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Research Article

Building an Inclusive Value Chain: Gender Participation in Cassava Marketing and Processing in Nigeria

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Abstract

The Nigerian cassava value chain shows different gender roles for men and women in marketing and processing activities. Women are typically found in the less profitable work and at the bottom of the value chain because of their position in the labor market. This study identifies farm and individual factors that shape gender participation in various phases of the cassava value chain and measures gender differences in the marketing and processing phases of the cassava value chain. The study draws from the survey of 4 geopolitical zones in Nigeria conducted by IITA in 2010 that surveyed 952 respondents consisting of 221 women. Results were analyzed using descriptive statistics like frequencies, mean, range, and standard deviation and inferential tools like t-test, chi-square, correlation, and multiple linear regression to test the hypotheses. We draw from the sustainable livelihood approach for the theoretical framework. The analysis indicated that more women were involved in the marketing phase than men, while more men were in the processing node than women. Additionally, producing cassava now, land allocated to cassava farming, level of education, marital status, and household size registered correlation with the index of participation in marketing. However, only household size registered a weak correlation with the index of participation in processing.

Introduction

Cassava and cassava-based products are essential food for Nigerians. Cassava is a staple food consumed daily by almost all households in Nigeria [1]. One study in southeastern Nigeria found that 53% and 34% consume various cassava products daily and every other day, respectively [2]. Women play important roles in agricultural value chains that are often underplayed [3]. Many other women, including most of the developing world's poor, participate in agricultural value chains as laborers or consumers [4,5]. In rural Nigeria, the division of labor within the households is gender-specific and according to age [6]. Men and women perform distinct roles, have unequal decision-making power, and have differences in access to and control over productive agricultural resources [7,8]. The Nigerian cassava value chain consists of various actors performing different functions to move it to the final consumers. Input suppliers, cassava farmers, cassava processors, traders, transporters, and consumers are the Nigerian cassava value chain's primary actors [1,9,10]. There is considerable gender specialization in Nigeria between men and women in the cassava value chains [11]. Men specialize in fresh cassava roots, and women specialize in traditional processed cassava products - the less profitable nodes of the chain, and do not fetch them much in terms of income [6], identified women's reproductive roles, unpaid labor as housekeepers and caregivers as some of the factors responsible for their placement at the bottom of the pyramid. Factors such as lack of mobility, numeracy skills, and low level of education often inhibit women from developing practical ties with other value chain actors [12]. Thus, they remain as producers at the bottom of the agriculture commodities value chain. The benefits of participating in agricultural value chains for women are determined by their control of productive resources and household-level decisions [13,14].

To reach the poorest and most vulnerable rural women for transformative impacts, it is crucial to clarify how value chains feature crops or sectors in which poor households and women are already more present or could easily integrate. Thus, it is imperative to understand the gender structure and functioning of traditional cassava value chains. Following this premise, this study examines gender participation in the processing and marketing phases of the cassava value chain in Nigeria. This study identifies farm and individual factors that shape gender participation in various phases of the cassava value chain and measures gender differences in the marketing and processing phases of the cassava value chain.

Gender and development

Gender and development takes a feminist approach to comprehending and addressing the disproportionate effects of economic development and globalization on people [15]. The study of gender's relationship to development was motivated by [16], who articulated how development affects men and women differently. The approach is concerned with how society assigns roles, responsibilities, and expectations to both men and women. Gender-driven policies aim to redefine traditional gender role expectations to achieve gender equality. Women are expected to manage their households, produce at home, bear, and raise children, and care for family members [6]. There is a need to understand the distinction between women and gender constructs because the focus of gender analysis is not biological differences between men and women but rather on their experiences as members of society. Women are a category of people while gender is the socially constructed difference between women and men. The distinction is not so much about the biological differences but about how society gives meanings to these differences in femininity and masculinity and the power relations and dynamics that come about because of this [17-19]. In other words, gender is a societal concept based on the belief systems put in place around masculinity and femininity.

Women and the Cassava Value Chain

The term "value chain" is used in diverse ways in different contexts. In this study, a value chain refers to the sequence of interlinked agents and markets that transforms inputs and services into products with attributes that consumers are prepared to purchase [4]. Women participate in agricultural value chains as producers, traders, processors, and retailers. The cassava value chain starts with the inputs used to produce it and consists of everything that is done until it gets to the final consumers. The value chain examines the interactions among different actors involved in the value-addition process between production and final markets of an agricultural commodity. The chain actors include producers, marketers, processors, and consumers, while non-actors include governmental and non-governmental organizations, banking institutions, and other essential service providers along the supply chain [20]. Although there is no one way to conduct a value chain analysis in agriculture, the outcome must map the actors participating in the production, processing, distribution, and marketing of an agricultural product [9,21,22] The Nigerian cassava value chain consists of various actors performing different functions to move it to the final consumers. Input suppliers, cassava farmers, cassava processors, traders, transporters, and consumers are the Nigerian cassava value chain's primary actors [1,9,10].

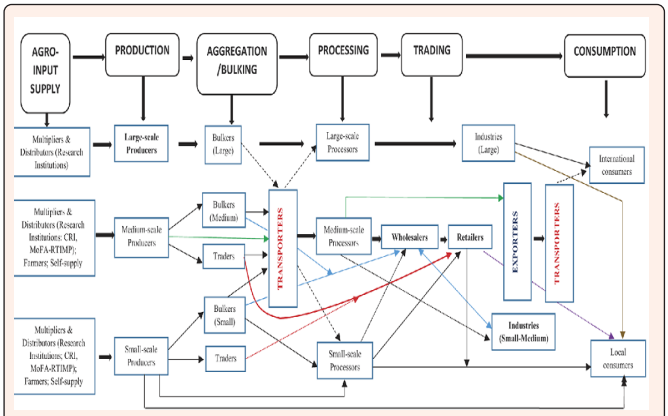

Figure 1: The Nigerian cassava value chain flow.

(Figure 1) In agricultural value chains moving high-value commodities, women are usually found in low-status work and at the bottom of the value chain where their participation is less visible, which contributes to a widening economic gap between women and men [23]. The highest returns are enjoyed by individuals who could access the most profitable and rewarding functions. Women also tend to earn less than men in similar roles [14]. The lack of gender equality in participation in agricultural value chains may prevent important development outcomes such as eradicating malnutrition and poverty and consequently lead to ineffective interventions. Women's work often takes place in the least valuable nodes of the value chain, for instance, as home-based workers or informal workers more generally. Women tend to be underpaid, and their jobs are less secure. In agricultural settings, women are often not visible while doing a large part of the farm activities. Moreover, it is well-documented that women-owned rural businesses tend to face many more constraints and receive far fewer services and support than those owned by men. Thus, by understanding interactions in a value chain between all these actors, identifying points of intervention to increase efficiency, increasing total generated value, and improving the competence of intended actors to increase their share of the total generated value becomes easier.

