SUSTAINABILITY OF SUNFLOWER FARMING PROJECTS IN IMPROVING FARMERS' LIVELIHOODS: A CASE OF MVOMERO DISTRICT

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ABSTRACT

The paper was set to assess the sustainability of sunflower as a diversification crop projects in improving community the rural smallholder farmers livelihoods. The study used Interview, Questionnaires, and focus group discussion methods were used in the study whereby 66 respondents were involved. Findings show that the crop value addition has been managed in the area, profitability of sunflower products in different actors and viability of sunflower projects in poverty reduction among the smallholder farmers. Furthermore it was evidenced that, failure to achieve goals and objectives are caused by lack of education and knowledge on sunflower production, lack of government support to farmer which bases on provision of agricultural inputs, like seeds, fertilizers and different seminars concern agricultural production. In order to facilitate farmers to profitability in the study recommended measures to be taken by various stakeholders of sunflower sub sector to work together with the farmers so as they can together address the challenges farmers are facing in the production and marketing of the products.

Keywords: Sustainability, sunflower, value addition, chain

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1. INTRODUCTION

1.1 Background Information

In Tanzania, agriculture continues to be the main backbone of the economy to most of the rural population. According to URT (2008) over 80% of Tanzanians live in rural areas where agriculture and the use of natural resources are crucial to their livelihoods. Generally agriculture contributes about 26 % of the country's Gross Domestic Product and 14.3 % of the foreign exchange earning comes from agriculture (URT 2008). The sector employs more than 80% of country's labour force mostly from the rural areas. This means that agriculture if well managed will continue to be a major reliable source of poverty reduction and improving livelihoods of many Tanzanians.

However, small scale farmers in Tanzania are facing various problems as other small scale farmers in Africa. Most small scale farmers in Africa, including Tanzania, experience low standard of living. This is largely due to their inability to attain recommended levels of income from their productive activities due to low productivity and subsequent low income (Wambura and Kapinga, 2007). The small scale farmers are faced by problems like low priority accorded to agriculture in public resources allocation and disbursement, poor rural infrastructure, farmers' limited capital and access to credit, inadequate support services, weak and inappropriate legal framework and tenure and tax policy. Also the current national crop marketing system does not guarantee returns to offset production costs and hence discourages small scale farmers who constitute the bulk of producers in this sector. Even the few large commercial farmers in the country are discouraged by the government policies on agriculture. This multitude of problems hampers growth of the agricultural sector (URT, 2001).

Sunflower is one of the most important oilseed crops in Tanzania. The crop is adaptable over a wide range of environments and therefore it is widely cultivated in Tanzania. The crop is popular in the Eastern, Central, Northern and Southern Highlands of Tanzania. Sunflower is gaining popularity and current data shows that local production of both factory and home extracted oils contributes to about 40% of the national cooking oil requirement with the remaining 60% being imported (ARI, 2008).

Sunflowers are relatively resilient with regard to temperatures, as well as day length. Ideally, ambient temperatures range between 70^0F and 78^0F for best growth. On the other hand, the crop grows best with moderate levels of rainfall. It ranks as one of the most important vegetable oil

with high value and on international market, sunflower ranks fourth after soybean, oil palm and rapeseed. In Tanzania oil extracted from sunflower by local producers contribute 40% of the national cooking oil requirements. The development of this industry in Tanzania to a larger degree has been triggered by two main factors: (i) food value – basically sunflower is grown for its edible oil production and (ii) processing ability by farmers at farm level (Ugulumu, 2008).

In Morogoro Region rural livelihood is detracted by high level of poverty. This situation calls for deliberate efforts to address the problem so as to improve the livelihood in the region. To address the problem, the Government at regional level has taken various steps including promotion of cash crops. Among the cash crops which have been given high priority as potential crop for reducing poverty and improving livelihoods of Tanzanians in this region is sunflower.

