# Kabale University Interdisciplinary Research Journal (KURJ)

Editors

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CONTENTS

FOREWORD

Internationally, researchers and scientists are known for creating, sharing and utilizing information to further the body of knowledge in their disciplines. In a bid to continue promoting the research agenda, the Kabale University Interdisciplinary Research Journal (KURJ) as a platform for disseminating research findings, routinely accepts high quality original research articles, letters and commentaries on a wide range of disciplines including but not limited to education, social sciences, agriculture and environment sciences, economics and management sciences, medicine and the engineering sciences among others. The main aim of the Journal is to disseminate high quality and impactful publications that benefits society nationally and globally.

The 3rd issue, volume 3 of the KURJ, is published with 8 papers which cover different issues of national, regional and global concern. The papers include: Reverse logistics and environmental sustainability in selected manufacturing entities in Kampala district, Uganda; Antiplasmodial compounds from Millettia dura; Resource mobilisation and allocation priorities on knowledge production in universities in Uganda: an empirical study; Epidemiology and causes of common soccer injuries during university games in Uganda; Micro-credit institution's services and sustainability of micro, small and medium-scale enterprises during Covid-19 pandemic in Kigezi region south western Uganda; Transformational Leadership style and occupational stress among primary School Teachers in Tanzania; Citrus fruit farmers' Adaptation Capacities to Climate Variability in Ngora district, Eastern Uganda; Developing metacognition in pre-primary childhood education in Nigeria and Uganda; and Mentorship and supervision in Ugandan higher education Institutions universities: challenges and prospects. The above articles will inform not only academics in these disciplines, but also policy and decision makers.

For the Editorial Board,

Professor Joy Kwesiga
The Vice Chancellor Kabale University

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Reverse logistics and environmental sustainability in selected manufacturing entities in Kampala district, Uganda

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ABSTRACT

The purpose of this study was to empirically establish the relationship between reverse logistics and environmental sustainability in Uganda, focusing on selected manufacturing entities in the Kampala district. The study employed a cross-sectional design. The study also used quantitative approaches in collecting and analysing the data both descriptively and inferentially. The study population was 675 manufacturing entities. Using the purposive sampling technique, the study took a sample of 248. Data were obtained from 186 usable questionnaires. The researcher applied Statistical Package for Social Scientists (SPSS) to test all four hypotheses. The results are presented in terms of descriptive statistics and inferential statistics in terms of correlation analysis, simple regression and multiple regression analysis models. Results indicate that Pearson's correlation results indicate a relatively moderate, positive and significant association between Green manufacturing and Environmental Sustainability in Kampala industries. The findings show that there was a low but positive correlation (r= 0.480, sig .000, p< .01) between Reverse Logistics and Environmental Sustainability. This implies that any improvements made in reverse logistics can be associated positively with environmental sustainability in Kampala. The study, therefore, concludes that findings are partially supportive of The National Environment Act, 2019; specifically concerning the prohibition of littering, Trans boundary movement of waste and classification and management of hazardous waste. It is therefore recommended that National Environment Management Authority and Uganda revenue Authority work out a rewards system for firms that actively practice Reverse Logistics as this undercuts pollution as reduces waste dumped in water bodies and the environment.

Keywords: Reverse Logistics, Environmental Sustainability, Manufacturing Entities - Kampala district

Introduction

Reverse logistics is the backward flow of goods, service delivery items and value from point of consumption to production. This helps in getting items for recycling, reuse, and remanufacturing. Organizations doing this, save a lot in costs of raw materials purchase and packaging costs among others (Jalil, *et al.*, 2016).

The final item is reverse logistics. After goods have been delivered to their final destination, some items are taken back to the manufacturing entities through the reverse logistics system, these are excess goods which shall be sold to other customers, broken goods which have to be mended and resold, empty containers like shipping containers, and other big containers that can be used to package goods and keep them in good condition during transportation for many more times, reusable goods like handling and fixing tools, these should be kept and used whenever they are needed. Fastening belts and tarpaulins, pallets and floorboards, and any more items are also returned for reuse. The other items that are returned by reverse logistics are waste that can be recycled low-cost raw materials are got for the production of industrial products, such items are plastic bottles and other non-biodegradable items. The items that aren't needed anymore but could jeopardize the environment if abandoned are brought back and disposed of professionally. These are called items that have reached the end of life e level. Reverse logistics is a very critical aspect of green supply chain practices, it helps in relieving the environment of dangerous items that would pollute it hence leaving the environment to thrive and be sustainable.

Reverse logistics also helps to generally enforce environmental sustainability, it can capture items that would have been disposed of poorly into wetlands and water bodies, hence ensuring better land use, availability of clean water sources and many more things. Reverse logistics is a critical function in helping to clean the environment, and not only that but improving environmental sustainability by relieving the environment of especially toxic waste.

Environmental sustainability is the process of human beings carrying out all activities they do in a manner that protects the natural environment and keeps it conducive for today and future generations (Zimon, Tyan, & Sroufe, 2020). The study decided to use this definition because it is precise and it grossly explains environmental sustainability. Such occurrences don't support environmental sustainability, which is a critical prerequisite to a life-supporting planet. Just like (Chathurani,2020), mentions the lack of environmental sustainability has over time become a critical concern in the manufacturing sector globally and an immediate remedy is required if the world is to survive the foreseen ramifications. Protecting the environment may be a costly venture but the dangers of not proactively protecting it are worse with situations like deaths occurring (Seyed, Ahmad, Mohammad, & Vahdat, 2018).

The world is under threat of being destroyed by poor environment-related disasters than ever before, and entities are compelled to align activities that promote green supply chain practices in order to reverse the situation (Tseng, Chiu, & Liang, 2017). This is due to the continued warming of the planet by carbon emissions, especially from manufacturing-based supply chains (Hendriks, *et al.*, 2017). In addition, for example, the wildfires that raved the Amazon rainforest in Brazil destroyed forestry and animal species (San-Miguel-Ayanz, Durrant, Boca, Maianti, Alberta, Artes, Jacome, Branco, De Rigo, Ferrari, Pfeiffer, Grecchi, Nuijten, Onida, & Loffler. 2020). The wildfires in California USA, South Wales and Victoria in Australia killed people and animal species, destroyed properties worth billions of dollars and many more storms in Asia and the USA (Food and Agricultural Organization & United Nations Environment Programme, 2020).

In Africa, a study on environmental sustainability focusing on health hazards espoused by poor environmental sustainability found that much as poor environmental sustainability and its effects were taking a toll on Zimbabweans, the local communities in the Mount Darwin district of Zimbabwe still believed that

environmental adverseness isn't real and simply not existing (Ncube & Tawodzera, 2019). Zimbabwe experienced a series of heat waves and storms which left a lot of devastation (Ncube *et al.*, 2019).

The study was carried out in Kampala Uganda specifically in the Kampala manufacturing industries. The impact of environmental management is still insignificant, in Uganda, there is evidence of poor environmental sustainability which manifests through droughts, floods and diseases like cholera that kill people especially, in Kampala, air and water and r pollution that is caused by the high concentration of manufacturing industries, reclamation of wetlands for construction the of manufacturing industries and harvest of raw materials which has led to the fast depletion of un renewable raw materials, congestion by the huge number of vehicles on the roads that also pollute the air and make it very unhealthy for human consumption. (Budget Monitoring and Accountability Unit, 2018). People move around littering everywhere with impunity, garbage hips and are seen in different spots within the city centre and which doesn't only keep the city untidy but also blocks drainage systems hence causing floods with sewage spilling on roads which causes disease and multiple other disease threats (National Environment Management Authority, 2018).

The issue of insufficient environmental management in Kampala has left manufacturing entities to continue operating inconsistent with environmental sustainability, for instance, wetlands have been claimed for the construction of factories, industrial packaging materials like polythene paper bags and bottles littered everywhere, poorly maintained vehicles polluting the environment with toxic smoke, uncontrolled mining of uncontrolled natural resources like stones while signs of air and water pollution amongst others are quite evident (BMAU, 2018). The continued practice has caused enormous challenges like serious, increased hot weather spells, inadequate waste management, continued flooding incidences in and around Kampala, depletion of raw materials, water and air pollution, wetland mismanagement, poor ecological balance, and not to mention the loss of human life due to disease outbreaks like cholera (National Environment Management Authority, 2018).

Environmental sustainability is very important, without sustainability, humankind, animals and humankind will be destroyed (Sarkis, 2017). Uganda is facing unprecedented environmental sustainability challenges caused by traditional supply chain practices which operate in total disregard to environmental protection (BMAUfor2018). Supply chains must continue to operate since they improve economic sustainability which is much needed, but the main challenge is that as they continue operating, they jeopardize environmental sustainability which threatens our existence and the existence of future generations (UGGDS, 2017/18). This is the main gap since without solving the current challenge, it would lead to a serious situation which threatens the extinction of all living things on the planet (Tesfaye & Kitaw, 2020). The state of affairs if not addressed expeditiously, it would also lead to adverse situations like raw materials depletion, which destroys lives and properties, wetland abuse, water and air pollution, and ecological challenges (National Environment Management Authority, 2018). Organizations like NEMA, KCCA, Ministry of water and environment, have educated the country on how to uphold environmental sustainability but all efforts haven't yielded enough (National Environment Management Authority, 2018). They have encouraged green sourcing, green manufacturing, green transportation, and reverse logistics among others (Ministerial Policy Statement, Ministry of Water and Environment; FY 2020-2021). Among all these efforts, environmental sustainability has continued to be a challenge in Kampala and this is due to supply chains not operating consistent with environmental sustainability (BMAU briefing paper, 2018).

If environmental sustainability in Kampala is to be improved, certain aspects that negatively impact it must be effectively identified and consequently addressed. Green supply chain practices in the manufacturing sector have been identified as a critical way of improving environmental sustainability Sarkis, (2017), and that is what compelled this study.

As such this study sets out to investigate the relationship between reverse logistics and wetland management. Since they are key to environmental sustainability, embracing green supply chain activities, and would allow sustainable solutions to environmental sustainability challenges.

Literature Review

A number of studies on reverse logistics and environmental sustainability have been published. For instance, Alhamzah & Bilal (2019) argue that reverse logistics is the process of moving goods and services to counter the forward supply chain. Wetland management means strictly avoiding activities that abuse wetlands. For instance, illegally building in them, disposing of waste items into them and reclaiming them in an unregulated manner. Reverse logistics is also defined as the effort made to collect all waste and other unrequired items from the trade back to the point of initiation for either proper disposal, recycling, or repair. Resale and general proper handling (Ahmed, Hui, Ahmed, Tarek & Mahmoud. 2020).

This research defines reverse logistics as the logistics flow of returning all that isn't required from the trade back to the manufacturers or to the supplier for professional handling. It involves activities of, identifying what needs to be returned, collecting the items, sorting and categorizing them, weighing, packing and transportation back to the manufacturers for recycling, reusing and any other necessary activities. The items sent back in the reverse system range from excess goods delivered, breakages, expired goods, packaging containers, i.e. shipping containers, waste like plastic bottles, obsoletes, and any other items not required in the trade (Alhamzah, *et al.*, 2019). These items are usually returned for better handling like remanufacturing, refurbishing, reusing, recycling, repairing, reconditioning, and renovating such that they are resold to the trade.

Reverse logistics is initially seen as a costly venture that drains the organization's resources but when implemented well, it reverses the initial stance tremendously, especially through availing of low-cost raw materials (Bashir, Aiman, Mohammed, Moath, Abdelatty, Ahmed, & Umar. 2021). In a study titled "drivers and barriers of reverse logistics practice: A study of large grocery retailers in South Africa" conducted by Arno Meyer, Wesley Niemann, Justin Mackenzie, & Jacques Lombaard (2017). It was found that reverse logistics optimizes profitability and reduces costs while also improving environmental sustainability. These findings indicate the criticality of practising reverse logistics as a measure of improving environmental sustainability. However, other authors negated the means of practising reverse logistics in a manner that would ensure environmental sustainability. This too needs to be addressed if positive results are to be obtained through reverse logistics globally. Most manufacturers especially in African countries are actually returning items they are going to reuse and or remanufacture living items like plastic waste which requires different sets of machines for recycling because they haven't mobilized that capacity. Some of the manufacturers haven't made a serious effort to venture into recycling because they lack the knowledge of how beneficial it is, leaving the few that have ventured into it to enjoy its proceeds although they also haven't succeeded in collecting most of the waste products so far.

Reverse logistics enables organizations to have full-time low-cost raw materials by enabling producers to collect the used items for the purpose of reuse, recycling and remanufacturing was that for the deplete able materials, it will take long for them to run out since the ones already in the market are being reused many more times (Sergio, Beatriz, Antonio, & Francisco, 2019). This should be encouraged by governments especially for nonrenewable resources and materials that if left in the environment unattended, will pollute wetlands, and other lands and adversely affect environmental sustainability (Jambeck,2018).

Reverse logistics facilitates sending back commercial value, end-of-use products and end-of-life products all to capture more value (Bashir, *et al.*, 2021). This prompts organizations to go green-of-reverse logistics being a critical operation in recovering waste and protecting the environment against pollution, there is strong evidence that reverse logistics can significantly protect wetlands, contribute to green supply chains/ environmental sustainability and reduce the overall cost of operations (Zhang, Zou, Feng, Wang & Yan. 2022).

Without a doubt, therefore, reverse logistics is of great importance globally in not only protecting wetlands but as well, improving social welfare through creating jobs for waste collectors and improving organizations' operational costs by providing low-cost raw materials (Al-Abrrow, Alnoor & Abdullah, 2018). This is a wake-up call for all of us. All leaders from the smallest unit of leadership which is a family setup should mobilize their people against disposing of especially non-biodegradable waste and keep it until they can sell it to those that can recycle it and have it reused for manufacturing different items. Many people's economic status can change through collecting waste and selling it to manufacturers for recycling, this has to be well communicated to the citizenry and people change from littering which kills them slowly to making money through collecting and selling the waste.

Although reverse logistics plays a significant role in environmental sustainability, many organizations aren't aware of it and most importantly, studies in Uganda don't really show how best it can be implemented in a manner that will harmonize manufacturing supply chains and environmental sustainability (National Environment Management Authority, 2018).

A similar study on reverse logistics found that it has a very significant relationship with both wetland management, environmental sustainability and sustainable manufacturing (Alhamzah *et al.*, 2019). Much as reverse logistics can be of great importance in the conservation of the environment, operating an efficient reverse logistics system requires serious systems development since the function requires funds to move around collecting waste. This can lead to high costs of operations if the process isn't well thought out and measures to make it financially viable put in place (Govindan *et al.*, 2015).

In the African context, a study was conducted to establish the feasibility of reverse logistics and it was concluded that some of the constraints faced in South Africa during reverse logistics operations are that, information systems to coordinate operations were found to be internal challenges whereas lack of supplier compliance was the external challenge (Meyer *et al.*, 2017).

In Uganda, coca cola limited is practising reverse logistics specifically collecting used plastic bottles for recycling.

They have established a large network of customers, private plastic waste collectors and administrative bodies like Kampala Capital City Authority to help gather plastic waste for recycling. In fact, to them, it is a successful business on its own making the recycling operations a dual benefit venture in which environmental protection and business avail income for society and the organization. The current reverse logistics operations in Uganda cannot significantly protect wetlands and avert environmental degradation in the country, which means that the gap between manufacturing systems and environmental sustainability will persevere unless most of the manufacturing entities take up reverse logistics. Government and other environment management bodies like NEMA should come up with more scientific and feasible ways of handling reverse logistics and educate and enforce green supply chain practices. According to Alkhatani *et al.*, (2021), the public doesn't easily comply with waste collection guidance like dumping their waste at collection points, this is a big challenge to the manufacturers because then they will have to go searching for the waste all over the environment and not collecting it from specific points if the public had put it in specific places. This makes it expensive for the manufacturers and that is probably the reason why Uganda is still grappling with the challenge of plastic collected from the environment. While the prior published works and studies enriched the available literature, they presented a number of gaps. Some of the studies used different variables to denote green supply chain practices creating a conceptual gap. A number of the studies took place in locations outside sub-Saharan creating geographical gaps. Another critical aspect that wasn't addressed by the studies is the issue of the provision of infrastructure and machinery necessary to implement reverse logistics, and this creates an empirical gap. This prompted the study to test the hypothesis that:

H1: There is a statistically significant relationship between reverse logistics and environmental sustainability in selected manufacturing entities in the Kampala district

Methodology

The study adopted Positivism Philosophical orientation and Positivism is mainly associated with the philosophical stance of the natural scientist, which entails working with an observable social reality to produce law-like generalizations (Saunders, 2019). This philosophy was found to be sufficient for the study because it establishes the truth about what's exactly happening in supply chains thereby helping to develop a scientific model to enforce green supply chain practices (Crowther & Lancaster, 2008).

The study employed both a survey and phenomenological design. The survey encompassed a cross-sectional approach whereby data was collected at a particular point in time. The study chose only a few illustrative sample essentials of a cross-section of manufacturing entities in Kampala. The researcher was not obliged to have further interactions with the study respondents.

In regard to the nature of the study objectives, a cross-sectional is the most suitable to gather quantitative data and make statistical predictions and correlations of factors associated with green supply chain practices and environmental sustainability.

The phenomenological approach was also adopted for this study, this was applied to establish inner most qualitative data using an open-ended question appended to the survey tool at the end of each objective, this open-ended question sought to establish the respondent's view on how green supply chain practices could be

improved in order to have them contribute to environmental sustainability. The use of two methodological designs aimed at detailed information gathering from respondents is highly recommended and supported due to its nature of helping the study to obtain more insight into what is happening in the area (Ntayi,2005; Mafabi; 2012).

The study area was environmental sustainability in selected manufacturing entities in the Kampala district. This geographical area has many high-scale manufacturing facilities, many of them being concentrated in close proximity, making accessibility easy (BMAU Briefing Paper 2018) the target population was all the manufacturing entities in the Kampala district. Kampala has 675 manufacturing entities (*www.uma.or.ug*).

The unit of analysis was the manufacturing entities and units of inquiry included top management like managing directors, general managers, operations managers, production managers, and procurement managers of these entities because they were well positioned to provide information on green supply chain practices and environmental sustainability in manufacturing entities in Kampala district.

Table 1 showing Sample size

Category of Population	Total Number (N)	Sample (S)	Sampling Technique
Top Managers	225	83	Purposive
Production and Operations	225	83	Purposive
Procurement Managers	225	82	Purposive
Total	675	248	

The sample size constituted 248 entities from a population of 675 entities; This was decided upon using Krejcie and Morgan's table of sample size determination. The research considered a more targeted way to select units of analysis and units of inquiry from whom to collect primary data. After determining the sample size of 248 manufacturing entities, they were categorized according to their level of activity and those with higher operations that were likely producing more waste were purposively selected. From these manufacturing entities and top management, production and operations managers, and procurement managers were selected. Purposive sampling from the categorized population was chosen as the method was fit for the purpose as only the managers of entities that produced a lot of waste were targeted as study participants. The study collected and analyzed primary data.

Data were collected at a single point in time since the study was a cross-sectional study. The cross-sectional kind of study was used due to its adequacy in fully exhausting the avenues of such a study and this method has been used in many more studies (Walugembe, 2018). Data was collected from one source and that is primary data which was collected through direct interviews with respondents.

Validity of Research Instrument

The researcher used the judgment of different experts to verify the content validity of the instruments. To assess this, judges were contacted to evaluate the relevance of each item in the instruments in relation to the objectives. The questionnaire was developed based on already used questionnaires which makes it appropriate enough for the exercise. Biases and inaccuracies were reduced through the creation of rapport between the

interviewer and interviewee, and explanations to make statements and questions well understood were also emphasized. Validity was determined using the Content Validity Index (C.V.I). C.V.I = Items rated relevant by both judges divided by the total number of items in the questionnaire.

$$CVI = \frac{\text{No. of items rated relevant}}{\text{Total no. of items}} \geq 0.5$$

In case less than the projected number of respondents had participated due to different reasons that caused failure to participate, a mathematical formula to establish a sufficient number like the one below was provided to ensure that the number of respondents is sufficient.

The CVI for the questionnaire was valid at above 0.5 because the least CVI recommended in a survey study should be 0.5 (Amin, 2005). CVI results were as presented in Table 2.

Table 2: Content Validity Index

Items	Number of Items	Items Deleted	Items Retained	Content Validity Index
Green Sourcing	12	2	10	0.833
Green Manufacturing	7	1	6	0.857
Green Transportation	6	2	4	0.667
Reverse logistics	6	1	5	0.833
Resource use efficiency	7	2	5	0.714
Ecological balance	8	3	5	0.625
Clean air and water	6	1	5	0.833
Wetland Management	7	2	5	0.714
Total Items	59	14	45	0.76 (AVG CVI)

Instrument Reliability

Reliability is the extent to which a research instrument yields consistent results across the various items when it is administered again at a different point in time (Sekaran, 2016). To establish reliability, the instruments were pilot tested in areas with designated industrial parks in Namanve, Jinja and Gulu industries. Reliability was assessed using an intra-class reliability measure. The intra-class correlation coefficient is computed to measure agreement between two or more raters.

Table 3: Intra-class Correlation Coefficient

	Intraclass Correlation	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.703[b]	.622	.769	5.728	185	185
Average Measures	.825[c]	.767	.869	5.728	185	185

Source: Primary Data

The intra-class correlation coefficient values less than 0.5 are indicative of poor reliability. Values between 0.5 and 0.75 indicate moderate reliability; values between 0.75 and 0.9 indicate good reliability and values greater than 0.9 indicate excellent reliability (Sekaran, 2011). This study scored an intra-class correlation coefficient of 0.825 which is indicative of a tool with good reliability.

Data Analysis and Presentation

The data collected was analyzed using a computerized analysis application called Statistical Package for Social Scientists (SPSS). This included descriptive and inferential analysis. The descriptive analysis gives data structures in form of frequency tables, standard deviation, and percentages. The inferential analysis gives correlations, Regression, and ANOVA tables. These were used to determine the relationship between the independent variables and the dependent variable. The results from the statistical analysis were presented in tables. This kind of analysis was done for each objective in the study.

Ethical Consideration

The ethics were handled with utmost care since any divergence or neglect of the ethical considerations would lead to a dispute regarding the study outcomes. In this regard, all necessary ethical guidelines were considered. Ethical approval was sought from Mengo Hospital Research Ethics Committee (MHREC) and Uganda National Council for Science and Technology (UNCST) was consulted for guidance on the ethical aspect of the study. prior consent from the respondents was sought and all data collected from respondents was handled in a way prior agreed upon between the researcher and respondent. Exposing the respondent's identity and publishing sensitive material without permission wasn't and won't be done too. Environmental sustainability is quite a sensitive area that is fast affecting the world and we all have to participate in countering the trajectory. In doing so, all of us who decide to make an input in the quest to find a solution should do it with the best of ethics and integrity. Things like reporting falsehoods must at all times be avoided.

Results

Response rate

This study involved 248 respondents to enable the researcher to come up with conclusive results about the relationship between reserve logistics and environmental sustainability in the Kampala district. Only 186 of the respondents that were set for the study or research were able to respond to the study. This reflected a per cent response rate

Table 4 showing a response rate.

Instrument	Distributed	Per cent	Response Rate
Questionnaire	248	186	75%

Source: Primary Data (2021)

Background of the Respondents

This theme handles the background information on the respondents that participated in the study. The study identifies characteristics of the respondents that help judge their aptitude in expressing views about the relationship between supply chain practices and invites the entire environmental sustainability in Kampala district. These characteristics include gender, age, the highest level of education, job description and tenure in the current docket.

Gender of the respondents

To take into consideration the gender of the respondents, the researcher recorded the results in figure 1.

Figure 1: Gender of the respondents.
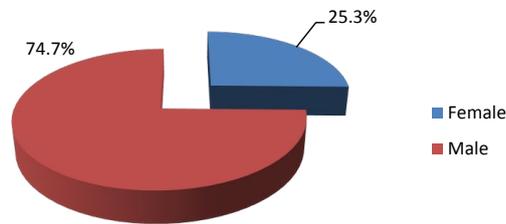
Primary Data 2022

From *Figure 1* above, the study was conducted with mainly male respondents who constituted 74.7%. Female respondents, on the other hand, were 25.3%. The implication of such gender percentages in the study was that all genders were reproduce gender percentages in the study implied between green supply chain practices and environmental sustainability in the Kampala district were captured in the study in a legitimate manner. The responses were however male dominated.

Age of the Respondents

To ascertain their respective age distribution, the respondents were asked to provide the study with their ages. Information presented in figure 2 below:

Figure 2: Age of the Respondents
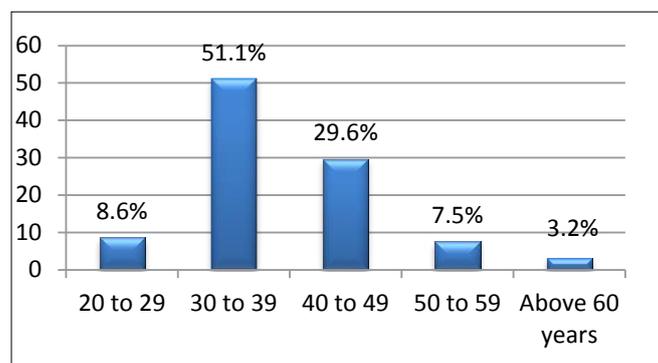
Primary Data 2022

Figure 2 above indicated that of the respondents who participated in the study, 8.6%, were in the range of 20 to 29, 51.1% were in the range of 30 to 39, 29.6%, were in the range of 40 to 49 years, 7.5% were in the range of 50 to 59 and 3.2% were Above 60 Years of age respectively.

The above statistics imply that all respondents (100 %) covered by the study were above ≥20 years of age and considered mature enough to give responses that were consistent and legitimate. The statistics also imply that there was fair distribution in terms of respondents' ages, which provided the study with views of respondents from all ranges in terms of age, without bias.

Highest Level of Education of the Respondents

Respondents were also asked to state their level of education and most of them indicated that they had a bachelor's degree as shown in figure 3 in detail below.

Figure 3: Level of education of the respondents

Primary Data 2022
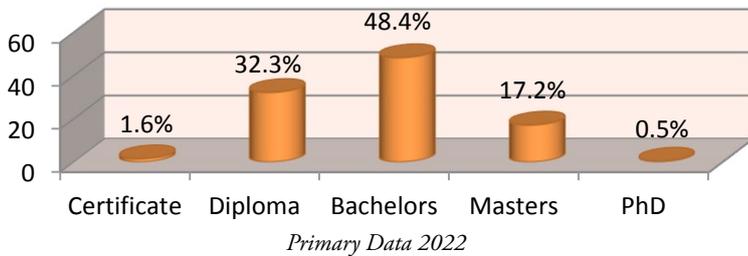
Figure 3 depicts the fact that the largest part of the respondents had attained a bachelor's degree which stood at 48.4%. Only 1.6% held certificates. Those who had attained a Diploma constituted 32.3% of the respondents and Master's Degree holders were 17.2% of the respondents. One PhD holder participated in the study. This implied that the respondents who took part in the study were adequately educated and could provide information that was pertinent to the study.

Job description held in Industry.

The research also sought to know the job description of the respondents. The findings are shown in figure below.

Figure 4: Showing Job description held in Industry
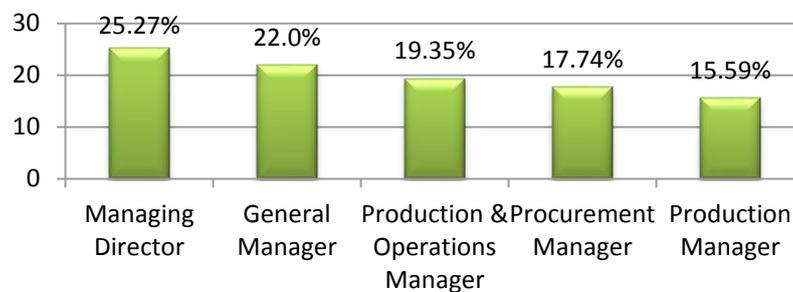
Prominent from figure 4 above it is clear that 25.27% of respondents were managing directors, 22.04% were general managers, 19.35% were production and operation managers, 17.74% were procurement managers, and 15.59% were production managers. The implication was that the majority of respondents involved in the running of factories were the right people to give their opinion on the relationship between reverse logistics and environmental sustainability in the Kampala district and their responses would be considered consistent and legitimate.

Correlation Results

This section delivers a detailed description of the inferential statistics obtained from the field of study based on the specific objective of the study. It goes on to present and answer to the research question. These findings were thus obtained on the relationship between Reverse Logistics and Environmental Sustainability in Kampala industries in terms of reverse logistics and how it relates to environmental sustainability in Kampala industries.

Objective four of the study was to establish the relationship between Reverse Logistics and Environmental Sustainability in Kampala industries.

In order to assess the association and direction between Reverse Logistics and Environmental Sustainability in Kampala industries, the study computed Pearson's product-moment Correlation (PPMC) between Reverse Logistics and Environmental Sustainability in Kampala industries. The bivariate Pearson Correlation produced a sample correlation coefficient, r, which measured the strength, association and direction of linear relationships between pairs of the two continuous variables. The weights of the correlation were interpreted on the following basis: 1.00 perfect relationship; 0.90 – 0.99 very high; 0.70 to 0.89 high; 0.50 to 0.69 moderate; 0.30 to 0.49 low; 0.01 to 0.29 very low and 0.00 translates to a non-existent relationship. Results can be seen in Table below:

Table 5: Correlations between Reverse Logistics and Environmental Sustainability in Kampala industries.

		Reverse Logistics	Environmental Sustainability
Reverse Logistics	Pearson Correlation	1	.480**
	Sig. (2-tailed)		.000
	N	186	186
Environmental Sustainability	Pearson Correlation	.480**	1
	Sig. (2-tailed)	.000	
	N	186	186
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary Data 2021

The results in table above show the results from the correlations computed. The findings show that there was a low but positive correlation (r= 0.480, sig .000, p< .01) between Reverse Logistics and Environmental Sustainability. This implies that any improvements made in reverse logistics can be associated positively with environmental sustainability in Kampala.

Regression results of Reverse Logistics on Environmental Sustainability in Kampala industries.

In order to derive the coefficient of determination and to also appreciate the predictive power of the Reverse Logistics on Environmental Sustainability in Kampala, a Linear Regression Analysis (LRA) was adopted. The findings are presented below.

Table 6: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.480a	.231	.227	.31733
a. Predictors: (Constant), Reverse Logistics				

Source: Primary Data 2021

Results in Table 5 above reveal an Adjusted R Square which indicates the variance in Environmental Sustainability due to changes in Reverse Logistics and Environmental Sustainability. The Adjusted R square value of 0.227 accounts for the variations noted in Environmental Sustainability in Kampala by 22.7% (at 100% test level). The remaining variations (77.3%) in Environmental Sustainability in Kampala are accounted for by other factors.

Table 6: Analysis of Variance

ANOVA						
Model	Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	5.556	1	5.556	55.177	.000ª
	Residual	18.529	184	.101		
	Total	24.085	185			
a. Predictors: (Constant), Reverse Logistics						
b. Dependent Variable: Environmental Sustainability						

Source Primary Data 2022

F-statistic measures the statistical significance of each of the regression coefficients. Reverse Logistics reflects a moderate F-statistic of 55.177 indicating a moderate variation between sample means relative to the variation within the samples. This means that an F-Factor of 55.177 provides evidence that despite the difference between the group coefficients, they still reflect statistically significant coefficients.

Table 7 showing Regression Coefficients analysis.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.800	.126		22.292	.000
	Reverse Logistics	.237	.032	.480	7.428	.000
a. Dependent Variable: Environmental Sustainability						

Source Primary Data 2022

The Standardized Beta value of .480 (sig. 000, p<.05); means Reverse Logistics explains 48.0 % of the variance in the dependent variable, the remaining 52.0% explained by other factors. Therefore, to improve environmental sustainability, manufacturing organizations can achieve it by improving reverse logistics activities

Testing the Hypothesis H1
The hypothesis states that;

> H1: "There is a statistically significant relationship between Reverse Logistics and Environmental Sustainability in selected manufacturing entities in Kampala district"

A statistically significant positive relationship between "reverse logistics" and "Environmental sustainability" The Standardized Coefficient (0.203) was positive (p = 0.010); (p<.05). H1 is accepted. Therefore, the null hypothesis is rejected. There is thus sufficient evidence at the 99 percent level of significance to support the alternative (directional) hypothesis.

Green transportation and Green manufacturing did not significantly predict variations in environmental sustainability. They are necessary factors but do not significantly predict environmental sustainability as they may have limited contributions to environmental sustainability when applied by manufacturing industries in Kampala district.

Discussions

This study analyzed reverse logistics along with the following domains: whether organizations return items that are unwanted by the consumers to the factory; whether organizations return waste from the trade for recycling; whether organizations dump waste in landfill stations; whether organizations repair and re-sale broken items and whether organizations collect, repair and replace spoilt items from the trade.

Findings on Reverse Logistics and Environmental Sustainability in Kampala revealed that organizations receive items that are unwanted by the consumers through the reverse logistics process to the factory. This statement can be supported by numerous submissions from other scholars. This is supported by Tesfaye *et al.* (2020), who assert that conceptualizing the reverse logistics of the plastics recycling system involves complete comprehension of how the whole system works from the initial phase to its logical conclusion when items are duly returned; while Jalil *et al.* (2016) asserted that deep understanding of the process of reverse logistics generally leads to the successful implementation of the process. Meyer *et al.* (2017), while examining drivers and barriers of reverse logistics practices while studying large grocery retailers in South Africa, concluded that a clear appreciation of the entire process explains its success in the South African country. The study results obtained reveal the adherence to reverse logistics standards as specified in the general obligation to prevent and mitigate pollution in the National Environment (Waste Management) Regulations, 2020 Part II (Standards for effluent) regarding criteria for documentation, handling, storage, recycling and reuse of plastics and plastic product. The study finding partly conforms to the Institutional Theory which specifies regulation based on governance institutions regarding laid down procedures.

The study established that organizations practice reverse logistics. These findings are supported by Alnoor, *et al.* (2019), who discussed the effect of Reverse Logistics on Sustainable Manufacturing and established that organizations practising reverse logistics will themselves be able to professionally handle the waste materials that they produce. Other scholars like Aslam, *et al.* (2019), conducting an environmental sustainability study in Pakistan hold the view that reverse logistics has cut demand for raw materials and cut solid waste materials substantially. De Carvalho *et al.* (2020), argue that promoting the practice of reverse logistics is a legitimate attempt to alleviate environmental degradation. However, the study results indicate that reverse logistics by the manufacturing sector as specified in the National Environment (Waste Management) Regulations, 2020 Part II (Standards for effluent) of regarding extended producer responsibility and product stewardship regarding accepting back goods that are deemed as damaged for recycling isn't sufficient. The study finding partly conforms to the Institutional Theory which requires that stakeholders to make social claims of their environment through practices like reverse logistics.

The study established that organizations don't dump waste in landfill stations. This finding is not in line with Chan, *et al.* (2015), who hold the view that manufacturing entities being the biggest active polluters should engage in responsible dumping like in landfills; while Zhang *et al.* (2018), argue strongly that just a fraction of manufacturers desisting from dumping untreated waste materials in the wetlands and instead utilize landfills. Diabat, *et al.* (2013) put forward the view that the Automotive Industry could greatly contribute to environmental sustainability by responsible disposal of waste; this incudes landfills. However, the study results are not in agreement to part II of general provisions relating to waste management contained in the National Environment (Waste Management) Regulations, 2020 regarding responsibility for waste management.

The study findings partly conform to the Institutional Theory which specifies that organizations have to make efforts to conform to the legislative powers and social claims of their environment. Manufacturing units desisting from dumping untreated waste into water bodies and utilizing designated landfills is in conformity with the legislative framework and feeds into environmental sustainability.

The study clarified that organizations repair and resale broken items. This finding is partly in line with Jambeck *et al.* (2018) who while conducting a study on plastic waste inputs from land into the ocean argued that more factories switching to reverse logistics involving repair of products regarded as damaged in support of environmental sustainability. Other scholars such as Govindan *et al.*. (2014) largely concur. They hypothesize that given the environmental degradation situation; only a decisive switch to reverse logistics will remedy the situation. However, the fact that the study was unable to identify a critical mass to form a firm foundation of firms that use renewable energy as a form of reduction in carbon emissions is a cause of concern. This is partly contrary to Part IV article 110 of domestic waste, municipal waste and industrial waste management contained in the National Environment (Waste Management) Regulations, 2020 concerning Waste generated at commercial premises or establishments. The study outcome is somewhat corresponding with the Institutional Theory which advocates for legislative powers and social rights involving recommended techniques like reverse logistics.

The study results established that organizations collect, repair and replace spoilt items from the trade. This finding is supported by Maleki, *et al.* (2019), who conducted a study on the eco-capability role and argue that manufacturing units reduce waste during manufacturing by assembling, refurbishing and swapping damaged items. Congruently, Choudhary *et al.*. (2019), specified that in Bangladesh and Pakistan, gradual reduction in their respective carbon emissions through the implementation of reverse logistics. Although the results reveal a positive association between Reverse Logistics and Environmental Sustainability, it also revealed evidence that many manufacturers are yet to buy fully into reverse logistics operations. The study finding partly conforms to the management of industrial waste contained in Part IV of domestic waste, municipal waste and industrial waste of the National Environment (Waste Management) Regulations, 2020 regarding the duty to manage industrial waste. The study results did not wholly conform to the Institutional Theory which urges that practitioners need to make efforts to conform to the legislative powers; some of which support reverse logistics as measures that can enhance environmental sustainability.

