Coping Strategies for Improving Profitability in Onion Production: A Conjoint Analysis among Small Scale Onion Producers in Mkalama District, Tanzania

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Abstract: *This paper focuses on the coping strategies employed to improve profitability in onion production among small-scale onion producers. The main objective of this study was to analyse the coping strategies used by small-scale onion producers to improve the profitability of onions in Mkalama district, Tanzania. The study applied a mixed research approach with both qualitative and quantitative methods of data collection such as -interviews, focus group discussions, household surveys, and observations methods, while secondary data were collected through documentary review. Questionnaires were administered to 269 heads of households from three villages namely, Msiu, Kidarafa and Marera located in Mwanga ward, Mkalama District. The data collected from respondents were analysed through SPSS and NVivo software. The findings revealed that lack of working and investment capital, lack of agricultural skills and training, lack of quality seeds and high transportation costs are the major challenges facing small scale onion producers in the study area. On the other hand, farm size and amount of capital are the two main determinants for the performance of farm produce. Moreover, the findings revealed that the strategies used to increase profitability to small-scale onion producers include, accessibility of market information, use of proper storage facilities, training to farmers, and modern production technology. The study recommends that in order to increase profitability and improve household income among small-scale onion producers in Tanzania collective efforts among government, non-governmental organizations, and other stakeholders is necessary.*

Keywords: *Coping Strategies; Profitability; Onion; Small Scale Onion Producers*

1.0 Introduction

Onions (*Allium cepa*) are important horticultural products in the urban market in Tanzania. The report of the International Fund for Agricultural Development (IFAD, 2017) revealed that, onions of whatever type, albeit in small quantities are the most consumed vegetable in any household in East Africa. FAO (2013) statistics show, the average production of onion in the country is about 10.06 tones/ha while the world's average stands at 19.31 tonnes/ha. There are several varieties of onions produced in Tanzania, such as red bombay, mang'ola red and 'khaki' but red bombay is mostly cultivated. According to the United Nations Food and Agriculture Organization (FAO, 2016) Tanzania produces about 189,604 Metric Tonnes of the crop per year, and this ranked 12th amongst onion producing countries in Africa and 49th in the world. The crop is produced almost all over the country from the Southern Highlands through the Central Plateau to the Northern Highlands.

Nevertheless, when compared to other countries in terms of yields, Tanzania experiences low yields. FAO (2016) statistics establishes that, the average yield of onion in the country is about 10.06 tonnes/ha while the world's average stands at 19.31 tonnes/ha. The gap in yields of over 9 tonnes/ha is pronouncing and detrimentally affects producers' efforts in improving profitability for enhancing their welfare. One of the factors that contribute to low yields is the use of low yielding old varieties and poor agronomic practices (FAO, 2016). Although high yielding varieties exist, most of them are adapted to the intermediate and long day climatic regions and cannot be grown successfully in Tanzania (ibid).

Similar situations are in Singida region which is one of the high onions producing regions in Tanzania (URT, 2011). The unpredictable rainfall and changes in temperature have severely affected onion production resulting decrease in productivity (Lyimo and Kangalawe, 2010). The region is experiencing greater weather extremes including increases in temperature and changes in rainfall patterns. Authors like Nelson et al. (2009) as quoted by Cooper et al. (2016) projected that climate change and variability will reduce agricultural production by 10 to 20% by 2050 by changing rainfall patterns and increasing frequency of extreme weather events. Such effects have increased drought, land resources degradation as well as health problems. Hence, the intensity of droughts and changes to growing seasons have significant effects on agricultural productivity (including onions), water supply, food security and human welfare in Mkalama District.

On the other hand, most studies done concerning onions production in Tanzania have highlighted crop yield enhancement through breeding, improving varieties, increasing productivity, disease tolerance, soil management and other agronomics properties. Example

Regessa et al., 2020 explained about demographic characteristics affecting onions productivity and profitability but little is known by most farmers and scholars on the profitability of onions production in Mkalama district and Mwanga ward in particular. Therefore, this study aims to analysing the coping strategies for improving profitability in onion production in the target population. In particular, it focuses on the challenges faced by small scale onion producers in onions production, and determinants for the performance of farm produce in the study area.

