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Vanilla Production in Bukoba Rural District, Tanzania: Its Impact on the Livelihood of Smallholder Farmers

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Abstract

The large price differences offered per kilogramme between vanilla and coffee has tempted farmers to abandon the production of coffee and shift to vanilla production as a way of improving their livelihoods. However, it has not been established if the move is a problem or solution to the livelihoods of smallholder farmers in Bukoba Rural District. It was important, therefore, to carry out an investigation to clear such doubts. Specifically, therefore, this article seeks to determine levels of livelihood outcomes based on assets ownership among smallholder farmers, and compare livelihood outcomes between vanilla and non-vanilla smallholder farmers. The study used a cross-sectional research design, and involved 100 respondents. It employed both qualitative and quantitative methods of data collection and analysis. The wealth index was used to analyse levels of livelihood outcomes between vanilla and non-vanilla smallholder farmers based on income and monetary asset values. Independent T-test was used to compare livelihood outcomes among both groups of farmers. The independent T-test revealed that there was a significant difference in livelihood outcomes ($p \leq 0.001$) between these groups. It is concluded that vanilla production is a solution for improved livelihoods of smallholder farmers in the study area. Thus, the government should sensitize smallholder farmers to engage in vanilla production through farmers' cooperatives because it stands a better chance of improving livelihood outcomes compared to other traditional crops produced in the study area.

Keywords: *vanilla, livelihood, smallholder farmers, Tanzania*

1. Introduction

Vanilla (*planifolia*) production is viewed as a solution to improve livelihood as reflected in increased income, food security, wellbeing and health (Bennett & Franzel, 2009). Livelihood outcomes from vanilla production are derived from the sale of cured vanilla beans, extracts, pastes, powders, and seedlings (Balasubramaniam et al., 2012). The climbing perennial orchid, Vanilla *planifolia*, originated in Mexico and Central America, and grows naturally in the region's tropical and subtropical areas (Exley, 2010). The principal source of vanilla today is Madagascar and the Reunion, Comoros and Mayotte Islands (Exley, 2010). Indonesia is also a significant producer/supplier of vanilla. It is one of the most expensive spices traded internationally, and consumers have increased their demand for its products. In the United States, more than 95% of the vanilla

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consumed is processed into extracts sold to manufacturers for flavouring (Balasubramaniam et al., 2012). In Germany, vanilla is mainly used as a flavour in foods, drinks and perfumes; as well as in industrial uses such as tyre and paint manufacturing. In Africa, Madagascar is the main producer and exporter of vanilla; comprising of 50% to 80% of the world's vanilla produce over the last 10 years (Exley, 2010; Doe, 2013). In Madagascar, vanilla is a high-value crop and its production is carried out on as little as 0.5–hectare piece of land, with an average annual net income of $1,500–5,800 for green vanilla, and $3,000–9,990 for dried vanilla per hectare over a six-year period (Doe, 2013). Income accrued from vanilla helps Malagasy farmers to safeguard household income, as well as ensure food security during food scarcity months from January to May when staple crops are not produced, thus hastening their livelihood transformation from staple to crops of high-value (ibid.). In East Africa, a growing number of farmers are foregoing coffee and other cash crops in favour of vanilla cultivation due to the price of vanilla hitting record highs (Makoye, 2021). The production of vanilla in this region is mostly carried out in the Lake Victoria Basin, and around Mountain Rwenzori (Busungu, 2009).

Uganda is the major vanilla producer in East Africa, followed by Tanzania and Kenya (Fehr, 2010). The agricultural sector in Tanzania is dominated by smallholder farmers who produce cash crops like coffee, tea and vanilla (Mwatawala et al., 2016). Smallholder farmers in Tanzania are earning huge profits from the global vanilla market, offsetting losses they have frequently suffered due to poor yield from growing traditional cash crops, notably coffee (Makoye, 2021). Vanilla, unlike other cash crops, is becoming a solution to livelihood outcomes of smallholder farmers in some regions and districts. A large number of farmers in Njombe, Kilimanjaro and Kagera regions are switching to vanilla cultivation with the hope of reaping big profits (Makoye, 2021). Vanilla production has increased significantly in the last five years: rising from 229.8 tons per year in 2015 to 1,949 tons in 2020 (ibid.). Regions like Arusha, Kilimanjaro and Morogoro are inhabited by 1,500 smallholder farmers who have benefitted from increased access to regional and international premium vanilla markets. In 2017, at least 1,600 farmers in Kilimanjaro region embraced the cultivation of vanilla, and 1,600 more were expected to join soon after. Currently, vanilla products fetch TZS60,000 per kilogramme in the region, compared to TZS3,500 to TZS4,000 earned for a kilogramme of coffee that takes three years to mature (Joseph, 2018). The large price differences offered per kilogramme of vanilla and coffee has resulted into farmers abandoning the production of coffee and shifting to vanilla production in some districts, for example, Bukoba Rural District.

