# Integration of Information Communication Technology, Strategic Leadership and Academic Performance in Universities in North Kivu, Democratic Republic of Congo

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Abstract:- Information communication technology has become an integral part of the management of higher educational institutions worldwide. There is no aspect of our lives that technology has not penetrated and brought lasting impact. This study delves into the intricate dynamics of how ICT influences management and learning processes in higher learning institutions. It sought to critically examine the impact of the integration of information communication technology in the strategic management of institutions of higher learning, specifically focusing on North Kivu, Democratic Republic of Congo. It aims to critically assess the integration of ICT and its impact on financial management, human resource management, and the overall enhancement of faculty and employee effectiveness in Congolese higher learning institutions. The study was conducted within selected institutions of higher learning in North Kivu in Congo. The study engaged a sample size of 124 staff from select universities who participated in this study. The study was guided by the positivist research philosophy, and it employed a cross-sectional descriptive design. This study utilized purposive sampling technique to get the sample size. Data collection was done through questionnaires. Data analysis entailed using descriptive statistics and inferential statistics. Descriptive statistics used mean and standard deviation which served as key metrics. The Ftest was used to make statistical inferences. Analysis of qualitative data was done using the use of content analysis. The study established that ICT usage, ICT accessibility, and ICT integration both have significant influence on academic performance. Furthermore, the study determined that strategic leadership played a mediating role in the relationship between ICT integration and academic performance. It is, therefore, advisable for managers of these institutions to invest in ICT so that they can improve performance and increase service delivery to all the stakeholders.

**Keywords:-** Integrated Financial Management Information System, Information and Communication Technology, Integrated Educational Management Information System.

# I. INTRODUCTION

Technological advancements have revolutionized higher education within the past few years, with information communication and technology (ICT) playing a crucial role in modernization, administrative services, research, and transforming learning paradigms within universities globally <sup>6,11,13</sup>. However, in some developing countries, higher learning institutions are still struggling to fully leverage the benefits of ICT investments effectively, resulting in a lack of innovation within these universities <sup>5,8,10</sup>. The challenges associated with the integration of ICT in higher learning institutions include the misalignment of the acquired ICT system with the organizational activities, policies, and objectives. According to <sup>7,8</sup>, the successful integration of ICT into the delivery of a service requires alignment between organizational objectives and ICT strategies.

To enhance the effectiveness of addressing the challenges associated with ICT integration, Organizations should consider both technical and non-technical perspectives. This entails evaluating various aspects such as policy factors, human resources, ICT infrastructure, and institutional factors<sup>17</sup>. In light of the complexity of integration, it has become clear that there is a need to establish a comprehensive framework to guide the implementation and integration of ICT within HEIs particularly in developing countries9, 6, and 11. Measuring and assessing the impacts of ICT on university services is challenging particularly in developing countries like the Democratic Republic of Congo, and there is a need for a comprehensive approach to assess the value and contribution of ICT investment in HEIs. Achieving this alignment requires a concerted effort to bridge

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the gap between ICT infrastructure and organizational Objectives, <sup>3, 2, 4</sup>. The alignment of the HEIs structure and objective, ICT infrastructure, and IT strategies is critical for the successful integration of ICT in HEIs. This alignment can be achieved via a set of exercises that encompasses and considers both the technical and social perspectives.

# II. STATEMENT OF THE PROBLEM

The global landscape of higher education is becoming increasingly competitive and HEIs are seeking innovative ways to enhance their teaching and learning process<sup>2</sup>, driven by many challenges which require strategic planning and decision-making regarding integration of ICT to enhance teaching and learning experiences. ICT integration has been identified as a critical factor in improving the performance in higher learning institutions <sup>3</sup>.

In Congo, the successful integration of ICT in higher learning institutions has been hindered by various challenges including, inadequate support from leadership in integrating ICT, lack of ICT infrastructure, and limited technical skills among staff<sup>7,9</sup>. A previous study in Australia focused on the relationship between ICT integration and Teacher use in primary schools in Australia<sup>12, 13</sup>. This Study seeks to address the gap in the literature by exploring the relationship between ICT integration, leadership support, and service delivery in higher learning institutions.