Women play essential roles in the production node of the cassava value chain as farmers, hired or family laborers involved in weeding, land preparation, planting, packing, manuring, fertilizer application, harvesting, packing, and transportation [24]. As hired laborers in cassava production, women conduct land preparation, planting, and weeding as the three main production activities. Several studies have examined cassava value chain participation among smallholder farmers in Tanzania, Malawi, and some states in Nigeria [25,2]. However, none analyzed the gender structure of value chain participation. Little is known about the differential participation of women in the two central phases of the cassava value chain-processing and marketing in Nigeria. The dominant activities of cassava-producing women in Imo State, Nigeria were cultivation, cutting of cassava sticks, frying, and fire preparation [2]. The women identified non-ownership of farmland, pre-occupation with household chores, inadequate farm size, and high cost of processing as constraining their participation in other phases of the value chain. [26], concluded that both males and females in Enugu State, Nigeria are involved in cassava production, processing, and marketing. More male-headed cassava households processed their fresh tubers into garri (dry flour), while female-headed cassava-based households sell fresh cassava tubers and process those not sold into fufu (boiled dough) and tapioca (extracted starch grains).

The sustainable livelihood framework

The sustainable livelihood framework is a widely recognized approach that studies how different people in various places engage in material activities for advancement and survival [53]. Since the early 1990s, the livelihood framework has evolved into a conceptual tool that identifies how household members use assets to manage stresses and shocks and how these choices are sustainable [15]. The approach is used in developing countries and at the household level and used by international development agencies [15,25-27]. A livelihoods approach emphasizes the multi-faceted nature of livelihoods, vulnerability, and people-centered change [28]. A central component is the analysis of capabilities, assets, and activities and how they are combined into livelihood strategies that result in a set of livelihood outcomes for rural households [29]. The Sustainable Livelihoods Framework (SLF) highlights the interaction between the use of capital assets (financial, human, natural, physical, and social) in developing individual and household livelihood strategies that improve well-being in the context of household vulnerability and transforming structures (policies, institutions, and processes). SLF treats the outcomes of the marketing and processing phases of the cassava value chain as an alternative activity that can bring improved well-being among resource-poor women.

Even though women make significant contributions to the agricultural sector, their roles in promoting economic growth and social stability continue to be inadequately recognized [30]. This lack of recognition is due to several factors: gendered division of labor, harmful cultural practices that subordinate women to men, customs that forbid women from owning land, and the extent of unpaid productive domestic activities performed by women [31,32]. The low status of women in the Nigerian cassava value chain could be attributed to traditional gender roles, which have confined women to the domestic sphere [2]. On the other hand, society gives greater authority and opportunities to men who exert control both within the family and the larger society. Women's low literacy levels, poverty, and inadequate access to opportunities and vital resources combine to put Nigerian women at a significant disadvantage economically and for participation in the development context. Therefore, this study focuses on the vulnerability context of the SLF, which emphasizes the importance of value chain characteristics and how the interaction between different types of actors in the value chain affects women's livelihoods.

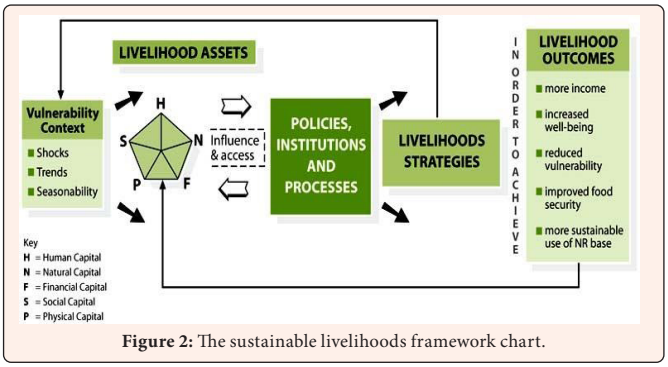

Figure 2: The sustainable livelihoods framework chart.

Method

Data were drawn from a survey conducted by IITA in 2010 in 4 geopolitical zones in Nigeria known for cassava production, where a total of 952 respondents, including 227 women, were surveyed. These zones were the South-West (SW), South-South (SS), South-East (SE), and North Central (NC). A total of 952 respondents were selected, comprising 38% (N= 361) who participated in project R4D interventions (participants) and 62% (N=591) who did not (non-participants). The participants were selected based on their initial participation in the project. These included 160 respondents from the SW, 96 respondents from the SS, 70 respondents from the SE, and 35 respondents from the NC. The non-participants were selected randomly from non-participating

communities in the regions. They included 262 from SW, 157 from SS, 114 from SE, and 58 from NC (Figure 2). To ensure a sub-nationally representative sample of communities and households, a three-stage stratified random sampling procedure was adopted, whereby States were used as strata to improve sampling efficiency. LGAs that are rural were used as primary sampling units (PSUs).

Enumeration Areas (EAs), defined as a cluster of housing units, were used as Secondary Sampling Units (SSUs). The rural smallholder farming households were used as the final sampling units. LGAs were selected from each State based on probability proportional to size, where size is measured in terms of the number of EAs. The EAs that formed the sampling frame were obtained from the Nigerian Bureau of Statistics (NBS), which uses the 2003/2004 master sample frame of the National Integrated Survey of Households (NISH). Finally, a list of households was developed for the selected EAs, and a sample of at least ten farming households was selected randomly in each of the sampled EAs. Trained enumerators administered community and household questionnaires under the field supervision of a senior agricultural economist and the direction of IITA's economist. The data was collected using a well-structured questionnaire (Figure 3).

