

Evaluation of Agribusiness Program on Youth Decision and Participation Level in Micro and Small Horticultural Enterprises in Tanzania

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Abstract: Tanzania has been experiencing youth unemployment problem for many years. As a result, the government, together with development partners, has come up with numerous strategic initiatives to increase youth involvement in the agricultural sector. Introduction of agribusiness programs to empower youth with entrepreneurship skills useful in establishing and operating their business enterprises. Yet, there is limited information on the effectiveness of such programs on youth decision and participation level in horticultural enterprises in the country. Therefore, this study examines the effect of the youth agribusiness program on youth decision and participation level in micro and small horticulture enterprises (MSEs) in the Morogoro and Pwani regions. A sample of 157 respondents comprising 51 participants and 106 non-participants of the youth agribusiness program were selected through a multi-stage sampling procedure. Data were collected using a semi-structured questionnaire and analyzed by the Double Hurdle Model (DHM). Results indicate the presence of a positive and significant relationship between participation in agribusiness program on youth decision and participation level in horticultural enterprises. Specifically, youth decision to establish horticultural enterprises was influenced by the presence of family members in agribusiness, farming experience, and easy access to farming inputs. Likewise, household head, non-farming income, credit access, and access to markets influenced youth participation level in those enterprises. This study recommends for the replication of the training model to increase youth employability in the agribusiness sector.

Keywords: Youth, Agribusiness, Horticultural, Tanzania, Double Hurdle Model (DHM)

1. Introduction

The agricultural sector remains the major contributor to the economic and social transformation of many countries. In Sub-Saharan Africa, agriculture is the key sector for stimulating socio-economic development by offering employment opportunities to all working groups, youth, and women (Geza *et al.*, 2021). Tanzania is not an exception to this, as agriculture remains the largest sector for achieving country's significant economic and social agenda. Almost 67% of the country's population directly or indirectly earns their living therein (Lunogelo *et al.*, 2015). Besides, the agricultural sector enhances forward and backward linkages with manufacturing and export sectors contributing directly to the growth of the country's GDP. For instance, 65% of the industrial raw materials and 30% of export earnings are derived from crop production, fisheries, and livestock keeping (Ministry of Agriculture-MoA, 2018). In addition, crop production accounts for almost 15.4% of the country's total GDP (National Bureau of Statistics-NBS, 2020). Similarly, the production of horticultural varieties such as flowers, spices, fruits, and vegetables provides the country with sufficient nutritious foods and contributes to the generation of foreign currencies through export to other regions around the world (Tanzania Horticultural Association-TAHA, 2011).

In Tanzania, horticulture is the fastest growing agricultural subsector with a tremendous growth rate of 9 to 12% per annum compared to other agricultural subsectors with a growth rate of 4% (TAHA, 2018). In 2019, horticultural production contributed about 38% of foreign exchange

earned from the agricultural sector (MoA, 2020). This resulted from an increase in exports from USD 64 million in 2004 to USD 779 million in 2019 (Ekka & Mjawa, 2020). Undoubtedly, horticultural enterprises are embedded with multiplier effects that accelerate the pace of economic development through job creation, society revitalization, and economic advancement. The horticulture subsector is also a labor-intensive occupation that creates employment opportunities along the chain node. The subsector is estimated to offer close to 3 million employment opportunities (Groenbech *et al.*, 2016), with 65% to 70% being women (Ekka & Mjawa, 2020). Besides, horticultural enterprises are simple to establish with minimum land and capital requirements than other agricultural enterprises. Unlike the production of staple crops, horticultural crops take a shorter period to mature (Adesina & Favour, 2018), hence enhances generation of quick income throughout the year. Currently, 85% of horticultural production in the country is dominated by small-scale producers (MoA, 2020). Most of these farmers are adults, with higher risk aversion, less innovative with conservative production ideas than young generations.

Youth may actively engage in horticultural production to maintain the sustainability of the subsector and improve their living standard. This is because they are more competent and sharp-minded with greater physical strength than most adults. They are quick learners and more risk-tolerant, with innovative ideas than other working-age groups (Nyabam *et al.*, 2018). Such potentials are highly recommended for transforming the agricultural sector, primarily dominated by aging individuals with an average of 65 years of age (Yami

et al., 2019). Concerning this, a recent work by Osabohien *et al.*, (2021) pointed out that there would be an increase in household income and poverty reduction by 17% once young people decide to take a full-time job in agricultural sector. Moreover, youth involvement in agriculture through enterprise development provides a country with sufficient food, reduces rural-urban migration, and contributes to sustainable economic development (Mbah *et al.*, 2016). In the same way, youth participation in such enterprises has a higher chance of reducing the burgeoning unemployed youth population within the economy.

Despite the potential of the horticultural subsector for poverty eradication, income diversification, and food security, horticultural enterprises have not been fully embraced by young people in the country. Lack of practical production and business skills, poor access to financial resources, limited output markets, and lack of access and legal ownership to productive land are the significant barriers limiting youth involvement in horticulture production (Horticultural Development Council of Tanzania-HODECT, 2012). In most cases, such challenges lessen youth motivation and aspiration to consider agribusiness for self-employment. Lack of competent skills in farming activities such as value addition and post-harvest management practices causes young agripreneurs to end up with low market-value produce that fetches lower prices in local and international markets. They receive low returns for their effort, thus seeing agriculture as a damning career. This notion has forced most young people, especially graduates, to choose formal occupation over farming (Chinsinga *et al.*, 2018). Similarly, the rural-based youth are moving away from farming and migrating to urban areas to have a better life. Though the urban centers, the formal sector, in particular, has proven to be less effective in absorbing a large number of jobless youth in the country (MoF, 2018, pg. 13; Geza *et al.*, 2021).

