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Full Length Research Paper

Gendered patterns of labour-force participation and productivity in tourism and hotel sectors in Arusha and Moshi urban areas, Tanzania

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This study examines the position of gendered labour participation in influencing gendered productivity within the hotel and tourism sectors of the Tanzanian economy. The study aims to identify and analyse the extent to which gendered labour participation influences productivity of some selected firms in Tanzania. Drawing on a survey of hotels and tour operators in Arusha and Moshi, this study took a holistic approach to analyzing gendered labour-force participation and existing productivity and understanding factors constraining the development of these sectors. A survey research design was used to get both primary and secondary data. A mixed research methodology was used. The study sample was determined using Fisher's et al formula for small populations of below 10,000 characters yielding to a sample size of 106 respondents. The Linear probability regression Model was used to measure the likelihood of gendered labour-force participation in influencing firm productivity. Linear probability regression results showed that education, age, wages, employment status, and segregation of the labour market are the most potent predictors of productivity. Results did not find support for the commonly held belief that marital status, experience, tenure, region and sector influence productivity. From a public policy perspective, the results suggest that policies focusing solely on addressing structural features of the labour market may prove unsuccessful in bridging the gendered labour participation if they are not accompanied by policies on increasing the productivity-related endowments of women.

Key words: Gendered, labour-force, productivity, labour-market, discrimination, Tanzania.

INTRODUCTION

Labour force participation is the prime indication of the extent to which people participate in the economic activities of society. However, a closer examination of the subject-matter reveals that gender variances in productivity and earnings are systematic and persistent.

Whether in agriculture or off the farm, among those self-employed or in wage employment, women exhibit lower average productivity and earn lower wages than men. These variances have been documented in both developed and developing countries, and although they

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have declined over time (primarily as a result of the reduction in the education gap), they remain substantial.

A number of empirical papers have examined low and declining female labour force participation in Africa, with many focusing on the role of educational attainment (Mammen and Paxson, 2008). Klasen and Pieters (2012) found that for urban Indian women, participation in the workforce at lower education levels is dictated by economic necessity, and there is a pull factor brought into play for highly-educated women getting into the workforce. Bhalla and Kaur (2011) on the other hand found that the education level of the spouse has a larger negative effect (each extra year of male education means a drop in female participation of 1% point) than the positive effect on participation of increasing female education.

The labour-force participation rate changes by education level for both males and females, with participation rates falling overall as education level increases. Despite the advances in female educational attainment and the expansion of the market economy, however, female labour force participation rates are still low in comparison to the rates of their male counterparts and thus the gender gap ((Ntuli, 2010; Serumaga-Zake and Kotze, 2004). This gender gap is more apparent in developing countries and less to the economically developed countries. The literature records the prevalence of discrimination against females in the labour market and workplace. Gender-based discrimination in wages and legal protections in employment occurs frequently. For instance, young women receive lower incomes where they are employed, and often confront hostile conditions in seeking employment and within the workplace (LO/FTF Council, 2016). In Tanzania, females form a larger share of the working age population, but a smaller share of the economically active population. Moreover, the drop off with rising education level is greater for females than males such that 67.1% of females with university education are economically active compared to 83.2% of university-educated males (Idris, 2018). Expounding more on the gender gap, a study on female leadership in Britain reports that “a female working full-time earns just 82% of her male colleague’s salary; a fee that for a part-time female worker sinks to 60%; as a consequence, the pay gap costs a woman with average qualifications about £250,000 during her lifetime” (Hejase et al., 2013:30).

In Browne (2013) study of sex differentials on wages, an annual difference of \$5,000 for full-time employed males and females was calculated from a 2012 working conditions survey. Browne adjusted the difference in pay by excluding those under the age of 22 and over 64, the self-employed, persons without a steady job, and professionals. He also adjusted or modified for differences in annual hours worked, fringe benefits, absenteeism, seniority, education, and unionization. The income difference was reduced to \$2,550 or 51% of the original

difference. Browne attributed this large residual to the concentration of women in lower paying jobs.

The Madden (2012) study of professional workers established male-female wage differentials that ranged from 0.48 to 0.51 for the years 1994, 1995, and 1996. Adjustment for differences in schooling and experience yielded residual differentials varying between 37 to 49% of the original wage differentials. For one of the years the unexplained residual was reduced to only 3% of the original wage difference by adjusting for differences in schooling, experience, job level, critical area of study, and publications. This clearly indicates that unequal pay for equal work is not a significant source of discrimination. The problem of discrimination is anchored on the assignment of job levels. The Madden’s study found that 53% of the male-female difference in job levels could not be explained by differences in personal characteristics.

The choices of females about whether and where to work may be constrained. In the case of Morocco, with a female labour force participation rate of 28% for young women (ages 15–24), many young women lack agency in deciding whether and when they work: over one-third do not work primarily because their husbands or parents will not allow them, and another third are constrained by social norms or related domestic responsibilities (World Bank, 2013). In Mozambique and Tanzania, some husbands and fathers actively prevent women from working in jobs where they would interact with other men (Oya, 2010).

The literature further identifies constraints that arise at different life stages. In spite of the fact that women’s labour-force participation is high in many sub-Saharan African countries, most of the work is for upkeep and is confined to farming and household enterprises. Gender earnings gaps persist and are largely explained by differences in human capital variables, such as education, training, and experience. The patterns that foster low labour force participation, earnings gaps, and occupational segregation begin early in life and accumulate over time. If girls marry early and drop out of school, they will have a harder time catching up to their male counterparts in adulthood, even with increased access to capital or progressive labour regulations. If social norms and educational streaming limit girls’ opportunities and aspirations to become engineers, doctors, or business executives early in life, then the female talent pool for these occupations will automatically be smaller in the next generation of workers.

The working age population (defined as 15-64 years old) in 2014 comprised 25.8 million people, or around 57% of the total population of around 45 million Tanzania. Taking into account of the working age population, males constitute 48% and females 52% (NBS, 2014). Defined as the number of people in the labour force given as a percentage of the working age population, the labour-force participation rate in 2014 for males increased to

89.4% whilst for females it rose to 84.2% (NBS, 2014). In all areas, labour-force participation rates are much higher for males than females, but the gender gap is narrowest in rural areas and widest in urban areas.

Translated into percentage distribution of total employees by Industry, age group and sex, it is seen clearly that Accommodation and food service activities where hotels and tour services belong have a share of 3.0 for male and 2.6 for female adults aged 36 years and above while other industries like agriculture constitute 4.5 and 2.3 for males and females of the same age category respectively. This pattern is also observed in other industries like mining and quarrying, construction, transportation and storage and others (NBS, 2014).

The Tanzanian labour market displays several striking features: low rates of female labour force participation; considerable variance in rates of female labour force participation across Tanzanian regions; and a large share of both women and men working in the informal sector. The informal and private sectors in Tanzania have been growing rapidly. Possible reasons for this are the fast-growing nature of the informal and private sector, including sharp falls in incomes and jobs in the formal economy, economic liberalization, the privatization of state service provision, and labour market deregulation. What is observed is that given the unequal access to resources among women and men, participation in the informal labour market is segregated. The proportion of men engaged in the private and informal sector as paid employees is twice that of women (Lokina et al., 2016). Figures for people employed in decision-making and management roles in government, large enterprises and institutions reveal a very big gender gap: the share of males in senior and middle management occupations is 82.6% compared to just 17.4% for females (Idris, 2018)

Gender inequality in the world of work has been stubbornly persistent across multiple dimensions, despite relatively large gains in recent decades in women's health and education (World Bank, 2008). Pervasive and persistent gender differences remain in productivity and earnings across the Hotels, Catering and Tourism (HCT) industry. Indeed, many women around this industry appear to be caught in a productivity trap—one that imposes significant costs on women's welfare and economic empowerment today and serious disincentives to invest in the women of tomorrow.

Women's labour force participation has stagnated around 56 percent, and actually fell by one percentage point since 1990. Women remain heavily concentrated into lower-paying jobs. Occupational segregation is enduring, as are wage gaps. This lack of progress in economic opportunities is puzzling. Low use of women's potential resulting from gender gaps in labour force participation can pose sizeable drags on aggregate productivity.

Focusing on the fact that reducing gendered occupational segregation can help drive productivity, this

study sought to examine female labour force participation rate in the hotel and tour operator industry in Tanzania using a case study of Arusha and Moshi hotels and tour operators. Specifically, the study sought to assess the effect of male-female characteristics (age, education, marital status) on labour force participation and also to assess the statistical data with respect to gender roles and gender equality in the hotel and tour operator sector, specifically with reference to pay, opportunity and status.

Overall this study analyzes the labour-force participation patterns of men and women employees in the Arusha and Moshi hotels and tour operators industry in Tanzania and strives to explain the determinants of gender differences in employment outcomes. The study attempts to establish whether gender differences in employment rates are due to factors related to human capital differences between men and women and/or individual endowments. Understanding the sources of gender differences in labour market outcomes in the hotel and tour operators industry is particularly important given the fact that the question of gender equality and women empowerment is a point of discussion in Tanzania and Africa in general.

To achieve the above stated objectives, this study had three hypotheses to be tested. These were (i) more women's education is associated with a decline in women's labour-force productivity up to secondary education, with a slight uptick for post-secondary education (ii) women's extensive family responsibilities militate against their participation in the formal labour (iii) there is no wage discrimination and differences in productivity between men and women in the labour market.