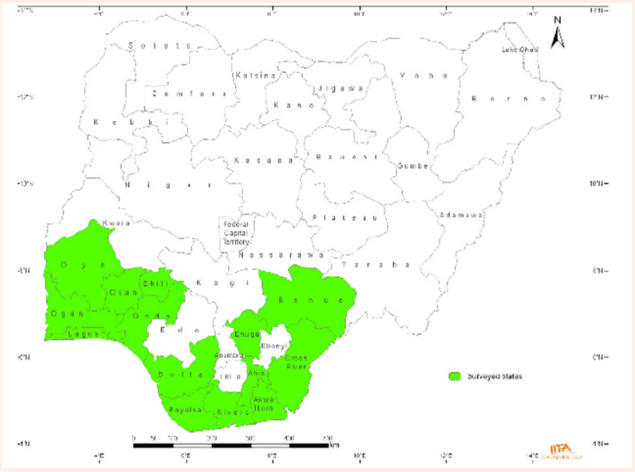

Figure 3: Map of the study area

Data Analysis

The study employed chi-square and t-test analysis to compare the dependent variable differences by gender to get a clear picture of how the variables differ for both men and women. Additionally, Pearson correlations to quantify the strength and direction of the relationship between the dependent and independent variables. Finally, we present four multiple regressions to analyze the individual and aggregate relationships between the independent and dependent variables.

Measures

Dependent variables

Participation in the cassava value chain was measured in terms of involvement in the processing and marketing phases as a function of personal, household, and farm variables. The specific measures were constructed as follows.

Index of Participation in Marketing: This indicator counts the number of marketing activities reported by the respondents. It ranges from zero to six. The component items are shown in (Table 1).

Index of Participation in Processing: This indicator counts the number of marketing activities reported by the respondent. It ranges from zero to six. The component items are shown in (Table 1).

Independent variables

Table 1: summarizes the independent variables used in the analysis. The questions, codes, and treatment are detailed therein.

Variables	Response codes	Percent (%)	Valid	Missing
Dependent				
Index of participation in marketing	Count (0 to 7)		952	0
Marketing cassava now	0 = No, 1 = Yes	0= 15.5, 1=84.5	952	0
Do you sell gari?	0 = No, 1 = Yes	0=38.6, 1=61.4	952	0
Do you sell fufu	0 = No, 1 = Yes	0= 76.1, 1=23.9	952	0
Do you sell starch?	0 = No, 1 = Yes	0= 97.88, 1=2.2	952	0
Do you sell flour paste?	0 = No, 1 = Yes	0=96.3, 1=3.7	952	0
Do you sell abacha?	0 = No, 1 = Yes	0=91.5, 1=8.5	952	0
Do you sell planting material?	0 = No, 1 = Yes	0= 70.8, 1=29.2	952	0
Index of participation in processing	Count (0 to 6)	6	952	0
Process cassava now	0 = No, 1 = Yes	0= 19.5, 1=80.5	952	0
Process gari now	0 = No, 1 = Yes	0= 31.8, 1=68.2	952	0
Process Fufu now	0 = No, 1 = Yes	0= 77.2, 1=22.8	952	0
Process starch now	0 = No, 1 = Yes	0= 97.8, 1=2.2	952	0
Process cassava flour(paste) now	0 = No, 1 = Yes	0= 94.7, 1=5.3	952	0
Process cassava chip (abacha) now	0 = No, 1 = Yes	0= 90.2, 1=9.8	952	0
Independent				
Years of farming cassava	(Years) 1 = 1-10, 2 = 11-20, 3 = 21-30, 4 = 31-40, 5 = >40	1=25.6, 2=31.7, 3=21.9, 4=14.6, 5=6.2	926	26
Producing cassava now?	0 = No, 1 = Yes	No = 4.0, Yes = 96.0	952	0
Land allocated to cassava farming	1 = under 5, 2 = 6-10, 3 = 11-15, 4 = >15 hectares	1=95.2, 2=4.3, 3=0.6	893	59
Tonnes of cassava harvested	1 = 1-10, 2 = 11-20, 3 = 21-30, 4= 31-40, 5= >40 tonnes	1=43.1, 2=25.2, 3=13.8, 4=5.5, 5=12.3	868	84
Main decision maker on farming activities	1= all members make decision, 0= else	1=1.8, 0=98.2	952	0
Age	1 = <20, 2=21-40, 3=41-60, 4=61-80, 5= >80 years	1=0.9, 2=25.6, 3=61.3, 4=11.7, 5=0.5	938	14
Gender	0 = Female, 1 = Male	0=23.2, 1=76.8	952	0
Education	1 = 1-5, 2 = 6-10, 3 = 11-15, 4 = 16 - 20, 5 = > 20 years	1=4.9, 2=26.7, 3= 62.2, 4=6.1, 5=0.1	729	223
Married	1= Married, else = 0	0=2.3, 1=97.7	952	0
Household size	1 = 1-5, 2 = 6-10, 3 = 11-15, 4 = 16 - 20, 5 = >20 persons	1=24.9, 2=57.5, 3=12.6, 4=2.9, 5=2.1	946	6

Analysis

Hypotheses were each tested at 95% confidence level (P≤0.05) using chi-square, t-test, correlation, and regression analysis in SPSS. Pearson correlations examined associations between the variables under study. The relationship between gender and participation in cassava processing and marketing with respondents' individual and farm characteristics was analyzed using regression. The regression model estimates the extent to which gender participation in processing and marketing correlated with the individual and farm characteristics of the respondents.
The model is represented below:

$$Y = f(X1, X2, X3, X4, X5, X6, X7, X8, X9, X10)$$

The explicit form of the model is represented thus.

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \beta 7X7 + \beta 8X8 + \beta 9X9 + \beta 10X10 + \varepsilon$ where,
Y1 = Index of participation in marketing.
Y2 = Index of participation in processing
X1 = Years of farming cassava
X2 = Producing cassava now
X3 = Land allocated to cassava farming
X4 = Quantity of cassava harvested
X5 = Main decision maker
X6 = Age of respondents
X7 = Gender of respondents
X8 = Education
X9 = Marital status
X10 = Household size
β1- β10 = estimated parameters
β0 = autonomous level of participation known as the constant.
ε = error term

Findings

Descriptive analysis

(Table 1) provides a descriptive summary of the dependent and independent variables. The variables considered in this study are indices of participation in both marketing and processing nodes as well as farm and individual characteristics of participants. The result showed that the two major marketed products were cassava tubers (84.5 percent) and garri (61.4 percent) for the index of participation in marketing. Findings for the processing index were also consistent with the marketing index as the two major processed products were cassava tubers and garri. About 81 percent of the participants currently engage in cassava processing, while 68 percent said they currently process gari. The descriptive analysis of the farm characteristics revealed that most of the participants (32 percent) have 11-20 years of experience in farming cassava. Likewise, the majority, 96 percent, answered yes to currently producing cassava, while 95 percent allocate below 5 hectares of land to cassava production, which suggests that most of the respondents were smallholder farmers. About 43 percent of the participants harvested 1- 10 tonnes of cassava, while 25 percent harvested between11-20 tonnes of cassava. Descriptive statistics of the primary decision-maker on farm activities revealed that 98 percent responded that one of the following: the husband, wife, children, or both husband and wife decides on farming activities while only 2 percent responded that all members of the household make a joint decision on farming activities. Results of individual characteristics indicate that most of the respondents (61.3 percent) were within the age range of 41- 60 years, 25. 6 percent were between 21-40 years, while the oldest was 100 years old. This means that most of the farmers are in their active years. The majority were male (77 percent), only 23 percent were female, while 98 percent were married. Lastly, the majority (58 percent) had a household size between 6-10 people per house, while about 24 percent had between 11-15 years of education. The descriptive analysis revealed that most respondents were male smallholder farmers in their active years, married, with large household size, and had more than secondary education. Most respondents were educated with large family sizes to assist in their processing and marketing operations.