To overcome these challenges, the United Nations (UN) agencies have been working to support various youth development programs to achieve global Sustainable Development Goals. For instance, in 2016, the Food and Agricultural Organization (FAO), in collaboration with the Sokoine University Graduates Entrepreneurship Cooperative (SUGECO), implemented a youth hands-on agribusiness training program to scale up the horticulture subsector as part of the broader youth-focused program in the country. This program was implemented in four (4) regions (Morogoro, Pwani, Singida, and Dodoma) from 2016 to 2020 to change youth perception of agribusiness. The program was divided into practical and theoretical sessions in a ratio of 8:2, respectively, and lasted for 14 days per cohort. In 2016, about 225 youth participated in the training program, of which 52% were trained on the whole chain of horticultural enterprises. In addition, the program beneficiaries were facilitated with start-up kits and linked with key stakeholders, financial institutions, extension officers, output markets, and local government authorities to benefit from the available opportunities within their local areas. To this far, there is limited documentation on the effectiveness of such training programs in enhancing youth participation in horticultural enterprises in the country.

2. Literature Review

In Tanzania, youth are estimated to be around 14.8 million, and 11.7% of the economically active group are unemployed (NBS, 2015). The youth unemployment problem is most critical in urban than rural settings due to pulling factors, including social amenities in the urban centers. It was further noted that secondary and university graduates suffer more from the greatest burden of unemployment than other groups (NBS, 2015). For instance, out of 800,000 graduates entering the labor force annually, only 40,000 youth get employment in the formal sector (MoF, 2018). The remaining portion is left with no employment or employed with lower-paying jobs that lack social protections. To overcome this challenge, the Tanzanian government, in collaboration with development partners, has been implementing various interventions to stimulate youth employability in various sectors, including the agricultural sector. Such initiatives can be traced back to the 1970s by introducing agriculture as a subject in school curricula (Gulamiwa, 2015, pg. 45). This was followed by a series of programs and strategies to provide grants and technical know-how to small agricultural projects in villages through capacity building to smallholder farmers, including youth. Likewise, in 1996 and 2007, through the Youth Development Policy (YDP), the government introduced several programs to intensify youth economic empowerment through entrepreneurship. This was further enhanced by establishing the National Employment Policy (NEP) of 2008, which provided equal access to employment opportunities for marginalized groups such as young people (FANRPAN, 2012). Currently, the National Strategy for Youth Involved in Agriculture (NSYIA 2016 – 2021) implemented by the government aimed at facilitating youth self-employment and create an enabling environment for increasing youth participation in agricultural activities (MoA, 2016).

On the other hand, agriculture has not been fully accepted by young people compared to older people. In relation to this, literature has documented different perceptions of youth in the agribusiness sector. Some works have revealed positive acceptance, while others have indicated a contrasting view of youth perception of the agricultural sector. In most cases, youth perceive agriculture to be mainly for uneducated, poor, and old generations. The youths have developed a negative mindset and view the sector as a dirty occupation, labor-intensive that requires the highest level of devotion hence not attracted to venture in (Muthomi, 2017). For instance, Abdullah & Sulaiman (2013) lamented that youth attitudes and acceptance of agribusiness had a positive and significant relationship with their interest in becoming agri-preneurs. When it comes to employment and job searching, youth always place agriculture as their last option in their list of preferred jobs. Regarding the rural-based youth, environmental factors such as inadequate land, poor harvests, and soil degradation were mentioned to reduce youth involvement in agriculture (Akpan, 2010). The level of education attained is considered one of the socio-cultural factors influencing youth perception of agriculture. Cheteni (2016) depicted that low self-esteem is one of the factors reducing the level of youth participation in agriculture. As a result, most youth, especially those around 20 years and above, spend a few hours working on the farm and allocate

much of their efforts to non-farming occupations. One of the most mentioned reasons for such negativity is lower profitability generated from the farming sector compared to other sectors. This is associated with fewer returns compared to time devoted, efforts made and systemic risks arising from unpredictable weather changes. Socio-cultural factors also play an important role in attracting or discouraging youth from engaging in agriculture. Yami *et al.*, (2019) revealed that socio-cultural factors such as education level, household responsibilities, and expectations of family members, communities, and media plays a critical role in shaping youth aspirations in considering agribusiness for self-employment.

In relation to the above, several literature have empirically tested factors influencing youth perception of the agricultural sector. These factors are categorized into socio-cultural, institutional, and economic factors. For instance, Kising'u (2016) & Mwendwa (2016) found a lower participation rate in agricultural projects among degree holders than primary and secondary graduates. Out of 76 respondents, only 4% had degree certificates, while primary and secondary graduates were 38% and 33% (Kising'u, 2016). Similarly, Mwendwa (2016) indicated that out of 318 respondents, 11% had higher learning education, 26% with primary education, and 38% had secondary education. Graduates often believe that farmers are less respected than their counterparts from formal sectors (Twumasi *et al.*, 2019). Cheteni (2016) used a binary logistic model and observed that program type, program availability, and resources statistically affected youth participation in agriculture in the Nkonkobe Municipality in South Africa. In addition, 58% of 140 of the surveyed youth had no interest in farming and argued that it was hard for them to engage in agriculture activities while their siblings worked in the formal sectors in the cities. However, those formal sectors offer few employment positions for the youth resulting in many working in non-formal sectors with no job security (Kararach *et al.*, 2011). Concerning institutional factors, Akpan *et al.*, (2015) used the Logit model and pointed out that years in social organizations, access to ICT services, nature of land ownership, and youth access to state-owned agricultural programs positively influenced youth decision to engage in agricultural activities.

Contrarily, Nyabam *et al.*, (2018) had different observations on youth perception of agriculture. Using descriptive statistics, they found that 94.2% of respondents who participated in the International Institute of Tropical Agriculture (IITA) agribusiness model agreed that agriculture is a profitable venture. To cement on the positive acceptance of agribusiness as an avenue for entrepreneurship amongst youth, the Youth Employment in Agriculture Programs (YEAP), established in 2013 in Nigeria, created employment opportunities for about 750,000 young farmers and agripreneurs (Etela & Onoja, 2017). Mohamed *et al.*, (2012) evaluated the effectiveness of the Basic Student Entrepreneurial Programme (BSEP) for entrepreneurship development in Malaysia. Findings indicated that 97% of the program participants acknowledged that the BSEP program influenced their decision to venture into agripreneurship. Akpan (2010) discovered that youths' decision to participate in agricultural activities is a function of society's cultural, political, environmental, and economic situation.