In Bukoba Rural District, engagement in vanilla production has enabled smallholder farmers build modern houses, buy house assets, buy food for families, send children to school, and invest in other economic activities such as livestock keeping as well as non-farm activities: all of which contribute towards income

generation (Farm Radio International, 2018). While smallholder farmers in the district have been producing vanilla after abandoning coffee production, the relative advantage of such a move has not been established as far as livelihood outcomes of smallholder farmers are concerned. Therefore, this article specifically sought to determine the levels of livelihood outcomes based on assets ownership among smallholder farmers, and compare livelihood outcomes between vanilla and non-vanilla smallholder farmers. The study sought to test the hypothesis: "*Livelihood outcomes among vanilla and non-vanilla smallholder farmers do not differ.*"

2. Literature Review

2.1 Vanilla Production and Rural Household Livelihood

Smallholder agriculture is one of the key economic occupations in the world and a major source of employment for 70% of the world's poor who live in rural areas (FAO, 2017). In Madagascar and Comoro, the major percentage of the labour force is found in the agricultural sector (Medina et al., 2009). This is because agriculture plays a significant role in the employment sector, especially to small-scale farmers worldwide. Smallholder farmers in rural areas derive their livelihood from the agricultural sector, and labour force is always provided by members of the family. According to Medina et al. (2009), vanilla production in Madagascar has provided employment opportunities to 20,000 growers and 5,000 producers. This is due to the fact that the majority of the population in rural areas work in the agricultural sector for a living. In addition, during the postharvest period and pollination of over two to six months, women in the Malagasy region of Madagascar are normally involved in drying, curing, smoothing, sorting and packaging vanilla products, which all require handwork. Vanilla production is labour-intensive and therefore, since women are mostly the providers of labour in most households in rural areas, their engagement in the production of vanilla is inevitable. As pointed out by Doe (2013), this implies that vanilla production has provided employment with unprecedented benefits to families and the community at large. Likewise, being one of the active exporters of vanilla, more than 70% of the population in Comoro works in rural areas and is active in the production of vanilla (Medina et al., 2009). In Bukoba Rural District, vanilla has been a great source of employment to poor farmers, and is locally used by small entrepreneurs as an essence in beverages, sweets, cakes, yoghurt, and local gin traditionally known as '*enkonyagi*'.

Vanilla production provides income for farmers and thus improves their livelihoods. Income from vanilla is derived from selling vanilla as pods, as well as vanilla vines. A vanilla grower can generate up to TZS2500 from a two-metre vine. Farmers cultivating on small plots of land are able to increase their income security while still growing staple and other perennial crops because the spice (vanilla) can cohabit well when intercropped with other crops and trees (Doe,

2013). Vanilla production has great value for money, and has become an alternative crop to bananas and coffee, which have frequently been affected by the wilt disease in Kagera Region.

Garu (2017) noted that vanilla production is a source of food security to smallholder farmers. Income derived from vanilla sales is used to purchase household food. According to Doe (2013), income generated from vanilla supports farmers for as long as six months when other staple foods are not being produced. This means that vanilla is a high-value crop that helps smallholder farmers meet their day-to-day necessary needs, for example, in purchasing food during times of food shortages.

