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Sustainability analysis of programme interventions: The case of Root and Tuber Improvement and Marketing Programme in the Central Region of Ghana

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Abstract

The Root and Tuber crop value chain is an important avenue for ending persistent poverty and food insecurity among farm households in most developing countries. Accordingly, several African countries, including Ghana has developed and implemented Root and Tuber crops improvement programme to promote the expansive production, processing and consumption of Root and Tuber crops. Given the huge investment requirement for such poverty and food insecurity reduction programmes, it becomes necessary to first establish the sustainability dimensions of the programme interventions. Programme sustainability is important to ensure that gains made during programme implementation continue to persist long after funding and assistance has been withdrawn by donors and implementers. Accordingly, we analysed the sustainability of RTIMP programme interventions among cassava farmers. 150 RTIMP beneficiary cassava farmers were sampled and data was collected and analysed using a multistage sampling approach. The results show that the RTIMP programme sustainability hinges on three sustainability dimensions (i.e., economic, social, and environmental). Farmers asserted that the interventions and services received contributed moderately to the sustainability of the RTIMP programme along the three identified sustainability dimensions. Accordingly, every intervention activity must impact beneficiaries across these dimensions. Another important outcome from our study was the significant locational variation on the sustainability impact of the intervention along the three sustainability dimensions, hence the needs to frame subsequent policy interventions in such a way that it takes into consideration the effect of location difference on the potential sustainability of the programme.

Keywords: cassava, Central Region, RTIMP, smallholder farmers, sustainability

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INTRODUCTION

The production of Root and Tuber (R&T) crops remains one of the most important agricultural engagements in most African countries. Research has shown that R&T crops account for about 20 percent of the calories consumed by households in sub-Saharan Africa (FAO, 2015). Empirical evidence demonstrates the importance of root and tuber crops when it comes to agricultural commodities by which it ensure sustainable income and food security among African farm households, especially among the marginalised groups including women, who play active role in the R&T value chain (FAO, 2015; Sanginga & Mbabu, 2015; Acheampong, et al., 2017). Within the African context, it is asserted that the production and processing of R&T crops serve as an important income generating activity for both rural and urban dwellers (Acheampong, et al., 2017). Sanginga and Mbabu noted that R&T crops which include yam, cassava, sweet potato, and potato are cultivated in different agro-ecological zones and production systems; recording over 240 million metric tons of staple food annually from more than 23 million hectares of arable farm land (Sanginga & Mbabu, 2015). R&T crops offer significant contribution to the socio-economic livelihoods of smallholder farmers on the continent (Andoh, 2010). Over the years, there has been a steady increase in the production of R&T crops in Africa and this can be attributed to the food, nutrition and income security dimension of the crops as well as their agro-ecological adaptability and market demands (i.e., for household consumption and industrial purpose) (Sanginga & Mbabu, 2015). The demand for R&T crops is expected to to increase significantly due to the growing urban market demand for the products and industrial market demand by the starch and brewery industries (Andoh, 2010). These have led to intensification of policy efforts by many African governments towards the commercialisation of R&T crops as a means of promoting sustainable agricultural development (FAO, 2015). As a means of developing a smooth and sustainable modernisation of the food crop production in Ghana, the government over the last two decades has, incollaboration with the development partners, initiated a number of R&T projects (MoFA/GoG, IFAD, BMGF, 2014). These were meant to enhance the development and production of R&T commodities in the country, all geared towards livelihood security improvement of farm households. The initiatives included, the FAO's Cassava Value Chain Project in the Northern and Central regions, the Market Oriented Agriculture Programme (MOAP), the Cassava Presidential Special Initiative (PSI) and the Root and Tuber Improvement and Marketing Programme (RTIMP) (FAO, 2015). RTIMP was a follow-up programme to the Root and Tuber Improvement Programme (RTIP) with funding support from the International Fund for Agricultural Development (IFAD) and the Government of Ghana (GoG) for an eight-year period (2006 to 2014) (Ministry of Food and Agriculture, 2013).The aim of RTIMP was to improve the livelihood security (i.e., income and food security) of the rural poor by building a competitive market-based R&T commodity value chain and an efficient and sustainable support services (MoFA, 2013; MoFA/GoG; IFAD; BMGF, 2015).

To create strong indigenous supply chains that would make Ghana's R&T commodity chains robust drivers of sustainable and comprehensive rural-economic growth, the programme sought to create an economic for platform for smallholder farmers and processors to take advantage of new business opportunities are being created from the R&T markets (MoFA/GoG et al., 2015).

The core target groups reached by the programme included: (i) asset-poor, food insecurity and scares labour, farmers who are willing to increase the value their farm produce and quality of their farming of R&T crops for food security and revenue generation; (ii) small-scale R&T processors, both independently and in groups (mostly existing, whose incomes are depressed by lack of quality technologies, equipment, skills, capital and markets); (iii) other asset-poor working conditon within the R&T commodity chains (e.g. informal traders and wage-workers) with the will and zeal to become viable micro/small business owner [p. 2]. To achieve the programme's goal of improving the welfare of the three categories of target groups, the programme was impinged on production, processing and market linkages as the three key programme components (MoFA/GoG et al., 2015). This is in line with the government of Ghana's vision of commercialising the cassava sector which has brought about a considerable increase in cassava production and the development of products which needed to be integrated into the industrial market (FAO, 2015). This is because cassava is regarded as one of the most important commodities globally with an annually produced of about 276 million tons in 2013 (Sanginga & Mbabu, 2015). Ghana continues to lag behind the top global producers (Nigeria, Thailand, Indonesia, Brazil and the Democratic Republic of Congo) of cassava despite the many intervention initiatives by the government and its development partners. The FAO posited that, the scale of production, consumer acceptability and quality of notable cassava commodity such as High Quality Cassava Flour (HQCF), cassava cake, chips, ethanol and industrial starch remain low (FAO, 2015). Sanginga and Mbabu added that, the dominance of smallholder farmers (25% of which women) within the cassava production space contributes a limiting factor to the scale of production (Sanginga & Mbabu, 2015). The absence of a policy framework for the ultilisation of cassava products and lack of consumer awareness has been enumerated by the FAO as some of the reasons behind the poor performance of the cassava industry in Ghana (FAO, 2015). Qustions remain as to the commitment of government towards the further development and production of cassava as an industrial crop, and also the sustainability of the previous R&T interventions especially the Root and Tuber Improvement and Marketing Programme (RTIMP) in the field five years after the closure of the programme. The programme was implemented in 106 districts in the country in four agro-ecological zones namely, Northern Savanna, Transition, Forests and Coastal Savanna (MoFA, 2013). Some districts in the Central region in the coastal savannah (Agona East, Awutu Senya West, and Gomoa Central districts) and forest (Abura Asebu Kwamankese and Assin Sounth districts) ecological zones benefited from the programme intervention (Kuwornu et al., 2013). Smallholder cassava farmers benefited from the programme in these districts in the region (MoFA, 2013; MoFA/GoG et al., 2015).