Okojie (2003) observed that most youths are under pressure from family members, particularly parents, due to the notion that they value salaried jobs from formal sectors. Mohamed *et al.*, (2012) pointed out that student origin, presence of family members in entrepreneurship, and educational background had statistical significance on student intention to venture into agripreneurship. Youth education level, household responsibilities, expectations of family members, society, and friends were also identified as social-cultural factors influencing youth decision to participate in agribusinesses. Etim & Udoh (2018) used the Univariate Probit model and revealed that social-economic factors such as education, experience, income level, and membership in social groups had a positive significance on youth engagement in agricultural activities in Akwa Ibom State, Nigeria. Moreover, Mbah *et al.*, (2016) employed factor analysis and binary logistic regression to analyze social-economic factors influencing rural youth participation in farming in Nigeria. Results indicated that sex, age, marital status, level of education, household size, experience, farm size, type of agriculture, principal occupation, group membership, and extension services positively influenced youth decision to participate in agricultural activities.

Mwendwa (2016) noted that land access, access to financial services, market access, and access to extension services influenced youth decision to participate in agriculture Yatta Sub-county in Kenya. Business start-up is one of the critical economic factors determining youth engagement in agribusiness activities. In relation to this, Njeru & Gichumu (2014) commented that in Africa and Latin America, financial institutions place youth in the portfolio of high-risk customers because of their inability to design attractive and well bankable business ideas to attract financiers. Access to information on the current agricultural opportunities is also a significant factor for youth participating in agricultural activities. This was observed by Kising'u (2016) that awareness of agribusiness programs influenced youth decision to participate in agriculture activities. Kimaro *et al.*, (2015) found that age, sex, marital status, education level, family background, credit facilities, land access, knowledge of agriculture, lack of an alternative job, and perception to be the factors associated with rural youth participation in farming activities in Kahe District in Tanzania. Ohene (2013) used the Logit model to identify the determinants of farmers' participation in the Youth in Agriculture Program (YiAP) in the Eastern Region of Ghana. The results revealed that education, household size, farm size, farm income, access to credit, location, and membership in FBO positively influenced participation decisions. Nwaogwugwu & Obele (2017) examined factors limiting youth participation in agriculture in Niger Delta in Nigeria. They found that poor social values, poor agricultural support services, land degradation, poor agricultural policies, industrialization, scarce arable land, and poor health are the main factors limiting youth participation in agriculture.

However, there is relationship between the intention to start a business and actual business establishment decisions. In this scenario, fewer individuals usually start their businesses even though they might have indicated their initial intention (Nabi & Holden, 2008). For instance, a study by Robertson & Wilkinson (2005) in the United Kingdom indicated that 33%

of students revealed their intention to start their business once done with their studies. However, a follow-up study by Harding (2007) discovered that only 7% of the graduates had started their businesses. In this case, a considerable number of literature reviewed in this study, such as; Bosompem *et al.*, (2017); Etim & Udoh (2018); Mohamed *et al.*, (2012); Zakaria *et al.*, (2014); Mbah *et al.*, (2016); Withanage & Damayanthi (2019); Maritim (2020); Ng'atigwa *et al.*, (2020); Dimelu *et al.*, (2020); Akinwekomi *et al.*, (2017) & Ohene (2012) concentrated on factors determined youth intention and willingness to participate in agricultural and agribusiness related activities. They stressed finding the entrepreneurship spirit among the youth and failed to indicate their actual participation in those activities. Nevertheless, intention to do something and actual engagement are considered to be different guided by two separate decisions.

On the other side, a study by Akpan *et al.*, (2015) used both Logit and Poisson regression models to evaluate the decision and participation of rural youth in agriculture production in the Southern region of Nigeria. Estimates show that youth age, number of extension visits, years in social organizations, and purpose of farming positively affected youth participation in agricultural activities. Another study by Twumasi *et al.*, (2019) used the Double Hurdle Model and discovered that access to credit, access to land and youth course of study at the tertiary institution, gender, and youth perception of farm income have a positive effect on youth decision and intensity to engage in farming activities in Ghana. Generally, the two studies were carried out in Nigeria and Ghana, which differ from the context of the Tanzanian economy in terms of geographical, demographic, institutional, social, and economic characteristics. In light of the above, this study will fill this knowledge gap by empirically evaluating the effect of an agribusiness training program on youth decisions and the level of participation in horticulture MSEs in Tanzania.

3. Methodology

3.1 Study Area

The study was conducted in Morogoro and Pwani regions. These regions are among Tanzania's famous and leading vegetable and fruit-producing areas. Morogoro region covers a landmass of 70,624 square kilometers with six districts; Morogoro Rural, Morogoro Urban, Mkulanga, Gairo, Kilombero, Kilosa, and Mvomero (Population & Housing Census-PHC, 2012). The region lies between latitudes 5° 58' South of the Equator and between longitude 35° 25' and 35° 30' East Greenwich. Pwani region is situated in the Eastern part of the country along the Indian Ocean coastal belt. This region is located between 6° and 8° South of the Equator and between 37° to 40°10' East of the Greenwich Meridian. The region has six districts: Bagamoyo, Kibaha, Kisarawe, Mkuranga, Rufiji, and Mafia, and occupies about 32,407 square kilometers (NBS, 2007).

3.2 Sampling and Sampling Procedure

A Multi-stage sampling technique was used to arrive at the desired population. In the first stage, Pwani and Morogoro

regions were purposely selected. These regions were among the youth hands-on agribusiness program target regions. This was followed by a purposive selection of 4 treated districts; Rufiji and Kisarawe in the Pwani region and Mvomero and Morogoro Urban in the Morogoro region. The next stage involved the purposive selection of youth-owned horticulture MSEs operated for at least three years from 2017. Using a Census survey, the study used a database provided by SUGECO to survey 51 youth who participated in the program in 2016 from Morogoro and Pwani region. This was because participants from the two regions represented the entire population to be studied. However, during the survey, it was hard to get all participants from the two regions as expected following the implementation of government regulation that required mandatory registration of all sim cards in the country by 2020. All unregistered sim cards ceased operations, and hence complicated locating the potential respondents who did not register their current phone numbers held in the SUGECO database. This posed a challenge despite having a list of all participants. In this case, the snowballing approach ended up with 51 respondents. To obtain the size of the non-participants, a list of non-participants was generated and a systematic sampling method was used to get 106 out of 150 youth engaged with horticulture SMEs. At this stage, district agricultural officers and extension officers from 2 non-treated districts, Mkuranga in the Pwani region and Kilosa districts in the Morogoro region, were consulted to identify and locate the selected respondents. Hence, 157 youth comprised 51 participants, and 106 non-participants of the agribusiness training program were surveyed. For the non-participants, Cochran's (1977) sample size determination formula specified in Eq. (1) was used to arrive at the desired sample size as indicated below.