Conclusion and Recommendations

Conclusion
On objective four of the study: "To evaluate the relationship between Reverse Logistics and Environmental Sustainability in Kampala district". The positive hypothesis that there is a significant positive relationship between Reverse Logistics and Environmental Sustainability was not rejected, thus confirming its predictive power of Environmental Sustainability.

The study results concluded that the amount of unique variance Green Sourcing accounts for is statistically significant.

The study, therefore, concludes that findings are partially supportive of The National Environment Act, 2019;

specifically concerning the prohibition of littering, Transboundary movement of waste and classification and management of hazardous waste.

Recommendations

Considering the finding which revealed that Reverse Logistics accounted for some small variations in Environmental Sustainability in Kampala led to the conclusion that Reverse Logistics when put under consideration by National Environment Management Authority, has had a small effect on Environmental Sustainability in Kampala.

It is therefore recommended that National Environment Management Authority and Uganda revenue Authority work out a rewards system for firms that actively practice Reverse Logistics as this undercuts pollution as reduces waste dumped in water bodies and the environment. This is because Reverse Logistics employed on a large scale can eventually contribute to Environmental Sustainability in Kampala.

The findings illustrate the fact that Reverse Logistics can be used to enhance Environmental Sustainability and should be highly considered amongst supply chain operators.

References

Ahmed, A., Hui, c., Ahmed, E, Tarek, M., & Mahmoud, A. H. (2020). The Impact of Reverse Logistics on Environmental Sustainability Performance. *International Journal of Advances in Science Engineering and Technology*, Volume-8, Issue-2, http://iraj.in

Ahmed, W. and Najmi, A. (2018) Developing and Analyzing Framework for Understanding the Effects of GSCM on Green and Economic Performance. *Management of Environmental Quality: An International Journal,* 29, 740-758. https://doi.org/10.1108/MEQ-11-2017

Almmzah, A., Bilala, E., Hebah, Z., M. & Ibrahim, A., R. (2019). The Effect of Reverse Logistics on Sustainable Manufacturing. *Journal of Academic Research in Accounting, Finance and Management Sciences*, 9(1): 71-79 http://dx.doi.org/10.6007/IJARAFMS/v9-i1/57680140

Al-Abrrow, H., Alnoor, A., & Abdullah, H. (2018). Socio-Technical Approach, Decision-Making Environment, and Sustainable Performance: Role of ERP Systems. *Interdisciplinary Journal of Information, Knowledge, and Management*, 5(1), 75-91

Anvar, S., Sadegheih, A., & Zad, M. (2018). Carbon emission management for greening supply chains at the operational level . *Environmental Engineering and Management Journal*, 17(6), 1337-1347. Retrieved from https://eemj.eu/index.php/EEMJ/article/view/3597

David, C., & Geoffrey, L. (2008). *Research Methods: A Concise Introduction to Research in Management and Business Consultancy*. Butterworth-Heinemann.

Govindan, K., Sarkis, J., Jabbour, C. J. C., Zhu, Q., & Geng, Y. (2014). Eco-efficiency based green supply chain management: Current status and opportunities. *European Journal of Operational Research*, 233(2), 293-298.

Hendriks, G., Slangen, A. H., & Heugens, P. P. (2018). How a firm's domestic footprint and domestic environmental uncertainties jointly shape added cultural distances: The roles of resource dependence and headquarters attention. *Journal of Management Studies*, 55(6), 883-909.

Jambeck, J., Hardesty, B. D., Brooks, A. L., Friend, T., Teleki, K., Fabres, J., ... & Wilcox, C. (2018). Challenges and emerging solutions to the land-based plastic waste issue in Africa. *Marine Policy*, 96, 256-263.

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., ... & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768-771.

Jia, P., Diabat, A., & Mathiyazhagan, K. (2015). Analyzing the SSCM practices in the mining and mineral industry by ISM approach. *Resources Policy*, 46, 76-85.

Mallikarathna, D. H., & Silva, C. C. (2019, March). The impact of Green supply chain management practices on operational performance and customer satisfaction. In *Proceedings of the International Conference on Industrial Engineering and Operations Management, Bangkok, Thailand (pp. 5-7).*

Meyer, A., Niemann, W., Mackenzie, J., & Lombaard, J. (2017). Drivers and Barriers of Reverse Logistics Practices: A study of large grocery retailers in South Africa. *Journal of Transport*, 5(3), 118-129

National Environment Management Authority (2018). *Annual Corporate Report for FY2017/2018.* https://nema. go.ug/sites/all/themes/nema/docs/NEMA%20Corporate%20Report%20FY2017-18%20(1).pdf

San-Miguel-Ayanz, J., Durrant, T., Boca, R., Maianti, P., Liberta`, G., Artes Vivancos, T., Jacome Felix Oom, D., San-Miguel-Ayanz, J., Durrant, T., Boca, R., Maianti, P., Liberta, G., Artes-Vivancos, T., ... & Ferrari, D. (2021). *Forest Fires in Europe, Middle East and North Africa 2020*, EUR 30862 EN.

Salah B, Ziout A, Alkahtani M, Alatefi M, Abdelgawad A, Badwelan A, Syarif U. A Qualitative and Quantitative Analysis of Remanufacturing Research. *Processes.* 2021; 9(10):1766. https://doi.org/10.3390/pr9101766

Sarkis, J., Zhu, Q., Lai, K. (2011). An Organizational Theoretic Review of Green Supply Chain Management Literature. *International Journal of Production Economics.* 130(1):1-15 DOI:10.1016/j.ijpe.2010.11.010

Sergio, R., Beatriz, B., P., Antonio, C., & Francisco, J., M. (2019). Reverse Logistics and Urban Logistics: making a link. Ecological. *Economy,* 73(6), 86–92. https://doi.org/10.3390/su11205684

Tawodzera, M., & Ncube, A. (2019). Communities' perceptions of health hazards induced by climate change in Mount Darwin district, Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies*, 11(1), 1-11.

Tesfaye, W., Kitaw, D. (2020). Conceptualizing Reverse Logistics to Plastics Recycling system. *Environment and Development Economics*, 9(2), 135-154.

Tseng, M., Chiu, A., S., F., & Dong, L. (2017). Sustainable Consumption and Production in Business Decision Making Models. *Environmental Health Perspectives*, 113(11), 1638-

Walugembe, A. (2018). *New Product Adoption in Uganda. 1644.*

Zhang Yu, Heris Golpira, Syed Abdul Rehman Khan, (2018). The Relationship between Green Supply Chain Performance, Energy Demand, Economic Growth and Environmental Sustainability: Empirical evidence from developed countries. *Geoforum*, 34(1), 85–98.

Antiplasmodial compounds from Millettia dura

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ABSTRACT

Malaria still poses a big challenge to the health care of many tropical countries. The plasmodium resistance to the conventional drugs is the major hitch in its treatment. Higher plants have produced single line antimalarials and given important lead molecules. On this basis, flavonoids isolated from millettia dura by chromatographic techniques were screened againest W2 and D6 strains of plasmoduim falcipalum. Both, the crude and pure compounds tested showed mild activities against the test organisms. The crude extract of the stem bark had the highest respective activity of 63.7±8.6 and 46.1±4.5 µg/ml against W2 and D6. Of the pure compounds, milletosin was active towards both W2 and D6 with a respective IC50s of 87.9±8.9 and 66.70±30.3 µg/ml. Synergistic effect might have contributed to the relative high activity of the crude than the pure compounds. Basing on the structure activity relationship of the tested compounds, suitable structural modification could be ideal to enhance the antiplasmodial activity.

Graphical Abstract
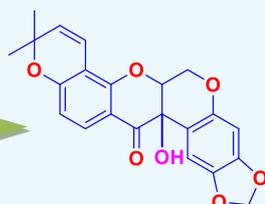
Keywords: Malaria, antiplasmodial, millettia dura, higher-plants and antimalarial-resistance.

Introduction

Malaria is the most lethal of the tropical diseases caused by protozoan parasites (Moukénet *et al.*, 2022; Omole *et al.*, 2018), the others being toxoplasmosis, amoebiasis, leishmaniosis, and trypanosomiasis (Mushtaque & Shahjahan, 2015; Nogueira & Lopes, 2011).

The world malaria report of 2020, records a 60% fall in the global malaria mortality between 2000 and 2019. In this period, African Region realized an extraordinary decline in her annual death toll from malaria from 680 000 to 386 000 (WHO 2020). However, due to disruption in, WHO projected that there could be 46,000 additional deaths as a result of a 25% disruption in treatment or any other single intervention due to COVID-19 (WHO 2020).

According to Dr Tedros Adhanom Ghebreyesus the Director-General of World Health Organization, "There were an estimated 14 million more malaria cases and 47,000 more deaths in 2020 compared to 2019", which he attributed to service disruptions during the pandemic (WHO 2021). Indeed, it has been reported that there were an estimated 241 million malaria cases (WHO 2022) resulting into 627 000 deaths globally in 2020 alone (Sangbakembi-Ngounou *et al.*, 2022). Africa (Otambo *et al.*, 2022) including Uganda (Achan *et al.*, 2022), contributed 95% of the global malaria burden in 2020. As of now, every 3 out of the 10 visits to a health facility in Uganda is due to malaria. This shift of events calls for a different intervention, possibly a home grown solution from the rich African flora (Buyinza & Gumula, 2022). The world partners now demand governments most affected by malaria to own up the challenge, this brings malaria to the list of the neglected tropical diseases.

The immunal compromised population of the world is the most vulnerable (WHO 2018). A case in point is the over 260,000 under five African children who die due to malaria annually (WHO 2021). The poor in less developed countries (Bhutta *et al.*, 2014; Makoge *et al.*, 2017) are the most affected of which Africa contributes over 93% (Otambo *et al.*, 2022) of the total global malaria burdden. Plasmodium *falciparum* is the most devastating parasites in Africa (99.7% deaths in 2017) and Plasmodium *vivax* causes 71.4% of all the malaria cases in America (WHO 2018; Omole *et al.*, 2019 & 2018; Nogueira and Lopes 2011).

As of old, quinine has been used effectively on both evils and later chloroquine. However, the parasites developed resistance to these drugs and the alternative drugs developed could not match the pharmacological profile of the old drugs. This invited more alternative treatments and combination therapies (CT). Artemisinin as the new alternative antimalarial has also registered resistance in many countries in Africa including East Africa (Arya *et al.*, 2021; Rosenthal, 2018; Tumwebaze *et al.*, 2021). Resistance to the recommended artemisinin combination therapy (ACTs) has also been reported in Southeast Asia and some parts in Africa (Arya *et al.*, 2021; Omole *et al.*, 2019) including Northern Uganda (Ikeda *et al.*, 2016) and yet some CTs pose cardiotoxicity challenges (Mushtaque, 2015; Vandekerckhove & Matthias, 2015).

Anti-malarial drug resistance has become a major hitch in malaria control over the WHO endemic zones leading to the spread of malaria to new zones and re-emergence in areas where it had previously been controlled (PAHO/WHO, 2018; Omole *et al.*, 2019). Vectors are also becoming more adaptive by changing their biting pattern to when people are most unprotected, in the evenings, early mornings and outdoors (Sangbakembi-Ngounou *et al.*, 2022).

Many other interventions have been sought including vaccination, in which over 2.4 million doses of malaria vaccine trials have been rolled out in the endemic areas of three African countries. Satisfactory reports on safety and effectiveness has been reported but this has not seen massive vaccination campaigns rolled out (World malaria report 2021). In the same way, intentional search of antimalarial lead molecules has been intensified. Between 2010 and 2017, a total of 1524 compounds from 397 plants were assayed against one or more *Plasmodium* strain. Interestingly, 29% of the test compounds showed an IC50 ≤ 3.0 μM towards different *Plasmodium* strain. This informs the potential of several of these compounds to be developed into feasible antimalarial drugs (Tajuddeen & Van Heerden, 2019).

The fact that massive vaccination against malaria has not been rolled out and that plants offer lead molecules of high potency, there is then need to intensify the search for new and cheaper antimalarial drugs from nature with different modes of action to mitigate the drug resistance.

Literature Review

Antimalarial from Nature

Antimalarial from nature or their derivatives have been at the forefront in the fight against malaria. The most prominent of these include quinine (1), chloroquine (2), artemisinin (3), primaquine (4), mefloquine (5), Figure 1 and their combinations (Baird, 2005; Woodrow, 2005; Kumar *et al.*, 2014, Vandekerckhove & hooghe, 2015, Bruce *et al.*, 1950). The aminoquinoline antimalarial drug quinine (1) was isolated from *Cinchona succiruba* (Rubiaceae) in 1812 and it became the cornerstone for development of modern antimalarial. An era of organic synthesis followed leading to the development of aminoquinoline-based synthetic antimalarial such as chloroquine (2), primaquine (4), mefloquine (5), amodiaquine (6) and quinidine (7) using quinine (1) as a template (Willcox *et al.*, 2004). In 1946, a quinazolin alkaloid, febrifugine (8) said to be 100-times more active than quinine was isolated from *Dichroa febrifuga* (Willcox *et al.*, 2004). However, up to now its development into antimalarial has been limited by its side effects (Willcox *et al.*, 2004). In 1971, another important antimalarial, a sesquiterpene lactone, artemisinin (3) was isolated from *Artemisia annua* (Woodrow, 2005). More effective artemisinin based semisynthetic antimalarial such as artemether (9), arteether (10), sodium artesunate (11) and Cinconine (12) have been developed (Willcox *et al.*, 2004). The search for antimalarial from nature is still an active research.
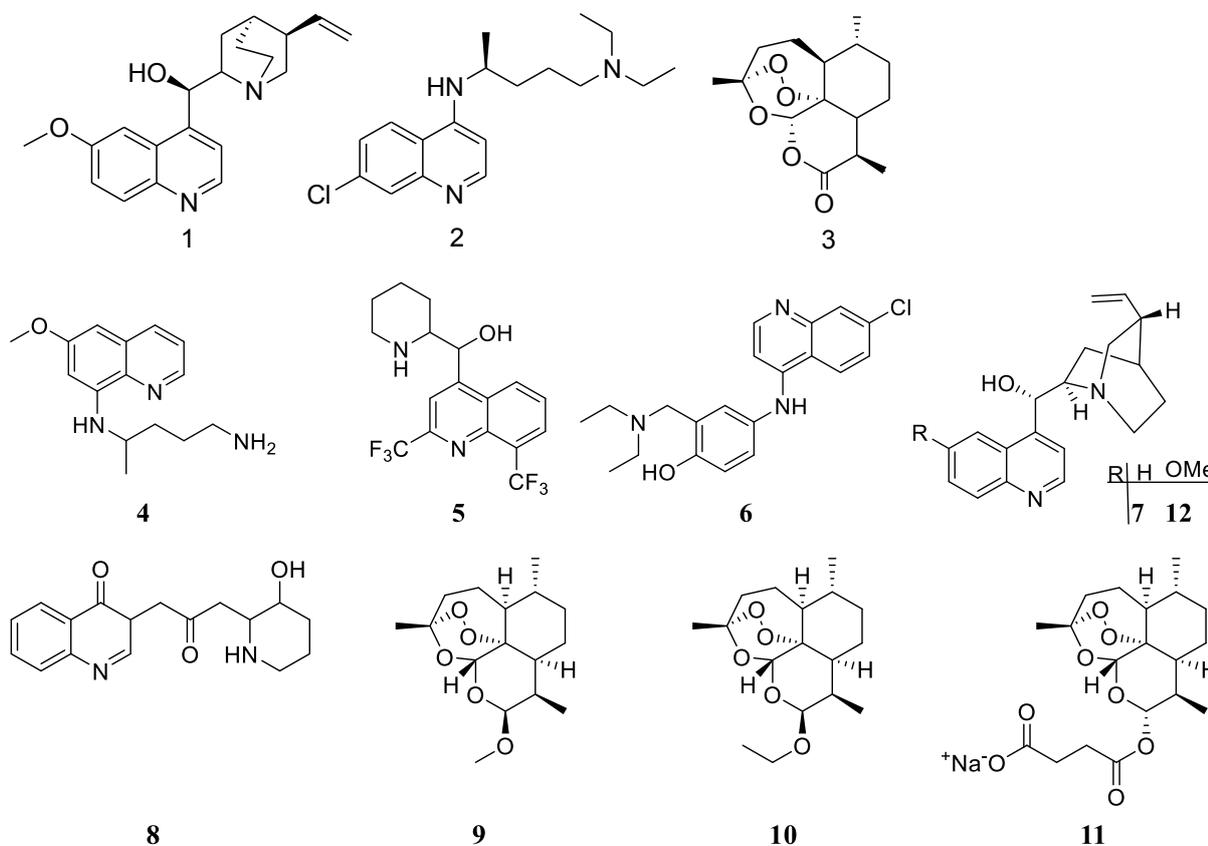

Figure 1: Antimalarials from higher plants and their derivatives

Resistance to Antimalarial

The success in the management and or elimination of malaria was hindered by the early emergence of drug resistant *Plasmodium* strains. *Plasmodium* resistance to drugs has been growing at a rate much higher than the development of new antimalarial. Antimalarial drug resistance has been reported for *P. falciparum*, *P. vivax*, and *P. malariae* (Gunjan *et al.*, 2017; White *et al.*, 2014). In Table 1 a brief overview of the time of the likely onsets of resistance to some conventional antimalarial is given.

Table 1: Time of resistance onsets to some antimalarial (data from Gunjan *et al.*, 2017)

Antimalarial	Time introduced	First report of resistance	Place of first occurrence
Quinine	1820	1925	S. America
Chloroquine	1947	1957	Thai-Cambodia boarder
Fansidar	1979	1980	
Mefloquine	1974	1987	
Artemisin	1972	2008	

Owing to mutation and travel patterns, the problem of Plasmodium resistance to first line antimalarial and their combination therapies has since then spread to other malaria endemic regions including Africa (Cooper *et al.*, 2018). A search therefore for new antimalarial with a different mode of action is an immediate necessity.

Materials and Methods

Plant Material

The flowers, seedpods, stem and root bark of *M. dura* (Figure 2) were collected from Chiromo campus, the University of Nairobi. The plant was identified by Mr. Patrick Mutiso Kyalo, School of Biological Sciences University of Nairobi.

Figure 2: Picture of Millettia dura (taken by Buyinza in 2018)

Extraction and Purification of Compounds from the Flowers of *M. dura*

The air dried and pulverized flowers of M. dura (1.8 kg) were extracted (4 x 24hrs) by cold percolation using six liters of dichloromethane/methanol (1:1 v/v). A crude extract 209.38g (11.6% yield) was obtained after concentration. 150g of the crude was fractionated by column chromatography over 600g of silica gel hexane slurry and eluting with increasing percentages of ethyl acetate in hexane.

Nine known compounds were isolated and characterized (Buyinza 2020 a).

Extraction and purification of compounds from the seed pods of *M. dura*

The air dried and ground seed pods of M. dura (2.5 kg) were exhaustively extracted by cold percolation using eight liters of dichloromethane/methanol (1:1 v/v). This gave 238.13g (9.5% yield) of a dark brown crude extract after concentration on a rotary evaporator. A portion of 200g of the crude extract was fractionated by column chromatography using n-hexane in increasing percentages of ethyl acetate. Seven compounds (three rotenoids and four isoflavones) were isolated from the seed/pods of M. dura as described in (Buyinza 2020 a).

Extraction and purification of compounds from the stem bark of *M. dura*

Four kilograms (4kg) of the air dried and pulverized stem bark of M. dura were extracted by cold percolation (6x24hrs) using 12 liters of dichloromethane/methanol (1:1 v/v). This gave 410.98g (10.3% yield) of a brown crude extract after concentration. A portion of 300g of the crude extract was fractionated by column chromatography using hexane in increasing percentages of ethyl acetate. Fourteen compounds were isolated and characterized from the stem bark of M. dura as described in (Buyinza 2020 a).

In vitro Antiplasmodial Activity

A semi-automated micro-dilution assay technique that measures the ability of the compounds to inhibit incorporation of [G-3H] hypoxanthine into the malaria parasite was used (M. O'Neill *et al.*, 1985; M. J. O'Neill *et al.*, 1986). The parasites were cultured by a method earlier described by (Trager & Jensen, 1976). Both D6 (chloroquine sensitive) and W2 (chloroquine resistant) plasmodium strains were used. Parasites were cultured in sealed flasks at 37°C, in a 3% O_2, 5% CO_2 and 92% N_2 atmosphere in RPMI 1640, 25 mM HEPES, pH 7.4, supplemented with heat inactivated 10% human serum and human erythrocytes to achieve a 3% haematocrit. On attainment of ring stage, parasites were synchronized with 5% sorbitol and tested at 0.4% parasitemia passage into 96-well plates. Stock solutions of compounds were prepared at 1mg/ml in DMSO diluted by RPM1640 to attain 0.2% DMSO and tested in triplicate as done by (Desjardins, 1979). Equal concentration of DMSO was used as negative control while 1.1µm artemisinin served as positive control. The cultures were then incubated for 48 hours at 37°C. Thereafter, each well was pulsed with 25 µL of culture medium containing 0.5 µCi of [G-3H]-hypoxanthine and the plates incubated for a further 18 hours. The contents of each plate were harvested onto glass fibre filters, washed thoroughly with distilled water, dried and radioactivity measured using a scintillation counter.

Results and discussion

Phytochemical investigation of the flowers of *Millettia dura* resulted in the identification of six known isoflavones; calopogonium isoflavone A, jamaicin, durmillone, durallone, ichthynone, formononetin and 6-methoxycalopogoniumisoflavone A (Buyinza *et al.*, 2019). The flavonol kampferol and the chalcone 4,2´-dihydroxy-4´-methoxychalcone were also obtained (Buyinza *et al.*, 2020 b).

From the seedpods of *mellettia dura*, seven compounds were isolated. Four isoflavones calopogonium isoflavone A, jamaicin, durallone and 6-methoxycalopogoniumisoflavone A plus three rotenoids, Milletone, Milletosin and Tephrosin (Buyinza, 2020 a).

Fourteen compounds were isolated and characterized from the stem bark of millettia dura. Isoerythrin-A-4′-(3-methylbut-2-enyl) ether, Maximaisoflavone J, Ferrugone, Psuedoferrugone, Barbigerone, Maximaisoflavone D, Maximaisoflavone G and (±) Deguelin were isolated in addition to calopogonium isoflavone A, jamaicin, durmillone, durallone, 6-methoxycalopogoniumisoflavone A and Tephrosin (Buyinza, 2020 a).

Antiplasmodial results

A total of ten compounds (Figure 3) and three samples of crude extracts were screen against both chloroquine sensitive (D6) and chloroquine resistant (W2) Plasmodium falciparum strains with the common anti-malarial drug chloroquine as the positive control (Table 2).

Table 2: Antiplasmodial results.

S/No.	Name of sample	W2 - IC50s (M±SD) (μg/ml)	D6 - IC50s (M±SD) (μg/ml)
1	Durmillone (13)	141.6±5.8	140.9±15.6
2	Durallone (14)	>160	>160
3	Ichthynone (15)	>160	124.3±17.4
4	Jamaicin (16)	100.4±5.9	>160
5	Barbigerone (17)	79.0±17.5	106.4±19.2
6	Calopogoniumisoflavone-A(18)	139.2±14.5	95.4±13.9
7	Isoerythrine-A-4′-(3-methylbutyl-2-ethyl)ether (19)	>160	122.5±18.9
8	Kaempferol (20)	>160	>160
9	Millettone (21)	132.1±7.4	108.9±26.1
10	Millettosin (22)	87.9±8.9	66.7±30.2
11	Flower extract	113.1±8.2	113.6±26.1
12	Stem bark extract	63.7±8.6	46.1±4.5
13	Seed pod extract	136.9±19.3	158.1±19.9
14	Chloroquine (standard)	121.2±11.0ng/ml	17.9±4.6ng/ml

The crude extract of the stem bark had the highest respective activity of 63.7±8.6 and 46.1±4.5 μg/ml against W2 and D6. The Seed pod extract had the least activities of 136.9±19.3 μg/ml towards W2 and 158.1±19.9 μg/ml against D6. Barbigerone (17) (79.0±17.5) and milletosin (22) (87.9±8.9) were the active compounds against W2 while Calopogoniumisoflavone-A (18) (95.4±13.9 μg/ml) and milletosin (22) (66.7±30.2 μg/ml) were the most active towards D6. From the test results, milletosin (22) was active towards both W2 and D6 with a respective IC50s of 87.9±8.9 and 66.7±30.2 μg/ml.

The most active compounds 17, 18 and 22 are C-6 deoxygenated, a likely indicator that C-6 oxygenation may interfere with activity. Among the C-6 deoxygenated isoflavanoids, 16,17,18 and 19, those with a free methoxyl group at C′-4 (17 and 18) were the most active and activity increased with oxygenation of ring B (17). Meanwhile, 12a oxygenation of rotenoid enhances activity.

Important to note is that two of the most active compounds (18 and 22) were found in the seed pod extract which was the least active of the crude extracts. This means that these compounds have antagonistic activities while in the extract. More still, the acitivity of the pure compounds did not match that of the most active crude extract, an indication that pure compounds in this extract work ssynergistically.
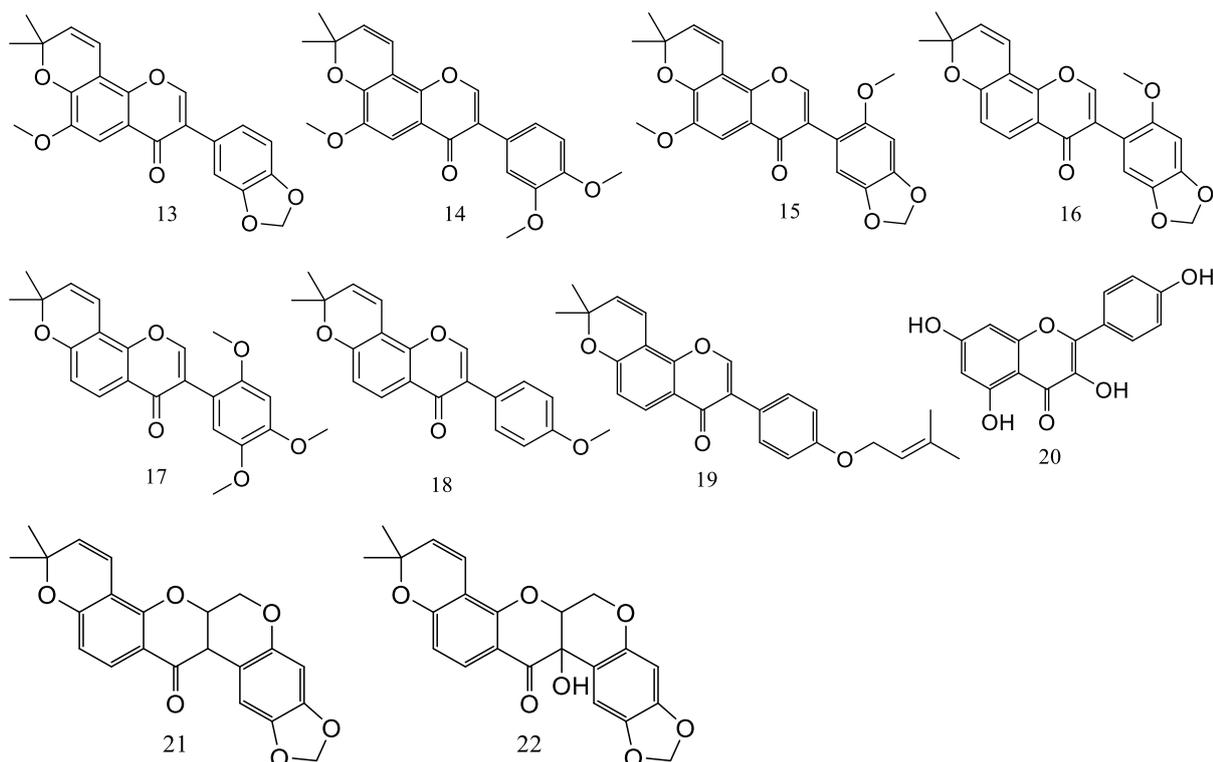
Figure 3: Structure of tested compounds

Limitations

Nature is "mean" producing some of the compounds reservingly, hence could only give amounts just sufficient for spectroscopic studies. Resource constraints limited testing of all the compounds characterized, yet the untasted compounds may be having a better activity than the tested compounds.

Conclusion and Recommendation

The antiplasmodial results show a moderate activity as earlier observed by Derese *et al.*, 2014. Synergistic effect of the compounds with conventional drugs can be sought. Since malaria can cause oxidative stress, and flavonoids are known antioxidants, such compounds as these tested have a double fold activity and are therefore important molecules which must be studied further. The structure activity relationship (SAR) discussed, suggests structural modification on the tested compounds in order to enhance antiplasmodial activity.

References

Achan, J., Serwanga, A., Wanzira, H., Kyagulanyi, T., Nuwa, A., Magumba, G., Kusasira, S., Sewanyana, I., Tetteh, K., Drakeley, C., Nakwagala, F., Aanyu, H., Opigo, J., Hamade, P., Marasciulo, M., Baterana, B., & Tibenderana, J. K. (2022). Current malaria infection, previous malaria exposure, and clinical profiles and outcomes of COVID-19 in a setting of high malaria transmission: An exploratory cohort study in Uganda. *The Lancet Microbe*, 3(1), e62–e71. https://doi.org/10.1016/S2666-5247(21)00240-8

Arya, A., Kojom Foko, L. P., Chaudhry, S., Sharma, A., & Singh, V. (2021). Artemisinin-based combination therapy (ACT) and drug resistance molecular markers: A systematic review of clinical studies from two malaria endemic regions – India and sub-Saharan Africa. *International Journal for Parasitology: Drugs and Drug Resistance*, 15, 43–56. https://doi.org/10.1016/j.ijpddr.2020.11.006

Baird, J. K. (2005). Effectiveness of antimalarial drugs. *New England Journal of Medicine*, 352, 1565–1577.

Bhutta, Z. A., Sommerfeld, J., Lassi, Z. S., Salam, R. A., & Das, J. K. (2014). Global burden, distribution, and interventions for infectious diseases of poverty. *Infectious Diseases of Poverty*, 3(1), 21. https://doi.org/10.1186/2049-9957-3-21

Bruce-Chwatt, L. J., and Bruce-Chwatt, J. M. (1950). Antimalarial Drugs in West Africa, with Particular Reference to Proguanil: Results of a Survey in Nigeria. *The British Medical Journal*, 2, 7–14.

Buyinza, D. (2020 a). *Antiplasmodial and Anticancer Principles from Millettia dura, Millettia leucantha and Millettia lasiantha* [Thesis, University of Nairobi]. http://erepository.uonbi.ac.ke/handle/11295/152975

Buyinza, D., Chalo, D. M., Derese, S., Ndakala, A., & Yenesew, A. (2020 b). Flavonoids and Isoflavonoids of Millettia dura and Millettia ferruginea: Phytochemical review and chemotaxonomic values. *Biochemical Systematics and Ecology*, 91, 1–6. https://doi.org/10.1016/j.bse.2020.104053

Buyinza, D., & Gumula, I. (2022). Chapter Nineteen Fighting the next pandemic: A phytochemical approach from African flora—An overview. In *COVID-19 Pandemic: Perspectives across Africa* (pp. 362–380). Tellwell Talent.

Buyinza, D., Yang, L. J., Derese, S., Ndakala, A., Coghi, P., Heydenreich, M., Wong, V. K. W., Möller, H. M., & Yenesew, A. (2019). Cytotoxicity of isoflavones from Millettia dura. *Natural Product Research*, 1–4. https://doi.org/10.1080/14786419.2019.1660335

Derese, S., Barasa, L., Akala, H. M., Yusuf, A. O., Kamau, E., Heydenreich, M., & Yenesew, A. (2014). 4´-Prenyloxyderrone from the stem bark of Millettia oblata ssp. Teitensis and the antiplasmodial activities of isoflavones from some Millettia species. *Phytochemistry Letters*, 8, 69–72. https://doi.org/10.1016/j.phytol.2014.02.001

Gunjan, A., Andaleeb, S and Vipin, C. K. (2017). *Drug Resistance in Bacteria, Fungi, Malaria, and Cancer (Vol. 3)*. Springer.

Ikeda, T., Masuda, T., Takayama, M., Adachi, H., & Haino, T. (2016). Solvent-induced emission of organogels based on tris(phenylisoxazolyl)benzene. *Organic & Biomolecular Chemistry*, 14(1), 36–39. https://doi.org/10.1039/C5OB01898F

Kumar, Ajay, Paliwal, D., Saini, D., Thakur, A., Aggarwal, S and Kaushik, D. (2014). A comprehensive review on synthetic approach for antimalarial agents. *European Journal of Medicinal Chemistry,* 85, 147–178. https://doi.org/10.1016/j.ejmech.2014.07.084.

Makoge, V., Maat, H., Vaandrager, L., & Koelen, M. (2017). Poverty-related diseases (PRDs): Unravelling complexities in disease responses in Cameroon. *Tropical Medicine and Health*, 45(1), 2. https://doi.org/10.1186/s41182-016-0042-5

Mushtaque, S. (2015). Reemergence of chloroquine (CQ) analogs as multi-targeting antimalarial agents: A review. *European Journal of Medicinal Chemistry*, 90, 280–295. https://doi.org/10.1016/j.ejmech.2014.11.022

Moukénet, A., Donovan, L., Honoré, B., Baker, K., Smith, H., Richardson, S., & Ward, C. (2022). Extending Delivery of Seasonal Malaria Chemoprevention to Children Aged 5–10 Years in Chad: A Mixed-Methods Study. *Global Health: Science and Practice*, 10(1), e2100161. https://doi.org/10.9745/GHSP-D-21-00161

Mushtaque, Md. & Shahjahan. (2015). Reemergence of chloroquine (CQ) analogs as multi-targeting antimalarial agents: A review. *European Journal of Medicinal Chemistry*, 90, 280–295. https://doi.org/10.1016/j.ejmech.2014.11.022

Nogueira, C. R., & Lopes, L. M. X. (2011). Antiplasmodial Natural Products. *Molecules*, 16(3), 2146–2190. https://doi.org/10.3390/molecules16032146

Omole, R., Malebo, H., Nondo, R., Katani, S., Mbugi, H., Midiwo, J., & Moshi, M. (2018). In vivo Anti-plasmodial Activity of Crude Extracts of Three Medicinal Plants Used Traditionally for Malaria Treatment in Kenya. European *Journal of Medicinal Plants*, 24(4), 1–7. https://doi.org/10.9734/EJMP/2018/42874

Omole, R. A., Moshi, M. J., Heydenreich, M., Malebo, H. M., Gathirwa, J. W., Oriko, R. O., Omosa, L. K., & Midiwo, J. O. (2019). Antiplasmodial Biflavanones from the Stem Bark of Garcinia buchananii Engl. *Pharmacognosy Communications,* 9(3), 96–99. https://doi.org/10.5530/pc.2019.3.20

Omole, R. A., Moshi, M. J., Ilias, M., Larry, W., Malebo, H. M., Omosa, L. K., & Midiwo, J. O. (2020). In vitro Antiplasmodial and Cytotoxic activity of Three Medicinal Plants used Traditionally for Treatment of Malaria. *Pharmacognosy Communications*, 10(1), 2–6. https://doi.org/10.5530/pc.2020.1.2

O'Neill, M., Bray, D., Boardman, P., Phillipson, J., & Warhurst, D. (1985). Plants as Sources of Antimalarial Drugs Part. 1. In vitro Test Method for the Evaluation of Crude Extracts from Plants. *Planta Medica*, 51(05), 394–398. https://doi.org/10.1055/s-2007-969529

O'Neill, M. J., Bray, D. H., Boardman, P., Phillipson, J. D., Warhurst, D. C., Peters, W., & Suffness, M. (1986). Plants as sources of antimalarial drugs: In vitro antimalarial activities of some quassinoids. *Antimicrobial Agents and Chemotherapy*, 30(1), 101–104. https://doi.org/10.1128/AAC.30.1.101

Otambo, W. O., Olumeh, J. O., Ochwedo, K. O., Magomere, E. O., Debrah, I., Ouma, C., Onyango, P., Atieli, H., Mukabana, W. R., Wang, C., Lee, M.-C., Githeko, A. K., Zhou, G., Githure, J., Kazura, J., & Yan, G. (2022). Health care provider practices in diagnosis and treatment of malaria in rural communities in Kisumu County, Kenya. *Malaria Journal*, 21(1), 129. https://doi.org/10.1186/s12936-022-04156-z

Rosenthal, P. J. (2018). Artemisinin Resistance Outside of Southeast Asia. *The American Journal of Tropical Medicine and Hygiene*, 99(6), 1357–1359. https://doi.org/10.4269/ajtmh.18-0845

Pan American Health Organization and World Health Organization; PAHO/WHO (2018). *Epidemiological Update Increase of malaria in the Americas*, 1–6.

