "visual instruction can be more appealing to students. Equally, technology assists teachers to share teaching and learning materials effectively.

During Covid 19, technology became a life saver to administrators and students. Thus, students still managed to engage in schooling whilst in the comfortable homes as Online learning became the norm in the year 2019/2020 and later as technology remained crucial in teaching and learning activities enabling quick research in the classroom to both teachers and students. Arguably, technology has to ascertain extent encouraged laziness as teachers and students to google for quick answers to their questions. All respondents in this study had smartphones and laptops which are an integral part of internet and technology assisted learning.

Technology can be used in the classroom to support learning through PowerPoint presentations and videos making learning more interesting and thereby improving the lesson delivery. Teachers are able to research extensively and faster before teaching and inclusive education has been made easy by use of technology. Students and teachers can now share ideas quickly and efficiently and studies become easy. Equally, updated information is easier and faster to acquire enabling faster decision making.

100% of the respondents used google, 80% you tube and almost all used other social media platforms like what's up generally shaping the behavior of both students and teachers alike. The respondents on average spent from 1 hour to 5 hours per day using technology.

Discussion

Technology enhances learning. Thus, according to Fintel (2011) [15], students have many teachers, advisors and effective instruction due to technology. Information is now easily accessible and can be easily and effectively disseminated to students. Studying habits, perceptions, emotions and attitudes have also changed due to the advent of technology. Thus, teachers and students are almost at par in terms of finding access to learning material. According to Worsham et al (2018) [26], people can make better technological decisions and create more meaningful digital transformation leading to tremendous academic and research results.

Recommendations

There is need for both students and tutors to engage in use of technology to enhance curriculum delivery and research output and government should provide infrastructure and provided continuous professional training for ICT teachers in National intuitions.

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IMPACT OF TOURISM ON THE ECONOMY OF RWANDA: SOCIAL ACCOUNTING MATRIX (SAM) ANALYSIS

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Abstract

The primary objective of this study was to evaluate the economic impact of tourism and assess the strength of tourism inter-industry linkages in Rwanda's economy for the year 2013/2014. The SAM model was used to estimate the impacts and linkages of tourism in terms of output production, employment generation, labor income earnings and total value creation. The economic models identified and quantified the linkages between different sectors of the economy. The relationships between expenditure and output, and income and employment (direct and indirect) were described by multipliers. Data for analysis was sourced from EORA multi-region input-output table (MRIO) database: http://www.worldmrio.com/. *All impacts have a starting point in the economy, defined as the direct effect. The direct effect sets off iterations of indirect (inter-industry production). Total tourism expenditure/consumption, which triggers direct effects, consists of internal tourism consumption. Internal tourism consumption is an aggregate that describes the size of direct visitor acquisition within a country of reference. Therefore, internal tourism expenditure (a portion of internal tourism consumption) was used as a basis for calculating tourism multipliers and their associated effects. There are several different types of multipliers depending on the secondary effects included and the measure of economic activity used. The common multipliers computed were associated with output, income, value addition and employment in the economy for the years 2013/2014. Multipliers were decomposed into their various multiplier effects: initial and production effects. About $286 million worth of internal tourism expenditure/consumption in the economy created 72,000 jobs (13% of economy-wide employment) and generated $195 million in labour income (6.4% of national labour income), $381 million in total value addition (6.8% of national total value) and $803 million in output (7.3% of national output).This study analyzed the effects of changes in tourism expenditure/consumption, effects of policies and regulations that affect tourism activity either directly or indirectly, resource allocation, policy and management of tourism development strategies. Internal tourism expenditure (a portion of internal tourism consumption) was used as a basis for calculating relevant multipliers and associated effects. Future studies should estimate the multipliers by considering internal tourism consumption in its entirety and a more robust methodology such as Computable General Equilibrium (CGE) models be considered for further analysis.*

Keywords: Tourism Satellite Accounts, Tourism Internal Expenditure/Consumption, Social Accounting Matrix, Rwanda.

Introduction

The Rwandan economy has annually recorded 8 percent average GDP growth since 2001 and GDP per capita increased more than three-fold from about US$211 per capita in 2001 to about US$718 in 2014 (National Institute of Statistics of Rwanda, NISR) [1]. The service sector accounted for 47% of GDP compared to 33 percent of the primary sector (agriculture, forestry and fishery). The growth of services was almost 9% by 2014 against 7% for industry and 4% for agriculture. The main sub-sectors in the service sector are wholesale and trade, transportation, storage and communication services. Trade and transport services contributed to the share of services in gross domestic product at Rwf 159 billion in 1999 which increased to Rwf 784 billion in 2014. Wholesale and retail trade had Rwf615 billion in 2014 against Rwf133 billion in 1999. Other services including hotels and restaurants, information and communication, and financial services increasingly contributed to GDP from Rwf430 billion in 1999 to Rwf 1,505 billion in 2014. The service sector's contribution grew to Rwf 2,290 billion in 2014 as compared to Rwf563 billion in 1999 (2011 prices).

In 2011, Rwanda tourism industry contributed 63% of the country's service export earnings and therefore significantly supported the country's balance of payment accounts. This sector ranks highly in Foreign Direct Investment (FDI) attraction accounting for up to 40% of total FDI into the country (United Nations, 2014) [2]. Rwanda is reliant on wildlife-based tourism for 90% of its tourism generated revenues (MoTI, 2009) [3]. The principal wildlife attractions are the Volcanoes National Park that offers an opportunity for gorilla tracking, Nyungwe tropical forest (the largest remaining track of mountain forest in East and Central Africa) and Akagera National Park which provides a typical savanna experience.

Internal Tourism Demand

Internal tourism consumption encompasses tourism expenditure and other components of tourism consumption. Tourism Satellite Accounts (TSAs) Tables 1 and 2 describe tourism expenditure[1]. TSA Table 1 presents tourism expenditure by inbound international visitors covering both overnight and same-day visitors (excursionists). Rwanda's international inbound tourism arrivals have been increasing steadily from 908,009 in 2011 to 1,219,529 in 2014. Most visitors arrive and depart by road. For instance, in 2014 almost 90% of arrivals used land transport. Traders, employees and other cross-border visitors are excluded since they do not leave their 'usual environment'. The average length of stay (ALOS) refers to the number of days, on average, taken by a specific group of visitors at a destination. In 2014, the average length of stay was estimated at 6.5 nights weighted according to purpose of visit and mode of transport. The average expenditure per visitor is the amount of money spent in relation to the length of stay by the visitors. As a result, 1,013,607 tourists generated 6,605,211 nights and total expenditure of RWF 202,800 million in 2014.

The total expenditure by same-day and overnight visitors was estimated at RWF 208.1 billion (2014). Domestic tourism expenditure includes not only the expenditure of visitors on domestic trips, but also the expenditure within Rwanda by residents that undertake outbound trips. About 22% of Rwanda's population participated in domestic tourism. Almost 24% of those who participated in domestic tourism were urban-based. The female participation rate was almost 50.6%. In 2014, domestic tourism generated RWF 53.1 billion in 2014 (TSA Table 2).

