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Effects of rural infrastructure on cassava commercialization in Kajola Local Government Area of Oyo State, Nigeria

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ABSTRACT

BACKGROUND:
Generically, infrastructure is critical to any economic development.

OBJECTIVE:
This study examined the effect of rural infrastructure (with emphasis on road and market facilities) on commercialization of cassava in Kajola Local Government Area of Oyo State, Nigeria. It examined the conditions of rural infrastructure facilities that the cassava farmers have access to, analyzed the level of commercialization among cassava farmers, and determined the relationship between rural infrastructure and cassava commercialization among the farmers.

METHODS:
Primary data was collected using a semi-structured questionnaire. Multi-stage sampling technique was used to select cassava farmers. Descriptive statistics (mean, standard deviation, percentage etc), infrastructural index, household commercialization index, and Tobit regression model, were used to analyze the data collected.

RESULTS:
Majority of the cassava farmers were males (70.50%), married (82.73 %), household size (6±3 persons), educated (93.53%) relatively young and agile (43.6±10.2 years). Also, mean farm size was of 7.1ha. ±9.8ha, farming experience was 13.3±8.8 years and (80.52%) were primarily employed in farming. Most farmers were producing at subsistence level and are yet to reach full cassava commercialization level.

CONCLUSION:
Inadequate provision of rural infrastructure hindered transformation of cassava farmers' level of production from subsistence level to commercialization level in the study area.

KEYWORDS:
Rural farmers, infrastructure, cassava, commercialization, Kajola and Oyo State

INTRODUCTION

Cassava (Manihot esculenta) has become an important crop globally by production, consumption and trade. Africa production stands at 192 million metric ton (MT), accounts for not less than 64% world production. More importantly, Nigeria cassava production as at 2020 is over 60 million MT[1, 2]. Cassava has been one of the fastest expanding staple crops that has attained economical prominence and crop to reckon with in Nigeria agriculture subsector in recent time[3, 4]. Its roles have gone beyond being a subsistence crop and industrial raw material only, but now serves as panacea to national food insecurity, employment and income generating farming enterprise. As reported by Adekunle, Edamisan and Adeyose[1,3], approximately, 84% of cassava has been for human consumption and 16% for industrial use, with hope that more quantity would be required by industrial sector in future.

Cassava versatility and increasing utilities resulting to huge demand have prompted transformation of cassava from being a survival farming oriented crop to a commercial oriented crop[5]. In recent time, the pressure of increasing demand on cassava has changed the orientation of most rural cassava farmers from being subsistence producers to commercially inclined cassava famers,[6]. However, to operate at optimum level as commercial farmers require adequate availability of basic rural infrastructure, without which production lines could be truncated,[7].

Commercialization refers to higher degree of engagement with markets, either for inputs, outputs or both. It means that agriculture commercialization is having higher propensity to increase specialization at farm household level[8]. Precisely, agricultural commercialization refers to process of transformation of agriculture production orientation from domestic objectives to revenue generating through increasing the proportion of agricultural outputs that is sold, resulting in better standard of living of farming households[9]. It is defined as increased input and output-market participation by farmers and this is an important way through which farmers can increase their productivity and income leading to better investment in cassava production and overall improved standard of living for the farming households[8, 9].

The work of Sugrinoma et al[8], highlighted the synergy in agricultural technological change, agricultural productivity and agricultural commercialization. He explained that access to innovative technologies is desired to improve productivity and increase market surplus. Also, the profitability of adopting productivity enhancing technologies is also associated to the accessibility of farm households to markets and their level of commercialization. Other studies submitted that some of the factors influencing agricultural commercialization also include rural infrastructure; thus can either facilitate or hamper commercialization,[10]. Decayed rural infrastructure hamper agricultural commercialization through its impact on marketing channel, processing, prices and dissemination of technology thus affects combination of inputs and outputs,[10]. Farming households whose food production hardly meets their consumption requirements are expected to be less commercialized, while market oriented farmers produced enough for family consumption and generate revenue. Then income earned from marketing of produce may significantly facilitate input acquisition and hence increased commercialization. Also, high transaction costs faced by farmers' influence commercialization; with low proportions of products exchange in the markets[11]. Improving the level of commercialization of cassava farmers requires the examination of the factors that affect commercialization level of farmers and among the critical factors is rural infrastructure.