THEORETICAL FRAMEWORK

The neo-classical theory views occupational segmentation in the labour market as an extension of the biological division of labour. Men have greater access to specialized skills due to their early entry into the labour market. Marginal differences in the initial skill levels get compounded and would result in the segregation of women and their marginalization towards non-specialized and unskilled jobs. Using the neo-classical framework, the human capital hypothesis has come up to explain labour market discrimination. It consists of an overcrowding hypothesis and a human capital hypothesis. Fawcett (1918) who was the first advocate of the overcrowding hypothesis argued that women overcrowd in unskilled jobs which leads to low wages and poor working conditions in these jobs. He found that trade unions' rules, employees' rules, their attributes and prejudices and social customs deny skilled jobs to women resulting in their overcrowding in unskilled occupations and consequently pulling down of their general wage levels. The human capital hypothesis on

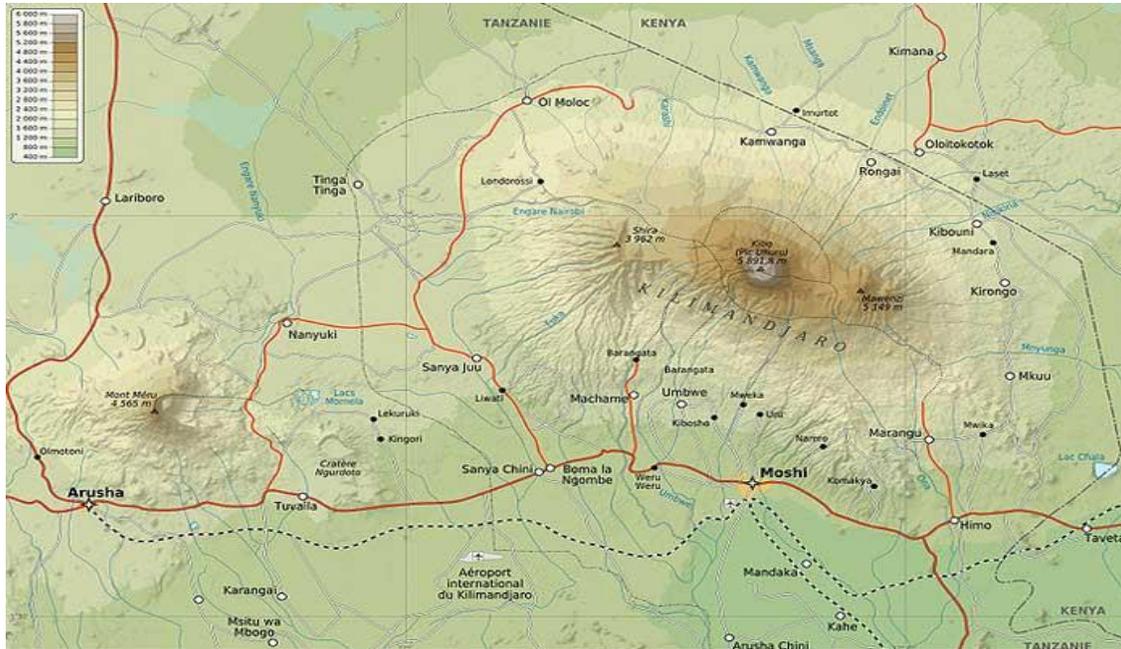


Figure 1. Map showing location of Arusha and Moshi urban areas.
Source: Prinster ME, (2017:5).

the other hand argues that differences in wages and segregation in jobs are largely due to differences in the human capital content of male and female jobs reflected in differences in productivity. The theory assumes that as women's prior commitment is to the home and because of long hours of work at home, women are usually seen as less committed to work outside home and hence are less paid than men. Following the neo-classical framework of supply and demand, Fawcett (1918) and Edgeworth (1922), put forth the theory that women earn less than men because their relative needs are less since they have fewer dependents. The 'new home economics' assumes that, the historical division of labour, between men and women, has resulted in creating a comparative advantage for men in market activities and women in household activities. Sexual division of labour within the household assumes man to be the 'bread winner' and woman's work is rated as secondary or subsidiary. Thus, though women are burdened with double roles, combining domestic unpaid work with paid work outside home, they are relegated to non-skilled and non-specialized jobs in which experience, skills and efficiency requirements are less and so payments are also low.

MATERIALS AND METHODS

Study area

This study was conducted in Arusha and Moshi urban areas in northern Tanzania. It concentrated on selected 6 tour operators and 8 tourist hotels located in these urban areas.

Demographic profile of Arusha and Moshi urban areas

The city of Arusha is located on the slopes of Mount Meru in northern Tanzania and functions as the regional headquarter of the administrative region of Arusha (Figure 1). In 2010, Arusha Municipality was upgraded to a city, expanding its boundaries and thus increasing its area from 93 to 208 km² (Wenbansmith, 2014). The city of Arusha is the largest commercial centre in northern Tanzania. Arusha city functions as a gateway and transit point for the Northern Safari Circuit, including Serengeti National Park, Ngorongoro Conservation Area and Lake Manyara National Park. In 2012, the population of Arusha City was 416,442. The males were 199,524 while the females constituted 216,918. The intercensal annual population growth rate was 2.24% compared to the national population growth rate of approximately 2.7% per year (NBS, 2013; Ambroz, 2014) which indicates that a sizeable share of Arusha's growth can be attributed to in-migration.

On the other hand, Moshi Municipality is found in Kilimanjaro region in the northern part of Tanzania on the slopes of Mount Kilimanjaro. According to the Tanzania population census of 2012, Moshi municipality had a population of 184,292 whereby 89,174 were males and 95,118 were females with area coverage of 58 square kilometres (NBS 2013; Ambroz, 2014). The female population, in both urban centres, was higher (52%) compared to the male population (48%) as shown in Figure 2. The sex ratio for both urban centres was 92. Based on the 2012 Tanzania Population and Housing Census, it was necessary to update the data with the help of the exponential population projection formula. The advantage of this formula is that it assumes the population changes instantaneously and continuously.

$$P_t = P_0 e^{rt}$$

Where,

P_t = Present estimated population (2020)

P_0 = Last observed population (2012)

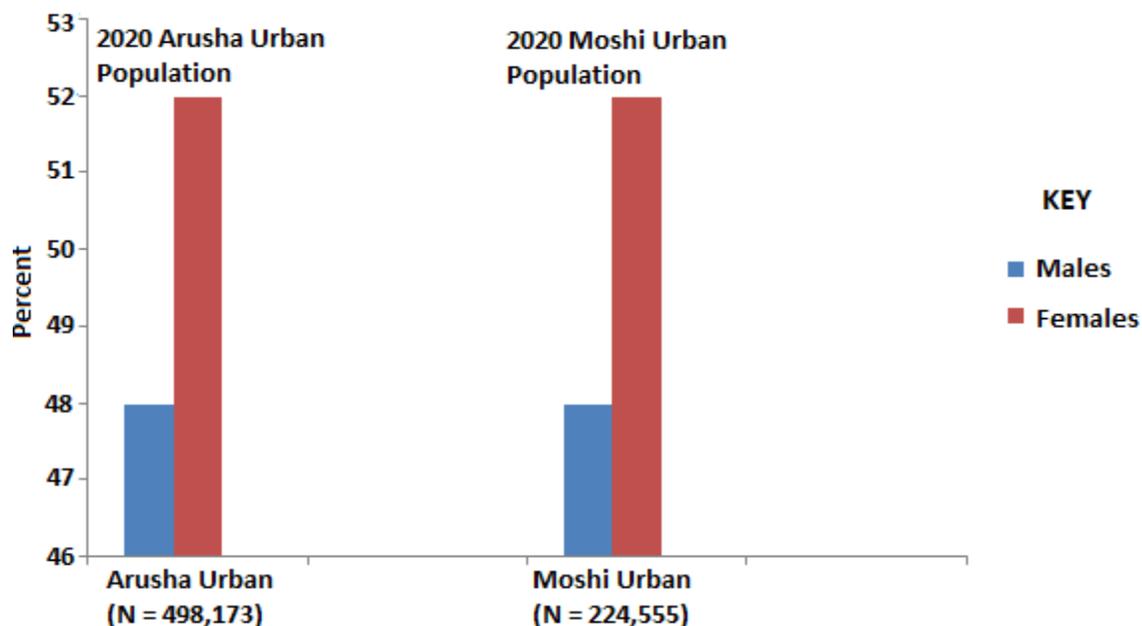


Figure 2. Population for Arusha and Moshi urban centres.
 Source: Calculated by the author from NBS (2013). 2012 Tanzania Population and Housing Census General Report

e = base of the natural logarithms with the value of 2.71828.
 r = average annual growth rate (in percent) between the intercensal period
 t = elapsed time in years from the year 2012

The updated population figures for Arusha city and Moshi Municipality as at the year 2020 are 498,173 and 224, 555 respectively.

Generally, Arusha City is sparsely populated compared to Moshi Urban. The population density of Arusha City, as per the 2012 Population and Housing Census, was 1560 persons per km² (Area: 267 km²) while that of Moshi Urban was 2907 persons per km² (Area: 63 km²). The 2012 population and Housing Census report also presents considerable proportions (32% in Arusha City and 17% in Moshi Urban) as self-employed in non-agricultural activities (NBS, 2013). In both urban areas, unskilled manual labour was the leading occupation among women (38%) and skilled manual labour was the leading occupation among men (34%). This is indicative that more than 70% of the populations in both urban centres were engaged in an economic activity of their own (NBS, 2014).