1.2 Problem Statement

Despite the government and other development stakeholders of the sub sector, there is shortage of information on how sunflower production has contributed to poverty reduction at the household level, mainly because poverty is still prevail in the rural areas where agriculture is the main source of income. In addition, there is inadequate knowledge on the value addition of this crop limits decision making with regard to raising incomes at the household level. The reliable sunflower value addition and profitability and other related agricultural products are not yet well-developed which is important tool for promoting sustainable production at smallholder farmers' level. Various studies have on sunflower been conducted in Tanzania (Zilihona et al., 2013; Match Maker Associate, 2012; Liberio, 2012; Mpangalile et al., 2008), however, the challenge lies on the suitability of such projects (i.e sunflower production) as far as viability of such projects is concerned. There is lack of information on the sustainability of sunflower projects (production) in Tanzania and in Morogoro in particular. There is a need of studying and analyzing sunflower value addition and profitability along the chain and thereafter projecting the respective channels for their sustainability. This was the task for this paper. The overall objective of the paper was to assess the sustainability of sunflower as a diversification crop projects in improving the rural smallholder farmers livelihoods.

2. RESEARCH METHODOLOGY

2.1 Area of Study

The study was conducted in Mvomero district. The district experiences two rainy seasons where by short rain period extends from October to January. The long rain period extends from March to mid may. The long and cold dry, this starts from June up to august. Rainfall ranges from less than 1500mm in the west zone to 2000mm in the eastern zone which means is reliable for agriculture. All in all the rain varies between different years. Main economic activities taking place in Mvomero district are agricultural production and animal keeping, retailing business including small shops, bars, hotels, and restaurant, transportation service, handcraft business and banking services. The district revenue depends on collection levied on several economic activities taking place in this area.

2.2 Research Design

The study used cross section research design, since survey covers large area in a short time. Also case study enhances the experience of the researcher, ability to analyze and understand the full behavior pattern of the concerned sample unity (Kothari, 2007).

2.3 Sample and Sampling Procedure

Probability sampling is the main sampling method used by the researcher to conduct the study smoothly. Probability sampling is also known as random sampling which has no complexities, the researcher used this method because it allows the study to yield research data that could be recognized to a larger population, and also it permit the application of inferential statistics to the data and provide equal opportunity of section for each element of the population. Probability sampling used to get farmers who involved in sunflower farming project whereby 66 respondents were sampled as representatives of the whole farmers' population in the study area.

2.4 Method of data collection

The primary data were collected through interview and questionnaire. Questionnaires were used by the researcher to collect information on social demographic and economic, farming practices, costing, volumes, prices, marketing channels. Semi structured interviews were conducted to DCDO, WEO, VEO, Agricultural Extension Officer and factory workers in the processing centres.

2.5 Methods of Data analysis

Data collected were analyzed as follows: The value addition was traced through chain mapping. The profitability of sunflower production of actors was determined using profit Margin using the following equation:

$$PM = \sum_{n-1}^{n} (PV - VC)$$

Where: *PM = Average profit margin of farmers, processors and traders, P= Unit of price, V = Volume traded, VC = Total variable costs.*

Moreover, the viability of sunflower production was assessed by projecting the production trend for five years of the two actors in the chain i.e farmer and processor where by Benefit –cost ratio and Net present values were used. The two principles are as stated below

$$BCR = \frac{\sum_{i=0}^{i} \frac{Bi}{(1+r)^i}}{\sum_{i=0}^{n} \frac{Ci}{(1+r)^i}}$$

Where: *BCR = Benefit cost ratio, R = discount rate, n = number of years, B = benefits, C=costs.*

The Net Present Value was also used and is specified as follows

$$NPV = \sum_{i=1}^{n} \frac{B_i - C_i}{(1+r)^i}$$

Where: *NPV= Net Present Value, r =discount rate, n =number of years, B =benefits, C =costs.*

The paper did not end at NPV and BCR, it has also established the Internal Rate of Returns and sensitivity analysis whereby a change in 5% of decline in selling price and increase in operating expenses were assumed (Refer Annexes 2 and 4)

3. RESULTS AND DISCUSSION

3.1 Socio economic Characteristics of the respondents

Table 1 indicates that 33.3% of the sampled population was aged 45-54, while 25.8% were above 55 years. Moreover 24.2% were of age of 35-44.Therefore majority of the respondent were aged 45 and above indicating that they are capable for production and settled in the area (permanent settlement).