Gender and value chain participation

(Table 2) shows significant chi-square test statistics at a 95 percent confidence level in bold. The result for the index of participation in marketing was significant at p<.05 with a chi-square statistic of (x^2=14.8). This means that participation in the marketing phase of the cassava value chain is associated with gender. Further, cassava tuber and garri marketing were statistically significant at 95 percent confidence level with (x^2=8.4 and 8.2). This implies that gender shapes participation in cassava tuber and garri marketing, explaining why there are more men marketing cassava tubers while we have more women selling garri. Since there was an association between gender and participation in the marketing index, we rejected the null hypothesis that there is no relationship between gender and participation in the marketing phase of the cassava value chain. Contrarily, the result for the index of participation in processing was not significant (x^2=5.5). However, there was a statistical significance for cassava chip (abacha) with x^2=16.2. This means that gender does not shape participation in the processing phase of the cassava value chain, which can be attributed to the heavy presence of the male gender in this phase of the cassava value chain. This finding is consistent with the Nigerian reality, as more men than women are involved in large-scale processing. Most women processing cassava do so at the household level, as food for the family, and sell the remaining, which often is insignificant. Therefore, we accepted the null hypothesis, which stated that there is no relationship between gender and participation in the processing phase of the cassava value chain since we did not find an association between the processing index and gender. Analysis of farm characteristics yielded a statistically significant chi-square value of x^2=27.2 for years of farming cassava and x^2=25.7 for tonnes of cassava harvested. Similarly, for individual characteristics, age, education, and household size yielded a statistically significant chi-square value of x^2= 18.8, x2=10.7, and x^2=18.9, respectively.

Gender differences

Table 2: Study variable differences by gender, Nigeria cassava farmers 2010.

Variable	Women	Men	t-test	Chi-square
Index of participation in marketing	2.5	2.13	-0.8	14.8
Marketing cassava now	0.78	0.86	-2.6	8.4
Do you sell gari?	0.7	0.59	2.5	8.2
Do you sell chips?	0.05	0.09	-2.1	3.5
Do you sell planting material?	0.31	0.29	0.8	0.6
Do you sell flour paste?	0.03	0.04	-0.5	0.2
Do you sell starch?	0.02	0.02	-0.5	0.2
Do you sell fufu	0.23	0.24	-0.3	0.1
Index of participation in processing	1.43	1.73	0.9	5.5
Process cassava chip(abacha) now	0.03	0.12	-5.7	16.2
Process starch now	0.01	0.03	-1.9	2.3
Process gari now	0.71	0.67	0.9	0.8
Process cassava flour(paste) now	0.04	0.06	-0.9	0.8
Process cassava now	0.8	0.81	-0.4	0.1
Process Fufu now	0.24	0.23	0.3	0.1
Farm characteristics				
Years of farming cassava	2.09	2.54	-5.4	27.2
Tonnes of cassava harvested	1.88	2.27	-3.5	25.7
Main decision maker on farming activities	0.03	0.01	1.4	3.1
Land allocated to cassava farming	1.04	1.06	-1.1	2
Producing cassava now	0.95	0.96	-1.1	1.6
Individual characteristics				
Household size	6.77	7.68	-4.5	19
Age	46.01	50.01	0.6	18.8
Education	2.51	2.63	-2.4	10.7
Married	0.99	0.97	1.3	1.2
Test statistics in bold p< .05				

(Table 2) shows the study variable differences by gender. An independent sample t-test was conducted to determine whether the gender differences in the index of participation in the marketing and processing nodes of the Nigerian cassava value chain and the farm and individual characteristics of the participants are statistically different. As shown in (Table 3), the result was statistically significant for the index of participation in marketing, marketing cassava now, garri, and chips with t values of -0.8, -2.6, 3.0, and -2.1. For the index of participation in marketing and garri, results show that the mean for women (2.50 and 0.70) is slightly higher than men (2.13 and 0.59 respectively). However, for marketing cassava now and do you sell chips, the mean score for the men (0.86 and 0.09 respectively) is slightly higher than the women (0.78 and 0.05). Again, t-test results show a statistically significant difference for starch and cassava chip processing with t-values of -2.0 and -5.7, but no statistically significant difference for tonnes of cassava harvested. The statistical significance for starch and cassava implies a gender difference in starch and cassava chip processing with a mean of 0.01 and 0.03 for women and 0.03 and 0.12 for men. For farm characteristics, t-test results were statistically significant for years of farming cassava, producing cassava, land allocated to cassava farming, and primary decision-maker on farming activities. A statistically significant t-test for years of farming cassava with a t-value of -5.4 with a slightly higher mean for men (2.54) than women (2.09) suggests that men have more years of experience in cassava production than their female counterpart. Also, there is no significant mean difference for both men and women regarding cassava production, nor for primary decision maker on farming activities. Men and women decide similarly on farming activities. With regards to farm characteristics, table 2 further reports a statistically significant mean difference for level of education, and household size, but not marital status (t= -2.3, 4.5, and 1.3). Men had more education and larger households. Comparing the t-test and chi-square statistics for the index of participation in marketing in table 2, the t-test was significant for cassava chips, but the chi-square test was not. This may be because chi-square test is more sensitive to nonlinear differences. Besides, there was no anomaly in the index of participation in processing and farm characteristics as the same variables were significant for the two tests. However, for individual characteristics, chi-square was significant for age (x2=18.8), but the t-test result did not show a significance because chi-square tested differences along five categories while the t-test measured differences in an interval variable.