Beneficiary smallholder farmers in the participating districts received interventions including the use of appropriate technology and equipment, support for creating new employment, improved planting materials, records keeping, product marketing, banking and savings (IFAD, 2013). The programme interventions were expected to positively impact on production, income and harvest of smallholder food crop producers in the Central region. The expected impact was also projected to drive the sustainability of the programme interventions in the region. IFAD posited that the effect of programme intervention on sustainability would be realised in the form of increased

profitability, reduced cost per unit revenue, increased price on offer for most R&T crops, increase production of farmers, commercial reproduction of improved planting materials and viablely commercial farmer groups at the end of the programme (IFAD, 2013). Five years after the closure of the programme in the Central region, there is limited empirical data and information on how the programme interventions is sustaining the programme outcomes in the region.

The general objective of the study was to examine the sustainability of programme interventions on the Root and Tuber Improvement and Marketing Programme in the Central Region of Ghana.

Specifically, the study sought to:

1. evaluate the nature of interventions and services received by farmers from RTIMP.
2. assess farmers perception of the factors contributing to the Sustainability of RTIMP intervention in the Central Region of Ghana.
3. examine the relationship between differences in Location and Sex of farmers and perception of the factors contributing to the Sustainability of the RTIMP Intervention.

Profile of the Study Area

The Central region is one of Ghana's sixteen administrative regions bordered by the Ashanti and Eastern regions to the north, Western and Western North regions to the west, Greater Accra region to the east, and to the south by the Atlantic Ocean (Ghana Statistical Service [GSS], 2010). The region occupies an area of 9,826 square kilometres or 4.1 percent of Ghana's land area (Ministry of Local Government [MLG], 2020). The Population and Housing Census held in Ghana in 2021 indicated that the region has a population of 2,859,821 (GSS, 2021), with more than half (51.4%) of households in the region engaged in farming (GSS, 2010). The highest proportion (94.1%) of farming households are engaged in crop farming, cultivating R&T crops such as cassava potato, taro, and cocoyam; cereals and tree crops including coconut, preaches and mango. The Central region is the fourth most important cassava producing region in the country (MoFA, 2016), with nearly one-third (31.5%) of farming households cultivating the commodity (MLG, 2020). Cassava is a primary crop with an average national per capita consumption of 152 kg, essential for sustaining the food security of the farm households in the region (MoFA, 2016).

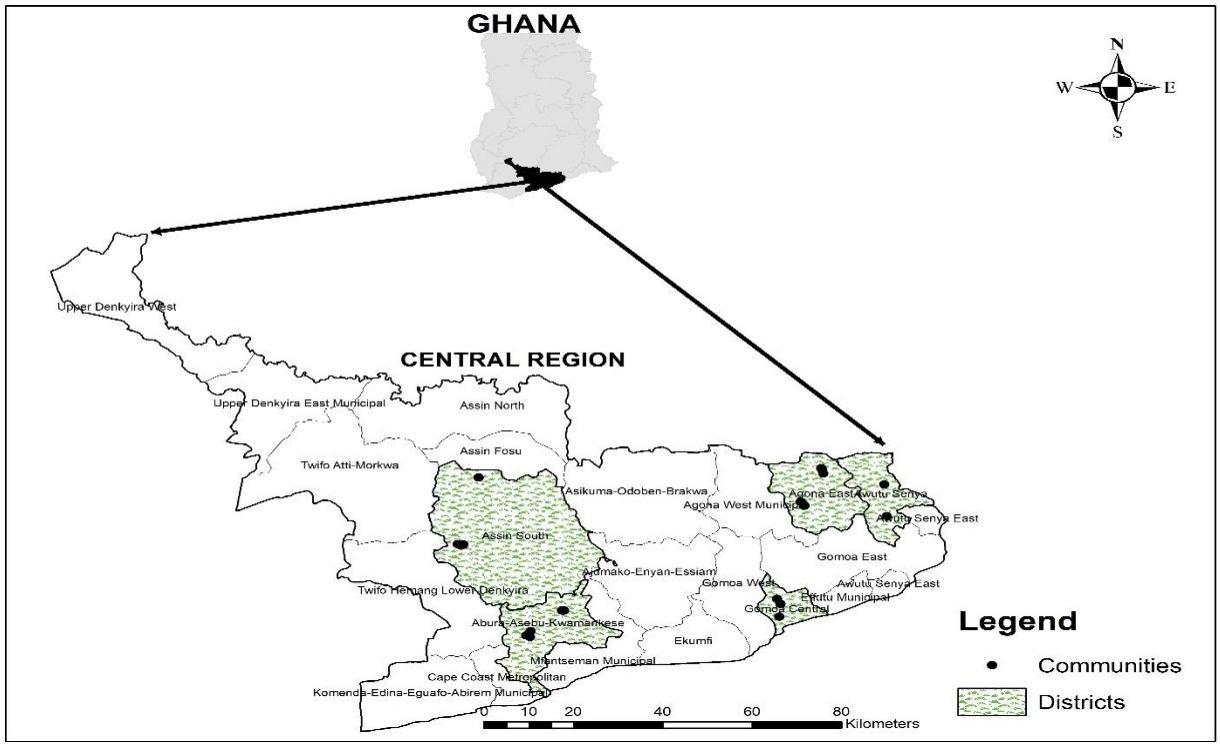

Figure 1: Map of the spatial dimension of the study area showing regional and national context

Instrument and Data Collection

A structured interview schedule was employed in taking data from 150 randomly selected smallholder farmers through a multistage sampling procedure from ten communities in five districts in the Central region of Ghana (Neuman, 204). To validate and check for reliability of the instrutment, a pre-test was conducted with cassava farmers from Abura Dunkwa and Pra Ewusi in Abura, Asebu, Kwamankese districts of the Cental region. Cronbach's Alpha and Kudar-Richardson reliability coefficients were computed to estimate the reliability of the Likert type sustainability variables and the dichotomous programme intervention sub-scales respectively using IBM SPSS version 26.0 (Pallant, 2016). The results of the Cronbach's Alpha and Kudar-Richardson reliability coefficients of the three sustainability sub-scales were between 0.81 to 0.94 and 0.89 for the dichotomous scale which indicated that the instrument was reliable (Reynaldo & Santos, 1999).

