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TECHNOLOGY ADOPTION INFLUENCE ON ORGANISATIONAL PERFORMANCE OF DAIRY FARMERS' COOPERATIVE SOCIETIES IN O'LESSOS SUB-COUNTY, NANDI COUNTY, KENYA

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Abstract

Despite potential in the dairy industry for Kenyan farmers, the sector had not yet developed to meet their demands. Several studies had been conducted to examine technology adoption in Kenya's milk production. However, little attention in research on the adoption of technologies such as financial, information, processing, Government policy, and Communication Information systems affected the organizational performance of dairy farming cooperatives. Researchers argued that the adoption of technologies such as financial, information, processing, Government policy, Communication Information systems, and digital payment can affect the organizational performance of dairy farming cooperatives. This indicated that the knowledge gap that currently existed must be filled immediately. The study's objectives were to evaluate the impact of digital technologies on the organizational performance of dairy farmers' cooperative societies in O'lessos Sub-County, Nandi County, to examine the impact of communication technologies on the organizational performance of dairy farmers' cooperative societies and to look at the challenges in modern organizations in utilizing technologies to improve organizational performance. Quantitative data for the study data was collected using questionnaires. R Studio was used for the analysis of the data. Regression analysis and descriptive statistics were used.



Regression analysis results indicated that for better performance, the management of dairy societies should give financial information system adoption precedence over other adoption priorities like digital technologies, information communication technologies, and organizational information system adoption.

Keywords: Dairy Producer Cooperatives, Gross Domestic Product, Information and Communications Technology, Smallholder Dairy Farmers, Human Resource Management

INTRODUCTION

The single largest agricultural subsector in Kenya is dairy farming. With a yearly growth rate of 4.1% as opposed to agriculture's 1.2%, it provides 14% of Gross Domestic Product (GDP) agriculture which necessitates increase in dairy production (Odero et al., 2017). Over the years, the industry has been dominated by smallholder agricultural dairy farmers who own more than 80% of the dairy cattle and in the production of more than 56% of the total milk making them major stake holders. Dairy producer cooperatives can increase farmers' market involvement while also increasing production in the smallholder sector through technological adoption while improving organizational performance (Birthal et al., 2020).

In Kenya, like in many other African nations, small-scale dairy farmers who operate in rural regions and frequently have poor literacy rates and little technological proficiency run the dairy industry. Dairy cooperatives need to enhance their management techniques and simplify their operations to maintain a healthy balance sheet and sufficient funds to distribute dividends to their members (Cheruiyot, 2015).

According to Bajo and Roelants (2011), dairy farming cooperative societies foster opportunities for social inclusion and decent work in a transparent and participatory manner by offering impartial prospects for resource sharing and promoting a greater role in decisions that affect members' lives. Robust cooperative organizations that collect the milk and subsequently sell it to bulk processors have grown over the years for the majority of Kenyan dairy farmers as a result of several small-scale milk producers pooling their resources. A smaller number of cooperatives are part of a larger union that also processes milk from its members before distributing the finished goods to retail stores.

Despite this, the performance of dairy farms has led to a demand-supply mismatch because of the nation's shifting consumption patterns and shifting demographics. According to Barasa et al. (2018), employees are also driven by awards for creativity and invention, a lack of workplace harassment, and a calm environment. The staff's findings also revealed

that members got regular training. A company may guarantee that its human resources are adequate to carry out its business strategies by engaging in strategic human resource management (HRM) operations.

Despite this, competitors cannot easily replicate the distinctive pool of human capital that these practices help to create because of the social complexity and causal ambiguity that are inherent in strategic HRM practices like team-based designs, empowerment, and the development of talent for the long term. The focus of this study, however, was not on organizational performance and technologies. This study investigated how the dairy farming industry's poor performance and sluggish growth are a result of significant difficulties dairy farmers' cooperatives confront when adopting new technology to boost performance.

LITERATURE REVIEW

14% of people throughout the world's livelihoods are dependent on the dairy industry. Due to the growing globalization of the agricultural segment, smallholder dairy farmers' capacity to participate in the dairy farming industry would only hinge on how well-developed and efficient their dairy production technology are. According to a study by Odero Waitituh (2017), dairy farming is one of the livestock industries in the majority of developing nations that offers additional resources for subsistence, particularly in rural populations. FAOSTAT (2015) reports that whereas global milk output as a whole has grown by 32%, it has decreased by 9% per capita.