Sangbakembi-Ngounou, C., Costantini, C., Longo-Pendy, N. M., Ngoagouni, C., Akone-Ella, O., Rahola, N., Cornelie, S., Kengne, P., Nakouné, E. R., Komas, N. P., & Ayala, D. (2022). Diurnal biting of malaria mosquitoes in the Central African Republic indicates residual transmission may be "out of control." *Proceedings of the National Academy of Sciences*, 119(21), e2104282119. https://doi.org/10.1073/pnas.2104282119

Tajuddeen, N., & Van Heerden, F. R. (2019). Antiplasmodial natural products: An update. *Malaria Journal,* 18(1), 404. https://doi.org/10.1186/s12936-019-3026-1

Tumwebaze, P. K., Katairo, T., Okitwi, M., Byaruhanga, O., Orena, S., Asua, V., Duvalsaint, M., Legac, J., Chelebieva, S., Ceja, F. G., Rasmussen, S. A., Conrad, M. D., Nsobya, S. L., Aydemir, O., Bailey, J. A., Bayles, B. R., Rosenthal, P. J., & Cooper, R. A. (2021). Drug susceptibility of Plasmodium falciparum in eastern Uganda: A longitudinal phenotypic and genotypic study. *The Lancet Microbe*, 2(9), e441–e449. https://doi.org/10.1016/S2666-5247(21)00085-9

Vandekerckhove, S., & D'hooghe, M. (2015). Quinoline-based antimalarial hybrid compounds. *Bioorganic & medicinal chemistry*, 23(16), 5098-5119.

Willcox, M., Bodeker, G and Rasoanaivo, P. (2004). *Traditional Medicinal Plants and Malaria (Vol. 4)*. CRC Press.

Woodrow, C. J. (2005). Artemisinins. *Postgraduate Medical Journal*, 81, 71–78. https://doi.org/10.1136/pgmj.2004.028399.

World Health Organization (2021). *Global technical strategy for malaria 2016–2030, 2021 update*. WHO

World Health Organization (2021). *World malaria report 2021*. WHO

World Health Organization (2020). *World malaria report 2020: 20 years of global progress and challenges*. WHO
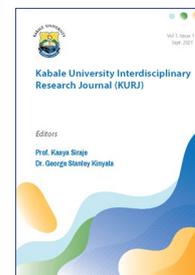
Resource mobilisation and allocation priorities on knowledge production in universities in Uganda: an empirical study

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ABSTRACT

Knowledge production is recognised as one of the core functions of a university, but its effective implementation has eluded many African universities, particularly those in Uganda. This paper analyses whether this situation is explained by these universities' resource mobilisation and allocation priorities. Using a mixed research design, data was collected from purposively selected respondents and from interviews with top management officials of Universities. In addition, a structured questionnaire to faculty members who were conveniently selected from four of the largest universities in Uganda was used. Data was analysed using qualitative and quantitative methods of analysis. Results indicate that the selected universities' resource mobilisation and allocation do not give knowledge production the priority it deserves. The priorities focus more on meeting the demands of the teaching, administrative and instructional infrastructure development functions. The research function is largely left out based on a view that it can generate its own resources not only through faculties and departments winning funded research projects and using university-industry collaborations but also through research students and faculty members sponsoring their research projects. This view however, does not always hold. Consequently, the paper concludes by urging top management of Uganda's universities that if they are to produce the knowledge expected of them, they have to give the research function the priority it deserves when mobilising and allocating resources.

Introduction

Knowledge production which refers to the creation of new information, innovations, applications and skills that can be used to guide or do human work in a better way (Carayannis & Campbell, 2019); is a key function of Universities. While the origin of this process is attributed to the early Greek philosophers such as Socrates, Plato, but primarily to Aristotle who asserted that producing knowledge enhances human productivity and civilisation (Gurukkal, 2019, 2020). Resent developments in the contemporary area has re-energised renewed debates in contemporary times. Knowledge production has thus moved side by side the evolution of a University.

Literature suggests that knowledge production became the core aim of research activities conducted at university level in 1088 when the University of Bologna was established in Italy as the first ever university in Europe (Bleiklie & Walter, 2005; Akbaritabar *et al.*, 2018). Other universities that were established afterwards in Europe, America, Asia, Australia and Africa embraced this process as a core function they started to pursue through research (Bleiklie & Walter, 2005; Kwiek, 2016; Phuong *et al.*, 2017; Heng *et al.*, 2020). Many universities such as Johns Hopkins University, Stanford University and Oxbridge are called research universities to underscore the fact that they emphasise knowledge production more than even teaching (Owen-Smith, 2018; Reichert, 2019; MacLeod & Urquiola, 2020). Unfortunately, many universities in the global south or Africa are struggling to produce the knowledge expected from them (Heng *et al.*, 2020). This is particularly the situation facing most of the universities in Uganda (Kyaligonza *et al.*, 2015).

In Uganda, knowledge production at the university level began at Makerere University, which started as a humble Technical College in 1922 (MacGregor, 2015). This University engaged in knowledge production through research up to the early 1980s when other universities began to be established following privatisation and liberalisation of higher education imposed through the structural adjustment programmes recommended by the World Bank and International Monetary Fund (Mugizi, 2018). Over 40 private universities and over 10 public universities have since been established (Alemiga & Kibukamusoke, 2019; Rwothumio *et al.*, 2020, 2021). Most of these universities are however, not producing the knowledge expected from them to propel industry innovation as well as Uganda's national development agenda. A study by Obuku *et al.* (2017) indicates that the little knowledge the universities generate in one discipline is specific and highly theoretical that its policy and practical relevance is very low.

Different factors have been identified to explain why Uganda's universities are not able to generate the practical knowledge expected of them to contribute effectively to business and national development. These include use of the British model of education whose outcomes are negligibly relevant within the context of the local development realities of Uganda (Nabayego, 2016; Serunkuma, 2019) and low funding (Kyaligonza *et al.*, 2015) and overreliance on Mode 1 of knowledge production (Obuku *et al.*, 2017) Others include government interference, corruption, weak internal governance (Asiimwe & Steyn, 2013), inappropriate higher education policies (Ecuru, 2011; Bazilio, 2019), and low research motivation among faculty members (Yawe, 2010; Daisy, (2019). A scrutiny of these factors reveals that they do not include resource mobilisation and allocation priorities.

Yet such priorities determine the required financial, human and material resources and how they are mobilised and allocated to facilitate an organization's activities (Achamkulangare, 2014; Wambua, 2017). In so doing, they play a role in influencing the extent to which an organisation like a university conducts research, thereby producing the knowledge expected from it (Wakoli & Kitainge, 2019; Agyepong *et al.*, 2021). These priorities therefore constitute a variable that can be examined and the factors influencing it when a university does not produce the knowledge expected from it. The purpose of this paper is to examine the resource mobilization and allocation priorities and how they influence knowledge production in Ugandan universities.

Theoretical and Conceptual Framework.

Theoretical review

This paper is underpinned by two theories. The first is the resource mobilisation theory, particularly its economic variant that was advocated by John D. McCarthy and Mayer Zald during the decades of 1960s and 1970s that were marked by intensified social movements, and published in 1977 (Crossman, 2020). This theory is adopted to guide analysis into the different resources needed by universities and which it should mobilise to facilitate knowledge production. This theory however, does not look into how the mobilised resources should be allocated to facilitate knowledge production optimally. This therefore complemented by the theory of resource allocation to cover this gap.

The economic variant of the resource mobilisation theory advances a view that all social movement organisations (SMOs) require and depend on resources to conduct their activities and achieve their goals (Golhasani & Hosseinirad, 2017). It views SMO as any human collectively or group established to pursue goals leading to social change, where social change is any improvement or new behaviour promoted to make people's way of life better (Crossman, 2020). In this study, the SMO is operationalised as a university, and the goal is conceptualised as knowledge production. According to Ojwang'awuor (2015), the resource mobilisation theory defines resources as all the tangible and intangible assets a SMO needs to do its work and achieve its goals. It recognises the resources as moral resources, which include solidarity, legitimacy and philanthropy extended to an SMO; cultural resources that include universal knowledge about the tasks to do to achieve set goals; social resources that consist of social networks for spreading relevant messages such as meetings, flyers, media, and volunteers, to mention but a few. The other resources this theory recognises include material resources, which include both financial (money) and physical capital such as office space, equipment, and supplies; human resources that consist of labour, experience, skills and expertise (McCarthy & Zald, 2001). In short, the resources this theory specifies include moral, human, financial, material, informational, social networks, collaborations, ideological and structure (Ortiz & Tripathi, 2017). In this paper however, only resources a university needs to engage in knowledge production are analysed in terms of how they are prioritised and how the prioritisation influences this production. As noted earlier, this theory does not delve into resource allocation, which is why is supplemented by the resource allocation theory.

The resource allocation theory was proposed by Joseph L. Bower in 1970 to explain how resources are apportioned within an organisation. This theory asserts that resource allocation begins with a cognitive trigger, which may be a performance gap, a necessity or opportunity that compels decision makers to appreciate that resources need to be invested in solving the problem or harnessing it (Bower, 2018). This appreciation is followed by impetus that involves forces that govern decision makers to decide whether or not to actually apportion and invest the resources into solving the gap, need or harnessing the opportunity based on evaluating and prioritising its importance relative to other competing demands (Bower, 2017; Vieregger *et al.*, 2017). The impetus is then followed by budgeting actions involving evaluating benefits, impact and selection between competing demands to prioritise them and allocate resources accordingly (Busenbark *et al.*, 2017). Most prioritised demands are allocated more resources than the less or non-prioritised demands, with the latter receiving no allocations sometimes (Maritan & Lee, 2017). In this study, this theory is used to guide the analysis of how knowledge production is prioritised relative to other functions of a university in terms of resource allocation.

Conceptual review

Knowledge Production

This process has attracted several scholars to understand how universities engage in it. Among these scholars are Major and Palmer (2006) who used Mode 1 to explain knowledge production by universities. According to these scholars, universities that use Mode 1 concentrate on generating discipline-specific and abstract knowledge that has only academic value, which takes the form of research dissertations, theses, papers, essays, articles published in peer-reviewed journals, book chapters or published textbooks. The value of this knowledge is in form of enabling either research students to produce new knowledge expected of them to graduate or faculty members to gain research expertise and professional growth through conducting research, publication of findings and supervision of research students (Carayannis *et al.*, 2016). The produced knowledge is considered theoretical because it tends to have little or no practical as far as solving real problems, creating practical innovations, skills and applications are concerned (Stamati *et al.*, 2018). Knowledge production under Mode 1 requires different resources to be accomplished. These include human resources (research students, research faculty, research supervisors), financial (research funds), material (research equipment and facilities), and networks (especially with other universities, research institutes, research funders, book and journal publishers) (Carayannis *et al.*, 2016). This paper is intended to examine how these resources are given priority when mobilising and allocating those needed by a university.

It should be noted that Mode 1 has been criticised for being overly concerned with production of knowledge that has little or no practical value (Stamati *et al.*, 2018). The criticism led Gibbons *et al.* (2010) to develop Mode 2 that focuses on production of practical knowledge based on applied research guided by theoretical models. Under Mode 2, practical knowledge is produced through research conducted by short-lived interdisciplinary, transdisciplinary or multi-disciplinary teams. The knowledge is practical because it is produced to solve real problems identified in daily life, business organizations or national development programs (Bleiklie & Walter, 2005). The produced knowledge can enable individuals, organizations or nations to address their entrepreneurial, business and national progress needs (Veit *et al.*, 2017). By its very nature, Mode 2 requires resources like those needed to facilitate Mode l; but it additionally needs collaborative resources in form of university-industry cooperation or partnership (Rybnicek & Königsgruber, 2019; Awasthy *et al.*, 2020). Mode 2 has also come under attack. Critics say that the knowledge it produces is for solving specific needs for specified users. For instance, the knowledge a university produces through collaboration with a business company is used by that company only. It does not benefit any other potential user (Awasthy *et al.*, 2020). This way, Mode 2 fails to produce knowledge needed to solve the needs of different users and is therefore, not competitive – the knowledge is not demanded by different users to create competition among its producers (Ivascu *et al.*, 2016).

The preceding criticism led to the development Mode 3, which according to Boehm (2015), combines Mode 1 and Mode 2 to assert that knowledge satisfies market needs only when it is relevant to more than one end-user and therefore, produced through a system of high engagement between producers (universities) and end-users. This system is formed through understanding end-users' knowledge needs and establishing collaborations between them and universities. Mode 3 recognises industry players, government agents, and community actors such as nongovernmental organizations, civil society, community-based organizations, as well as individuals such as entrepreneurs (Boehm, 2015).

The collaborations are formed in a way which allows partners to combine basic research (Mode 1) and applied research (Mode 2) to develop practical knowledge that can be entrepreneurial at a micro level, enhance organisational innovation at a meso level, foster national development at a macro level, or promote business internationalization at a global level (Carayannis & Campbell, 2019). Therefore, Mode 3 generates knowledge that empowers all societal actors to become entrepreneurs, improve and globalise their businesses, and contribute effectively to national development. Effective use of Mode 3 requires giving it priority when mobilising and allocating university resources. This paper investigates how this is done in Uganda's universities.

Generally, previous research indicates that knowledge production requires more resources as it advances from Mode 1 through Mode 2 to Mode 3. It therefore suggests that for universities to shift from production of theoretical to practical knowledge production, their research function needs to be more prioritised as far as mobilising and allocating necessary resources is concerned. The question answered in this paper is about the extent of this prioritisation in Uganda's universities.

Resource mobilization

Resource mobilization is a broad concept that connotes all way by which all types of resources an organisation such as a university needs to facilitate the attainment of set objectives and goals are identified and raised (Kipchumba *et al.*, 2013; Bhattacharjee & Kabra, 2014). These resources span over a wide spectrum including human labour, talents, competences (knowledge, skills and experience); economic goods like money, materials, equipment; accessible information, and energy (electricity); structure; gainful collaborations and supply relationships established with resource providers such as banks, other educational institutions, government agencies, civil society, donors, business community, and others (Ojwang'awuor (2015; Golhasani & Hosseinirad, 2017; Ortiz & Tripathi, 2017; Crossman, 2020). Much of the previous research on higher educational institutions like universities has however, largely focused on mobilisation of financial resources (Webber, 2017; World Bank, 2019; OECD, 2020), with a few studies examining mobilisation of university-industry collaborations (Ankrah *et al.*, 2015; Ivascu *et al.*, 2016; Awasthy *et al.*, 2020), and human resources (Kamel, 2016; Bilal *et al.*, 2019; Jadhav, 2019; Silander & Stigmar, 2019; Zeleza, 2020). This research explains that universities mobilise necessary human resources through pre-service training, retention and postgraduate training as well as hiring professors and research experts (Kamel, 2016; Bilal *et al.*, 2019; Jadhav, 2019). It also indicates that these institutions mobilise the required financial resources through raising tuition, fees, loan finance, applying for donor grants, endowments, internal income generating projects, subventions, and winning research projects through encouraging their faculty to write competitive research proposals (Webber, 2017; World Bank, 2019; OECD, 2020). This research further shows that university functions to which priority is given when mobilising resources are implemented better than those to which less priority is given (Awasthy *et al.*, 2020; Zeleza, 2020). However, it has all fallen short of delving into analysing priority given to knowledge production when mobilising these resources. This leaves the question of how knowledge production is prioritised when mobilising resources that a university needs to implement its functions, which is answered in this paper within the context of Ugandan universities.

Resource allocation

This concept connotes a strategic management practice that involves apportionment of expected and available human, financial, material and other resources to the different functions, categories of activities or

even specific undertakings planned to enable an organisation such as a university to achieve its set objectives (Liefner, 2003). The concept involves deciding where to assign which resources and in what quantity to ensure that an organisation's core functions are optimally implemented within the limitations of the available resources (Mah'd, 2014). Specifically, this concept is about assigning the right people to perform the planned activities and allotting financial and material resources required to facilitate the execution of these activities and delivery of expected outputs within the scheduled time (Wang, 2019). Prior research indicates that resources are allocated through budgeting decisions taken in such a way that more resources are apportioned to prioritised functions and activities while less or no resources are allotted to non-prioritised areas (Ibukun *et al.*, 2012). This way, less prioritised functions and activities are resource-constrained, which makes them minimally executed or not implemented at all while those that more prioritised receive more resources that improve their implementation (Broeker *et al.*, 2021). Resource allocation priorities can therefore be investigated when production of practical knowledge, a core objective of any university, is at its lowest. This is needed at most of the universities in Uganda, since they are grappling with this very situation as different studies have shown (see for instance Kyaligonza *et al.*, 2015; Obuku *et al.*, 2017)

Methodology

This study was designed as a cross-sectional survey involving mixed methods. this research design was employed because of its ability to facilitate analysis of first-hand qualitative and quantitative data collected at once (Abdelbasset *et al.*, 2019; Thomas, 2020). The sample consisted of top university administrators who were purposively selected from two largest public and two largest private universities in Uganda to provide qualitative interview data as key informants. It also consisted of faculty members selected from the same universities using convenience sampling to facilitate selection of those who could be accessible during the partial opening of the universities which had been caused by COVID-19. Faculty members were selected to provide quantitative data using a structured questionnaire which had valid and reliable items (its validity and reliability indices were .875 and .899, respectively). The sample size was determined using Sloven's formula stated below:

$$ n \quad = \quad \frac{N}{[1 + N(e)^2]} $$

Where *n* was the sample size, N was the size of the target population, which, from Annual Management Reports of the four selected universities was 85,830, which included 85,800 faculty members and 30 top administrators; e was the standard error allowed in sample selection, implying that respondents were selected at the 95% confidence level. Therefore, *e* = 5% or 0.05.

Therefore, *n* = 85,830 ÷ [1 + 85,830 (0.05)2] ≈ 398

The expected sample size was equally divided into two categories of 199 respondents who were to be selected from public universities and 199 expected from private universities. However, owing to the World Health Organisation's measures against the spread of COVID-19, all the universities were partially closed at the time of data collection. Consequently, the expected sample size was not realised. The actual sample consisted of 207 of whom 109 were faculty members and four top administrators from public universities and 98 were faculty members and four top administrators from private universities. The qualitative interview data collected from the top administrators was analysed using thematic analysis enriched by relevant data excerpts. Quantitative questionnaire data was analysed descriptive and linear regression analysis.

Findings

The aim of this study was to examine the resource mobilization and allocation priorities and how they influence knowledge production in Ugandan universities. This aim was met by asking respondents to explain how their universities prioritised the mobilisation and allocation of resources required to implement their research or knowledge production function. When this question was posed to the interviewed top administrators, the main theme developed from thematic analysis of their responses was that the mobilising of resources for research was the least prioritised. There was consensus that mobilising resources for research is not prioritised as much as raising those which the universities needed to implement their teaching and administrative functions because these latter functions attracted much more critical stakeholder interest and attention. This theme was revealed by different responses the most revealing of which was as follows:

> We are aware that knowledge production is one of the core functions of a university, but teaching is also essential and actually the main function for teaching universities like ours, and one with the most critical stakeholder interest and demands. All students demand learning as their critical interest. Faculty members demand emoluments and instructional materials as their indispensable interests. More importantly, the teaching function is difficult to implement effectively without the administrative function playing its supervisory role. Therefore, our resource mobilisation strategy focuses more on raising the resources we need to support the teaching and administrative functions; the research function is considered later. By the way, even Government prioritises teaching and administration when financing our budget. Money proposed to support the research function is inadequately provided. This is the vote that usually records the hugest funding gap (Interview held with University Bursar, 15 January 2021).

In support, another top administrator indicated that their general resource mobilisation strategy prioritised knowledge production less compared to teaching, administration and even instructional infrastructure development. This administrator expressed a view that giving the research function less priority was because it was expected to generate its own resources. This view was substantiated by explaining that all research students were expected to meet the cost of their research. In addition, all faculty members were expected to improve their research expertise through self-driven conducting of academic research. They were further encouraged to win funded research projects by writing competitive research proposals responding to calls for sponsored research, and sell innovative and valuable research ideas to business companies in way that could persuade these organisations to invest in university-industry research collaborations:

> We don't pay much attention to mobilising resources for research or knowledge production because we expect it to generate its own resources. Students are expected to pay for their research and for the research supervision they get from the university. Faculty members are encouraged to be self-driven in conducting research to improve their research expertise. They are also encouraged to compete for funded research projects and to develop research proposals that can add value to business companies and which these companies can therefore sponsor through university–industry collaborations. But teaching, administration and educational infrastructure have to be mobilised for (Interview with university VC, 19 January 2021).

Furthermore, one of the top administrators argued that knowledge production was a so expensive function that if prioritised, it would need all the resources mobilised and even require more that would be difficult to raise given the resource-constrained conditions within which their universities operated. This respondent

supported this view by explaining that the resources that knowledge production needed included faculty members such as professors and expert researchers and a lot of their time to engage in research. It also needed research facilities and equipment in addition to huge financial resources to facilitate its implementation. Therefore, its prioritisation would make the universities fail to mobilise the resources needed to implement the other core functions of teaching and administration, since it would take much of the time that faculty members would need to teach and much of the financial resources that would have been used to motivate them to teach and to finance administration needed to supervise them. The respondent added that it is for this reason that universities have to choose to specialise either as research or teaching universities, with those implementing both functions being adequately resourced:

> Giving priority to raising resources for knowledge production is suicidal to a teaching university like ours. Teaching requires supervision and both need resources, but research requires much more resources. Focusing on knowledge production first is very likely to exhaust all the resources we can raise, thereby leaving other functions with no resources needed to implement them. This is why a university chooses to specialise either in teaching or knowledge production. Very few universities prioritise both knowledge production and teaching, and these are the institutions that are well-resourced in terms of teaching and research resources (Interview with Vice Chancellor, 20 January 2021).

The views expressed by the top administrators did not differ from those revealed by faculty members. When the latter were given a number of questionnaire items and asked to use a 5-point Likert scale of responses running from strongly disagree (1) through disagree (2), not sure (3) and agree (4) to strongly agree (5) to assess how their universities prioritised mobilising resources for knowledge production. Respondents who disagreed and strongly disagreed indicated that this mobilisation was not prioritised. Those who were not sure pointed to a mixed view. Respondents who agreed indicated that it was inadequately prioritised while those who strongly agreed suggested that it was strongly enough priority. Descriptive analysis of their assessment led to results shown in Table 1.

Table 1: **Faculty assessment of prioritising mobilisation of resources for knowledge production**.

Indicators of prioritising mobilisation of resources for knowledge production	Faculty assessment of each indicator (N = 207)			
	Min	Max	Mean	Std.
Our university gives priority to raising funds needed to facilitate applied research for production of knowledge needed in the market.	1	4	1.92	.877
Our university prioritises establishing research partnerships with other universities as a way of enhancing its knowledge production capacity	1	3	1.53	.434
Our university gives priority to sponsoring research training intended to improve faculty members' knowledge production competences	1	4	1.88	.444
Our university prioritises hiring research experts needed to boost its knowledge production capacity	1	3	1.68	.567
Our university gives priority to establishing research collaborations with business companies to enhance its capacity for knowledge production	1	3	1.65	.673
Our university prioritises mobilising equipment needed to support knowledge production through research	1	4	1.56	.778
In our university, raising resources needed to produce any new knowledge is left to those conducting the research or their sponsors	4	5	4.88	.212
Overall average assessment	1	5	2.16	.569

The findings in Table 1 indicate how faculty members assessed the manner in which mobilisation of resources for knowledge production was prioritised in their universities. The minimum and maximum values show that there were faculty members who strongly disagreed (Min = 1) and those who strongly agreed (Max = 5) to the various indicators of this prioritisation. Those who strongly agreed indicated that the mobilisation of the resources was highly prioritised while those who strongly disagreed opposed this view. The magnitudes of the mean values were close to '2', except one corresponding to "In our university, raising resources needed to produce any new knowledge is left to those conducting the research or their sponsors" (Mean = 4.88), which was close to '5'. Being close to '2' reveals that on average, faculty members disagreed that their universities prioritised mobilisation of resources that were necessary to facilitate knowledge production. These results suggest that the universities did not prioritise mobilisation of these resources. All the standard deviations in Table 1 were less than '1', suggesting that there was low dispersion in the sample. In other words, the assessment of this prioritisation, which faculty members provided as individuals did not deviate much from their average assessment as a whole sample. This suggests that no priority was given to mobilising resources for knowledge production in all the selected universities.

Turning to the priority given to knowledge production during resource allocation, thematic analysis of the interview responses provided by top administrators revealed 'least prioritised' as one of the emerging themes. This theme suggests that knowledge production was not given priority far as apportioning the mobilised resources was concerned. Top administrators argued that if research did not generate its own resources, no other resources would be made available to facilitate it because those mobilised were even not enough to adequately facilitate teaching and its supervision as the main functions of the universities. One of the administrators was more articulate in revealing this theme when he stated:

> It is hard to imagine allocating the limited budgetary resources we mobilise to research when they are not even enough to meet the university's teaching and administrative requirements. The resources are in fact not even sufficient to pay our faculty satisfactorily and to facilitate them with teaching facilities they need to facilitate students – our main source of funding – to learn as they expect (Interview with University Bursar, 20 January 2021).

In addition, the research function was not prioritised as far as allocating human resources was concerned. Top administrators explained that since theirs were teaching universities, they were more concerned with allocation of faculty members to teaching of academic programmes to knowledge production. These respondents indicated that having enough faculty members to teach all the offered academic programmes was better than having enough researchers as the former was critical to guaranteeing students' receiving of learning services that would make them realise value for their money (tuition and fees) compared to when priority was given the research component.

> Our students are a priority to us because they determine our existence. It is better to allocate them the human resources they need to be taught to realise value for their tuition and fees than to apportion the resources to the research function. Having enough faculty members allocated to the teaching of all the academic programs we offer is more important to us because we are a teaching university (Interview with University Secretary, 20 January 2021).

Furthermore, most of the interviewed top administrators indicated that they prioritised the development of educational infrastructure more than the research function as far as resource allocation was concerned.

This was attributed to the fact that their universities were still developing. The universities needed to establish enough educational capacity as teaching institutions. They needed more well-furnished classrooms, more well-stocked libraries and laboratories, and more extracurricular and recreational facilities that enrolled students needed to have a healthy mind in a healthy body, and which were also necessary to attract more students. Putting all these facilities in place left these top officials with no option but to prioritise it more than the research function, which, despite its knowledge production importance, would require even much more resources to operationalise:

> We are aware of the role a university plays as a knowledge producer through its research function. however, ours emphasises the teaching function more than the research function. it is also a developing university. Therefore, when allocating resources, more priority is given to developing its educational infrastructure: we need more well-furnished classrooms, more well-stocked libraries and laboratories, and more sports and games grounds. While resources we need to put up all this capacity are huge and different, those needed to invest in the research function to its operational level are 10 times more enormous. So, our prioritisation as a teaching university as justifiable (Interview with University Planning Director, 20 January 2021).

The findings obtained from faculty members were consistent with those provided by the top administrators. Asked to use the same scale of responses to assess how their universities prioritised allocation of resources to knowledge production, descriptive analysis of the assessment provided by the selected faculty members produced results shown in Table 2.

Table 2: Faculty assessment of prioritising resource allocation to knowledge production.

Indicators of prioritising knowledge production in resource allocation	Faculty assessment of each indicator (N = 207)			
	Min	Max	Mean	Std.
Our university gives priority to the research function when allocating its budget to its different activities.	1	4	1.55	.807
Our university prioritises the research function when assigning faculty members to perform its different activities	1	4	1.66	.734
Our university gives priority to stocking equipment and facilities for implementing its research function when allocating its mobilised resources.	1	4	1.48	.944
Our university prioritises allocation of resources needed to hire research experts needed to boost its knowledge production capacity	1	3	1.68	.567
Overall average assessment	1	4	1.59	.763

Using the same interpretative logic applied to results in Table 1, the minimum and maximum values show that there were faculty members who strongly disagreed (Min = 1) and those who agreed (Max = 4) to the indicators of prioritising knowledge production when allocating budgeted and mobilised resources. The faculty members who strongly disagreed indicated that allocation of these resources did not give priority to research and hence, knowledge production. Those who agreed showed that it was it was given moderate priority. The magnitudes of the mean values were all close to '2', suggesting that on average, faculty members disagreed that the research function was given priority during of allocation of budgeted and mobilised resources. The standard deviations were all less than '1', suggesting that there was low dispersion in the sample. This implies that the way faculty members disagreed as individuals did not digress much from their average disagreement as a whole sample. Accordingly, results indicate that the selected universities did not prioritise knowledge production during allocation of resources.

Further investigation was conducted to establish the level of knowledge production in the selected universities as a basis for analysing how it was affected by the universities resource mobilisation and allocation priorities. This involved asking faculty members to assess this level using the same Likert scale of responses. Findings from descriptive analysis of the assessment are presented in Table 3.

Table 3: Faculty assessment of level of knowledge production.

Indicators of knowledge production level	Faculty assessment of each indicator (N = 207)			
	Min	Max	Mean	Std.
Our students are required to conduct research regardless of their academic program on which they are enrolled.	1	5	3.53	.817
Our students are encouraged to conduct research that must contribute new knowledge	1	5	3.64	.714
As a faculty member, I am satisfied with the amount of academic research I have been able to accomplish.	1	5	3.61	.914
As a faculty member, I am contended with the amount applied research I have conducted for different business companies.	1	5	3.55	.517
As a faculty member, I am satisfied with the amount of practical knowledge I have contributed to improve the productivity of people whose work are in line with my specialisation.	1	5	3.59	.455
Overall average assessment	1	5	3.58	.683

From Table 3, the minimum and maximum values show that there were faculty members who strongly disagreed (Min = 1) and those who strongly agreed (Max = 5) to the indicators of the level of knowledge production. Those who strongly disagreed indicated that their universities did not produce any knowledge while those who strongly agreed showed that their universities posted a high level of knowledge production. All the mean values, including the overall value of 3.58 were however, close to '4', suggesting that on average, faculty members agreed, thereby revealing a low level of knowledge production in their universities. The standard deviations were all less than '1', pointing to low dispersion in the sample. Therefore, faculty members showed that the level of knowledge production was low in their respective universities.

After establishing the level of knowledge production in the selected universities, the arithmetic technique of the data transformation method of SPSS was applied to consult global variables from the responses to the items administered to faculty members to measure each of variable. The assessed prioritisation of mobilisation of resources needed to facilitate knowledge production was named Resource Mobilisation Prioritisation, that of prioritising allocation of these resources was named Resource Allocation Prioritisation, and level of knowledge production was named Knowledge Production). Thereafter, linear regression analysis was conducted with the first two as the independent/predictor variables and Knowledge Production as the dependent/predicted variable. Results are presented in Table 4.

Table 4: Linear regression statistics between Prioritisation in Resource Mobilisation, Allocation and knowledge production.

Predictor	Statistics predicted on the dependent variable: Knowledge Production										
	Unstandardised Coefficients		Standardised Coefficients								
	B	Std. Error	Beta	t	Sig.	R	R^2	Adjusted R^2	F	Sig	Error of estimate
(Constant)	-3.241	2.408		-1.346	.197	.597	.356	.275	4.420	.030	1.978
Prioritisation of Resource Mobilisation	1.338	.554	.519	2.414	.028						
Prioritisation of Resource Allocation	1.890	.759	.535	2.488	.024						

The statistics in Table 4 indicate that prioritisation of resource mobilisation and allocation predicted knowledge production by significant a 27.5% (Adjusted R^2 = .275, F = 4.420, Sig. = .030 < 0.05). This prediction implies that close to 28% of the knowledge produced by the selected universities depended on how mobilisation and allocation of the resources required to do so were prioritised. The beta coefficients were positive, suggesting that the degree of priority given to these two processes determined the proportion of the generated knowledge positively. The corresponding t-values were significant for both predictors, indicating that each of them affected the generated knowledge significantly. The magnitudes of the beta coefficients suggest that prioritising allocation of resources required to facilitate knowledge production had a relatively stronger effect (Beta = .535, t = 2.488, Sig. = .024 < .05) compared to that of prioritising their mobilisation (Beta = .519, t = 2.414, Sig. = .028 < .05). These coefficients suggest that any improvement in prioritising mobilisation and allocation of resources for knowledge production translates into significant improvement in the level of generated knowledge, more so when the improvement is in allocation of these resources.

Discussion

The results indicate that the way Ugandan universities prioritise mobilisation and allocation of resources required to facilitate knowledge production has a significantly positive effect on the amount of new knowledge generated by these institutions (Table 4). These results imply that knowledge production increases in these universities when more priority is given to mobilising and allocating resources required to facilitate it. Therefore, the findings support the observations made by Awasthy *et al.* (2020) and Zeleza (2020) that when a university gives priority to mobilising resources required to facilitate a function or activity, its implementation is better than that of the function or activity to which less priority is given when mobilising the necessary resources. They also give credence to Broeker *et al.*'s (2021) observation that during resource allocation, less prioritised functions and activities are not allotted less or no resources which constrains their implementation, but those that more prioritised during allocation receive more resources that improve their implementation.

Unfortunately, qualitative results and those in Table 1 and Table 2 indicate that the mobilisation and allocation of resources needed to facilitate knowledge production were both not given priority. It is therefore not surprising that the level of knowledge production was low in all the selected universities (Table 3). Therefore, the results point to a need for all these universities to give more priority to the mobilisation and

allocation of resources for knowledge production, if its level is to improve. These results in Table 4 suggest that the level of knowledge production rises higher when priority is given more to allocating than mobilising resources for it. This suggests that while mobilising resources for knowledge production specifically is necessary, better outcomes are realised when the resources are allocated from the pool of the generally mobilised resources. Therefore, the view held by the top administrators of some of the selected universities that research or knowledge production should generate its own resources is not entirely supported by these results, and therefore, needs to be revisited. It can generate its own resources through winning funded research projects and university-industry collaborations, but these arrangements need to be enhanced by allocating it resources mobilised by a university from other sources.

Limitations

Due to difficulties encountered in accessing respondents because of the partial closure of universities as a social distancing measure for minimising the spread of COVID-19, the actual sample size was much lower than the statistically expected size. Only 207 respondents participated out of the expected minimum of 398 respondents. This limited the statistical representativeness of the sample. In addition, Uganda had over 10 public- and over 40 private-universities, but the study was based on four of them of which two public and two private universities. Having four out of over 50 universities limits the generalizability of the findings.

Conclusion and Recommendations

The study indicates that the way mobilisation and allocation of resources required to facilitate knowledge are prioritised is a significant determinant of the level of knowledge produced by universities in Uganda. Therefore, not prioritising mobilisation and allocation of these resources explains why knowledge production is low in these universities. There is therefore need for these universities to give priority to mobilising and allocating resources to their knowledge production function instead of expecting this function to generate its own resources.

The top management of Uganda's universities should prioritise mobilising and allocating resources required to facilitate knowledge production. More emphasis should be put on allocating these resources from the central pool than expecting to mobilise them using the research function itself. The top management officials who hold a view that knowledge production is a self-resource generating and therefore self-sponsoring function should replace it with another perspective that combines both the use of this function to generate its own resources while also allocating it more resources from the central pool to the mobilised faculty members, financial, material and other necessary resources.

A replicate of this study should be conducted based on a sample size that is statistically representative of all the universities in Uganda to provide a generalizable understanding of how prioritisation resource mobilisation and allocation affects their level of knowledge production.

References

Abdelbasset, W.K., Alsubaie, S.F., Tantawy, S.A., Elyazed, T.I.A., & Elshehawy, A.A. (2019). A cross-sectional study on the correlation between physical activity levels and health-related quality of life in community-dwelling middle-aged and older adults. *Medicine*, 98(11)

Achamkulangare, G. (2014). *An analysis of the resource mobilization function within the United Nations system*. Geneva: United Nations.

Agyepong, I.A., Godt, S., Sombie, I., Binka, C., Okine, V., & Ingabire, M.G. (2021). Strengthening capacities and resource allocation for co-production of health research in low- and middle-income countries. *BMJ*, 372(166).

Akbaritabar, A., Casnici, N., & Squazzoni, F. (2018). The conundrum of research productivity: A study on sociologists in Italy. *Scientometrics*, 114(3), 859-882.

Alemiga, J., & Kibukamusoke, M. (2019). Determinants of the quality of academic staff in the process of teaching and learning in private universities in Uganda. *Africa's Public Service Delivery and Performance Review,* 7(1), a244.

Ankrah Samueland AL-Tabbaa Omar. 2015. Universities–industry collaboration: A systematic review. *Scandinavian Journal of Management*, 31(3), 387-408

Asiimwe, S., & Steyn, G. M. (2013). Obstacles hindering the effective governance of universities in Uganda. *Journal of Social Sciences*, 34(1), 17-18.

Awasthy, R., Flint, S., Sankarnarayana, R., & Jones, R.L. (2020). A framework to improve university–industry collaboration. *Journal of Industry - University Collaboration*, 2(1), 49-62.

Bazilio, K. (2019). Analysis of the Different Education Policy Reforms in Uganda (1922–2000). In *Proceedings of the 15th International RAIS Conference on Social Sciences and Humanities* (pp. 311-317). Scientia Moralitas Research Institute.

Bhattacharjee, M., & Kabra, K. (2014). University funding - a world view. *International Journal of Business & Administration Research Review*, 1, 88-98.

Bilal, A., Guraya, S.L., & Chen, S. (2019). The impact and effectiveness of faculty development program in fostering the faculty's knowledge, skills, and professional competence: A systematic review and meta-analysis. S*audi Journal of Biological Sciences*, 26(4), 688-697.

Bleiklie, I., & Walter, W.P. (2005). Universities and the production of knowledge: Introduction. *Higher Education* ,49(1/2), 1-8.

Boehm, C. (2015). *Engaged universities, Mode 3 knowledge production and the impact agendas of the REF*. retrieved from http://e-space.mmu.ac.uk/595960/1/2015_04_26_TripleHelixes_WestminsterForum.pdf

Bower, J. (2018). *Resource allocation theory.* Retrieved from https://doi.org/10.1057/978-1-137-00772-8_677

Bower, J.L. (2017). Managing resource allocation: Personal reflections from a managerial perspective. *Journal of Management*, 43, 2421–2429.