Study design

The study used a comparative cross-sectional survey design to analyse gendered productivity in the tourism, hotel and agriculture sectors in Tanzania. The empirical tests were performed by comparing sub-samples of male and female employees to each other and across urban areas.

Study population

All managers, line managers and labourers working in the aforementioned tourism and hotel firms were included in the study. The respondents were categorized into two groups. The first category of respondents came from 6 tourism institutions under

Tanzania Association of Tour Operators (TATO), the firms included Kilislope Tours and Safaris, World Tours and Safaris, Tomodachi Tours and Safaris, Seven Wonders Tours, Kiliholidays Tours and Safaris and Kiliholidays Tours and Safaris all based in Arusha City. The second category included respondents under the Hotel Association of Tanzania (HAT). Specifically, they were drawn from Mount Meru Hotel, The African Tulip Hotel, Kibo Palace Hotel, Arusha Planet Hotel, Naura Springs Hotel, and Four Points by Sheraton Hotel all based in Arusha City. Hotels picked from Moshi Municipality included Ameg Hotel and Kiliwonders Hotel. There were 8 hotels altogether. The respondents were categorized based on the criteria for standardization provided by the Ministry of Natural Resources in Tanzania (MNRT, 2007). The total population for the study was below 10,000.

Sampling design and sample size determination

The study employed purposive sampling technique to identify and select eligible firms and participants for the study specifically the firm managers while the firm labourers were randomly selected from the target population. The sample size was initially determined using the standard scientific formula given by Fisher et al (1998). This formula is used to estimate the smallest possible categorical sample size when the target population of study area is above 10,000,

$$n = \frac{z^2 pq}{d^2}$$

n = the desired sample size (when the population is greater than 10,000)
 z = the standard normal deviate set at 1.96 which corresponds to the 95% confidence level
 p = the proportion in the target population estimated (.50)
 q = 1.0 – p

d = degree of accuracy desired set at 5%

$$n = \frac{(1.96)^2 (.50)(.50)}{(.05)^2}$$

= 384

To maintain the same measure of confidence (95%), Fisher et al. (1998) proposed the following formula for use when the N (the entire population) is less than 10,000

$$n_f = \frac{n}{1 + (\frac{n}{N})}$$

Where,

n_f = the desired sample size (when population is less than 10,000)
 n = the desired sample size (when the population is more than 10,000)

N = the estimate of the population size.

Since the n was found to be 384 and the population size of tea farm, hotel and tour operator workers was estimated at 128 then n_f would be calculated as follows:

$$n_f = \frac{384}{1 + (\frac{384}{128})}$$

$$= \frac{384}{4}$$

= 96

Given that a non-response margin of 10% would be allowed, then

$$96 + (\frac{10}{100}) = 9.6$$

$$96 + 9.6 = 106$$

Thus, the sample size of this study was 106 individuals. For the purpose of this study, the sample size of 106 participants were categorized as follows: 18 top managers (17%) of the sample size, 18 representatives of workers unions (17%) of the sample size, and 70 labourers (66%) of the sample size in the hotels and tour operators. This gave a sample size of 106 participants from the target population in Arusha and Moshi hotels and tour operators. The units of analysis in this study were an individual and a firm. The units were subsequently classified into hotels and tour operators after which questionnaires were administered to the sampled respondents from tour operator offices and hotels in Arusha and Moshi urban centres. The instruments of investigation included a questionnaire, and in-depth interview schedule.

Data collection techniques and tools

The survey instrument included a set of questionnaires split into three categories. The first category of the questionnaires sought to collect information from employers, the second collected data from employees and the third gathered data from employees who are members of a workers' union at the work place. The questionnaires were administered to workers of each sampled firm on the proportion of 1 employer, 3 employees and 1 respondent to respond to the questionnaire for the workers' union per firm.

Interview topics included demographic information, type of firm, technical training and experience, employment trends, labour contract, wage, tenure, labour productivity, and capital productivity.

Validity and reliability

The reliability of the questionnaire was analysed using Cronbach's alpha. During the pilot the alpha for the questionnaire for employers was 0.905, employees had alpha of 0.837, and union representatives had 0.921. The aforementioned Internal Reliability assessed using the Cronbach's Alpha technique shows that all values fall in the range 0.8 - 0.9 labelled "Very Good". This indicates a very good strength of association and proves that the selection of the questions is suitable for the questionnaire purpose (Chehimi et al., 2019). The questionnaires were refined on the basis of the responses and the items which required revision were done to make them more meaningful before the actual collection of data. Validity is the degree to which results emanating from the analysis of the data actually represent the study phenomenon. The instruments were vetted in terms of how efficiently the samples signified certain aspects of the purpose of study. This was determined by the researcher in the field of study and during data analysis.

Data

The study used a probability regression model. The goal was to determine the effect of age, sex and level of education on one's probability of participating in the labour force. The study chose the linear probability regression model for estimation, as it was less biased than index model alternatives and is much easier to estimate. It was also chosen due to the nature of the outcome variable that is labour force productivity which is dichotomous. Since the dependent variable is discrete, using the linear probability model which is heteroskedastic may predict probability values that are outside the range of 0 and 1. To estimate this model, survey data for the hotels and tour operators of Arusha and Moshi cities were used.

The data series used in this study rely on answers to the questionnaire addressed to persons who were present during the survey interview. The current activity status (CAS) had 2 answer options:

1 - Employed, 2 - Unemployed, looking for a job.

For the purpose of this analysis, the population of this study was defined as the population with age between 15 and 65 years who reported one of the following categories of current status: Employed (EMP), Unemployed, looking for a job (UNE). The variable 'sex' was measured using the answers to Question 2 and included the options 1 for males and 2 for females. To derive the variable 'age' the 'date of Birth' (Question 4) in the questionnaire was used. The level of education was measured based on the answers to question 26 - highest level of education attained (HLE variable): 1 - Completed higher education, 2 - Completed post-secondary school studies, 3 - Completed secondary education, 4 - Completed primary education, 5 - Completed other studies (literacy courses).

For all the other variables defined in this study, indicators for Arusha and Moshi were calculated separately. In the following section, the variables that were used in the analysis are introduced. Using the current status variable, a dummy variable (ES) which takes the value of 1 for "employed", and 2 when occupational status was EMP or UNE was created. To estimate a person's level of education, the variable LE, which is defined based on the relationship $LE = 4/HLE$ and takes values between 0.8 and 4 was created. The goal of this recording was to reverse the scores

Table 1. Description of variables used in the probability regression model.

Employment status (ES)	This dummy variable takes the value 1 if the person declared his/her current activity status as “Employed” and 0 if the person responded “Unemployed” or “Seeking work”
Person’s age (AGE)	Age in years at the date of the interview
Highest Level of Education (HLE)	Highest level of education: 1-college/university, 2- High school. 3- Secondary school, 4-primary school. 5-other studies (literacy Classes) and 6-No schooling
HE	4/HLE
Sex	0- female, 1- male
Working hours (WKH)	0- less working hours, 1- more working hours
Experience	0-years of full-time work, 1- fresh from school
Tenure	0-years of experience with present employer, 1-without experience with present employer
Wage (WGE)	0- low wage, 1 – high wage
Segregation of the labour market (SEG)	0- there is segregation, 1- there is no segregation
Region (REG)	0- Arusha, 1- Moshi
Tenure (SEC)	0-Hotel, 1- Tour operator

Source: Gendered patterns of labour force participation Survey 2019.

associated with the 4 levels of formal education, so that the score reflects the highest level of qualification: each level of education (primary, secondary, high school, higher education) are given scores from 1 to 4 as they provide a specific set of competencies at national level; other studies such as literacy courses are given a 0.8 score. Although literacy courses provide learners useful competencies, they are not unitary at national level.

Table 1 lists the variables that were used in the model. The dependent variable in the model is labour-force productivity while age, highest level of education including technical training and experience, sex, working hours, wage, tenure, labour-force participation segregation of the labour market, stereotyping, region and sector constitute the independent variables. Educational attainment is of a particular interest for employment rates and participation in labour force in developing countries (United Nations Scientific and Cultural Organization, 2013). As a consequence, this paper also focuses on this variable. The paper offers a strong basis for further analysis at even more specific level (school unit level) from the point of view of interaction variables (gender-age, gender-working hours, gender-wage, gender-segregation of the labour market, gender-region, and gender-sector). It is very important to carry out such analysis at the lowest disaggregation level as possible, as employed people are very heterogeneous (O’Higgins, 2015).

Control variables

Male and female unemployment rates are used as control variables to capture additional productivity effects and the state of the labour market.

Model specification and estimation

In order to evaluate the extent to which a person’s age, sex, marital

status, and education level are related to participation in the labour-force, the study used the linear binary regression model. This model used employment status (ES) as the dependent variable and Age, Sex, HLE, Exp, Ten, working hours, wage, segregation of the labour market, region and sector as independent variables. The probability regression model is defined by the following equation:

$$p_i = p_i + \varepsilon_i \tag{1}$$

where: $P_i = P(ES = AGE, SEX, HLE, WKH, WGE, SEG, REG \text{ AND } SEC)$

is a function (linear or non-linear) of the independent variables and the error ε_i follows a normal distribution $N(0, \sigma^2)$. When the probability regression model is linear, is defined as follows:

$$P_i = a_0 + a_1 AGE_i + a_2 AGE_i^2 + a_3 SEX_i + a_4 HLE_i \dots = Xi^1 a \tag{2}$$

In this case the parameters of the model are estimated with the least squares method. As regards wage differentials among male and female employees in the hotels and tour operator sectors in Arusha and Moshi, it was necessary to have a different approach. To understand these wage differentials, it was necessary to decompose them by regressions. This study studied the dispersion with the help of a regression that takes the form:

$$Y_i = \beta_o + \sum_{j=1}^n \beta_j X_{ji} + u_i \tag{3}$$

where Y_i is the level or natural logarithm of earnings, income or wage rate and X_{1i}, \dots, X_{ni} are n observable characteristics used to explain Y. Since the interest is in comparing two demographic

Table 2. Descriptive statistics of employees in this study (n = 106).