According to Ogunleye et al[11], infrastructures is defined as factors of production, increasing aggregate output and driving economic growth. Furthermore, he expressed that the demand for infrastructure is driven largely by economic and population growth[12] and it has been further alluded that several years of underinvestment and poor upkeep have left Nigeria with a significant infrastructure deficit that is holding back development and economic growth. According to Sugrinoma et al [8] provision of efficient infrastructure is now widely recognized as indispensable to improve farmers' user-friendliness to markets and increase their inducement to invest leading to agricultural progress as it is a known fact that infrastructure can support economic growth, reduce poverty and make environmental development sustainable.

The work of Ogunleye et al[11] classified rural infrastructures as physical, social and institutional forms of capital. The main components of physical infrastructure include transport (road), market, storage, processing, irrigation and flood control, water resources development and social conservation facilities. Social infrastructure includes health and education facilities and rural utilities such as electricity and water supply, while institutional infrastructure includes the cooperative societies, farmers' unions, financial institutions such as bank, microfinance facilities, agricultural research facilities, agricultural extension and trading facilities, and agricultural markets. Inadequate provision of basic infrastructure may impose additional stress on the available ones which are not regularly maintained, leading to eventual breakdown in many instances. This has accounted for substantial loss of productive time and economic values in Nigeria. The rural areas are specifically worse-off in terms of key agricultural infrastructures; transportation (access road) and rural market facilities[12].

The rally point of previous studies has been a general concept of needs for infrastructure development in Nigeria. The studies of rural infrastructure have failed to consider the effects of available rural infrastructure on cassava commercialization[11]. Therefore, this paper x-rayed the specific effect of rural infrastructure (with emphasis on road and market facilities) on commercialization among cassava farmers in Kajola local government area of Oyo state, Nigeria. The following research questions are the pivot leading for this study: What are the conditions of rural infrastructure facilities that the cassava farmers have access to? What is the level of commercialization among cassava farmers in the study area? Is there any significant relationship between rural infrastructure and commercialization among cassava farmers in the study area?

METHODS
Study area
Kajola local government is located in Oyo North region (Oke-ogun region) of Oyo state, Nigeria. it is situated in a midst hills and valleys with its topography characterized in the area landforms, a hilly terrain, rocky features, flat plain, valleys and vegetation with area of 609km2 and a population of 200,997 at the 2006 census. The people in the area engaged in various occupations such as: farming, trading, and civil service.

Sampling procedure
Primary data were collected using a semi-structured questionnaire. Data collected include; socio-economic characteristics such as age, household size, and marital status, access to rural infrastructure, and level of commercialization among the cassava farmers in the study area. Multi-stage sampling technique was used for the selection of the respondents; the first stage involved random selection of five wards out of eleven wards namely: Isemi-ile/Imia/Ilua, Ayetoro-oke, Ijo, Ilaji-oke/Iwere-oke, and Ilero. The second stage involved random selection of two villages each from the five wards. The last stage involved selection of cassava farmers proportionate to size, to make total one hundred and fifty sample size. However, only one hundred and thirty-nine were used for data analysis after data cleaning exercise.

Analytical techniques
Descriptive statistics, infrastructural index, household commercialization index, and tobit regression model, were used to analyzed the data collected. Descriptive statistics such as mean, percentage, frequency were used to profile the socio economic characteristics of the cassava farmers in the study area.