TSA Table presents other components of tourism consumption in addition to tourism expenditure[2]. The internal tourism consumption for the year 2014 was estimated at RWF 261.2 billion at market prices. At basic prices this translated to RWF 209.2 billion. However, these "other" components were not captured in the TSA for Rwanda.

The Objectives of the Study

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The primary objective of this study is to evaluate the economic impact of internal tourism consumption on Rwanda's economy for the year 2014. The specific objectives are to estimate the impacts of tourism in terms of output, employment generation, and labour income, total value generation and the strength of tourism inter-industry linkages.

Significance of the Study

The significance of the current study is mainly related to policy formulation, implementation, monitoring and evaluation:

Methodology

The economic impacts of tourism can be estimated using economic models that identify and quantify the linkages between different sectors of the economy (Dwyer et al, 2004 [4]; Hara, T., 2008 [5]; Stynes, D., 1999) [6]. The relationship between expenditure and output, income and employment can be described by multiplier effect (Frechtling and Horvath, 1999) [7]. The standard approach is to estimate the economic impacts of tourism by using SAM models in order to derive appropriate multipliers[3].

Tourism Satellite Accounts (TSAs) provide input data for entry into an economy's input-output model (Hara, T., 2012) [8]. TSAs are constructed to aggregate a country's tourism activities into a single industry. The ten TSA tables are built according to the National Accounting System (NAS). The aggregated tourism industry is inserted as one explicit industry in the I-O table, thus avoiding double counting. Data from Rwanda TSA (2014), surveys by NISR and BNR was used to estimate the macroeconomic and inter-industry linkages of the tourism industry. TSA is used in compiling the intermediate and final consumption (demand) vector based on tourism expenditure.

SAM methodology focuses on induced effects besides the direct and indirect ones, giving it some advantages over the I-O modeling methodology Miller and Blair, 2009 [9]; Surugiu, C., 2009 [10]; Hasan GÜL, 2013 [11]). SAM describes the structure of an economy in terms of links

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between production, income distribution and demand (Akkemik, A.K. 2012) [12]. However, SAM is a demand-driven model with an excess capacity assumption. The model assumes that any increase in demand is immediately met by increased supply due to availability of unemployed resources. Such models are robust for economies with high unemployment and unused capacity in all industries (Akkemik, 2012) [12].

A SAM capturing an economy's expenditure and income linkages is derived by modifying the appropriate I-O table. SAM square matrix records flows of all transactions in an economy and provides an accounting system of an economy for a given year. Besides I-O and TSA tables, public sector accounts, national income accounts and balance of payments are used to construct SAM. Table 1 and 2 present modified input-output accounting table for the input output model and the matrix structure of input coefficient and value added coefficient respectively.

Table 1: Modified Input-Output Accounting Table for the Input-Output Model

	Intermediate Demands (Output)				Final Demand	Total Final Demand	Imports	Total Gross Output
Intermediate Supplies (Input)	X_{11}	X_{12}	…..	X_{1n}	F_1	$\sum_{F_1}^{X_{1j+}}$	M_1	X_1
	X_{21}	X_{22}	…..	X_{2n}	F_2	$\sum_{F_2}^{X_{2j+}}$	M_2	X_2
	:	:	X_{ij}	:	:	:	:	:
	X_{n1}	X_{n2}	…..	X_{nn}	F_n	$\sum_{F_n}^{X_{nj+}}$	M_n	X_n
Value-Added	V_1	V_2	…..	V_n				
Total Gross Outlays	X_1	X_2	…..	X_n				

Table 2. Matrix Structure of Input Coefficient and Value-Added Coefficient

Input Coefficient	$a_{11}(=X_{11}/X_1)$	$a_{12}(=X_{12}/X_2)$	…..	$a_{1n}(=X_{1n}/X_n)$
	$a_{21}(=X_{21}/X_1)$	$a_{22}(=X_{22}/X_2)$		$a_{2n}(=X_{2n}/X_n)$
	:	:	$a_{11}(=X_{11}/X_1)$	:
	$a_{n1}(=X_{n1}/X_1)$	$a_{n2}(=X_{n2}/X_2)$	…..	$a_{nn}(=X_{nn}/X_n)$
Value-Added Coefficient	$a^v{}_1(=V_1/X_1)$	$a^v{}_2(=V_2/X_2)$	…..	$a^v{}_n(=V_n/X_n)$
Total	1	1	…..	1

Table. 3 multiple simultaneous equations of total gross output for each industry sector from industry $f-1$ to industry $f-n$ are set up as follows:

$$X_1 = X_{11} + X_{12} + \ldots. + X_{1n} + F_1 - M_1$$

$$X_2 = X_{21} + X_{22} + \ldots. + X_{2n} + F_2 - M_2$$

$$\vdots \qquad\qquad \vdots$$

$$X_n = X_{n1} + X_{n2} + \ldots. + X_{nn} + F_n - M_n \qquad \text{Equation (1)}$$

To schematize a distribution ratio of the amount of input of each industry for industry f from industry $f-1$ to industry $f-n$, the following equations are formulated along with Table 2 representing input coefficients of each industry and equation (1) driven by Table 6.

$$X_1 = a_{11}X_1 + a_{12}X_2 + \ldots. + a_{1n}X_n + F_1 - M_1$$

$$X_2 = a_{21}X_1 + a_{22}X_2 + \ldots. + a_{2n}X_n + F_2 - M_2$$

$$\vdots \qquad\qquad \vdots$$

$$X_n = a_{n1}X_1 + a_{n2}X_2 + \ldots. + a_{nn}X_n + F_n - M_n \qquad \text{Equation (2)}$$

To simplify equation (2), when the input coefficients from each industry are grouped into the same section, equation (2) is presented as the following equation.

$$[X_1 \vdots X_n] = [a_{11}a_{12} \cdots a_{1n} \quad \vdots \quad a_{n1}a_{n2} \cdots a_{nn}][X_1 \vdots X_n] + [F_1 \vdots F_n] - [M_1 \vdots M_n]$$

Equation (3)

To represent a more simplified equation (3), equation (3) is formulated as the following mathematical input-output model:

$$X = A \times X + F - M \qquad \text{Equation (4)}$$

Where X is vector of total gross output from industry $_{f-1}$ to industry $_{f-n}$; A is input coefficient matrix from industry $_{f-1}$ to industry $_{f-n}$; F is a vector of final demand from industry $_{f-1}$ to industry $_{f-n}$; M is a vector of import from industry $_{f-1}$ to industry $_{f-n}$. To extract the invert matrix or the Leontief inverse, which is a multiplier explaining direct, indirect and induced effects, all elements from equation (4) are transposed to X as the following equation (6) as going through equation (5):

$$(1 - A)X = F - M \qquad \text{Equation (5)}$$

$$X = (1 - A)^{-1}(F - M) \qquad \text{Equation (6)}$$

Where $(1 - A)^{-1}$ is the inverse matrix.

The computerized software from the MIG, Inc. time-efficiently helps to produce the inverse matrices, which is a set of multipliers. Analyses of four different sets of multipliers from the input-output system, namely total industry output, labour income, value added, and employment are conducted under a given mathematical input-output model (Equation 6). Each set of multipliers creates four types of multipliers: Type 1, Type 2, Type 3, and Type 4 multiplier within the IMPLAN system[4]. This paper is based on Type 4 multipliers.