2.0 Materials and Methods.

2.1 Study Area.

The study was conducted in Mkalama District in Singida Region. Mkalama District is one of the six districts of Singida Region. It is one of the 26 new districts that were formed in Tanzania since 2010. The District is situated in the north of the region between latitudes 4^0 and 4.30^0 south of the Equator and longitudes 34^0 and 35^0 east of Greenwich Meridian covering an area of 3,365.51 km^2 of which 44% is arable land. The district is bordered to the north by Simiyu Region and Arusha Region, to the East by Manyara Region, to the south by Singida Rural District and to the West by Iramba District. According to the 2012 Population and Housing Census Report, the total population of the district is 188,733. The District was administratively divided into 14 wards. Three villages namely, Msiu, Kidarafa and Marera were purposely selected from Mwanga ward for the study.

Figure 1: Geographical location of Mkalama District

The district experiences variation in climatic conditions throughout the year. Most of the areas in the district receive rainfall between 500mm - 850mm per annum. Rainfall season usually starts from mid-November up to mid-May. The rainfall is unimodal and rainfall is interrupted by two notable day spells in mid-February and mid-March. The amount of temperature ranges from about 15^0c in July to 30^0c during October.

2.2 Research Methods

2.2.1 Data Collection Methods and Sample Size

The study applied a mixed research approach (quantitative and qualitative methods) of data collection to ensure the study objectives addressed properly. Kothari (2004) confirms that, the use of different methods enables triangulation of different data collected to ensure accuracy and better quality. Both primary and secondary data collection tools were used to collect information on the coping strategies used to increase profitability among small-scale onion producers. Primary data sources include, questionnaires (n=12 for each village), Focus Group Discussions (n=8 for each village), trend analysis (n=8 per village), household survey (n=269), and

interviews with key informants (n=10 involves District Agricultural Officer, Village leaders, Agricultural extension officers and Village elders). The study measured perception of small-scale onion producers on the challenges facing them in onion production through Likertscale of five levels (1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Strongly Agree, 5= Agree) and developed Mean Index ($\bar{x}$) which indicated the magnitude of theactual percentages (%) from the measured attributes. Arsenault and Anderson (1998) described Likert scale as an excellent means of gathering people's attitudes and perception.

Direct field observation through transect walk was also employed to confirm some of the issues raised during in-depth interviews, household surveys and focus group discussions. Secondary sources used includes various published research papers and reports, rainfall and temperature data collected from Tanzania Meteorological Agency, onions production data collected from Mkalama District Council and National Bureau of Statistics, internet search and other relevant sources.

The sample size of the heads of households involved 10% of the total number of household heads in each study village for the household survey. Simple random sampling was used in the selection of the sample therefore, about 58% of males 42% of females interviewed.

2.2.2 Data Analysis

The Qualitative data were translated from Swahili to English language and analysed using NVivo software in three stages: first, the line-by-line coding of field notes and transcripts (unpacking of text into discrete elements to expose underlying thoughts and meanings); second, the in-depth examination and interpretation of the resultant codes into descriptive themes and; third, interpretation of the descriptive themes into more abstract analytical themes. IBM SPSS statistics version 20 was employed to analyse Quantitative Data. Rainfall, temperature and crop yield data were analyzed by using Microsoft Office Excel, 2007, to examine patterns and trends of the variables. Tables and figures were used to present the findings.

3.0 Results and Discussion
3.1 Demographic Characteristics
3.1.1 Sex of Respondents

Table 1 shows participants sex, education level and age. The table shows that 269 total respondents out of which 75% were males and 25% were females' respondents. This implies that majority of the respondents were male compared to women.