RTIMP was implemented in a number of districts in the region, however, five districts were selected for the study. The districts were, Assin South, Abura, Asebu, Kwamankese, Gomoa Central, Awutu Senya West and Agona East districts (MoFA/GoG et at., 2015). Following the selection of the districts, ten communities were drawn at random from the districts that had been chosen. Fifteen farmers were randomly selected from each community as respondents of the study (Kothari, 2004). Structured interview schedule comprising items on farmer and farm related characteristics of the beneficiary smallholder farmers, RTIMP intervention received by the farmers and a five point Likert-type items to measure the factors contributing to the sustainability

(economic, social and evironmental) of the programme was used as the instrument of the study (Picciotto, 2013). A total of 150 smallholder farmers were duly selected as the sample size for the study.

Data Processing and Analysis

The data collected was coded and cleaned for analysis. The farm and farmer related characteristics was analyzed using descriptive statistic (frequencies, percentages, means, and others). Frequencies and percentages were used to analyze the RTIMP interventions received by the farmers. Means, standard deviations, Kendall's coefficient of concordance (W) and two multivariate analysis of variance (Two-way MANOVA) were used to analyze the sustainability indicators (Gomez & Gomez, 1984). The significance level was set at 0.05. Tukey's honest significant difference test was adopted to separate the means using a Bonferroni adjustment of 0.017 for three dependent variables (Pallant, 2016).

RESULTS

Farm and Farmer related characteristics

In Table 1 presents results on the distribution of farmer and farm related characteristics. More than seven out of every ten (71.3%) cassava farmers were males while the rest were females.The age distribution of the respondents range between 28 and 75 years with a mean age is 49.49 years (standard deviation = 11.06 years). Almost eight out of every ten farmers (78.7%) were between the ages of 30 and 59 years. The category of farmers between the ages of 60 and 75 years constitute 20 percent of the respondents and cannot be regarded as active, hence, cannot be relied on for a significant and sustainable cassava production improvement intervention in the future. The respondent's years of farming experience ranged between 8 and 58 years with a mean expperience of 23.89 years (standard deviation is 9.88 years). Overwelmingly maojority of the cassava farmers in the study have appreciable years of farming experience. For instance, as high as two-thirds of the farmers have 20 years or more years experience in cassava production. This wealth of experience is a good predictor of the average cassava farmer's propensity to properly access and adopt technologies introduced to them for the purpose of improving upon their farm performance and income. The level of education of the farmers indicate that only about one out of five of the farmers (21.3%) have no formal education whiles the rest (78.7%) have formal education. More than half of the educated farmers (52.0%) have Junior Secondary/High School education. Approximately one out every ten farmers have either primary (10.7%) or senior secondary/high school (11.3%) education. A few of them (4.7%) have tertiary education. The result indicates that at least three out of every five of the farmers (62.0%) are members of farmer based organisations in their communities whilst 38.0 perecet are not. Almost all the farmers (91.3%) are married with farming as their primary occupation (82.0%). Table 1 also shows that the farm area cultivated by the farmers ranged from 0.16ha to 8.0ha with mean farm size of 1.89ha (Standard deviation = 1.70ha).

Table 1: Farmer and farm related characteristics

Variables	Categories	Frequency	Percentage	Mean	SD
Sex of Farmers	Male	107	71.3		
	Female	43	28.2		
Age of Farmers	20 – 29	2	1.3	49.49	11.06
	30 – 39	28	18.7		
	40 – 49	44	29.3		
	50 – 59	46	30.7		
	60 – 69	22	14.7		
	70 – 79	8	5.3		
Years of farming experience	Less than 10	4	2.7	23.89	9.88
	10 – 19	46	30.7		
	20 – 29	59	39.3		
	30 – 39	33	22.0		
	40 – 49	4	2.7		
	50 – 59	4	2.7		
Level of education	No education	32	21.3		
	Primary	16	10.7		
	Middle/JSS/JHS	78	52.0		
	SSS/SHS	17	11.3		
	Tertiary	7	4.7		
Membership of FBO	Yes	93	62.0		
	No	38	38.0		
Primary occuapation of farmers	Farming	123	82.0		
	Trading	16	10.7		
	Artisan	6	4.0		
	Formal employment	5	3.3		
Marital status of farmers	Married	137	91		
	Single	5	3.3		
	Divorced	5	3.3		
	Widowed	3	2.0		
Farm sizes cultivated to cassava (Hecters)	Less than 1Ha	48	32.0	1.89	1.70
	1.0 – 2.0	64	42.7		
	2.1 – 4.0	27	18.0		
	4.1 – 6.0	4	2.7		
	6.1 – 8.0	7	4.7		

Source: Survey data, 2020. N = 150

Interventions and Services received by farmers from RTIMP

Twenty one interventions and services of RTIMP were acknowledged and utilizd for this research (Table 2). The results indicate that (81.35%) received improved cassava planting materials from the programme. Other interventions and services received by more than half of the farmers include; farm records keeping (74.7%), farm activity planning (68.0%), use of appropriate technology equipment (65.3%), marketing training (62.7%), banking and savings training (62.7%), contract negotiation contract with buyers (60.7%), costing and pricing training (60.7%) and building of trust in relationships (60.7%).

Table 2: Interventions and Services received by farmers from RTIMP

Intervention Services from RTIMP	Yes	
	*Freq.	Percentage
Improved planting materials	122	81.3
Records keeping	112	74.7
Farm activity planning	102	68.0
Use of appropriate technology equipment	98	65.3
Marketing trainings	94	62.7
Banking and savings training	94	62.7
Negotiating contract with buyers	91	60.7
Costing and pricing training	91	60.7
Building of trust in relationships	90	60.0
Financial management training	88	58.7
Business/market linkages training	86	57.3
Budgeting and forecasting training	82	54.7
Association building strategies training	77	51.3
Credit management training	71	47.3
Access to technical service providers	70	46.7
Introduction to new equipment	67	44.7
Support for creating new employment	66	44.0
Access to credit	66	44.0
Access to agro inputs and chemical	62	41.3
Waste disposal methods	58	38.7
Introduction of improved Infrastructure	55	36.7

*Source: Survey data, 2020. * Multiple responses*

Farmers Perception of the factors contributing to the Sustainability of RTIMP intervention in the Central Region of Ghana

In order to assess perception of farmers of the factors contributing to the sustainability of the RTIMP intervention in the Central Region of Ghana, twenty programme indicators were identified and used for this study (Table 3). Farmers were asked to assess the sustainability potential of the programme intervention on a scale of 1 to 5 (indicating the extent of perceived sustainability potential).