2.2 Theoretical Review

The sustainable livelihood approach (SLA) (DFID, 2001) was used to guide this study. The approach provides guidance in understanding ways in which vanilla production contributes to livelihood outcomes. It is one of the methods used to provide an understanding of poor households' livelihoods (Samsudin & Kamarudin, 2013). SLA is multidimensional, integrated and rational to poverty eradication unlike other methods (ibid.). Krantz (2001) pointed out that SLA is based on three basic common features. First, it is people-centred as it focuses on the livelihoods of the poor in the reduction of poverty over time and space (Chambers & Conway, 1992). Second, the approach displays factors that limit or enhance livelihood outcome opportunities, and displays how they relate with each other (Serrat, 2017). Third, in the SLA the livelihoods of individuals are realized through the following key components:

(a) ecological system of vulnerability and resilience that involves individuals' realization of livelihood to react to shocks and how well they can recover from those shocks;
(b) utilization of capital assets;
(c) transforming structures and institutions that help to clarify relationship between assets and activities at individual and household level;
(d) livelihood strategies; and finally; and (
(e) livelihood outcomes (Mchopa & Jeckoniah, 2018).

Thus, towards understanding households' livelihood outcomes it was important to understand how vanilla smallholder farmers utilize their livelihood capabilities and assets to achieve the desired livelihood outcomes in terms of increased household income, assets ownership, and improved housing condition as qualified by DFID (2001).

2.3 Conceptual Framework

This study is anchored on the SLA framework, which states that any community livelihood comprises of capabilities, assets and activities required for means of living (DFID, 2000). A livelihood is said to be sustainable when it copes with, and recovers from, shocks and maintains its capabilities as well as assets now and in the future, without undermining the natural resource base.

The conceptual framework (Figure 1) shows how vanilla production can have a direct influence on household livelihood outcomes. The background variables (education, sex, age, education, farm size, and marital status), as well as livelihood assets (human capital, financial capital, physical capital, social capital, and natural capital) are interrelated. For example, the age of an individual determines the financial ability of a household to participate in livelihood strategies (farm and non-farm) to achieve desired family ends, and thus livelihood outcomes, which in this study are increased income, asset ownership and improved housing conditions.

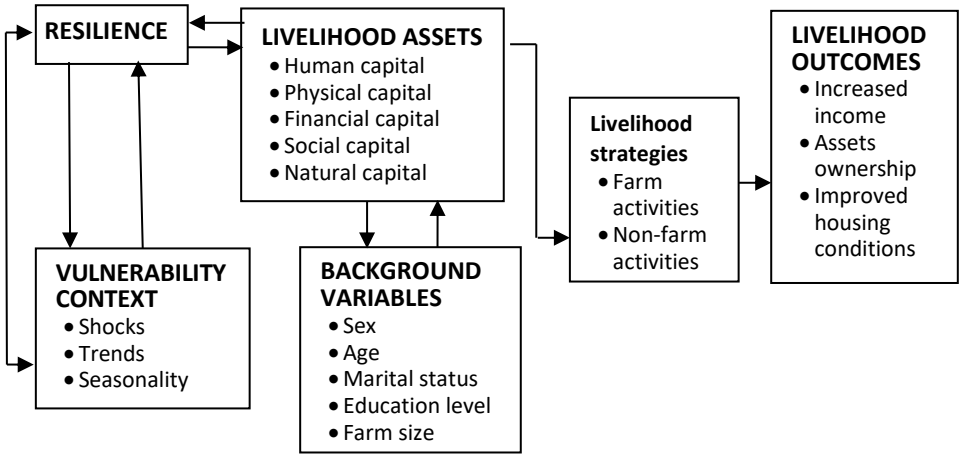

Figure 1: ***Contribution of Vanilla Production to Smallholder Farmers' Livelihood***

Source: Modified from DFID, 1999

In this study, vanilla production helps smallholder farmers to achieve different livelihood strategies; this results into the attainment of household ends which are the increase in income, increase in asset acquisition as well as better housing conditions. However, inefficiency in achieving livelihood outcomes may arise due to other factors which are out of control of the household. Such factors include shocks, trends and seasonality, but the household ability to remain resilient, these shocks notwithstanding, can result into achieving household livelihood outcomes.

2.4 Empirical Literature Review

In Madagascar, Doe (2013) found that over a 13 to 15–year period, vanilla had delivered a permanent economic asset of a minimum of 10 annual harvests per plant. About 70,000 families in Madagascar are dependent on vanilla production as their most important source of income. Medina et al. (2009) reported that the production line of vanilla in 2000 employed about 20,000 growers and 5,000 producers. This indicates the extent to which the crop contributes to employment opportunities to farmers.