$$n = \frac{Z^2 PQ}{E^2} \text{ Equation 1}$$

$$n = \frac{(1.96)^2 (0.5) * (0.5)}{(0.08)^2} = 150.06 \text{ Equation 2}$$

$$n \approx 150$$

Where n represent the desired sample size; Z stands for the confidence level; P is the proportion of the population of major interest, Q stands for 1-P, and E is the allowable (margin) error. Since the variability of youth engaging in horticulture MSEs from the two regions was unknown, then a maximum variability with P = 0.5 and 95% confidence level and an allowable error of ±8% was used to calculate the size for the non-participant group.

3.3 Data Collection and Analysis

The target population for the survey was youth with 18 to 35 years, participants, and non-participants of the youth agribusiness program who owned horticulture MSEs operated for at least three years from 2017. Primary data was collected using the semi-structured questionnaire through a face-to-face interview of about 45 minutes per respondent. Likewise, secondary data was obtained from relevant books, journal articles, thesis, and reports from relevant ministries. Both SPSS and STATA version 14 soft wares were employed for data management and analysis.

3.4 Post Estimation Test Methods

Prior to data analysis, various econometric tests were performed to detect potential data problems such as the Multicollinearity and Heteroskedasticity problems from the selected explanatory variables. These tests are necessary to ensure the presence of consistent and unbiased estimates for the selected variables. Multicollinearity test was carried out for both continuous and categorical variables using Variance Inflation Factor (VIF) and the Pairwise correlation,

respectively. From the testing results in Table 1, the mean VIF of 1.44 was obtained, suggesting that Multicollinearity was not a problem. In addition, from Table 2, a Pairwise correlation of less than 0.5 was obtained, proving the absence of a severe relationship among the categorical variables used. Lastly, from Table 3, using the White test at a 95% confidence level, a Chi-square (χ^2) of 0.4625 was obtained, indicating that the variance of the unobserved factors does not change across different segments of the population (homoscedasticity).

Table 1: Results of Multicollinearity test using VIF

Variable	VIF	1/VIF
Experience (Number of years in farming)	2.60	0.3844
Enterprise age	2.47	0.4044
Age of household head	1.10	0.9125
Total credit accessed	1.61	0.6208
Extension services (Number of contacts)	1.55	0.6458
Age of respondent	1.16	0.8610
Total land accessed	1.38	0.7263
Education level (Years)	1.15	0.8680
Group membership (Maximum years in group)	1.22	0.8199
Employment size (Mean size of employment)	1.12	0.8900
Number of family members in Agribusiness	1.17	0.8513
Access to output market (Distance in Km)	1.08	0.9287
Log of non-farming income	1.16	0.8649
Mean VIF	1.44	

Table 2: Results for Multicollinearity Test using Pairwise Correlation

	Region	Marital	Gender	Information	Inputs	Location	Ownship
Region	1						
Marital status	-0.0271	1					
Gender	0.2443	0.1220	1				
Information	-0.1172	-0.1560	-0.0369	1			
Inputs	-0.0610	0.1172	-0.0139	0.2655	1		
Location	-0.1898	0.1367	-0.0864	0.0302	-0.1069	1	
Ownership	0.2362	0.1686	0.1888	-0.0287	0.1625	0.0315	1

Table 3: Results of Heteroskedasticity test using the White Test

Source	chi2	df	p
Heteroskedasticity	157	156	0.4625
Skewness	47.71	17	0.0001
Kurtosis	8.82	1	0.003
Total	213.54	174	0.0221

Note: chi2 = chi-square; df = degrees of freedom and p value = significance level

3.5 Empirical Model Specification

The Double Hurdle Model (DHM) proposed by (Craggit, 1971) was implemented to analyze the objective of this study. The basis for selecting this model was attributed to the fact that in social science studies, hurdle models are preferred in estimating the determinants of the truncated outcomes, specifically in participation and adoption studies (Burke, 2019). In our case, youth agripreneurs were considered to undertake two different but sequential decisions in relation to engagement in horticultural enterprises. This was demonstrated as follows; In the first stage, the youth decided whether to establish horticultural enterprises or not ($I=establish$, $0=otherwise$). Immediately after the first decision was accomplished, then a decision on the initial size of start-up capital invested in horticultural enterprises was effected as a measure of the participation level in such enterprises. There was a likelihood of having youth with zero amount of initial start-up capital for the

second stage. These zeros illustrated the existence of a corner solution utility function or problem, representing youths who made their optimal decision of not investing in such enterprises and not otherwise.

The Tobit (Tobin, 1958) model is perfect for analyzing data characterized by corner solution outcomes than a Truncated selection model (Garcia, 2013). However, the Tobit model turns out to be less effective in scenarios whereby the decision to establish horticultural enterprises is not related to the decision made on the size of initial start-up capital invested in horticultural MSEs. This is so because the Tobit model contains a single-step procedure, treating the two decisions as one (Wooldridge, 2013). Apart from Tobit, the Heckman Two-stage Model (Heckman, 1976) could be used. The Heckman Model combines discrete and continuous outcomes (Mignouna *et al.*, 2017), assuming different or similar sets of variables affecting two decisions separately. However, the model is limited to phenomena that contain a

corner solution challenge. In this case, the Heckman model treats the optimal amounts attained by youths with zero investment as missing responses (Mbitsemunda & Karangwa, 2017). The Heckman model accounts for non-zeros responses only (Mignouna *et al.*, 2017), those with zero start-up capital must be eliminated from the sample. This limits the analysis of characteristics of youth with no investments (Mossie *et al.*, 2020) into such enterprises, hence selection bias.