Despite the potential benefits of ICT integration in higher learning institutions, there is a lack of clarity on the role of leadership in supporting ICT integration in Congo. The lack of ICT integration in both learning and strategic management has resulted in stunted processes in higher learning institutions in North Kivu, Congo. The university's infrastructure and human resources have continued to face challenges in efficiency and competitiveness. Affecting their ability to attract and retain. The study aims to investigate how ICT integration and leadership support can improve the efficacy and competitiveness of universities' infrastructure and human resources, including the admission process, financial records system, and human resource management system. Therefore, this study aims to explore the impacts of integrating ICT and leadership on performance in strategic management on service delivery in higher learning institutions in North Kivu, Congo

## III. OBJECTIVES

## ➢ General Objective

The general study objective was to investigate the impact of ICT integration and leadership on the performance of institutions of higher learning in Congo.

- To assess the level of ICT integration among employees in higher education institutions in North Kivu.
- To assess the level of ICT utilization by strategic leadership in higher education institutions in North Kivu.

• To investigate the impact of ICT integration in learning and teaching on academic performance in higher education institutions in North Kivu.

#### Research Questions The study was guided by the following questions:

- What is the level of ICT integration among employees in higher education institutions in North Kivu?
- What is the level of ICT utilization by strategic leadership in higher education institutions in North Kivu.?
- How does the integration of ICT in learning and teaching impact academic performance in higher education institutions in North Kivu?

## IV. MATERIALS AND METHODS

## A. Research Design

The study employed a cross-sectional descriptive design that aimed at determining how ICT has been integrated and its impacts on the performance of five higher learning institutions in North Kivu, Congo. A cross-sectional descriptive design was chosen to provide a detailed description of the research area which made it possible to explore the broad spectrum of variables that affect the unit under investigation for the purpose of examining research. This design facilitates the collection of in-depth information from a wide range of sources including employees and managers at different levels in the university in North Kivu. The dependent variable in this study is the performance of institutions of higher learning in North Kivu, Congo. The independent variables are ICT integration, leadership, and accessibility.

## B. Target Population

The study was undertaken within five institutions of higher learning in North Kivu in the Democratic Republic of Congo, which involved interviewing staff and directors at different levels of management within these institutions. The target populations considered staff from both the academic and administrative sides of the university <sup>12</sup>. The research would be acquiring information from the personnel and management staff of the five selected institutions. The target population for the study consisted of 470 respondents from the five institutions of higher learning in north Kivu as shown in the table below:

University	Number of Employees
UCBC	73
UCG	130
ULPGL	120
UOS	62
UNILUK	85
Total	470

Table 1: Target Population of the Study

## C. Sample and Sampling Methods

The study utilized purposive sampling technique. Purposive sampling is a technique that is mainly used in qualitative research work to deliberately select cases that

Specific Objectives Specifically, the study sought to:

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offer rich and meaningful information, to maximize the use of limited resources <sup>14</sup>. It entails identifying and selecting an individual and an institution that possesses the relevant experiences and the knowledge that is required to answer questions in the research <sup>15</sup>. The choice to employ purposive sampling in this study was driven by the need to target participants who possessed an in-depth understanding and relevant experience regarding the integration of ICT and its impacts on higher learning institutions in North Kivu, Congo.