Economic Sustainability

Generally, the farmers rated the factors contributing to economic sustainability of the RTIMP intervention to be 'moderate' (Overall mean = 3.03, S.D = 0.73). Apart from increased direct farm labour, indirect employment, number of businesses, improved savings and development of sustainable enterprises which were rated 'moderate', increased yield and income per hectare were rated 'high'. It is worth noting that the sustainability of farm equipment owned by farmers was rated as 'very low'.

Table 3: Farmers perception of the factors contributing to the Sustainability of RTIMP intervention in the Central Region of Ghana

Sustainability variables		
Economic indicators	**Mean**	**Stand. dev.**
Increased yield	4.15	0.99
Increased income/ha	3.89	1.06
Increased in direct farm labour	3.41	1.07
Increase in indirect employment	3.25	1.15
Increased number of business	3.17	1.26
Improved savings	3.10	1.24
Developed sustainable enterprise	2.91	1.21
Increased access to credit	2.36	1.08
Increased in farm equipment owned	1.02	0.24
Overall mean	3.03	0.73
Social sustainability indicators	**Mean**	**Stand. dev.**
Enhanced food security	3.80	1.05
Increased collaboration between value chain partners to improve market access	3.35	1.27
Increased trust with other partners	3.34	1.19
Increased cooperation between value chain actors to improve market access	3.34	1.29
Inreased functional relationships with other partners	3.18	1.19
Improved management skills	3.15	1.22
Increased linkages with financial instittutions	2.60	1.18
Overall mean	3.25	0.99
Environmental indicators	**Mean**	**Stand. dev.**
Improved knowledge on good agronomic practices	4.13	1.00
Improved farm sanitation	3.33	1.22
Improved an enabling business environment	3.14	1.20
Increased use of by-products as animal feed	2.90	1.17
Overall mean	3.38	0.97

Source: Survey data, 2020. N = 150. Means were calculated from a scale of 1= Very low, 2 = Low, 3 = Moderate, 4 = High and 5 = Very high.

Ranking of Economic Sustainability Indicators

The ranking of the economic indicators contributing to the sustainability of the RTIMP intervention were assessed using Kendall's coefficient of concordance (W). Table (4) shows that increased yield (Mean rank = 7.35) is the highest ranked indicator contributing to the sustainability of the intervention followed closely by increased income per hectare of cassava farm (Mean rank = 6.74). On the other hand, increased assets/equipment owned (Mean rank = 1.30) through the activities of the intervention is the least ranked economic indicator. The Kendall's coefficient [W = 0.55, χ^2 (8) = 653.80, p = 0.00] revealed that farmers intermediately agree that the economic indicators like increased yield, income per hectare, direct farm labour, indirect employment and improved saving are contributing to economic sustainability of the RTIMP intervention in the Central Region (Wang et al., 2018). The Kendall's W value of 0.55 indicates that the degree of agreement or concordance in the ranking of the economic indicators was about 55 percent; suggesting a significant convergence on the sustainability implication of the individual economic indicators to the overall economic sustainability of the RTIMP programme.

Table 4: Ranking of Economic sustainability indicators

Economic indicators	Mean Rank	Kendall's W	Chi-Square	df	Asymp. Sig.*
increased yield	7.35	0.55	653.80	8	0.00
increased income/hectare	6.74				
increase in direct farm labour	5.57				
increase in indirect employment	5.36				
improved savings	5.10				
increased access to credit	3.71				
developing sustainable enterprise	4.65				
increased volume of business	5.22				
increased asset/equipment owned through your activities in RTIMP interventions	1.30				

**p < 0.05. N = 150. Source: Data Analysis, 2020*

Social sustainability

Another sustainability dimension assessment presented in Table (3) is on the contribution of social indicators to the overall sustainability of RTIMP intervention. The results as presented in the table revealed that overall, farmers perceived the social factors contributing to the sustainability of the programme in the Central Region to be 'moderate' (Overall Mean = 3.25, S.D = 0.99). Five factors that were found to be major contributors to social sustainability of the intervention was enhanced food security, collaboration between value chain partners to improve market access, trust with other value chain partners, cooperation between value chain actors to improve market access and functional relationship with other value chain partners.

Ranking of Social Indicators

To evaluate the convergence intensity among farmers in their assessment of the contributing effect of the individual social indicators to the sustainability of the RTIMP intervention, we

estimated the Kendall's coefficient of concordance (W); the result of which is presented in Table (5) which shows that enhanced food security (Mean rank = 4.95) was the highest ranked whilst linkage with financial institutions (Mean rank = 2.79) was the least ranked. The Kendall's coefficient of 0.17 suggested that there was a low degree of convergence (17 %) among farmers on their agreement on the contributing effect of social factors to the sustainability of the RTIMP intervention in the Central region [W = 0.17, χ^2 (6) = 150.98, p = 0.00] (Wang et al., 2018). Although the estimated Kendall's W is somewhat low, it being significant implies that the social indicators are still considered to be significant influencing factors to the sustainability of the RTIMP programme and as such must still be given attention.

Table 5: Ranking of Social Indicators

Social indicators	Mean Rank	Kendall's W	Chi-Square	df	Asymp. Sig.*
enhanced food security	4.95	0.17	150.98	6	0.00
increased collaboration between value chain partners to improve market access	4.24				
increased trust with other partners	4.22				
increased cooperation between value chain actors to improve market access	4.18				
increased functional relationships with other partners	3.86				
improved management skills	3.76				
increased linkages with financial institutions	2.79				

$p < 0.05$. N = 150. Source: Data Analysis, 2020

Environmental Sustainability

The results of the environmental indicators contributing to the sustainability of the intervention is presented in Table (3). From the results, it was realised that farmers in general perceived the contributing effects of the environmental factors to the sustainability of the RTIMP intervention to be 'moderate' (Overall mean =3.38, S.D = 0.97). Even though improved farm sanitation, enabling business environment and the use of by-product as animal feed 'moderately' contributed to the sustainability of the intervention, the contribution of improved knowledge on good agronomic practices was 'high'.