The Double Hurdle Model (DHM) is an appropriate alternative and extension of the Tobit model (Garcia, 2013). The DHM works by eliminating the weaknesses of both Tobit and Heckman models. The DHM follows a two-step technique by integrating both Probit and Truncated Normal Regression models (Khoza *et al.*, 2019). The Probit model measures participation (discrete, $y > 0$) decisions, while the regression model deals with investment outcome (continuous, $y < 0$) (Mutinda *et al.*, 2020). In addition, the DHM considers both zero and non-zero observations by assuming that youth decisions and level of participation are detached but sequential decisions (Burke, 2019). Several studies have used the Double Hurdle Model (DHM), including (Mutinda *et al.*, 2020; Twumasi *et al.*, 2019; Mossie *et al.*, 2020; Mignouna *et al.*, 2017 & Nkuya, 2019). Thus, based on Cragg's DHM then, the two decision equations are expressed as;

$$d_i^* = z_i' \gamma + \mu_i \text{ If } d_i^* > 0, \text{ and } = 0 \text{ if otherwise Equation 3}$$

$$y_i^* = x_i' \beta + v_i \text{ If } y_i^* > 0, \text{ and } = 0 \text{ if otherwise Equation 4}$$

Whereby d_i^* and y_i^* are the latent variables describing youth participation decisions and level of participation. z_i' and x_i' vectors of observed covariates, γ and β vectors of unobserved parameters, and μ_i and v_i independent and normally distributed error terms ($\mu_i, N \sim (0, 1)$, and $v_i, N \sim (0, \sigma^2)$) indicating factors affecting d_i^* and y_i^* apart from z_i' and x_i' .

$$L(\alpha, \beta, \sigma^2) = \prod_0 \left[1 - \varphi(z_i' \gamma) \varphi \left(\frac{x_i' \beta}{\sigma} \right) \right] \times \prod_1 \left[\varphi(z_i' \gamma) \sigma^{-1} \varphi \left(\frac{y_i - x_i' \beta}{\sigma} \right) \right] \text{Equation 7}$$

Where φ and Φ is the standard normal cumulative distribution function and density function, respectively. The log-likelihood for the DHM specified above comprises the log-likelihood values estimated in the First hurdle by the Probit model and the Second hurdle by the Truncated normal

$$(y_i / y_i > 0) = \varphi \left(\frac{x_i' \beta}{\sigma_i} \right)^{-1} \int_0^\infty \left(\frac{y_i}{\sigma_i \sqrt{1 + \theta^2 y_i^2}} \varphi \left(\frac{T(\Phi y_i) - x_i' \beta}{\sigma_i} \right) \right) dy_i \text{Equation 8}$$

4. Results and Discussion

4.1 Descriptive Statistics

The overall mean age of the sampled respondents was 29.69 years which falls within the youth age criterion used in Tanzania. The mean age for participants was 30.55, and that for non-participants was 29.27 years, respectively. This

The empirical model for youth decision to participate is estimated by the Probit model as follows;

Estab

$$= \gamma_0 + \gamma_1 age + \gamma_2 hhhead + \gamma_3 agehh_{head} + \gamma_4 marst + \gamma_5 resorgn + \gamma_6 sex + \gamma_7edul + \gamma_8 hhszize + \gamma_9 nonfrminc + \gamma_{10} fmagb + \gamma_{11} trngpart + \gamma_{12} frmexp + \gamma_{13} grpmsrshp + \gamma_{14} infoac + \gamma_{15} inputac + \gamma_{16} credtac + \gamma_{17} landacc + \mu_i \text{Equation 5}$$

The second equation for the level of participation having the size of initial start-up capital as the dependent variable estimated by the Truncated normal regression will be;

InitStartup =

$$\beta_0 + \beta_1 age + \beta_2 hhhead + \beta_3 agehh_{head} + \beta_4 marst + \beta_5 resorgn + \beta_6 sex + \beta_7edul + \beta_8 hhszize + \beta_9 nonfrminc + \beta_{10} trngpart + \beta_{11} fmagb + \beta_{12} frmexp + \beta_{13} grpmsrshp + \beta_{14} infoac + \beta_{15} inputac + \beta_{16} credtac + \beta_{17} landacc + \beta_{18} extnserv + \beta_{19} marktac + v_i \text{Equation 6}$$

Explanatory variables used in the *First stage* of the model were; respondent age, age of the household head, head of the household, marital status, respondent's region of origin, gender of respondent, education level, non-farming income, presence of family members in agribusiness, training participation, farming experience, group membership, access to information on agribusiness training, inputs access, credit access, and land access. Variables for the *Second stage* were; respondent age, age of the household head, head of the household, marital status, gender of respondent, education level, non-farming income, training participation, farming experience, group membership, access to information on agribusiness training, inputs access, credit access, land access, access to extension services and output markets.

To allow for Heteroskedasticity and the non-normal error term, the log-likelihood function for DHM, as specified by (Carroll *et al.*, 2005) as follows, was used;

regression model. Furthermore, to determine the effects of explanatory variables on the level of youth participation, the marginal effects were evaluated. Jensen & Yen (1996) specified the marginal effect as;

implies that most respondents from the surveyed regions are of their productive age and regarded as economically active groups in society. The number of years they stayed in school proxy the respondents' level of education. The average years in school was 8, participants of the training had 10.12 years while non-participants had 8.32 years in school. This indicates that respondents had attended at least primary education, an important demographic component that helps

young agripreneurs make better decisions on various issues affecting their lives. An average of 4 years was obtained representing respondents' farming experience, whereby training participants had 4.9 years and 3.6 years for non-participants. Training participants had more years in farming undertakings than their counterparts, non-participants. Training participants had more years of formal education that might have increased their engagement in farming activities for a long time through learning and practicing agriculture as a subject while in school.

Furthermore, findings show an average of Tsh. 122,063 generated from non-farming occupations. Training participants received higher income from non-farming activities than non-participants, as seen in Table 4. During training, participants were exposed to other income-generating sources, such as soap and garment making, which increased their chances of earning more than their counterparts. The justification for this could be that, horticultural crops take an average of 3 months to be harvested; hence there is a need for income diversification to cover the day-to-day needs and unforeseen risks associated with post-harvest losses. Regarding social capital formation, 55.48% of the respondents were members of at least one group (farmer's groups, village community banking groups-VICOBA, youth groups, and village community-based groups). The longest year stayed in those groups was 1.7 years; participants had 2.5 while non-participants stayed for 1.3 years. Affiliation to such groups provides members with crucial economic and social gains, which serve as the platforms for affordable credits, marketing information, and entrepreneurship skills.