Data Sources

The Input-Output Table was sourced from *EORA multi-region input-output table (MRIO) database:*http://www.worldmrio.com/

4

Data for the direct impacts of tourism on the national economy of the country was extracted from the Rwanda Tourism Satellite Account (TSA) for the year 2014.

Software Package for Analysis

This study used the IMPLAN (Impact analysis for PLANning) software to evaluate the economic impact of the tourism sector on Rwanda's economy. The IMPLAN economic analysis framework is comprehensive and adaptive. For a complete description of sources and methodology for construction of the IMPLAN database please refer to the IMPLAN Pro User's, Analysis and Data Guide.

Results

The results in this section encompass the direct, indirect and induced effects arising from demand (Frechtling and Smeral, 2010 [13]; Kumar and Hussain, 2014 [14]; Michalkova et al. 2018 [15]; Pratt, S., 2015 [16]; Song et al, 2012[17]; Arndt, et al. 2000 [18]. Under direct effects, for every one million dollars of production: Food and Beverage sector generated $70,401 in labour income and $143,815 in value addition and created 22 jobs. The Hotels and Restaurants sector generated $266,355 in labour income and $392,161 in value addition and created 77 jobs. Transport sector generated $234,046 in labour income and $345,873 in value addition and created 243 jobs. Under indirect effects, for every one million dollars of production: Food and Beverage sector generated $218,322 in labour income and $727,579 in value addition and created 5,260 jobs.

The Hotels and Restaurants sector generated $172,155 in labour income and $452,808 in value addition and created 1,912 jobs. Transport sector generated $122,059 in labour income and $264,563 in value addition and created 112 jobs. For every one dollar of output: Food and Beverage sector generated $1.1, the Hotels and Restaurants sector $0.9, and Transport sector $1.2. Under induced effects, for every one million dollars of production: Food and Beverage sector generated $180,422 in labour income and $348,064 in value addition and created 387 jobs.

The Hotels and Restaurants sector generated $247,364 in labour income and $685,873 in value addition and created 530 jobs. Transport sector generated $336,913 in labour income and $693,017 in value addition and created 722 jobs. For every one dollar of output: Food and Beverage sector induced $0.7, the Hotels and Restaurants sector $0.9, and Transport sector $1.3.

Tourism expenditure in the year 2014 (Table 3) was decomposed into accommodation ($124 million), food and drinks ($54 million), passenger transport ($35 million), travel agency and tour-operations ($4 million) and shopping ($71 million). Accommodation sub-sector is estimated to have supported about 298 thousand jobs and generated $84 million as labour income, $163 million in value addition and $353 million as output due to $ 124 million spending in the sub-sector. Food and drinks sub-sector supported about 289 thousand jobs and generated $25 million as labour income, $65 million in value addition and $148 million as output due to $54 million spending in the sub-sector.

TABLE 3: TOURISM IMPACT INDICATORS- Tourism Consumption/Expenditure (US$)

		Accommodation	Food and Drinks	Passenger Transport	Travel Agencies etc.		Shopping and Other Expenses
Employment	Direct	9, 227 (03%)	1,125 (0.4%)	8,294 (23%)	967 (23%)		31,152 (33%)
	Indirect	226,394 (76%)	268,588 (93%)	3,814 (10%)	444 (10%)		19,123 (20%)
	Induced	62,772 (21%)	19,747 (07%)	24,602 (67%)	2,867 (67%)		43,057 (46%)
	Total	298,393	289,461	36,710	4,278		93,332
Labour Income	Direct	32,751, 790 (39%)	3,732,906 (15%)	8,280,379 (34%)	965,007 (34%)		28,589,182 (48%)

	Indirect	21,168,706 (25%)	11,576,146 (47%)	4,318,360 (18%)	503,268 (18%)		9,511,111 (16%)
	Induced	30,416,588 (36%)	9,567,640 (38%)	11,919,732 (49%)	1,389,141 (49%)		20,861,994 (35%)
	Total	84,337, 084	24,876, 692	24,518, 472	2,857,416		58,962,287
Total Value Added	Direct	48, 221, 296 (30%)	7,625,564 (12%)	12,236,761 (27%)	1,426,088 (27%)		42,408,300 (41%)
	Indirect	55, 678, 634 (34%)	38,578, 658 (60%)	9,360,071 (21%)	1,090,835 (21%)		20,955,463 (20%)
	Induced	58,671,289 (36%)	18,455,483 (29%)	22,992,550 (52%)	2,679,583 (52%)		40,241,589 (39%)
	Total	162,571,219	64,659,705	44,589,382	5,196,507		103,605,352
Output	Direct	123,599,999 (35%)	53,733,333 (36%)	33,466,667 (34%)	4,133,333 (35%)		71,466,664 (37%)
	Indirect	114,843,291 (32%)	57,684,622 (39%)	20,034,833 (20%)	2,334,886 (20%)		40,721,915 (21%)
	Induced	115,048,607 (33%)	36,188,569 (25%)	45,085,104 (46%)	5,254,279 (45%)		78,908,436 (41%)
	Total	353, 491, 897	147,606,524	100,586,605	11,722,498		191,097,015

Source: Compiled from IMPLAN OUTPUT

Passenger transport sub-sector supported about 37 thousand jobs and generated $25 million as labour income, $45 million in value addition and $101 million as output due to $33 million spending in the sub-sector. Travel agency and tour operations sub-sector supported about 4 thousand jobs and generated $3 million as labour income, $5 million in value addition and $12 million as output due to $4 million spending in the sub-sector. Shopping activities

supported about 93 thousand jobs and generated $59 million as labour income, $104 million in value addition and $191 million as output due to $71 million spending in the sub-sector.

Policy Implications

Employment creation was as a result of 7% direct effects, 72% indirect and 21% through induced effects. Therefore, if the target is to increase employment by 100,000 jobs, the tourism sector needs to create 7,000 direct jobs. Labour income generation was a combination of 38% direct effects, 24% indirect and 38% induced effects. If labour income was to increase by $1,000,000 then the tourism sector should generate $380,000 through direct effects. Total value addition in the economy was generated through 29% direct effects, 33% indirect and 38% induced effects. If value added in the economy was to increase by $1,000,000 then the tourism sector should generate $290,000 worth of value addition through direct effects.

Total output of tourism goods and services in the economy was derived through 36% direct effects, 29% indirect and 33% induced effects. If required increase in the economy's total output is $1,000,000 then the tourism sector should generate $360,000 worth of output through direct effects.

Conclusion

This paper covers general multipliers (direct, indirect and induced) in the economy of Rwanda for the year 2013/2014. Three sectors closely associated with tourism expenditure/consumption are considered in this report. These are Food and Beverage (FandB), Hotels and Restaurants (HandR), and transport sectors. The paper covers specific multiplier effects (initial, production and consumption-induced) with respect to internal tourism demand. Internal tourism demand encompasses tourism expenditure/consumption, gross fixed capital formation and collective consumption.