Infrastructural index
The composite degree of infrastructure development was adopted from 13, 14. Individual transportation cost (ITCi) of the cassava farmers in each of the village (N) was obtained by summing up the individual cost of access (CAi) to two basic infrastructure elements in this study (road and market). An average total cost (ATC) of getting to each of the infrastructure element across the communities was computed and used to divide the average costs (ACi) of getting to a particular infrastructure facility in each of the villages. The outcome of this step Wi was summed up to obtain the infrastructural index (INF). The INF indicates the degree of access to infrastructure by the cassava farmers. Thus, the value of infrastructural index increases with access of cassava farmers to infrastructure.

$$AC_i = \frac{\sum_{i=1}^{n} ITC_i}{N} \qquad (1)$$

$$CA_i = \sum_{i=1}^{n} AC_i \qquad (2)$$

$$ATC_i = \frac{CA_i}{N} \qquad (3)$$

$$W_i = \frac{AC_i}{ATC_i} \qquad (4)$$

$$INF = \sum_{i=1}^{n} W_i \qquad (5)$$

Where:
ITC_i = individual transportation cost of getting to each infrastructure by the respondents in each community (N);
AC_i = average cost of transportation in each community to a particular infrastructure (N);
CA = total cost of transportation to a particular infrastructure across communities (N);
ATC = average cost of transportation to a particular infrastructure across communities (N);
W_i = weight of average transportation cost attached to infrastructure in each community;
INF = infrastructural index;
N = total number of communities;
n = number of respondents in each community.

Household commercialization index
The Commercialization index used both household commercialization index (HCI) and composite weighted index for value addition. The HCI model has been extensively used to categorize the levels of commercialization 15. It is an estimated single index for market participation, taking into account the gross value of sales and production. The index measures the orientation of farmers towards commercialization which ranges from 0 to 1. The interpretation of the index is that the intensity of commercialization increase as the value tends to one. Household commercialization index was estimated as follows:

$$HCI = \frac{\text{Gross value of cassava sales}}{\text{Gross value of all cassava producted}} \times 100$$

Tobit regression model
The Tobit regression model was employed to analyze the effects of rural infrastructure on cassava commercialization among the cassava in the study area. This allows for the estimation of linear relationships between dependent and independent variables. The model is expressed explicitly as adapted from (17).

$$y_i^* = \beta_0 X_i \beta + \varepsilon_i$$

Where:
y_i^* = commercialization index (index ranges from 0 to 1).
β_1 = Parameters to be estimated.
ε_i = Error term
X_i = Vector of explanatory variables
$X1$ = Infrastructure index
$X2$ = Sex (male=1, female = 0)
$X3$ = Marital status (married=1, otherwise=0)
$X4$ = Mode of land acquisition (individual=1, otherwise = 0)
$X5$ = income (naira)
$X6$ = Farm size in hectares
$X7$ = Level of education (formal =1, otherwise =0)
$X8$ = Membership of producer association (membership = 1, otherwise= 0)
$X9$ = Primary occupation of the household head (Farming=1, 0 otherwise)

RESULTS
Socio-economic characteristics of cassava farmers
The results of socioeconomics characteristics of the cassava farmers are presented in Table 1. The result shows that 70.50% of farmers were males and 29.50 % were females. Approximately, 83.00 %, 16.00% and 1.00% of cassava farmers were married, single and divorced, respectively. The result further shows that 28.06%, 37.41% and 28.06% of the farmers had primary, secondary and tertiary educational qualification respectively, while the remaining 6.47% had none formal education. This implies that the literacy level was high in the study area. The distribution of ages of the farmers revealed that 25.18% were within 23-35 years, 33.81% had ages ranging between 36-45 years, 32.37% were within 46-55 years, about 6.00% had ages around 56-65 years and about 3.00% had more than 65 years. The average age of the farmers was estimated to be 43.6 years with standard deviation of 10.2 years. The household size results show that 53.24% of the cassava farmers had family size ranges within 1-5 population, 45.30% had 6-10 household population and 1.44% had more than 10 household size. The mean household size of a typical cassava farmers in the study area was 6 with standard deviation of 3 family population.