According to estimates, the industry makes for about a third of the agricultural GDP in emerging nations, and its proportion is growth (World Bank, 2017). However, smallholder dairy producers confront many obstacles linked to production and marketing (Mojo et al., 2018). Producers' associations, like dairy cooperatives, can be crucial in easing these restrictions (Chagwiza, Muradian & Ruben, 2016).

According to Mwangi (2013), a third of the global yearly production of cow milk is thought to come from tropical regions in the Middle East, Asia, North and South America, and Africa.

Dairy production accounts for 6-8% of Kenya's Gross Domestic Product (GDP) and 14% of the global agricultural GDP, making it one of the most developed industries in the nation (IFAD, 2017; USAID/GoK, 2016). Smallholders who feed their families with family food and sell any periodic surpluses define dairy production. These small-scale farmers normally have two to four milking animals, and milk is delivered to the proper spot after it has been collected. Most small-scale farmers save some milk for their use, which they can

turn into ghee, cheese, fermented milk products, and concentrated milk products (Ngongo, 2019). To achieve Kenya's Vision 2030 objective of ending hunger and poverty, smallholder farmers' Small Business Organizations (SBOs) for dairy must become more effective and build an effective dairy marketing and support system (Ndemo & Mureithi, 2013).

A variety of factors, such as the abandoning of planned economies in favor of the globalization of production, economic liberalization, and democratization, have been linked to the comeback of cooperatives in industrialized nations (Chagwiza et al. 2016). The assembly, processing, and distribution of milk have altered as a result of technology. Analysis of the outcomes of technology adoption and utilization by dairy farmers in developing nations is of interest given the role that technology plays in the structural advancement of the dairy sector.

These small-scale farmers normally have two to four milking animals, and milk is delivered to the proper spot after it has been collected. Revitalizing the industry necessitates investments in organizational performance. Even though there are more types of technology on the market now than ever before, dairy farmers still face barriers to adopting new ones, which contributes to the cooperatives' poor performance and delayed growth.

Farmers have recently come together to form cooperative groups. This is because it is believed that dairy farming cooperative organizations, which primarily aim to empower local communities, especially in rural regions where agriculture is the basis, are essential to sustainable development. According to UN estimates, cooperative organizations have helped 800 million dairy producers throughout the world. To commercialize milk products, dairy producers have depended more on these societies (Mwangi, 2013).

The study literature for this research focused on the following themes, which were derived from the study objectives: how financial technologies influence the performance of dairy farmers' cooperative societies; the degree to which digital technologies influence the performance of dairy farmers' cooperative societies; how communication technologies influence the performance of dairy farmers cooperative societies; and how digital technologies influence the efficiency.

The conceptual framework outlines the relationship between independent and dependent variables.