Broeker, L., Ewolds, H., de Oliveira, R.F., Künzell, S., & Raab, M. (2021). The impact of predictability on dual-task performance and implications for resource-sharing accounts. *Cognitive Research: Principles and Implications*, 6(1).

Busenbark, J.R., Wiseman, R.M., Arrfelt, M., Woo, H.S. (2017). A review of the internal capital allocation literature: Piecing together the capital allocation puzzle. *Journal of Management*, 43, 2430–2455

Carayannis, E.G., & Campbell, D.F.J. (2019). Definition of key terms: Knowledge, knowledge production, innovation, democracy, and governance, In *Smart quintuple helix innovation systems. springer briefs in business* (pp. 1-20). Cham: Springer 5.

Carayannis, E.G., Campbell, D.F.J., & Rehman, S.S. (2016). Mode 3 knowledge production: systems and systems theory, clusters and networks. *Journal of Innovation and Entrepreneurship*, 5(17), 1–2.

Clelan, E., & Kofoed, M. (2016). The effect of the business cycle on freshman financial aid. *Contemporary Economic Policy*, 35(2), 253-268

Cowles, H.M. (2015). Hypothesis bound: Trial and error in the nineteenth century. *Isis*, 106(3), 635-645.

Crossman, A. (2020). *What is the resource mobilization theory*? Retrieved from https://www.thoughtco.com/resource-mobilization-theory-3026523

Daisy, A. (2019). *Motivational practices and performance of lecturers in tertiary institutions in Arua District* (Masters Dissertation) Kyambogo University

Ecuru, J. (2011). *Fostering growth in Uganda's innovation system*. Licentiate Dissertation Series No. 11, Blekinge Institute of Technology.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (2010). *The new production of knowledge: The dynamics of science and research in contemporary societies*. London: SAGE Publications Ltd.

Golhasani, A., & Hosseinirad, A. (2017). The role of resource mobilization theory in social movement. International *Journal of Multicultural and Multireligious Understanding*, 3(6), 1

Gurukkal, R. (2019). *History and theory of knowledge production: An introductory outline*. New Delhi: Oxford University Press.

Gurukkal, R. (2020). Book review: History and theory of knowledge production: An introductory outline. *The Indian Economic & Social History Review*, 57(3), 422.

Heng, K., Hamid, O.M., & Khan, A. (2020). Factors influencing academics' research engagement and productivity: A developing countries perspective. *Issues in Educational Research*, 30(3), 965-987.

Hugentobler, M., Müller, M., & Morrissey, F. (2017). Private funding and its dangers to academia: an experience in Switzerland. *European Journal of Higher Education*, 7(2), 203-213.

Ibukun, W.O., Iyiomo, A.O., & Akinfolarin, C.A. (2012). Impact of human resource allocation and utilization on the academic performance of students in Ondo State Secondary Schools. *Global Journal of Management and Research*, 12(1), 114-121.

Ivascu, L., Cirjaliu, B., & Draghici, A. (2016). Business model for the university-industry collaboration in open innovation. *Procedia Economics and Finance*, 39, 674 – 678.

Jadhav, A. (2019). Impact of faculty development programmes on the development of proficiency and competency of faculty in higher education. *International Journal of Research and Analytical Reviews*, 6(1), 223-226.

Kamel, A.M. (2016). Role of faculty development programs in improving teaching and learning. *Saudi Journal of Oral Sciences*, 3, 61-68.

Kipchumba, S.K., Zhimin, L., & Chelagat, R. (2013). A study on the sources of resources and capacity building in resource mobilization: Case of private chartered universities in Nakuru Town, Kenya. *Journal of International Education and Leadership*, 3(2), 1-17.

Kwiek, M. (2016). The European research elite: A cross-national study of highly productive academics in 11 countries. *Higher Education*, 71(3), 379-397.

Kwiek, M. (2018). High research productivity in vertically undifferentiated higher education systems: Who are the top performers? *Scientometrics*, 115(1), 415-462.

Kyaligonza, R., Kimoga, J., & Nabayego, C. (2015). Funding of academic staff's research in public universities in Uganda: Challenges and opportunities. *Makerere Journal of Higher Education,* 7(2), 147-162.

Kyvik, S. & Reymert, I. (2017). Research collaboration in groups and networks: Differences across academic fields. *Scientometrics*, 113(2), 951-967.

Liefner, I. (2003). Funding, resource allocation, and performance in higher education systems. *Higher Education*, 46, 469–489.

MacGregor, K. (2015). *Transforming Makerere into a research-led university*. Retrieved 25 February 2021 from https://www.universityworldnews.com/post.php?story=20150108173021489

MacLeod, W.B., & Urquiola, M. (2020). *Why does the U.S. have the best research universities? incentives, resources, and virtuous circles*. Discussion Paper Series No. IZA DP No. 13203. New York: The IZA Institute of Labour Economics.

Mah'd, O.A. (2014). Allocating resources in higher education: Evidence from private Jordanian universities. *International Journal of Business and Management*, 9(5), 169-183.

Major, C.H., & Palmer, B. (2006). Reshaping teaching and learning: The transformation of faculty pedagogical content knowledge. *Higher Education*, 51(4), 619-647.

Maritan, C.A., & Lee, G.A. (2017). Resource allocation and strategy. *Journal of Management*, 43(8), 2411-2420.

McCarthy, J.D., & Zald, M.N. (2001). The Enduring vitality of the resource mobilization theory of social movements: In Jonathan H. T. (ed.), *Handbook of sociological theory* (pp. 533-65). London: McGraw-Hall.

Mugizi, W. (2018). The role of higher education in achieving Uganda Vision 2040. Elixir Social Studies, 115, 49831.

Nabayego, C. (2011). *Adoption of informal education practices in formal education in Uganda*. [Doctoral Dissertation, Makerere University]. http://makir.mak.ac.ug/handle/10570/3838

Nasser-Abu Alhija, F. M. & Majdob, A. (2017). Predictors of teacher educators' research productivity. *Australian Journal of Teacher Education*, 42(11), 34-51.

Negash, M., Lemma, T. T. & Samkin, G. (2019). Factors impacting accounting research output in developing countries: An exploratory study. *The British Accounting Review*, 51(2), 170-192.

Obuku, E.A., Lavis, J.N., Kinengyere, A., Mafigiri, D. K., Sengooba, F., Karamagi C. & Sewankambo, N.K. (2017). Academic research productivity of post-graduate students at Makerere University College of Health Sciences, Uganda, from 1996 to 2010: A retrospective review. *Health Research Policy and Systems*, 15(30).

OECD. (2020). Mobilising financial resources for higher education, In: *Resourcing higher education: challenges, choices and consequences* (pp. 29-50). Paris: OECD Publishing.

Ojwang'awuor, J. (2015). *Financial resource mobilization strategies and internal efficiency of public secondary schools in Rachuonyo South Sub-County, Homabay County, Kenya* [Masters Dissertation, University of Nairobi]. http://erepository.uonbi.ac.ke/handle/11295/89978

Ortiz, J., & Tripathi, A.K. (2017). Resource mobilization in social media: the role of influential actors. In *Proceedings of the 25th European Conference on Information Systems (ECIS)*, Guimarães, Portugal, June 5-10, 2017 (pp. 3049-3059).

Owen-Smith, J. (2018). *Research universities and the public good: Discovery for an uncertain future (innovation and technology in the world economy)* (1st ed.). Stanford: Stanford Business Books.

Paul, S., Vijayaragavan, K., Singh, P., Burman, R.R., & Chahal, V.P. (2017). Determinants of research productivity of agricultural scientists: Implications for the national agricultural research and education system of India. *Current Science*, 112(2), 252-257.

Phuong, Y.H., Ly, P.T.B., & Vo, Q.P. (2017). Factors inhibiting English lecturers from doing research: The case of the Mekong Delta, Vietnam. *Phranakhon Rajabhat Research Journal*, 12(2), 60-72.

Quimbo, M.A.T., & Sulabo, E. C. (2014). Research productivity and its policy implications in higher education institutions. *Studies in Higher Education*, 39(10), 1955-1971.

Reichert, S. (2019). *The role of universities in regional innovation ecosystems*. Brussels: European University Association

Rwothumio, J., Mbirithi, D., & Itolondo, W. (2020). Role of financial rewards in enhancing academic staff performance in public universities in Uganda. *East African Journal of Interdisciplinary Studies,* 2(1), 207-223.

Rwothumio, J., Okaka, W., Kambaza, S., & Kyomukama, E. (2021). Influence of performance appraisal in determining academic staff performance in public universities in Uganda. *International Journal of Advanced Research*, 3(11).

Rybnicek, R., & Königsgruber, R. (2019). What makes industry–university collaboration succeed? A systematic review of the literature. *Journal of Business Economics*, 89, 221–250.

Serunkuma, Y. (2019). The academia is a marketplace: History, context and decolonization at Makerere University. *Africa in the World*: *Shifting Boundaries and Knowledge Production*, 2(1), 119-130.

Shirrell, M., Hopkins, M., & Spillane, J.P. (2019). Educational infrastructure, professional learning, and changes in teachers' instructional practices and beliefs. *Professional Development in Education*, 45(4), 599-613.

Silander, C., & Stigmar, M. (2019). Individual growth or institutional development? Ideological perspectives on motives behind Swedish higher education teacher training. *Higher Education*, 77, 265–281.

Stamati, D., Meissner, D., Campbell, D.F.J., Carayannis, E.G., & Grigoroudis, E. (2018). 'Mode 3' universities and academic firms: Thinking beyond the box trans-disciplinarity and nonlinear innovation dynamics within competitive entrepreneurial ecosystems. *International Journal of Technology Management*, 77(1/2/3), 145.

Thomas, L. (2020). *What is a cross-sectional study*? Retrieved from https://www.scribbr.com/methodology/cross-sectional-study/

Thomsen, S., & von Haaren-Giebel, F. (2016). Did tuition fees in Germany constrain students' budgets? New evidence from a natural experiment. *IZA Journal of European Labour Studies*, 5(1).

Veit, D.R., Lacerda, D.P., Camargo, L.F.R., Kipper, L.M., & Dresch, A. (2017). Towards Mode 2 knowledge production. *Business Process Management Journal*, 23, 293–328.

Vieregger, C., Larson, E.C., Anderson, P.C. (2017). Top management team structure and resource reallocation within the multibusiness firm. *Journal of Management*, 43, 2497–2525.

Vuong, Q.H., Ho, M.T., Vuong, T.T., Napier, N.K., Pham, H.H., & Nguyen, H.V. (2017). Gender, age, research experience, leading role and academic productivity of Vietnamese researchers in the social sciences and humanities: Exploring a 2008-2017 Scopus dataset. *European Science Editing*, 43(3), 51-55.

Vuong, Q.H., Napier, N.K., Ho, T.M., Nguyen, V.H., Vuong, T.T., Pham, H.H., & Nguyen, H.K.T. (2019). Effects of work environment and collaboration on research productivity in Vietnamese social sciences: Evidence from 2008 to 2017 Scopus data. *Studies in Higher Education*, 44(12), 2132-2147.

Wakoli, M., & Kitainge, P. (2019). Instructional resource mobilisation and internal efficiency of public technical training institutions in Bungoma County, Kenya. *Journal Of Humanities And Social Science*, 24(11), 71-79

Wambua, A.W. (2017). *Mobilization and allocation of teaching and learning resources among subjects in public secondary schools in Makueni County, Kenya*. [Masters Dissertation, Kenyatta University]. https://ir-library.ku.ac.ke/handle/123456789/14505

Wang, D.D. (2019). Performance-based resource allocation for higher education institutions in China. *Socio-Economic Planning Sciences*, 65, 66-75

Webber, D. (2017). State divestment and tuition at public institutions. *Economics of Education Review*, 60, 1-4.

World Bank (2019). *Improving higher education performance in Kenya: a policy report.* Report No: AUS0001105. Washington DC: World Bank.

Yawe, G. (2010). *Motivation and academic staff performance in public universities in Uganda: the case of Makerere University.* [Masters Dissertation, Makerere University]. http://makir.mak.ac.ug/handle/10570/1611

Zeleza, P.T. (2020). *Money matters: The financial crises facing universities.* Retrieved from https://www.theelephant. info/ideas/2020/03/12/money-matters-the-financial-crises-facing-universities/

Zhang, X. (2014). *Factors that motivate academic staff to conduct research and influence research productivity in Chinese Project 211 universities.* [Doctoral Thesis, University of Canberra, Australia}. https://researchprofiles.canberra. edu.au/files/33679140/file

Epidemiology and causes of common soccer injuries during university games in Uganda

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ABSTRACT

The study sought to establish the common soccer injuries, their causes and management among Busitema University athletes. The study used a cross-sectional survey design involving quantitative and qualitative approaches on a sample of 76 respondents, obtained by simple random and purposive sampling techniques. Data was collected by use of self-administered questionnaires, an observational tool and interview guide. Quantitative data analysis involved generation of descriptive statistics; frequencies, percentages and means. Qualitative data was analysed using content analysis. The study established that the common injuries were ligament sprain or strains (56.6%) and re-injuries (55.1%). Dry and hard grounds, joint instability, bad playing field conditions, inadequate treatment/ rehabilitation from previous injury, exercise overload/ over training, poor skill execution, poor training techniques and player neglect caused the injuries. It was recommended that quality playing fields and equipment, providing players with adequate attention and advocating for full implementation of fair play rules should be fostered to abate sports injuries.

Introduction

Traditional scientific practice in sports injury research has routinely involved collapsing the broader socio-ecological landscape down in order to analyse individual-level determinants of injury whether biomechanical and/ or behavioural (Hulme & Finch, 2015). The concern for injuries in sports has been there for a long time with records made on sports fatalities. For instance, reports indicate that between 1945 and 1994, nearly 85% of all football-related fatalities resulted from head and cervical spine injuries (Zahir & Ludwig, 2010). In the FIFA World Cups1998–2012, a total of 3944 injuries were reported from 1546 matches, equivalent to 2.6 injuries per match (Junge & Dvorak, 2013).

In Africa, the statistics on injuries resulting from sports are difficult to quantify because of limited data. However, the rate of sports injuries is also high. For instance, in South Africa in one season, among netball players, the injury rate was 61.8% with 1.9 injuries per player (Pillay& Frantz, 2012).

In Kenya, many sportspeople, especially footballers, had to end their careers due to an injury that could have been cured (Muneza, 2013). Still in Kenya, there were 102 injuries for 2,400 match player hours recorded in 60 league games for the season of rugby and the incidence of injuries was 42.5% of 1,000 match player hours (Nyagetuba, 2011).

In Uganda, injuries in sports are also of high concern. However, the rate at which Ugandan sportsmen get injuries, the time lag of rehabilitation, and the eventual full recovery procedure are not documented (Isabirye, 2013). The prevalence of sports injuries among the 2012 – 2013 Ugandan super league players was 64.0% (Mwaka, 2013). In addition, in a tour to Austria, a routine health check of Uganda's national soccer side (Cranes) showed that the entire Cranes side was injured (Bakama 2015). More so, that most clubs and federations simply do not care about injuries and thus players continue risking their lives in an environment of questionable medical Services.

Sports injuries refer to accidents sustained during an athletic game such as football or any other sporting activity such as running, cycling or skiing (Wood &Bellis, 2010). In this paper, sports injuries refer to common injuries including contusions, sprains/ strains, fractures, re-injuries and bruises. Causes of sports injuries refer to risk factors for sports injuries that expose players to sports injuries (Bahr & Holme, 2003). In this article, risk factors are defined as factors that make players get injured including poor conditions, poor injury treatment, collisions, foul play and poor playing techniques.

Epidemiology of Accidents Theory introduced by Gordon in 1949 underpinned this study. The theory proposes that injuries are caused by particular episodes (Hulme & Finch, 2015). The theory identifies two injury-causing episodes, namely predisposition and situational characteristics. Predisposition characteristics include the susceptibility of the people (host), hazardous environment and injury-producing agent among others (Bonilla-Escobar & Gutiérrez, 2014). Situational characteristics are risk assessment by individual, priorities of the supervisor and prevailing attitude predisposition (Hulme & Finch, 2015). This theory suggests that for certain athletes, because of their predisposition and situational characteristics, they are likely to suffer certain injuries during their participation in sports activities. This theory was the guide for analysing common sports injuries and their causes. Sports such as football are very important for individuals and society. Participation in sports is associated with improved self-esteem, social interaction, fewer depressive symptoms and improved psychosocial health and physical health outcomes (Eime et al., 2013). Despite the recognised importance of performance in sports, sports are associated with the risk of injuries which prevent players' continued performance in sports.

In Uganda, 80% of athletes have retired from sports because of injuries that could have been controlled (Muneza, 2013). At Busitema University, the medical report shows that a total of 102 players since 2012 have registered cases of chronic injuries obtained from the previous sports seasons (Makozi, 2016). Makozi (2016) further reported that Players have been made to continue playing during games despite suffering concussions in sports like football. Worse still, there has been no effort to compile data of injuries suffered by players of the university during play according to Busitema medical documentation. If the problem of injury among footballers at Busitema University is not addressed, the welfare of players will be put at stake and they will not be able to compete successfully in the various football tournaments in the country and abroad. Therefore, this study sought to analyse sports injuries in football in Busitema University, establish

the common injuries and their causes. The objectives of the study were (a) to establish common injuries, (b) to examine the causes of the injuries.

Methodology

This study adopted cross-sectional survey design. The target population was 119 including all the sports students involved in football numbering 108 and 11 sports department staff. The study was carried out at all campuses of Busitema University. The main campus is located at Busitema along Jinja-Tororo highway. The other campuses were: Nagongera, Mbale, Arapai, Pallisa, and Namasagali.

The sampling procedure was simple random and purposive sampling as explained by (Amin (2005). The sample size for the questionnaire survey was 72 respondents. The sample for the interview guide included seven sports officials from the university sports department. The study adopted two types of proportional sampling methods, namely simple random and purposive sampling. Stratified random sampling involved dividing the sample for the questionnaire survey into different subgroups according to their positions that is players and Sports department staff. Thereafter, the respondents were randomly selected proportionally from the different subgroups as guided by Lu, Zhang, Wen and Lan (2012) on sample selection. Both male and female football players were involved in the study.

The questionnaire comprised close-ended question items based nominal scale with appropriate alternatives given for Section A on demographic characteristics of the respondents and ordinal scale based on the five-point Likert. Close-ended questions were selected because they were easy to administer, easily coded and analysed, allow comparisons and quantification, and they were more likely to produce fully completed questionnaires while avoiding irrelevant responses. At the end of each section of the SAQ there was an open ended question. Open- ended questions were added because they allowed time and space for free-form responses that invited participants to share their understandings, experiences, opinions and interpretations. Overall, a combination of close and open-ended questions provided the survey write-up with quantifiable and in-depth results. Closed questions produced results that were easily summarised and clearly presented in quick-look summaries while open questions produce verbatim comments adding depth and meaning as suggested by Bird (2009).

An interview guide was used to collect data from the seven staff in the sports department. The question items for the respondents were questions eliciting open-ended responses. The open-endedness of interview questions allowed the respondents to provide detailed information and allowed the asking of probing questions. The participants were able to fully express their viewpoints and experiences helping to obtain in-depth data necessary for qualitative analysis. The respondents were identified by "R" denoting "respondent". An observation check list was used to collect observation data by the researcher while observing different Busitema University team football games. Observations were carried out in seven games during the Uganda Inter- University games in December 2017 and seven games during the University football league in 2018. This was to get more information on the injuries which occur among football players.

Results

Common Injuries among Football Athletes

Objective 1 was to establish common injuries among football athletes of Busitema University. The results are as presented in table 1

Table 1: **Common Injuries among Football Players**.

Common Injuries among Football Players	SD F (%)	D F (%)	N F (%)	A F (%)	SA F (%)	Mean
I have previously suffered a contusion during play	26(37.7)	25(36.2)	4(5.8)	7(10.1)	7(10.1)	2.19
I have previously developed ligament sprain or strain during play	13(18.8)	12(17.4)	5(7.2)	24(34.8)	15(21.7)	3.23
I have suffered fractures in the past	22(31.9)	16(23.2)	5(7.2)	20(29.0)	6(8.7)	2.59
I have been prone to re-injuries	17(24.6)	12(17.4)	2(2.9)	26(37.7)	12(17.4)	3.06
I have suffered an ankle sprain during play	15(21.7)	19(27.5)	1(1.4)	22(31.9)	12(17.4)	2.96
I have injured my neck during play in the past	28(40.6)	23(33.3)	7(10.1)	11(15.9)	-	2.01
My head has been injured in the past during play	32(46.4)	23(33.3)	3(4.3)	8(11.6)	3(4.3)	1.94
My nose has previously been injured during play	24(34.8)	24(34.8)	3(4.3)	13(18.8)	5(7.2)	2.29
I have suffered a damage to the teeth during play	40(58.0)	15(21.7)	3(4.3)	9(13.0)	2(2.9)	1.81

The results in Table 1 show that the most common injuries were sprain or strain during play as reflected by 56.6% (39) of the respondents who agreed that they have suffered from either of the two injuries whereas 36.2% disagreed. The mean = 3.23 implied that the occurrence of a sprain or strain during play was moderately high. Therefore, the incident of sprain or strain amongst the football players was high.

Concerning whether the players had been prone to re-injuries, the larger percentage (55.1%) agreed with 42.0% disagreeing. The mean = 3.06 suggested that the respondents indicated re-injuries amongst the football players were moderately high. The results showed that, the injuries common among football players that occurred were; re: injuries (55.1%).

As to whether the football players had suffered fractures in the past, (55.1%) disagreed with 37.7% agreeing. The mean = 2.59 indicates that the occurrence of fractures in the past was moderately low. Therefore, the commonness of factures amongst the football players was moderately low.

On whether the athletes had previously suffered contusions during play showed that, the majority (73.9%) disagreed while only 20.2% agreed. The mean = 2.19 suggested that the respondents generally disagreed. Therefore, this means that the occurrence of contusions during play among the football athletes was low.

With respect to whether the athletes had suffered ankle injuries during play, the results showed that the percentage (49.3%) of those who agreed and those who disagreed 49.2% were approximately equal. With regard to whether the athletes had injured their necks during play in the past, the majority percentage (73.9%) disagreed with 15.9% agreeing. The mean = 2.01 meant that most respondents disagreed. Therefore, the incidence of injuring the necks during play by the players was minimal.

As to whether the athletes had injured their heads in the past during play, the majority percentage (79.7%) disagreed with 15.8% agreeing. The mean = 1.94 implied that most of the respondents disagreed. Therefore, the frequency of head injuries to amongst the football players was low.

With regard to whether the players had injured their noses previously during play, the majority percentage (69.6%) disagreed with 26.0% agreeing. The mean = 2.29 meant that the respondents disagreed. Therefore, the commonness of nose injury during play amongst the football players was low.

Concerning whether the players had suffered damage to the teeth during play, the majority percentage (79.7%) disagreed with 15.9% agreeing. The mean = 1.81 meant that the respondents disagreed. Therefore, the incidence of teeth damage during play amongst the football players was low.

Observations were also carried out in seven games during the Uganda Inter- University games in December, 2017, and seven games during the University football league in 2018. This was to get more information on the injuries which occur to football players. The results are as presented in table 2

Table 2: Occurrence of Injuries among players of the Uganda Inter-University Games, 2017 and Uganda Universities Football League 2018.

Injury	Morning			Afternoon				
	Lower Extremity	Upper Extremity	Total	Lower Extremity	Upper Extremity	Total	Grand total	%
Sprain	03	00	03	04	01	05	08	22.2
Strain	02	01	03	03	01	04	07	19.4
Contusion	05	01	06	08	03	11	17	47.2
Fracture	00	00	00	00	00	00	00	00
Dislocation	00	01	01	00	03	03	04	11.1
Total	10	03	13	15	08	23	36 injuries	

The observations from Table 2 revealed that of the 36 injuries that occurred during the games, most of them, 17 (47.2%) were contusions; followed by sprains, 8 (22.2%); strains, 7 (19.4%); and 4 (11.1%) dislocations. This implies that contusion amongst the football players in Busitema University was the highest occurring while dislocations occurrence was lowest.

Qualitative data was collected using spaces for open responses in the questionnaire and interviews. Respondents from open ended questionnaire were denoted by "R" while those from the interview guide by "P".

Out of 72 respondents from open ended questions, (90%) said that common injuries included ankle strains, minor injuries, lower limbs injuries and dislocations. These were in line with the results in the observation tool, which points out the strains and minor injuries (contusions) are common. R28 stated "Ankle strains are the common injuries among football players". R41and R48 observed, "Most injuries that occur on the legs are fractures and dislocations". This was a response of 6(9.7%) of the total respondents, which implied that fractures and dislocations were not common.

In the interviews with the sports officials, they gave several responses to the question concerning what they considered common injuries among football players in the university. All the 7 (100%) respondents indicated that the common injuries were bruises, sprains, joint dislocations, ankle injuries and pains at the pelvic girdle.

During presentation of the responses obtained through interview data;
P1 stated, "the injuries that have plagued our teams are leg injuries which occur during play and training. These include joint dislocations, ankle injuries, strains and muscle pulls." P4 said;

> "Our number nine player got a dislocation during the final days to begin interuniversity games. The whole team was disorganised, demoralised and the games played were not well performed. The players almost refused to play because they had put much of their confidence in him. Some students demanded that the doctor injects him pain killers for him to play. The whole team became psychologically disturbed".

P6 stated "Most players suffer injuries in their lower limbs including muscle pulls, ankle, knee, joint, toe injuries and dislocations. Due to lack of sufficient resources to handle these injuries, team performance has been affected and some players have had to give up their football careers."

"The injuries affect the students' participation in football more so their form. Thus most players abandon football due to repeated injuries." Overall, the views from the questionnaire survey and interviews presented above were in agreement that the common injuries among the football players were joint dislocations, ankle injuries and sprains which affected the lower part of the lower limb.

Causes of Injuries among Football players.

Objective 2 was to examine the Causes of Injuries among Football players of Busitema University. The results are as presented below.

Table 3: Descriptive Statistics for Causes of Injuries among Football Athletes.

Causes of Injuries among Athletes	F/%	SD	D	N	A	SA	Mean
Dry and hard ground with the sunny weather	F	4	8	4	32	21	3.84
	%	5.8	11.6	5.8	46.4	30.4	
Joint instability	F	6	14	15	27	7	3.22
	%	8.7	20.3	21.7	39.1	10.1	
The bad playing field condition	F	4	3	2	37	23	4.04
	%	5.8	4.3	2.9	53.6	33.3	
Inadequate treatment/ rehabilitation from previous injury	F	4	6	4	35	20	3.88
	%	5.8	8.7	5.8	50.7	29.0	
Subjective exercise overload/ over training	F	5	26	12	19	7	2.96
	%	7.2	37.7	17.4	27.5	10.1	
Poor physical condition of players	F	3	12	10	35	9	3.51
	%	4.3	17.4	14.5	50.7	13.0	
Lack of/ poor equipment like football boots	F	3	5	4	29	28	4.07
	%	4.3	7.2	5.8	42.0	40.6	
Collisions during play	F	3	5	7	36	18	3.88
	%	4.3	7.2	10.1	52.2	26.1	
Foul play	F	5	10	5	30	19	3.70
	%	7.2	14.5	7.2	43.5	27.5	
Poor skill execution	F	3	17	16	20	13	3.33
	%	4.3	24.6	23.2	29.0	18.8	

Poor training techniques	F	8	6	6	37	12	3.57
	%	11.6	8.7	8.7	53.6	17.4	
Player neglect of the injury for the sake of representation on the team	F	4	11	5	21	28	3.84
	%	5.8	15.9	7.2	30.4	40.6	

The results in Table 3 show that the largest number of respondents, 60(86.9%) agreed that bad playing field condition was the cause of injuries while 10.1% disagreed. The mean = 4.04 indicated that the respondents agreed. Therefore, bad playing field condition was the major cause of injuries. This was followed by 59 (82.6%) of the respondents who agreed that lack of/ poor equipment like football boots caused injuries with 11.5% disagreeing. The mean = 4.07 implied that the respondents agreed. Therefore, lack of/ poor equipment like football boots was a major cause of injuries.

Concerning whether inadequate treatment/ rehabilitation from previous injuries were a cause of injuries, the majority percentage (79.5%) agreed with 14.5% disagreeing. The mean = 3.88 suggested that the respondents agreed. Therefore, inadequate treatment/ rehabilitation from previous injuries were a cause of injuries.

Regarding to whether collisions during play caused injuries, the majority percentage (78.3%) agreed with 11.5% disagreeing. The mean = 3.88 meant that the respondents agreed. Therefore, collisions during play caused injuries. On whether dry and hard ground with the sunny weather caused injuries, the largest number of respondents 55(76.8%) agreed with 17.4% disagreeing that sunny weather caused injuries. The mean = 3.84 suggested that the respondents agreed. Therefore, this implied that dry and hard ground with sunny weather caused injuries.

As to whether player's neglect of the injury for the sake of representation on the team caused injuries, the majority percentage (71.0%) agreed with 21.7% disagreeing. The mean = 4.06 meant that the respondents agreed. Therefore, player neglect of the injury for the sake of representation on the team caused injuries. Concerning whether foul play caused injuries, the majority percentage (71.0%) agreed with 21.7% disagreeing. The mean = 3.70 meant that the respondents agreed. Therefore, foul play caused injuries.

As to whether poor training techniques caused injuries, the larger percentage (71.0%) agreed with 19.3% disagreeing. The mean = 3.57 suggested that the respondents agreed. Therefore, poor training techniques caused injuries. As to whether poor physical conditions of players caused injuries, the majority percentage (63.7%) agreed with 21.7% disagreeing. The mean = 3.51 meant that the respondents agreed. Therefore, poor physical conditions of the players caused injuries. About joint instability being a cause of injuries, the larger percentage (49.2%) agreed with 29.0% disagreeing. The mean = 3.22 suggested that joint instability moderately caused injuries. Therefore, joint instability being a cause of injuries was moderate. With respect to whether poor skill execution was a cause of injuries, the larger percentage (47.8%) agreed with 28.9% disagreeing. The mean = 3.33 suggested that poor skill execution moderately caused injuries. Therefore, the effect of poor skill execution in causing injuries was moderate.

With respect to whether the subjective exercises overload/ over training, the larger percentage (44.9%) disagreed with 37.6% agreeing. The mean = 2.96 suggested that the respondents were not sure.

Therefore, the effect of subjective exercises overload/ over training causing injuries was moderate.

Discussion

The overall findings revealed that the most common injuries were sprains or strains during play and re-injuries. This is in agreement with Darrow et al. (2009), who revealed that the most common injuries in football were; complete ligament sprains and incomplete ligament sprains as well as Ekstrand et al. (2011), who also revealed that the single most common injury subtype was thigh strains. These findings were also in consonance with Abimbola et al. (2012), who stated that the most common injuries in football athletes were the re-occurring injuries.

The findings also revealed that the causes of injuries were: bad playing field conditions, lack of and poor equipment, inadequate treatment and rehabilitation from previous injuries, collisions during play, dry and hard grounds with the sunny weather, players' neglect of the injury for the sake of representation on the team, foul play, poor training techniques, poor physical conditions of players, joints instability, poor skill execution, subjective exercise overload/ over training. These results are consistent with Junge et al. (2000), who established that the causes of sports injuries were; playing field conditions, lack of equipment, inadequate treatment and rehabilitation, poor football skills and taping, violation of existing rules (foul play), poor physical condition of players and joint instability caused injuries. The findings are also in agreement with Mwaka (2013), who found out that dry and hard grounds and poor technique caused injuries, Arnason et al. (2004) and Stege et al. (2011), who revealed that players with previous injury were at increased risk of new injuries, Ryynänen, et al. (2013), who found out that injuries were associated with the number of fouls in a match, Bahr and Holme (2003), who indicated that poor training caused injuries and Gulhane (2015),who reported that injuries were a result of improper training techniques, weakness (especially of the core muscles), poor preparation and poor training and muscle weakness.

Conclusion

The most common injuries among Busitema University football athletes were re-injuries, ligament sprain or strains, ankle sprains and factures. However, nose injuries, contusions, neck injuries, head and teeth injuries respectively were the least common.
Factors including bad playing field conditions, lack or poor equipment like football boots, collisions during play, player neglect, dry and hard grounds, foul play, poor training techniques and poor physical conditions of players caused injuries.

Recommendations

Managers of Busitema University should ensure players adopt tactics that reduce proneness to sprains, strains and re-injuries.

Management of Busitema University should provide quality playing fields, equipment, provide players adequate attention and advocate full implementation of fair play rules.

There is also need to consider more funding to the sports department of the University from the University coffers each year, have a doctor who has specialised in sports medicine like many football clubs in developed countries. There is also need to improve upon ambulance-transport to a specialist, road safety and need to train supporting staff that can offer professional support.

References

Abimbola O, Bowling T, Edizer B, Kunze H, Thistlethwaite J (2012). Common sports-related injuries and the effectiveness of rehabilitation in the prevention of reoccurrence. *The Online Journal of Science and Technology*, 2(1), 1-5.

Amin E. (2005). Social Science Research. *Conception, methodology and analysis*, 235-244

Arnason A, Sigurdsson SB, Gudmundsson A, Holme I, Engebretsen L, Bahr R (2004). Risk factors for injuries in football. *The American journal of sports medicine*, 32(1 suppl), 5-16.

Bahr R, Holme I (2003). Risk factors for sports injuries: A methodological approach. *The British journal of sports medicine*, 37(5), 384-392.

Bird DK (2009). The use of questionnaires for acquiring information on public perception of natural hazards and risk mitigation–a review of current knowledge and practice. *Natural Hazards and Earth System Sciences*, 9(4), 1307-25.

Darrow, C.J., Christy, B. S., Collins, L., Ellen, M. A., Yard, E., &Comstoc, D. (2009). Epidemiology of severe injuries among United States high school athletes. *The American Journal of Sports Medicine*, 37(9), 1798-1805.

Eime RM, Young AJ, Harvey JT, Charity MJ, Warren RP (2013). Systematic review of the psychological and social benefits of participation in sports in children and adolescents: informing development of a conceptual model of health....*International Journal of behavioural nutrition and physical activity* 10(1),135,2013.

Ekstrand, J., Healy, J. C., Waldén, M., Lee, J. C., English, B., &Hägglund, M. (2012). Hamstring muscle injuries in professional football: the correlation of MRI findings with return to play. *British journal of sports medicine*, 46(2), 112-117.

Gulhane TF (2015). Sports injuries: Causes, symptoms, treatment and prevention. *International Journal of Physical Education, Sports and Health*, 1(4), 107-109.

Hulme A, Finch CF (2015). From monocausality to systems thinking: A complementary and alternative conceptual approach for better understanding the development and prevention of sports injury. *The Injury epidemiology*, 2(31), 1-12.

Junge A, Dvorak J (2013). Injury surveillance in the world football tournaments 1998–2012. *British Journal of Sports Medicine*, 47(12): 782–788.

Junge A, Dvořák J (2015). Football injuries during the 2014 FIFA World Cup. *The British journal of sports medicine*, 49(9), 599-602.

Lu Q, Zhang X, Wen S, Lan G (2012). Comparison four different probability sampling methods based on differential evolution algorithm. *Journal of Advances in Information Technology*, 3(4), 206-214.

Muneza S (2013, November 18). Olympic sports medicine course kicks off in Kampala. *Redpepper*. Available at: https://redpepper.co.ug/2013/11/olympic-sports-medicine-course-kicks-off-in-kampala/

Mwaka E J (2013). *Prevalence, patterns and factors associated with sports injuries among players in the 2012 – 2013 Federation of Uganda Football Association Super League*. [Unpublished Masters dissertation, Makerere University].

Nyagetuba J M K (2011). *Surveillance of injuries among Kenya Rugby Football Union (KRFU) players-season 2010*. Available at: www.researchkenya.or.ke/.../surveillance-of-injuries-among-kenya-rugb...

Pillay T, Frantz JM (2012). Injury prevalence of netball players in South Africa: The need for injury prevention. *South African Journal of Physiotherapy*, 68(3), 7-10

Stege JP, Stubbe JH, Verhagen EA LM, Van Mechelen W (2011). Risk factors for injuries in male professional soccer: a systematic review. *British journal of sports medicine*, 45(4), 375-376.

Ryynänen, J., Junge, A., Dvorak, J., Peterson, L., Kautiainen, H., Karlsson, J., & Börjesson, M. (2013). Foul play is associated with injury incidence: an epidemiological study of three FIFA World Cups (2002–2010). *British journal of sports medicine*, 47(15), 986-991.

Wood S, Bellis MA (2010). *Sports injuries: A review of evidence for prevention from the UK focal point for violence and injury prevention*. Liverpool, UK: Centre for Public Health Faculty of Health and Applied Social Sciences Liverpool John Moores University.

Zahir, U., & Ludwig, S. C. (2010, December). Sports-related cervical spine injuries: on-field assessment and management. In *Seminars in Spine Surgery* (Vol. 22, No. 4, pp. 173-180). WB Saunders.