Almost $286 million worth of internal tourism consumption in the economy created 722 thousand jobs (13% of economy-wide employment) and generated $195 million in labour income (6.4% of national labour income), $381 million in total value addition (6.8% of national total value) and $803 million in output (7.3% of national outpu

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APPENDIX: Rwanda Implan Model

Rwanda IMPLAN Model	**Copyright 2017 Minnesota IMPLAN Group, Inc.**			
Model Information				
Model Year	2013		*Value Added*	
GRP	$5 569 868 114		Employee Compensation	$2 322 098 437
Total Personal Income	$4 163 492 000		Proprietor Income	$721 414 497
Total Employment	5 560 000		Other Property Type Income	$2 520 215 134
			Tax on Production and Import	$6 140 046
Number of Industries	26			
Land Area (Sq. Miles)	10 169		Total Value Added	$5 569 868 114
Area Count	1			
			Final Demand	
Population	11 460 000		Households	5 182 582 010
Total Households	2 546 667		State/Local Government	$
Average Household Income	$1 635		Federal Government	$876 256 173
			Capital	$2 222 740 128
Trade Flows Method	Supply/Demand Pooling		Exports	$285 053 232
Model Status	Multipliers		Imports	-$1 622 100 303
			Institutional Sales	-$1 566 862 485

Economic Indicators						
Shannon-Weaver Index		.51503		Total Final Demand:		$5 377 668 756
Top Ten Industries						
Sector	Description			Employment	Labour Income	Output
1	Agriculture			3 254 281	$85 003 670	$428 973 500
2	Fishing			621 039	$10 857 460	$32 334 910
16	Wholesale Trade			265 049	$226 165 000	$525 059 800
17	Retail Trade			252 031	$222 705 600	$567 889 200
14	Construction			233 520	$284 157 600	$671 708 600
25	Others			227 915	$3 451 336	$27 185 530
23	Education, Health and Other Services			155 680	$501 221 800	$1 313 087 000
19	Transport			116 760	$112 241 400	$479 570 400
21	Financial Intermediation and Business Activities			94 520	$692 705 900	$3 013 000 000
3	Mining and Quarrying			61 160	$4 785 626	$119 032 400
Areas In the Model						
Rwanda	National					

ENHANCING LOGISTICS OPERATIONS THROUGH OPTIMAL WAREHOUSING DESIGN

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Abstract

Warehousing plays a vital role in sustaining global supply chains. This study examined the effect of warehouse design optimization on the logistics operational performance of the Nairobi Inland Container Depot, Kenya, with a specific objective to ascertain the effects of equipment layout on logistics operational performance. The study is grounded in systems theory. It employed a correlational design and conducted a census. Respondents were drawn from the warehousing management, transportation management, and customer care departments. Data was analyzed using descriptive and inferential statistics. The overall model was interpreted using F-value results; the F-statistic was 3.2 against a critical F-value of 2.67. Results showed that equipment layout significantly influences the logistics operations of the Nairobi Inland Container Depot. Future studies should use surveys to examine warehouse optimization and map all containers as part of reverse logistics to assess performance of port activities in Kenya.

Keywords: Warehouse Optimization, Equipment Layout, Logistics Operations Performance, Inland Container Depot.

Introduction

Fundamental to modern supply chain management operations is warehousing located at inland container depots (ICDs), also referred to as dry ports, which handle and store containerized cargo temporarily [1]. These ports aid hinterland customers by providing port services closer to their premises [2]. These ports play a significant role in the success or failure of many global businesses today [3]. These entities: (i) provide storage for raw materials, components, work-in-process, and finished goods; (ii) operate as distribution and order execution centers; and (iii) perform localized and value-added warehousing [4]. The tasks of inland container depots include reception, storage, picking, loading and unloading, and shipping [5]. Similarly, these depots manage inventory levels, track product movement, and optimize warehouse layout operations to reduce costs and improve customer satisfaction [6]. Effective warehouse management ensures efficient flow of goods and materials through supply chains from the point of receipt to the point of delivery [3]. The number of containers handled at container terminals has increased significantly [7]. Numerous changes must be made to layouts to accommodate and handle the increasing number of containers entering and leaving container terminals [8]. The transfer of containers between landside and seaside requires new layouts with smaller footprints that are faster, cheaper, and more efficient [8].

According to a World Bank report, Kenya's logistics performance is rated best in East Africa due to the continued reduction of administrative controls and the upgrading of infrastructure [7]. Similarly, according to logistics performance indicators (LPI), Kenya ranked 42nd globally with a score of 3.33 points in 2019, while surveys conducted in 2019 placed Uganda and Tanzania at 58th and 61st positions with scores of 3.04 and 2.99, respectively [7]. Kenya's logistics performance is second on the African continent after South Africa, which is in the 20th position globally with a score of 3.78 [9]. This LPI shows that Kenya has significantly reduced the costs of doing business and improved its trade flow for exporters and importers, as the attractiveness of a country's logistics depends on customs clearance efficiency and

effectiveness [7]. Optimized layout setups are aligned to meeting business operational needs and integrate warehouse design by revolutionizing inventory organization and retrieval, ensuring swift and accurate fulfillment [2].

Statement of Problem

Warehouse design requirements vary based on factors such as regional infrastructure, economic development, and trade patterns [5]. Inland container depots (ICDs) serve as critical nodes in logistics networks, connecting ports or airports to inland destinations [10]. Regional variations in market characteristics, consumer preferences, and supply chain dynamics influence the design and optimization of warehouses to cater for specific regional needs [11]. Factors such as availability of appropriate equipment, space layout, and the flow of in-transit inventory influence warehouse optimization [12]. Local market settings, customer demands, and industry practices affect the design and operational requirements of warehouses in ICDs [13].

Additionally, local culture and business settings may affect adoption of new technologies, workforce capabilities, and overall working efficiency [14]. Murugi (2022) [15] examined container terminal layouts, identifying different possible future developments and observed that mathematical optimization is more suitable for scheduling problems in the final steps of Netherlands firms. It also identified racks, lifts, transport tools, and automation as key components for handling containers. This study replicates Murugi's research by focusing on equipment layouts (racks, lifts, transport tools, and automation) and their effect on the logistics operational performance of ICD Nairobi, Kenya. Asha and Noor 2019 [16] examined the role of warehouse layout design on the performance of distribution at DHL, Kenya, using a descriptive research design. The study found that several basic principles apply to warehouse layout design and effective distribution center operations [17]. Elsewhere, a study on the impact of logistic management practices on the performance of operations by road transport companies in Jordan using a descriptive-analytical approach observed that logistic

management practices influence inventory management, warehousing, order processing, transportation, and packaging on operational performance [18] and further identified a knowledge gap in the optimization of warehousing design layouts.

Null Hypothesis of the Study

This study tested the null hypothesis that equipment layouts have no significant effect on logistics operations performance of Nairobi ICD, Kenya.

Specific Objective of the Study

The specific objective of the study was to ascertain the effects of equipment layouts on logistics operational performance of Nairobi ICD, Kenya.

Significance of the Study

This study aimed to contribute to the existing knowledge of supply chain management, with a specific focus on warehouse optimization and its influence on the operational performance of inland container depots. The study sought to broaden an understanding of how warehouse optimization, particularly through equipment layouts, can enhance the operational logistics for organizations, thereby improving overall supply chain performance. The findings of this study can guide the development and implementation of policies aimed at creating resilient and efficient logistics supply chains.