Table 1. Distribution of cassava farmers by their socioeconomic characteristics

Variable	Frequency	Percentage (%)
Sex		
Male	98	70.50
Female	41	29.50
Marital Status		
Single	22	15.83
Married	115	82.73
Divorced	2	1.44
Educational level		
Non-formal	9	6.47
Primary	39	28.06
Secondary	52	37.41
Tertiary	39	28.06
Age		
23-35	35	25.18
36-47	47	33.81
46-55	45	32.37
56-65	8	5.76
>65	4	2.88
Age (mean±SD)	43.6±10.20	
Household size		
1-5	74	53.24
6-10	63	45.30
>10	2	1.44
Household size (mean±SD)	5.6±2.50	
Experience (Yrs)		
1-10	71	51.08
11-20	53	38.13
>20	15	10.79
Experience (Yrs) (mean±SD)	13±8.80	
Farm size		
1-5	82	58.99
6-10	41	29.50
>10	16	11.51
Farm size (mean±SD)	9.8. ±7.10ha	
Income (₦)		
<100000	23	16.55
100000-200000	31	22.30
200001-300000	24	17.27
300001-400000	20	14.39
>400000	41	29.49
Income (₦) (mean±SD)	347270±309276	
Primary occupation		
Farming	112	80.58
Non-farming	27	19.42
Extension service		
No	71	51.08
Yes	68	48.92

The distribution of farming experience of the respondents showed that about 51.00% of the farmers had cumulative of cassava production experience for not more than 10 years, 38.13 % had their cassava farming experience within 11- 20 years while 11.00% had cassava production experience of over 20 years. The mean years of farming experience was 13.3 years with standard deviation of 8.8 years. Furthermore, the outcome of analysis of cassava farm size among respondents revealed that about 59.00% had about 5 ha. or less, 30.00% cultivated 6ha or more while 11.51% cultivated above 10 ha. of cassava farm in the study area. The mean farm size was 9.8 ha. with 7.1 ha as standard deviation. Moreover, the result shows that cassava farmers in study area earned an average income of ₦347,270.10 with standard deviation of₦309,276.10 per production cycle. The distribution of income earnings from cassava production indicated that 16.55%, 22.30%, 17.27% and 43.88% of the farmers earned less than ₦100000, ₦100000-200000, ₦200001 – 300000 and more than ₦300000 per cassava production cycle, respectively. The results of primary occupation revealed that majority of cassava farmers (80.52%) were primarily engaged in farming while the remaining 19.42% involved in non-farming occupations. Finally, the results of extension service indicated that 48.92% of the cassava farmers had access to extension services while 51.08% of cassava farmers had no access to extension services

Profile of cassava farmers by their level of access to rural infrastructure
The level of access to rural infrastructure index was computed and the result presented in Table 2 shows that 63.31% and 36.69% had low and high level of access to rural infrastructure, respectively. The mean score of infrastructure index was 0.23 with standard deviation of 0.11. The Profile of cassava farmers' socio-economic characteristics by their access to rural infrastructure in the study area revealed that most cassava farmers, male (71.59%) and female (28.91%), had low level of access to infrastructure. Among the majority of married (82.73%), 82.95% and 89.02% within the group had low and high access to rural infrastructure, respectively. Similarly, close to 8% of non-formal and 92% of educated cassava farmers had low access to infrastructure. Nearly, 4% of non-formal and 96% of educated cassava farmers had high access

to infrastructure. Close to 92% within low access to infrastructure and 90% within high access to infrastructure were younger ages (23-55 years) of the cassava farmers. This implies that young cassava farmers with higher potential of improving their cassava commercialization could be constrained or hindered with low and inadequate access to infrastructure.