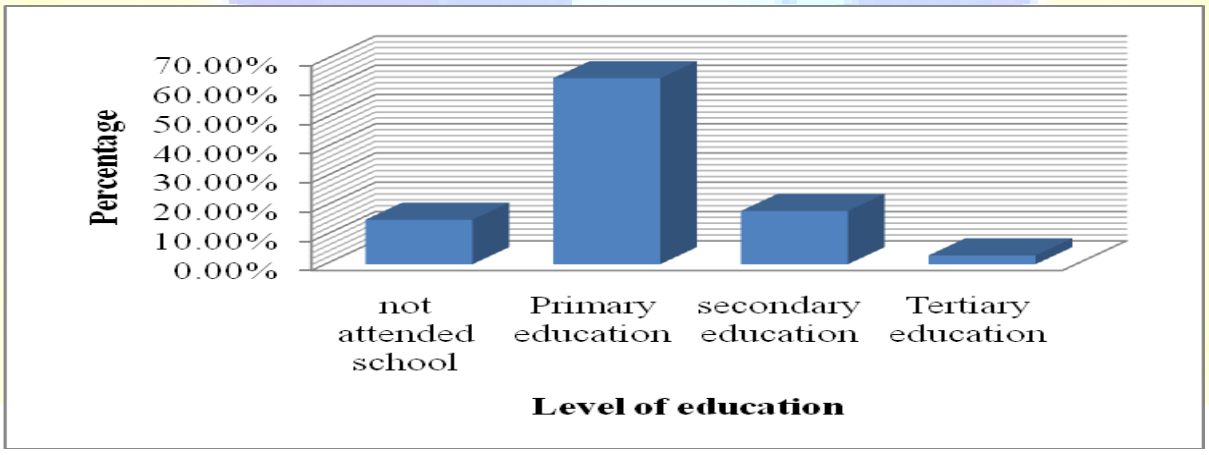
Table 1: Distribution of respondents by Age

Age group	Frequency	Percent
15-24	1	1.5
25-34	10	15.2
35-44	16	24.2
45-54	22	33.3
55 years and above	17	25.8
Total	66	100.0

Sex of the respondent is very important in examining the characteristics of the population because in agriculture production people who are involved tends to differ indifferent ages. Results revealed that most of people who are dealing with sunflower production are men 61% this means that in the study area there is gender imbalance so long as cash production is concerned in other wards men tend to dominate cash related production activities.

Education level of the respondents was another variable taken care by the survey. Results indicate that most of the people have primary education 63% while 18% attended secondary education and 3% attended tertiary education which enables them to read, write and count hence engaging full in cash crops production (Figure 1).

Figure 1; Distribution of respondents by education level



Marital status is one of important characteristics of population concerned. Married is a vital factor in making decision about various issues. Marriage is the fundamental to build up families and societies in general. In this study marital status is classified into three categories married, single and widow. The results from Table 2 show that 75% of the majority of respondent are married this means that the family have many responsibilities such as carrying children. Due to

the different responsibilities the parents have to engage in different activities such as agricultural production in order to add their sources of money. This shows that those who are not married 18% and 6% of those who are widow are not much involved in cash crops production. This might be caused by their living situation of being single without dependant as compared to the married people who are accompanied with a no responsibilities of supporting their dependants like children that force them to engage in cash crops production in order to meet requirements of their families that is food shelter and cloth.