Ranking of Environmental Sustainability Indicators

To ascertain the degree of concordance among farmers on the combined effect of the environmental indicators to the sustainability of the RTIMP programme, we relied on the Kendall's coefficient of concordance statistics. Table 6 presents the ranking of the environmental factors contributing to the sustainability of the RTIMP intervention in the Central Region. In general, the findings showed that improved knowledge on good agronomic practices was ranked first (Mean rank = 3.33). Improved farm sanitation (Mean rank = 2.38) was ranked second, enabling business environment (Mean rank = 2.25) was ranked third and use of by-products as

animal feed (Mean rank = 2.05) fourth. The Kendall's coefficient [W = 0.34, χ^2 (3) = 151.52, p = 0.00] showed that farmers were about 34 percent in agreement on the environmental indicators contributing to the sustainability of the RTIMP intervention in the Central region (Wang et at., 2018). The findings reveal how unevenly most farmers ranked the environmental indicators. The results attest to the significant convergence in the assessment of farmers in relation to the contributing effect of environmental indicators to the sustainability of the RTIMP programme.

Table 6: Ranking of Environmental Sustainability Indicators

Environmental indicators	Mean Rank	Kendall's W	Chi-Square	df	Asymp. Sig.*
improved knowledge on good agronomic practices	3.33	0.34	151.52	3	0.00
improved farm sanitation	2.38				
improved an enabling business environment	2.25				
increased use of by-products as animal feed	2.05				

**p < 0.05. N = 150. Source: Data Analysis, 2020*

Differences in Location and Sex of farmers and perception of the factors contributing to the Sustainability of the RTIMP Intervention

The linear combination of the differences in the three dimensions (economic, social, and environmental factors) contributing to the sustainability of the RTIMP intervention with respect to the location and sex of the farmers was established using a two-way Multivariate Analysis of Variance (two-way MANOVA) test. Preliminary assessment to test normality, linearity, univariate and multivariate outliers, and multicollinearity showed no serious violation. The findings of the two-way MANOVA are shown in Table (7). The effect of district locations (Assin South, Gomoa Central, Agona East, Awutu Senya West and Abura Asebu Kwamankese districts) and sex (male and female) variations on the three aspects of sustainability was investigated using a two-way between groups multivariate analysis of variance. The assumption of equality of homogeneity of variance-covariance matrices was satisfied using Box's M test. The estimated Box's M value of 80.50 implies that covariance matrices across groups are expected to be homogeneous [F (54,5464.61) = 1.30, p = 0.07]. Wilks' Lamba (**Λ**w) was used in the statistical significance testing. The results established statistically significant differences based on the location of the five districts, on the linear combination of economic, social, and environmental factors contribution to sustainability of RTIMP intervention in the Central Region [F (12,365.41) = 4.60; p = 0.00; Λw = 0.69; partial eta squared = 0.12]. On the other hand, male and female farmers did not differ significantly on the linear combination of sustainability in economic, social, and environmental dimensions of the RTIMP intervention [F (3,138.00) = 1.97, p = 0.12, **Λ**w = 0.96; partial eta squared = 0.04]. Additionally, there was no noticeable difference in the interaction of district locations and sex among the farmers [F (12,365.41) = 1.02; p = 0.43; **Λ**w = 0.92; partial eta squared = 0.03]. The results show that economic, social, and environmental sustainability dimensions of RTIMP intervention is significantly influenced by the location of the farmers, but

not their sex. The result implies that sustainability of the programme is different in the five districts, however, the same cannot be said about the sex and the interaction between sex and district locations. Inferring that sex had no bearing on the three domains of sustainability among smallholder cassava farmers.

Table 7: Multivariate Test of District and Sex on Sustainability Indicators

Effect		Value	F	Hypothesis df	Error df	p value*	Partial Eta Squared
district	Wilks' Lambda	0.69	4.60	12.000	365.41	0.00*	0.12
sex	Wilks' Lambda	0.96	1.97	3.000	138.00	0.12	0.04
district * sex	Wilks' Lambda	0.92	1.02	12.000	365.41	0.43	0.03

**p < 0.05. N = 150. Source: Data Analysis, 2020*

When the results of the dependent variables were examined independently based on the district locations, using a Bonferroni adjustment alpha level of 0.017, all the three variables reached statistical significance, economic sustainability: F (4,14.24) = 7.70, p = 0.00, partial eta squared = 0.18; social sustainability: F (4,33.90) = 11.07, p = 0.00, partial eta squared = 0.24, and environmental sustainability: F (4,18.86) = 6.55, p = 0.00, partial eta squared = 0.16. An examination of the Levene's test of equality of variance of all three dependent variables indicated that the assumption of equality of variance was not violated [Economic: F (9,140) = 1.19; p = 0.31; Social: F (9,140) = 0.97; p = 0.34: Environmental: F (9,140) = 1.34; p = 0.48].

An inspection of the mean score indicated that farmers in the Assin South (Mean = 3.41, S.D = 0.14), Gomoa Central (Mean = 3.23, S.D = 0.16) and Abura Asebu Kwamankese districts reported 'moderate' economic sustainability compared respectively to farmers in Awutu Senya (Mean = 2.40, S.D = 0.16) who reported 'low' economic sustainability (Table 9). The diffeence between the economic sustainability of farmers in Awutu Senya and Assin South, Gomoa Central and Abura, Asebu Kwamankese is statistically significant at 0.017 alpha level. Secondly, farmers in the Assin South District (Mean = 3.85, S.D = 0.17) recorded 'high' social sustainability compared to farmers in the Agona East (Mean = 2.90, S.D = 0.16) and Awutu Senya (Mean = 2.27, S.D = 0.20) who recorded 'moderate' and 'low' social sustainability respectively. Also, farmers in Gomoa Central (Mean = 3.48, S.D = 0.20) and Abura Asebu Kwamankese (Mean = 3.53, S.D = 0.17) recorded 'high' social sustainability compared to farmers in Awutu Senya (Mean = 2.27, S.D = 0.20) who recorded 'low' social sustainability (Table 9). The difference in social sustainability between the farmers in the districts was statistically significant at 0.017 alpha level. Finally, environmental sustainability reported by farmers in Abura Asebu Kwamankese (Mean = 3.76, S.D = 0.16), Assin South (Mean = 3.59, S.D = 0.17), and Gomoa Central (Mean = 3.57, S.D = 0.19) ditricts was 'high' whereas farmers in Agona East (Mean = 3.02, S.D = 0.16) and Awutu Senya (Mean = 2.67, S.D = 0.19) recorded moderate environmental sustainability (Table 9). Statistical difference was observed between the districts at 0.017 alpha level.