In Uganda, vanilla is graced as the country's green gold. According to a study by Komarek (2010) on crop diversification decisions in Uganda, vanilla production has proved to be an important welfare benefit containing a high profit margin in the country. In a study on economic rural income dynamics in Kagera Region, by Kessy (2005) reported that vanilla production was one of the crops adopted by farmers for income generation. Several related studies have considered the role of other agricultural crops to livelihood outcomes of smallholder farmers. For example, a study by Mchopa and Jeckoniah (2018) looked at the impact of sunflower production on livelihood outcomes; Kintingu (2013) looked at the contribution of grapes farming to livelihoods of growers in Dodoma; and Hivu (2013) looked at the impact of smallholder cocoa production on rural livelihoods.

3. Methodology

3.1 Description of the Study Area

This study was conducted in Bukoba Rural District, which is one of the eight districts that form the Kagera Region of Tanzania. The district lies between longitudes 30^0 45′ and 32^0 00′ East of the Greenwich, and between latitudes 1^0 00′ and 3^0 00′ South of the Equator (Figure 2).

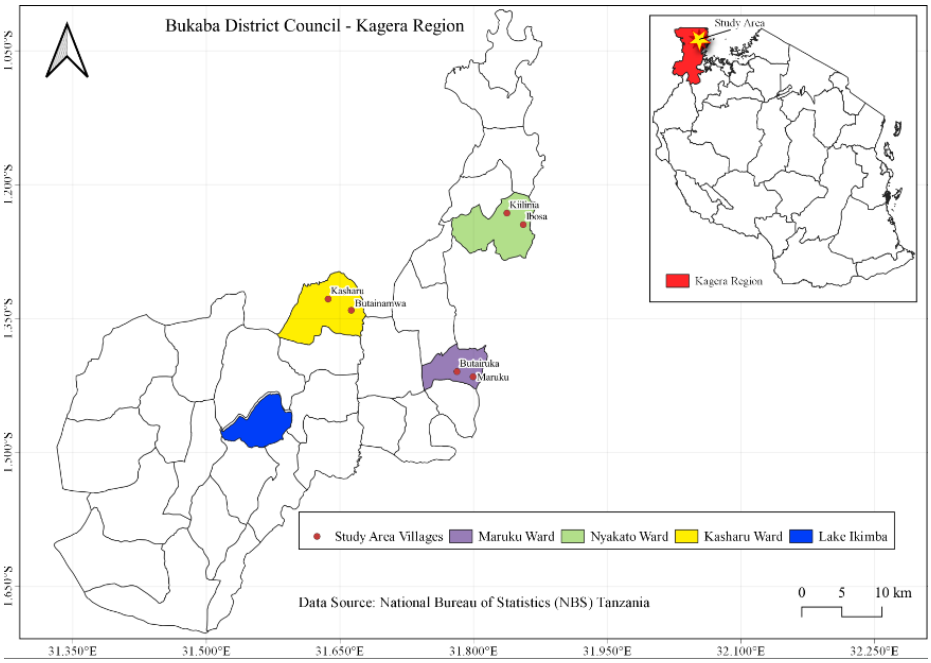

Figure 2: ***Location of the Study Area***

Source: Muzanila & Assenga, 2019

The study area borders Uganda on the northern side, and Lake Victoria on the east. The district has a total population of 289,697 people (URT, 2013). This area was selected as the leading vanilla producing district in Kagera Region. The study involved smallholder farmers from six villages, namely, Kaisharu, Maruku, Bukairuka, Butainamwa, Kiilima and Ibosa. These villages were purposively selected because they are populated by the majority of vanilla farmers who are registered under Maendeleo ya Wakulima [*Farmers Development*] (MAYAWA).

3.2 Research Design, Sampling Procedures and Sample Size

A cross-sectional research design was used in this study, and the sampling unit was a household whether cultivating vanilla or not. This was done for farmers cultivating less than 5 acres of land for comparison purposes. A household was taken to be the sampling unit since livelihood is measured at the household level. Bukoba Rural District was selected purposively because it is currently the leading vanilla producing district in Kagera Region. Three wards comprising six villages were selected purposively, and they included Maruku (Maruku and Bukairuka villages), Kasharu (Kasharu and Butainamwa villages), and Nyakato (Kiilima and Ibosa villages). The selection criterion considered the fact that the majority of the vanilla farmers in these areas were registered under MAYAWA (DAICO of Bukoba Rural District, personal communication, 2019). Vanilla smallholder farmers were randomly selected from the register book of the Maendeleo ya Wakulima (MAYAWA) farmers' association. Non-vanilla smallholder farmers were selected randomly from a sampling frame that was constructed by listing all households from the village register book. A total of 100 respondents were involved in the study, 50 being vanilla smallholder farmers, while 50 were non-vanilla smallholder farmers from the same villages for comparison purposes.