Table 2. Profile of cassava farmers by their level of access to rural infrastructure

Variable	Low (0.00-0.23) 88 (63.31)	High (0.24-1.00) 51 (36.69)	Total 139(100)
Sex			
Male	63(71.59)	35(68.63)	98(70.50)
Female	25(28.41)	16(31.37)	41(29.50)
Marital Status			
Single	14(15.91)	8(9.76)	22(15.83)
Married	73 (82.95)	42 (89.02)	115(82.73)
Divorced	1(1.14)	1(1.22)	2(1.44)
Educational level			
Non-formal	7(7.95)	2(3.92)	9(6.47)
Primary	23(26.14)	16(31.37)	39(28.06)
Secondary	29(32.95)	23(45.10)	52(37.41)
Tertiary	29(32.95)	10(19.61)	39(28.06)
Age			
23-35	22(25.00)	13(25.49)	35(25.18)
36-47	30(34.09)	17(33.330	47(33.81)
46-55	29(32.95)	16(31.37)	45(32.37)
56-65	6(6.82)	2(3.92)	8(5.76)
>65	1(1.14)	3(5.88)	4(2.88)
Household size			
1-5	46(52.27)	28(54.90)	74(53.24)
6-10	41(46.59)	22(43.14)	63(45.32)
>10	1(0.72)	1(0.72)	2(1.44)
Farm size			
1-5	52(59.09)	30(58.82)	82(58.99)
6-10	24(27.27)	17(33.33)	41(29.5)
>10	12 (13.64)	4 (7.84)	16 (11.51)
Primary occupation			
Farming	69(78.41)	43(84.31)	112(80.58)
Non-farming	19(21.59)	8(15.69)	27(19.42)
Ownership of farm			
Yes	72(81.82)	43(84.31)	115(82.73)
No	16(18.18)	8(15.69)	24(17.27)
Membership of Association			
Yes	61(69.32)	39(76.47)	100(71.94)
No	27(30.68)	12(23.53)	39(28.06)

Profile of cassava farmers by their level of commercialization

The distribution of cassava farmers in the study area by the commercialization index is shown in Table 3 below. The results show that 34.53% of cassava farmers had low level of commercialization and 65.47% had high levels of commercialization. The mean commercialization index is 0.866 with standard deviation of 0.15. The distribution of the results show that 58.33% among low commercial oriented and 76.92% among high commercial oriented farmers were males while, 41.67% within low commercial oriented and 23.08% within high commercial oriented farmers were females. The results also revealed that 80.22% of married cassava farmers tend toward commercialization orientation and 40.66% of cassava farmers with secondary education had commercialization motives of farming production. Approximately 34.07% of the cassava farmers aged 36 – 45years had high level of cassava commercialization orientation. The cassava farmers (52.75%) with household size of 1-5 had high level of commercialization and 56.04% of cassava farmers with farm size of 1-5ha had high level of commercialization. Majority, 83.52 % of farmers with farming as primary occupation had high level of commercialization. The cassava farmers that belong to farmer association (75.82%) had high level of commercialization.

Effect of Infrastructure on Cassava Commercialization

The result of the Tobit regression analysis showing the effect of rural infrastructure on cassava commercialization of the respondents is presented in Table 4. The diagnostics parameter of the model revealed a Pseudo R^2 of -0.2385 with Probability > F of 0.0004 which was significant at 1%, indicating goodness of fit in the model. The results of the Tobit regression show that seven (7) out of ten (10) explanatory variables were significant at various levels. Among the seven variables and their level of significance include; infrastructure (10%), member of association (10%), land ownership (10%), gender (10%), fam size (5%), primary occupation (5%) and education (10%). It worth to note that rural-infrastructure index was significant at 10 % and had a positive relationship with commercialization of the cassava farmers in the study area.