Table 1: Demographic characteristics of respondents

Criteria	Description	Frequency	Percent
Sex of respondents	Male	202	75
	Female	67	25
Education level	Primary education	183	68
	Secondary education	64	23.8
	Advanced secondary	16	5.9
	Tertiary education	6	2.2
Age of respondents	<18 years	38	14.1
	18-33 years	91	33.8
	34-49 years	102	37.9
	>50 years	38	14.1

Source: Field data, 2021

3.1.2 Education Level of Respondents

Education is noted to be a significant factor in accessing advanced information on new improved agricultural technologies and increased agricultural productivity (Norris and Batie, 1987; Elahi et al., 2015). The study revealed that, about 68% of the respondents have attended primary education, 23.8% secondary education, 5.9% advanced secondary education while the rest (2.2%) have tertiary education as presented in Table 1. This implies that most of the respondents did not go beyond primary education but have sufficient knowledge to receive new knowledge and skills. Education obtained by the population can lead to both positive results on onion production hence increase profitability of onion production within the area of study. This was evidenced by the study conducted by Alshatti (2015) who concluded that, in African countries most of the crop growers have no or very low education

because they take most of their time in producing crops. Also, Rahmeto (2006) concluded the level of education increases farmers' ability to obtain, process, and use information relevant to adoption of improved onions seed varieties. Educated respondents are therefore expected to increase the quality of onions produced in the study area.

3.1.3 Age of Respondents

The analysis of respondents' ages simply aimed at looking out the involvement of different age groups in onion production. This study showed that, onion production is practiced by all age groups however the majority (37.9%) of onion producers were within the age ranging from 34-49 years, 33.8% were within 18-33 years while <18 years were 14.1% and 14.1% were elders with the age >50 years old as shown in Table 1. These findings are in contrast to the existing complaints that the majority of youth and middle-aged people do not prefer to participate in agriculture as their income-generating activity. The study results concurred with those of Reuben (2013) who reported that 71% of the study respondents were economically active age group. Findings revealed further that, there is enough involvement of youth in the study who can take responsibility for onion production efficiently and effectively since they are an active working group of the society.

3.1.4 Economic Activities

The findings exposed that, crop farming was the leading economic activity in the study area which accounted for 78.2% of the total number of respondents. The second economic activity conducted include Agro-pastoralism which accounted for 12.8% of the respondents, followed by small business (1.4%), casual labour (6.6%) and formal employment (1%) due to presence public institutions like hospitals and dispensaries as presented in Table 2.

Table 2: Economic Activities of Respondents

Strategies	Frequency	Percent	Rank
Crop farming	210	78.2	1
Agro-pastoralism	34	12.8	2
Casual labour	18	1.4	3
Small Business	4	3.6	4
Formal employment	3	1	5

Source: Field Data 2021

3.2 Onion Production Challenges to Small Scale Onion Producers.

This section sought to identify the challenges faced by small scale onion producers in Mkalama District. Responses regarding various challenges in the production of onions were recorded and analysed during the field study. The respondents were asked to identify, choose, and prioritize the various categories of challenges they had been facing in onion production. The majority of respondents indicated lack of working and investment capita (45%), lack of agricultural skills and training (17%), lack of quality seeds (16%) and high transportation costs (11%) as major challenges. Others mentioned, lack of standard weight and measurement (7%), lack of storage facilities (3%) and inadequate irrigation structures and poor water management (1%), as shown in figure 2.

3.2.1 Lack of Working and Investment Capital

The absence of affordable loans, according to respondents, was the primary reason of the challenge of a lack of working and investment capital, which led them to plunge themselves into a cycle of excessive debt. The majority of these loans are obtained through unofficial means, such as traders, and come with extremely high interest rates and strict terms. Onion production is a particularly capital-intensive crop, with seeds, field preparation activities, and inputs all using significant amounts of money. These activities occur during the start of the season, when onion producers do not have the disposable incomes to finance them (FAO, 2007). This forces farmers to take out high-interest and predatory loans from input companies and onion traders.