Correlation

(Table 3) outlines the correlation matrix of the study variables. Correlation coefficients are used to quantify the strength of the relationship between two variables. It assesses how well the variables correspond in terms of high and low values. We report Pearson correlation coefficients, and the significant relationships are indicated in bold at the .05 level of significance

Table 3: Pearson correlations among study variables, Nigeria cassava farmers 2010.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Index of participation in marketing	--										
2. Index of participation in processing	0.117	--									
3. Years of farming cassava	0.109	-0.02	--								
4. Producing cassava now	-0.082	0.002	0.089	--							
5. Land allocated to cassava farming	0.05	-0.06	0.146	0.011	--						
6. Tonnes of cassava harvested	-0.009	-0.021	-0.063	0.027	-0.027	--					
7. Main decision maker on farming	0.01	0.06	0.534	0.005	0.093	0.117	--				
8. Age	0.041	0.003	0.161	0.04	0.035	0.12	-0.057	--			
9. Gender	-0.07	-0.016	-0.13	0.026	-0.056	-0.063	0.041	0.142	--		
10. Education	-0.076	-0.006	-0.095	0.04	0.031	-0.119	-0.032	0.037	0.062	--	
11. Married	0.065	0.153	0.263	0.072	0.156	0.091	0.037	0.08	-0.035	-0.017	--
12. Household size	0.117	-0.02	0.089	0.011	-0.027	0.117	-0.057	0.143	0.139	0.005	-0.024

Bold: Coefficient significant at the 0.05 level (2-tailed); Bold italic: .01 level

(Table 3) presents the correlation matrix of the study variables. Significant relationships are indicated in bold and bold italics. As indicated in (Table 3), years of farming cassava, producing cassava now, tonnes of cassava harvested, gender, education, marital status, and household size registered correlations with the index of participation in marketing. The results signify that, years of experience in cassava production, engagement in cassava farming, the quantity of cassava harvested, gender, and household size say quite a bit about participation in the marketing phase of the cassava value chain in Nigeria. In contrast, only marital status registered an association with the processing index. The correlations between the independent variables and the indices of participation in marketing and processing were weak. This implies that the association between the dependent and independent variables did not say much about participation in the value chain. However, the correlation results suggest that regression analysis will produce reliable estimates as there was no multicollinearity.

Regression analysis

Table 4: Regression of value chain participation measures on selected farm and personal characteristics by gender, Nigeria cassava farmers 2010.

Standardized beta coefficients				
	Index of participation in processing		Index of participation in marketing	
Variable	Men	Women	Men	Women
Producing cassava now	0.056	0.179	0.129	0.302
Tonnes of cassava harvested	-0.007	0.211	-0.148	0.24
Household size	0.087	-0.023	0.168	0.093
Education	-0.083	-0.033	-0.024	0.015
Age	0.023	-0.02	-0.013	0.012
Land allocated to cassava farming	-0.099	-0.067	-0.006	0.007
Married	-0.092	-0.014	-0.037	0.002
Main decision maker on farming activities	-0.009	-0.011	-0.015	-0.086
R2	0.034	0.078	0.063	0.169
Adjusted R2	0.024	0.043	0.053	0.138
F-ratio	3.215	2.248	6.075	5.395
N	731	221	731	221

Bold: $p < 0.05$ level (2-tailed). Bold italic: $p < 0.01$ level (2-tailed).

(Table 4) details the standardized beta coefficients for the regression analysis of the cassava value chain participation on the selected farm and personal characteristics by gender. In this study, the variables of interest were the relationship between the indices of participation in marketing and processing with selected farm and individual characteristics. The significant relationships are indicated in bold italics and bold at .01 and .05 levels of significance.

Cassava processing

We present regressions for males and females to address the research question asking if farm and individual characteristics (independent variables) acted as statistically significant predictors of participation in cassava processing by gender (dependent variable). Additionally, the standardized beta coefficients addressed the research question related to which of the independent variables carries more weight in predicting participation in cassava processing by gender. A comparison of the standardized beta coefficients in (Table 5) indicates that the main decision-maker on farming activities, marital status, and household size statistically predict for men at $p < .01$ and $p<.05$ levels of significance while producing cassava now and tonnes of cassava harvested are predictors for women at $p<.01$ level of significance. For men, the negative beta coefficients for educational level and marital status denote that a unit increase in education and marital status reduces the chances for men to participate in cassava processing. However, a positive beta coefficient for household size means that a larger household size encourages the men to participate in cassava processing. This could be attributed to the fact that the processing node is quite labor-intensive. Besides, for women, the positive beta coefficients for producing cassava now and tonnes of cassava harvested connotes that a unit increase in the two variables motivates women's participation in processing activities. Thus, we can safely conclude that the determining factor for women's participation in the processing node of the cassava value chain depends on whether they are involved in cassava production and the quantity of the cassava harvested. It could also mean that they process the cassava they produce. The R2 value of .034 for men shows that approximately 3.4 percent of the variance in cassava processing variance can be accounted for by its linear relationship with both farm and individual characteristics. For the women, the R2 value of .078 reveals that approximately 7.8 percent of the variance in cassava processing variance can be accounted for by its linear relationship with both farm and individual characteristics. For women, the decision to participate in cassava processing depends on whether they plant cassava or not and the quantity of cassava harvested. Based on the positive beta coefficients for women, we can conclude that the higher the quantity of cassava produced and harvested, the more likely it is for women to participate. In other words, the availability of land for farming and higher yield will encourage women to participate in cassava processing.

Cassava marketing

(Table 5) shows the regression analysis of marketing participation on the selected farm and personal characteristics by gender. Producing cassava now predicted marketing activity for both men and women but was stronger for women. In contrast, the more cassava men reported harvesting, the fewer marketing activities in which they engaged. For women, the relationship was opposite the more they produced the more marketing activities they engage in. Large producers may have established buyers that belie the need for additional marketing activities. Household size predicted marketing engagement for both men and women, but the relationship was stronger for men. The production characteristics and personal attributes together predicted marketing participation for both men and women, but the explained variation was much greater for men.

Conclusion

Mapping the gender structure and functioning of the traditional cassava value chains ensures that women's position in the female-dominated nodes of the value chains is strengthened, ensuring more social and economic empowerment. Moreover, value chain analysis by gender also guarantees that women enter the more profitable male-dominated nodes of the cassava value chains, thereby promoting gender equality and economic development. Consequently, this study examined gender participation in the processing and marketing phases of the cassava value chain in Nigeria through the relationship between selected farms and individual characteristics and participation in the marketing and processing phases of the Nigerian cassava value chain Two dominant marketed products were cassava tubers and garri, while the major processed products were cassava tubers and fufu. The t-tests compare means for males and females, and results showed a statistical significance for the index of participation in marketing but were not significant for cassava processing. The higher mean score for women implies that we have slightly more women than men in the marketing node of the cassava value chain. The results indicate that men have more years of experience in cassava farming, have more land allocated to cassava production, and higher yields than their female counterparts. Also, the men were older, more educated, and had larger household sizes than the women.