Table 3. Profile of cassava farmers by their level of commercialization

Variable	Low (0.00- 0.87) 48 (34.52)	High (0.87 – 1.00) 91 (65.47)	Total 139 (100)
Sex			
Male	28(58.33)	70(76.92)	98(70.50)
Female	20(41.67)	21(23.08)	41(29.5)
Marital Status			
Single	5(10.42)	17(18.68)	22(15.83)
Married	42(87.5)	73(80.22)	115(82.73)
Divorced	1(0.72)	1(0.72)	2(1.44)
Educational level			
Non-formal	2(4.17)	7(7.69)	9(6.47)
Primary	15(31.25)	24(26.37)	39(28.06)
Secondary	15(31.25)	37(40.66)	52(37.41)
Tertiary	16(33.33)	23 (25.27)	39(28.06)
Age			
23-35	13(27.08)	22(24.18)	35(25.18)
36-47	16 (33.33)	31(34.07)	47(33.81)
46-55	15 (31.25)	30(32.97)	45(32.37)
56-65	3 (6.25)	5(5.49)	8(5.76)
>65	1 (2.08)	3(3.30)	4(2.88)
Household size			
1-5	26 (54.17)	48(52.75)	74(53.24)
6-10	22 (45.83)	41(45.05)	63(45.32)
>10	0 (0.00)	2(2.20)	2(1.44)
Farm size			
1-5	31(64.58)	51(56.04)	82(58.99)
6-10	13(27.08)	28(30.77)	41(29.5)
>10	4(8.33)	12(13.19)	16(11.51)
Primary occupation			
Farming	36 (75.00)	76(83.52)	112(80.58)
Non-farming	12 (25.00)	15(16.48)	27(19.42)
Income			
0-100000	11(22.92)	12(13.19)	23(16.55)
100001-200000	14(29.17)	17(18.68)	31(22.3)
200001-300000	9(18.75)	15(16.48)	24(17.27)
300001-400000	4(8.33)	16(17.58)	20(14.39)
400000-500000	5 (10.42)	8(8.79)	13(9.35)
500001-2517500	5 (10.42)	23(25.27)	28(20.14)
Ownership			
Yes	40(83.33)	75(82.42)	115(82.73)
No	8(16.67)	16(17.58)	24(17.27)
Membership of Association			
Yes	31(64.58)	69(75.82)	100(71.94)
No	17 (35.42)	22(24.18)	39(28.0)6

Table 4. Effect of infrastructure on commercialization

Commercialization index	Coefficient	SE	T	P>t
Infrastructure	0.0219***	0.0127	1.72	0.089
Member of association	-0.0383***	0.0231	-1.66	0.100
Marital status	-0.0466	0.0310	-1.51	0.134
Income	0.0168	0.0156	1.08	0.282
Land ownership	0.0542***	0.0335	1.67	0.103
Gender	-0.0546***	0.0292	-1.87	0.064
Farm size	0.0019**	0.0009	2.13	0.035
Primary occupation	0.0537***	0.0332	1.69	0.102
Education	-0.1238**	0.0498	-2.49	0.014
Constant	0.7130	0.1841	3.87	0.000

$F_{(16, 122)} = 2.94$; Prob > F = 0.0004; Pseudo R^2 = -0.2385

* = significant at 1 percent level, ** = significant at 5 percent level, *** = significant at 10 percent level

DISCUSSION

Discussion of major findings

Socio-economic characteristics of the cassava farmers

The results of the study indicated that cassava farming is dominated by male in the study area. This is in agreement with the findings of Mekonnen[18], who found out that there were more males than females in cassava production. The results also revealed that many of cassava farmers were married. This might be due to the fact that cassava is a crop that enhances household food security and most farmers in rural area use more of family members as labour for their farm operations. This is in line with Ashagidigbi et al[19] who found out that there were more married farmers among cassava farming households than singles and divorced. The result further shows that larger percentage of the farmers had at least primary education. This implies that the literacy level was high in the study area. This study corroborates Ashagidigbi et al[19] who found out that high literacy level indicating the possibility of better maintenance of rural infrastructure if provided.