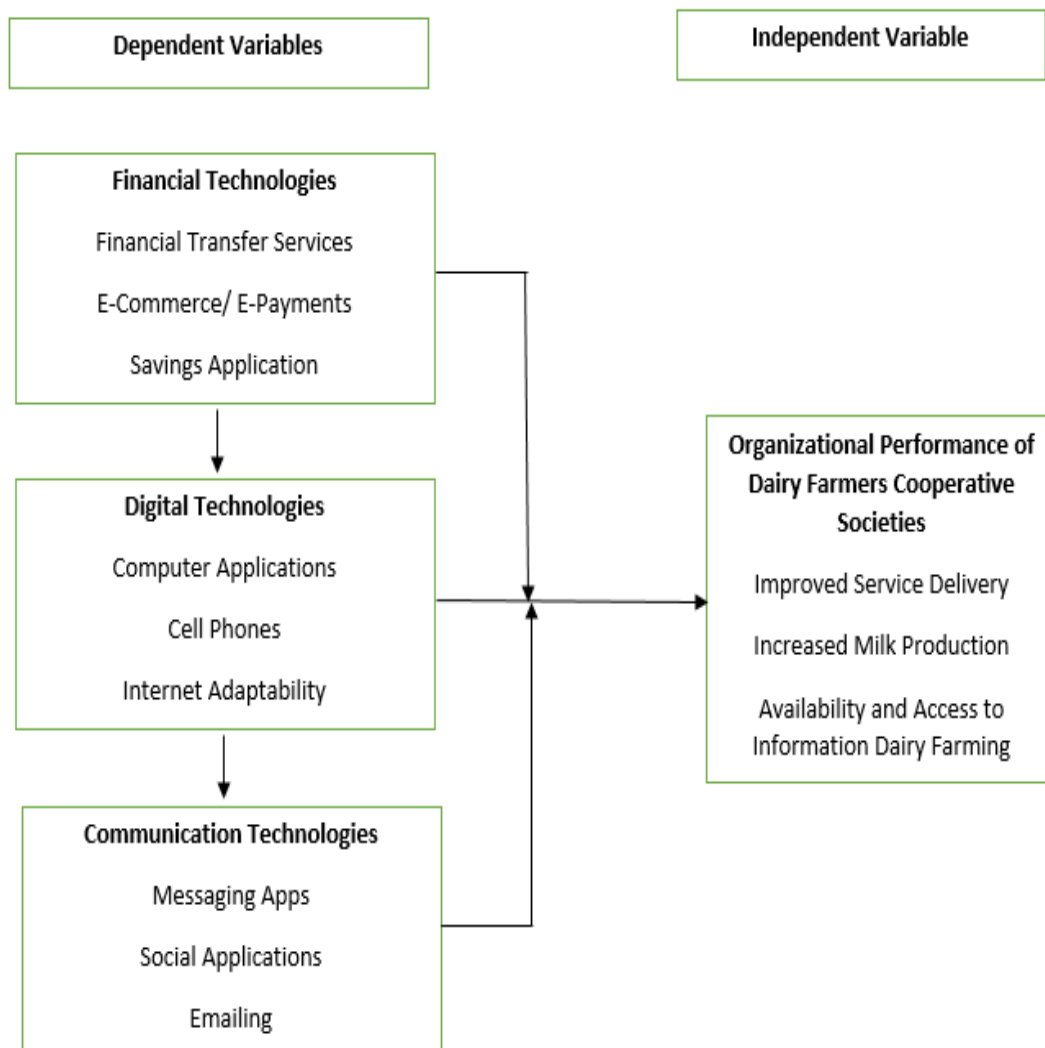


Figure 1: Conceptual Framework

The preceding figure makes clear that a variety of factors affect how well dairy cooperative organizations work structurally. These variables include; financial, digital, and communication technologies and how all these variables influence the organizational performance of dairy farmers' cooperative societies in O'lessos Sub-County. Financial technologies, financial literacy, and e-payments were be analyzed. On communication technologies, the research was be interested in understanding the applicability of mobile communication use of messages through e-mail and social applications, especially during sharing of the pertinent information on dairy production, networking, and marketing.

On digital technologies, availability of the digital technology, usability, and adaptability was be investigated. Furthermore, the researcher was be interested in how computer applications cell phones, and internet adaptability can facilitate technology adoption by dairy

farmers on organizational performance. On digital technologies, availability of markets, and accessibility to the market. However, the independent variables and dependent variables may be affected by intervening variables such as government policy on the promotion of dairy farming.

METHODOLOGY

The study utilized a descriptive survey approach that concentrates on a big population and provides an explanation of the current situation. By questioning people about their thoughts and opinions on the topic under investigation, the descriptive approach was used to collect data from the target audience and characterize actual occurrences. The research was assisted in producing both qualitative and quantitative data by design.

Using a descriptive research design study approach is appropriate when drawing findings from a bigger population. The goal of descriptive research is to establish and describe the state of the world at the time the subject of the study is being investigated. These factors led to the consideration of the design for this investigation. This research method was advantageous for linking independent and dependent variables and, most crucially, for elucidating the study outcomes.

The study was done in Nandi County's O'lessos Sub-County, on six officially recognized dairy cooperative groups. All six of the study area's cooperatives, which collectively employ 84 people, were the subject of inquiry.

Table 1: Target Population

Name of Cooperative Societies in O'lessos	Total
A. Leleben Dairies LTD	14
B. Lessons Farmers Cooperative Society	14
C. Kilibwoni Farmer's cooperative society	14
D. Nandi dairy cooperative union	14
E. Cingalo cooperative society	14
F. Lechecho cooperative society	14
Total	84

The act of gathering and evaluating data on pertinent variables in a planned, scientific approach that enables one to reply to specific research questions is known as data collection. The researcher designed a special questionnaire with a particular focus on the objectives of the study. A structured questionnaire was employed in this study to collect data. Due to the presumption that respondents are literate enough to provide acceptable answers and because it saves time and money, questionnaires were selected for this study. Both open-ended and

closed-ended questions were included in the survey. Sections of the questionnaire were used to acquire quantitative data. The respondents filled out the online questionnaires while the researcher waited to give them. To assist with administering the questions, three highly qualified research assistants were hired. Respondents were given plenty of time to complete the questionnaires, which were then collected.