Results also show an average number of respondents' contacts with extension officers in the last production season. Training participants were contacted two times, while non-

participants were contacted only once. Training participants had higher chances of contracting the available extension officers due to several connections and networks created during the training. Extension services help agripreneurs access essential production and management services and improved technologies that help to make informed farming decisions. The total amount of initial start-up capital invested in horticultural enterprises by the two groups was Tsh. 281,014/=. Participants invested a total of Tsh. 423,813/= while non-participants had Tsh 189,214/=. A higher level of investments into such enterprises is a sign of acknowledging and accepting agribusiness as a profitable economic undertaking. Besides, good agricultural practices (GAP) such as modern fertilizer application systems (fertigation process), soil preparations, and drip irrigation techniques require considerable investment. Training participants were in an advantageous position to invest more in such enterprises as they were introduced to available funding opportunities from financial institutions and local government authorities.

An average of Tsh. 2,461,595/= was generated from enterprise sales in which program beneficiaries super passed the amount generated by the non-participants by Tsh.1,095,853/= as shown in Table 4. Agribusiness training familiarised participants with other several courses (business planning, marketing, financial literacy, record keeping, and leadership management) that add value to their enterprises and enhance the generation of more income. Farm size owned proxy the size of the surveyed enterprises at an average of 2.3 acres. Training beneficiaries owned an average of 3.28 acres, while for the non-participants was 1.86 acres. This implies that the surveyed enterprises still fall under the micro-enterprises category suggesting that small-scale growers dominate horticultural enterprises with plot sizes of less than 5 acres.

Table 4: Descriptive statistics of Socio-economic, Institutional, and Enterprise attributes for continuous variables

Variables	All (157)	Participants	Non-Participants	t-test
	Mean	Mean	Mean	
Age	29.69 (4.46)	30.55 (3.94)	29.27 (4.65)	-1.6884*
Education level	8.9 (3.57)	10.12 (3.51)	8.32 (3.46)	-3.0321***
Household size	4.53 (2.69)	4.86 (3.48)	4.37 (2.22)	-1.0789
Family members in Agb	1.92 (1.12)	2 (1.02)	1.88 (1.18)	-0.445
Farming experience	4.08 (3.92)	4.93 (4.43)	3.62 (3.56)	-1.6829*
Non-farm income	122,063 (249,788)	178,567 (382,785)	94,877 (143,628)	-1.9845***
Group membership	1.666 (2.0454)	2.5131 (2.2536)	1.2585 (1.8113)	-3.7467***
Extension services	1.3057 (3.0206)	2.2157 (4.3466)	0.8679 (1.9908)	-2.6692***
Credit access	1,608,235 (1,382,916)	1857143(1,554,533)	1206154 (973,691.8)	-1.3504
Market access (km)	6.7593 (11.7525)	6.5349 (10.3149)	6.9102 (12.7046)	0.1612
Initial capital	281,014 (257,441)	423,813(357,136)	189,214 (148,880)	-4.8840***
Employment size	2.2522 (3.732)	2.2389 (2.8732)	2.2607 (4.2127)	0.0305
Enterprise age	4.4261 (3.7675)	3.9556 (3.4704)	4.7286 (3.9413)	1.0746
Sales income	2,461,595 (2,970,680)	3,178,114 (3,220,459)	2,082,261(2,779,736)	-1.8094*
Farm size (acres)	2.3218 (3.3636)	3.2846(5.1111)	1.8575 (1.9302)	-2.2680**

Note: *, ** and *** Significant at 10%, 5% and 1% levels, respectively

Figures in parenthesis are standard deviations associated with means of the variables indicated

Source: Field Survey, Sept 2020

Table 5: Descriptive statistics of Socio-economic, Institutional, and Enterprise attributes for categorical variables

Variable	Description	Participants	Non-participants	χ^2
Gender	Male	68.63	73.58	0.4195
	Female	31.37	26.42	
Marital status	Single	50.98	38.68	2.1299
	Otherwise	49.02	61.32	
Respondents' Regions	Pwani	45.45	54.55	8.7345**
	Morogoro	23.08	76.92	
Access to land	Yes	82.35	85.85	0.325
	No	17.65	14.15	
Access to information	Yes	90.2	50	23.8825***
	No	9.8	50	
Access to inputs	Yes	76.47	66.04	1.7657
	No	23.53	33.96	
Enterprise ownership	Family-owned	11.63	6.85	0.7898
	Partnership	27.91	28.77	
	Sole proprietorship	60.47	64.38	
Enterprise Location	Market place	27.91	21.92	4.9017
	Along the main road	4.65	6.85	
	Residential area	16.28	5.48	
	At farm gate	51.16	65.75	

Note: *, ** and *** Significant at 10%, 5% and 1% levels, respectively

Source: Field Survey, Sept 2020

Furthermore, findings show the majority of the surveyed respondents were males, 71.97%, while females were only 28.03%. Even in terms of training participation, the percentage of male participants was higher than females, as seen in Table 5. Females youth are more responsible for maintaining household chores that spend most of their time. Besides, agribusiness-related enterprises are more tedious and time-consuming, making males more dominant than their female counterparts. Marital status was broken down into single, married, and divorced, of which 50.98% of training participants were single, and the non-participants were 51.89%. Being single increases individual freedom to decide and participate in various economic activities than married ones. Moreover, the youth agribusiness program surveyed in this study was conducted at Mkongo village in the Pwani region. In this case, 45.45% of program participants came from the Pwani region, and only 23.08% were from the Morogoro region. Participants coming from areas with agribusiness intervention programs have a greater chance of participation than those located away from such areas.

Regarding access to agribusiness information, findings indicate that 63.06% of respondents had access to information. Specifically, training participants had more access than non-participants (Table 5). Access to important farming information provides a means for the better and increased performance of established enterprises. By having access to important agribusiness information, youth agribusinesses will make informed choices on inputs usage, production techniques, post-harvest management techniques, and marketing decisions.