Micro-credit institution's services and sustainability of micro, small and medium-scale enterprises during Covid-19 pandemic in Kigezi region south western Uganda

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ABSTRACT

The study examined the effect of Microcredit institutions' services on the sustainability of micro, small and medium size enterprises during the Covid-19 pandemic of the Kigezi region, South Western Uganda. The specific objectives were to: determine the effect of loan provision by microcredit institutions on the sustainability of MSMEs; determine the effect of the provision of the saving account by microcredit institutions sustainability of MSMEs, The study was conducted in the Kigezi region of Uganda. The region has six (6) districts namely: Kabale, Kisoro, Kanungu, Rukungiri, Rubanda and Rukiga. The Kigezi region is situated in Southwestern Uganda. The sample size was computed using Yamane's sampling formulae and was based on a 5% level of precision. The research used both descriptive and cross-sectional surveys to gather information from various MSMEs records and panel procedures as well as a supplementary interview as methods of data collection. A cluster sampling procedure was applied to select the enterprises' respondents. Enterprises' owners and managers were the units of inquiry due to their importance as custodians of information on all the activities taking place in their respective MSMEs. The research population was divided into clusters (areas or districts) and the required sample was selected using simple random sampling. The study used an interviewer-administered structured questionnaire to collect the data. This suggests that increases in Loan Provision and Saving Accounts help to increase Sustainability. Results further indicate that of the aspects of Sustainability of MSMEs, Loan Provision has no significant effect (β=0.048, Sig=0.279); Saving Account has a significant effect (β=0.125, Sig=0.001); and Training on Managerial Skills has a significant effect (β=0.309, Sig=0.000). The study concludes that loan provision by microcredit institutions did not sustain MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda, accessing an adequate amount of credit is an important factor in increasing the development and growth of SMEs and increasing Saving accounts will increase Micro-credit Institutions Serviceability of MSMEs. The researchers recommend the use of sensitization of the clients and the use of other marketing tools.

Keywords: Micro-credit services, Micro, small and medium scale enterprises - sustainability, Small businness - Finance, Microfinance - Uganda - Kigezi Region, Covid-19 Pandemic, 2020

Introduction

Micro, Small and Medium Enterprises (MSMEs) may be commonly defined as businesses with identified objectives and locations. Mustafa and Saat (2012) refer to Small and Medium Enterprises (SMEs), on the other hand, as an engine of job creation and growth in emerging markets that are central to the larger equation of development.

MSMEs can be a key part of thriving globally competitive industries, creating the large numbers of jobs needed to reduce poverty. In the right business environment, MSMEs can grow into large firms, changing the game locally, and carving their niche globally. But even if remaining small or medium-size, they can create significant income opportunities for their workers and generate new tax revenues for government services. They do so by boosting their productivity and sales and supplying increasingly valuable goods and services. However, throughout the world, the efforts of SMEs are inhibited by a lack of access to financial services such as deposit and credit facilities and other financial services (Eissa, 2013).

Uganda Bureau of Statistics has adopted to categorize MSMEs based on any of the following criteria: number of employees, capital investment and annual turnover. In quantitative terms, micro enterprises are those businesses employing not more than 5 people and their total assets do not exceed UGX: 10 million. On the other hand, small enterprises employ between 5 and 49 people and total assets between UGX: 10 million but not exceeding UGX: 100 million. The medium enterprises, therefore, employ between 50 and 100people with total assets of more than UGX: 100 million but not exceeding UGX: 360 million.

According to the Ministry of Finance, Planning and Economic Development (MFPED), the majority of MSMEs have fewer than 20 employees. MFPED defines a 'Micro Enterprise' as an enterprise employing up to four people, with an annual turnover of 12 million Uganda shillings, and a 'Small Enterprise' as an enterprise employing between 5 and 50 people, with an annual sales/revenue turnover total asset of up to Uganda Shillings (USH.) 360 million, and a 'Medium Enterprise' as an enterprise that employs more than 50 people with an annual sales turnover or assets of between (USH.) 360 million and 30 billion.

Micro, Small and Medium Enterprises (MSMEs) are the backbone of Uganda's economy as they represent 90 per cent of the entire private sector and contribute about 18 per cent to the country's GDP. MSMEs also account for the bulk of employment in Uganda. According to the 2015 MSME policy, 2.5 million people are employed by these enterprises, and the policy is cognizant of the substantial contribution that MSMEs make to technological innovation and new products. Thus, MSMEs are regarded as highly significant, with great potential to change Uganda's economy for the better.

Despite their contribution to the economy, MSMEs still face legal, institutional and attitudinal challenges which impede their growth and survival. Recent evidence indicates that the most significant binding constraint to MSME growth is limited access to affordable short-term and long-term financing. For instance, Lakuma et al., (2019) show that Uganda's MSMEs are more credit constrained than large enterprises, with only 10 per cent of them accessing a bank loan or a line of credit.

Most importantly, this particular challenge has been exacerbated by the economic crisis triggered by the outbreak of the COVID-19 pandemic. Due to the COVID-19-induced uncertainty and its associated containment measures, most borrowers are afraid to borrow. In addition, the lenders are hesitant to lend to MSMEs because their riskiness has increased. A recent study by the Economic Policy Research Centre confirms that COVID-19 has aggravated the credit and liquidity constraints among MSMEs relative to large businesses – with 69 per cent of businesses reporting a decline in access to credit. Worse still, 65 per cent of the MSMEs having outstanding debts indicated that their Sustainability and ability to service debts declined because of the risk associated with COVID-19.

A recent by the Economic Policy Research Centre (EPRC) in Uganda reveals that three-quarters of the surveyed businesses have laid off employees due to the risks presented by COVID-19 and subsequent containment measures. Indeed, the results suggest that lockdown measures have reduced business activity by more than half. In terms of sectors, we find that businesses in agriculture have experienced the largest constraints in access to both inputs and markets for outputs due to control measures such as transport restrictions, quarantine, social distancing, and bans on weekly markets.

The COVID-19 pandemic may have the most severe and wide-reaching social, economic and health impacts in low- and middle-income countries like Uganda (Dahab, 2020). The Covid-19 Pandemic has hit SMEs in Uganda. The quarantines, travel restrictions, market lockdowns, the ban on public transport and social-distancing measures are leading to a fall in consumer spending. Businesses that rely on physical spaces and interpersonal interactions, such as restaurants, supermarkets, markets, hotels, tour operators, bars, and gyms are experiencing a severe drop in sales. Reduced sales are likely to result in a cash flow crunch in these businesses. Many small businesses import inputs or products for sale, from China. These will suffer shortages. The ban on public transport will also disrupt domestic supply chains. Due to diminished cash flows, many businesses are struggling to pay their employees and meet their other financial obligations. Moreover, the heightened uncertainty is leading to a reduction in access to credit, as financial institutions are less sure of the businesses' ability to pay back loans (Mahabu, 2019 & Dahab, 2020).

MSMEs have experienced a larger decline in business activity since most of the country's micro and small businesses halted operations due to their inability to implement preventative health measures such as the provision of on-site lodging for employees, sanitisers and hand washing equipment for customers. These preventive measures have resulted in an increase in operating expenses for businesses that continued to stay open. Consequently, a majority of micro and small businesses, particularly in the service sector, predict they will have to close within one to three months if the pandemic persists and current restrictions are maintained To ensure MSMEs' recovery from the effects of the pandemic, the government came up with stimulus packages such as the credit facility advanced to the Uganda Development Bank (UDB) to enhance MSMEs' investments in import replacement and export promotion and also stimulate businesses operating in the tourism sector. Other interventions include funds advanced to Savings and Credit Cooperatives (SACCOs) through the microfinance support centre, and cheap capital for special groups such as youth and women through the "*Emyooga*" program, among others.

Nonetheless, COVID-19 being an existential crisis poses challenging questions in this regard: whether these packages can adequately meet the financing needs to be given that the exact financing gap is not known; whether the target beneficiaries are aware of these packages and if they meet the eligibility criteria and the required documentation to apply for them (accessibility); and whether the few enterprises that have accessed these packages will not backslide after servicing them or even whether they will be able to service the loans in the first place (sustainability). Additionally, most of the beneficiary enterprises do not have the requisite financial skills and knowledge to gainfully utilize these packages to enable them to pay back within the credit period and meet other terms of the credit.

For instance, as already indicated, the biggest percentage of the private sector is made up of MSMEs, however, details about these enterprises, including who they are, how many they are, their location, ownership, nature

of the operation and the actual financing gap are not well understood. More so, how much of the MSME financing gap has been created by the pandemic has not been established. This, therefore, justifies the queries on the adequacy of these packages.

Additionally, according to UDB's requirements call for applications for loans directed at businesses engaged in the production of essential goods and services for import replacement and export promotion, applicants are required to be registered and must possess collateral security depending on project specifics and risk, with the current valuation of the assets. Also, among the documents required for loan application are business plans, credit reference bureau and audit reports and proof of compliance with the National Social Security Fund (NSSF) which most MSMEs in Uganda do not possess. (Dahab, 2020).

The application procedure further requires the loan applicants to present a bank statement for the past year, yet most of these enterprises hardly have transacted with formal financial institutions. The World Bank Enterprise Survey (WBES) indicates that only 9 per cent of SMEs in Uganda had a line of credit with formal financial institutions by 2020. Moreover, the majority of the MSMEs are unaware of some of these packages, let alone the inability of MSME owners to understand the requirements and application procedures since they are expressed only in English. This automatically pushes the majority of them out of the bracket of eligible beneficiaries for these packages which are specifically meant for them.

Furthermore, the sustainability component of these packages is not very clear. Apart from the collateral security (which most MSME owners do not even have) that is listed as part of the requirements for accessing the loans, sustainability plans if the borrower fails to service the loan due to some unforeseen factors are not addressed. Just like in other similar government programs, the issue of sustainability has not been given a lot of attention, which partly explains the failure of such initiatives to achieve the intended objectives.

Micro, small and medium enterprises are the engine for job creation and growth in emerging markets that are central to the larger equation of development and are regarded as the most powerful economic forces of the developing world, creating the largest number of jobs needed to reduce poverty (IFC, 2011). In developing districts like Kabale, the majority of the households practice micro, small and medium enterprise activities as a way of earning living and contributing to economic growth. Despite the enormous contributions of MSMEs in Kabale, most of the MSMEs are at the point of stagnation and closure. There is a need, therefore, to examine the causes of business failure that require to be addressed.

In Kabale Unemployment has worsened due to the risks associated with COVID-19 and a preliminary Survey conducted by investigators in November 2020 indicated that some MSMEs lay off or would lay off some workers temporarily and permanently if the threat of COVID-19 persists for the next six months. In addition to the lower demand and higher costs of safety measures, MSMEs surveyed in Kabale shared other worrying concerns, including lessened production and productivity and credit and liquidity constraints. Indeed, risks associated with COVID-19 have exacerbated preexisting credit and liquidity constraints among micro, small, and medium enterprises (MSMEs) in Kigezi. Many SMEs struggle to meet the COVID-19 prevention requirements from the local government agencies. Some local governments also push the burden of coronavirus prevention entirely on businesses. If one COVID-19 case cluster shows up in a business, the business was closed for a longer period. Third, broken supply chain and logistics: Upstream SME closures

are felt by downstream factories that are relying on the parts they produce for SMEs (Hamiza, 2019). In the Kigezi region, South Western Uganda majority of the households practice micro, small and medium enterprise activities as a way of earning living and contributing to economic growth. Despite the enormous contributions of MSMEs in Kabale, most of the MSMEs are at the point of stagnation and closure during Covid-19. There is a need, therefore, to determine the effect of Microcredit institutions' services on the sustainability of micro, small and medium size enterprises during the Covid-19 pandemic in the Kigezi region, South Western Uganda.

The objectives of the study were: To determine the effect of loan provision by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda and To determine the effect of the provision of saving accounts by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in the Kigezi Sub- Sub-Region

Literature Review

Relationship between loan provision by Microcredit Institutions and sustainability of MSMEs

Prah (2016) conducted research on microfinance credit facilities and the growth of SMEs in the Cape Coast Metropolis of Ghana where the researcher used a descriptive study design and quantitative data analysis with a sample of 357 respondents. The study finding revealed that most of the SMEs in the Cape Coast Metropolis has contracted Microfinance credit facilities and that there was a positive significant difference in the growth of the SMEs after receiving the microfinance credit. And this has mainly been attributed to the support of MFIs. The study also discovered unfavourable loan recovery mechanisms used against SMEs and high-interest rates. It was therefore recommended that the government show create enabling environment for financial institutions MFIs not being an exception to advance more of these facilities to people in the SMEs sector.

Accessing an adequate amount of credit is considered to be an important factor in increasing the development and growth of SMEs, and it is also known to boost income, and employment level and thereby reduce poverty (Alhassan et al, 2016). The same authors carried out research to determine the effects of Microcredit on profitability and the challenges of women-owned SMEs in Northern Ghana. A paired t-test was employed to determine the changes in gross profit over time from a sample of 199 respondents. The results indicated a significant increase in the average monthly gross profit over time. According to Alhassan et al, (2016) profit is one of the important measures of growth that must be considered as it is unlikely that enterprise growth can be sustained without profits being available for reinvestment in the business. Growth can be considered in terms of net profit margins.

In another related study conducted by Awuah and Addaney (2016), the research findings revealed that there is a positive relationship between MFIs services and the growth of SMEs in the Sunyani Municipality of Kenya. This was when the researcher investigated the interactions between MFIs and SMEs in the area. According to the findings, the revenue, profits and the asset base of the SMEs targeted increased after benefiting from SME's services. The researcher used a survey approach to examine the effects of microfinance services and the products provided by multi-credit Savings and loan limited on the performance of SMEs in the area. To be specific one of the findings shows that micro-credit from MFI has improved the business

status of its clients in form of increased revenue, profit and increased asset base and opening more branches amidst challenges of short loan repayment duration, high-interest rate, insufficient loan amount and high loan processing fees. The researcher, therefore, recommended a reduction in the interest rate, an increase in the loan repayment period and a reduction in loan processing fees to further boost accessibility to SMEs.

Laetitia et al. (2015) also revealed that MFIs provides services such as loan, advice on investment, saving and training on investment to women who owned SMEs in the Kicukiro district in Rwanda. The finding also revealed that business performance after the loan was fairer compared to before the growth of women SMEs in Kicukiro district, Rwanda where the researchers used a descriptive research design and qualitative and quantitative research approach with a sample size of 275 respondents. To determine the relationship between the two variables, the researchers used Pearson's correlation coefficient. The finding confirmed the loan as one of the services of MFIs. In general, the findings concluded that MFIs have positive impacts on the growth of selected SMEs owned by women in Kicukiro in Rwanda. The research findings nevertheless noted the challenges of a high-interest rate. Hence it was recommended that government should intervene by the means of subsidizing the interest rate.

Abdinor (2013) researched to establish the effects of microfinance institutions' lending on the growth of SMEs in Somalia, by the use of the regression model, the finding shows that MFIs lending has an effect on the growth of small and medium enterprises in Somalia and has a positive relationship. The researcher, therefore, recommended government and other partners facilitate the accessibility of credit for Small and medium enterprises to Microfinance Institutions and minimize the collateral conditions since these have been noted to be some of the challenges. Finally, the researcher also recommended that to reduce the rate of default, MFIs can research very profitable business lines and offer credit to clients who can exploit such business lines. SMEs should be encouraged also to adopt group financing to avert loan defaulting.

In another similar research conducted by Olowe et al. (2013) in an attempt to investigate the impacts of MFIs and the growth of SMEs in Nigeria, the researcher use a regression model and the results from this study showed that financial services obtained from MFIs have a positive significant impact on SMEs growth in Nigeria. The results also revealed that the duration of the loan has a positive impact on SME growth but is not statistically significant. The results also showed that high-interest rates, collateral security and frequency of loan repayment can cripple the expansion of SMEs in Nigeria. Therefore, the paper recommended that MFIs should lighten the condition for borrowing and increase the duration of their customers' loans and also spread the repayment over a long period.

Nahamya et al. (2013) conducted a research study that sought to establish the impact of microfinance service delivery on the growth of SMEs in eastern Uganda, by the use of multiple regression and logit model, the findings indicate that although the MFIs have performed below a set standard on average due to some industry-wide challenges, they have had a significant impact in linking SMEs and the poor to sources of credit and contributed to their growth in terms of growth of business capital and stock accumulation. The researchers recommended that there is a need for an institutionalized public-private partnership for creating favourable conditions for the operations of these enterprises. This will reduce the numerous constraints facing SMEs to make the nationals benefit from their overall contribution to poverty reduction. Designed tailored made products for SMEs are essential through investment in education, setting up an authority

or coordination centre for SMEs and promotion of prudential mechanisms by setting a regulatory and supervisory framework for all Microfinance Institutions.

Salomey et al (2013), in their research to determine the impact of MFIs on the growth of SMEs in Ghana used a regression model for data analyses the result also revealed that MFIs have a positive effect on the growth of SMEs. As per the research findings, some of the critical contributions of MFIs include; greater access to credit, savings enhancement and provision of business, financial and managerial training. And the researchers recommended that to enhance sustained and accelerated growth in the operations of SMEs, credits should be client-oriented and not product-oriented. Proper and extensive monitoring activities should be provided for clients who are granted loans.

Veronica & Kerongo (2014) conducted similar research on the Effects of Micro-Financing on the Growth of Small and Micro Enterprises in Mombasa County, the researchers adopted a stratified and systematic random sampling method where a descriptive survey method was used and the results indicated that microfinance has positive effects on growth of SMEs. The majority of the owners indicated that microfinance has enabled them to expand businesses, and build their business assets. Also, the ability of the business to compete was enhanced. The researcher recommended that credits should be client-oriented and not product-oriented. Proper and extensive monitoring activities should be provided for clients who are granted loans. Microfinance institutions should reduce interest rates and increase the grace period to three to six months. The MFIs demand the payment immediately of the loans advanced to borrowers. The longer the grace period will enable borrowers to pay interest and principal using income generated from the borrowed money. This will accommodate more start-up MSEs to participate in MFI lending. Finally, the researcher recommended that business and financial training should be provided by MFIs regularly and most cases should be tailored toward the training needs of the clients.

In another related research study, Quaye (2011) conducted research to study the effects of microfinance institutions on the growth of small and medium-scale enterprises among selected SMEs in Kumasi, the research finding showed that MFIs have contributed enormously to the growth of the SME sector through several activities as enumerated such as:
Greater access to credit. The MFIs have provided SMEs with greater access to credit than traditional banks. Most respondents indicated that 100% of their credit demand was granted. Since most of these SMEs are Micro, their credit needs are very small and their credit needs are most of the time meet. Most SMEs were found to be dealing with more than one MFI, and the credits granted helped to boost their capital and expand their businesses. And through other ways such as enhanced saving habits, and financial and managerial training. The findings also revealed a majority of 86 per cent of respondents indicated that the operations of MFIs had had a positive effect on their businesses.

In another study conducted by Xitian (2013), on the impacts of microfinance on the development of SMEs in Taizhou in China by the use of multiple linear regression models, the finding revealed that SMEs that participated in micro financing had better performance in terms of higher net profit growth and revenue growth. However, it also points out that SMEs that have a large portion of capital from microfinancing do not perform as well as expected. The author recommended the use of microfinancing by firms only in unhealthy conditions.

Abiola (2012) carried out related research on the effects of microfinance on Micro and Small business enterprises in Nigeria. The paper employed panel data and multiple regression analysis to analyse a survey of 502 randomly selected enterprises financed by microfinance banks in Nigeria. A contrabass result between IV and DV was obtained that indicated strong evidence that access to microfinance does not enhance the growth of micro and small enterprises in Nigeria. However, other firm-level characteristics such as business size and business location, are considered to be the determinant factors for SME growth.

Relationship between the provision of saving accounts by Microcredit Institutions and Sustainability of MSMEs

Mulungiand (2015) conducted a related study on the accessibility of Microfinance saving services and its effect on business growth of Small scale enterprises in Uganda: a case study of pride microfinance branches and their small-scale enterprise clients in Kampala, descriptive cross-sectional research design and multiple regression with a sample size of 156 respondents was used, the finding revealed that the level of accessibility of the saving services had a positively significant but weak relationship with the business growth that the selected small scale enterprises attained in terms of sales revenue, profit, business expansion and product range. The recommendation the researchers gave was to improve this relationship by the use of sensitization of the clients and using other marketing tools like an advertisement.

Methods

The study was conducted in the Kigezi region of Uganda. It has six (6) districts namely: Kabale, Kisoro, Kanungu, Rukungiri, Rubanda and Rukiga. The Kigezi region is situated in southwestern Uganda. A very hilly, cold and mountainous region bordering the Republic of Rwanda and the Democratic Republic of Congo Because of its hills, mountains and cold weather, people call it the Switzerland of Africa. It is full of Agricultural Terraces and home to the world-famous mountain guerillas. According to the National Census of 2014 and Uganda Bureau of Statistics (UBOS) of 2016, the region has a population of about 1.5 million people from the following 6 Districts:

The research uses both descriptive and cross-sectional surveys to gather information from various MSMEs records and panel procedures as well as a supplementary interview as methods of data collection. Descriptive designs are applied to explain particular individual(s) or group(s) to determine the Micro-Credit Institution's Services and Sustainability of Micro, Small and Medium Scale Enterprises during the Covid-19 Pandemic in Kigezi Region, South Western Uganda. The standardized information collected is processed statistically to enable this study to be generalized. The adoption of this research design was a result of the economic and cost-effectiveness of the method. The researchers used questionnaires and supplementary interviews as well as firms' records from the sample size.

The population of this study are owners of micro, small and medium enterprises in the six (6) districts of the Kigezi region, Uganda. These districts have a high concentration of MSMEs. The owners and the managers of these MSMEs were the units of enquiry or respondents as a result of their direct involvement in the planning, implementation and management of the firm's growth and development. The population of firm owners and managers were 1400 MSMEs.

A cluster sampling procedure was applied to select the enterprises' respondents. Enterprises' owners and managers are the units of inquiry due to their importance as custodians of information on all the activities taking place in their respective MSMEs (Rhodes, 2009). In cluster sampling, the research population shall be divided into clusters (areas or districts) and selected using simple random sampling. The sample size is in line with Kothari (2010) who believes that sample size should be optimum, that is, one that fulfils the requirements of efficiency, representativeness, reliability and flexibility. The unit of sampling in the study was 312 respondents (MSMEs) in the six (6) districts of the Kigezi region.

Yamane's sampling formulae were used for sample size determination (Yamane, 1967). It was based on a 5% level of precision (*e*) and the formula below was used to determine the sample size.

$$n \quad = \quad \frac{N}{[1 + N(e)^2]}$$

Where; N is the population of study; n is the sample size and e is the precision level.
This enables the target population of firms to be adequately and sufficiently represented in the sample size as indicated in the table below:

Table showing the Number of firms for the respective districts in the Kigezi region.

District	Population Size	Sample Size	Sampling Technique
Kabale	480	107	Cluster Sampling
Kisoro	160	36	Cluster Sampling
Kanungu	190	42	Cluster Sampling
Rukungiri	320	71	Cluster Sampling
Rubanda	130	29	Cluster Sampling
Rukiga	120	27	Cluster Sampling
TOTAL	1400	312	

Source: UBOS (2016)

Data Collection

It is an interviewer-administered structured questionnaire to obtain information from SMEs by trained interviewers. The criteria of selection shall be based on the inclusive criteria that the SMEs are registered. The firms that were selected have spent a minimum of one year in business and are categorized as micro, small or medium in their scale of production. The firms were based in any of the six (6) districts of the Kigezi region and under the selected area of the study. Firms owners and managers are the units of inquiry due to their importance as custodians of information of their respective enterprises.

Three (3) Research Assistants and three (3) Research Officers are needed based on a set of criteria such as expertise and knowledge of the local language. The Research Assistants were trained for two days by the Research Officers on the purpose of the study, data collection tools or instruments, how to interview and how to extract information from firm records and the overall data collection procedures.

Data Analysis
The study results that microcredit institutions' services and sustainability are a function of Loan Provision, Saving Accounts and Training in Managerial Skills.

Microcredit institutions' services are key factors in the Sustainability of MSMEs. Data obtained from the questionnaire were entered, cleaned and prepared for tabulation using Statistical Package for Social Sciences (SPSS). Frequencies and descriptive statistics were determined and Pearson Product Moment correlation statistics were used to establish the level of the relationship.

Ethical Considerations

The research proposal was approved by the research ethics review committee of Mbarara University of Science and Technology, Mbarara, Uganda before conducting the study. Permission to undertake the study was obtained from all the relevant authorities in the region, district and respective LCS. The applicable consent form and the information sheet were duly integrated along with the respective data collection instruments. All the study participants were informed about the objectives or purposes, procedures, risks and benefits, and privacy and confidentiality issues of the study. Finally, verbal informed consent was obtained from each study participant before the interview. This method of consent was specifically approved by the ethical committee of Mbarara University of Science and Technology, Mbarara, Uganda.

Expected Outcomes & Dissemination

The study findings validate the argument that there is a need to access credit to initially re-start business activities for many MSEs that lack working capital as a result of the COVID-19 pandemic. The findings would be useful to the managers of Micro, Small and Medium Enterprises in the Kigezi region of Uganda who would examine other organizational factors and micro-credit institutions' services toward supporting micro, small and medium enterprise recovery programs during the Covid-19 pandemic.

The government can use the research findings as a guide on policy formulation and implementation of the COVID-19 Pandemic and the socio-economic wellbeing of the people.

For the academic environment, the research findings would provide a piece of new knowledge to the existing ones because of the empirical evidence that was provided on the Micro-Credit Institution's Services and Sustainability of Micro, Small and Medium Scale Enterprises during the Covid-19 Pandemic in Kigezi Region, South Western Uganda. The research findings would be useful to future researchers who might want to carry out further research on the same or related topics with relevant literature.

Lastly, at the end of this project, at least two articles would be published from this study and this will increase the research output for Kabale University.

Validity

Mazaki (2009) echoes LoBiondo-wood & Haber (2002) by referring to validity as the extent to which an instrument measures what it is supposed to measure and whether it measures it accurately. To ensure validity, the research instrument covered all the dimensions of the phenomenon under study as clarified in the conceptual framework. The questionnaire was discussed among the Principal Investigator and Co-Investigators; and experts were also requested to rate the instrument to assess its structure, contents, clarity, level of consistency and relevancy to the research objectives. The content validity of the instrument was found worthy of execution.

The following formula was used to test the validity index.

According to Amin (2005), the Content Validity Index (CVI) must be greater than or equal to 0.7 and this was calculated as:

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$$CVI \ = \ \frac{\text{Number of items regarded as relevant by judges}}{\text{Total number of items}}$$

According to Amin (2005), the Content Validity Index (CVI) must be greater or equal to 0.7 and this was calculated as:

$$CVI \ = \ \frac{\text{Number of items regarded as relevant}}{\text{Total number of items}} \ = \ \frac{23}{28} \ = \ 0.821$$

The value of CVI obtained, which is a measure of the validity of the instrument, was interpreted based on George and Mallery's (2003) scale. Accordingly, a value of 0.821 obtained is greater than the standard value of 0.7 which indicates that the items were extremely relevant for the kind of data that was needed by the study.

Reliability

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measured Cohen, Manion and Morrison (2000). It also measures the degree to which a research instrument yields consistent results if administered on different occasions. Reliability can be equated with the stability, consistency, or dependability of a measuring tool.

According to Cohen et al. (2000), a correlation value greater than 0.7 makes possible group predictions that are accurate enough for most purposes. A high degree of stability indicated a high degree of reliability, which meant the results are repeatable (Amin, 2005). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability.

Researchers administered some copies of questionnaires to respondents who were not part of the final sample for the study. They administered questionnaires were later entered into Statistical Package for Social Sciences (SPSS). Reliability analysis was conducted for the scales using Cronbach's Alpha. Cronbach's coefficient alpha is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing (George and Mallery, 2003).

Cronbach's alpha is used here to measure the reliability of the questionnaire between each construct. The normal range of Cronbach's coefficient alpha value is between 0.0 and + 1.0. The closer the Alpha is to 1, the greater the internal consistency of items in the instrument is assumed. As the number of items (variables) in the construct increases, the value becomes large. If the inter-correlation between items is large, the corresponding value was also large. Since the alpha value is inflated by a large number of variables then there is no set interpretation as to what is an acceptable alpha value.

A rule of thumb that applies to must situations according to Cohen, Manion and Morrison (2000) and (George and Mallery, 2003) is:

Between 0.9 and 1.0   -   Excellent
Between 0.8 and 0.9   -   Good
Between 0.7 and 0.8   -   Acceptable
Between 0.6 and 0.7   -   Questionable
Between 0.5 and 0.6   -   Poor
Between 0.0 and 0.5   -   Unacceptable

The Cronbach's coefficient alpha was calculated for each construct of the questionnaire. The most identical values of alpha indicate that the mean and variances in the original construct do not differ much, and thus standardization does not make a great difference in alpha. The value obtained was 0.857. This value is considered high and acceptable; the result ensures the reliability of each construct of the questionnaire; and indicates a good degree of reliability of the entire questionnaire, as supported by Cohen, Manion and Morrison (2000) and (George and Mallery, 2003). Hence, it is proved that the questionnaire is valid, reliable and suitable for the study.

Results

Response Rate

According to Amin (2005), response rate refers to the number of respondents who answered the questionnaires divided by the number of respondents in the sample who received the questionnaires. It is normally expressed in form of percentages. Before the researchers embarked on the analysis of the data collected, an assessment of the return rate was done by dividing the number of respondents who were involved in answering the questionnaire by the targeted categories of the respondents in each case and multiplied by 100 as presented in Table 3.

Table 3: Response rate for the questionnaire.

Category of the respondents	Number of questionnaires administered	Number returned	Return rate (%)
MSMEs	312	294	94.2%

Source: Primary Data (2021)

From Table 3, three hundred and twelve (312) questionnaires were administered but the number of respondents (MSMEs) who returned the filled questionnaires was two hundred and ninety-four (294) giving the overall return rate as 94.2%. According to Babble (2001), a response rate that is above 94.2% is appropriate to make conclusions. The return rate was a clear indication that a good number of respondents (MSMEs) participated in the study. Amin (2005) argued that a high return rate ensures more accurate survey results. Therefore, the results obtained were representative and relied on for investigating the Micro-Credit Institution's Services and Sustainability of Micro, Small and Medium Scale Enterprises during the Covid-19 Pandemic in Kigezi Region, South Western Uganda.

Table Showing the Social Demographic Characteristics of the Respondents.

Characteristics		Frequency	Percentage (%)
Gender	Female	162	55.1
	Male	132	44.9
	Total	294	100.0
Level of Education	Informal	74	25.2
	Primary	56	19.0
	Secondary	81	27.6
	Vocational School	55	18.7
	University	28	9.5
	Total	294	100.0
Year of Experience with MFIs	2 years and below	73	24.8
	3-5 years	112	38.1
	6-8 years	29	9.9
	9 years and above	80	27.2
	Total	294	100.0
Type of Enterprise (to stakeholders)	Trade	160	54.4
	Small Scale Farming	63	21.4
	Creative Design	71	24.1
	Total	294	100.0

Source: Primary Data (2022)

The results above indicate more females 162 (55.1%) participated than males 132(44.9%). Respondents at an informal level of education were 74 (25.2%), primary level was56 (19.0%), the secondary level was 81 (27.6%), vocational school were 55(18.7%), and University level was 28 (9.5%). Respondents (24.8%) the experience of 2 years, 38.1% the experience of 3-5 years, 9.9% had the experience of 6-8 years and 27.2% had experience of above 9 years. This implies that most respondents had the experience of up to 5 years with MFIs. Respondents (54.4%) engaged in trade enterprise, 21.4% of the respondents engaged in small-scale farming and 24.1% of respondents engaged in creative design. This implies that most respondents engaged in trade and small-scale farming.

Therefore, the respondents were mostly females (55.1%), with secondary level and below (71.8%), had up to 5 years of business experience were (62.9%) and involved in trade and small-scale farming.

Pearson product-moment correlation between the Loan Provision by microcredit institutions and the Sustainability of MSMEs.

Variables Computed index		Loan provision by microcredit institutions	Sustainability of MSMEs
Loan provision by microcredit institutions	Pearson Correlation	1	0.163
	Sig. (2-tailed)		0.025
	N	294	294
Sustainability of MSMEs	Pearson Correlation	0.163	1
	Sig. (2-tailed)	0.025	
	N	294	294

Correlation is not significant at the 0.05 level (2-tailed)

Source: Primary Data (2022)

Results in Table reveal that the Pearson product moment correlation was applied to establish the effect of loan provision by microcredit institutions on the sustainability of MSME during the Covid-19 pandemic in Kigezi Sub-Region Uganda. The results show a weak and positive but not statistically significant relationship between loan provision by microcredit institutions and the sustainability of MSMEs during the Covid-19 pandemic ($r=0.163^{**}$, $p>0.05$). Thus, the null hypothesis was not rejected. This implies that there was a low, positive but non-significant effect of loan provision by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda.

Pearson product moment correlation between the Provision of saving accounts by microcredit institutions and the Sustainability of MSMEs.

Variables Computed index		Provision of savings accounts by microcredit institutions	Sustainability of MSMEs
Provision of saving accounts by microcredit institutions	Pearson Correlation	1	0.326**
	Sig. (2-tailed)		0.000
	N	294	294
Sustainability of MSMEs	Pearson Correlation	0.326**	1
	Sig. (2-tailed)	0.000	
	N	294	294

**Correlation is significant at the 0.01 level (2-tailed)

Source: Primary Data (2022)

The results in Table reveal the results for Pearson product moment correlation when applied to determine the effect of the provision of saving accounts by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda. The results show a statistically moderate positive and significant relationship between the provision of saving accounts by microcredit institutions and the sustainability of MSMEs ($r=0.326^{**}$, $p<0.01$). Thus, the null hypothesis was rejected. This implies that there the provision of saving accounts by microcredit institutions was significantly and moderately related to the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda.

Discussion

The study was set up to determine the effect of micro-credit institution's services and the sustainability of micro, small and medium-scale enterprises during the covid-19 pandemic in the Kigezi region, southwestern Uganda.

The effect of loan provision by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda.

The Results reveal that the Pearson product-moment correlation was applied to establish the effect of loan provision by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda. The results show a weak and positive but not statistically significant relationship between loan provision by microcredit institutions and the sustainability of MSMEs during the Covid-19 pandemic ($r=0.163^{**}$, $p>0.05$). Thus, the null hypothesis was not rejected. This implies that there was a low, positive but non-significant effect of loan provision by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda.

The results of this research are not in accord with Prah (2016) who researched microfinance credit facilities and the growth of SMEs in the Cape Coast Metropolis of Ghana where the study finding revealed that most of the SMEs in the Cape Coashastropolis have contracted Microfinance credit facilities and that there was a positive significant difference in the growth of the SMEs after receiving the microfinance credit.

In addition, this research disagrees with Alhassan et al, 2016 who carried out research to determine the effects of Microcredit on profitability and the challenges of women-owned SMEs in Northern Ghana. The results indicated a significant increase in the average monthly gross profit over time.

However, this research is supported by Awuah and Addaney (2016), whose research findings revealed that there is a positive relationship between MFIs services and the growth of SMEs in the Sunyani Municipality of Kenya. This was when the researcher investigated the interactions between MFIs and SMEs in the area. According to the findings the revenue, profits, and the asset base of the SMEs targeted increased after benefiting from SMEs' services.

The effect of the provision of saving accounts by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in the Kigezi Sub-Region Uganda
The results show a statistically moderate positive and significant relationship between the provision of saving accounts by microcredit in accounts on the sustainability of MSMEs (r=0.326**, p<0.01). Thus, the null hypothesis was rejected. This implies that there the provision of saving accounts by microcredit institutions was significantly and moderately related to the sustainability of MSMEs the during the Covid-19 pandemic in the Kigezi Sub- Region Uganda

The findings are supported by Mulungi and Kwagala (2015) who conducted a related study on the accessibility of Microfinance saving services and its effect on business growth of Small scale enterprises in Uganda: a case study of pride microfinance branches and their small-scale enterprise clients in Kampala, their findings revealed that the level of accessibility of the saving services had a positively significant but weak relationship with the business growth that the selected small scale enterprises attained in terms of sales revenue, profit, business expansion and product range.

Conclusion and Recommendation

Conclusion

The study was set up to determine the effect of micro-credit institution's services and the sustainability of micro, small and medium-scale enterprises during the covid-19 pandemic in the Kigezi Sub-region, Southwestern Uganda. Specifically, the study sought to determine the effect of loan provision by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in Kigezi Sub- Region, The effect of the provision of saving accounts by microcredit institutions on the sustainability of MSMEs during the Covid-19 pandemic in the Kigezi Sub-Region Uganda and the effect of the provision of Managerial skills by microcredit institutions on the sustainability of the MSMEs during the Covid-19 pandemic in Kigezi Sub-Region Uganda by evaluating responses obtained through questionnaires using descriptive analysis and multiple regression analysis. From the analysis of respondents, the percentage of targeted respondents that responded to the questionnaire was 94%. From the preliminary analysis conducted in the study, the majority of respondents in this study have the following attributes
1 Secondly level education
2 are Females
3 aged between 36–45 years
4 type of enterprise is trade.

The results show that Micro-credit Institutions Services (LP: Loan Provision; SA: Saving Account and TMS: Training on Managerial Skills) account for a 23.8% increase in the Sustainability of MSMEs. Concerning the coefficients, results further indicate that of the aspects of Sustainability of MSMEs, Loan Provision has no significant effect (β=0.048, Sig=0.279); Saving Account has a significant effect (β=0.125, Sig=0.001); and Training on Managerial Skills has a significant effect (β=0.309, Sig=0.000).

Therefore, the study concludes that loan provision by microcredit institutions did not sustain MSMEs during the Covid-19 pandemic in Kigezi Sub- Region Uganda.