Data management was handled based on respondent confidentiality, respected even as this study attempted to advance the fields of IT and business administration. The university provided an introduction letter, and seeking the National Council for Science, Technology and Innovation (NACOSTI) granted research permission. The potential respondents were shown all approvals. Before the research begins, the participants are asked verbally to confirm their readiness to take part. The appropriate citing of all used sources allowed for the avoidance of all sorts of plagiarism as secrecy and data integrity was upheld.

A research instrument's validity was determined by determining if it successfully gathered the data it was designed to. In order to ensure both content and face validity in the study, the supervisor and a statistician discussed the questionnaire's final draft. In order to verify the study questionnaire's content validity and ensure that it accurately assesses all of it, an expert opinion was sought. The expert examined the questionnaire's structure, language, alignment, and any other problems to ensure that it would be most likely to obtain the needed data.

When a research tool is used to measure a concept and produces the same results over time, such a tool is said to be reliable. Cohen, Manion, and Morrison (2013) advised using Cronbach's Coefficient Alpha to assess the data's trustworthiness. Cronbach's alpha coefficient ranges from 0 to 1; greater alpha values of 0.5 are considered unsatisfactory, 0.5 to 0.6 are considered bad, 0.6 to 0.7 are considered doubtful, 0.7 to 0.8 are considered acceptable, 0.8 to 0.9 are considered good, and above 0.9 are considered exceptional. The questionnaires were approved since they had a reliability rating of 0.84.

The sample target population group were personnel who are affiliates of dairy cooperative groups in the Nandi-County neighborhood of O'lessos. Six dairy cooperative societies are recognized as a whole. In the study region, there are six cooperatives, and the researcher exclusively focused on these six cooperatives' of 84 employees ensuring equal distribution from the sample target population.

Pre-test data was be utilized to attain dependability, which assisted in computing the Cronbach alpha coefficient, which serves as the foundation for testing reliability. Alpha of Cronbach. When Cronbach's alpha value is between +0.7 and +1.0, there is a substantial correlation between the two halves of the scores, and the instruments are considered to be trustworthy (Bland & Altman, 2020). The researcher then pinpointed the measurement error

sources that might influence how well a score is interpreted. To prepare for real data collection, questions that are confusing, ambiguous, unclear, or irrelevant were amended or deleted based on the replies' accuracy in providing the requested information.

Frequency means, and standard deviation are descriptive statistical methods that were used to analyze the data. To determine how strongly two variables are correlated, inferential statistics like Pearson moment correlations was utilized. The link between the variables were examined using multiple regression models. ANOVA was used to evaluate the hypotheses.

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RESULTS

Model Synopsis

The results showed that all predictors of the adoption of digital technologies, information communication technologies, and financial information system technologies explained 60.61 percent of the variation in organizational performance. This shows that there is a possibility of predicting organizational performance by 60.61% when taking into account the four research independent variables (R squared = 0.6061).

Regression Model

Organizational Performance ~ Digital Technologies + Information Communication Technologies + Financial Information System Technologies

Modeling using ANOVA

Results of the study were presented in the ANOVA table 5 below, and it was clear from the F ratio of 14.95 and p-value of 1.208e-11 less than 0.05 level of significance that the coefficient of determination previously mentioned was significant. The use of Financial Information System Technologies allowed the model to accurately anticipate organizational performance contrary to Information Communication Technologies, and Digital technologies.

Table 2: ANOVA Statistics

Model	Regression	Sum of Squares	df	Mean Square	F	Pr(>F)
1	Financial Information System Technologies	5.451	1	5.451	14.95	1.21E-11
2	Information Communication Technologies	0.02	1	0.02	0.11	0.741
3	Digital Technology Systems	0.001	1	0.001	0.005	0.942
	Residual		71	0.18	30.345	

a. Dependent Variable: Adoption Of Dairy Technologies Performance

b. Predictors: (Constant), Financial Information System Technologies, Information Communication Technologies, Digital Technology Systems

Testing Hypotheses

The impact of technology acceptance on the organizational performance of dairy societies in O'lessos Sub-County was examined using multiple regression analysis via t test analysis as shown in table 6. The constant was 2.48502, per the regression equation, when all factors, including the adoption of Communication information system technologies, financial information system technologies, and Digital technologies, are taken into consideration. The model's coefficients were positive. Standardized coefficients beta and p-value are used in hypothesis testing to determine whether or not a hypothesis is accepted.