3.2.2 Lack of Agricultural Skills and Training

In-depth interviews with key informants and focus group discussions (FGDs) demonstrated that a lack of agricultural skills and training among small-scale onion producers has an impact on crop yield and, as a result, on potential profitability. With a particular focus on this, the District Agricultural Officer narrated that,

> *"Small scale onion producers in Mkalama District are self-taught and do onion farming by experience. As a result, they are uninformed of their crop's potential and how to maximize that potential through proper usage of inputs, application of proper agricultural production and irrigation techniques."*

The implication of the findings is that, lack of training programs in the study area, which would have been done by various stakeholders like LGA, private sector and development partners, has prevented these farmers from taking advantage of the available opportunities and potentials in onion crop. These findings tally with Mauro *et al.* (2014), who found that, smallholder farmers in Kenya need agribusiness skills such as farm planning, maintaining farm records, farm budgeting (cash flow), gross margin calculations and other relevant skills in running a farm enterprise. Ovah *et al*, (2017) supported, the need for farmer trainings especially in the areas of improving harvesting techniques, sorting and grading, packing and transportation seems obvious. With improved knowledge farmers can reduce the cost of production per unit, increase yields and thus increase potential profitability.

3.2.3 Lack of Quality Seeds

Another challenge that small-scale onion producers encounter is lack of quality seeds. Majority of respondents (141) equivalent to 53% stated that, farmers recycle their own seeds selected from previous seasons while 97 respondents equivalent to 36% mentioned that, farmers purchase seeds from local seed producers and only 29 respondents equivalent to 11% mentioned that farmers purchase quality declared seeds from local entrepreneurs and traders from outside the district (Table 3). This implies that the alternatives selected by majority of farmers to purchase seeds make it difficult to ensure high quality seeds and yields in the study area. The varieties available to the farmers are not necessarily the optimal variety for the growing conditions. Furthermore, some farmers have no idea which variety they have planted because it may have been recycled for a long period. Using observation method, the study revealed that, the types of seeds used ultimately have implications on disease susceptibility, productivity and final quality of the produce. These findings are consistent with Haile *et al.* (2016), who confirmed that, poor quality of seeds is one of the major onion production constraints to small scale onion producers in Ethiopia. Despite the immense merits of onion to farmers, their production has been constrained by a myriad of biotic and abiotic factors as well as institution.

Table 3: Seeds Availability

Source	Frequency	Percent	Rank
Recycling	141	53	1
Local seeds producers	97	36	2
Entrepreneurs and Traders	29	11	3

Source: Field data, 2021

3.2.4 High Transportation Costs

Farmers articulated in the FDGs that the price of transporting each bag is extremely high due to inflated costs of loading and offloading various forms of transport from the farm to the market, implying that traders must reduce their buying price from the farmers. On the other hand, the state of rural road infrastructure contributes to high transportation costs. Lack of reliable infrastructure increases the risk of reaching the market, particularly in remote areas such as Msiu, Kidarafa and Marera villages in Mkalama District. Poor infrastructures contribute to the increase of transportation costs as well as decrease of prices of products sold by farmers.

Figure 2: Onion Production Challenges
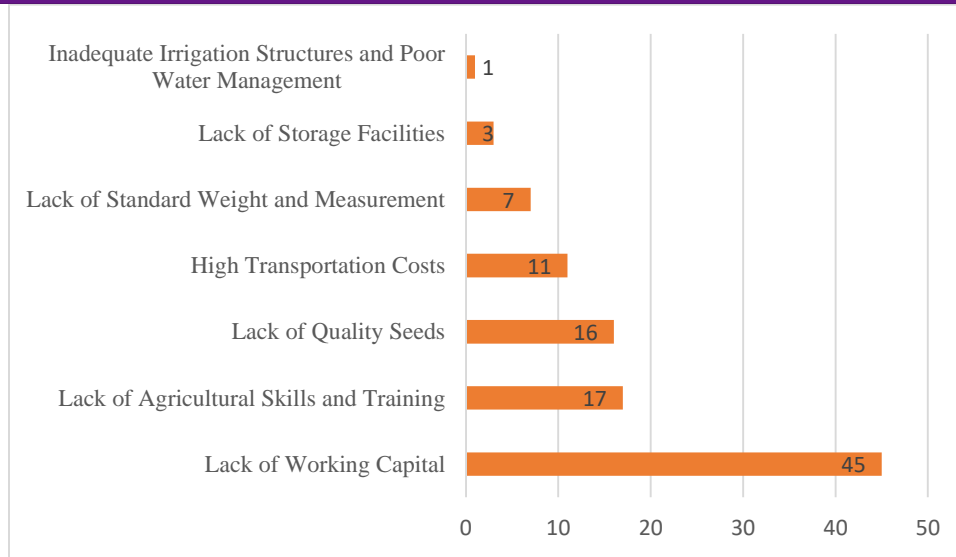
Source: Field Data 2021