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University	Management	Teaching	Non-teaching Staffs	Total
UCBC	10	44	19	73
UCG	10	84	36	130
ULPGL	10	77	33	120
UOS	10	36	14	62
UNILUK	10	53	24	85
Total	50	292	126	470

#### D. Sample Size and Sampling Technique

The study employed a sample size of 140 participants, determined using the Kothari formula. A purposive sampling technique was adopted to ensure that all management from the universities in the study area were included in the study. Simple random sampling to incorporate 30% of non-teaching

and teaching staff. This approach guaranteed a comprehensive representation of the target population, capturing insights from key stakeholders while maintaining broader inclusivity. The target population is displayed in Table 3:

|--|

University	Total Population (HRM Records, 2022)	30% of the Total Target Population
UCBC	73	22
UCG	130	39
ULPGL	120	36
UOS	62	18
UNILUK	85	25
Total	470	140

## E. Data Analysis

The data analysis and interpretation of the collected data were done with a focus on aligning it with the objectives of the research. SPSS version 23 was used to analyze the data and communicate the results. Despite the relatively small dataset use of SPSS establishes connections between independent and dependent variables through linear regression analysis. Qualitative data underwent content analysis and was presented descriptively. The multiple linear regression model was used to bring out the relationships between variables, providing a comprehensive understanding of the data and enhancing the interpretation. The multiple linear regression model was presented as follows:

$$\begin{split} Y &= \alpha + \beta_1 \; X_1 + e \\ Y &= a + \beta_1 X_1 + \beta_2 X_2 + \beta_{12} X_1 \; X_2 + \epsilon \end{split}$$

#### Where

Y represented Academic performance,  $\beta$ = Co-efficient,  $X_1$  = ICT integration,  $X_2$ =Strategic leadership (Mediator),  $X_1 X_2$ = ICT integration\* Strategic leadership e = error term

## V. FINDINGS

Findings from this chapter reveal significant demographic information within the university staff, most employees are male, with the majority range falling between 30 and 40 years old. Furthermore, a considerable number of employees have attained postgraduate diploma qualifications. On average the number of employees in these universities is about 640 staff. Many employees also have worked for a period of three years in these universities. The majority of these employees also had competency skills in computer. Overall, the study found that there is a positive correlation between ICT usage, CT accessibility, and ICT integration on students' academic performance across these Universities. In addition, strategic leadership is highlighted as a mediator in the relationship between ICT integration and academic Performance. Respondents overwhelmingly reported experiencing the beneficial impacts of ICT usage on academic performance for the universities, and they also reported accessibility and using components of ICT in their daily responsibilities at work. Furthermore, the integration of ICT into teaching and learning processes had a positive significant influence on the academic performance of these universities. This was supported by the majority of the respondents who indicated that they use ICT to teach their classes and it mostly makes their work easy.

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#### A. Descriptive Statistics

The main variances in this study were ICT integration, strategic leadership, and academic performance. These variables were analyzed using descriptive statistics and interpreted on a scale ranging from 1-Not at all,2-Less extent,3-Moderate extent,4-Large extent, and 5-very large extent. The results were presented as follows in the subsections.

#### > ICT Integration

Employees were presented with several statements pertaining to this variable and asked to provide their responses. The analysis of these responses was carried out using measures of central tendency, specifically, mean and standard deviation results indicated in Table 4.

#### Table 4: ICT Integration

	Ν	Mean	Std. Deviation
ICT integration in teaching and learning can lead to learners improved grades	124	3.94	.647
ICT integration requires a lot of time	124	3.53	.604
ICT integration in teaching and learning should start at the beginning of any	124	3.82	0.618
course in the university			
ICT integration in teaching and learning should start at the beginning of any	124	3.77	0.052
course in the university			
The university is well-equipped with ICT resources.	124	3.31	.616
Valid N (listwise)	124		

Analysis of Table 4 reveals that all five statements yielded mean scores ranging between 3 and 4. This indicated that a majority of employees perceive themselves as moderately integrated with ICT in their work as per the Likert scale. Additionally, the small standard deviation, less than 1, indicates a high level of consensus among employees regarding ICT integration in these universities, with most responses clustering closely around the mean.

#### Strategic Leadership

Employees were presented with several statements pertaining to this variable. The analysis of these responses was carried out using mean and standard deviation. The results were indicated as in table 5.