The study further concludes that accessing an adequate amount of credit is an important factor in increasing the development and growth of SMEs boost employment levels hence reducing poverty.

The study concludes that increasing Saving Accounts will increase Micro-Credit Institutions Services .

The government of Uganda can use the findings of this study to develop appropriate strategies to support MSME businesses in a bid to rescue them since they are the greatest contributors to the Ugandan economy. Finally, this article highlights the voice of both entrepreneurs and managers on the effect of business lockdown and this may aid in diagnosing the required remedies, given the gravity of the situation.

Recommendations

It is therefore recommended that the government should create enabling environment for MSMEs to advance more financial facilities to people in the SME sector.

The researchers recommended that Proper and extensive monitoring activities should be provided for clients who are granted loans Microfinance institutions should reduce interest rates and increase the grace period to three to six months.

The researchers, therefore, recommend that government and other partners facilitate the accessibility of credit for Small and medium enterprises to Microfinance Institutions and minimize the collateral conditions since these have been noted to be some of the challenges.

Finally, the researcher also recommended that to reduce the rate of default, MFIs can research very profitable business lines and offer credit to clients who can exploit such business lines. SMEs should be encouraged also to adopt group financing to avert loan defaulting.

Recommendations for Further Research

While this study was carried out in Kigezi Sub Region, it can be applicable to many other Regions in Uganda with the same level of development. Other studies can also be conducted on the formal and informal institution's lending policies from small-scale to credit enterprises in Kigezi Sub Region

References

Abdinor, D.S. (2013). *The effects of microfinance institution lending on the growth of small and medium enterprises in Somalia*. (Doctoral dissertation, University of Nairobi). http://erepository.uonbi.ac.ke/handle/11295/59110

Abiola, B. (2012). Effects of microfinance on micro and small enterprises' growth in Nigeria. *Asian Economic and Financial Review* 2(3), 463-477.

Ahmad, W. & Ali, N.A.M. (2017). Pecking order theory: Evidence from Malaysia and Thailand's food and beverages industry. *Journal interlink,* 12(1). Retrieved from: http://jurnalintelek.uitm.edu.my/index.php/main/article/view/150

Amin, E.M. (2005). *Social science research: Conception, methodology and analysis*. Kampala: Makerere University Printery

Awuah, S. B., & Addaney, M. (2016). The interactions between microfinance institutions and small and medium scale enterprises in the Sunyani municipality of Ghana. *Asian Development Policy Review*, 4(2), 51-64.

Benoit, B. A., & Weber, R. (2001). Transaction cost theory, the resource-based view, and information technology sourcing decisions: A re-examination of Lacity et al.'s findings. *Administrative Science Quarterly*, 35, 740-767.

Clement, L. K. (2010). *Socio-economic impact of microfinance in a post-conflict situation: A case of SUMI in Juba County Sudan.* (Unpublished Master Thesis, University of Khartoum).

Dada, F. B., & Ukaegbu, B. (2015). The pecking order theory: Evidence from Listed firms in Nigeria. I*nternational Finance and Banking*, 2(2), 72-84.

Della, T. (1996). *The oxford compact English dictionary.* New York: Oxford University Press

Drost, E. A. (2011). Validity and reliability in social science research. *Education Research and Perspective.* 38(1), 105-123

Duvendack, M., Palmer-Jones, R., Copestake, J.G., Hooper, L., Loke, Y. & Rao, N. (2011). *What is the evidence of the impact of microfinance on the well-being of poor people?* EPPI-Centre, Social Science Research Unit, Institute of Education, University of London, August. Retrieved from https://ueaeprints.uea.ac.uk/id/eprint/35466/1/Microfinance2011Duvendackreport.pdf

Essay, UK. (November 2013). *Important Theories And Models Of Microfinance Economics Essay.* https://www.ukessays.com/essays/economics/important-theories- and-models-of-microfinance-economics-essay.PHP?cref=1

Eissa, G. S. (2013). Microcredit as a strategy for poverty reduction: A case study of Sudan. *Journal of Modern Accounting and Auditing*, 9(4), 557-570

European Commission (2017). *Growth: Internal Market, industry, entrepreneurship and SMEs.* http://ec.europa.eu/growth/smes/business-friendlyenvironment/sme-definition_en

European Commission, (2015). U*ser guide to the SME definition.* Luxembourg: Publications Office of the European Union

Fotabong, L.A.(2011). Comparing Microfinance Models: MC2 Model versus other Microfinance Models. http://dx.doi.org/10.2139/ssrn.2007874

Gathogo, P. K. (2014). T*he Effect of Microfinance Institutions on the Growth of Small Scale Enterprises in Kiambu County* (Doctoral dissertation, United States International University-Africa).

Hari, S. (2015). *Microfinance- le*nding *model. Continuing Research Series E-059.* https://www.gdrc.org/icm/model/model-fulldoc.html

Kyale, M. S. (2013). *Impact of microfinance institutions on growth and development of small and medium enterprises; A survey of Machakos Town* (Doctoral dissertation, University of Nairobi).

Laetitia, M. et al (2015). Microfinance and business growth of women in small and medium Enterprises in Rwanda. (A case of selected women small and medium enterprises in Kicukiro district). *European journal of accounting, auditing and finance research*, 3(11).

Lubega, T. et al (2000). *Financial services handbook for financial community-based organisations (FCBOS): Intermediate course.* Kampala: The Uganda Institutes of Bankers

Mhidini, M.M. (2013).T*he impact of microfinance on small and medium enterprises growth in Morogoro Tanzania.* Dissertation paper Open University of Tanzania

Mugenda, O. M. & Mugenda, A.G. (2003). *Research methods: Quantitative and qualitative Approaches* (Rev. Ed). Nairobi Kenya: African Centre for Technology Studies

Mulungi, R. & Kwagala, M. (2015). Accessibility of microfinance savings services and its effect on business growth of small enterprises in Uganda: A case of pride microfinance branches and their small scale enterprise clients in Kampala. *Researchjournali's journal of management*, 3(5). R

Munene, P. M. (2014). The role of micro-finance institutions to the growth of micro and small enterprises (MSE) in Thika, Kenya (Empirical review of nonfinancial factors). I*nternational journal of academic research in accounting, finance and management sciences.* 4(4), 249-262

Mungai, D. W. (2015). *The effect of micro-finance services on the growth of small and medium enterprises in Kajiado County Nairobi.* (Dissertation Thesis, University of Nairobi).

Mutua, F. N. (2017). *Effect of microfinance services on poverty reduction in Makueni County* (Doctoral dissertation, South Eastern Kenya University). http://repository.seku.ac.ke/handle/123456789/3055

Nkundabanyanga, K.S. (2007).*Microfinance and Public Sector Accounting in Uganda, Including Specialized Accounts.* Kampala: Wide Link Services

Olaitan, M. A. (2006). Finance for small and medium enterprises: Nigeria's agricultural credit guarantee scheme fund. *Journal of* Inter*national farm management*, 3(2), 30-38.

Olowe, F.T. Moradeyo, O. A. &Babalola, O.A. (2013). An empirical study of the impact of microfinance banks on small and medium growth in Nigeria. *International journal of academic research in economics and management science*, 2(6). http://dx.doi.org/10.6007/IJAREMS/v2-i6/465

Osoro, K., & Muturi, W. (2013). The role of micro financial institutions on the growth of SMEs in Kenya: A case study of micro financial institutions in Kisi Town. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 16(1), 2279-0837.

Prah, S. (2017). Microfinance credit facilities and the growth of the small and medium scale enterprises in Cape Coast Metropolis of Ghana. *International journal of economics, commerce and management*, 6(12). Retrieved from: http://ijecm.co.uk/wp-content/uploads/2016/12/41249.pdf

Quaye, D. N. (2011). *The effect of Micro Finance Institutions on the growth of Small and MediumScale Enterprises (SMEs); a Case Study of Selected SMEs in the Kumasi Metropolis*. (Dissertation Thesis, Kwame Nkrumah University). http://ir.knust.edu.gh/bitstream/123456789/4450/1/Quaye%20Daniel%20Nii%20Obli.pdf

Robbins, S.P. &Decenzo, D. A. (2001). *Fundamentals of management.* (3rd edition). New Jersey: Prentice Hall

Salomey, T. Ennin, S. Kate, F. Ghansah, L. &Kwasi, C.O. (2013). *The impact of microfinance on small and medium scale enterprises in Ghana.* (Dissertation Theis, Christian Service University College). http://ir.csuc.edu.gh:8080/jspui/handle/123456789/253

Seens, D. (2015). *SME Operating Performance. Canada: Research and Analysis Directorate, Small business branch.* https://www.ic.gc.ca/eic/site/061.nsf/eng/h_02941.html?Open=1&

Shovel, M. (2007). *Macmillan English dictionary for advanced learners.* (2nd edition). Malaysia: Macmillan

Veronica, W.N. & Kerongo, F. (2014). Effects of micro-financing on the growth of small and micro enterprises in Mombasa County. *International journal of scientific engineering and research.* 2(4)

Wang, X. (2013). *The impact of microfinance on the development of small and medium enterprises: The case of Taizhou, China.* (Doctoral Thesis, The Johns Hopkins University).

Wilfred, N. K., Ajanga, M., Omeke, M., Tumwine, N., & Nasinyama, M. M. (2013). *The impact of microfinance service delivery on the growth of SMEs in Uganda.* https://nru.uncst.go.ug/handle/123456789/867

Yunus, M. (1999). *Banker to the poor: micro-lending and the battle against world poverty.* New York: Public Affairs

Transformational Leadership style and occupational stress among primary School Teachers in Tanzania.

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ABSTRACT

This study focused on assessing how transformational leadership style affects occupational stress among public primary school teachers in Tanzania, Morogoro Municipality being as a case study. A sample size of 618 primary school teachers was used for data collection. A cross-sectional survey was done in 51 schools in Morogoro Municipality from January to March, 2020. The study examined how four elements of transformational leadership style affect occupational stress. The study used multiple linear regression analysis to examine how four components of transformational leadership which includes inspirational motivation, idealized influence, individual consideration and intellectual stimulation relate with occupational stress. The study found that all four components individual influence (β= -.154, p=.001), inspirational motivation (β= -.122, p=.000), intellectual stimulation (β= -.112, p=.002), individual consideration (β= -.179, p=.000) have significant negative relationship with occupational stress. This implies that the use of transformational leadership can help in reducing amount of stress that primary school teachers' experience.

Keywords: Occupational stress, Leadership style, Job stress - study & teaching (primary) – Tanzania

Introduction

Occupational stress is a mental and physical discomfort that an employee experiences as a result of a mismatch between job requirements on one side and capabilities and resources of a job holder on the side. Different factors such as poor working conditions, skill insufficiency, conflicting roles, workload, and poor time management are among sources of occupational stress among employees. The use of inappropriate leadership style tend to negatively affect job performance, job satisfaction, employee motivation, organisational commitment and other issues that lead to bad experiences at workplaces (Mwita, Mwakasangula, &Tefurukwa, 2018; Belias & Koustelios, 2014).

Teachers have been considered to work in a very stressful profession due to nature of activities and pressures that is associated with their daily activities (Wettstein, Schneider, Holtforth, & Marca, 2021; Herman, Hickmon-Rosa, & Reinke, 2018; Yusoff & Khan, 2013). Teaching workloads, class disruptions, maintaining students discipline and multiple roles that teachers play (as educators and guardians) make teaching profession more stressful (Wettstein, Schneider, Holtforth, & Marca, 2021).

Globally, attention has been given to educators to find out ways of making their working environment pleasant due to an important role they play in our communities (Ekpoh, 2018). In Tanzania, teachers in both primary and secondary schools have been experiencing stressful working environment. Studies show that leadership is considered one of factors that can lead to higher levels of stress or helping in making working places less stressful (Villalba-Moreno et al., 2016).

It has been widely recognised by different researchers that transformational leadership is among the most prominent leadership style in contemporary organisations (Yoho, 2021). However, the reviewed literature shows that there are no empirical evidences that show how leadership styles specifically transformational leadership affect occupational stress among primary school teachers in Tanzania public primary schools although teachers in public primary schools experience high levels of stress (Mwakasangula & Mwita, 2020; Mlaki; 2015). This study aimed at bridging this empirical gap.

Study Objectives

The study's main objective was to explore the relationship between transformational leadership style and occupational stress among primary school teachers in Tanzania. The study had the following specific objectives;

- To determine the effect of idealised influence on occupational stress among primary school teachers in Morogoro Municipality.
- To determine the influence of inspirational motivation on occupational stress among primary school teachers in Morogoro Municipality.
- To determine the influence of intellectual stimulation on occupational stress among primary school teachers in Morogoro Municipality.
- To determine the influence of individualised consideration on occupational stress among primary school teachers in Morogoro Municipality.

Research Hypotheses

The study tested the following null hypotheses:

H_1: There is no significant positive relationship between idealised influence and occupational stress among primary school teachers in Morogoro Municipality.

H_2: There is no significant positive relationship between inspirational motivation and occupational stress among primary school teachers in Morogoro Municipality.

H_3: There is no significant positive relationship between intellectual stimulation and occupational stress among primary school teachers in Morogoro Municipality.

H_4: There is no significant positive relationship between individualised consideration and occupational stress among primary school teachers in Morogoro Municipality.

Literature Review

Theoretical Review

This study was underpinned by transformational leadership theory. The origin of transformational leadership theory is associated with studies on charismatic leadership conducted by Weber (1947).

Weber argues that charismatic leaders gain authority from exceptional qualities that few leaders have. Transformational leadership as a concept was firstly noted in the work of Burns (1978) and later various transformational theory versions were developed by different theorists including Bass (1985).

Transformational leadership has to do with inspiration that a leader directs his followers to transcend their own self-interests for the benefit of the organisation; leaders can have a profound and desirable effect on followers to make the required change (Robbins, 2003). Leaders who opt to use transformational leadership style provide a vision and develop an emotional relationship with people they lead, increasing the latter's consciousness and belief in higher goals, above their own interests (Bass, 1985). Transformational leadership comprises four components which are inspirational motivation; intellectual stimulation; ideal influence; and individual consideration, interdependent, and synergized to achieve performance that meets expectations (Rindu, et al 2020).

Bass and Avolio (1994) postulated that idealized influence relates to how leaders hold trust of their followers, maintain their respect and faith, showing dedication and appeal their hopes and dreams and act as their role models. On the other hand, inspirational motivation shows the extent to which a leader provides a vision, uses appropriate symbols and images to help others focus on their work, and try to make others feel their work is significant. Intellectual stimulation has to do with the amount of encouragement that a leader offers to help them to be more creative. Intellectual stimulation helps subordinates to find new ways of solving existing problems. Through intellectual stimulation, leaders create an environment that makes subordinates to evaluate their values and beliefs and those of the organisations they are working in. Lastly, individualized consideration shows the extent to which leaders are concerned with their subordinates' well-being and regard them as individuals with varied needs. Through individual consideration, leaders tend to help those who seem to be less engaged with groups or organisation's activities.

In the effort to make workplace friendlier and less stressful, researchers have been looking for empirical evidences to see how transformational leadership affects occupational stress in different sectors. Arguably, leaders may play a crucial role in reducing stress at work, and in helping employees to cope with stress. The positive effects of perceived supervisor support have been well documented and increasingly researched in the literature (Villalba-Moreno, Ramos-Garza & Ramos-Garza, 2016).

Leadership

Leadership is a process of influencing and inspiring followers to willingly use their knowledge, skills and expertise to achieve group or organisational goals (Mwakasangula & Mwita, 2021). Roupne, Rinfre & Grenier (2019) define leadership as a capacity serving to transform ways of seeing, thinking, and acting so that the group may adapt to the various challenges confronting it. This means that leadership has to do with what a leader says or does to influence his/her followers to do what it takes to achieve group or organisational goals.

Occupational Stress

Occupational stress is a natural reaction to excessive demands and perceived threats from an occupational perspective or it is the gap between employees' needs and employees' abilities and what their workplace offers and requires (Jain, 2021).

Occupational or job stress means harmful physical and emotional responses which occur as the result of a mismatch between job requirements and capabilities and resources of a job holder.

Transformational Leadership and Occupational Stress

Leadership styles have been associated with various issues in organisations including occupational stress (Villalba-Moreno, Ramos-Garza & Ramos-Garza, 2016). Salem and Kattara (2015) studied the relationship between transformational leadership and occupational stress in the hospitality industry and found a significant and negative relationship between transformational leadership and occupational stress among five-star hotels in Egypt. Other consistent findings were reported by Huang, Kuo, Yang, Hsiao and Yang (2018) who studied the impact of transformational leadership on nurses' job stress in Taiwan. The study found an inverse relationship between transformational leadership and employee job stress. Dartey-Baah and Ampofo (2015) conducted a study among banks in Ghana to see how leadership styles affect occupational stress. The study also found a negative relationship between transformational leadership and job stress among employees working in Ghanaian banks.

Leadership in the educational sector is something that deserves a more serious attention by researchers and practitioners. This is due to the fact that teachers are considered to be working in a more fragile sector comparing to other professionals. A study of Marshall (2015) which was done in Barbados detected a negative relationship between leadership styles adopted with school principals and teachers' stress levels. This implies that leadership styles used were the sources of higher level of stress among the teachers.

In Tanzania, educational reforms have taken place, which is part of improving the quality of education. These reforms in Tanzania have been in place to enhance performance and commitment of teachers. Schools in Tanzania are expected to facilitate transformational change while ensuring teachers are committed with work morale (Nguni, Sleegers & Denessen, 2006). While government initiatives on supplying various facilities to help schools performing better an element of leadership in primary schools has not been given attention it deserves by the government and scholars to see how leadership styles could be a potential source of stress or stress management among primary school teachers.

Data and Methods

The study employed a cross sectional survey which included 51 public primary schools found in Morogoro Municipality. Cross-sectional survey examines information of many cases at one point in time which creates a 'snapshot' of a social life as argued by Neuman (2014). The study used a standardised questionnaire to collect data from a sample 618 teachers who were randomly sampled. The study involved inferential statistics to establish the relationship between transformational leadership and occupational stress among primary school teachers through the use of multiple linear regression analysis. Data analysis was done with an assistance of a computer software namely SPSS version 21.

Results

Valid and Reliability of Research the Instrument

Reliability and validity are the most important and fundamental factors to consider in evaluating any measurement instrument for good research (Mohajan, 2017).

Validity explains how well the collected data cover the actual area of investigation (Sürücü & Maslakçı, 2020). Validity has to do with whether the tool is able to measure what it was originally designed to measure. Crobach's alpha was calculated to test the validity of the instrument for each variable involved in the study. cronbach's alpha was found to be 0.831, 0.77, 0.78, 0.776 and 0.790 for idealised influence, inspirational motivation, intellectual stimulation, individual consideration and occupational stress respectively. Mugenda (2003) informs that a coefficient of 0.70 or above signifies a high degree of reliability. This implies that the instrument used in this study was reliable enough to be used for data collection. In order to ensure that the questionnaire for data collection was valid, the tool was given to two experts; one statistician and one researcher in the field of human resource management. The tool was improved based on comments offered by the experts. Further, a pilot study which involved 50 teachers was done. Piloting helped to correct errors and mistakes detected in the questionnaire especially in sentences that were not well understood by the respondents.

Table 1: Coefficients of Cronbach's Alpha

Variable	No. of items	Cronbach's Alpha
Idealized Influence	3	.831
Inspirational Motivation	3	.770
Intellectual stimulation	3	.780
Individual consideration	3	.776
Occupational Stress	8	.790

Source: Authors (2022)

Demographic characteristics of the respondents

The study involved a total of 618 respondents who had different characteristics as presented in table 2. The table shows how inclusive the study was.

Table 2: Demographic characteristics of the respondents

Characteristic	Category	Frequency (%)
Gender	Male	130 (21%)
	Female	488 (29%)
Age	18-22 Years	4 (0.6%)
	23-33 Years	182 (29.4%)
	34-44 Years	266 (43%)
	45-55 Years	148 (23%)
	Above 55 Years	18 (2.9%)
Marital Status	Single	56 (9.1%)
	Married	562 (90.9%)
Education level	Certificate	248 (40.1%)
	Diploma	246 (39.8%)
	Bachelor's Degree	118 (19.1%)
	Master's Degree	6 (1%)

Source: Researchers' computation

Descriptive Findings

Means and standard deviations for all variables are presented in Table 3. All leadership components were found to have higher mean score than the midpoint of 3.0 except for inspirational motivation. The highest score was found in individual consideration with a mean of 3.8. The mean for occupational stress was found to be 4.2 which implies high level of stress among primary school teachers. The standard deviation scores for all five variables were relatively low because they were all below 1.0 which means they are close to the mean score.

Table 3: **Means (M) and standard deviations (SD) for study variables**

Variable	M	SD
Idealized Influence	3.2	.39
Inspirational Motivation	2.7	.52
intellectual stimulation	3.5	.48
Individual consideration	3.8	.88
Occupational Stress	4.2	.72

Source: Field Data (2022)

Regression Analysis

The study involved multiple regression analysis. Independent variables included in the analysis were idealized influence, inspirational motivation, intellectual stimulation and individual consideration, and while for the dependent variable was occupational stress. The following model tested;

$$OS = \beta_0 + \beta_1 II + \beta_2 IM + \beta_3 IS + \beta_4 IC + \varepsilon$$

Where
OS= Occupational stress
β_0 = Constant (coefficient of intercept)
II = Idealized Influence
IM = Inspirational Motivation
IS = Intellectual stimulation
IC= Individual Consideration
β_0-β_4= Regression coefficient of the three variables
ε = Error term

The model summary in table 4 shows that correlation coefficient value r = 0.736 which means that transformational leadership is a good predictor of occupational stress. Moreover, r^2 =.542 suggests that 54.2% variation in occupational stress is explained by the independent variables included in the model. This means 45.8% of the variation is explained by other factors which were not included in the study.

Table 4: **Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.736[a]	.542	.540	3.324

a. Predictors: (Constant), Idealized Influence, Inspirational Motivation, intellectual stimulation, Individual Consideration.

The goodness of fit test in table 5 shows that the model used in the study was a good predictor of occupational stress intentions among the students, $F_{(4, 229)}$ =12.251, p=.000

Table 5: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	25.879	4	6.47	12.251	.000[b]
1	Residual	189.235	229	.527		
	Total	215.114	223			

a. Dependent Variable: Occupational Stress

b. Predictors: (Constant), Idealized Influence, Inspirational Motivation, Intellectual stimulation, Individual Consideration

Results in Table 6 show that individual influence (β= -.154, p=.001) have a negative significant relationship with occupational stress. Since p=.001 at α=0.05 we have sufficient evidence we to accept the null hypothesis and therefore conclude that individual influence has a significant negative relationship with occupational stress.

Inspirational motivation (β= -.122, p=.000) have a negative significant relationship with occupational stress. Since p=.000 at α=0.05 we have sufficient evidence to accept the null hypothesis and therefore conclude that inspirational motivation has a significant negative relationship with occupational stress.

Intellectual stimulation (β= -.112, p=.002) have a negative significant relationship with occupational stress. Since p=.002 at α=0.05 we have sufficient evidence to accept the null hypothesis and therefore conclude that intellectual stimulation has a significant negative relationship with occupational stress.

Further, individual consideration (β= -.179, p=.000) have a negative significant relationship with occupational stress. Since p=.000 at α=0.05 we have sufficient evidence to accept the null hypothesis and therefore conclude that individual consideration has a significant negative relationship with occupational stress.

Table 6: The estimated Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.421	1.137		18.433	.000
	Idealized Influence	-.154	.027	-.164	-2.661	.001
	Inspirational Motivation	-.122	.175	-.128	-2.335	.000
	intellectual stimulation	-.112	.214	-.114	2.124	.002
	Individual consideration	-.179	.269	-.154	2.321	.000

Dependent Variable: Occupational Stress

Source: Authors' Analysis (2022)

Discussion

The study showed a negative relationship between individual influence and occupational stress that public primary school teachers are experiencing in public primary schools. This implies that when leaders act as role models and demonstrate their capabilities while remaining ethical, there are higher chances of reducing amount of stress which teachers experience in job places. These findings are consistent with those of Salem and Kattara (2015) who found the inverse relationship between individual influence and occupational stress among employees.

The study detected a negative relationship between inspirational motivation and occupational stress; this implies that once leaders manage to inspire and motivate their employees, an environment is created that help primary school teachers to feel less stressful. This is due to the reason that employees tend to consider their leaders as sources of inspiration as postulated by Power (2016); therefore, having inspirational leaders leads into making them to feel confident and secure.

Intellectual stimulation was also found to have an inverse relationship with occupational stress in this study. This implies that when people holding leadership positions in public primary schools manage to stimulate teachers' efforts to be creative and innovative and give teachers opportunities to come up with new ideas it creates a positive environment for them and helps to lower their stress levels. These findings are against assumptions put forward by Arnold and Connelly (2013) that intellectual stimulation may act as a source of stress since a transformational leader becomes too demanding; hence, subordinates are required to work longer hours and use more energy into their work.

Individual consideration is also another component of transformational leadership that was found to have a negative relationship with occupational stress. Individual consideration refers to transformational leaders who give special attention to each individual followers' needs for achievement and growth by acting as a coach or mentor (Avolio & Bass, 1995). This means teachers who experience support in achieving their individual and organisational goals from their leaders experience lower levels of stress comparing to those who do not. These findings are consistent with those of Khalid, Murtaza, Zafar, Saqib and Mushtaq (2012) who found that supportive leadership plays an important role in making workplaces for employees in education institutions less stressful.

Generally, this study's findings show that transformational leadership negatively affects occupational stress among teachers in Tanzania public primary schools which implies that the use of transformational leadership style in primary schools may help to lower level of stress among the teachers working in the schools. This study confirms findings of previous studies done by different researchers who attempted to study how transformational leadership affects occupational stress (Huang et al, 2018; Dartey-Baah & Ampofo, 2015; Marshall, 2015). The fact that occupational stress is still a major challenge among Tanzania primary school teachers sends a signal on type of leadership styles that leaders use in the education sector and leadership skills they possess.

Limitations

Data for this study were collected from Morogoro Municipality only; it did not cover other regions in Tanzania. Hence, this has limited the study since circumstances in other regions could be different. Moreover, the study made use of quantitative data only; this implies that the study misses the triangulation of data from both qualitative and quantitative approach. The use of both approaches could help to offer more insights from opinions of the respondents.

Conclusion

This study examined how transformational leadership relates to occupational stress among teachers in Tanzania public primary schools. The study concludes that there is a significant negative relationship between transformational leadership and occupational stress. Further, all transformational leadership elements were found to negatively affect occupational stress.

Recommendations

Leaders in Tanzania education sector specifically in public primary schools where this study focused should consider using transformational leadership so as to make working environment for teachers less stressful. Special leadership training should be designed for people holding positions in primary schools to equip them with necessary leadership skills.

More researches have to be done on leadership and occupational stress in both private and public schools which will have to cover bigger geographical area of Tanzania and use both qualitative and quantitative approach.

References

Adedeji, S. O. & Olaniyan, O. (2011). *Improving the conditions of teachers and teaching in rural schools across African countries*. Addis Ababa: UNESCO-IICBA

Argyle, M., & Furnham, A. (2013). *The Psychology of Money*. Routledge

Arnold, K. A., & Connelly, C. E. (2013). Transformational leadership and psychological well- being: Effects on followers and leaders. In H. S. Leonard, R. Lewis, A. M. Freeman, & J. Passmore (Eds.), *The Wiley-Blackwell handbook of the psychology of leadership, change, and organisational development* (pp. 175-194). Chichester, UK: Wiley-Blackwell.

Bass, B. M. (1998). *Transformational leadership: Industry, military, and educational impact*. NewJersey: Lawrence Erlbaum Associates.

Bass, B. M., & Avolio, B. J. (1990). *Transformational leadership development: Manual for the multifactor leadership questionnaire*. Consulting Psychologists Press.

Bass, B. M. (1985). *Leadership and performance Beyond Expectations*. New York: Free Press.

Belias, D. &Koustelios, A. (2014). Leadership and Job Satisfaction: A Review. *European Scientific Journal*, 10(8), 24-46

Bolman, L. G. & Deal, T. E. (1994). Looking for leadership: Another search party's report. *Educational Administration Quarterly*, 30(1), 77

Dartey-Baah, K. &Ampofo, E. (2015). Examining the Influence of Transformational and Transactional Leadership Styles on Perceived Job Stress among Ghanaian Banking Employees. *International Journal of Business and Management*, 10(8), 161-170.

Ekpoh, U. (2018). Teachers' Satisfaction with Physical Working Environment: Imperative for Effective Service Delivery. *Journal of Education and Human Development*, 7(1), 92-97. DOI: 10.15640/jehd. v7n1a11

Huang, C., Kuo, M., Yang, L., Hsiao, S. & Yang, T. (2018). The Impact of Transformational Leadership and Empowerment Perception on Nurses' Job Stress.*OSR Journal of Nursing and Health Science*, 7(3), 23-29.

Jacobs, C. M. (2019). Ineffective-leader-induced occupational stress. *SAGE Open*, 9(2). https://doi. org/10.1177/2158244019855858

Khalid, A., Murtaza, G., Zafar, A., Zafar, M.A, Saqib, L. & Mushtaq, R.(2012). Role of Supportive Leadership as a Moderator between Job Stress and Job Performance. *Information Management and Business Review*, 4(9), 487-495.

Mareku, A. (2017).Role of Leadership in Organisational Effectiveness. *Journal of Economics, Business and Management*, 5(11), 336-340

Marshall, I . A. (2015). Principal Leadership Style and Teacher Stress among a Sample of Secondary School Teachers in Barbados. *Caribbean Educational Research Journal*, 3(1), 76-90.

Mulins, L. J. (2001). *Management and Organisational Behaviour*: 6th Edition. New York: Prentice Hall

Mwakasangula, E. & Mwita, K. (2020). Relationship between Occupational Stress and Job Satisfaction among Teachers in Tanzania Public Primary Schools. *Journal of Co-operative and Business Studies*, 5(1), 96-103.

Mwita, K. M., Mwakasangula, E., &Tefurukwa, O. (2018). The Influence of Leadership o Employee retention in Tanzania Commercial Banks. *International Journal of Human Resource Studies*, 8(2), 274-283.

Mlaki, E. (2015). Variation in Stress in the Teaching Profession: Tanzania Teachers' Experience Based on Personal Factors. *The International Journal of Humanities and Social Studies*, 3(1).

Ogalo,S.A., Odera, F., &Ogogo, C. (2020). Principals' Stress in Public Secondary Schools in Kisumu County, Kenya. *Journal of Research & Method in Education*, 10(4), 1-16.

Rindu, R., Lukman, S., Hardisman, H., Hafizurrachman, M. &Bachtiar, A. (2020). The Relationship between Transformational Leadership, Organisational Commitment, Work Stress, and Turnover Intentions of Nurse at Private Hospital in Indonesia. *Macedonian Journal of Medical Sciences*, 8(E), 551-557

Robbins SP (2003) *Organisation behavior* (8th ed) New Jersey: Prentice Hall, Upper Saddle River.

Salem, I. &Kattara, H. (2015). Transformational leadership: Relationship to job stress and job burnout in five-star hotels. *Tourism and Hospitality Research*, 0(0) 1–14.

Yusoff, R. & Khan, F. (2013). Stress and Burnout in the Higher Education Sector in Pakistan: A Systematic Review of Literature. *Research Journal of Recent Sciences*, 2(11), 90-98

Villalba-Moreno, O., Ramos-Garza, C. & Ramos-Garza, L. (2016). Leadership Behaviors and Occupational Stress: *The Power of Empowerment*, 7(10), 1662-1674.

Weihrich, H. and Koontz, H. (2005). Management: A global Perspective. New Delhi: Tata McGraw-Hill.

Weiman, C. (1977). A Study of Occupational Stressors and the Incidence of Disease/ Risk. J*ournal of Occupational Medicine*, 19(2), 119-122.

Citrus fruit farmers' adaptation capacities to climate variability in Ngora district, Eastern Uganda

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ABSTRACT

Over the past three decades the government of Uganda prioritized fruits growing in Teso sub-region as a means to promote socioeconomic development. However, climate variability threatens the realization of this initiative and yet inadequate research has been done to address this gap. This study assessed citrus fruit farmers' adaptation capacities to climate variability in Ngora district, eastern Uganda. Longitudinal and cross-sectional research designs were adopted in which 135 randomly selected farmers were interviewed. Findings indicated that 82% of the respondents attested that rainfall amounts and temperature patterns had changed with the highest rainfall of 1686 mm received in 1991, and the lowest amount of 785mm received in 2009. Average annual temperatures in the same period varied between 23.8ºC and 25.7ºC. These variations contributed to a drop in orange fruit yields from 90% in 2015 to below 54% in 2016. Overall, 94.8% of citrus farmers were aware of the term climate variability and they associated it to variation in rainfall amounts and distribution, rise in surface temperature and occurrence of droughts; 73.3% of the farmers had positive attitude towards climate variability adaptation especially in instances where it directly affected their livelihoods. Only 21% of the farmers did something to adapt to climate variability through irrigating young orange trees. Conclusively, citrus growing provided an option to poverty eradication, however climate variability threatens farmer's efforts. In a short-run farmers may be encouraged to work in groups. Overall capital investment on irrigation technology by government and or other stakeholders will offer lasting solutions.

Keywords: Citrus fruits - climatic factors, Climatic changes, Agriculture - environmental aspects , Ngora district, Uganda

Background

Climate change which usually manifests itself inform of unreliable rainfall and high temperatures is among the greatest challenges that human race has faced in the 21st century and if not well managed; its impacts are likely to stall or reverse international efforts to propel development and reduce poverty (Trumper *et al.*, 2008). The capacity of humans to adapt to and cope with the effects of climate variability such as unreliable rainfall and prolonged droughts are progressing slowly (Juana *et al.*, 2013; Okonya *et al.*, 2013).

As such adaptation to climate variability may require farmers to first appreciate that the climate has changed and then identify useful mechanisms to cope with the ongoing changing conditions (Gbetibouo, 2009). In scenarios where farmers are unable to adopt to climate change effects, the consequences are dire and usually result to social, economic and ecological loses (Juana *et al.*, 2013).

Uganda like many developing countries in the world that depend on rain fed agriculture is very prone to the negative impacts of climate variability; this is worsened by the fact that the livelihood of the local people and the country's economy is agro-based. Thus any change in rainfall pattern and distribution usually results into worst conditions in food security, soil erosion and land degradation among others (Shikuku *et al.*, 2017).

Over the past four decades the amount and distribution pattern of rainfall has not been uniform, for instance; between 1991 and 2000, Uganda experienced seven droughts episodes and these had serious negative impacts on water resources, hydropower production, agriculture and the overall economy (Lane & McNaught, 2009). In the same period excess rainfall was noted during the ElNino of 1997/98 which also had its damaging impacts. For example; it caused outbreak of diseases, loss of crops and destruction of some infrastructure like roads and bridges. The worst occurrence of ElNino was in 1998 when excess rainfall caused deaths of over 100 people and displacement of more than 150,000 people. In March 2010, the occurrence of landslides for example in Bududa district left over 100 people dead and destroyed lots of food crops. In the downstream areas, over 6,000 people were affected by flush floods directly or indirectly especially in Butaleja district.

Similar to the above, analysis of pre-analysed rainfall and temperature data for Ngora district also showed that between 1983 –2013, the amount and distribution of rainfall and temperature had varied. Variations and shifts in rainfall patterns affects crops yielding and farmers livelihoods (Belarmain & Sanchez, 2015; Kotir, 2011). Meteorologists and economists of Uganda for example note that; the persistence of poverty among the rural farmers in Uganda is partially due to poor crop yields exacerbated by inadequate and erratic rainfall. This is further illustrated by the decline in economic growth from about 1.3% (6.6% in 2004/05 to 5.3% in 2005/06 due to inadequate rainfall received in that time (Osbahr *et al.*, 2011).