3.3 Determinants of the Performance of the Farm Produce

3.3.1 Farm Size

Farm size is one of the determinants explaining the performance of the farm produce. Findings of this study show that most smallholder farmers averaged to 82% used to produce onion in small farmlands less than 1 acre while 11% responded to use land between 1 to 2 acres and the rest averaged to 4% produce onion in a farm of more than 3 acres, and only 3% used the land between 2.1-3 acres as shown in Figure 1.

Figure 3: Farm Size for Smallholder's Farmers
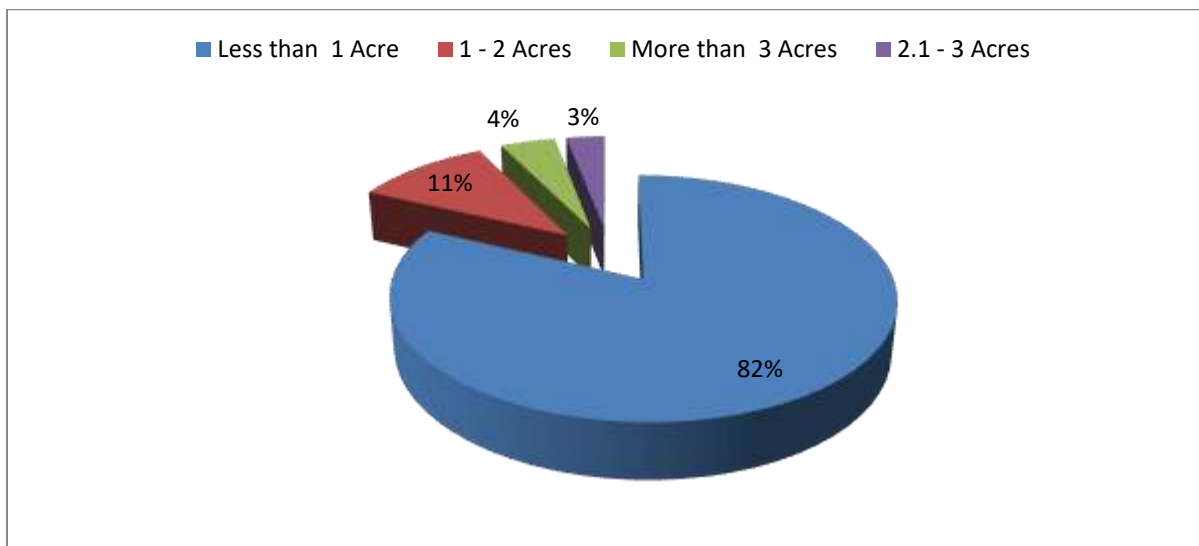
Source: Field data, 2021

However, the majority of farmers who put their efforts and capital in onion production were observed to produce onions in small farm size because of low capital as large-scale onion production needs enough capital since operation cost is very high although producing in large farm size, a producer will get higher returns as compared to small farmland. 10.6% of respondents used to cultivate land area between 1 and 2 acres. 3.0% of respondents used to grow the land between 2.5 and 3 acres. The remaining respondents (4.3%) cultivate more than 3 acres and only acres as shown in Figure 1.