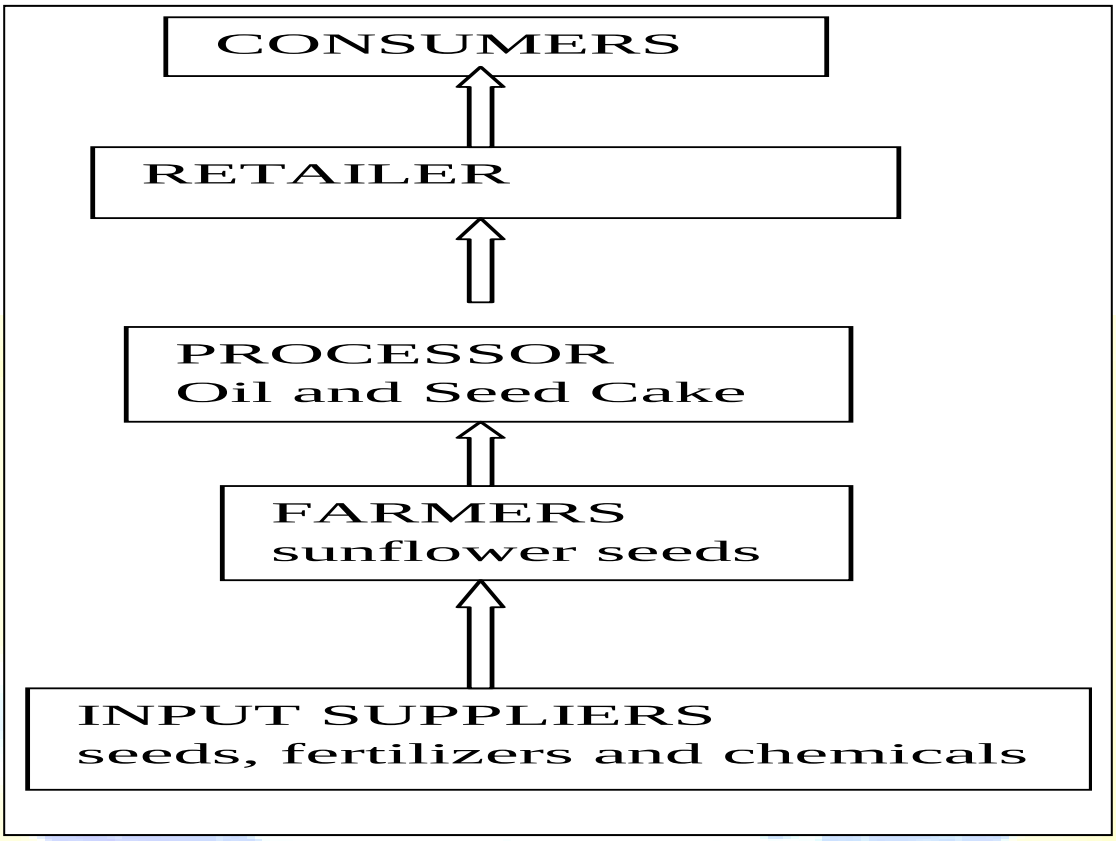
Table 2: Respondents' distribution by marital status

Marital status	Frequency	Percent
Married	50	75.8
Widow	4	6.1
Single	12	18.2
Total	66	100.0

3.2 Value Addition of sunflower production in the study area.

The mapping of the sunflower value addition in the study area has come up with just one strand, whereby it was observed that Inputs suppliers supplied seeds, fertilizers, chemicals to the farmers, and the farmers produces seeds which is useful for planting and processing as well The processor processes that seeds and have two products which are oil and seed cake. The sunflower oil is sold to retailers who are using the product direct at home and in cooking food vendors. The animal cake also is send to animal keepers which is used as animal food. The retailer sells the oil to the consumers who have to sell to the consumers (Figure 2

Figure 2. Mapping of sunflower value addition



In dealing with sunflower production the chain have some stages which should be followed in order to reach to the last point. The farmer prepare the farm the preparation including planting, weeding and harvesting then followed by the point of drying the sunflower after drying comes to the point of storing where by it is packed in sacks processing process in the processing point is where there are two products which are produced these are oil which passes through the refining point and ready for human beings use. The other product is produced by sunflower is seed cakes which used as animal feeder.

Sunflower oil is used as medicine to human beings because it has no choreatrol which is not good for the human health. The product produced in the study are meet the quality as it has barcode and TBS certification (Figure 4) therefore the sunflower oil is safe for human consumption.

3.3 Profitability of sunflower production

a) Sunflower profitability at farm level

It was the interest of this study to scrutinize if the respondents of sunflower production are getting profit or loss in their production. Table 3 shows the profit margin at farm level was 537 500 for an average of 1300 kgs produced per acre.