The outcome of analysis further indicated that most of the farmers are still in their active and productive ages. This agrees with Adenegan et al[21] who found out that there are more youth in farming. The distribution of

household size of the cassava farmers revealed moderate household size. This deviates from the study of Obayelu[20] who found out that average household was larger. The farming experience of the cassava farmers in the study area showed that most of the cassava farmers were experienced. This is in line with Adenegan et al[21] who found out that majority of farmers had between 1-10 years of farming experience in Osun State.

Furthermore, the mean farm size was 9.8ha, indicating that cassava farmers in the study area operated on medium scale[23]. This may be due to problem involving land tenure system in the locality, capital and infrastructure to cultivate and maintain large hectares of land. There has been an improvement on the scale of cassava production because this finding is in contrast with the study of Obayelu[20] who found out that majority of farmers cultivated between 0.4 and 0.8 hectares of land in Odogbolu local government area, Ogun state, Nigeria. Moreover, the result shows that cassava farmers in study area earned an average income of ₦347,270.10 per production cycle or per annual. This indicates that most of the cassava farmers earn low income. This is in line with Agwu et al[22] who found out that income of farmers was low in Abia State, Nigeria.

Primary occupation of the cassava farmers is capable of influencing the level of commercialization. The results revealed that majority of cassava farmers were primarily engaged in farming while the remaining involved in non-farming occupations. Hence, larger proportion of the respondents depend on cassava farming as their major occupation in the area. This finding is supported by Adetola et al[17] who found out that majority of cassava producers were engaging in farming as their primary source of livelihood. Finally, the results also show that more than half of cassava farmers had no access to extension agent. The findings follow the work of Agwu et al[22] who opined that the majority of farmers had no access to extension agents supports in Abia State.

Profile of cassava farmers by their level of access to rural infrastructure

The index of access to rural infrastructure was computed and the result shows that larger proportion of the farmers had low level of access to rural infrastructure. The mean score of infrastructure index was 0.23±0.11. This indicates that the level of access to rural infrastructures was very low among the cassava farmers in the study area.

Moreover, the profile of cassava farmers' socio economic characteristics access to rural infrastructure indicated that respondents had low level of access to infrastructure, particularly female cassava farmers were worse off in level of access to rural infrastructure. This indicates that most of cassava farmers in the study area might have difficulties in accessing markets which could affect their market participation leading to low commercialization. This could be due to deplorable conditions of rural road network and poor access to marketing information by the farmers in the study area. According to Ashagidigbi et al[19], provision of efficient infrastructure is now widely recognized as indispensable to agricultural progress as it is a known fact that infrastructure can support economic growth, reduce poverty and make development environmentally sustainable.

Also, married cassava farmers had low access to rural infrastructure, as well as educated cassava farmers. This suggests that being married and educated may not enhance access to public goods and services such as road and market facilities since the provision is solely perceived to be the responsibility of either community or government. The low access to rural infrastructure among cassava farmers in the study area was prominent among young age groups (23-55years). Larger fraction of the younger ages had low access to the rural infrastructure. This could impede the momentum of expected level of cassava commercialization among the youths. The inadequacy of needed rural infrastructure especially road and market facilities could cause huge economic losses on cassava products and lead to setbacks on cassava production due to effects of poor market pricing system and high cost of transportation attributable to deplorable condition of rural roads.

Profile of cassava farmers by their level of commercialization

The distribution of cassava farmers in the study area by the commercialization index is shown that 34.53% and 65.47% had low and high levels of commercialization,

respectively. The mean commercialization index is 0.866 with standard deviation of 0.15. This value is very high which implies that the level of commercialization was very high among the cassava farmers. This indicates that larger proportion of cassava farmers' population in the study area involved in market participation (commercialization). This implies that cassava farmers' production orientation is now towards commercial production and not subsistence again. Also commercialization of cassava production could be attributed to high demand or consumption. This is in agreement with findings of Muricho[15] in Kenya who stated that the high commercialization index has been extensively used to categorize the levels of commercialization and the index measures the orientation of farmers towards market participation which range from 0 to 1. The interpretation of the index is that the closer it is to one, the greater the intensity of market participation.