Table 8: Tukey HSD Multiple Comparison of Difference in Sustainability Indicators and Districts

						98.3% Confidence Interval	
Dependent Variable			**Mean Difference**	**Std. Error**	***p value**	**Lower Bound**	**Upper Bound**
ECO	Assin South	Awutu Senya	0.81*	0.18	0.000	0.26	1.36
	Gomoa Central	Awutu Senya	0.64*	0.18	0.003	0.09	1.19
	AAK	Awutu Senya	0.66*	0.18	0.002	1.22	0.11
SOC	Assin South	Agona East	0.85*	0.23	0.002	0.14	1.56
		Awutu Senya	1.33*	0.23	0.000	0.62	2.04
	Gomoa Central	Awutu Senya	0.95*	0.23	0.000	0.24	1.66
	AAK	Awutu Senya	1.08*	0.23	0.000	1.79	0.37
ENT	Assin South	Awutu Senya	0.79*	0.22	0.004	0.10	1.48
	Gomoa Central	Awutu Senya	0.69*	0.22	0.016	0.00	1.38
	AAK	Agona East	0.76*	0.22	0.006	1.45	0.07
	AAK	Awutu Senya	0.98*	0.22	0.000	1.66	0.29

**p < 0.05. N = 150. Source: Data Analysis, 2020*

DISCUSSION OF RESULTS

This study sought to examine the interventions received by smallholder cassava growers in some few choosen districts in the Central region under the Roots and Tuber Improvement and Marketing Programme, what factors are contributing to the sustainability of the programme intervention and the influence of district locations and sex on the sustainability factors. The results indicated that more than eight out of every ten farmers received improved planting materials for cassava from the programme. According to MoFA, the improved cassava planting materials is expected to help farmers improve yields while reducing the effect of diseases and pest infestations on the crops (MoFA, 2013). The results reflect the assession of IFAD that progragramme sustainability would be enhanced by commercial reproduction of improved cassava planting materials after the intervention has ended (IFAD, 2013). More than half of the

farmers received training on various topics including farm records keeping, farm activity planning, use of appropriate technology equipment, marketing training, banking and savings training, negotiating contract with buyers, costing and pricing training and building of trust in relationships. These interventions and services were received by farmers in order to build their capacities to manage the farming enterprise (MoFA, 2013). The result is in line with government policy as stipulated in the Food and Agriculture Sector Development Policy (FASDEP II) to train and build the capacity of smallholder farmers to develop the knowledge and skills to manage their farming enterprises (MoFA, 2007).

Programme sustainability hinges on three sustainability dimensions (i.e., economic, social, and environmental) and as such every intervening activity must impact beneficiaries across these dimensions (Picciotto, 2013). The three dimensions of programme sustainability was assessed in this study. The results indicate that increased yield and income per hectare are two the main factors contributing towards economic sustainability of the RTIMP intervention in the Central Region. The result in line with IFAD which posited that the effect of programme intervention on sustainability would be realised in the form of increased profitability, reduced cost per unit revenue, increased price on offer for most R&T crops, increase production of farmers at the end of the programme (IFAD, 2013). Vermeulen, et al. indicated that farmers' income, which is a combined effect of improved yield and lower food prices, are economic growth drivers (Vermeulen, et al., 2017). Previous research has shown that income levels have an impact on farming activities, with the rate at which income grows having a positive effect on sustainable agricultural enterprise development (Umoren et al., 2015). This is because economic sustainability can lead to the incorporation of new businesses and strengthening of existing businesses, as there are more opportunities for agricultural enterprises to flourish (Fernández-Serrano & Romero, 2014). Thus, to a large extent, the level of economic factors such as income is responsible for long-term sustainable agricultural enterprises (Moya-Clemente et al., 2020). Other factors contributing to economic sustainability are increased direct farm labour, savings, and access to credit facilities. The result of the study is in line with the findings of IFAD which in an interim evaluation of the Ghana Rural Enterprise Project Phase II rated increased access to rural financial services and savings as high contributors of the economic sustainability of the Rural Enterprise Programme (IFAD, 2011). It is worth noting that the farmers perceived the ownership of farm equipment to be a 'very low'contributor of programme economic sustainability. The result implies that the consensus among the cassava farmers in the study area is that investing in new farm equipment to improve their production contribute very little to programme sustainability. This development may affect the volumes of cassava produced in the region since it is widely accepted that technology improves agricultural productivity (Rehman et al., 2016; Kebebe, 2017).

Social factors contributing to the sustainability of the RTIMP programme in the Central Region was perceived to be 'moderate". Enhanced food security, increased collaboration and cooperation between value chain actors and improved access to market are key factors contributing to social sustainability of the RTIMP intervention in the study area. Long-term food security might be regarded as contingent on sustainability. Therefore, for everyone to have access to food, Berry et al. noted that social sustainability is required because utilization of food is also influenced by

social sustainability (Berry et al., 2014). The results on improved market access is in line with Aku et al. who concluded that market access has a considerable and long-term impact on farm income (Aku et al., 2018). IFAD notes that market access that is reliable boosts productivity, raises earnings and improves food security (IFAD, 2022). Thus, if suitable intervention such as RTIMP are done to mitigate market risks and unequal market power, it can help to lessen poverty and hunger for producing families and their communities and ultimately promote the sustainability of the intervention.

Improved farm sanitation, enabling business environment and the use of R&T by-products as animal feed are factors contributing to environmental sustainability of the RTIMP programme. Improved farm sanitation as a result of programme intervention has a link to sustainability, because it offers economic opportunities to sectors delpoying technologies for reduced effect of production on the environment (Hanchett, 2016). This implies that protection, restoration and promotion of sustainable use of terrestial ecosystem is consistent with the work of Shepherd and Patzelt (2011) which connects sustainable agriculture intervention to more activities that avoid environmental damage as well as improved farming activities that support diversification (Dhahria & Omri, 2018).

The results from the two-way multivariate analysis of variance indicate that sex had no bearing on the three dimensions of sustainability in the study area. The results is similar to Teklewold et al. (2013) which concluded that sex had no impact on perception of farmers on sustainable agricultural interventions. The results however contradict that of Kristjanson, et al. (2017) which recorded variability in sex and sustainability of agricultural development intervention implemented among men and women farmers. The study however recorded locational differences along the linear combination of the three dimensions of sustainability, indicating that the local context of a farmer is most likely to influence his/her perception on how an agricultural intervention is sustained in the community. The result is in line with Baccar et al. (2020) which concluded that context influence farmers interpretation of sustainability. Programme sustainability is the ability of project benefits to be resilient to risk and persist long after project funding has been withdrawn (Picciotto, 2013). Agriculture is deeply rooted in local and regional contexts, and it is always bound by specific socially defined linkages and inter-dependencies between the production of commodities and the use of production for multi-functional public good (Hurni & Osman-Elasha, 2007).