The main costs incurred by the farmer involved land preparation, planting, weeding harvesting and post harvest. The return the per shilling investing at a farm level was 0.17 which is lower than other actors in the chain.

Table 3: Profitability of sunflower at farm level

Parameter	Amount in Tshs
Yield per acre in Kg	1300
Average purchasing price per kg	485
Gross revenue	630500
Farming Costs	
land preparation	40000
planting	10000
Weeding	20000
Harvesting	10000
Purchasing Sacks	13000
Total variable costs	93000
Profit margin	**537500**
Return per shilling invested	**0.17**

b) Profitability at processing level

It was the interest of this study to scrutinize if the respondents of sunflower production are getting profit or loss in their production. Table 4 shows the profit margin at farm level was 865,960.00 for an average of 1300 kgs produced per acre. The main costs incurred by the processor involved bulking, seed crushing and refining. Bulking is normally done by packing the oilseeds into sacks and then storing them in a warehouse or collection centre prior to selling; the process of crushing includes weaning and removing of foreign particles, crushing, filtering, and oil storing. The processing machines act as market place for all forms of sunflower products that

is oil selling and. animal cakes selling place. The return per shilling invested at processing level was 0.92 which shows that the processors are the once who invest more profits than other actors.

Table 4: Processors' profits

Parameter	Amount in Tshs
1.2 Average purchasing price per kg	485.00
1.3 Purchases costs	630,500.00
Quantity of oil seed in litres	286.00
Quantity of animal cake in kg	585.00
Average price	300.00
Average selling price per lt	3,000.00
Total revenue for oil seed	858,000.00
Total revenue for animal cake	175,500.00
Gross revenue	1,033,500.00
Costs	
Electricity	14,040.00
Labour (refining of seeds)	6,500.00
Labour for milling	10,000.00
Packaging 1 litre	80,000.00
Packaging 5 litre	57,000.00
Total variable costs	167,540.00
Profit margin	865,960.00
Return per shilling invested	0.92

c) Profitability at trading level

It was the interest of this study to scrutinize if the respondents of sunflower production are getting profit or loss in their production. Table 5 shows the profit margin at trading level was **683,560.00** for an average of 1300 kgs produced per acre. The main costs incurred by the traders involved transport and levy tax. The return per shilling invested at trading level was 0.80 which was higher than that of farm level.

Table 5: Profitability at trading level

Parameter	Amount in Tshs
Quantity of oil seed in liter	286.00
Average purchasing price per litre	3,000.00
Gross revenue	858,000.00

Costs	
Transport	20,000.00
Tax	154,440.00
Total variable costs	174,440.00
Profit margin	683,560.00
Return per shilling invested	0.80

3.4 Viability of sunflower

Worthiness of the project financial and economic feasibility

The project financial and economic feasibility worthiness was measured through discounted measures of project worthiness. The researcher used Benefit- Cost Ratio (BCR), and Net Present Worth or value (NPV) as discounted measures to assess the sunflower project sustainability, at a farm and processing levels.NPV and BCR are important parameters in the discounted measure of the project worthiness method, since they differentiate the project in the external environment as to whether the project is really paying according to the existing business circumstance at the time when the project is about to start. The study involved a number of producers but the researcher sampled only sunflower producers so as to appraise the sustainability of sunflower project, where by the average values in terms of quantity (volume) traded, price, levy and other expenses were computed.

At farm level

i) Benefit-Cost-Ratio (BCR)

The benefit-cost ratio compares the present worth of benefits and the present worth of costs and presses their relationship as a ratio. There are three methods of calculating BCR but the most common used is by taking discounted growth benefits divide by total discounted gross costs. The decision rule is to accept project with BCR greater than one and reject project with BCR less than one. From this project the BCR is 1.27 from this signifies that the project is viable.

ii) The Net Present Value

Net Present Value (NPV) is the different between the present worth of the benefits and the present worth of costs of the project and the decision rule is to accept the project with positive NPV. The sunflower project has a positive NPV of 683,560.00 which implies that the production

is viable (financially and economically profitable). The values of BCR and NPV, IRR and Sensitivity analysis are indicated in annexes1 - 4.