Theoretical Review

Systems Theory

Systems theory is an interdisciplinary framework that examines the relationships and interactions between components within a complex system [1]. It emphasizes a holistic perspective, focusing on the whole system rather than just its parts. This theory offers a perspective on warehouse design optimization and its impact on overall logistics operations

[19]. It recognizes that warehouse design is an integral part of the broader logistics system and explores how optimizing it affects efficiency and effectiveness of the entire logistics system [20]. The study utilizes systems theory to examine how optimizing warehouse design impacts efficiency and effectiveness of the entire logistics system within ICDs in Kenya. This theory investigates how changes in equipment layouts, material flow, or storage systems affect other aspects of logistics operations [21]. A well-designed warehouse reduces material handling time, influencing inventory management and passage routes [20]. By analyzing these feedback loops, potential areas for improvement and optimization can be identified. Systems theory also acknowledges that a system possesses emergent properties, recognizing that the overall performance and outcomes of logistics operations within ICDs are influenced by the synergy and interaction of various elements, such as layout, technology, workforce, and processes [22]. Therefore, this study explores how optimizing warehouse design contributes to the emergence of desirable properties such as increased operational efficiency, reduced costs, improved customer satisfaction, and boundary spanning as the interactions and exchanges between the warehouse and its external environment [21].

Empirical Review

Equipment Layouts

The global logistics sector has undergone significant transformations due to technological advancements [23]. In the past, manual tasks were the norm, but now, automation has enhanced efficiency [24]. Previously, customers lacked visibility into the status of their cargo during transit, but today, advancements in software and internet technology have improved tracking systems [4]. Additionally, standardized procedures now guide the operation of forklifts in warehouse management systems, ensuring safety and efficiency [24].

A well-designed layout takes into account the smooth movement of people, equipment, and vehicles within the facility [25]. By establishing separate pathways for materials, employees, and vehicles, the potential for congestion and accidents can be significantly minimized [26]. In

many instances, the planning of a warehouse begins not with the space itself, but with elements such as racks, lifts, or transport equipment, which need to be carefully considered and evaluated for their specific attributes [27]. Optimizing warehouse tasks encompasses various aspects of business management, including inventory management, organization, and transportation management [28]. This process involves making the most of the warehouse's available storage capacity and assessing the impact of material handling equipment choices, labor, methods, procedures, and support systems on warehouse operations [29]. Warehouse design and operations have undergone significant changes with the rise of e-commerce [29]. The complexity of warehouse operations has increased due to the storage of a wide range of stock-keeping units (SKUs) in small quantities, unpredictable demand patterns, and primarily single-line customer orders [30]. Warehouses have expanded in size due to consolidation, and new identification and communication technologies have been integrated, while process automation technologies have advanced, enhancing speed and operational efficiencies [29].

Equipment Layout on Logistics Operations Performance

Garehgozli et al 2019 [2] discussed different container terminal layouts and potential future developments. These developments include expansion by adding or reclaiming land, collaboration with inland terminals, construction of offshore containers, and movement of empty containers to external depots in the Netherlands. The review also presented innovative solutions such as container racks and overhead grid rail systems. The authors used a three-step framework, simulation, and queuing models to estimate performance during the first two steps of layout analysis and design optimization. They found that mathematical optimization is more suitable for addressing scheduling problems within the last steps [22]. Saderova et al 2014 [31] examined warehouse system design methodology by applying the logistics principle-systematic system approach in Slovakia in a cold box. The design process entailed numerous phases of project identification, design process, system analysis, synthesis,

and project evaluation. The warehouse system was designed for two options of racking assemblies served by forklifts based on: alternative 1 and alternative 2 (standard pallet rack with wide aisles and pallet dynamic flow rack). These systems were compared based on capacity, the percentage ratio of storage area from the box area, the percentage ratio of handling aisles from the box area, access to individual pallets by forklift, and investment costs for 1 pallet space in EUR. Based on the multi-criteria evaluation, alternative 2 was chosen as the acceptable design of the warehouse system with a storage capacity of 720 pallet units. Loading and unloading processes are separate from each other, implying that there are no collisions with forklifts. The pallets with the goods are operated on the principle of FIFO (first in, first out), which facilitates the control of the shelf life of batches or series of products.

Odeyinka and Omoegun 2023 [23] examined various types of warehouses and analyzed activities involved in warehouse operations in Nigeria. The integration of warehouses into the supply chain process is emphasized in their critical role in facilitating the flow of goods. The study delves into WMS functions and highlights its importance in inventory control, order management, and system reliability by probing variances amid traditional manual warehousing and automated approaches by taking into account factors such as cost, efficiency, and suitability for different types of organizations. The study suggests that automated warehousing is more suitable for larger companies operating in countries with limited manual labor availability.

Murugi 2022 [7] examined the effect of the adoption of a single window system, cargo scanner management system, and electronic cargo tracking system on logistics performance. Resource advantage competition and task technology fit theories guided the study. It adopted an explanatory research design targeting 300 customs officers and managers of logistics companies within Nairobi. A sample of 171 customs officers and logistics managers were selected using a stratified random sampling technique. Results showed that single window systems, electronic cargo tracking management systems, and cargo scanner management

solutions have a positive and significant effect on the logistics performance of transport operators.

Conceptual Framework

The conceptual model clarifies the affiliation between independent and dependent variables in the study. The independent variable is equipment, and the dependent variable is logistics operational performance, as presented on Figure 1. This was conceptually hypothesized as equipment layouts having no significant effect on the logistics operations performance of Nairobi ICD, Kenya.

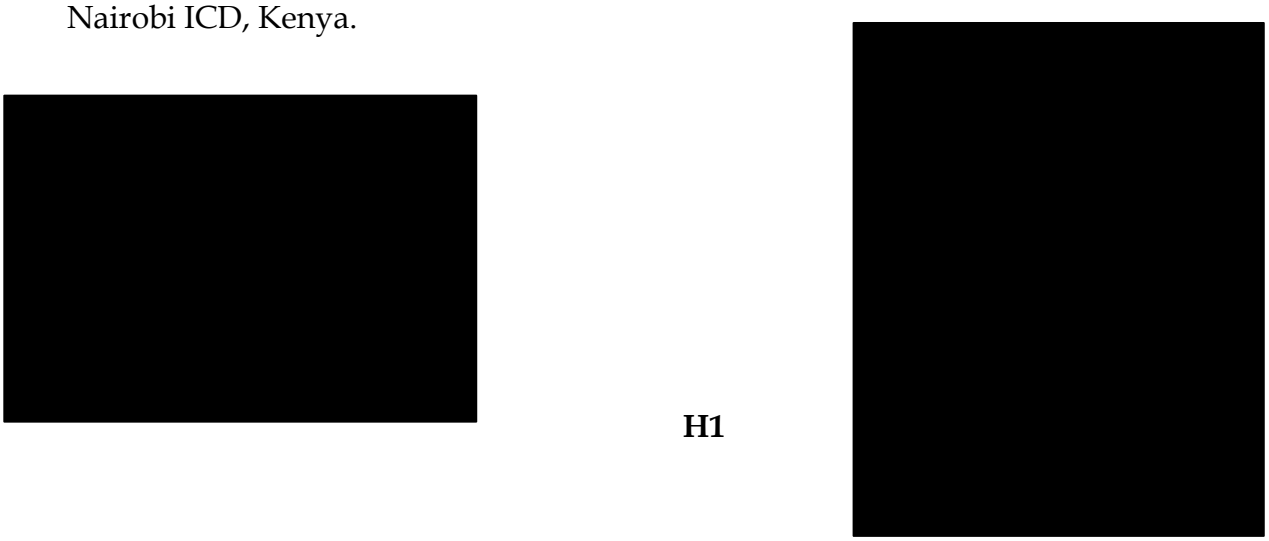

Figure 1: Conceptual Framework

Based on the study's objective and the literature reviewed, the conceptual hypothesis formulated was that equipment layout has a significant effect on the logistics operations performance of Nairobi ICD, Kenya.