Variable	Male		Female	
	Mean	SD	Mean	SD
No schooling	0.302	0.467	0.398	0.49
Literacy class	0.409	0.492	0.264	0.441
Primary school	0.136	0.342	0.127	0.334
Secondary school	0.037	0.189	0.026	0.161
High school	0.096	0.295	0.083	0.387
College/University	0.274	0.379	0.179	0.449
Age	34.826	16.083	32.221	14.007
Age Squared	14.714	13.464	12.341	10.877
Employed	0.457	0.498	0.374	0.484
Married	0.534	0.691	0.479	0.68
Number of children, 0-2 years old, a woman has	2.633	1.353	3.012	1.459
Working hours	2.357	1.366	0.279	0.449
Wages	0.204	0.403	0.279	0.449
Union membership	0.176	0.381	0.174	0.397
Tenure	0.174	0.379	0.117	0.322
Experience	0.887	0.316	0.102	0.304
Gender segregation of the labour market	0.147	0.354	0.132	0.339
Region of residence	0.821	0.322	0.636	0.373
Sector	0.773	0.342	0.562	0.361

Source: Gendered patterns of labour force participation Survey 2019.

groups (such as male and female employees), it makes sense to estimate an Equation 3 for each group:

$$Y_i^H = \beta_o^H + \sum_{j=1}^n \beta_j^H X_{ji}^H + u_i^H \quad (4)$$

$$Y_i^L = \beta_o^L + \sum_{j=1}^n \beta_j^L X_{ji}^L + u_i^L \quad (5)$$

Where, the H superscript indicates the high-wage group (always male employees in this study) and the L superscript indicates the low-wage group (female employees in this study). Given Equation 4 and 5, it is a simple matter to compute the portion of the differential explained by the regression:

$$\sum_j \beta_j^H \bar{x}_j^H - \sum_j \beta_j^L \bar{x}_j^L$$

and the amount which is captured by the shift coefficient. The latter is typically attributed to discrimination. The explained part of the differential comes from both differences in the coefficients, β_j^H and β_j^L and differences in the average characteristics, \bar{x}_j^H and \bar{x}_j^L . In particular:

$$\sum_i \beta_j^H \bar{x}_j^H - \sum_i \beta_j^L \bar{x}_j^L = \sum_j \beta_j^H (\bar{x}_j^H - \bar{x}_j^L) + \sum_j \bar{x}_j^L (\beta_j^H - \beta_j^L) \quad (6)$$

In this case, the first sum is "inferable to the endowments," while the second is "attributable to the coefficients. Blinder (1973) gives a thorough discussion of this methodology.

RESULTS

Table 2 reports the variables utilized in the analysis and the basic sample descriptive statistics (by sex and employment status). Personal characteristics include the level of education (specified by a series of dummy variables indicating the different levels of the highest educational attainment), age and its square, marital status and the number of children living in the household. Age is primarily used as a proxy or substitute to labour market experience though admittedly it also captures changes in employment outcomes over the life cycle. Furthermore, if employers discriminate against married women then marital status also affects labour demand.

The most important patterns arising from the male-female descriptive statistics presented in Table 2 are: Females in the sample have significantly lower levels of education than males. About 39.8(30.2%) of women (men) report no formal schooling. Likewise, about 12.7(13.6%) of women (men) have not completed their primary education. Almost 9.6% of males reported some post-secondary schooling compared to 8.3% of females; however, when one looks at the levels of education by sector of employment, the proportion of those reporting some post-secondary education, employed and receiving wages is much higher for males than females. In particular, 14.5% of females receiving wages have had some post-secondary education (compared to 20.4% of males). Employed women tend to be relatively younger

Table 3. Regression Coefficients in the Linear Probability Regression Model (n =106).

Dependent variable = 1 if in labour-force				
Variable	Females		Males	
	Arusha	Moshi	Arusha	Moshi
Constant	0.866* (0.536)	0.304* (0.140)	-0.669* (0.994)	0.622* (0.843)
Age	0.066* (0.232)	0.553* (0.200)	0.436* (0.907)	0.511* (0.892)
Age ²	-0.302* (0.287)	-0.316* (0.024)	-0.573* (0.246)	0.523* (0.256)
Sex	0.088* (0.685)	0.088* (0.752)	0.232* (0.8136)	0.231* (0.811)
Predicted wage	0.153** (0.064)	0.038 (0.051)	-0.022 (0.129)	0.410*** (0.119)
Married	-0.787*** (0.057)	-0.374*** (0.050)	0.247*** (0.076)	2.659*** (0.081)
Children	-0.167*** (0.052)	-0.077* (0.045)	0.041 (0.067)	-0.204*** (0.063)
No schooling	-0.845*** (0.105)	-1.315*** (0.086)	-1.163*** (0.156)	-2.026*** (0.129)
Primary school	0.493*** (0.100)	0.706*** (0.083)	1.432*** (0.085)	1.774*** (0.083)
Secondary school	1.271*** (0.106)	1.034*** (0.108)	1.299*** (0.097)	0.859*** (0.107)
High school	0.045* (0.043)	0.141*** (0.063)	0.057 (0.026)	-0.019 (0.033)
College/University (HLE)	0.346*** (0.051)	0.351*** (0.048)	0.426*** (0.054)	0.338* (0.071)
N	106	64	42	
R-squared	0.06	0.07	0.11	
Log likelihood	-376939.2	-341405.4	-8845.488	

than men (32.2 vs. 34.8 years of age). Gender age differences are particularly pronounced in the employment sector, where men are about 2.6 years older than women. This may reflect the fact that those selecting employment are those with more labour market experience. Married males have higher employment rates than married females.

The first hypothesis of this study stated that more

women's education is associated with a decline in women's labour force productivity up to secondary education, with a slight uptick for post-secondary education. Results emanating from Equation 2 of the estimation model are presented in Table 3. The results presented in the table reveal that the coefficients estimated for each variable (both males and females and each urban centre model) have the same sign, indicating

Table 4. Marginal rates for the probability of being employed in relation to human capital (n = 106).

Variable	Total sample	Males	Females
Other	0.02	0.04	0.06
Primary School	0.05	0.06	0.09
Secondary School	0.06	0.07	0.12
High School	0.1	0.11	0.17
College/University	0.2	0.22	0.35
Experience	0.14	0.15	0.13
Tenure	0.28	0.3	0.26

Source: Gendered patterns of labour force participation Survey 2019.

the following:

Women have a lower probability of being employed than men do. This holds true for Arusha and Moshi hotels and tour operators. For the Arusha model, women are 8.8% less likely than men to be employed and the gender gap increases to 23% for the Moshi model.

Further, the positive signs for the coefficients corresponding to the variable HLE in the model estimated for the sample as well as the models for each group (urban centres) suggest a positive return for investment in education when the outcome is defined as probability of being employed. The simple comparison of the coefficients estimated for each of the two groups indicates significant differences in the importance of educational attainment among the groups. In order to evaluate the extent to which highest level of education predicts employment status, the marginal probabilities for each group were calculated. For males for example, a unit increase in educational attainment results in a 5.3% increase in the probability of being employed for those with high school education (Table 3). For the linear probability regression model, the marginal rate for the probability of being employed in relation to the increase in level of education equals the value of the coefficient that corresponds to variable:

$$\frac{\partial P_i}{\partial HLE_i} = \frac{\partial P(DV = 1 | AGE, SEX, HLE, WKH, WGE, SEG, STE, REG, AND SEC)}{\partial HLE}$$

Marginal probabilities are defined as the partial derivatives of the probability of a group being in the labour market with respect to individual control variables. The marginal probabilities are distributed asymptotically according to the normal distribution. Table 4 further presents the probability of being employed for each gender group and level of education.

Results in Table 4 reveal significant differences in the marginal probability of being employed across gender. For instance, the low level of education for the females yields a relatively high marginal rate for this group. From an economic point of view, this should be interpreted as

follows: the lower the educational level of a person, the lower it is the probability of being employed and hence their productivity.

The mathematical expressions or coefficients for age and age squared are positive and negative, respectively, suggesting that the probability of employment rises with age but at a falling rate for both sexes. The coefficient of age for the linear probability regression model shows that with an increase in age, there is a greater likelihood that a female will enter the labour market. The study revealed that, an increase in age by a unit increased the coefficient of being in the labour force (versus not being in the labour force) by 6.6% for females and 43.6% for males (Table 3). Age has the expected inverse U-shaped effect on participation, which is shown in Figure 3.

Excitingly the dichotomous model shows a slightly higher peak age for female employment than for male employment, which is reached at about age 41. The probability of working for wages in the public and private sectors by age has the same inverse U-shape detected in the dichotomous linear probability model, but the peak for private sector work is attained close to age 36, pointing to the lower compatibility of private sector wage work with women's marital responsibilities. The second hypothesis of this study posits that women's extensive family responsibilities militate against their participation in the formal labour. As a reflection of the consolidation of gender roles at marriage, being married has a positive and significant effect on participation for men and a substantial negative as well as significant effect on women's participation. The results of the study indicate that if a woman is single, she is more likely to participate in the labour force than those who are married as evidenced by their marginal effects shown in Table 5. Currently married women have a 23.6% lower probability of working for wages in the private sector than single women. On the other hand marriage is associated with a 10.3% increase in participation for men and a 23.6% decline for women. Table 4 shows that generally and for all levels of educational attainment, there is a drop in female participation in employment once they get married.