3.3 Data Collection

Primary data was collected using questionnaires that were administered to household heads, selected randomly from the sampling frame which was established from the village register by listing all households, whether female- or male-headed. Information collected included income earned per year, assets owned and their monetary value, farm and non-farm activities, housing conditions, source of energy, water and sanitation.

There are four advantages of using a questionnaire in research (Pamela & Eric, 1990). These include efficient use of time, anonymity (for the respondent), the possibility of a high return rate and standardized questions. Apart from these merits, however, questionnaires have their limitations (ibid.). There are three main limitations in using a questionnaire, and these need to be borne in mind when deciding to use this method of data collection. One of the demerits is that the information collected tends to describe rather than explain why

things are the way they are; secondly, the information can be superficial; and thirdly, the time needed to draft and pilot the questionnaire is often underestimated: so, the usefulness of a questionnaire is reduced if preparation has been inadequate (ibid.).

Key informant interviews were held with people who were believed to have in-depth understanding and knowledge on vanilla production in the area. These individuals included ward executive officers (WEOs), village government leaders, representatives from the vanilla farmers association (MAYAWA), village and ward extension officers, district community development officers (DCDO), as well as district agricultural officers. These key informants were purposively selected. The district, ward and village leaders helped in generating general information about people and their livelihoods. Issues explored during the interviews included main sources of income, non-farm activities, current total number of vanilla farmers in the study area, other crops produced in the study area apart from vanilla, sizes of farms dedicated to vanilla farming, assets owned, the price of vanilla per kilogramme, and major challenges faced by vanilla farmers.

3.4 Data Processing and Analysis

Quantitative data was analysed using IBM SPSS Statistics Version 20 software and Microsoft Excel. All data on assets ownership was exported from SPSS to Excel to compute the wealth index by adding up the number of each individual asset, e.g., poultry, radio, television, land) for the whole sample, and thereafter dividing by the maximum number of those assets in the sample to generate the scores for every individual asset for each household. After generating scores for each individual asset per household, all scores were added up to generate total score for the assets owned by every household. Thereafter, the data was exported from Excel to SPSS where the mean score was calculated. Descriptive and inferential statistical analysis was then conducted. The wealth status was used as a proxy indicator of the wellbeing of a household. Interviews with key informants were used to generate information about assets that were used in the index to generate the wealth status of a household. The study adopted a formula developed by Simon (2005) cited in Tweve and Jeckoniah (2018) to compute the wealth status of a household, which is:

$$WETi = \Sigma (yij/Ymax) (i = 1, 2, ----x, j = 1, 2, --------, n)$$

Where:

WET = wealth index

yij = number of an individual's assets (poultry, bicycle, motorbike, mobile phone, radio, television set, land and solar panel)

Ymax = maximum number of those assets in the sample

X = number of items considered as indicators for wealth.

n = sample size

Based on the mean score of the wealth index, respondents were categorized into two groups: low, and high wealth status. Those below the mean were taken as having a low wealth status, while those above the mean were taken as having a high wealth status. Wealth index was used by Tweve and Jeckoniah (2018) to gauge the levels of livelihood outcomes of woodlot and non-woodlot farmers in Mufindi District, Tanzania. Independent T-test was used to compare livelihood outcomes of vanilla and non-vanilla smallholder farmers.

4. Results and Discussion

4.1 Annual Income Earned from Vanilla Production

The findings from Table 1 reveal that just above a quarter (26%) of vanilla smallholder farmers in the study area were earning income between TZS500,001 and 1,000,000, while very few (6%) were earning less than TZS500,000 from vanilla sales. This implies that vanilla production has a great contribution to the provision of household income. The results of income earned from vanilla are similar to those confirmed by Nyomera et al. (2012) and Lwelamira (2015) who reported that farmers earned more than TZS500,000 from cash crop sales. During an interview with one of the key informants, he reported that a kilogramme of vanilla costs TZS150,000 on average; however, some farmers were not able to acquire much from their farms because they harvest and sell immature beans due to the fear of other people stealing their products (Interview with the Extension Officer, 2019).