Materials and Methods

Research Design

This study adopted objectivism, subjectivism, and interpretivism views of research According to Yin [31]. A descriptive research design is a scientific method considered best as it involves observing, describing, recording, analyzing, and reporting conditions that exist without

alterations. Gitonga et al 2020 [14] described a case study as a description of a specific situation to understand processes performed within an organization. The case study aims to answer how the object affects and is affected by its surroundings. This study applied a descriptive case study design.

Population of the Study

Yin 2017 [31] Emphasizes that a target population refers to a sample from a defined population from which specific units have been properly selected. A population is a complete set of individuals, cases, or objects with some common observable characteristics.

A target population is the total number of respondents in the environment of interest to the researcher [32]. The study targeted managers and staff in warehousing management [7], transportation management [33], and customer sections [28]. The study was a census.

Instrumentation: Reliability and Validity

The data collection process involved a self-administered structured questionnaire. The validity and reliability of the instrument were established through various measures, including a pilot study, pre-test, expert opinion, and Cronbach Alpha coefficient. The Cronbach's Alpha coefficient indicated internal consistency, with acceptable values for equipment layout and logistics operations performance. Validity tests, including construct and face validity, were conducted. Statistical analysis, such as ANOVA, confirmatory factor analysis, correlation, multiple regression, and hierarchical regression, was used to establish relationships between variables. An alpha coefficient of .700 or above is an acceptable measure. Equipment layout had a Cronbach Alpha coefficient of .802 and logistics operations performance had .794. This indicates that the data collected using the aforementioned instrument was reliable for analysis.

Data Collection Procedures

Researchers obtained permission to collect data from the National Commission for Science, Technology, and Innovation (NACOSTI). After obtaining permission from the respective

university, the drop-and-pick method was used, where the questionnaire was left with the respondents and picked up after it had been filled out.

Data Analysis and Presentation

The simple linear regression model used was: $Y=\beta0+\beta1X1+\varepsilon Y=\beta0+\beta1X1+\varepsilon$, where YY is logistics operations performance (dependent variable), $\beta0\beta0$ is the intercept, $\beta1\beta1$ is the coefficient, $X1X1$ is equipment layouts (independent variable), and $\varepsilon\varepsilon$ is the error term.

Ethical Considerations

The researchers obtained a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) to undertake the study. Authority was also sought from and granted by the Technical University of Kenya.

Consent was obtained from respondents before data was collected and guaranteed the respondents' confidentiality of the information provided.

Findings and Discussion

The study used both descriptive and inferential statistics for data analysis. Regression analysis was used to establish the relationship between the variables and to test the hypothesized relationship. The coefficient of determination $R2R2$ shows the degree or amount of variation in the dependent variable attributed to the predictor variable. The Beta values show the amount of change in the dependent variable attributable to the amount of change in the predictor variable, and the F ratio measures the model fit, indicating how well the developed equation line fits with observed data. The statistical significance of each hypothesized relationship was interpreted based on $R2R2$, F, t, β, and p values.

Table 1a: Model summary, anova and regression analysis test results for equipment layout on logistics operational performance items.

Model	R	R- square	Adjusted R-square	Std. Error of the Estimate -	Durbin Watson
1	.175a	.031	.007	1.04811	1.832

a. Predictors: (Constant), Racks, Forklifts/cranes, Transport tools and Automation
b. Dependent variable: Logistics operational performance

Model		Sum of square	*df*	Mean square	F	Sig
1	Regression	2.644	4	.881	3.2	.001a
	Residual	85.734	32	1.099		
	Total	88.378	36			

a. Predictors: (Constant), Racks, Forklifts/cranes, Transport tools and Automation

b. Dependent variable: Component 1, Logistics operational performance

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	2.016	.432	4.672	.000	
	Racks	-.157	.121	-.169	1.305	.001
	Forklifts/cranes	.191	.138	.185	1.385	.007
	Transport tools	.349	.120	.339	2.918	.070
	Automation	.219	.340	.122	1.146	.001

Dependent variable: Component 1, Logistics operational performance

The Coefficient of determination and coefficient of correlation results on Table 1a are as follows: $R^2 = 0.031$, $R = 0.175$. These results imply that 3.1% of the variation in the dependent variable is explained by equipment layout, while the correlation between the independent and dependent variables is 17.5%. From these outputs, the F-test value (3.2) is higher than the critical F-value (2.67) [34]. The unstandardized values on Table 1b indicate that racks, forklifts/cranes, and automation significantly contribute to the dependent variable, whereas transport tools were insignificant. The analysis derived the following econometric regression equation:

$Y = 2.016 - 0.157X1 + 0.191X2 + 0.349X3 + 0.219X4$. Additionally, the R-value signifies a genuine but modest link with the criterion variable [33].

Conclusion and Recommendation

The objective of the study was to ascertain the impact of equipment layout on the logistics operational performance of the Nairobi Inland Container Depot (ICD), Kenya. The key indicators of the variable studied were racks, forklifts/cranes, transport tools, and automation. Descriptive statistics indicated that equipment layout had a significant effect on the response variable. Inferential statistics revealed that racks, automation, and forklifts/cranes had a substantial influence on the criterion variable, whereas transport tools had a negligible impact.

The coefficient estimate values are as follows: Beta = 2.016, coefficient of determination R^2 = 0.031, F-statistic = 3.2 and critical F-value = 2.67. These results indicate that the F-statistic (3.2) is higher than the critical F-value (2.67), signifying that the model is substantial. Consequently, the null hypothesis is rejected, and the alternative hypothesis is accepted.

Future Research

The study recommends that upcoming studies should encompass the mapping of all containers as reverse logistics to assess their impact on port activities in Kenya.

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SUPPLIER SOURCING PRACTICES ON SERVICE DELIVERY AT STATE DEPARTMENT FOR DEVOLUTION IN NAIROBI, KENYA

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Abstract

While many of the researchers have acknowledged that a reduction in costs is as a result of efficient buying, it has equally been challenged and agreed upon that cost alone cannot be an adequate measure of world class procurement performance. This falls short of excellence in sourcing and supplier management practices. It is also important to ensure that prospective suppliers have the capability and demonstrate a willingness to form a collaborative relationship early in the requirement definition process. The purpose of this paper was to assess the effects of supplier sourcing practices through the lens of supplier selection, evaluation and development on service delivery in the public department.