The performance of dairy producers' cooperative organizations in O'lessos Sub-County is affected by financial innovations, according to Research Question 1, there is an appreciable impact on organizational performance. Results indicated that the adoption of financial information system technologies had significant coefficients of an estimate based on $r = 0.18832$ ($p\text{-value} = 0.00197$, which is less than $= 0.05$). The adoption of financial information system technology was therefore shown to significantly affect organizational performance, confirming our research question. According to this, there was an increase in organizational performance of up to 0.333 units for every unit rise in the use of financial information system technology. This suggests that technology used in financial information systems has an effect on how well organizations function. This is consistent with the study's finding that adopting financial information system technology would help ensure performance in many developing nations like Kenya where local government institutions are of low quality. Dairy societies employ financial information system technology extensively.

Digital technology in O'lessos Sub-County has an impact on the performance of dairy producers' cooperative organizations' information system performance was significantly impacted, according to Research Question 2. It was accepted as a result of research results showing the digital information system's coefficients of estimation were negligible based on $r = 0.061$ ($p\text{-value} = 8.15e-09$, which is less than $= 0.05$). This indicates that the organizational performance of dairy societies is significantly impacted by information and communication technologies. ICT has significantly impacted dairy societies to boost their production and achieve greater commercial success, according to Rahman (2008). Wolfert (2020) makes the case that ICT adoption by firms establishes the conditions for the formation of competitive advantages and subsequently enhances organizational performance.

Communication technologies influence the performance of dairy farmers' cooperative societies in O'lessos Sub-County had an impact on organizational performance under Research Question 3. The adoption of information and communication technologies had significant coefficients of an estimate based on $r = 0.11502$ ($p\text{-value} = 5.39e-05$, which is less than $= 0.05$),

it was concluded that this adoption has a substantial impact on organizational performance. This showed that the use of communication and information technologies increased organizational performance by up to 0.49575 units for every unit. The null hypothesis was therefore accepted. This runs counter to research showing that technology has an impact on organizational performance. Additionally, the findings are at odds with a case study conducted in Kenya by the Limuru Cooperative Society, which found that technology significantly influences the organizational performance of dairy cooperatives.

Table 3: T-Test Table

Model	Regression	n	Mean	Df	r	Pr(>F)	Decision
1	Financial Information System Technologies	77	5.451	0.33333	0.18832	0.00197	Accept
2	Information Communication Technologies	77	0.02	0.49575	0.061	8.15E-09	Accept
3	Digital Technology Systems	77	0.001	0.24793	0.11502	5.39E-05	Accept
Constant				2.48502			

a. Dependent Variable: Adoption Of Dairy Technologies Performance
b. Predictors: (Constant), Financial Information System Technologies, Information Communication Technologies, Digital Technology Systems

CONCLUSIONS AND DISCUSSION

To ascertain how technology adoption affects organizational performance, a case study of dairy societies in O'lessos Sub-County was employed in the research. The study's research design was explanatory. Data were acquired by using questionnaires. Descriptive statistics were used to analyze the data, which revealed that most respondents had diplomas and had been employed by dairy societies for more than two years. Additionally, the bulk of them work on contracts, while a small number have informal jobs.

Results showed that the adoption of financial information system technologies was strongly and favorably related to organizational performance. It is clear that the majority of dairy societies have embraced financial information system (FIS) technologies available for cooperative organizations in O'lessos Sub-County. In particular, the respondents verified that there are computerized accounting, corporate resource planning, and integrated financial information systems. This is consistent with research that concluded that the use of financial technology has a big influence on how dairy societies run organizationally.

Technologies of Information and Communication Organizational performance and adoption had a favorable correlation. According to the report, ICT has made it easier to communicate with coworkers in other departments and enabled data backups in dairy organizations. However, the department only sometimes uses the video-mediated conference feature. Dairy societies have benefited from the use of ICT by becoming more productive and doing better in their businesses.

It was discovered that coolers are present in dairy societies and they are useful in keeping extra milk, hence minimizing wastage. Digital technologies were positively and strongly connected to organizational performance. Although there may not be an online filling method, there are chilling devices as well. This is consistent with a US research that found dairy societies need to employ Product Processing technology to ensure the safety of the milk products (Gandhi et al., 2020).