Table 1: Income Earned per Year from Vanilla Production

Annual Income Earned (TZS)	
Less than 500000	6.0
500001–1000000	26.0
1000001–1500000	10.0
1500001–2000000	4.0
Above 2000000	4.0

Source: Field Survey, 2019

4.2 Income Earned per Year from Farming and Non-Farming Activities

The findings in Table 2 reveal that about two-thirds (62%) of vanilla smallholder farmers were earning income between TZS1,500,001 and 2,500,000 from both farming and non-farming activities, while more than half (52%) of non-vanilla smallholder farmers were earning income between TZS500,001 and 1,500,000 from both farming and non-farming activities. The results from cross-tabulation show that there is a statistically significant difference ($p<0.05$) between engagement in vanilla production and income from farming and non-farming activities. These results imply that vanilla smallholder farmers are earning more income compared to non-vanilla smallholder farmers.

Table 2: Yearly Income from Farming and Non-Farming Activities between Vanilla and Non-vanilla Smallholder Farmers

Characteristics Income (TZS)	Vanilla *(n=50)*	Non-vanilla *(n=50)*	Total *(%)*	P-value
Less than 500 000	0.0	8.0	4	
500001–1500000	14.0	52.0	52.0	
1500001–2500000	62.0	28.0	45	
2500001–3500000	16.0	4.0	10	
Above 3500000	8.0	8.0	8	0.000*

Note: * = statistically significant (P< 0.05)

Source: Field Survey, 2019

The findings of this study are supported by Mckillop and Wood (2010), Wamalwa (2011) and Achterbosch (2014) who testified that cash crop production is a means of increasing rural poor income. Other findings by the World Bank (2008) found out that smallholder farmers who were successful in moving out of poverty were the ones who diversified their farming activities by growing non-traditional cash crops like vanilla, while those who stuck to growing traditional crops remained in poverty.

4.3 Levels of Livelihood Outcomes Based on Assets Ownership

Assets are reflected as indicators of wellbeing of a household. Asset ownership in the study was presented by a wealth index, whereby respondents were categorized as having a high or low wealth status. Based on the wealth index, the mean was 4.05. Respondents were categorized into two groups: those below the mean were categorized as having a low wealth status, while those above the mean were categorized as having a high wealth status. The results in Table 3 show that 82% of vanilla smallholder farmers were above 4.05, while 84% of non-vanilla smallholder farmers were below 4.05.

Table 3: Wealth Index on Assets Owned by Vanilla and Non-vanilla Smallholder Farmers

Wealth Groups	Mean	Vanilla *(n=50)*	Non-vanilla *(n=50)*
High wealth status	>4.05	82.0	16.0
Low wealth status	<4.05	18.0	84.0

Source: Field Survey, 2019

These findings suggest that farming vanilla was associated with a high wealth status. The high wealth status among vanilla smallholder farmers may be due to better opportunities with regard to the acquisition of assets compared to non-vanilla growing smallholder farmers. These results study concur with the findings from studies by Mchopa and Jeckoniah (2018) and Tweve and Jeckoniah (2018),

who found that smallholder farmers who engage in sunflower and woodlot production have a high wealth status compared to their counterparts. This implies that vanilla production is associated with high wealth status of smallholder farmers. Other crop growers are not that wealthy because they engage in production of crops that generate less income.

4.4 Housing Conditions

The physical state of housing among vanilla and non-vanilla smallholder farmers was one of the factors that was used to determine livelihood outcomes of this study. The study findings in Table 4 show that most vanilla and non-vanilla smallholder farmers in the study area owned houses. The findings of this study are in agreement with FAO (2015) which reported that the majority families that lived in houses owned the houses. House ownership by smallholder farmers in the study area may be explained by the fact that they use local building materials because which are plenty and easy to procure (Sefika, 2015).