Keywords: Supplier Sourcing practices, Service Delivery, State Department, KENYA

Introduction and Background

Selecting the right supplier is a difficult decision for many companies and organizations, with a possible significant impact on the organization's ongoing performance and its ability to obtain the quality products and services it wishes to market [1]. Previous research also suggested that organizations involved in supplier development programs will improve their supplier performance and build competitive advantage. Monczka et al 2015 [2] stated that choosing a supplier is a deliberate multi-party process. When selecting a service, there are a few factors to consider. These characteristics, such as managerial and cultural fit, the supplier company's strategic direction, and objective unity, are difficult to quantify because they are considered "soft" elements instead of cost. Based on current research, one of the important practices in the literature on supplier management is supplier development. In order to ensure that possible suppliers can meet the buyers' short- and long-term expectations, buyers engage in this technique [3]. Contract management comprises drafting contract terms and conditions, maintaining consistency, and documenting any variations that may occur during the project execution process. In procurement, contract management has been linked to helping purchasers make sure that involved suppliers are managed well. The research indicates that public sector companies are often entangled in procurement contract management challenges, notwithstanding the significance of contract management [4].

The costs and labour expended by purchasing organizations in overseeing formal contracts with their engaged suppliers are among the problems associated with contract management [3]. These difficulties have an effect on how well purchasing groups collaborate with suppliers to achieve their goals [3]. Therefore, in order to maximize procurement efforts, purchasing organizations should adopt the mindset of effectively handling contract management challenges while integrating suppliers. Turner 2017 [5] stated that supporting an organization's contractual management administrative process is the main goal of contract monitoring and control. Project managers may encounter situations in which a project must fulfill quality standards outlined in the project management plan even though it is completed

on schedule. Monitoring and overseeing contractor performance to ensure the greatest potential outcomes from a contract is known as contract management.

The concept of the Resource-Based View highlights the significance of a company's unique assets and proficiencies in achieving sustained competitive advantage. Organizations that focus on the qualities of valuable, unusual, hard-to-mimic, and non-substitutable resources can develop procurement strategies that leverage their unique skills. By matching their procurement strategy to their resource base, the state department of devolution can enhance service delivery, set themselves apart from competitors, and eventually perform better. According to Oluka and Basheka 2014 [4] the T.C.T. provides an effective framework for managing contracts related to procurement as well as other important contractual processes. Consequently, in order to guarantee that procurement deliverables are fulfilled, buyers should endeavor to enhance supplier management, as contractual processes control the interactions between suppliers and buyers. Buyers may incur additional expenses and exert more work in administering the contracts, according to T.C.T [6].

Statement of the Problem

Every organization depends on its suppliers, and how well they perform affects whether or not the organization achieves its objectives. The process of finding suitable suppliers who can provide the best and highest quality goods and/or services at the right time, in the right quantity, and at a reasonable price is known as supplier evaluation and selection. Choosing suppliers is a difficult task for any business operating in a cut throat market. The organizations should therefore be exposed to reliable suppliers and be ready to develop potential suppliers to survive competitively in the dynamic markets, [7]. Based on their research, the authors determined that supplier selection has a considerable impact on procurement function performance and hence an organizations' overall success.

Standard selection criteria like price, quality, and delivery are not the only considerations in a strategic supplier selection and evaluation decision. Thus, to establish a long-term supplier

relationship, strategic sourcing should take into account additional factors like quality management practices, long-term management practices, financial strength, technology and innovativeness level, suppliers' cooperative attitude, suppliers' co-design capabilities, and suppliers' cost-reduction capabilities. Wandera et al 2022 [8] employed a descriptive case study design with statistical analysis in their study examining the impact of procurement practices on multinational corporations (MNCs) in Kenya. Their findings, based on data collected via questionnaires, revealed that specific practices – contract monitoring and evaluation, information and communication technology (ICT) utilization, supplier partnership development, strategic outsourcing, and procurement risk management all contributed positively to organizational performance. The case study corporation demonstrated efficiency gains through timely deliveries, streamlined procurement processes, and effective supplier relationship management, ultimately leading to superior performance. Additionally, the study highlighted the importance of user department involvement and ongoing process review to ensure the procurement function adapts to evolving customer needs. In this way organizations are thus intentionally continuously working towards better standards from the suppliers impacting delivery and performance of the organization at the same time reducing the risk of non-performance and delivery of the suppliers [9]. The following questions were therefore raised: does supplier selection, supplier evaluation and supplier development have any effects on service delivery?

Study objectives

The study was guided by the objective:

Supplier sourcing practices on service delivery at the state department for devolution in Nairobi County, Kenya.

Theoretical Review: Grey System Theory

The grey system theory was first put forth by Deng in the early 1980s. According to the Grey System Theory, the majority of supplier assessments in a real-world business setting take place in a situation with imperfect information. Decisions regarding the evaluation of

suppliers are therefore uncertain. It is thus, essential to create qualitative or quantitative indicators or criteria that can be used to evaluate suppliers in such a setting before choosing one. The seven progressive steps of the grey correlation analysis model were developed using this theory as basis [10]. Grey creation, grey modeling to produce a set of grey variation equations and grey differential equations, grey prediction to derive a qualitative prediction, grey decision, grey relational analysis, and grey control are the processes that make up this process. The Grey System theory considers the following factors in order to identify the optimal supplier: Factor dependability and expandability, a manageable number of variables that can be directly ascribed to possible suppliers, and the existence of critical factors for the buyer. The theory creates a grey relation by utilizing the series comparability concept. It would be possible to create an assessment matrix to help with this procedure. In order to select the best supplier, a goal must be set and all assessment elements must be carefully considered in light of the demand patterns and the qualities of the commodities to be sourced. This theory is pertinent to the study since it covers the complete supplier selection process and essentially offers criteria and a strategy for choosing a supplier, which is important when purchasing organizations evaluate critical performance areas.

Because the theory offers a standard for choosing the qualities to consider in a supplier, it has the beneficial and useful effect of increasing selection effectiveness. The performance of the supply chain is positively impacted when a quality supplier is chosen.

Literature Review

For this study three sourcing practices were identified as supplier selection, supplier evaluation and supplier development which if adopted effectively can yield competitive advantage for organizations. Supplier sourcing is a phase of the procurement cycle that focuses on locating, evaluating, and selecting vendors or suppliers to offer the goods, services, or raw materials required for everyday business operations. It is an essential stage in the purchasing process that significantly affects the availability, cost, and caliber of the goods or

services purchased. PPOA 2011[10] demonstrates how strategic sourcing selections have a direct impact on service delivery results. Notably, supplier collaboration and the integration of modern technologies through strategic sourcing has been shown to result in improved service quality and operational preparedness. Similarly, Wang et al 2020 [17] emphasize that a diverse supplier base, facilitated by strategic sourcing, mitigates disruption risks, enabling uninterrupted service delivery. Furthermore, it has been discovered that strategic sourcing optimizes resource allocation, reduces costs, and improves response to dynamic operational needs. The SDD may guarantee that it procures products and services that fulfill strict quality requirements and contribute to mission achievement by aligning sourcing choices with organizational goals. The idea that strategic sourcing is a keystone for raising service delivery standards is essentially supported by empirical data, allowing organizations to accomplish their goals effectively and efficiently while preserving operational readiness and stakeholder satisfaction. According to [9], a company's evaluation and selection of suppliers is one of its most important tasks [11, 12], postulating that selecting suppliers is difficult as it requires careful evaluation of several important factors. On the other hand, supplier selection takes into account both qualitative and quantitative elements, it is a problem with multiple objective criteria.