4.2 Empirical Results

From the DHM results, the *Log-pseudolikelihood* for the fitted model obtained was -186.84728 , and the model was found to be strongly significant at a 1% level with a Wald *Chi-square* value of 100.71 ($p = 0.000$). To make a sensible and meaningful interpretation of the maximum likelihood

estimates of the *Firststage*, the Marginal effects were estimated. This follows the fact that, the Probit estimates do not show by how much a particular variable increases or decreases the likelihood of youth decision to establish horticultural MSEs for each additional unit increase in the selected explanatory variables.

Youth decision to establish horticultural MSEs

The Probit estimates in the *First stage* illustrated that out of seventeen (17) variables, four (4) variables were significant with positive effects on influencing youth decision to establish horticultural MSEs, as indicated in Table 6.

Existence of family members in agribusiness value chains positively ($0.05 < p$) increased youth decision to participate in horticultural enterprises by 48.8%. A plausible explanation could be that, involvement of close family members such as parents in agribusiness undertakings provides opportunities for youth to learn entrepreneurship skills and business principles that widen their ability to overcome problems associated with market imperfections (Magagula & Tsvakirai, 2020). Those members can also provide the financial assistance necessary for enterprise establishment, in return motivating and increasing youths' aspirations to undertake meaningful investment in agribusiness. It also changes youths' mindset to see agribusiness as a profitable investment for self-employment. Our finding supports Mohamed *et al.*, (2012) that youth originating from families with successful entrepreneurs have a higher probability of taking entrepreneurial occupation due to guidance received from their family members. Parents with entrepreneurship undertakings play an essential role in attracting their children to engage in such ventures.

Participation in agribusiness training positively affected youth decision to establish horticultural MSEs at a higher significance level ($0.01 < p$). Estimates depicted that a 1% increase in youth participation in agribusiness programs increased the likelihood of youth decision to establish

horticultural enterprises by 1.36%. Training programs allow participants to familiarize themselves with new knowledge and skills (Kidane *et al.*, 2018) needed to run their businesses. Unlike formal education systems, specialized training programs expose young agripreneurs to practical aspects of the subject matter rather than theories learned in a closed class environment. Such programs increase youth's ability to establish business relationships and networks relevant to their businesses. Latopa & Rashid (2015) indicated that training programs expose youth to modern farming technologies necessary for marketing and business management and increase their access to extension services that intensify their interests in agriculture.

Results on farming experience portrayed a positive and significant influence ($0.01 < p$) on youth participation decisions in horticultural MSEs. A 1% increase in farming experience increased the probability of youth decision to establish horticultural MSEs by 28.2%. Youth with more farming experience can create more business networks that simplify marketing entrance and facilitate access to information needed for continuous business operations. This finding agrees with (Mango *et al.*, 2017), who noted a positive association between farming experience and market participation. Also, a study by (Ogunmodede *et al.*, 2020) observed a significant and positive influence of experience in agribusiness and youth decision to practice agribusiness for self-employment. Individuals with farming experience make

the most informed decisions and access more trade opportunities at an affordable cost (Martey *et al.*, 2012) than misinformed ones. Chelang'a *et al.*, (2021) argued that farmers with farming experience tend to have better bargaining power and marketing linkage that enables them to grasp opportunities and understand threats in the available market. Experience also provides sharp-minded and energetic youth farmers' ability to discover proper production techniques and the use of costs saving methods that expand their business margins.

Access to farming inputs is one of the critical factors for the inclusive youth engagement in agribusiness activities. In this study, results indicate that, access to farming inputs by the youth was positive and statistically significant at 1%. A percentage increase in access to farming inputs increased the probability of youth decision to establish horticultural MSEs by 3.8%, else held constant. This finding is consistent with (Fawole & Ozkan, 2019), who argued that input subsidies contributed to youth engagement in agriculture value chains in Southwest Nigeria. Improved seed varieties, fertilizers, and agrochemicals are essential for increased productivity and earnings of smallholder farmers in developing countries (World Bank, 2013). Youths are known to be less resource endowed; thus, the higher the chance of accessing farming inputs, the greater the likelihood of their involvement in farming activity.

Table 6: Factors influencing youth decision to establish Horticultural MSEs

<i>Variables</i>	<i>Marginal Effect (dy/dx)</i>	<i>Std. Err.</i>	<i>P>z</i>
Age of the respondent	0.0147308	0.072	0.838
Age of household head	0.019771	0.05014	0.693
Total household size	0.0290861	0.10307	0.778
Household head (1=Yes)	-0.1983544	1.15598	0.864
Marital status (1=Single)	0.095047	0.60903	0.876
Respondent's origin (1=Yes)	-0.8024813	0.42435	0.059*
Gender of respondent (1=Male)	-0.0237772	0.42126	0.955
Education level (Years in school)	-0.0010633	0.05325	0.984
Log of non-farm income	-0.0436323	0.03044	0.152
Family members in Agribusiness	0.4880537	0.21033	0.02**
Training participation	1.359229	0.52409	0.009***
Farming experience	0.2820412	0.1059	0.008***
Group membership (Max year stayed)	0.1671585	0.13942	0.231
Access to info on agribusiness training	-0.3880842	0.36154	0.283
Access to farming inputs	3.801389	0.60796	0.000***
Log of total credit accessed	-0.0674899	0.05124	0.188
Total size of land accessed	-0.1168086	0.05142	0.023**
Constant		1.87928	0.171
Observations	157		
Wald chi2(17)	100.71		
Prob>chi2	0.0000		
Log pseudolikelihood	-186.84728		

Note: *, ** and *** Significant at 10%, 5% and 1% levels, respectively
Source: Field Survey, Sept 2020

Youth participation level in horticulture MSEs.

Results from the *Second stage* of the Truncated Regression indicated that out of seventeen (17) variables, five (5) variables were significant with a positive effect on the level of youth participation in horticultural MSEs in Pwani and Morogoro regions (Table 7).