Family responsibilities also include the number of

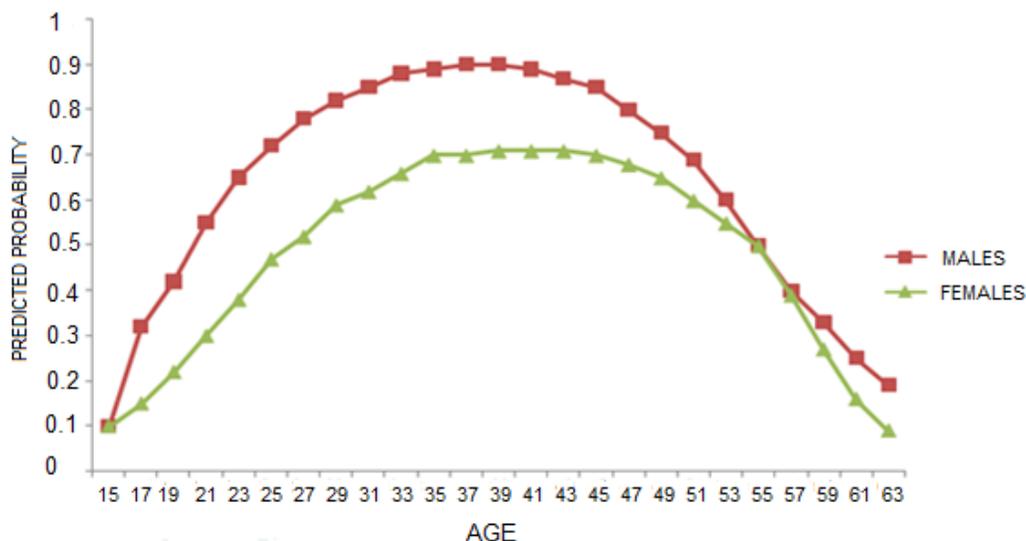


Figure 3. Predicted Probability of Working by Age and Gender.
 Source: Simulations based on linear probability model results using data from Gendered patterns of labour force participation Survey 2019.

Table 5. Linear probability regression model of Labour market participation by gender (n=106)

Variable	Females	Males
	dx/dy	dx/dy
Reference: reference individual	0.469	0.670
Age	0.094*** (0.006)	0.110*** (0.004)
Age ²	-0.117*** (0.007)	-0.147 (0.004)
Currently married	-0.236*** (0.032)	0.103*** (0.025)
Divorced/Widowed	-0.100** (0.043)	-0.107 (0.083)
Children	-0.167*** (0.052)	0.041 (0.067)
HLE	-0.347***	-0.207***
Region of residence	0.006	0.030

1. Robust standard errors in parentheses, 2. Significance level: ***p<0.05, **p<0.01, *p<0.1, 3. Calculations are for a reference individual with means for the continuous variables and zeros for dummy variables. 4. Age and Age squared are continuous variables. 5. The reference for the educational level is the above secondary education. iv. Rural are the reference for Regions. Source: Gendered patterns of labour force participation Survey 2019.

children a woman has to take care. The presence of small children has no statistically significant impact on the probability of employment for males, but the number of very small children in the household (0-2 years old) has a statistically significant impact in reducing the propensity of female employment. The coefficients in Table 5 show that a woman with a unit increase in the number of infant

children being involved in the labour force has a 16.7 less productivity.

The third hypothesis of the analysis was that there is no wage discrimination and differences in productivity between men and women in the labour market. Labour productivity differences at the job level, where men and women do the same work for the same employer was

assessed hand in hand with wages. The decomposition of male-female differences in productivity in Table 6 shows that gender differences in endowments (such as education) increase the productivity rate of women by a marginal difference of only 2.4% for those who complete secondary education. The table also shows that a 5.6% differential can be attributed to males thus reflecting females' inadequate endowments at the College or University level.

Table 6 further presents the regression results for the wage equation. Comparison of these figures shows how much of this differential is due to unequal attainment of the other endogenous variables (education, occupation, and union membership) and how much appears to be strictly a labour-market differential. Of the 0.149 differential in favour of male employees with high white collar skills, about 0.123 is attributable to their superior education, occupations, etc., while 0.339 remains even holding these equal. Similarly, 0.061 of the total disadvantage of female employees appears to come from inadequate education and occupation, while 0.223 is the result of discrimination and disadvantaged background. It would appear that outright discrimination in the labour market is quite substantial. Likewise, there is a considerable wage gap linked with gender, even for the same occupations and even when controlling for individual characteristics, such as education.

DISCUSSION

This study found that female participation in the hotel and tour operators industry is below average. The coefficient of age for the linear model has shown that the peak for private sector jobs is reached at close to age 36, pointing to the lower compatibility of private sector wage work with women's marital responsibilities and thus reflecting low productivity in the private sector. The revelation that female participation in this industry is low corroborates the findings of Dante and Gonzalo (2008), Ntuli (2010) and Verick (2014). Studies by different authors reveal that there are several causes of low female participation in the hotel and tour operators industry.

A significant number of female employees in the hotel and tour operator sectors had secondary education, a level below high school education. This finding reflects low labour-force participation for females thereby portraying low productivity. High school education and vocational training has a positive impact on the labour-force participation of women. As such, policies attempting to increase the access of schooling to women may be effective in increasing female employment and productivity. For example, revamping public and private vocational and skills training programs in such a way that they prepare women for non-traditional, hotel and tour operator jobs may be an effective policy tool to increase both female labour force participation earnings and

productivity (Manyaga and Athuman, 2010).

In general, the study on labour-force participation in hotels and tour services has indicated that the participation rate increases with the level of education. Among the females in the study, 20% had some secondary education. This result highlights the challenges of labour market entry for females who do not have educational skills. As the demand for unskilled labour continues to decline in Tanzania, labour-force participation will remain low as many women lack the required education to be competitive in the labour market. The third hypothesis of this study has led to this finding. Consequently, some of the female hotel employees have opted for small-scale agriculture as an alternative source of income. Agriculture is the largest sector of employment in Tanzania Mainland. Self-employment in agriculture is known to be the most common form of labour deployment among rural populations, in particular rural women. Despite majority of females have been seeking employment opportunities in the hotels and tour industry in Arusha and Moshi urban centres, many of them have not been successful and hence turning back to small scale agriculture in urban centres. This is consistent with previous findings (Buehren, 2015; Idris, 2018) which have shown the largest gender gap existing in rural earnings especially in the northern regions which comprise Arusha and Kilimanjaro. These studies show that men earn 2.9 times more than women.

For females, marital status is not related to employment. This finding is particularly interesting when compared to the results of Jordan and Zitek (2012) and Toledo (2014) who found that by females being married, it negatively influences the probability of employment. The decline in employment with marriage is larger in relative terms for less educated women, but is larger in absolute terms for university educated women who have higher participation rates. The pattern of employment varies strongly by marital status for women in distinct contrast to men whose patterns of employment are not strongly associated with marital status. Employed married women at all education levels tend to be more concentrated in government work and in self-employment rather than in privately owned firms like hotels and tour operator.

The findings of the study have also found that the number of very small children (0-2 years old) in the household has a statistically significant impact in reducing the propensity of female employment. This finding is consistent with the assertion that-unlike men-women allocate their time to market and non-market activities, which include household work and child-rearing (Lang, 2011). That is, small children increase the opportunity cost of women to engage in market activities and thus reduce the attractiveness of work outside the household and consequently affects productivity negatively. The negative influence of very young children in workforce participation suggests that policies fomenting family planning could increase female employment substantially.

Table 6. Coefficients (Standard Errors)(Dependent Variable: Natural log of wage)(n=106).

Variable	Male employees	Female employees
Constant	3.149*** (0.400)	3.856*** (0.347)
Experience: Age	0.0466** (0.0174)	0.0342** (0.0141)
Experience: (Age) ²	-0.000194 (0.000235)	0.000216 (0.000175)
Marital Status	-0.113* (0.0588)	-0.105 (0.0669)
Working in an urban area	0.333* (0.0676)	0.128 (0.0929)
Regions: Northeast	-0.106 (0.135)	0.0671 (0.154)
Education: Primary Education	0.393*** (0.162)	0.248 (0.114)
Secondary Education	0.749*** (0.197)	0.725*** (0.125)
College/University	1.329*** (0.197)	1.273*** (0.138)
Occupation: High skilled blue collar	0.0649 (0.0623)	-0.0353 (0.155)
Low skilled white collar	-0.092 (0.0601)	-0.153** (0.0828)
High skilled white collar	0.456*** (0.0746)	0.207** (0.102)
Type of Contract: Permanent	0.580*** (0.0632)	1.044*** (0.0992)
Casual written	0.154** (0.0782)	0.5560*** (0.108)
Contract	0.275*** (0.0806)	0.811*** (0.136)
Union membership	0.712*** (0.123)	0.623*** (0.212)
Non union membership	0.113** (0.466)	0.142** (0.333)
Control variables:		
Unemployment: Female	0.732*** (0.162)	0.209 (0.328)

Table 6. Cont'd.