#### Table 5: Strategic Leadership

	Ν	Mean	Std. Deviation
Human Resources department uses ICT to conduct its core duties	124	3.42	.755
ICT resources are Identified and purchased by senior managers in this institution	124	2.99	.693
Lecturers invest in a personal computer/laptop	124	3.52	.501
Use of ICT has enabled the human resource department to perform its duties effectively	124	4.52	.501
Use of ICT has enabled senior management to perform its duties effectively	124	4.58	.495
Use of ICT has led to equitable use of the available resources for all employees.	124	4.35	.766
Use of ICT has improved ways of managing finance effectively.	124	4.23	.425
I use ICT to plan for lectures	124	4.10	.315
I use ICT to make presentation slides/ delivery	124	4.34	.945
Valid N (listwise)	124		

The analysis of Table 5 indicates that all nine statements yielded mean scores ranging between 3 and 4. This suggests that the majority of employees perceive their strategic leadership as utilizing ICT in their work duties to a moderate extent, and occasionally to a large extent, based on the Likert scale. Additionally, the small standard deviation, less than 1, implies a high level of consensus among employees regarding the strategic leadership's use of ICT in these universities.

#### Academic Performance

Employees were presented with several statements pertaining to this variable. The analysis of these responses was carried out using mean and standard deviation. The results are indicated in Table 6.

	Ν	Mean	Std. Deviation
I use ICT to plan for lectures	124	4.10	.315
I use ICT to schedule and control learning	124	4.40	.649
For Budgeting process	124	3.37	.522
For Efficiency of financial management	124	3.37	.522
Valid N (listwise)	124		

#### Table 6: Academic Performance

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Analysis of Table 6 reveals that all four statements yielded mean scores ranging between 3 and 4. This implies that the majority of the employees indicated that they use ICT at their work when performing academic duties to a moderate extent and sometimes to a large extent as per the Likert scale. From the analysis, responses to these statements had a very small standard deviation of less than 1 which implies that the majority of employees almost had similar responses as per academic performance and use of ICT in these universities.

ICT Integration in Learning and Teaching had a positive significant influence on Academic performance ( $\beta$ =2.991, P-value<0.05). This is represented using the equation Academic Performance=-6.036+2.991\* ICT Integration Learning and Teaching.

This implies that as ICT Integration in learning and Teaching improves in these universities, also academic performance improves and vice-versa. This finding was also consistent with a previous study <sup>6,8</sup> which suggests that trainers' knowledge of the benefits of integrating ICT into instructions can lead to improved skills implemented, supported both financially and morally. In addition, it concurred with the findings of the study by <sup>1, 6</sup> who found out that the quality of training offered can be improved by investing in ICT through encouraging distance support course implementation that involves a wider range of educational resources that are focused on each individual. The different educational materials facilitated by information communication technology would promote collaborative learning and reduce barriers to knowledge sharing, thereby fostering collaborative human capital development. Furthermore, the study identified the Mediating effects of strategic leadership on the relationship between ICT integration and the performance of universities.

The adequacy of the model was presented using the model summary presented in Table 7.

Table 7: Model Summary						
Model R R Square Adjusted R Square Std. Error of the Estima						
1 .883 <sup>a</sup> .780 .774 .402						
a. Predictors: (Constant), Interaction, ICT Integration, Strategic Leadership						

From Table 7, the  $R^2=0.78$  which implies that the model is capable of explaining 78% of the variations when predicting Academic performance. Since it's above 50%, then the model is considered to be adequate for predicting academic performance using Strategic leadership mediating ICT Integration. To assess the mediating role of strategic leadership on the relationship between ICT integration and the academic performance of universities in North Kivu, I conducted a study and collected relevant data. Which was then analyzed using a regression model, which was summarized using Table 8 ANOVA

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	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	68.755	3	22.918	141.616	.000 <sup>b</sup>
	Residual	19.420	120	.162		
	Total	88.175	123			
		a. Dependent V	ariable: Academ	ic Performance		
	b. Pre	edictors: (Constant), Inte	raction, ICT Inte	gration, Strategic Lead	ership	

Table 8: ANOVA of Mediating Effect of Strategic Leadership

From table 8, since the F statistics is significant (p-value<0.05) and hence it confirms that strategic leadership has a mediating effect on the relationship between ICT integration and the performance of universities in North Kivu.