The gender distribution result shows that males had high level of cassava commercialization compared to female. This implies that males involved more in market activities of cassava enterprise than females. Married cassava farmers had high tendency of commercialization and cassava farmers with secondary education had high level of commercialization. Cassava farmers within the ages of 36 to 45 years had high inclination toward cassava commercialization. The cassava farmers with household size of 1-5 had high level of market orientation. Majority of farmers that had farming as primary occupation cultivated cassava primarily for sale. The implication is that most farmers in the study area engaged in cassava production principally as major source of income and livelihood. Cassava farmers that earned between ₦100001-200000 had low level of market participation. Following the submissions of Adenegan et al[21] and Agwu et al[22] the factors responsible for low market participation include, small farm holding due land fragmentation, inadequate financing, poor market price, etc. The cassava farmers that belong to farmer association had high level of commercialization.

Effect of Infrastructure on cassava commercialization

The result of the Tobit regression analysis showing the effect of rural infrastructure on cassava commercialization of the respondents in the study area is presented in Table 4. Rural infrastructure index was significant at 10% and had a positive relationship with commercialization of the cassava farmers in the study area. It implies that provision, availability and accessibility to rural infrastructure has propensity to increase cassava commercialization in the study area. This is in line with Kembe[16], who found that infrastructural development positively influenced the commercialization index. However, econometrically and statistically, 10% level of significant and coefficient of 0.0219 of infrastructure indicate low or weak effects on level of cassava commercialization in the study area. The weak or low effects of inadequate access to infrastructure on cassava commercialization is confirmed by 63.31% of cassava farmers on table 3 that indicated low access to available facilities. Being a member of cassava producers' association and being male were significant at 10 %. These suggest that membership of producers' association and male cassava farmers have tendency to increase commercialization. Mode of land acquisition and primary occupation were also significant at 10% and had a positive relationship on commercialization. These indicate that individual land acquisition and having farming as primary occupation could improve the level of cassava commercialization of the farmers. This is partly in line with the study of Adetola et al[17] who found out that individual ownership of land increase in-depth of investment and commercialization.

Farm size was significant at 5 percent% and it had a positive relationship on cassava commercialization of farmers, indicating that cassava farmers' commercialization increases with increase in their farm size. This finding corroborates [18] who found out that farm size was positive and had a significant relationship with market participation. Formal education was significant at 5% in influencing commercialization. According to Muricho[15] and Adetola et al[17] most farmers with formal education are not primarily employed in cassava farming as their sole means of livelihood but as either subsistence producer for family food security or means of supplementing their family income.

CONCLUSION

The findings from this empirical study revealed that majority of the cassava farmers were male, married, educated, relatively young, and agile in their active and productive ages. However, cassava commercialization orientation is getting prominent among the cassava farmers with high propensity to increase cassava production for commercial reasons. Poor infrastructure was evident and young cassava farmers with higher potential for cassava commercialization were mostly constrained with low and inadequate access to infrastructure. This study has also identified be weak and inadequate nexus between cassava commercialization and rural infrastructure (market and road). Other factors such as farm size, formal education, membership in cassava producers' association and gender also contribute their effects on cassava commercialization. Therefore, provision of adequate and accessible infrastructure (market and road) is necessary with other key factors that have propensity of improving cassava commercialization in the study area. Following rigorous and thorough empirical analysis resulting to the outcomes of the major findings of this study, it is therefore, recommended that all relevant stakeholders such as cassava farmers association and their communities, local government, non-government organization, private and public agricultural development agencies should endeavor to address these identified factors for sustainable rural livelihood. Specifically, provision of accessible rural roads and market infrastructure needed to enhance full cassava commercialization.

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CONFLICT OF INTEREST

None declared.

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