Male	-0.941*** (0.169)	-0.373 (0.373)
R ²	0.498	0.708
N	47	59

1. The linear function of all the independent variables (including age squared as a variable) assumes that impacts on the wage rate enter independently and multiplicatively. 2. Standard errors in parentheses, 3. Robust standard errors in parentheses, 4. Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Gendered patterns of labour force participation Survey 2019.

Family planning could also lead to an increase in employment and consequently on wage. Child-rearing responsibilities are a major factor affecting the employment decision as well as labour productivity and earnings (Lang, 2011). This study also found that more commonly women get less than men for executing jobs of equal value. One of the principal causes is the way women's capacities are valued compared to men's. Occupations which demand similar skills, qualifications or experience tend to be less paid and undervalued when they are dominated by women rather than by men. For instance, the (mainly female) room attendants in hotels more often receive rather less than male kitchen porters whose work demands less skills. A study conducted in Lebanon also corroborates the findings of this study as it contends "upon comparing the average salaries of males to those of females while controlling for education, the researchers concluded that, in general, male' average salaries are significantly higher than those of females under all experience categories" (Hejase et al., 2014: 438).

The rationality for gender pay gap can be examined through a ternary framework. The first explanation is occupational segregation: women tend to work in subordinate posts and occupations where attributes seen as innate for women, such as care and domestic and household work, can be commercialised. Second, women tend to work in industries that are low-paid: thus, there is segregation not only inside but within industries. Pinar et al. (2011) report findings of their analysis of hotel employment and gender division in the Balearic Islands. Specifically, they highlight significant gender variation across departments in hotels.

The analysis of the findings of this study also highlights the increment of micro and small enterprises among female employees of hotels and tour services in the two urban centres. In an effort to bridge the gender gap on wages, a few female employees reported to own micro enterprises. This finding is consistent with a separate study of women's entrepreneurship in Tanzania which reported that the proportion of women owning enterprises had increased from 35% in the early 1990s to 54.3% in 2012 (Mori, 2014). However the same study concluded that most women owning enterprises in Tanzania are

concentrated in informal, micro, low growth, and low profit activities, where entry barriers are low. The study by Mori further reinforces the finding that wage discrimination and differences in productivity between men and women in the labour market still exists.

The study found that segregation is frequently linked to traditions and stereotypes. The empirical evidence discussed here suggests three things. First, gender variances in human capital play a part to gender differences in productivity and earnings, but their relative significance is diminishing as the education gap closes the world over. Second, although labour markets show some evidence of gender discrimination, a significant part of the observed wage and productivity gap can be explained by women and men sorting into different occupations and third women are as efficient as their male counterparts especially after accounting for gender differences in access to productive inputs.

Conclusion

On the basis of evidence drawn from the findings, this paper provides a number of conclusions and make key recommendations which may contribute to long term strategic change on gender issues in the sector. The results of this analysis indicate that each step up the educational attainment ladder is associated with some increase in labour force participation. This pattern is observed across all sexes in the hotel and tour operator labour market. However, the responsiveness of labour participation rates to educational attainment varies significantly among gender groups. As regards the structure of the Tanzanian labour market, the market appears to be relatively closed to the less educated women and that married women, even if educated, find it hard to accommodate working for wages in the private sector with their family responsibilities.

Pertaining to stereotyping and traditional gender roles, employed women tend to be highly segregated in some industries and occupations. Hotel as opposed to tour operator has been found to be a feminized industry that significantly accounts for female employment. The high level of gender segregation in the tour operator industry

is most probably due to prevalent norms about what kind of employment is socially acceptable for women.

It is almost certain that change in the role of women within these sectors is or will be significant both from an economic and rights based approach and this report considers measures which may help achieve such change. Given the speed of demographic, economic and technological change in many countries and regions, a hotel workforce in which women are represented at all levels should be a major feature over the next decade in most parts of the world.

In order to reduce gender gaps with regard to employability of females, one must notice that special policies must be addressed to hotel and tour operator women as they are often captured within the tradition of the patriarchal principles of family and community. The findings of this study unearth issues of importance for employment of women as a basis for future dialogue. Empowering women and girls is crucial in order to successfully accomplish twin goals: ending extreme poverty by 2030 and boosting their productivity.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Full Length Research Paper

Towards a theoretical model linking university education to climate change interventions in the African context

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Climate change education continues to gain popularity among educationalists especially at university level. The Paris Agreement on climate change 2015 advocated for support towards this approach especially for universities in the developing nations. This paper aims to present a model linking university education to climate change interventions in the African context. This model has been developed based on findings from a larger study on opportunities and challenges for climate change education in the African context conducted in Uganda and Tanzania. The study adopted a multiple case study design with Makerere University in Uganda and University of Dar es-Salaam in Tanzania, collecting data from 58 participants. Data were collected through semi-structured in-depth interviews, focus group discussions and document review. Thematic analysis based on Braun and Clarke (2006) was used to analyze and interpret the data. Based on study findings, the model was developed by the research team. The model identifies the key roles (functions) of a typical African university and the potential climate change education interventions it can initiate. It also explains the various contextual factors dubbed key drivers for climate change education within the African context. Based on this model, it is expected that universities in similar contexts, that have not started climate change education programmes, could learn a big deal on potential interventions to implement and explore the key drivers for their own benefit. Those universities that are already implementing climate change education interventions could also find the model useful in helping them exploit the opportunities and key drivers to enhance their existing interventions.

Key words: Climate change education, African context, university education, key drivers.

INTRODUCTION

The problem of climate change has generated a lot of literature by researchers, writers and several international organisations because of its importance to the wellbeing

of humanity and nature. Experts that comprise the Intergovernmental Panel on Climate Change (IPCC) have created awareness globally about this issue through their

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scientific reports on climate change. Scholars such as Farmer and Cook (2013), Filho (2010), Stern (2008) and others have also written about this global problem. Stern (2008 p. 3) reported that, “an overwhelming body of scientific evidence now clearly indicates that climate change is a serious and urgent issue. The earth’s climate is rapidly changing, mainly as a result of increases in Green House Gases (GHG) caused by human activities.” This illustrates the graveness of the problem of climate change and the urgent need to take action.

Fumiyo Kagawa and David Selby argue that education has a crucial role to play in raising people’s consciousness about the problem:

At such a moment of enormous human challenge, formal, non-formal, and informal education have a potentially crucial role to play. In both school age and adult learning communities, learners of all ages can be invited to take up the challenge of understanding and re-thinking the world, of shattering assumptions, shibboleths and the taken for granted, of deliberating where to go at this critical fork in the road (Kagawa and Selby, 2010, p. 5).

Kagawa and Selby (2010) underscore the important role formal and informal education at all levels can play to address issues of climate change. To them, the education system can be a very useful tool for promoting mitigation and adaptation to climate change. Others such as Boyde and Hume (2015, p. 78) recognise the fact that “education at all levels and particularly at higher level should play a key role in addressing existing and emerging ecological and socio-economic challenges including climate change.” Universities are key actors in this struggle. According to Cordero et al. (2008, p. 870) universities could engage in “educating students about climate change” by linking it to various socio-economic issues such as food security, accessibility to safe water and sustainable use of renewable and non-renewable energy in their livelihoods. Though this has happened in developed countries like Australia, Finland, Germany and Canada, very few studies have shown very few universities in Africa and Latin America that have climate change education programmes implemented at their campuses (Filho, 2010). There is limited research on climate change education in the African context (Lemons, 2011); this is a serious gap in the literature. Climate change education, therefore, continues to gain popularity among educationalists especially at university level. The Paris Agreement on climate change 2015 advocated for support towards this approach especially for universities in the developing nations.

This paper presents a model that emerged from a bigger study on the opportunities and challenges that universities face in addressing climate change issues in the African context. The model was developed based on thematic analysis of data collected from a comparative multiple case study of Makerere University in Uganda

and University of Dar-es-Salaam in Tanzania. The model illustrates the link between university education and climate change interventions in the African context. The paper briefly explains the methodology followed in undertaking the study that resulted into the theoretical model, illustrates the model and then explains each component of the model in detail. It also provides implications for practitioners of climate change education in universities.

METHODOLOGY

This paper is part of a larger study undertaken for three years in Uganda and Tanzania. The study examined the opportunities and challenges of climate change education at universities in the African context. Based on the social constructivist paradigm, the researchers adopted a qualitative approach and a multiple case study design to guide data collection, analysis and interpretation. According to Yin (2012), a multiple case study design enhances literal replication which may help to yield theoretical constructions that can be replicated across cases of the same contexts. The researchers using this design therefore considered Makerere University in Uganda and University of Dar es salaam in Tanzania as cases. These universities were considered because they are the oldest in the region and have been champions in conducting programmes on climate change in the region. The selection of the case universities was therefore purposive.

Data were collected using document review, semi-structured in-depth interviews and focus group discussions. Document review provided contextual information about the climate change situation in both Uganda and Tanzania and the case universities. The semi-structured in-depth interviews were used to collect data from 18 administrators of climate change related units, lecturers and researchers on climate change related disciplines from both universities. Five focus groups were conducted among 40 undergraduate and postgraduate students offering various programmes related to climate change across case universities. For both interviews and focus groups, a tape recorder was used during data collection which enabled the researchers to transcribe the data for analysis.