However, differences were observed in the quality of the respondents' houses, whereby vanilla smallholder farmers were living in better quality houses than non-vanilla smallholder farmers in terms of the type of floor, building materials, sources of energy for cooking, and the number of rooms per house. About three-quarters (74%) of vanilla smallholder farmers had houses with cemented floors, while a half (50%) of non-vanilla smallholder had houses with earthen floors. Most (92%) of vanilla smallholder farmers had walls made of cement bricks, while just over three-quarters (76%) of non-vanilla smallholder farmers had houses with walls made of unburnt bricks. Most (84% and 96%) of vanilla and non-vanilla smallholder farmers, respectively, were using firewood as their main source of energy for cooking. It was also learnt that close to three-quarters (72%) of vanilla smallholder farmers owned houses with 3–4 rooms, while well over two-thirds (70%) of non-vanilla smallholder farmers owned houses with 1–2 rooms.

Results in Table 4 further show that there is a statistical significance difference ($p<0.05$) between engagement in vanilla production and quality of housing conditions in relation to the type of floor of the house, materials of the walls and the number of rooms and sources of energy for cooking. This implies that a majority of vanilla smallholder farmers in the study area had better houses than non-vanilla smallholder farmers. Better housing conditions among vanilla smallholder farmers may be attributed to the fact that they get more income from vanilla, other crops and non-farming activities compared to non-vanilla smallholder farmers. This means that income from vanilla smallholder farmers is used to repair their houses. The findings of this study are supported by Mulisa (2018) who reported that smallholder farmers from Bukoba Rural District living in small mud houses before engaging in vanilla production changed their lives for the better by starting to live in good quality houses.

Table 4: Housing Conditions among Vanilla and Non-Vanilla Smallholder Farmers

Characteristics Category		Vanilla (n=50)	Non-vanilla (n=50)	Total (%)	P-value
House ownership	No	0.0	0.0	0.0	a
	Yes	50.0	50.0	100	
Type of floor	Soil	0.0	50.0	25	0.000*
	Floor tiles	24.0	0.0	12	
	Cement	74.0	10.0	42	
	Grass	2.0	40.0	21	
Material of wall	Block bricks	92.0	12.0	52	0.000*
	Un burnt bricks	8.0	76.0	42	
	Muddy	0.0	12.0	6	
Roof of the house	Iron sheets	98.0	98.0	98	0.368ns
	Roofing tiles	2.0	0.0	1	
	Grass	0.0	2.0	1	
Main source of energy for cooking	Electricity	16.0	4.0	90	0.046*
	Firewood	84.0	96.0	10	
Number of rooms	1–2	22.0	70.0	46	0.000*
	3–4	72.0	30.0	51	
	Above 4	6.0	0.0	3	

Notes: ns = means not significant
* = means statistically significant (P<0.05)
a = means no statics computed because variable is constant

Source: Field Survey, 2019.

The findings of this study align with those by Wamalwa (2011), Oyugi (2016), Mchopa and Jeckoniah (2018) and Tweve and Jeckoniah (2018) who researched on the production of jatropha, sugarcane, sunflower and woodlot, which reported that through the production of these high-value cash crop, smallholder farmers were able to own good quality houses compared to their counterparts. This implies that vanilla production, like other high-value cash crops mentioned above could also be associated with the ownership of good quality houses.

4.5 Asset Ownership between Vanilla and Non-Vanilla Smallholder Farmers

Table 5 presents assets owned by household heads of vanilla and non-vanilla smallholder farmers. Results reveal that all (100%) of both vanilla and non-vanilla smallholder farmers owned land; and (100% and 98%) of vanilla and non-vanilla smallholder farmers, respectively, owned cell phones. Also, the majority (82% and 78%) of vanilla and non-vanilla smallholder farmers, respectively, owned radio sets. The results in Table 5 further show that there is a statistical significance relationship ($p<0.05$) between vanilla production and ownership of motorbikes, television sets, cattle, bicycles and sofa sets.

Table 5: Asset Ownership between Vanilla and Non-vanilla Smallholder Farmers

Variable	Percentage		Total	P-value
	Vanilla (n50)	*Non-vanilla (n=50)*	n=100	
Poultry	62.0	72.0	67	0.288ns
Land	100.0	100.0	100	a
Cattle	62.0	32.0	47	0.003*
Bicycle	60.0	30.0	45	0.003*
Motorbike	48.0	0.0	24	0.000*
Television	72.0	14.0	43	0.000*
Solar Panel	6.0	0.0	3	0.079ns
Cell phone	100.0	98.0	99	0.315ns
Radio	82.0	78.0	80	0.617ns
Goat	36.0	38.0	37	0.836ns
Pig	10.0	6.0	8	0.461ns
Wheelbarrow	16.0	8.0	12	0.218ns
Sprayer	18.0	10.0	14	0.249ns
Sofa	50.0	6.0	28	0.000*