For correlation analysis, producing cassava now, land allocated to cassava farming, level of education, marital status, and household size registered correlation with the index of participation in marketing. However, only household size registered a weak correlation with the index of participation in processing. These findings align with the Sustainable Livelihood Framework and suggest that participation in the marketing and processing phases of the Nigerian cassava value chain is a livelihood strategy for the chain actors. The Livelihoods framework constitutes the skills, assets (both material and social), and the strategies for individuals' and communities' survival. The sustainability element connotes that these individuals or communities can cope with moments of stress and crisis and maintain or even improve current and future skills and assets without depleting natural resources [27]. The findings are firmly in line with the submission of UNDP (2017), that there is likely a strong interdependence between (a) structures and processes for transformation and the level of vulnerability in each context; and (b) achievements in livelihoods and assets which influence livelihoods. In this study, we established statistically significant farm characteristics and the indices of participation in the marketing and processing phases of the Nigerian cassava value chain. Notably, we discovered that education, primary decision-maker, marital status, and household size were motivating factors for men to participate in the cassava processing phase while producing cassava now, and tonnes of cassava harvested were determining factors for both men and women in the marketing phase of the cassava value chain. The SLF sheds light on how the poor live and coordinate assets to cope with vulnerabilities for a sustainable livelihood outcome. Capital assets that the rural poor draw upon as a source of livelihood include human, social, natural, physical, and financial capital [27] states that human assets refer to health, nutrition, education, knowledge and skills, capacity to work, and capacity to adapt. However, this study extends human capital to include all household members working together to sustain a livelihood.

In terms of human asset, the study finds that household size was significant for the male. The implication of this is that male-headed households will have more hands to support their processing or marketing venture, consequently cushioning the effects of shock, seasonality, or critical trends that may threaten their livelihood strategies. This finding supports argument that human assets are vital for labor supply for agricultural

activities in the rural context, comprising primarily family labor. Family labor is vital to smallholder farmers because of its lower cost and better quality of farmhands than hired labor because household members have personal stake in the benefits of production activities. However, household size was not significant for women, which translates to increased vulnerability for female-headed households as this will limit the scale of production, hence, reducing their abilities to cope with shocks, seasonality, or critical trends that may arise. This may lead to reduced well-being of the womenfolk, reduced food security, and increased vulnerability, negatively impacting rural women's livelihood outcomes [28-35].

However, the study cannot analyze assets like social, natural, physical, and financial capital since land allocated to cassava farming was not significant for this study. This study did not consider credit facilities availability and respondents' involvement in any social or producer organizations. One limiting factor of the Sustainable Livelihood Framework is that it does not take gender into cognizance, hence, this study also utilized gender and development for our analytical framework. The Gender and Development (GAD) approach focuses on the socially constructed differences between men and women, the need to challenge existing gender roles and relations, and the creation and effects of class differences on development. Findings for this study are also in line with the prediction of Ester Boserup, the pioneer of the theoretical perspective of gender and development, about the gendered division of labor in agricultural value chains and what motivates the different actors for development. This study established a significant gender disparity in access to productive resources and decision-making. For instance, household size, primary decision-maker on farming activities, education, and marital status significantly predicted men's participation in the marketing and processing nodes of the VC, which may be due to the social relationship between men and women which has systematically subordinated women. Our results showed that most male respondents had larger household sizes than their female counterparts. Consistent with the Nigerian reality; a large household size has an economic advantage.

With a large household, respondents will have more hands to support them in their marketing and processing activities. Large household size also means that they have more mouths to feed, hence the motivation to increase their production scale. Women are the ones who bear the burden and feel the heat of having a large household. This is because they are responsible for taking care of everyone in the family; they are saddled with the responsibilities of caring for the sick and elderly, bearing and rearing children, and other day-to-day house-keeping activities, further guaranteeing that they are not at par with their male counterparts.Resilient value chains have the potential for strategically supporting production, value addition, and distribution of all agricultural products. In Nigeria's case, value chain function and access have consequences for a sizable proportion of the population and economy. The role of women in value chains in Nigeria is both severely disadvantaged and critical. Nigeria must address the issues facing women within its agricultural sector for economic progress [36-44].

The cassava value chain, a significant import sub-sector in guaranteeing food security and income generation, needs an overhaul. The development of higher-functioning and more inclusive value chains will require the engagement, education, and support of all value chain actors, both male and female. The findings established a differential gender participation in the marketing and processing phases of the Nigerian cassava value chain, albeit a slight difference. Men had a higher representation in cassava processing than women. This finding corroborates, that cassava processing has become more commercialized, but men increasingly own and manage cassava processing enterprises. The government needs to support the integration of gender equality and women's empowerment objectives in agri-food value chain interventions and ensure that they are inclusive and socially sustainable and seek support on how best to address gender issues in their work on agri-food value chains. Furthermore, the findings uncovered gender disparity in education, decision-making regarding farming activities, the quantity of cassava harvested, land allocated to cassava production, and participation in the marketing and processing phase of the cassava. Thus, assessing the broader context from a gender lens in analyzing the value chain helps understand both women's and men's playing ground within the economy. It identifies the areas in which gender discrimination is more pronounced (e.g., with education, financial inclusion, or ownership of agricultural assets) and anticipates the challenges and opportunities women are likely to face in food value chains. Therefore, agricultural policies and strategies should consider gender concerns to ensure a level playing ground for male and female actors in the value chain. Gender relations determine access to assets and resources, participation, and decision-making power, all of which directly impact the performance and governance of the chain. Since producing cassava now and tons of cassava harvested are predictors for participation in the processing and marketing phases of the value chain, the government should intensify its efforts to remove the cassava production barriers to facilitate a robust and more inclusive cassava industry that has the potential to promote more equitable access to value chain entrepreneurship opportunities and advance Nigeria's economic revitalization goals. Also, both government and non-governmental organizations need to intensify campaigns on gender inequalities to sensitize the Nigerian public on disaggregating control of resources and decision making within the household, planning for balancing work and household responsibilities to reduce the time poverty for women. Lastly, interventions should involve women in planning and needs assessment through a participatory research approach [45-54].