Despite the predicted bad conditions, the capacity and readiness of local farmers in most parts of Sub Saharan Africa and Uganda in particular, to adapt to such conditions is still very low (Kotir, 2011; Okonya *et al.*, 2013). There is also very scanty information to explain the relationship between farmers perceptions and adaptations to changing rainfall and temperature patterns (Belarmain & Sanchez, 2015; Okonya *et al.*, 2013; Osbahr *et al.*, 2011). It was therefore very important to conduct this study as it would provide useful information to address the current challenges faced by citrus farmers and may also act as a reference source for decision making in matters of adaptation to the negative impacts of climate change. The main objective of the study was to assess the perception and adaptation capacities of citrus farmers to the impacts of water stresses and shortages (climate variability) in Ngora district. Specifically the study intended to: 1) Assess temporal variations in rainfall and temperature in Ngora district over a period of 30 years 1983 to 2013. 2) Establish the relationship between Farmers' socioeconomic factors and Knowledge, Attitude and Practices (KAP) towards adaptation to climate variability

Materials and Methods

Study site

This study was carried in Kees and Kumel parishes both located in Mukura Sub County in Ngora district (figure 1). Ngora district is located in Eastern Uganda. These parishes have many citrus fruit farmers, at the same time they are usually faced with harsh weather conditions especially higher temperatures, drought and irregular rainfall (Ngora District Development Plan, 2015 - 2020). The study examined pre-calculated rainfall and temperature data covering a period of 30 years (1983 to 2013), this period was considered due to availability of complete datasets for both rainfall and temperature which was extracted from online data sources. While data on farmer adaptations was collected over a period of 20 years that is since the technology of citrus fruit growing was introduced in Teso sub-region where Ngora district is located.
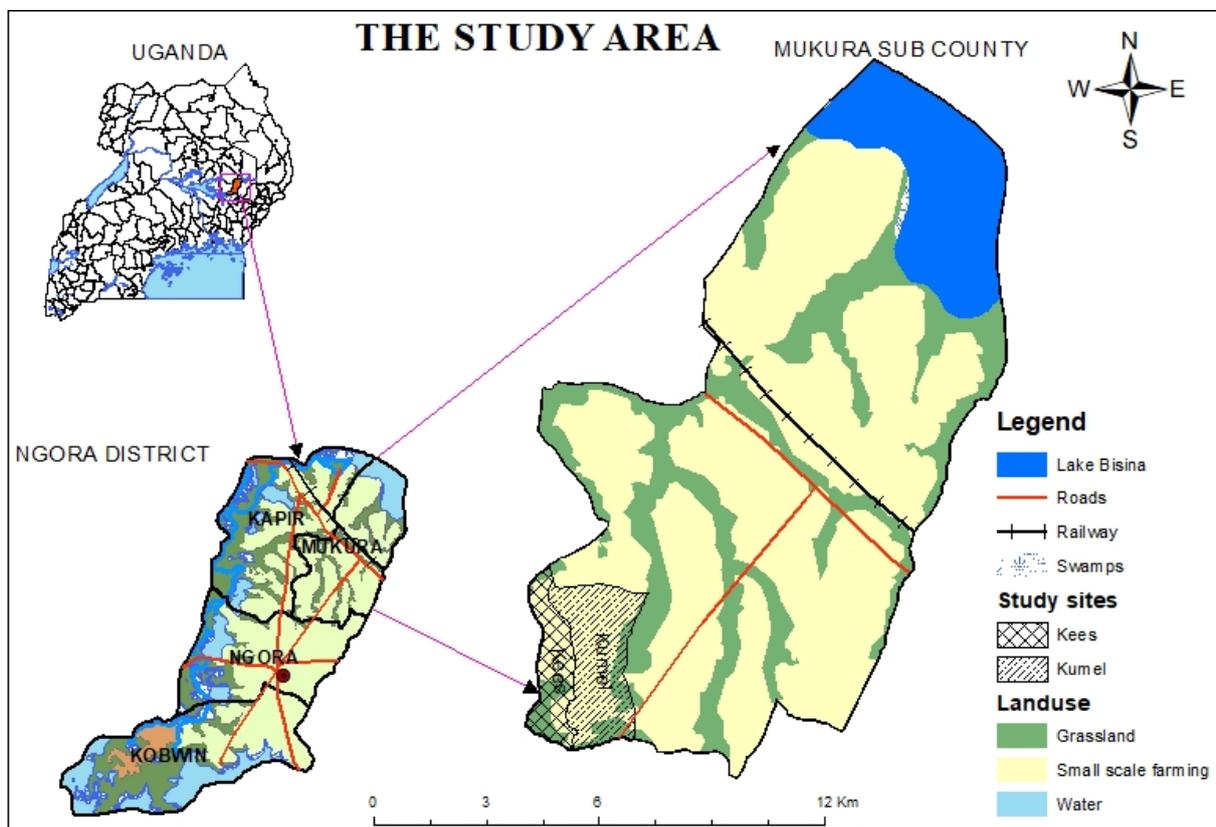
Figure1: Location of study site in Ngora district

Study design and population

This study adopted both longitudinal and cross-sectional study designs, this was because some (weather) data had been collected overtime and the other was directly collected from the citrus fruit farmers. The study population constituted of the local citrus fruits farmers as primary population, and the other category included Key Informants Interviews (KIIs) including district agricultural officer, assistant agricultural officers, wetlands officer, environment officer, forestry officer and the in-charge Operation Wealth Creation (OWC). There were about 204 households with more than 50 citrus trees on their farms that is in Kees (108) and Kumel (96) parishes respectively (District Development Plan 2015 - 2020).

Determination of the Sample size
Given that the total population targeted by this study was 204, the sample size n of 135 was determined from Slovin's Formula

$$n = \frac{N}{1 + Ne^2}$$ where e = 5% or 0.05, at 95% confidence level, N = 204

Therefore the study targeted information from a sample of 135 respondents: 71 from Kees and 64 from Kumel. Farmers to be interviewed were then selected randomly.

Data collection and analysis methods

A cross sectional survey using a self-administered questionnaire and face to face interviews were held to collect data from the local citrus fruit farmers. In addition, focused group discussions comprising of 12 citrus fruit farmers were held to supplement and triangulate the interviews responses. Data were analyzed using the Statistical Package for Social Scientists (SPSS) version 20. Time series trend analysis was used to present rainfall and temperature patterns over the 30 year period.

Results

Temporal variation in rainfall and surface temperature in Ngora District over a period of 30 Years
Field findings indicated that annual rainfall totals in Ngora district ranged between 785mm and 1686mm The highest amounts of rainfall of 1686mm was received in 1991, 1639mm received in 2001 and 1626mm received in 1996 respectively while the lowest rainfall amount of 785mm was experienced in 2009 (Figure 2). The rest of the years recorded moderate rainfall amounts ranging between 1490mm and 1000mm per annum. It is visible that the amount of rainfall received was still adequate to support crop farming, the only challenge was its distribution which was erratic in nature.
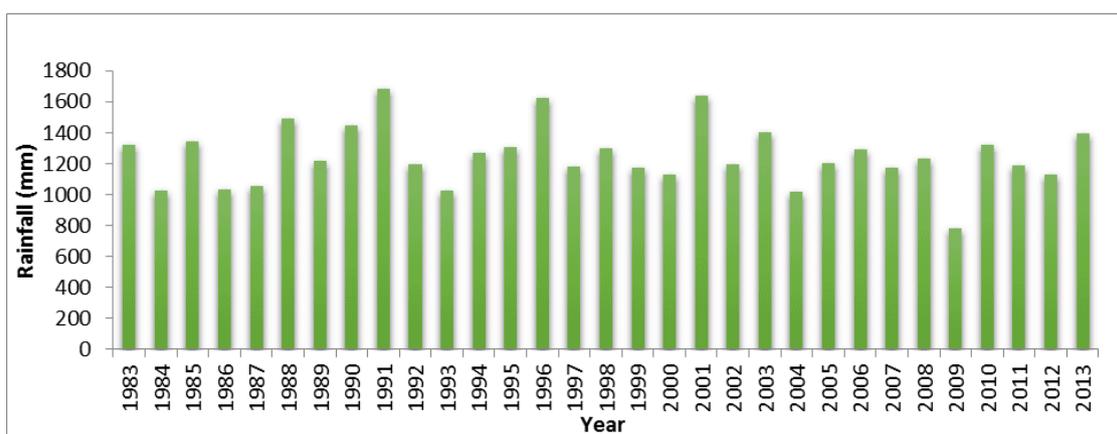

Figure 2. Temporal variation in annual rainfall in Ngora District from 1983 to 2013

In terms of monthly rainfall distribution, the months with high average rainfall amounts (above 100mm) over the study period were April and May (for the first season) and August, September, October and November (for the second season). Looking at the dry conditions, the lowest average rainfall amounts of below 60mm was experienced in January, February and December (figure3).
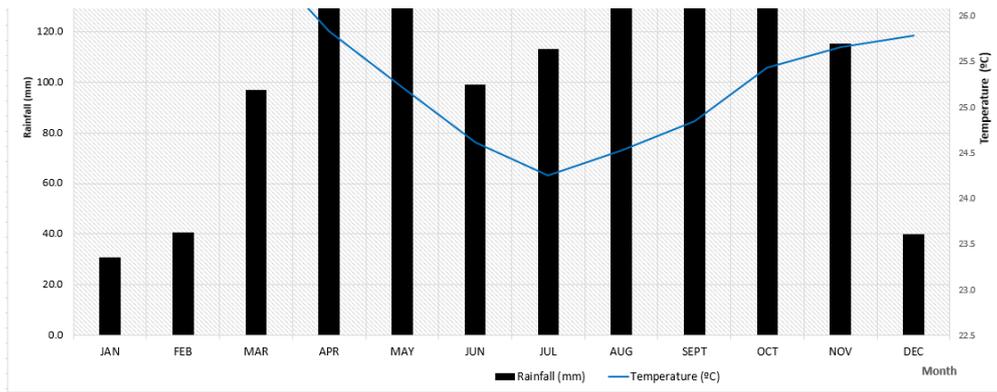
Figure 3. Temporal variation in rainfall and temperature in Ngora District over a period of 30 Years.

Over the three decades 1983 to 2013, the annual average temperatures ranged between 24.3ºC and 27ºC; it was only in the three years (1985, 1989 and 1994) where the lowest (around 24ºC) mean annual temperature was recorded. On the other hand, the three years of 2003, 2002 and 2009 recorded the highest mean annual temperature of above 25.5ºC; the rest of the years recorded temperature of between 24ºC and 26ºC (figure 3).

In terms of monthly temperature variations; the months of June, July and August recorded the lowest mean monthly temperatures below 24ºC whereas January, February and March recorded the highest mean monthly temperatures above 25.5ºC (figure 4).
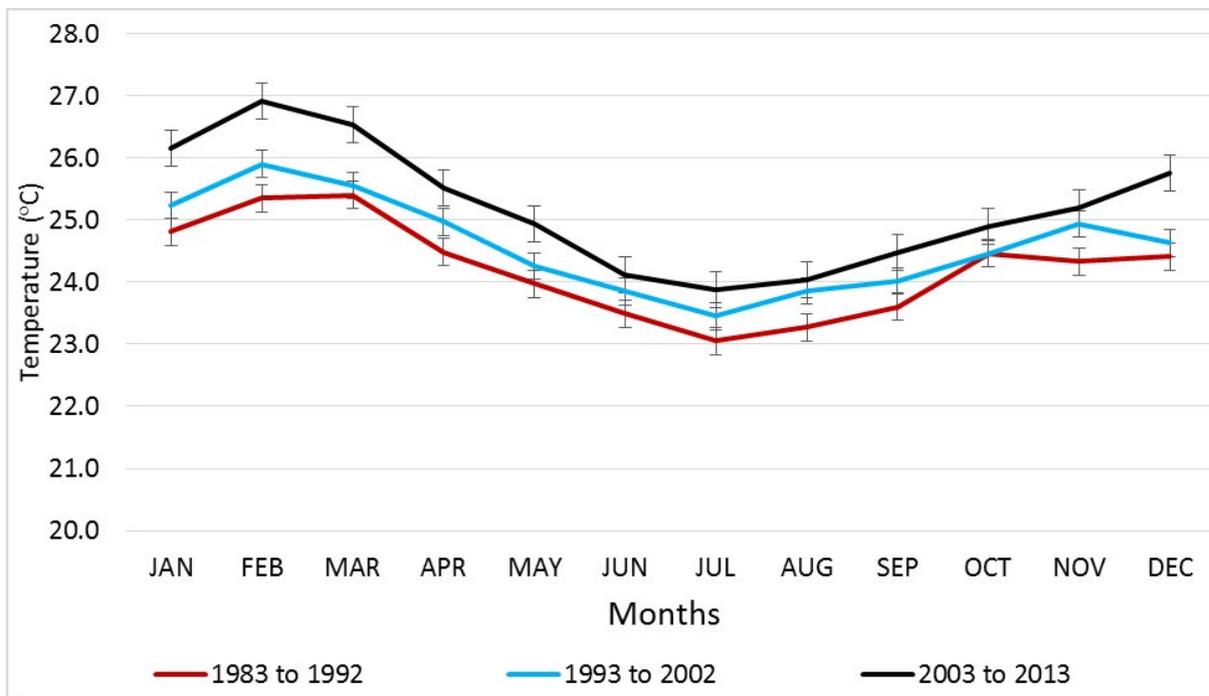
Figure 4: The average surface temperature variations for the decades of 1983 to 2013 in Ngora District

Farmers' perception on rainfall distribution and temperature over the past 10 years
Study findings show that 82% of the respondents testified that the rainfall and temperature patterns had become irregular (figure 5). Farmers stated that in the past it was easy to master the farming calendar; they knew for example that first planting commences in late February or March. "In February the first rains would start falling and go on until late June where a short dry season would follow in the months of July and August.

By September, the second rains would then start falling and continue through to mid-December when the long dry season would commence and go on till late February or March. However, in the recent past the reverse is true, 'the rains never come on time, and even whenever they did, the amounts were very small with various breaks (dry spells) in between the wet season", stated one of the orchard farmers during a focused group discussion in Kees Parish. Timely return of rains would enable farmers to plan on what crops to grow (especially annual crops), depending on rainfall amounts expected in that specific season.

A smaller percentage of 15% of the fruit farmers agreed that the rainfall and temperature patterns were regular and had not changed very much compared to the past decades. Despite this, they also acknowledged that the amounts of rainfall had reduced while the temperatures had continuously increased. To this category of respondents, the distribution of rainfall remained bimodal. Only five respondents were not sure whether the rainfall pattern was regular or irregular. Accordingly, they stated that sometimes rains come a little earlier that is in late February or early March and other times the rains delayed for example start in April. However, like others, they also appreciated that the conditions in 2016 were a little unique and distorted as very little rainfall and very high temperatures for both the first and second season were experienced.
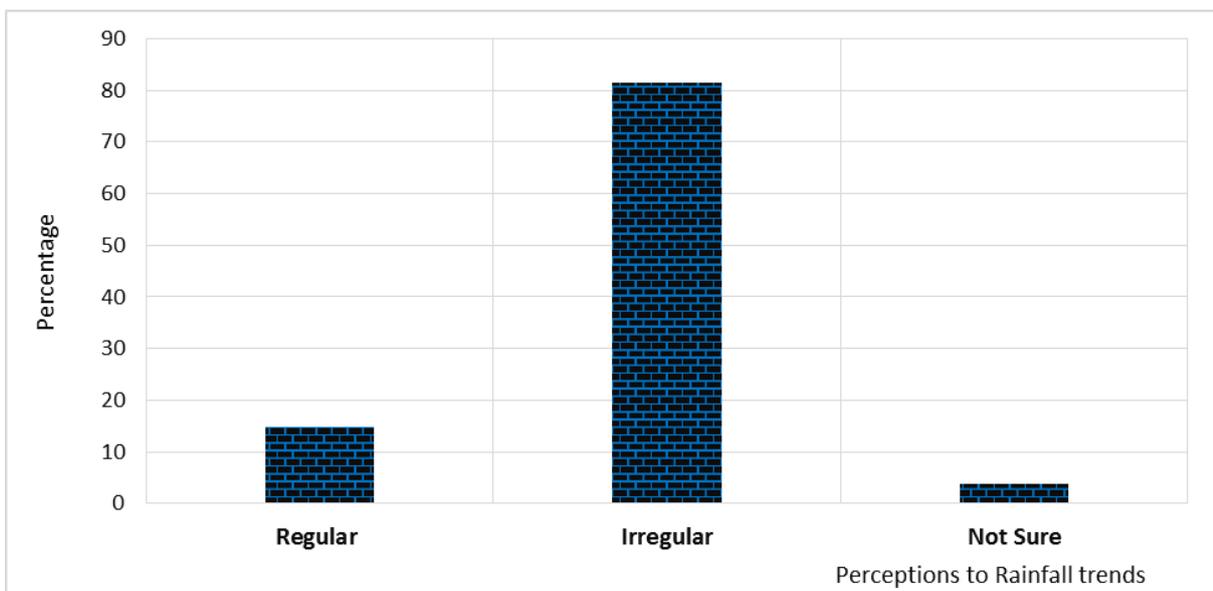

Figure 5. Farmers' perception on rainfall distribution and temperature over the past 10 years

Farmers' Knowledge, Attitude and Practices (KAP) towards climate variability

Results show that 94.8% of the citrus famers had heard of the term climate change. The farmers associated climate variability to changes in rainfall distribution and amounts, increase in temperature and other weather parameters like strong winds especially during the dry season and storms in the wet season. However, about five percent of the respondents claimed not to be aware of the meaning of climate change, although they were experiencing variations in rainfall distribution, amounts and temperature.

During focused group discussion, citrus farmers noted that the worst harvest over the past decade occurred in 2016 where a prolonged dry spell led to death of young orange fruits, affecting orange fruiting (plate 1). This was further confirmed by the district agricultural officer who noted that there was a significant drop in the yield from about 90% in the previous years to less than 54% in 2016. Drought severely affected orange fruit yields….. *"Usually when we have adequate rainfall I harvest about 55 bags of oranges from my 110 trees (orchard), however due to the long dry spell this year, I have got only 27 bags"* reported one orange farmer in Kumel Parish. Reduced yields worried most farmers as it directly affected their earning.

Although climate variability manifested in many ways, the dry spell and rise in temperature were noted to have affected farmers most as all the farmers irrespective of their location while flooding was ranked least because it affected fewer farmers especially those in low lying areas.

About 98% of the farmers stated that human activities like vegetation clearance and degradation of wetlands have contributed to changes in rainfall and temperature conditions. Such human activities are known to increase drought conditions by reducing the amount of rainfall received. Trees and wetlands through evaporation and evapotranspiration processes recharge the hydrological cycle which in turn influence the prevailing weather conditions of any place. However, once vegetation is lost, the recharging aspect and carbon sequestration are equally lost, noted a forest ranger. Despite high awareness about climate change variability, some farmers believed that the current weather variations were natural and cyclic in nature and man had little or no control over it.

Plate 1. The effect of prolonged drought on citrus fruits in Kumel village (October, 2016)

Attitudes and Concerns about Climate Variability

In examining the attitudes of citrus fruit farmers' towards climate variability, questions were asked regarding the extent to which they were concerned about climate change effects. Results of these are presented in figure 6.
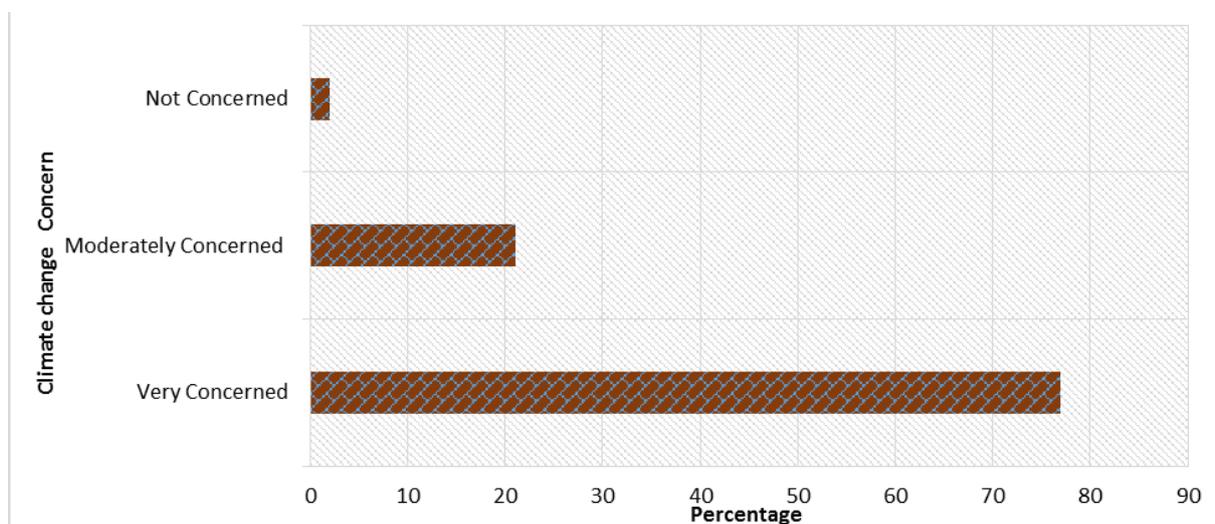

Figure 6. Farmers concerns about Climate Change

About 77% of citrus farmers were very concerned about the negative effects of climate variability especially on their orchard establishments. They noted that droughts and high temperatures contribute to reduced orange fruit yielding and this in turn led to increased poverty levels. Some of testified that they were not able to pay school fees for their children because of poor yields realized and they requested government to support them during dry seasons. "*….we call government or any other nongovernmental organizations to support us to access irrigation facilities to avoid total losses in times of inadequate rainfall. We ask for this because irrigation technologies are very expensive and therefore many farmers cannot afford*". In the meantime farmers were willing to do anything possible to adapt to climate variability effects. This was through irrigating the young orange trees using old perforated plastic bottles filled with water and tied directly on the stem of an orange tree or supported with a stick (plate 2). The water in the bottle then trickles down slowly and improves on the moisture content of the soil.

During group discussions and through field observations, drip irrigation technologies were mostly applied on younger orange trees and in small gardens (plate 2). The older trees could not be irrigated using perforated plastic bottles because they required much water which a small plastic bottle couldnot hold. Most old orange trees therefore dried or suffered water stress whenever drought or high temperatures occurred.

Although faced with the harsh weather conditions, about 21% of fruit farmers were moderately concerned about climate variability, this applied mostly to those farmers who did not have strategies for managing the weather extremes. They believed that, the actual causes and origin of climate change were not known thus single actions by a few individuals could not cause much change in combating climate change. "*committing ourselves alone without engaging other persons in the world can never yield any positive results in managing extreme droughts and flooding, there is need for everyone to be engaged especially people from the developed world who contribute much to pollution and climate change*" stated one farmer in Kees village.

It is worth noting that many farmers were less educated and relatively poor, for that reason, they could not afford any alternative means to mitigate climate extremes. To others, climate variability in terms of excessive rainfall was seen as a relief especially during the second planting season which in the past associated with the challenges of inadequate rainfall, they could therefore engage in the growing of other crops for subsistence and other benefits. Furthermore, about 2% of the farmers were not concerned about the negative effects of climate variability on their fruit trees. They believe these are works of nature that are not permanent, because in due time, the situation would normalize and farmers would be able to earn normally from their orchards. Generally, increased awareness among farmers on how to cope-up with the negative impacts of climate variability greatly influenced their behavior and willingness to mitigate climate variability.

Adaptation practices applied by citrus farmers to minimise climate variability
Fruit farmers used various strategies and practices to adapt to the variability of climatic conditions especially in times of drought and high temperatures. About 21% of the citrus fruit farmers did something to adapt to climate variability while 79% could not afford alternative adaptation strategies to minimize climate variability. Farmers used water retention technologies like mulching and drip irrigation as to adapt to water stress (Plate 2).

Plate 2: A farmer demonstrating the use of perforated plastic bottle for drip irrigation

Generally, the most common practices used by some farmers to minimize negative effects of water shortages included; diversification of agriculture, swamp/wetlands restoration (conservation), afforestation and reforestation, soil conservation, rainwater management and growing of fast maturing crops among others (figure 7).
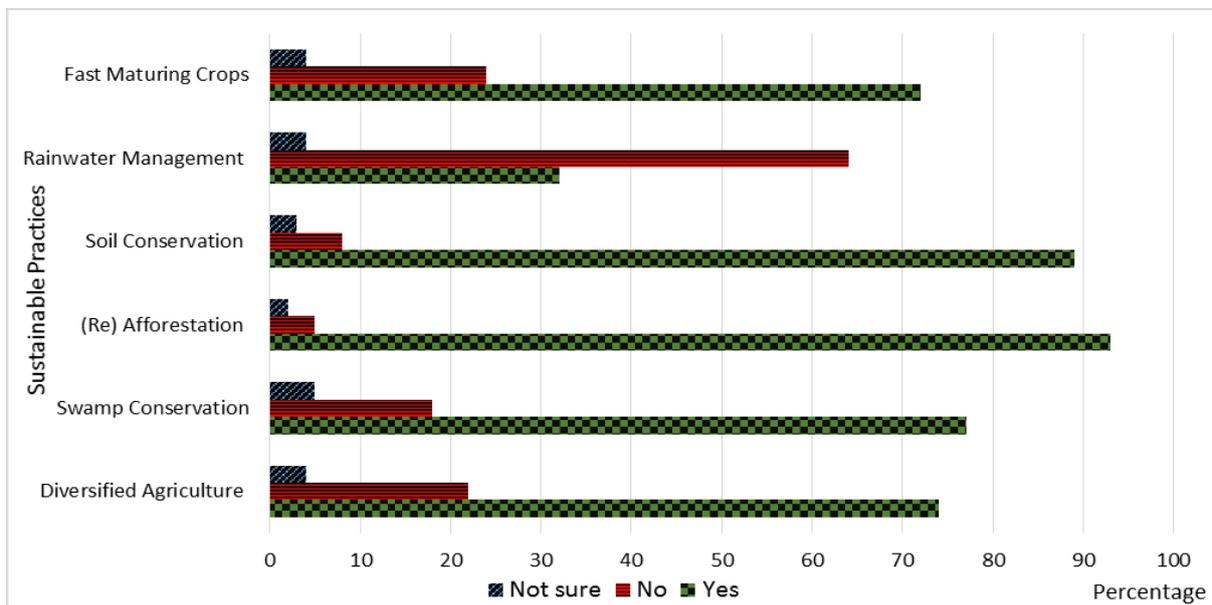

Figure 7. Adaptation practices and strategies applied by citrus farmers to minimise climate variability

Discussion

Demographics

Male farmers were more engaged in citrus fruit growing as compared to female farmers; this may be attributed to the cultural practices of land inheritance where land is passed-on from one generation to another following patrilineal male lineage. The boys who get land inheritance rights therefore may easily involve themselves in fruit tree growing as compared to their female counterparts.

Similarly, the young were less involved in fruit tree growing probably due to cultural limitations as well in that decisions on the use of family land is mostly determined by parents, thus even if youth and females had interest in growing orange trees they could not due to the above reasons. A bigger proportion of farmers earned less than 500 dollars in a year, therefore they could not invest in technologies that were capital intensive to address the challenges of climate variability. Results of the focused group discussions indicated that besides engaging in formal employment, most households headed by educated persons were engaged in commercial and some intensive farming because they had some money to invest in technologies and strategies to adapt to climate variability. It is therefore possible that the low annual incomes among many farmers is as a result of low education levels since such farmers could not benefit from formal employment and also take long to internalize and or adapt to any new changes..

Variation in rainfall and surface temperature in Ngora District over a period of 30 Years
The study affirmed that surface temperature and rainfall distribution and amount had varied in Ngora District during the three decades of this study. This was furthers supported by the district agriculture and production report which indicated that the variability of weather had contributed to a drop in the yield of orange fruits from about 90% in the in 2015 to below 54% in 2016. Similarly a study in Ethiopia also indicated that 58% of farmers had observed changes in climate over the past 20 years. This had led to loses in terms of decreased yields, it was also regarded as the major cause of increasing poverty (Habtemariam *et al.*, 2016; Tessema, Aweke, & Endris, 2013). It is thus worth commenting that climate variability is one of the leading causes of poverty among the people of Ngora district and Uganda at. This because most of the local farmers depend on farming which is rain-fed in nature and cannot withstand extreme weather conditions.

Farmers' Knowledge, Attitude and Practices (KAP) towards climate variability
More than 90% of the farmers were aware of the meaning climate variability, this finding coincides with what most scholars discovered that most people world over were aware of what climate change means (Muller & Shackleton, 2013; Sacchettini & Calliera, 2017). Despite the higher levels of awareness, some farmers still believe that the current weather variations were natural and cyclic in nature and they had little or no control over it. It is important to note that such respondents were from born again Christian (Pentecostal) households who believed that, the droughts or floods experienced could have resulted from God's anger emanating from unrepentant behavior of human beings (Mike Hulme, 2009; Takyi & Addai, 2002). They believed that farmers could overcome the current weather challenges through praying to God for forgiveness. Such farmers stated that the current humans had sinned against God in many ways and the current climate change and other disasters were warnings were fruits of sins committed by the fore-fathers and the current humans, they were also sign of the end times.

Adaptation practices and strategies applied by citrus farmers to minimise climate variability
The response of farmers to the challenges of climate variability is manifested by the myriad of adaptation practices such as: diversification of agriculture through growing of fast maturing crops, restoration and conservation of wetland resources, afforestation and reforestation, soil conservation and rainwater management among others as the major adaptation practices. Such practices have also been adopted by farmers in other parts of the world (Habtemariam *et al.*, 2016; Tessema *et al.*, 2013, Bryan *et al.*, 2013). Although there is an elaborate range of such practices, planting short season varieties, crop diversification were considered as very useful short term adaptation strategies (Biazin & Sterk, 2013; Tambo, 2016); and growing of draught resistant crop varieties were highly recommended (Li *et al.*, 2015; Okonya *et al.*, 2013) .This is because some of the coping strategies are not very feasible and practicable because they require high investment costs (Bamutaze and Mutenyo, 2011; Elum *et al.*, 2017). Most of the farmers could not afford better adaptation strategies since they are at the base of the economic pyramid (Mapfumo *et al.*, 2013; Muller & Shackleton, 2013). It is advisable that the local governments and other development partners

consider such expensive ventures in order to support citrus fruit growing in Ngora district as a means of alleviating poverty and promoting socioeconomic development among farmers.

Conclusions and Recommendations

This study confirmed that climate variability had taken place in Ngora district and mainly manifested itself in form of variations rainfall distribution and amounts. The highest rainfall 1686 mm was received in 1991 and the lowest rainfall amounts of 785mm was experienced in 2009. The annual average surface temperatures ranged between 23.8ºC and 25.7ºC. However, a lover surface temperature of 24ºC was experienced in 1989, 1985 and 1994 respectively.

Some citrus farmers had adapted to climate variability through application of drip irrigation especially for younger orange trees, others harvested rain water and grew fast maturing and drought tolerant crops. Farmers requested governments and other development partners to support them through establishment of irrigation facilities and ensuring that flowing water reaches out to all the farmers in the landscape, this would minimize loses and ensure bumper harvests which would lead to socioeconomic emancipation.

The study recommends that, as a short term measure, citrus farmers should be mobilized to work in groups to harvest rain water through digging of trenches and holes to collect water during the rainy season this water would be used to irrigate orchards during the dry season. Working in groups a tradition practice in the study area it is therefore easy to mobilise farmers and help them in a short run to cope up with the challenges of climate change. To mitigate the increasing rate of erratic rainfall patterns and droughts, Ngora district local government in partnership with line government ministries and other development partners should invest on modern irrigation technologies to harvest water and benefit citrus farmers so that they are able to produce even in times of extreme weather conditions as exacerbated by climate variability. In the mid and long term, there is need to strengthen the climate early warning systems to regularly and on a timely basis provide farmers with relevant information on current weather to support farming.

Availability of data and materials
All data generated and analysed during this study are included in this published article.

References

Bamutaze, A., & Mutenyo, I. (2011). Promotion of appropriate technologies in water and sanitation using the village model concept: The case of Kikandwa village, Mukono district, Uganda. In *6th Rural Water Supply Network Forum* (pp. 1–7). Retrieved from http://atc.mwe.go.ug/wp-content/uploads/2019/09/Model_village-baseline. pdf

Belarmain, S., & Sanchez, A. C. (2015). Local perceptions of climate change and its impacts on indigenous fruit trees, Water, adaptation and Sustainability in Benin. In D. & E. L.-G. Stucker (Ed.), *Adaptation to Climate Change through Water Resources Management. Capacity, Equity and Sustainabilty* (p. 425). New York, NY.

Biazin, B., & Sterk, G. (2013). Drought vulnerability drives land-use and land cover changes in the Rift Valley dry lands of Ethiopia. *Agriculture, Ecosystems & Environment*, 164, 100–113. https://doi.org/10.1016/j.agee.2012.09.012

Bryan, E., Ringler, C., Okoba, B., Koo, J., Herrero, M., & Silvestri, S. (2013). Can agriculture support climate change adaptation, greenhouse gas mitigation and rural livelihoods? insights from Kenya. *Climatic Change*, 118(2). https://doi.org/10.1007/s10584-012-0640-0

Bryan, E., Ringler, C., Okoba, B., Roncoli, C., Silvestri, S., & Herrero, M. (2013). Adapting agriculture to climate change in Kenya: Household strategies and determinants. *Journal of Environmental Management*, 114, 26–35. https://doi.org/10.1016/j.jenvman.2012.10.036

Elum, Z. A., Modise, D. M., & Marr, A. (2017). Farmer's perception of climate change and responsive strategies in three selected provinces of South Africa. *Climate Risk Management*, 16. https://doi.org/10.1016/j.crm.2016.11.001

Gbetibouo, G. A. (2009). *Understanding Farmers' Perceptions and Adaptations to Climate Change and Variability: The Case of the Limpopo Basin, South Africa*. IFPRI Discussion Paper 00849, (February), 52. https://doi.org/10.1068/a312017

Habtemariam, L. T., Gandorfer, M., Kassa, G. A., & Heissenhuber, A. (2016). Factors Influencing Smallholder Farmers' Climate Change Perceptions: A Study from Farmers in Ethiopia. *Environmental Management,* 58(2). https://doi.org/10.1007/s00267-016-0708-0

Juana, J. S., Kahaka, Z., & Okurut, F. N. (2013). Farmers' Perceptions and Adaptations to Climate Change in Sub-Sahara Africa: A Synthesis of Empirical Studies and Implications for Public Policy in African Agriculture. *Journal of Agricultural Science* (1916-9752), 5(4), 121–135. https://doi.org/10.5539/jas.v5n4p121

Kotir, J. H. (2011). Climate change and variability in Sub-Saharan Africa: A review of current and future trends and impacts on agriculture and food security. *Environment, Development and Sustainability*, 13(3), 587–605. https://doi.org/10.1007/s10668-010-9278-0

Lane, R., & McNaught, R. (2009). Building gendered approaches to adaptation in the Pacific. *Gender & Development*, 17(1), 67–80. https://doi.org/10.1080/13552070802696920

Li, S., An, P. L., Pan, Z. H., Wang, F. T., Li, X. M., & Liu, Y. (2015). Farmers' initiative on adaptation to climate change in the Northern Agro-pastoral Ecotone. *International Journal of Disaster Risk Reduction*, 12. https://doi.org/10.1016/j.ijdrr.2015.02.002

Mapfumo, P., Adjei-Nsiah, S., Mtambanengwe, F., Chikowo, R., & Giller, K. E. (2013). Participatory action research (PAR) as an entry point for supporting climate change adaptation by smallholder farmers in Africa. *Environmental Development*, 5(1). https://doi.org/10.1016/j.envdev.2012.11.001

Mike Hulme. (2009). *Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity*. New York: Cambridge University Press.

Muller, C., & Shackleton, S. E. (2013). Perceptions of climate change and barriers to adaptation amongst commonage and commercial livestock farmers in the semi-arid Eastern Cape Karoo. African *Journal of Range & Forage Science*, 31(1). https://doi.org/10.2989/10220119.2013.845606

Okonya, J. S., Syndikus, K., & Kroschel, J. (2013). Farmers' Perception of and Coping Strategies to Climate Change: Evidence From Six Agro-Ecological Zones of Uganda. *Journal of Agricultural Science*, 5(8), 252–263. https://doi.org/10.5539/jas.v5n8p252

Osbahr, H., Dorward, P., Stern, R., & Cooper, S. (2011). Supporting agricltural innovation in Ugnada to respond to climate risk: linking climate change and variability with farmer perceptions. *Expl Agric.*, 47, 24. https://doi.org/10.1017/S0014479710000785

Sacchettini, G., & Calliera, M. (2017). Link practical-oriented research and education: New training tools for a sustainable use of plant protection products. S*cience of The Total Environment*, 579, 972–977. https://doi.org/10.1016/j.scitotenv.2016.10.166

Shikuku, K. M., Winowiecki, L., Twyman, J., Eitzinger, A., Perez, J. G., Mwongera, C., & Läderach, P. (2017). Smallholder farmers' attitudes and determinants of adaptation to climate risks in East Africa. *Climate Risk Management*, 16. https://doi.org/10.1016/j.crm.2017.03.001

Takyi, B. K., & Addai, I. (2002). Religious Affiliation, Marital Processes and Women's Educational Attainment in a Developing Society. *Sociology of Religion*, 63(2), 177. https://doi.org/10.2307/3712564

Tambo, J. A. (2016). Adaptation and resilience to climate change and variability in north-east Ghana. *International Journal of Disaster Risk Reduction*. https://doi.org/10.1016/j.ijdrr.2016.04.005

Tessema, Y. A., Aweke, C. S., & Endris, G. S. (2013). Understanding the process of adaptation to climate change by small-holder farmers: the case of east Hararghe Zone, Ethiopia. *Agricultural and Food Economics*, 1(1). https://doi.org/10.1186/2193-7532-1-13

Trumper, K., Ravilious, C., & Dickson, B. (2008). *Carbon in Drylands: Desertification, Climate Change and Carbon Finance. A UNEP-UNDP-UNCCD Technical Note for Discussions at CRIC 7, Istanbul, Turkey - 03-14 November.*

Developing metacognition in pre-primary childhood education in Nigeria and Uganda

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ABSTRACT

Education is a process designed to develop skills and attitudes in learners, among these skills is metacognition. Societies have faulted educational institutions on its inability to produce graduates who can reason and decide rationally, this had prompted the search by scholars to resolve this challenge. This paper examined metacognition as a concept and how teachers can develop this skill in learners especially, those in the pre-school classes in Nigeria and Uganda. Metacognition is the ability to reflect on issues and personally take decisions that are rational and result in beneficial actions. The paper discussed various methods and theories of imparting this skill in early childhood learners which include the play-way, dramatisation and story-telling methods of teaching while the theories of learning considered include the Stimulus-Response and Cognitive theories. Models of learning like the Reggio Emilia and Friedrich Froebel's were enumerated as means by which the skill can be imparted. The paper concluded that the skill is indispensable if the process of education is to produce graduates competent in critical thinking and logical reasoning. It recommended that professionals should be employed to handle children's education, conducive environment be provided, while young learners should be encouraged to carry out independent actions with supervision from teachers.