Notes: * = means statistically significant (P<0.05), ns: means not significant
a = No statistics computed because the variable is constant

Source: Field Survey, 2019

4.6 Monetary Asset Value and Income Comparison between Vanilla and Non-vanilla Smallholder Farmers

The monetary value of assets owned indicates a household's ability in terms of the amount of fixed currency available. Respondents were asked to estimate the value of the assets they owned, whereby the results revealed that vanilla and non-vanilla smallholder farmers, respectively, owned valuable assets. However, differences were observed in the monetary value of assets owned. The monetary value of assets owned by vanilla smallholder farmers was twice as high compared to their counterparts (Table 6). Results in Table 6 reveal that the mean monetary asset value for vanilla smallholder farmers was TZS4,557,700, while the mean monetary asset value for non-vanilla smallholder farmers was TZS2,571,320. The results in Table 6 also reveal that the mean income for vanilla and non-vanilla smallholder farmers was TZS2,234,820 and TZS1,519,894, respectively.

Table 6: Comparison of Monetary Asset Value and Income between Vanilla and Non-vanilla Smallholder Farmers

Characteristics		N	Mean	Std. Deviation	Std. Error Mean
Monetary asset value	Vanilla	50	4557700.00	1585304.600	224195.927
	Non-vanilla	50	2571320.00	1102369.016	155898.521
Income	Vanilla	50	2234820.00	922162.2702	130413.4389
	Non-vanilla	50	1519894.00	1159250.267	163942.7450

Source: Field Survey, 2019

As seen from Table 6, the mean income and monetary value of assets owned by vanilla smallholder farmers was twice as much, compared to non-vanilla smallholder farmers. These findings corroborate Tweve and Jeckoniah (2018) and Mchopa and Jeckoniah (2018) who reported that farmers who engaged in woodlot farming and sunflower production were wealthier than their counterparts. It was initially hypothesized that there is a significant difference in livelihood outcomes between vanilla and non-vanilla smallholder farmers. The independent t-test was used to test the hypothesis. The results are presented in Tables A1 and A2. The results in both tables show that there was a significant difference ($p \leq 0.000$) in income and monetary value of assets between vanilla and non-vanilla smallholder farmers. Thus, the hypothesis that there was no significant difference in livelihood outcomes between vanilla and non-vanilla smallholder farmers is rejected.

5. Conclusions and Recommendations

Based on levels of livelihood outcomes on assets ownership among smallholder farmers in the study area, it can be concluded that vanilla smallholder farmers have high levels of livelihood outcomes compared to non-vanilla smallholder farmers. Based on comparison of livelihood outcomes between vanilla and non-vanilla smallholder farmers, it can also be concluded that livelihood outcomes of vanilla smallholder farmers and non-vanilla smallholder farmers differ significantly ($p \leq 0.000$). It is recommended that the government, through the Ministry of Agriculture, should find reliable markets that can benefit vanilla smallholder farmers more for further improved livelihoods.

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Appendix

Table A1: Independent Sample T-Test for Household Monetary Asset Values Among Vanilla and Non-Vanilla Smallholder Farmers (n=100)

Income	Levene's Test for Equality of Variance		T-test for Equality of Means					95% Confidence Interval of the Difference	
	F	*Sig*	*T*	*Df*	*Sig. (2tad)*	*Mean Difference*	*Std Error difference*	*Lower*	*Upper*
Equal variances assumed	6.456	0.13	7.274	98	.000	1986380	273071.717	1444478.066	2528281.934
Equal variances not assumed			7.274	87.407	.000	1986380	273071.717	1443656.005	2529103.995

Table A2: Independent Sample T-test for Household Income Among Vanilla And Non-Vanilla Smallholder Farmers (N=100)

Income	Levene's Test for Equality of Variance		T-test for Equality of Means					95% Confidence Interval of the Difference	
	F	*Sig*	*T*	*Df*	*Sig. (2tad)*	*Mean Difference*	*Std Error difference*	*Lower*	*Upper*
Equal variances assumed	1.118	.293	3.413	98	.001	714926	209487.2041	299205.4613	1130646.539
Equal variances not assumed			3.413	93.282	.001	714926	209487.2041	298942.4999	1130909.500