The study identified four nodes of the cassava value chain; input supply, cassava production, cassava processing, and cassava marketing but only analyzed two nodes. Thus, further studies should investigate the input supply and access to productive resources. Also, this study did not have enough data to analyze gender participation in cassava production; hence, further studies should analyze gender participation in cassava production to have a clearer picture of the Nigerian cassava value chain and to further ensure that women enter the profitable node of the Nigerian cassava value chain. There is a rising commercial opportunity in producing high-quality cassava flour (HQCF) for women. However, this study did not examine the supply of cassava tubers to large-scale processors and did not exhaust all the processed cassava products, including the earning potential of other processed products. Thus, further research might want to look at the barriers preventing women from unlocking the higher earning potential in this profitable venture in the Nigerian cassava value chain. New commercial opportunities for processed products could increase women's direct benefit through increased income and employment opportunities. Future studies may want to analyze gender participation in the cassava value chain using a qualitative approach to capture the nuances and views of the participants that a quantitative design would not capture.

References

1. Abdulsalam-Saghir, Petra (2011) Cassava: Adding Value for Africa–Gender and Diversity as a Driving Force. Agricultural Innovations for Sustainable Development 3(2).
2. Onyemauwa, Chinasaokwu Sebastian (2012) Analysis of Women Participation in Cassava Production and Processing in Imo State, Southeast Nigeria. Agricultura Tropica et Subtropica 45(2): 72-77.
3. Azeez FA, JM Usman, OO Obadimu, P Mukarumbwa, GB Kabir (2021) Women Involvement in Cassava Value Chain among Cassava Processors and Marketers in Afijio Local Government Area, Oyo State, Nigeria. Russian Journal of Agricultural and Socio-Economic Sciences 110(2): 103-109.
4. Devaux, Andre, Maximo Torero, Jason Donovan, Douglas Horton (2018) Agricultural Innovation and Inclusive Value-Chain Development: A Review. Journal of Agribusiness in Developing and Emerging Economies 8(1).
5. Hill, Ruth Vargas, Marcella Vigneri (2014) Mainstreaming Gender Sensitivity in Cash Crop Market Supply Chains. The Food and Agricultural Organization of the United Nations, (Rome) ESA, Working Paper 11-08.
6. Nweke, Felix I (1999) Gender Surprises in Food Production, Processing, and Marketing with Emphasis on Cassava in Africa. COSCA (Ibadan), IITA, Working Paper P. 19.
7. Andersson, Karolin, Johanna Bergman Lodin and Linley Chiwona-Karltun (2016) Gender Dynamics in Cassava Leaves Value Chains: The Case of Tanzania. Journal of Gender, Agriculture and Food Security (Agri-Gender) 1(302-2016-4753): 84-109.
8. Baden, Sally, Hazel Reeves (2000) Gender and Development: Concepts and Definitions: BRIDGE Development-Gender Report No 55.
9. Coker, Ayodeji Alexander Ajibola, Christopher C Molokwu, Benjamin C Odoemena, Jeremiah G Tuedogheye et al. (2017) Enterprise Analyses across Cassava Agribusiness Value Chain in Niger-Delta Region of Nigeria: Implications for Agribusiness, Women and Youth Policies. Paper presented at the 18th Annual National Conference of the Nigerian Agricultural Economists, Abeokuta, Nigeria, October 16-19.
10. Coulibaly O, AD Arinloye, M Faye, T Abdoulaye (2014) Regional Cassava Value Chains Analysis in West Africa. CORAF/WECARD.
11. Mukasa, Adamon N, Adeleke O Salami (2015) Gender Productivity Differentials among Smallholder Farmers in Africa: A Cross-Country Comparison. African Development Bank Group (Abidjan) AFDB, Working Paper Ppp. 231.