Being a household head positively and significantly affected youth participation level in horticultural MSEs at a 10% level. Being a household head increases the size of initial start-up capital invested in horticulture MSEs by 68.62%. Being head of a household indicates an individual's maturity level, which is critical in making decisions on important matters relating to their households. Usually, household heads are responsible for providing primary and necessary wants to dependent family members such as children and

elders. This influences the choice of livelihood activities of the household head who provide for the needs of their families (Mossie *et al.*, 2020) including food, shelters, healthy services, and education.

Results on non-farming income show a percentage increase in the size of start-up capital invested by youth in horticultural MSEs by 2.78%, and significant at a 10% level. Engagement of young agripreneurs to non-farming activities increases their level of participation in horticultural MSEs, holding other factors constant. Youth involvement into such activities might increase their disposable income that increases their investment level in horticultural MSEs. Usually, non-farm occupations enable farmers to expand their income sizes due to having multiple income sources (Khatiwada *et al.*, 2017). Also, off-farm income increases farmers' ability on debt payments and makes them more creditworthy during the needy times.

Participation in training revealed a significant ($0.05 < p$) and positive effect on the level of youth participation in horticultural enterprises by 68.37%. This is justified by the accessibility of links and networks created during and after the training with relevant stakeholders. Training programs, especially agricultural programs, are attached to packages targeting the beneficiaries, which reduce several hurdles that limit their willingness to undertake a particular investment. Etwire *et al.*, (2013) commented on the likelihood of farmers' participation in agricultural projects to benefit from the available financial support. For instance, in our case, apart from the provision of a start-up kit (improved seed varieties, insecticides), program participants were connected to financial institutions, including the local government authorities, for loan applications. This opportunity facilitated easy credit applications to program beneficiaries because the project implementing office (SUGECO) acted as a guarantor from the issued loans. Alternatively, the situation is quite different when youth seek such loans alone without secure guarantees. In addition, training programs increase participants' ability to choose the output market due to

having access to the correct marketing information (Okello *et al.*, 2020).

Concerning credit access, findings show a positive effect ($0.05 < p$) on the probability of youth investment decisions in horticultural MSEs. A percentage increase in credit access by the youth increases the level of investments in horticultural enterprises by 4.23%. This finding is consistent with Maritim (2020), who noted a positive relationship between credit access and youth participation in agribusiness in Kericho County, Kenya. Access to credit relaxes financial constraints faced by agri-preneurs, youth in specific. Also, credit access relaxes constraints faced by farmers when accessing necessary production resources (Ng'ang'a *et al.*, 2022). Credit access can be used to expand the size of the investments, purchasing farming inputs and financing both fixed and variable costs of the established business enterprises. Lack of access to credits is a notable factor limiting youth engagement in profitable economic activities such as agribusiness (Muthomi, 2017).

Distance traveled by the agri-preneurs in accessing the markets for their products adds to the transaction costs of doing business. Theoretically, the shorter the distance, the better for the producer as a result of lower transaction costs incurred when doing business. This argument supports the observations made by (Tura *et al.*, 2016). However, our results are quite different from some of the findings of the previous works. This was so because a percentage increase in the distance traveled by youth agri-preneurs from the two regions positively increased ($0.05 < p$) youth participation in horticultural enterprises by 0.16%. This was most likely because youth agri-preneurs are more flexible, which influences their ability to transport their produce to the marketing centers to fetch higher prices compared to farm gate prices. There is a higher chance of trading directly with large traders from different parts of the country in those marketing areas. This was also noted by (Mukarumbwa *et al.*, 2018) that vegetable producers sell their produce to urban markets by traveling a long distance to get higher market prices.

Table 7: Second hurdle results in the level of youth participation in Horticultural MSEs

Variables	Coefficients	Robust Std. Err	P-value
Age of the respondent	-0.0775115	0.0260937	0.003***
Age of household head	0.0229749	0.0143504	0.109
Household head	0.6862076	0.4140574	0.097*
Total household size	0.0094914	0.0551061	0.863
Marital status (1=Single)	-0.5505438	0.2780249	0.048**
Gender of respondent (1=Male)	-0.2301877	0.2415373	0.341
Education level (Years in school)	0.0373806	0.0329739	0.257
Log of non-farm income	0.0278094	0.0160203	0.083*
Training participation	0.6837321	0.27176	0.012**
Farming experience	0.0213283	0.0235152	0.364
Group membership (Max year stayed)	-0.1298719	0.052732	0.014**
Access to info on agribusiness training	0.2881663	0.2142453	0.179
Access to farming inputs	0.0225542	0.3921663	0.954
Log of total credit accessed	0.0422757	0.0183216	0.021**
Total size of land accessed	0.0074213	0.0222403	0.739
Extension services (Number of contacts)	-0.009197	0.0243812	0.706
Distance to output market in Km	0.0015652	0.0006026	0.009***
Constant	12.43228	0.9808316	0.000***
Observations	157		
Wald chi2(17)	100.71		
Prob>chi2	0.0000		
Log pseudolikelihood	-186.84728		

Note: *, ** and *** Significant at 10%, 5% and 1% levels, respectively

Source: Field Survey, Sept 2020

5. Conclusion and Recommendation

5.1 Conclusion

This paper evaluated the effect of agribusiness program on youth decision and participation level in horticultural enterprises in Morogoro and Pwani regions in Tanzania. Results from descriptive statistics revealed that, program beneficiaries had better access to credit, many years in social groups, and had more access to extension services. They also had higher initial start-up capital invested in horticultural enterprises and generated higher sales revenues from horticultural production than their counterparts. At the same time, the Double Hurdle Model (DHM) results exposed a positive and significant relationship between participation in agribusiness program on youth decision and participation level in horticultural enterprises from the surveyed regions. These findings justify the significant contribution of the agribusiness programs on increasing youth uptakes and employability within the agribusiness sector in the country.

5.2 Recommendation

Based on the obtained findings, this study recommends for the followings: First, stakeholders aiming at empowering youth through agribusiness enterprises should develop policy-based strategies, and programs to attract more youth, graduates in specific to engage and consider agribusiness sector as a gainful career. Second, provision of practical agribusiness training to other regions in the country to attract and equip more youth with production and updated business skills useful in running their enterprises. Lastly, effective policies that ensure land rights acquisitions for young agripreneurs should be put in place to enhance the accessibility of affordable credits from formal financial institutions.

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