According to the findings, the four determinants of organizational performance; the use of digital technologies, information communication technologies, and financial information systems all explained 60.61% of the variation in performance. This shows that there is a possibility of predicting organizational performance by 60.61% when taking into account the research independent variables (R squared = 0.6061).

Increasing performance in areas like productivity and product quality has been made possible by the implementation of financial information system technology in dairy societies. Faster decision-making and more efficacy and performance in finishing auditing activities have made this feasible.

The research has also demonstrated that Information Communication Technology (ICT) adoption improves organizational performance. ICT adoption alters how information is processed, communication is carried out, and services are made available in dairy societies. As a result, businesses that have accepted and used ICT demonstrate greater business performance and increased productivity. For dairy societies to perform better, digital technologies must be used.

The results are in line with earlier research, refuting the initial notion that financial technology had a major impact on organizational performance. The second hypothesis was accepted since it was shown that the Communication information system did not significantly affect organizational performance. The adoption of information communication technology had a considerable impact on organizational performance, contrary to research question three, which was likewise less approved. As with research question two, the adoption of digital technology was also discovered to have a major impact on organizational performance.

As per the findings of the regression analysis, the management of dairy societies should prioritize adopting financial information system technology over other adoption priorities like digital technologies, information communication technologies, and organizational information system technologies for better performance.

Due to the restricted amount of land available, extension workers should teach farmers in intensive farming techniques so they may use the available area to produce more. Smallholder farmers should be encouraged to maximize feed conservation and storage in order to preserve the production of their dairy animals during dry seasons. Farmers should be encouraged to vary the quality of their feed, for instance by intercropping edible legumes like desmodium or Napier grass. Farmers also should be instructed to utilize sexed straw semen with AI so that they may acquire the heifers they want for future milk output.

The government and all other relevant parties must encourage farmers to join organizations so they may take advantage of agricultural extensions as information may be shared more easily in groups. Additionally, farmers have the ability to advocate for services and pay for extension services when necessary, which helps to increase milk production. The marketing of dairy products was substantially improved by the improvement of facilities including roads, electrical supplies, and milk chilling units. This raised the revenue of smallholder dairy farmers as well as open new job possibilities.

The researcher advises further studies be done on biogas generation, zero grazing, and farming standard of dairy farmers' life.

REFERENCES

- Bajo, C. S., & Roelants, B. (2011). *Capital and the Debt Trap*. <https://doi.org/10.1057/9780230308527>
- Barasa, C., Barasa, C., Achoki, G., & Njuguna, A. (2018). Managers views on the determinants of cash holdings: Evidence from Kenya. *International Journal of Economics and Finance*, 10(8), 172. <https://doi.org/10.5539/ijef.v10n8p172>
- Birthal, P. S., Joshi, P. K., & Hazrana, J. (2020). Financing Agricultural Value Chains. *Transforming Agriculture in South Asia*, 101–115. <https://doi.org/10.4324/9781003024996-7>
- Chagwiza, C., Muradian, R., & Ruben, R. (2016). Cooperative membership and dairy Performance among smallholders in Ethiopia. *Food Policy*, 59, 165-173.
- Cheruiyot, C., Kipchillat, C. J., & Kapkiyai, C. (2015). Relationship between Selected Technologies Adoption and Organizational Performance; a Case of Dairy Societies in Uasin Gishu County, Kenya. *European Journal of Business and Management*, Vol.7 (No.34.), 116–125.
- Cohen, L., Manion, L., & Morrison, K. (2013). *Research Methods in Education*. <https://doi.org/10.4324/9780203720967>
- Mwangi, E. (2013). Literature and the study of Africa. *Oxford Bibliographies Online Datasets*. <https://doi.org/10.1093/obo/9780199846733-0087>
- Ndemo, B., & Mureithi, M. (n.d.). Information and Communications Technologies. *Africans Investing in Africa*. <https://doi.org/10.1057/9781137542809.0021>

Ngongo, B. P., Ochola, P., Ndegwa, J., & Katuse, P. (2019). The technological, organizational and environmental determinants of adoption of mobile health applications (M-health) by hospitals in Kenya. *PLOS ONE*, 14(12). <https://doi.org/10.1371/journal.pone.0225167>

Odero, K., Ochara, N. M., & Quenum, J. (2017). Towards data-driven logistics value chains in Africa. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2960510>.

Weerakkody, Y., & Moore, C. (2020). Bland-Altman analysis. *Radiopaedia.Org*. <https://doi.org/10.53347/rid-74312>