CONCLUSION AND POLICY IMPLICATION

Programme sustainability is important to ensure that gains made during programme implementation continue to persist long after funding and assistance have terminated. This study sought to identify the interventions received by the beneficiaries of the Root and Tuber Improvement and Marketing Programme (RTIMP) in the Central region, the ranking of factors contributing to the sustainability of the programme and differences between sex of the district of the farmers and the sustainability of the programme. The farmers received a number of interventions, key among them was improved cassava planting materials. The Ministry should continue to create avenues for the farmers to continue to access improved planting materials as that constitute one of the major drivers of improved R&T yields which would ultimately improve

the farmers' source of livelihood and decrease food insecurity. In terms of economic outcomes, the results from the programme are important to the farmers (improved yield and revenue), social (decrease food insecurity and collaboration between value chain actors) and environmental (improved knowledge on GAP and farm sanitation) sustainability even though the effect is perceived to be moderate. Interventions that improve yields, income, food security, value chain relationships, knowledge on good agronomic practices and farm sanitation should be given priority during planning as it has the propensity to improve economic, social and environmental sustainability of the programme in the region. Activities that improve economic sustainability should be given more priority because it is rated highly by the farmers followed by environmental and social sustainability. Though sex is an important issue that generate debates among development practioners, male and female farmers who participated in th RTIMP in the Central region did not differ in their perception of the sustainability of the programme. This demographic feature should not be given special attention by the Ministry of Food and Agriculture and Development Partners when planning for sustainability of similar programmes in the future. On the other hand, since farmers in respective districts significantly varried in their opinions on the sustainability of the programme in their districts, locations of future intervention should be given important consideration when planning for sustainability. The scope of this research was limited to the Central region of Ghana, further studies should look at extending it to cover the other regions in Ghana where the programme was implemented in order to expand the coverage of the factors contributing to the sustainability of the Root and Tuber Improvement and Marketing Programme (RTIMP) in Ghana.

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REFERENCES

Acheampong, P. P., Amengor, N. E., Nimo-Wiredu, A., Adogoba, D., Nsiah-Frimpong, B., Haleegoah, J., . . . Baafi, E. (2017). *Root and Tuber crops technologies adoption and impact studies in Ghana: The case of improved sweet potato technologies.* Accra: Council For Scientific And Industrial Research.

Aku, A., Mshenga, P., Afari-Sefa, V., & Ochieng, J. (2018). Effect of market access provided by farmer organizations on smallholder vegetable farmer's income in Tanzania. *Cogent Food & Agriculture, 4*(1560596), 1-13. doi:https://doi.org/10.1080/23311932.2018.1560596

Andoh, P. K. (2010). Socio-Economic Relevance of Cassava to Rural Peasant Farmers in the Awutu-Effutu-Senya and Atebubu-Amantin Districts of Ghana. *Ghana Journal of Development Studies, 7*(2), 1-15.

Berry, E., Dernini, S., Burlingame, B., Meybeck, A., & Conforti, P. (2014). Food security and sustainability: Can one exist without the other? *Public Health Nutrition*, 1-10. doi:doi:10.1017/S136898001500021X

Dhahria, S., & Omri, A. (2018). Entrepreneurship contribution to the three pillars of sustainable development: What does the evidence really say? *World Development, 106*, 64-77. doi:https://doi.org/10.1016/j.worlddev.2018.01.008.

FAO. (2015). *Strengthening linkages between small actors and buyers in the Roots and Tubers sector in Africa.* Accra: The Food and Agriculture Organization of the United Nations.

Fernández-Serrano, J., & Romero, I. (2014). About the interactive influence of culture and regulatory barriers on entrepreneurial activity. *International Entrepreneurship and Management Journal, 10*, 781–802. doi:https://doi.org/10.1007/s11365-014-0296-5

Ghana Statistical Service. (2010). *2010 population and housing census report.* Accra: Ghana Statistical Service.

Ghana Statistical Service. (2021). *2021 Population and Housing Census: Press Release on Provisional Results.* Accra: Ghana Statistical Service. Retrieved March 16, 2022, from https://statsghana.gov.gh/gssmain/storage/img/infobank/2021%20PHC%20Provisional%20Results%20Press%20Release.pdf

Gomez, K. A., & Gomez, A. A. (1984). *Statistical Procedures for Agricultural Research* (2 ed.). Chichester, UK,: Wiley.

Hanchett, S. (2016, March 2). *Sustainable Sanitation for all*. Retrieved from CLTS Knowledge Hub Learning: http://www.developmentbookshelf.com/doi/pdf/10.3362/9781780449272#page=49%0A

Hurni, H., & Osman-Elasha, B. (2007). *Context, Conceptual Framework and Sustainability Indicators.* Berlin: International Assessment of Agricultural Knowledge, Science and Technology for Development. Retrieved from https://publications.iwmi.org/pdf/H042790.pdf

IFAD. (2011). *Republic of Ghana: Rural Enterprises Project, Phase II Interim Evaluation.* Rome: International Fund for Agricultural Development. Retrieved from https://www.ifad.org/documents/38714182/39731686/rep.pdf/adda1cd2-6bd7-4c41-9167-95dd2685d860

IFAD. (2013). *Republic of Ghana: Root and Tuber Improvement and Marketing Programme RTIMP Supervision report- Mission dates: 3-21 June 2013.* Accra: International Fund for Agricultural Development, West and Central Africa Division Programme Management Department.

IFAD. (2022, March 2). *Poverty reduction through market participation*. Retrieved from Market Access: https://www.ifad.org/en/market-access

Kebebe, E. G. (2017). Household nutrition and income impacts of using dairy technologies in mixed crop–livestock production systems. *Australian Journal of Agricultural and Resource Economics, 61*(4), 626-644. doi:10.1111/1467-8489.12223

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques* (Revised 2 ed.). New Delhi: New Age International (P) Ltd.

Kuwornu, J. K., Suleyman, D. M., & Amegashie, D. P. (2013). Comparative analysis of food security status of farming households in the Coastal and the Forest communities in the Central region of Ghana. *Asian Journal of Empirical Research, 3*(1), 39-61.