4 CONCLUSIONS AND RECOMMENDATION

4.1 Conclusions

The findings reveal that there are five major actors in sunflower production channel, namely; input suppliers, farmers, processors, trades and consumers. Results indicate that at farm level the profit margin was 537,500.00 while the investment per shilling invested was 0.17. At processing level the profit margin was 865,960.00 while the investment per shilling invested was 0.92. At trading level the profit margin was 683,560.00 while the investment per shilling invested was 1.27. Furthermore the results indicate that the farming and processing projects are viable.

4.2 Recommendations

A team of District level staff from community development department should be formed to strengthen mobilization and sensitization of communities to understand the importance of sunflower production in improving community livelihood ,through the slogan which says "KILIMO NI UTI WA MGONGO" in order to let them engage full in agricultural production especial sunflower production.

The government should support sunflower production by facilitating some important techniques and providing soft loans with low interest to the community members. In order to let them obtain easily hence improvement of sunflower production. The government should also provide seminars about agricultural production and education or building capacity about sunflower as a cash crop production. Then provision of good seeds of sunflower to the community members and livestock keeping .as well as subsidy on inputs for sunflower production. Also through MKURABITA the government should implement soft laws to rural farmers like, titled deed, house and farmer or plots in order to help them to be loan able.

The farmers have to express the sense of readiness in receiving training and other instructions given by the extension officers several times and increase creativity in different cash crop production that will increase their income hence improve standard of living and get better living standard which increase national income. Financial institutions should provide loans and consider the farmers as loanable.

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Annex 1: Discounted Cash flow at farm level

Costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Capital		381,306				
Working Capital		81,306				
Operating Costs		381,300	381,300	404,430	429,123	455,498
Financial Costs		31,915	17,430	-	-	-
Total Costs		875,827	398,730	404,430	429,123	455,498
Discount Factor (19%)	1.00	0.83	0.69	0.58	0.48	0.40
Discounted Costs		729,855	276,896	234,045	206,946	183,054
Sum (A)		1,630,797				
Benefits						
Revenue		630,500	630,500	693,550	762,905	839,196
Discounted Revenue		525,417	437,847	401,360	367,913	337,254
Sum (B)		2,069,791				
BCR		1.27				
Net cash flow		(245,327)	231,770	289,120	333,782	383,698
Disc Cash outflow		(204,439)	160,951	167,315	160,967	154,200
NPV		$177,828.27				
IRR		70%				

Annex 2: Sensitivity Analysis for sunflower production at farm level

Sensitivity Analysis	% Change	IRR	NPV
Base	0	70%	$177,828
Decline in sales price	-5%	25%	418,354
increase in operating exp	5%	28%	634,409

Annex 3: Discounted Cash flow for oil sunflower Processors

Costs	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Fixed Capital		15,766,118				
Working Capital		766,118				
Operating Costs		7,366,100	7,366,100	7,772,710	8,203,481	8,660,004
Financial Costs		4,549,340	3,497,266	2,325,857	1,860,686	1,395,514
Total Costs		28,447,676	10,863,366	10,098,567	10,064,167	10,055,518
Discount Factor (19%)	1.00	0.83	0.69	0.58	0.48	0.40
Discounted Costs		23,706,397	7,544,004	5,844,078	4,853,475	4,041,087
Sum (A)		45,989,042				
Benefits						
Revenue		19,368,000	19,368,000	21,021,300	22,839,930	24,840,423
Discounted Revenue		16,140,000	13,450,000	12,165,104	11,014,627	9,982,809
Sum (B)		62,752,540				
BCR		1.36				
Net cash flow		(9,079,676)	8,504,634	10,922,733	12,775,763	14,784,905

Disc Cash outflow	(7,566,397)	5,905,996	6,321,026	6,161,151	5,941,722
NPV	$6,813,135.26				
IRR	71%				

Annex 4: Sensitivity Analysis for oil sunflower Processors

Sensitivity Analysis	% Change	IRR	NPV
Base	0	71%	$6,813,135
Decline in sales price	-5%	25%	418,354
increase in operating exp	5%	28%	634,409