Process-based and performance-based evaluations are the two categories of supplier evaluations that [10] propose. Process-based evaluation is an appraisal of the supplier's actual production or service process and is usually carried out by site auditing [12]. According to Tolmay 2019 [13] performance-based evaluation is an appraisal of the supplier's actual performance based on a range of factors, including cost and delivery dependability. Performance assessment is more popular since objective data is more accessible to evaluate and more widely available than the manufacturing or service process of the provider [12].

Supplier development is any activity carried out by a purchasing organization that focuses on identifying, measuring, and improving the performance of suppliers and facilitating "the continuous improvement of the overall value of goods and services" provided by suppliers

to the purchasing organization [14]. Furthermore, it should be mentioned that through supplier development practices, acquired items may be conveniently made available to customers' premises through improved delivery schedules, supply flexibility, and internal quality enhancement [14]. Supplier development and buyer-supplier relationships, according to Mgawe and Masanja 2018 [7] should be simplified to allow enterprises to organize their processes and engage with suppliers in developing product manufacturing capabilities [11]. Supplier development entails the process of; supplier assessment as many organizations today evaluate supplier-buyer relationships using reliability, quality, pricing, satisfaction, commitment, trust, and benevolence criterias [9]. These are regarded as primary relationship dimensions that drive buyer-supplier relationship [8].

Conceptual Framework

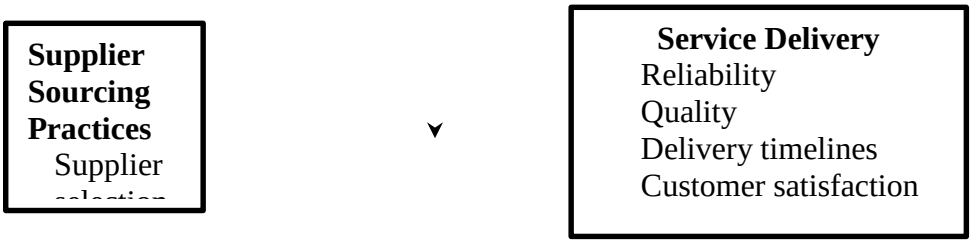

Fig.1: Conceptual Framework

Source: Researcher

Research Design

Descriptive research is a scientific method considered best design as it involves observing, describing, recording, analyzing, and reporting conditions that exist without alterations. This study is based on census design [14]. The authors further describe a case study as a description of a specific situation to understand processes performed within an organization. This study applied a descriptive correlational research design with simple random sampling technique to select a sample of 110 from a population of (150) employees at state department of

devolution, Nairobi, Kenya. A structured questionnaire was used to collect data and validity tests such as construct and face-to-face validity, were conducted. Statistical analysis as ANOVA, correlation, regression were conducted. Saunders et al 2019 [15] argues that cronbach Alpha coefficient of .700 or above is an acceptable measure depicted by supplier sourcing having a cronbach Alpha coefficient of .810, while service delivery performance had .814. This indicates that data collected using instruments was reliable.

Research Findings

The study sought to ascertain the effect of supplier sourcing on service delivery. To realize this objective, R-square, level of significance, and R with criterion variable was computed expending model summary, anova, and regression tests on Table 1.

Table 1: Model Summary, Anova and Regression Test Results for Effect of Supplier Sourcing on Service Delivery Items

Model	R	R- square	Adjusted R-square	Std. Error of the Estimate	Durbin -Watson
1	.422[a]	.178	.012	1.06221	1.615

Predictors: (Constant), supplier selection, supplier evaluation, and supplier development

Dependent variable: Service delivery

Model		Sum of square	*df*	Mean square	F	Sig
	Regression	4.126	3	.731	1.98	.002[a]
1	Residual	87.268	96	1.022		
	Total	91.394	99			

Predictors: (Constant), supplier selection, supplier evaluation, and supplier development

Dependent Variable: Component 1, Service delivery

Model	Un-standardized Co-efficient		Standardized Co-efficient	t	Sig
	B	Std. Error	Beta		

	(Constant)	1.458	.462		2.282	000
1	Supplier selection	. 175	.143	.032	1.225	.080
	Supplier evaluation	.000	.001	.218	.012	.073
	Supplier development	.044	.018	.132	2.468	.004

Dependent variable: component 1, Service delivery

The coefficient of determination and correlation results on Table 1 for the model are; (R^2=0.187, R=0.422). These results imply that 18.7% of variation in dependent variables is explained by supplier sourcing, while 42.2% clarify affiliation amid predictor and dependent variables. The Anova results on Table 1 (F (3, 96) =1.98, p<.05). The F-statistic (2.7) value is smaller than critical F-value (2.7). The un-standardized values on the regression model elucidated on Table 1 reveals that all observed manifest determinants on supplier sourcing significantly imply dependent variables. Thus, $Y=1.458+.175X_1+.000X_2+044X_3$; econometric model was derived, where Y: service delivery, X_1: supplier selection, X_2: supplier evaluation, and X_3: supplier development.

H_{01}: Supplier sourcing practices have no significant effect on service delivery

The coefficient estimate values on Table 1 are; {(Beta=2.054)}, goodness-of-fit statistic (R^2) (0.053) values, F-value (1.98) values, and critical F-value (2.67) consecutively. The F-value (1.98) is lower than critical F-value (2.7).

This finding, designates the model is inconsequential. Thus the null hypothesis is accepted and the alternate hypothesis rejected.

Summary: Supplier sourcing practices

The objective studied supplier sourcing practices on service delivery at the state department for devolution, Nairobi. The constructs of the variable are supplier selection, supplier evaluation, and supplier development. Descriptive statistics on the variable had mixed

findings, where, supplier selection and evaluation were insignificant with supplier development being significant on dependent variables. The business environment has become complex day by day with uncertainty, instability and volatility. The Public sector has to rethink the traditional methods and strategies for doing business in order to overcome the changing market conditions and customer preferred service levels. Supplier development should be a priority for government agencies in order for them to improve performance. This is also a key factor in building partnerships and improving mutual success. Further research is necessary on the effect of supplier relations on service delivery in service industries like apparel.

Conclusion and Recommendations

This study examined the impact of supplier sourcing practices on service delivery at the State Department for Devolution in Nairobi, focusing on supplier selection, evaluation, and development. The findings revealed that while supplier selection and evaluation had an insignificant effect, supplier development significantly influenced service delivery. Given the increasing complexity and volatility of the business environment, it is imperative for the public sector to innovate beyond traditional methods to meet evolving market demands and customer expectations. Prioritizing supplier development is crucial for government agencies to enhance performance, build strong partnerships, and achieve mutual success. Future research should explore the effect of supplier relations on service delivery in service industries, such as apparel, to gain broader insights.

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