3.3.2 Amount of Capital

Further analysis was carried to find out the reasons for cultivating onion in small size areas as responded by the majority of respondents (81.8%). The majority of farmers about 61% reported the production need large capital since operation cost is very high. However, producing in large farm size, a producer will get higher returns as compared to small farmland.

3.4 Strategies Used to Increase Profits to Small Scale Onion Producers

3.4.1 Market Information

Accessibility of market information was the best option and ranked 1st among others. The majority of farmers (45.5%) responded that, access to required market information is the best strategy used to increase profitability. The study revealed that, farmers used various sources such as agricultural extension officers, training, local radio and informal sources to acquire the required market information especially the amount of price for their products. Drawing from focused group discussion with farmers one participant said:

> ......"It is our normal behaviour to listen to the radio about the current amount of price of onion in the market, also Ward Agricultural Officer normally give us information about the amount of price in the market" (Male 43 years in Msiu Village).

3.4.2 Storage Facilities

Proper storage facilities were also mentioned as one the best strategy employed for improving profit to small scale farmers involved in onion production. Majority of farmers (30.3%) of total respondents as shown in Table 2 said, they have knowledge on how to preserve their onion soon after harvest. Furthermore, farmers explained that, onion as like other vegetables is very sensitive due to its perishability in nature and high supply of onions in the market sometimes are forcing farmers to sell their produce on low prices in local markets due to poor marketing infrastructure (poor storage facilities and storage techniques) and uncertainty in the whole sale market which then affect their profit margins.

> ...."Some years ago, it was difficult to see modern storage bags for onions in our village, there were no proper bags for storing and packing onions. Fortunately, the situation has changed because the bags are available and we have knowledge on how to preserve onions after harvest. Onions are very sensitive due to their perishability, therefore we need proper storage facilities" (Key Informant, 68 years in Kidarafa Village).

3.4.3 Farmers' Training

Farmers' training was ranked the 3rd among others as the best strategy to increase profit to their products. Most farmers about 15.2% responded to acquire adequate training on the whole value chain in the study area. It was revealed that, training to farmers impact knowledge as onion farming need information on the practices involved from the nursery stage all the way to harvesting to avoid making mistakes that could lead to losses. For that reason, farmers need experts to give them more insights and understand the venture much better. Training give confidence and enables them to weigh the risks involved from another perspective with the promising returns in mind. Every time onion farmers need trainings that benefit them in the whole value chain.

Table 4: Strategies applied for improving profit

Strategies	Frequency	Percent	Rank
Market information	122	45.5	1
Farmers training	82	30.3	2
Storage facilities	41	15.2	3
Production technology	24	9.0	4

Source: Field data, 2021

3.4.4 Modern Production Technology

Investment in modern production technology was mentioned to be another best strategy towards addressing the existing challenges facing farmers toward onion profitability (Table 2). Using observation method, the study identified that, majority of famers use drip irrigation, using petrol operated machines, but not to large extent as it was mentioned by 9.0% of total responses. Technological

adoption needs willingness, readiness and capital of farmers to adopt, which is very difficult to most smallholder farmers in rural settings where supply of technology, inputs and motivation is very low.

4.0 Conclusion and Recommendations

The findings in the study revealed that, status of onion production shows most of farmer has small size farms (ranging from 0-1 acre) which they use in the production of onion. Moreover, small scale onion producers in the study area are facing various challenges including lack of working and investment capital, lack of agricultural skills and training, lack of quality seeds and high transportation costs. Also, the finding indicates that, onion produced in the area are low yield products, these results is contributed by the low technology used in the production process as most farmers use local tools in the production process leading to low productivity and hence its profitability is very minimal. As a remedy to the challenges, the study proposed coping strategies to increase farm profits such as good storage facilities, Farmers' Training, and the use of modern production technology. Further, collective efforts from the government, nongovernmental organizations and other stakeholders should be enhanced to support the strategies identified for the aim of increasing profitability for onion producers, as one of the mechanisms to improve household income for scale onion producers in Tanzania is pertinent.

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