All data collected were analysed based on Braun and Clarke (2006)’s thematic analysis model. According to the authors thematic analysis is more flexible and compatible with many other analytical methods to generate findings from the data based on themes. The analysis began with a thorough reading of the transcripts to familiarize with the data. The researchers then generated initial codes with the help of MAXQDA software. The codes were then categorized to help in searching for themes that were later reviewed and a final list of themes that answer the research questions was agreed on among the researchers. The final themes were then written up into a report. The quality of the research findings was ensured based on Patton (2015)’s research quality criteria. According to the author the quality and credibility of research findings rests on: the philosophical belief in the value of the inquiry; the credibility of the inquirer; the systematic in-depth field work that yields high quality data and; systematic and conscientious analysis of data.

The theoretical model

A lot of literature can be found in scientific sources linking education to sustainable development in various parts of the globe. Several writers like Filho and Pace (2016);

Kagawa and Selby (2010); Rohweder and Virtanen (2009) and many others have written a lot on this link. All of them agree to the fact that education can play a key role in enhancing sustainable development. UNESCO and a few other agencies have advocated for education for sustainable development for over a decade now. A review of the literature on education for sustainable development revealed that Rohweder and Virtanen (2009) developed a model of learning for sustainable development in 2009. The model provides the critical factors that are key in integrating sustainability aspects into learning programmes at universities. The factors were categorized into three: contextual factors (integrative approach, spatiality and time perspective); the mental aspects (value clarification, systemic thinking, critical reflection and motivation building); and activity related aspects (partnerships, cooperation, communication and participations). The authors argue that these are key for educators in their quest for developing competences for sustainability. Climate change education is part of sustainability education and focuses on creating a platform where education institutions can engage in academic, research and community engagement programmes focused on supporting mitigation and adaptation to climate change. This implies that the model applies to climate change education and can be very handy in supporting universities to integrate climate change issues in their programmes.

However, based on the key findings from this study, the researchers found the model of learning for sustainable development inadequate to a certain extent in terms of supporting African universities to fully address climate change issues. First, it was developed focusing on pedagogical aspects of sustainability education within the context of developed nations. It did not take into consideration the context of African universities. Secondly, the model focused on learning and training functions of the universities. It ignored the other key functions; research and knowledge generation as well as outreach programmes. Thirdly, the model does not consider the institutional set up of the universities, especially the key institutional factors that drive university programmes given the context.

Therefore, based on these deficiencies and the key findings of the study, the researchers have come up with a theoretical model linking university education to climate change interventions within the African context. The model is presented in Figure 1.

The theoretical model illustrated in Figure 1 provides a graphical link between the university in terms of its major role and the climate change interventions. The role of the university has been dubbed the university in action. The model links the university in action to the potential climate change education interventions, supported by various key rivers contributing to the final outcome- societal improved lives and behavioural change for sustainability.

These parts of the model are explained below;

The university in action

The thematic analysis of data revealed that the university has five key roles they play in addressing climate change issues within the African context. These include: knowledge generation through research; training and capacity building on climate change; innovations and technological solutions to problems arising due to climate change; conducting sensitizations and guidance on climate change issues and; actively being engaged in supporting communities on mitigation and adaptation to climate change.

The above key roles are contextual in nature and may not be applicable to universities in other contexts. Universities especially in sub Saharan Africa are in critical condition given their low research output mainly due to inadequate research funding and infrastructure (Teferra and Albach, 2004). This implies that such universities need to enhance their research output and generate the much-needed knowledge on climate change. Sub Saharan African countries are characterised by low capacity in terms of scientists and academics generally. This is because of the socio-economic and political instabilities as well as poor working conditions that these countries have faced for some time. They also face a problem of brain drain where the few academics and experts migrate to developed nations in such for better employment conditions (Teferra and Albach, 2004). This means that there is a shortage in terms of experts and professionals on climate change which calls for increased training and capacity building initiatives. Universities can play a key role in this aspect.

Findings revealed that African countries are yet to advance in high level innovations and technology. Given the low capacities and expertise, it's unlikely that high level innovations and technology will be advanced. Therefore, participants argued that African universities can invest efforts in advancing innovations and technological solutions for climate change mitigation and adaptation. Across cases, findings showed that societies especially in sub-Saharan African countries are characterised by low levels of literacy, limited access to internet, undeveloped communication infrastructure and many other factors. The study participants, therefore, argued that universities can conduct sensitizations for communities and provide guidance to policy makers and other actors on climate change mitigation and adaptation. It also came out clearly that the universities can also support communities through local initiatives for climate change mitigation and adaptation. By supporting communities, the university will get an opportunity to interact with the community, pilot some of the innovations and technologies from their research and developing new ideas for mitigation and adaptation to climate change.

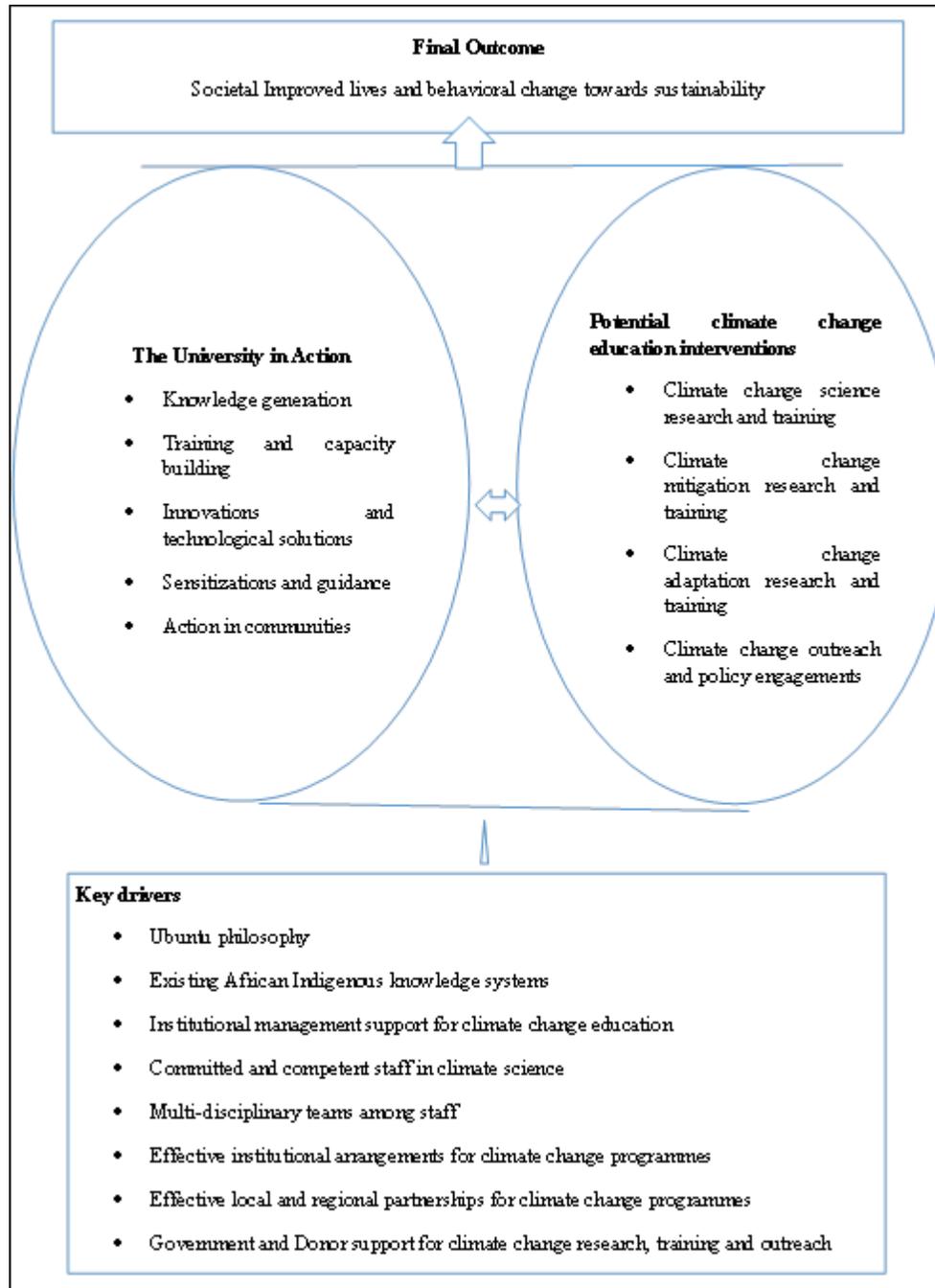


Figure 1. Theoretical Model: Linking University Education to Climate Change Interventions in the African Context.

Potential climate change education interventions

Analysis of data revealed that the case universities implement several training, research and community engagement programmes. The training programmes were; short courses, seminars, undergraduate and postgraduate programmes on climate change. The

universities conduct various research programmes mainly on climate change adaptation. Findings showed that implementing units at these universities conducted sensitization events, local adaptation community initiatives, policy engagement events, climate change festivals, and identification as well as empowerment of climate change champions in various communities across

Uganda and Tanzania. Based on these findings, the researchers came up with four potential climate change education interventions that African universities can engage in. They include: climate change science research and training; climate change mitigation research and training; climate change adaptation research and training and; climate change outreach and policy engagements.

Climate change science research and training relates to research and training programmes that are focused on understanding the science behind the climate change phenomenon. Such research would result in generation of scientific knowledge that is needed to create awareness about the existence of the problem, its effects and impacts on various sectors and creation of urgency to address the phenomenon. In sub Saharan African countries, experts and academics in climate change science are scarce. This implies that universities can ably develop training courses and programmes on climate change science like Meteorology etc. They can also come up with research projects focusing on generating climate change scientific knowledge.