Keywords: Metacognition, Methods of teaching, Theories of learning, Models of learning, Education

Introduction

Education involves activities of teaching and learning intended to build learners in critical thinking and logical reasoning so as to be able to take rational decisions and be responsible for their actions according to the philosophers like Jean Paul Sartre and Simeon de Beauvoir. The need for critical thinking has become necessary due to incidences of wrong decision taking resulting in negative consequences. Societies had criticised such attitudes in learners and graduates of educational institutions particularly, in Africa and especially, in Nigeria and Uganda, this therefore necessitated the search for how to build learners to become rational in decision making and actions. This is believed can be achieved by the educational process through development and acquisition of certain skills and attitudes which include metacognition in young learners.

The norms, beliefs, values, attitudes and traditions of societies are usually passed from one generation to another through impartation of knowledge in children for holistic development. For this to be successfully achieved, there is the need for educational process to among several other things, develop various domains of learning which include the affective, psychomotor and cognitive domains in learners right from their childhood stage. Cognitive domain of learning involves the development of mental skills through acquired knowledge. Knowledge is simply an awareness or understanding of skills, facts or objects obtained through various sources which can include experience, reason, memory, inquiry and practice. It is considered as the ability to recall facts and/or information. The cognitive domain deals with the intellectual aspect of learning and comprises of six categories which are; knowledge, comprehension, application, analysis, synthesis and evaluation commonly referred to as the Bloom's Taxonomy. The goal of using the Bloom's taxonomy is to encourage higher-order thinking in students, and it is simply the classification system used to define and distinguish different levels of human cognition which are thinking, learning and understanding (https://fctl. ucf.edu>blooms-taxonomy). Cognitive skills are therefore expected from learners as they undergo educational process. These skills are required to be demonstrated by each learner independently, in other words, little or no interference is expected in the exercise of these skills by learners. This necessitated metacognitive skills in learners which can help them in personal rational decisions and actions. When metacognition is developed in learners right from the tender age, it is expected to build the socially desired individuals capable of critical thinking and logical reasoning as they grow. Hence, this study intends to find out how metacognition, a concept that is pertinent for the achievement of holistic development of the child and the goals of education in general, can be developed in learners right from the elementary school age. The holistic development of young learners will involve their social, emotional and intellectual development. This in essence is what childhood education entails; education of the child during the formative years.

Education in Nigeria and Uganda

The system of education in several pre-independent African countries was an offshoot of the colonial administration. It fell short of expectations after independence in many of the colonised of which Nigeria and Uganda are part. The discovery of an education system working in consonance with the desires of western colonisers but to the detriment of host societies ignited the need for a change. Nigeria took a bold step through the 1969 Curriculum Conference to prompt emergence of a new educational system. Uganda came very much later to provide a road map for another educational system which took effect in 1997.

Nigeria and Uganda realised the need for increased enrolment of citizens to learn therefore, the idea of Universal Primary Education (U.P.E.) was raised and nurtured to provide the needed impetus for a successful take off of larger participation and enrolment of population in the process of education of the two countries. Both Nigeria and Uganda desired a long term policy goal of providing quality education that will be able to equip learners with the skills required to promote good economy and engender good political administration as well as atmosphere in their societies. This desire led to the massive investment in education by both countries. According to Nigeria's National Policy on Education (2013) and the World Education News Reviews (2020), the strategic plans led to the awareness of the gap and inadequacies in the systems of education which provided an expanded role for the process of education as a means for the survival and development of both countries economically, socially and politically.

For these to be achieved, the need for the development of the educational process became imperative in order to build the full capacities and potentials of human resource as well as the development of competent work force to acquire the skills relevant to the world of work and social relationships, necessary for the 21st century. Therefore, the goal of providing the child with various mental skills and knowledge to contribute to social development of their societies became necessary in both Nigeria and Uganda. Thus, the child is to be trained and imparted such that the young learner can develop manipulative skills that can ensure his/her effective and meaningful participation in the society. These has made both countries to have great similarities which prompted the consideration of the concept of metacognition in pre-primary childhood learners in the countries.

The Concept of Metacognition

There are several concepts connected and related to the process of education. Among these related concepts is metacognition. Metacognition is a combination of two words; 'meta' and 'cognition'. 'Meta' is a word that connotes self-referential, it symbolises personal efforts or influences in actions or decision making. 'Cognition' on the other hand is the process of knowing or understanding through the sense or thought. Therefore, metacognition can be explained as the self or personal development of the act of knowing or understanding by personal reflection on things or issues. Flavel (1987) defines metacognition as a regulatory system that includes knowledge, experiences or regulation, goals, and strategies. This implies that the concept involves the ability to apply one's sense to utilise acquired knowledge in handling issues or resolving problems without any influence from another person/individual or external body. According to Dawson (2008) metacognitive regulation/experiences are conscious cognitive or affective experiences that concern any aspect of an intellectual undertaking. That is, it is a self-regulatory activity of cognition as well as learning experiences through a set of activities that help people control their learning (Adeyemo and Ayeni, 2016). In other words, learners become responsible for what they learn and the application of the knowledge they acquired. Therefore, self-regulation in metacognition will enable the use of cognitive processes that activate and sustain thoughts, behaviours and affects in order to attain goals according to Schunk and Zimmerman (1997) in Adeyemo and Ayeni (2016). Thus, the skill of self-regulation will involve valuing learning and its resultant or anticipated outcomes. From all these, it can be deduced that metacognition, in relation to this discourse, can be considered as the skill required to make learners process acquired/imparted knowledge in ways that will make education worth its while and achieve its objectives as well as make recipients of knowledge apply such knowledge rationally and positively with limited influence from external bodies/individuals through critical thinking and logical reasoning.

Concept of Child Development

Child development entails the process by which a child changes over time. It covers the period of childhood to the period when a child becomes fully independent. It is the period of physical, cognitive, and social growth that begins at birth and continues through early childhood (Dance-Schissel, 2015). Basically, there are three broad stages of child development; the early childhood, middle childhood and adolescence. However, the definitions of these concepts are organised around the primary tasks of development in each stage though, the boundaries are malleable. Jean Jacque Rousseau identified four (4) stages of education as stated in his book Emile, through which the child can be educated and developed. The stages are; Infancy stage (ages 1-5 years), Childhood stage (5-12 years), Boyhood stage (12-15 years) and Manhood stage (15-20 years). On the other hand, Jean Piaget identified the Sensori-motor stage (0-2 years), Preoperational stage

(2-7 years), Concrete operational stage (7-11 years) and Formal operational stage (11-adulthood). For the purpose of this study, the Childhood stage in the basic three (3) broad stages, that is, the Infancy stage in Rousseau, and the Sensori-motor as well as Preoperational stages in Piaget shall be taken into consideration. This is because the stages covered ages 0-7 years which is considered as the childhood stage. This stage requires childhood education which is the education given to a child during formative years, this is to ensure holistic development of the child intellectually, socially, emotionally and physically which are considered to be inter-dependent and related to one another. Therefore, how the childhood education can be used to develop metacognition using the selected stages above shall be the focus of the next section of this paper.

Developing Metacognition through Childhood Education

Generally, childhood education entails different strategies or methods of teaching as well as learning theories to impart knowledge and skills in young learners, these strategies include the play-way, storytelling, songs and rhymes, simulation and game, field trip and dramatisation methods among several others, while the learning theories comprise the Stimulus-Response (S-R) theory as well as the Cognitive theory.

Play as a concept in early childhood care and development is considered as one of the primary needs of a child which is crucial to his/her growth and development. This is because it is through play that children learn many things about the world around them (Adejobi, 2005) and performs significant roles in the physical, social, emotional, linguistic and cognitive development of the child. Play can be considered as the spontaneous actions and reactions of children to people and things that appeal to them in their environment. The play-way method is the strategy by which caregivers/early childhood educators engage leaners in educative play activities while in the school to acquire knowledge and skills. Children are made to learn by playing with different materials and items which often involve both the gross and fine motor skill activities (Adejobi, 2005).

Thus, when a child encounters issues or things of interests, he/she begins to engage in activities that encourage exploration and derive some fun in it. When young learners explore their environment through the issues or things they encounter, their cognition is developed. This method is necessary since learners at the childhood stage love to play therefore, what appeals to them most are employed to impart knowledge.

Applying the Stimulus-Response (S-R) learning theory, this theory promotes learning as a result of the association between the stimuli and responses. Metacognition can be developed in young learners using the play-way method of teaching and the S-R learning theory when children are exposed and allowed to engage in play activities which are otherwise known as learning experiences (the stimulus). Reactions are expected from them, this can either be negative or positive (the response). Learning is the relatively permanent change in behaviour of learners as a result of learning experiences according to the psychologists. When the teacher sees that a child responds/reacts brilliantly and intelligently to a play activity, such can be reinforced and strengthened by rewards as many times as the child repeats the brilliant or intelligent actions. The positive reactions are often associated with critical thinking and logical reasoning which the child can display continually as circumstances demand. Therefore, when the child repeats the good actions/ attitudes several times independently, the rewards will strengthen the positive actions/attitudes. This will help the young leaner to develop the special skill of metacognition because he/she can continually reason and personally reflect on things, situations or issues at hand to take rational decisions and actions. This is why it is always encouraged that pre-school learners are allowed to carry out activities or do things on

their own in an enriched environment under the supervision of the teacher/care-giver. Cognitive theory of learning on the other hand stresses latent learning, and places learning as involving experimentation, exploratory, perception and cognition theoretically (Adejobi, 2005). This theory can develop metacognition in young learners when the play-way method of teaching is employed in a rich environment where children are stimulated cognitively through their interactions with the play activities and allowed to observe, explore and discover knowledge independently. The positive cognition is developed when learners are motivated to exercise the same and similar cognitions via independent decision making just as it obtains in the S-R theory. Children love listening to stories. Some stories can keep the listeners in suspense, this is capable of arousing curiosity in the child which can lead him/her to develop interest and subsequently aid his/her learning. Thus, the story as a stimulus, can encourage certain responses from the learners, which if they are positive and socially desired, can be rewarded to encourage repetition of such responses. Such method of teaching can be used to impart good moral attitudes, values, beliefs and good relationship, so that when learners found themselves in similar situations, they can apply the knowledge independently thereby utilising metacognition as a skill. The cognitive theory of learning will ensure what can be termed interpretation of sensory information received through the story heard which goes a long way in developing metacognition in learners. The stories they listened to can be ruminated on and enable the young learners take similar positive responses and actions that earned accolades and rewards from their teachers in the past. In similar situations in the future, the child can make references to such past experiences and choose decisions and actions that are rational.

Songs and rhymes as a method of teaching can be used to teach different concepts that are important in educating the young ones. These concepts are deep with meanings which can be used to teach values and beliefs. Reactions to understanding of lessons from songs, rhymes and folklores can be reinforced through rewards or punishments as the case may be to encourage or discourage similar actions subsequently. All these are possible through the cognition of the child.

Dramatisation is another method or strategy of childhood education can be used to develop metacognition in learners. Dramatic plays whereby young learners imitate or mimic role models and display their roles is capable of building little children in repeating similar acts when faced with real life situations. They are capable of doing this by their enquiry minds and acts of independent decision making at the appropriate times by their ability to learn from what others do. This enables the young ones to be rationally dynamic and constructive in their thinking and decision making process. In other words, sense of value and commitment to display of skills and attitudes are entrenched in them. Dramatisation method provides children with opportunities to freely express themselves as they play the roles of other people for example, personalities in the society. Creativity is encouraged as children act spontaneously thereby reacting and revealing emotions to people and situations. As the children mature, recall of such actions, emotions and reactions are easily made because the method of teaching develops the power of imagination and can shape their characters.

These teaching strategies are however, best employed and complemented by different models in early childhood care and development. Among these models are the Reggio Emilia model, which embraces a community-based approach to teaching and learning (Sulaiman, 2019). It relies on the natural development of the child which lays emphasis on the worth of the individual, responsibility and community education. Constructivism forms the basis of this model.

With this model, all the sense organs in children are involved in the process of learning, this enables them to discover truth that is, knowledge by themselves. The model also emphasised social skills like cooperation, team spirit and collaboration.

Friedrich Froebel's model lays premium on play which according to him drives learning. His curriculum made prominent the use of blocks for mental development which in essence promotes fine motor skills in little children. As an idealist, he believed that education should be able to draw out powers of development and aid the unfolding of inner potentialities in children. Sulaiman (2019) identified features common to all these models; they all strive to develop the whole child and placing emphasis on play as well as self-directed learning activities.

The various models identified environment as important in the development of a child therefore, the adequate and friendly environment provided will assist the child to personally construct knowledge thereby developing the sense of the child for instance, in the area of independent imagination and memory. In developing metacognition among young learners the following studies become handy among others. Ukwueze, (2014) Onu, Eskay, Igbo, Obiyo and Agbo (2012), carried out a study on effect of training in mathematics metacognitive strategy on fractional achievement of Nigerian School children. The result of the study showed that training in mathematics metacognitive strategy improved pupils' achievement in fractional mathematics. The study also revealed a significant gender difference in the achievement of pupils in fractional mathematics. The study recommended that training in mathematics metacognitive strategy should be introduced in preparation of teachers in order to remedy the prevalent mathematics fear and failure in Nigeria. Ekwueze (2014), examined counselling for epistemological beliefs and metacognitive awareness: a psychological innovation for transforming students' study behaviours in Nigerian secondary schools. At the end of the paper, the author posited that students need to be aware of metacognitive process in order to be useful to themselves in the area of knowledge acquisition and that the students need self-denial, habit cultivation, self-directed, problem solving, explicit instruction and mentoring strategies of counselling in order to achieve.

Lewis (2018), investigated the development of young children's metacognition through the use of stimulated reflective dialogue. This involves using a video clip as a scaffold for dialogue. The children decided who and what to film and which aspects to discuss about. They worked in pairs, on how to use the video camera. The children watched and made one short video of children in their class doing 'good thinking' and discussed it with their teacher, talking about why they thought it was a good example. This promoted their own thinking – in the justification of decisions. The result of the investigation showed that children's understanding of thinking changed over time. By the end of the study, children were able to describe 'good thinkers' with more reference to strategy and understanding. This implies that the metacognition of children improved. Rizqi and Fauzi (2017) investigated the development of materials based on metacognitive approach to improve mathematical reasoning ability and emotional intelligence students of SMP Sabilina Tembung. The research objectives include: describing the validity, praticallity and effectiveness of metacognitive approach-based materials to improve students' math reasoning skill and emotional intelligence; to improve students' math reasoning skill through developing materials; and improve students' emotional intelligence through developing materials. Modification of 4-D development model was utilised in order to achieve the above mentioned objectives. Four phases were involved in the execution of the programme which are; defining,

designing, developing, and disseminating. Children who participated in the experiment were in grade VIII-7 and VIII-8 comprising 37 children of Private Junior High School SMP Sabilina Tembung. The findings of the study showed that after experiment I and II, the validity of material was valid based on the experts and there was a significant improvement of students' math reasoning skill and there was also a significant improvement of students' emotional intelligence by using metacognitive approach among others. The implication of the above underscores the importance and necessity of application of metacognition among young learners.

Conclusion

The skill of metacognition in learner is indispensable if education process would realise its goals. Lack of metacognitive skills in learners had led to the denigration of educational institutions globally and had resulted in difficulty of learners to engage in critical and logical reasoning to take rational decisions and actions. The skill of metacognition is best developed in learners from the childhood stage hence, the need for study on how this can be achieved. The various methods of teaching and theories of learning are pertinent in this endeavour therefore; it is needful for early childhood educators and caregivers to be knowledgeable in these methods and theories. The need for logical, critical reasoning and rational decision making is highly imperative for learners to fulfil aspirations, goals and objectives of the educational sector in every society. This can be achieved as teachers encourage development of the power, attitude and skill of metacognition in learners through the teaching/learning interactions at every stage and level of education most importantly, at the early childhood education stage.

Recommendations

It can therefore, be recommended that professional early childhood educators and caregivers are employed to handle the education of little children at such tender age because it is a critical stage where the basis of what the child will become is established. Friendly and conducive environment that can encourage or promote exploration and exercise of cognitive skills are provided in the process teaching the young learners. Learners should be encouraged to act and take decisions independently when interacting with learning materials. This will enable the attitude of self-reflection and independent decision making. Adequate preparation by pre-school owners and supervision as well as supervision of such institutions before approval for operations and admitting pupils are ensured by the responsible government bodies and agencies are ensured.

References

Adejobi, A. (2005). *Philosophical foundation of early childhood education*. Nigeria: Sanpan, Abeokuta.

Ayeni,J. O. (2014). *Effects of metacognitive strategy and achievement motivation training on dissertation efficacy and anxiety among doctoral students in southwestern nigerian universities* (Doctoral dissertation, University of Ibadan). Retrieved from http://ir.library.ui.edu.ng/handle/123456789/162

Dance-Schissel, D. (2015). *What is child development? Definition, theories and stage*s. Retrieved from https:/study.com/academy/lesson/what-is-child-development-definition-theories-stages.html

Dawson, T. L. (2008). *Metacognition and Learning in Adulthood*. Massachusetts: Developmental Testing Service, Northampton.

Federal Republic of Nigeria (2013). *National policy on education 6th Ed*. Nigerian Educational Research and Development Council (NERDC). Available http://wbgfiles.worldbank.org/documents/hdn/ed/saber/supporting_doc/AFR/Nigeria/TCH/National%20Policy%20on%20Education.pdf

Flavel, J. H. (1987). Speculations about the nature and development of metacognition. In F. Weiner and R. Kluwe. (Eds.), *Metacognition, motivation, and understanding* (pp21-29). Hillsdale, NJ: Lawrence Erlbaum Associates.

Island, V. (2014). Counselling for Epistemological Beliefs and Metacognitive Awareness: A Psychological Innovation for Transforming Students' Study Behaviours in Nigerian Secondary Schools. *Journal of Resourcefulness and Distinction*, 9(1).

Lewis, H. (2019). Supporting the development of young children's metacognition through the use of video-stimulated reflective dialogue. *Early Child Development and Care*, 189(11), 1842-1858.

Onu V. C., Eskay M., Igbo J. N., Obiyo N., Agbo O.(2012). Effect of training in mathematics metacognitive strategy on fractional achievement of Nigerian School children. *US-China Education Review*, 3, 316-325.

Rizqi, N. R. and Fauzi, K. M. (2017). Development of materials based on metacognitive approach to improve mathematical reasoning ability and emotional intelligence students of SMP Sabilina Tembung. J*ournal of Education and Practice*. Vol. 8 (30) 116-123.

Al-Balushi, S. M., & Martin-Hansen, L. (2019). The development of students' justifications for their positions regarding two theoretical models: Electron cloud or sodium chloride crystal—After engaging in different learning activities. *Journal of Research in Science Teaching*, 56(8), 1011-1036.

Schunk, D. H., & Zimmerman, B. J. (1997). Social origins of self-regulatory competence. *Educational psychologist*, 32(4), 195-208.

Mentorship and supervision in Ugandan higher education institutions universities: challenges and prospects

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ABSTRACT

The paper examined the current status of Mentorship and Supervision in Ugandan higher education institutions and universities and considered the ideal model of Mentorship and Supervision for a typical higher education institution and university. The paper then depicted the importance of Mentorship as one way of fostering effective and efficient service delivery at higher education institutions and universities. The ideal higher education institution or university should facilitate personal and professional development enabling individuals and groups to achieve their full potential. Mentoring is a dynamic way of facilitating such development. The higher education institution or university formally requires all its faculties to make arrangements for the mentoring of its newly appointed staff and newly admitted students. Mentoring at a higher education institution or university entails long time passing on of support, guidance and advice. The underlying factor in mentoring in the work place is that the more experienced colleague uses their greater knowledge and understanding of the work or workplace to support the development of a more junior or inexperienced member of staff. The Mentoring and Supervision discussed in this paper has been considered through the three strands of the mandate of the higher education institution which are: teaching, research and community service. Data concerning Mentorship and Supervision was obtained from a meta- analysis of documents such as reports, journals, articles and books concerning Mentorship in the Ugandan higher education institutions and universities. The overall mean score for the influence was 2.5 which indicates a low influence of mentorship and supervision on the career. The paper underscored the status of Mentorship and Supervision at the Ugandan higher education institutions and universities as low. Lastly, pointed out the challenges faced in mentoring staff and students and charted the way forward in the mentoring process at Ugandan higher education institutions and universities. Therefore, the study recommends that supervisors-supervisees relationships be improved to achieve higher graduate study completion rates.

Keywords: Mentorship, Supervision, Universities, Higher Education Institutions, Challenges, Prospects

Introduction

The paramount role of Mentoring and Supervision cannot be over emphasized around the world. The duo cannot be separated from each other and it has been embedded in our daily life activities. It also emanated from socialization processes of human life. Mentoring and supervision moderate human attitude, behaviour and career life of every human being.

The University as an institution that signify the citadel of learning has rules and regulations that streamline its teaching, learning, research, and community services. This paper is written optimistically, with the goal of motivating academics, where possible, to become active in supervising research candidates and to encourage budding research supervisors to become mentors. Academics assuming the mentoring and supervision role should be trusted and valued advisors, with integrity, taking a step beyond simply directing people and activities, which is the common definition of supervision. They should add value to the mentee and supervisee career life improvement and not nagging on supervisee that the supervisor is a king. The mentors and supervisors do not wish to see mentees and supervisees in their houses, want them to buy tea for them, do not wish to receive telephone calls in the morning and actions test the mentees' patience by use of abusive language.

Background

Over the past decade, in the academic profession, research was carried out predominantly by determined field practitioners and teaching staff members with little or no research training. The situation is improving, including greatly improved research funding opportunities (Murphy, et. al, 2008). For decades, authors from within the academic profession have called for the development of formally trained researchers in different fields to consolidate the past problem in mentoring and supervision (Haldeman, et. al,2002). One factor in this change is that as new pedagogical methods of teaching institutions around the world are being created within existing universities, the opportunities for research training and mentorship are increasing. However, even among calls for more research funding and the development of a research culture, little is seen in the literature about integrative research with universities or about training Masters, PhD for the future, although there are few exceptions towards this goal.

Literature Search Methods and Strategy Used

The researchers developed literature review methods that included: inclusion and exclusion criteria to identify potentially relevant articles, search strategies to retrieve articles and review of theses and dissertations that provided data on Mentorship and Supervision at the public universities of Makerere, Kyambogo, Mbarara and Gulu in Uganda.

Database Used

Data were obtained from meta-analysis of documents such as reports, journals, articles and books concerning mentorship and supervision.

Inclusion /Exclusion Criteria

To be considered an article that provided evidence regarding the status of Mentorship and Supervision, the authors focused mainly on the oldest and biggest universities in the country; Makerere University, Kyambogo University, Gulu University and Mbarara University of Science and Technology(MUST) and left out the younger and private universities since they would not provide as much data as Makerere University and other public universities would.

Methods of Evaluating the Output of the Meta-Analysis

The independent variables were mentorship and supervision while the dependent variable was career development of both students and academic staff in higher education / universities. Data were obtained

from meta-analysis of documents such as reports, journals, articles and books concerning mentorship and supervision.

Statistical Analysis

Data were analyzed using descriptive statistics (mean score analysis) for each variable and thereafter, the overall mean score was got to determine the influence of mentorship and supervision on the career development of both students and academic staff in higher education / universities. The overall mean score for the influence was 2.5 which indicates a low influence of mentorship and supervision on the career. The implication is that more efforts need to be put on the mentorship and supervision among Universities' staff and students as a way of guiding new academic staff and newly admitted students. Similarly, supervisors-supervisees relationships need to be improved to achieve higher graduate study completion rates.

Situation on Ground

From the perspective of a typical graduate student, lack of supervision, isolation in work environment, the supervisee being treated as a slave, over assumption on the part of supervisor by implying to the supervisee that they are a god, using appeal for pity method to exploit the supervisee and monetary demand factors are significant barriers to completion to study (Wright and Cochrane, 2000). Understanding good graduate degree supervision practices, including appropriate matching of supervisors with candidates, the benefits of a hands-on approach, and guidance with constructive criticism and encouragement, will help more students attain graduate degrees timely.

Understanding the Nitty-Gritty in Mentoring and Supervision

Faculty members are expected to produce research in most universities, and supervising, mentoring can help boost one's scholarship portfolio (Kyambogo University Student Brochure, 2019). However, candidates may not be requesting supervision for the best reasons and potential supervisors may need to be selective. Bettman (2009), observes that although research is driven by data, choosing a research topic and mentor are almost completely based on opinion. Knowledge of a candidate's capabilities and personality are important. A supervisor should meet with a candidate face-to-face, or if supervising long distance, via video conference to discuss the candidate's previous work as well as career goals.

Understanding a candidate's career goals will help guide a supervisor's decision, as well as the candidate's best options along the way (Hill and Walsh, 2010). For instance, if a potential candidate ultimately would like a career in government, making health policy decisions, then a supervisor with experience only in academia or industry may not be the best match. Sometimes, however, co-supervision can be a viable option if a specialist's knowledge area matches the candidate's project well. This raises the point that all parties should understand everyone's role from the outset. There may be several people involved, including supervisors with different strengths, members of a research team and research assistants. Full and clear communication about the makeup and function of everyone involved in a graduate degree candidacy may help avoid confusion, wasted time and anxiety. A good supervisor should carefully explain all this to a candidate and it has been noted that formalization of this process is advantageous.

A supervisor may encourage a strong undergraduate to continue on an academic track as one of his or her candidates, or occasionally an organization may take the initiative. It has been found that access to

experienced researchers is important to a candidate's success (Ismail et. al., 2011). This creates the dilemma of newly credentialed PhDs having difficulty gaining experience, and experience is a major criterion for good supervision. This problem may be overcome with co-supervision. Co-supervision has myriad advantages (James and Baldwin, 2006). It involves the blending of individual strengths. For instance, a particular supervisor may be a good writer, and another may have a record of obtaining grants. Or one supervisor may have great technical strengths and another may be exceptional at inter-personal communication, facilitating the acquisition of the technical skills by the candidate. In one of the author's own experience as a current graduate degree candidate, two official supervisors with credentials in the broad field of study are required by the university. For advice specific to the chosen topic, he also contacted 2 international experts in the topic and asked if they would be happy to give their advice periodically over the course of the candidacy. They assented, and the author refers to them as "specialist content advisors." With new methods of electronic communication, distance supervision can be just as effective as local guidance. Some institutions maintain a database of potential supervisors with varied degrees of experience and interests to help connect candidates with appropriate supervisors.

Creating a Conducive Environment for Mentoring and Supervision

Candidates can be devastated by a negative word at the wrong time, so supervisors should always be constructive with criticism. They should make positive statements about a candidate's work when appropriate (Rowarth and Cornforth, 2005).Candidates should be encouraged to write early and often, a habit associated with a higher completion rate (Sinclair, 2004). Since the end product of a graduate degree is a sizeable piece of writing, and good writing takes practice, it is beneficial for the candidate to engage the writing process early. It is sometimes helpful for the candidate to try to obtain some early victories; sometimes papers, such as a literature reviews, can be derived from components of the overall process. Publications along the way are rewards; an acceptance to a prestigious (or, indeed, nearly any) journal is a real boost to motivation.

Supervising a graduate degree candidate is a long-term relationship and life will intrude. Candidates and supervisors alike may get married, have deaths in the family, or experience other events that can delay or derail the process. Supervisors should be aware of this and make sure that candidates are aware, too. Again, they should allow flexibility to deal with these issues (Rowarth and Cornforth, 2005).If difficulties of any kind arise, supervisors should give advice on how the candidate may receive assistance. Supervisors may, for instance, advise on how to suspend studies in the event of life difficulties, how to approach a journal editor who is not timely with responses, or even which is the best coffee shop in town to sit for hours editing a paper.

It should be noted here that just following these suggestions is not sufficient for good research mentoring. It is rather an enhancement of a process that will include many other factors, such as having sufficient facilities to properly support candidates, having sufficient finances in place or experience with obtaining research grants, holding a degree that is at least at the level of that which the candidate is working toward, or being part of a supervisory team in which at least some members hold that degree.

The Ideal Mentoring Process at Ugandan Higher Education Institutions

Mentoring and supervision is a welcome ideal situation all over the world, because individual grow up from different families that monitor in development process of everyone. As mentoring is already defined, it is

a long standing form of training, learning and development and increasing important tool for supporting personal development. Mentoring is a widespread development tool in organizations and institutions such as universities .Anyone can be a mentor if they have something to pass on and the skills, time and commitment to do it (Cutterbuck, 2004). This, in the case of the university implies that colleagues can mentor each other at the teaching, research and community service conducted by the university as its core functions. The senior colleague at a university, be he/she a Professor, Senior Lecturer, Lecturer, Assistant Lecturer Senior Administrator, could be a mentor or mentee depending on the particular area of mentorship.

The researchers therefore argue that one can be mentored a colleague much younger in chronological age. Mentoring at university entails long time passing on of support, guidance and advice. The underlying factor in mentoring in the work place is that the more experienced colleague uses their greater knowledge and understanding of the work or workplace to support the development of a more junior or inexperienced member of staff.

In other words, mentorship at the university is a form of apprenticeship whereby the inexperienced learner learns the tricks of trade from an experienced colleague, backed up as in modern apprenticeship by off-site training. Mentoring at the university should be of benefit to the individual first but resulting to immense benefits to the institution (Cutterbuck, 2004).

The following are the characteristics of mentoring at the university:
i)It should essentially be a supportive form of development
ii) It should focus on assisting the employee to manage their career and improve their skills
iii) Personal issues can be discussed more productively unlike in coaching where the focus is on performance at work
iv)It should have both personal and university goals
The university benefits from mentoring in the following ways:
i) Has a significant impact upon recruitment and retention
ii) Provides effective succession planning
iii) Makes the University adapt to change
iv) Increases productivity through better engagement and job satisfaction.

The Ideal Supervision Process at Ugandan Higher Education Institutions

Supervision is a way of stimulating, guiding, refreshing, encouraging and overseeing a certain group with the hope of seeking their cooperation in order for the supervisors to be successful in their task of supervision (Ogusanju, 1983). It is essentially the practice of monitoring the performance of university staff, noting the merit and demerits and using befitting and amicable techniques to ameliorate the flaws while still improving on the merits thereby increasing the standard of schools and achieving university goals. The term supervision is derived from word "Super video" meaning to oversee (Adepoju,1998). It is an interaction between at least two persons for the improvement of an activity. It is also a combination or integration of processes, procedures and conditions that are consciously designed to advance the work effectiveness of individuals and group. Adepoju (1998) defines school supervision as the process of bringing about improvement in instruction by working with people who are working with pupils.It has also been described as a process of stimulating growth and a means of helping teachers to achieve excellence in teaching. Supervision in the

university therefore is a vital process and combination of activities which is concerned with the teaching and improvement of the teaching in the university framework.

Basic Principles of Supervision at Ugandan Higher Education Institutions

Recently, the one of the authors was afforded the opportunity to more closely consider practices of graduate research supervision and reflect on them in comparison to his own experiences as a graduate degree candidate and as a research supervisor.

The principles run as follows:

I.   Healthy Atmosphere

The environment should be made free of tension and emotional stress. The atmosphere should be given incentives for work.

II.   Staff Orientation

The quality and quantity of the work must be specified in clean clear terms. Staff should be made to understand clearly what is or not expected of them. New staff must be given   the necessary orientation. They should have a schedule to know where to get information and materials to help them perform the work satisfactorily well(Onasanya, 2009).

III.   Guidance and Staff Training

Staff should be offered necessary guidance. They should be guided on how to carry out the assignment, standard should be set by the supervisor while information should be given ruling out the possibility of rumours. Information should be for everybody and specific to individuals assigned to a particular task. Techniques of how to do it must be given at all times. The university must always arrange and participate in staff training (ibid).

IV.   Immediate Recognition of Good Work

 Good work should be recognized. This implies that the acknowledgement of any good work done must be immediate and made public to others which will then serve as incentive to others. Incentive of merit, recommendation for promotion and such actions improve performance. (ibid).

V.   Constructive Criticisms

 Poor work done should be constructively criticized. Advice and personal relationship should be given to the affected staff. It needs be stated here that such criticisms should be made private and with mind free of bias (ibid).

VI.   Opportunity for Improvement

 University staff should be given opportunity to prove their worth and for aspiring higher. They should therefore be allowed to use their initiatives in performing their jobs and taking decision .It will give them the motivation to work much harder (ibid).

VII.   Motivation and Encouragement

 Staff should be motivated and encouraged to work to increase their productivity. They should be encouraged to improve their ability to achieve university goals. (ibid)

Current Status of Mentorship at Ugandan Higher Education Institutions

In Uganda Universities, the level of mentorship is very low. Part of the reason is that the staff to mentor and to be mentored are really thin on the ground. This means that the senior staff are inadequate and over-stretched to the extent that even if they wished to mentor anybody, there is simply no time to do so. On the

other hand, there are very few who staff of junior cadre to mentor that is if they are willing to be mentored. In fact, it appears to the authors that the concept of mentorship at the majorities of Ugandan Universities are either ignored or not understood by a majority of the way they would be mentors. In some cases, the mentee is better qualified academically and older than they would be mentor who is his/her superior so there is no mentorship that takes place. There is also clearly no willingness of the mentor to do their job and that of the mentee to be mentored. At the Ugandan most of the universities, recruitment of staff at the various levels has not been done to fill the university staff structure so many gaps exist at the level of Professor, Associate Professor, Senior Lecturer, Lecturer etc. Even at the biggest and oldest university in the country; Makerere University, only about 60% of the academic positions are filled. This means that mentorship cannot effectively occur.

Challenges in Mentoring and Supervision at Ugandan Higher Education Institutions
The following challenges in mentoring and supervision:

I. Poor remuneration of lecturers, most of them are not on the government payroll and are employed on part-time basis
II. Insufficient staffing/shortage of supervisors
III. Weak supervisors who are not on the ground or fear to report incompetent staff, or have a laissez fare attitude to their supervision role
IV. Lack of adequate facilities, materials and resources for the supervisors of teaching staff to work with e.g. vehicles, whiteboards, projectors, e.g laptops, internet connectivity and projectors offices and teaching space etc.
V. Poor time management even by the supervisors which does not provide a good example to the supervisees
VI. Weak evaluation systems-the Quality Assurance Units are understaffed and only make occasional visits to the faculties
VII. Poor funding of the supervision units making it impossible to analyse information gathered during staff supervision. Most Quality Assurance Units in Ugandan universities are limping financially.
VIII. Negative attitude to supervision and supervisors by teaching and non-teaching staff.
IX. Poor record keeping at the department and faculty levels.

Conclusion

There are many challenges to completing a graduate degree. From an institutional perspective, readers are encouraged to consider embarking on a graduate research degree or to take on candidates to supervise. Individuals are encouraged to attend inter-professional conferences and cross-disciplinary meetings to learn the language and practices of researchers. Private chiropractic teaching institutions are encouraged to form links with other tertiary institutions that have similar research interests.

This commentary is not meant to be a comprehensive treatment of all aspects of research supervision and mentoring, but rather a summary of the salient points the authors took away from a recent reflection exercise on the topic. Interested parties who would like more in-depth knowledge are invited to read the papers referenced as well as many others that are not included here. It is hoped that the issues dealt with in this paper act as a stimulus for consideration and conversation. This does not mark the end of the discussion but just the beginning because of the importance of the topic.

References

Adepoju. T.L (1998). *Fundamental of school administration, planning and supervision in Nigeria*. Ibadan; Alafas Nigeria at Company.

Bettmann. M. (2009). Choosing a research project and a research mentor. *Circulation,* 119:1832–1835.

Clutterbuck, D. (2004) *Everyone needs a mentor: fostering talent in your organisation 4th ed.* London: Chartered Institute of Personnel and Development.

Haldeman. S, Meeker WC, Mootz.R.D. (2002). The state of chiropractic research. Top Clin Chiropr. 9(1):1–13.

Hill, G.W and Walsh S.P. (2010). Graduate research capabilities: a new agenda for research supervisors. *Aust J Career Dev*, 19:78–80.

Ismail, A., Abiddin, N. Z., & Hassan, A. (2011). Improving the Development of Postgraduates' Research and Supervision. *International Education Studie*s, 4(1), 78-89.

James, R., & Baldwin, G. (2006). *Eleven practices of effective postgraduate research supervisors*. Centre for the Study of Higher Education and the School of Graduate Studies, University of Melbourne.

Murphy. D, Schneider. M, Seaman.D, Perle S, Nelson. C. (2008). How can chiropractic become a respected mainstream profession? The example of podiatry. *Chiropr Osteopat*, 16:10.

Ogunsaju. S. (1983) *Educational Supervision perfectives and practice in Nigeria*. Ile-Ife: Obafemi Awolowo University Press.

Onasanya, S. A. (2006). The Concept and Practices of Supervision/inspection in kwara state public primary schools. *Journal of Education*, 4, 40-55.

Rowarth .J, Cornforth. I. (2005). A fluid model for supervision. In Green P. (ed). *Supervising Postgraduate Research: Contexts and Processes, Theories and Practices*. Melbourne, Australia: RMIT University Press; pp. 154–162. In. ed.

Sinclair. M.(2004). *The Pedagogy of "Good" PhD Supervision: A National Cross-Disciplinary Investigation of PhD Supervision*. Canberra, Australia: Central Queensland University.

Wright.T, Cochrane R.(2000). Factors influencing successful submission of PhD theses. *Stud High Educ*. 2000;25:181–195.