12. Ao, Xuan Hoa, Trinh Vuong Vu, Khac Dong Le, Sopin Jirakiattikul et al. (2019) An Analysis of the Smallholder Farmers' Cassava (Manihot Esculenta Crantz) Value Chain through a Gender Perspective: The Case of Dak Lak Province, Vietnam. Cogent Economics & Finance 7(1): 1645632.
13. Apata, Temidayo Gabriel (2019) Analysis of Cassava Value Chain in Nigeria: Pro-Poor Approach and Gender Perspective. International Journal of Value Chain Management 10(3): 219-237.
14. Coles, Christopher, Jonathan Mitchell (2011) Gender and Agricultural Value Chains: A Review of Current Knowledge and Practice and Their Policy Implications. The Food and Agricultural Organization of the United Nations, (Rome) ESA, Working Paper 11-05.
15. Aganyira, Kellen (2005) Aquaculture: A Tool for Sustainable Development in Uganda.: A Case Study of Kigoowa Catholic Women's Association in Kampala District. Master's thesis, Faculty of Social Science and Technology Management Norwegian University of Science and Technology, Trondheim-Norway.
16. Boserup Ester, SF Tan, C Toulmin (2013) Woman's Role in Economic Development. London: Routledge.
17. Agada, Mary O, Favour I Onuche, Evangeline N Mbah (2018) Gender Participation and Constraints in Cassava Production, Processing and Marketing in Makurdi, Benue State, Nigeria. International Journal of Gender and Women's Studies 6(1): 79-87.
18. Ahmadu, Joyce, PO Idisi (2014) Gendered Participation in Cassava Value Chain in Nigeria. Merit Research Journal 2(11): 147-153.
19. Folake FHB, MA Adeyemi, TF Ojo (2020) Gender Assessment of Pig Farmers' Preference for Training Logistics in the Use of Cassava Plant Meal in the Diet for Pigs in South-West Nigeria. Archivos de Zootecnia 69(265): 172-183.
20. Samuel, Darko-Koomson, Aidoo Robert, Abdoulaye Tahirou (2020) Analysis of Cassava Value Chain in Ghana: Implications for Upgrading Smallholder Supply Systems. Journal of Agribusiness in Developing and Emerging Economies 10(2): 217-235.
21. German, Laura A, Anya M Bonanno, Laura Catherine Foster, Lorenzo Cotula (2020) Inclusive Business in Agriculture: Evidence from the Evolution of Agricultural Value Chains. World Development 134: 105018.
22. Kaplinsky R, M Morris (2000) A Handbook for Value Chain Research. Institute of Development Studies, University of Sussex, UK and Center for Research in Innovation Management, University of Brighton.
23. Ajie, EN, Uche Chima (2019) Food Insecurity in Nigeria and the Need for Effectual Mitigating Measures. American Journal of Basic and Applied Sciences 2(9).
24. Joshua Sikhu, Okonya, Mudege Netsayi Noris, M Rietveld Anne, Nduwayezu Anastase, et al. (2019) The Role of Women in Production and Management of Rtb Crops in Rwanda and Burundi: Do Men Decide, and Women Work?. Sustainability.
25. Forsythe, Lora, Helena Posthumous, Adrienne Martin (2016) A Crop of One's Own? Women's Experiences of Cassava Commercialization in Nigeria and Malawi. Journal of Gender, Agriculture and Food Security 1(2): 110-128.
26. Emerole, Christopher Ogbonna, Anderson Nwalozie Nwachukwu, Chidozie Onyedikachi Anyiro, Victor Ebong et al. (2014) Cassava Entrepreneurship and Gender Participation in Udi Local Government Area of Enugu State, Nigeria. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development 14(1): 127-138.
27. Serrat, Olivier (2017) The Sustainable Livelihoods Approach. Knowledge Solutions 21-26.
28. Dorward, Andrew, Jonathan Kydd (2003) Policy Reform in Sub Saharan Africa. Paper presented at the Policy Reform and Adjustment Workshop, Imperial College London (WYE Campus), Kent.
29. Scoones Ian (2009) Livelihoods Perspectives and Rural Development. The Journal of Peasant Studies 36(1): 171-196.
30. Masamha, Blessing, Veronica Ne Uzokwe, Frederick Evans Ntagwabira, Damien Gabagambi et al. (2019) Gender Influence on Participation in Cassava Value Chains in Smallholder Farming Sectors: Evidence from Kigoma Region, Tanzania. Experimental Agriculture.
31. Moyo, Christabelle S (2013) Rural Women and Land, the Inseparable Twins: A Case of South Africa. Gender and Behaviour 11(2): 5393-5401.
32. Nwachukwu, Chibuzor, Doris Anoliefo, Chigozie Onwusirib, Chibuzo Okpokiri (2020) Contributing Factors and Restrictions to the Participation of Rural Women in Cassava Processing in Isiukwuato Area of Abia State, Nigeria. Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development 20(4).
33. Ahmadu, Joyce, PO Idisi (2014) Gendered Participation in Cassava Value Chain in Nigeria. Merit Research Journal 2(11): 147-153.
34. Alves, Alfredo Augusto Cunha (2002) Cassava Botany and Physiology. Cassava: Biology, Production and Utilization 1: 67-89.
35. Aseltine, Robert H, Ronald C, Kessler (1993) Marital Disruption and Depression in a Community Sample. Journal of Health and Social Behavior 34(3): 237-251.
36. Cramer, Christopher, Deborah Johnston, Carlos Oya, John Sender (2014) Fairtrade, Employment and Poverty Reduction in Ethiopia and Uganda. FTEPR
37. Darko-Koomson, Samuel, Robert Aidoo, Tahirou Abdoulaye (2020) Analysis of Cassava Value Chain in Ghana: Implications for Upgrading Smallholder Supply Systems. Journal of Agribusiness in Developing and Emerging Economies 10(2).
38. Gaffney, Angela, Claire Kpaka, Elysia Slakie, C Leigh Anderson (2019) Cassava Integrated Value Chain. Bill and Melinda Gates Foundation (Washington), EPAR, Brief No 223.
39. Hanan, Anne Lassen (2013) Re-Engaging the Unequal Distribution of Rewards: A Study of Trust among Actors in the Yam and Cassava Value Chain in Ghana. Ph.D. Proposal Doctoral School of Humanities, Aalborg University, Northern Denmark.
40. Kalleberg Arne L, Barbara F, Reskin, Ken Hudson (2000) Bad Jobs in America: Standard and Nonstandard Employment Relations and Job Quality in the United States. American Sociological Review 65(2): 256-278.
41. Kareem IA, IA Ayinde, AO Dipeolu, CI Sodiya (2017) Comparative Gender Efficiency in Cassava Production in Ogun State, Nigeria. Natural Sciences Education 46(1): 1-6.
42. Krantz, Lasse (2001) The Sustainable Livelihood Approach to Poverty Reduction. SIDA. Division for Policy and Socio-Economic Analysis. 44-98.
43. Lagat, Job Kibiwot, Mary Chepkoech Maina (2017) A Gender and Decent Work Analysis of Cassava Production and on-Farm Processing, in Kuria West Sub-County, Kenya. African Journal of Agricultural Research 12(31): 2533-2544.
44. Lambrecht, Isabel, Monica Schuster, Sarah Asare Samwini, Laura Pelleriaux (2018) Changing Gender Roles in Agriculture? Evidence from 20 Years of Data in Ghana. Agricultural Economics 49(6): 691-710.
45. Masamha, Blessing, Vusilizwe Thebe, Veronica NE Uzokwe (2018) Mapping Cassava Food Value Chains in Tanzania's Smallholder Farming Sector: The Implications of Intra-Household Gender Dynamics. Journal of Rural Studies 58: 82-92.
46. Mayanja S, NN Mudege, D Naziri (2016) Gender Situational Analysis of the Cassava Value Chain in Western Uganda and Strategies for Gender Equity in Postharvest Innovations. CGIAR, Peru.
47. Nkuba, Dorothy V (2007) Rural Tanzanian Women's Agency: Experiences and Responses to Socio-Economic Challenges. PhD Dissertation University of the Incarnate Word, Texas, USA
48. Otunba Payne, Gabriella (2020) An Analysis of the Role of Women in the Cassava Value Chain in Nigeria. Master's Thesis, Department of International Agriculture and Rural Development, Cornell University.
49. Ross, Margaret E, David M Shannon (2011) Handbook on Applied Quantitative Methods in Education. Dubuque, Iowa. Kendall/Hunt Publishing Company.
50. Samuel, Darko-Koomson, Aidoo Robert, Abdoulaye Tahirou (2020) Analysis of Cassava Value Chain in Ghana: Implications for Upgrading Smallholder Supply Systems. Journal of Agribusiness in Developing and Emerging Economies 10(2): 217-235.
51. Serpagli A, GP Nagori, G Amoriggi, C Calvosa (2010) The Use of Cassava Wastes to Produce Energy: Outcomes of a Feasibility Study Implemented in Ghana, IFAD RTIMP.
52. SHIOYA, Akiyo (2013) Cassava Processing and Marketing by Rural Women in the Central Region of Cameroon. African Study Monographs 34(4): 203-219.
53. Teeken, Béla, Olamide Olaosebikan, Joyce Haleegoah, Elizabeth Oladejo, Tessy Madu, et al. (2018) Cassava Trait Preferences of Men and Women Farmers in Nigeria: Implications for Breeding. Economic Botany 72(3): 263-277.