Climate change affects almost all aspects of life including; health, livelihoods, air quality, economic and social infrastructure, water resources and many other sectors. Sub Saharan African countries have been characterised by low levels of science and technology to support mitigation of climate change. Therefore, universities can be handy in supporting governments and communities on climate change mitigation through training and research. Climate change mitigation research and training is a potential intervention that relates to specialized training courses and programmes focusing on dealing with the root causes of climate change, that is reducing the sources of greenhouse gases in the atmosphere. African universities could explore possibilities of developing postgraduate and short training programmes focused on mitigation. They could also initiate research programmes focusing on mitigation at various levels, that is national, regional and community levels.

Often the climate change phenomenon comes with various effects that result from failure to effectively mitigate it. African countries especially in the sub Saharan region do not have the capacity to mitigate due to low level of science and technology, financial resources and climate expertise. This makes these countries more vulnerable to the effects which call for adaptation measures. In this situation African universities can intervene by conducting adaptation research and training in their respective countries. Adaptation research would enhance the ability of societies around the university deal with the effects of climate change. Such research may focus on agricultural sector, infrastructural development, water resources management, livelihoods and other socio-economic aspects of communities. Programmes can be developed for short- and long-term training on adaptation to develop a pool of adaptation experts and human resource for their respective

countries.

Lastly, universities can actively participate in climate change outreach and policy engagements in their respective countries. Sensitization and outreach initiatives could be developed to disseminate climate change information and engage communities on mitigation and adaptation measures at their local level. Through outreaches, the university could explore piloting some of their innovations and technologies on climate change arising from their research projects. Universities especially in the sub Saharan Africa can support policy formulation and review on climate change in their respective countries. This is because most of these countries have weak political and economic systems. Based on research and the existing expertise within the universities, such countries could benefit from technical support on climate policy formulation, evaluation and guidance provided to the respective governments. Such policy engagements can be very useful in enhancing mitigation and adaptation efforts by governments in the respective countries.

Key drivers

Thematic analysis of data from the two case universities revealed several internal and external drivers for climate change education at African universities. Most of these drivers are quite unique to African universities and therefore contextual in nature. For this model, eight key drivers were singled out. They are: Ubuntu philosophy, existing African indigenous knowledge systems; institutional management support; committed and competent staff in climate science; multi-disciplinary teams among staff; effective institutional arrangements; effective local and regional partnerships and; government and donor support.

One of the African social and cultural systems is Ubuntu philosophy. Mugumbate and Nyanguru (2013, p. 83) described Ubuntu as “an African philosophy that places emphasis on being human through other people”. Across most of the African societies, this ethic is held as a key value in social and political realms. Societies promote values like collectively, solidarity, respect for human dignity and hospitality across all aspects of lives in their communities. For Nussbaum (2003) Ubuntu comprises compassion, reciprocity, maintaining harmony, supporting each other with justice and mutual care. These values are inherent in most of the African social and cultural structures and therefore are key drivers for what individuals, communities and nations do for humanity. African universities can engage actors and communities in climate change education initiatives based on this African ethic. Providing climate change education should be viewed as a way of promoting Ubuntu, social justice and social responsibility and caring for the other (Metz, 2016).

The existing African indigenous knowledge systems

can be key drivers for climate change education interventions at African universities. Indigenous knowledge has been described as “what indigenous people know and do, and what they have known and done for generations, practices that evolved and through trial and error and proved flexible enough to cope with change” (Eyong, 2007, p. 121). The author argues that African indigenous knowledge systems have inherent linkages with social equity and ecological responsibility which significantly contributes to sustainable development. Therefore, integrating such knowledge into climate change education programmes can yield various benefits including: enabling learners to acquire “community attitudes and values” for sustainable development; enhancing “learning about African cultures and local contexts” and; enabling students to “appreciate and respect the knowledge of elders and other community members” (Kaya and Seleti, 2013, p. 34).

Climate change education can also be driven by effective institutional management support provided by the university. Both strategic and administrative support to climate change education programmes is key in enhancing mitigation and adaptation. Strategically, the implementers will need support in terms of structural approvals, inclusion of climate change education components in strategic plans and research agenda for the university as well as structural provisions at senior management levels within the university. Administratively, climate change education requires quick approval processes for new programmes and courses, prudent financial management systems, effective monitoring and evaluation systems, robust management information systems and effective human resource related processes. Teferra and Albach (2004) reported that many African universities especially in sub Saharan Africa “suffer from poor, inefficient and highly bureaucratic management systems” (p. 31). Improved effective and efficient institutional management systems in African universities can significantly drive climate change education to higher heights.

Committed and competent staff in climate sciences is another key driver for climate change education at African universities. African countries especially those in the sub Saharan region, suffer from limited number of experts in various disciplines especially science related ones. The region has continued to suffer from the challenge of brain drain where scholars and academics leave university jobs and go to work in other sectors and government agencies for better pay and working conditions. This greatly affects the volume and quality of research and training at universities since replacements for such competent staff doesn't happen in a short time. There is also a challenge of migration of best scholars to developed countries. Many scholars and scientists have migrated to developed nations for better paying opportunities and working conditions which makes the situation for African universities worse (Teferra and Albach, 2004). Climate change education, therefore, can

be promoted effectively when universities have committed and competent staff which calls for interventions to build capacity of existing staff and train and recruit more to support the programmes.

The other key driver for climate change education is having multi-disciplinary teams among staff. Findings revealed that having piecemeal and isolated climate change research hardly creates significant impact at local community levels. Therefore, there is a need to create multi-disciplinary, or interdisciplinary research teams where a variety of skills, knowledge, experiences and resources can be put together to address a set of research questions on climate change in a single project. Rohweder and Virtanen (2009) advocated for adoption of an integrated and interconnected approach to learning for sustainability which calls for multidisciplinary, transdisciplinary and interdisciplinary approaches in delivering such learning. Such approaches enhance linkages among disciplines, sharing of knowledge and collaborative approach to bigger societal challenges like climate change. African universities could explore creation of multidisciplinary research teams and combine expertise and resources on climate change research programmes thereby enhancing quality, credibility of research and ability to mobilize resources on a large scale.

Climate change education requires effective institutional arrangements to enable effective delivery of training, research and community engagement programmes on climate change within the universities. Findings revealed that across the case universities, climate change education programmes had been institutionalized through establishment of climate change centres run by full time administrative staff. These are responsible for providing administrative support and coordination of the academic, research and community engagement programmes on climate change. They also support planning, resource mobilization and providing logistical support to the academic staff who implement climate change education activities. Participants of the study called for ensuring that these existing structures within the universities closely work with the rest of the academic units for proper coordination of programmes. Establishing institutional structures for climate change education can greatly enhance the interventions on climate change at universities in Africa.

The other key driver is effective local and regional partnerships for climate change education programmes. Across the case universities, findings revealed that local and regional partnerships were one of the success factors behind their climate change education interventions. UNESCO (2015, p. 67) argued that to promote climate change education, players need to form or strengthen “partnerships and collaborations”. These could be formed between “education communities, public organizations, NGOs, local communities, entrepreneurs etc” (Virtanen, 2010). Therefore, effective climate change interventions require local and international support which

could be in form of technical, financial, collective learning and other kinds of support for the programmes. Universities could explore partnerships with other universities, international NGOs, the private sector, donor agencies within and outside the respective countries, as well as public agencies to boost their climate change education interventions. This will promote sharing of technical expertise and experiences, financial resources, diverse perspectives, good practices, innovation and new technologies as well as collective advocacy for policy and action on climate change issues.

Lastly, universities in Africa can effectively address issues of climate change with support from government and donors. Findings reveal that most of these universities suffer from lack of funding especially from their home governments. Across the case universities, participants decried lack of financial support or limited support from governments to universities especially for research and innovation. This significantly affects research output and innovation from these universities. Teferra and Albach (2004) explained that “most countries in Africa have practically no funds allocated to research in university budgets” and “many of the research activities that are undertaken on the continent are largely funded and to a certain extent, managed and directed by external agencies” (p.39). Participants reported that most of the research at their institutions was donor driven and therefore had no input into the research agenda. They reported that donors mainly from the north pay almost all costs related to the research. This implies that universities in Africa need to seriously engage their government to fund research, training and outreach programmes on climate change in addition to the funding from donors. This will enhance research output and their voice in determining the research agenda and training based on local needs. Locally generated resources to universities especially from governments can go a long way in driving climate change education and consequently contribute to mitigation and adaptation on the continent.

Model flow

As shown above, based on the traditional roles of an African University (university in action) the university can implement various climate change education interventions (potential climate change education interventions). For this to happen, there is a need to take into account various factors, which are both internal and external contextual factors within the African context (key drivers). African universities will then be able to contribute to the realisation of societal improved lives and behavioural change towards sustainability (final outcome).

Implications for practitioners

Universities in Africa tend to operate in a relatively unique

context, with different expectations from their societies which somehow present different roles they ought to play, different cultural context and less endowed in terms of resources compared to those from the north. This implies that interventions by these universities on global issues like climate change need to be contextualized. This theoretical model is a good start for practitioners and scholars on climate change education at universities in Africa to start thinking about initiating interventions on climate change in their respective institutions. The model provides a good start for those who are yet to start climate change education programmes at their universities to think about the traditional roles their universities can play and the likely initiatives on climate change. It also provides them with a variety of key drivers that can be explored to stir their interventions. For the universities that have already initiated climate change education interventions, the model offers a simple theoretical frame to strengthen their interventions that already exists.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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