This effect was analyzed using multiple linear regression model. With the results presented in table 9.

From table 9, ICT Integration had a negative significant influence ( $\beta$ =-0.563, P-value<0.05), Strategic leadership had a negative significant influence ( $\beta$ =-2.991, P-value<0.05) and their interaction had a positive significant influence ( $\beta$ =0.968, P-value<0.05) on academic performance. This is represented using the equation

Academic Performance=4.869-0.563\* ICT Integration-2.991\*Strategic leadership+0.968\*interaction.

This implies that strategic leadership had a mediating effect on the relationship between ICT Integration in these universities and academic performance Lastly, the study found out that strategic leadership had a mediating effect on the relationship between ICT integration and academic Performance. This finding is consistent with the results of the study by Huskisson<sup>5</sup> who found out that strategic leadership is multifunctional; it entails management by others and aiding the organization to cope with the changes which may seem to be highly increasing exponentially in the globalization of the business environment. This was affirmed by the study of Mutungi, Oduor and Oduol<sup>16</sup> on the mediating role of succession planning on the relationship between strategic leadership and organizational performance. It hence needs the ability to integrate and accommodate both the external and the internal business environment for an organization and to engage and manage complex information processing. It hence stands to affect the existing relationship between the performance of universities and ICT integration<sup>11</sup>

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#### VI. CONCLUSION

This study arrived at four major conclusions based on the objectives of this study.

Firstly, the study found that there is a positive significant effect of ICT usage on academic performance, implying that ICT usage improves the academic performance of the Institutions of higher learning in Congo.

Secondly, the study concludes that increased ICT accessibility improves academic performance. Suggesting that the easier learners and lecturers access ICT resources, the better the academic performance of the institutions of higher learning in Congo.

Thirdly the findings, the study found that ICT integration in learning and training improves academic performance. This implies that integrating ICT in learning and training at the universities in Congo improves academic performance.

Lastly, the study highlighted the pivotal role of strategic leadership in enhancing the improvement of academic performance through ICT integration in Institutions of higher learning in Congo. Effective leadership support is essential for guiding ICT initiatives, fostering a culture of innovation, and maximizing the potential of ICT resources to improve service delivery and institutional effectiveness.

#### RECOMMENDATIONS

Based on the findings of the study, several recommendations can be made to strengthen the relationship between ICT and strategic leadership in higher institutions in North Kivu, Congo.

Firstly, institutions should prioritize and allocate more resources to the development of ICT infrastructure by replacing old hardware and software, as well as improving networking capabilities to provide sufficient support for teaching, learning, and administrative activities. Further, comprehensive training programs should be established to equip staff with ICT skills and competencies for to use ICT tools and resources effectively in their work.

Institutional leaders within these institutions must show their unwavering commitment and advocacy for ICT integration by being active supporters of such initiatives. They should become ICT-based solutions promoters, provide resources and incentives for innovation, and make an environment that fuses learning and experimentation. Additionally, institutions have to encourage the use of ICT in instruction and learning to ensure students are more engaged and collaborative and to improve knowledge acquisition.

Consistent evaluation and monitoring of ICT integration efforts are vital to measure progress, detect obstacles, and make well-informed decisions on the betterment. Stakeholders' feedback, as well as the monitoring of outcomes and strategies, should be among the main tasks of institutions. It is necessary to promote collaboration and knowledge sharing among staff, students, and external partners to facilitate the application of best practices and lessons learned in ICT integration.

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To conclude, institutions must envision long-term sustainability programs to keep the ICT integration projects running successfully. It entails allocating funds for the upkeep, upgrade, and growth of ICT infrastructure, and nurturing a spirit of innovation and flexibility in the face of technology advancements. Through the implementation of these recommendations, higher education institutions in North Kivu can maximize their use of ICT to realize improved academic performance, institutional effectiveness, and service delivery, which in turn will lead to the development of education and the society in the region.

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