Kuwornu, J. K., Suleyman, D. M., & Amegashie, D. P. (2013). Comparative Analysis of Food Security Status of Farming Households in the Coastal and the Forest Communities of Central Region of Ghana. *Asian Journal of Empirical Research, 3*(1), 39-61. Retrieved from https://archive.aessweb.com/index.php/5004/article/view/2928

Mariem Baccar, Ahmed Bouaziz, Patrick Dugué, Mohamed Gafsi, & Pierre-Yves LeGal. (2020). Sustainability Viewed from Farmers' Perspectives in a Resource-Constrained Environment. *Sustainability, 12*(8671), 1-15. doi:10.3390/su12208671

Ministry of Food and Agriculture. (2007). *Food and Agriculture Sector Development Policy (FASDEP II).* Accra: Ministry of Food and Agriculture.

Ministry of Food and Agriculture. (2013). *Root and Tuber Improvement and Marketing Programme (RTIMP): Status report as at May 2013.* Kumasi: Ministry of Food and Agriculture, RTIMP Programme Coordinating Office.

Ministry of Food and Agriculture. (2016). *Agriculture in Ghana: Facts and figures (2016).* Accra: Statistics, Research and Information Directorate (SRID) of the Ministry of Food and Agriculture.

Ministry of Local Government. (2020, April 9). *2020 Central region profile*. Retrieved from Regional profiles: http://www.ghanadistricts.com/region/?r=3

MoFA/GoG, IFAD, BMGF. (2014). *Root & Tuber Improvement & Marketing Program (RTIMP): Design Paper for the Participatory Impact Assessment & Learning Approach (PIALA).* Accra: MoFA, IFAD and BMGF.

MoFA/GoG; IFAD; BMGF. (2015). *Final report on the participatory impact evaluation of the Root & Tuber Improvement and Marketing Program (RTIMP). Pilot application of a Participatory Impact Assessment & Learning Approach.* Accra: MoFA/GoG, IFAD and the BMGF.

Moya-Clemente, I., Ribes-Giner, G., & Pantoja-Di´az, O. (2020). Identifying environmental and economic development factors in sustainable entrepreneurship over time by partial least squares (PLS). *PLoS ONE, 15*(9), e0238462. doi: https://doi.org/10.1371/journal.pone.0238462

Neuman, W. L. (204). *Social Research Methods: Qualitative and Quantitative Approaches* (7 ed.). London: Pearson Education Limited.

Pallant, J. (2016). *SPSS Survival Manual: A step by step guide to data analysis using IBM SPSS* (6 ed.). Sydney: Open University Press: McGraw-Hill Education. Retrieved from www.allenandunwin.com/spss

Patricia Kristjanson, Elizabeth Bryan, Quinn Bernier, Jennifer Twyman, Ruth Meinzen-Dick, Caitlin Kieran, . . . Doss, C. (2017). Addressing gender in agricultural research for development in the face of a changing climate: where are we and where should we be going?,. *ternational Journal of Agricultural Sustainability, 15*(5), 482-500. doi:10.1080/14735903.2017.1336411

Picciotto, R. (2013). The logic of development effectiveness: Is it time for the broader evaluation community to take notice? *Evaluation, 19*(2), 155–170. doi:10.1177/1356389013483715

Rehman, A., Jingdong, L., Khatoon, R., & Hussain, I. (2016). Modern agricultural technology adoption its importance, role and usage for the improvement of agriculture. *American-Eurasian J. Agric. & Environ. Sci., 16*(2), 284-288. doi:10.5829/idosi.aejaes.2016.16.2.12840

Reynaldo, J., & Santos, A. (1999). Cronbach's Alpha: A tool for assessing the reliability of scales. *Journal of Extension, 37*(2), 1-5. Retrieved from https://www.joe.org/joe/1999april/tt3.php

Sanginga, N., & Mbabu, A. (2015). Root and Tuber Crops (Cassava, Yam, Potato and Sweet Potato). *Feeding Africa: An Action Plan for African Agricultural Transformation* (pp. 1-26). Dakar: United Nations Economic Commision for Africa.

Shepherd, D., & Patzelt, H. (2011). The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking "What Is to Be Sustained" With "What Is to Be Developed". *Entrepreneurship Theory and Practice, 35*(1), 137-163. doi:10.1111/j.1540-6520.2010.00426.x

Teklewold, H., Kassie, M., & Shiferaw, B. (2013). Adoption of Multiple Sustainable Agricultural Practices in Rural Ethiopia. *African Journal of Agricultural Economics, 64*(3), 597-623. doi:10.1111/1477-9552.12011

Umoren, N., Akpanuko, E., & Akpan, S. (2015). Entrepreneurship Education and National Development: Evidence from Nigeria. *International Association of Breath Research, 1*(1), 35-53. Retrieved from https://d1wqtxts1xzle7.cloudfront.net/54687876/Entrepreneurship-Education-and-National-Development-Evidence-from-Nigeria-Ntiedo-J-Umoren-IABR-Vol-1-No-1-Winter-2015.pdf?1507725763=&response-content-disposition=inline%3B+filename%3DENTREPRENEURSHIP_EDUCATI

Vermeulen, S., Richards, M., De-Pinto, A., Ferrarese, D., Läderach, P., Lan, L., . . . Watkiss, P. (2017). *The Economic Advantage: Assessing the value of climate-change actions in agriculture.* Rome: The International Fund for Agricultural Development (IFAD). Retrieved from https://www.ifad.org/documents/38714170/40321165/economics_advantage.pdf/bb2525f4-0c2f-4ea6-9201-e1e14c0e8725

Wang, L., Xu, J., Wang, C., & Wang, J. (2018). (2018). Whole brain functional connectivity pattern homogeneity mapping. *Frontiers in Human Neuroscience, 12*, 1-19. doi:https://doi.org/10.3389/fnhum.2018.00164

White, H. (2005). *Challenges in evaluating development effectiveness: IDS Working Paper 242.* London: Institute of Development Studies. Retrieved from https://www.ids.ac.uk/download.php?file=files/Wp242.pdf

Appendix

Table 9: List of Study Districts, Communities and their respective sample sizes

Districts	Communities	Frequency	Percentage
Assin South	Assin Dominase	15	10.0
	Ningo Mepeasem	15	10.0
Gomoa Central	Gomoa Obuasi	15	10.0
	Gomoa Afransi	15	10.0
Agona East	Mankron Junction	15	10.0
	Agona Kwanyarko	15	10.0
Awutu Senya	Bontrase	15	10.0
West	Bawjiase	15	10.0
Abura, Asebu,	Abakrampa	15	10.0
Kwamankese	Old Ebu	15	10.0
	Total	150	100.0

Source: Survey data, 2020. N = 150.