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Investigating Value Addition Activities in the Palm Oil Supply Chain in Kigoma Region, Tanzania

Charles W. Merengo

Department of Procurement and Logistics Management, Tanzania Institute of Accountancy (T.I.A), Kigoma Campus.

ABSTRACT

The purpose of this paper was to investigates value addition activities of palm oil supply chain in Kigoma region, Tanzania. A case research design was adopted in which questionnaire and interview was used to collect data from 130 respondents. The study findings revealed that main actors in Kigoma pam oil supply chain are farmers (46%) followed by processors (38.2%) and traders while non-governments (6.3%) and government agents (9.1%) being the minority. Seed production, nursery, cultivation and harvesting are main upstream (production) supply chain activities. At Midstream (Processing), main activities include processing of crude palm/kernel oil by refining, fractionating and distilling into marketable forms which are suitable for manufacturing food and non-food products. While in downstream activities includes marketing of food and non-food products from refined and crude palm and kernel oil. Study further revealed that palm oil subsector create employment, increase income, promote other sector development and improve living standard of majority farmers in Kigoma Region. Though several challenges like shortage of capital among small farmers in Kigoma, unreliable local and international market, poor infrastructure network in Kigoma rural areas and low level of technological application in palm industry as main constrains. The study recommended that government support is more required for enhance capacity building among small farmers, invest in research and development, improve Infrastructure Network and increase support to farmers through its agents like SIDO, TBS, TFDA, financial institutions, ministry of industry and other public institutions.

Introduction

In today's globalized economy, development and business communities involved in African agriculture and agribusiness sectors experience a resurgence interest in promoting supply chain activities as a way of adding value, diversifying rural economies and contributing to increasing rural household incomes in most Sub-Saharan Africa (SSA) countries (Modi & Cheru, 2013; Schaffnit-Chatterjee et al., 2014). Value addition in agricultural products considered as source of improved production, increased harvesting, promotion of primary and secondary processing industries, improved packaging and export of agricultural produce to the global market, with strong linkages either directly or indirectly to livelihoods (Nugroho et al., 2021; Shamsuddin et al., 2021). These outputs of supply chain addition are drivers of the transformation of agricultural production into industrialized activities (Barrett et al., 2019; Barrett et al., 2020; German et al., 2020)

Like other SSA countries, Tanzania's economy is heavily dependent on agriculture that links to the non-farm sectors through forward linkages to agro-processing, consumption and export and provides raw materials to manufacturing industries and a market for manufactured goods (Jahari et al., 2018; Jha et al., 2020; Peter Mgeni et al., 2019). However, fifty (50%) per cent of domestic consumption of edible oil is imported and spends more than USD 230 million of her scarce foreign resources to meet the importation expenditure of edible oil (Mgeni & Mpenda, 2021; Olabisi et al., 2021). Palm oil is a highly lucrative and demanded product at local and international levels (Nambiappan et al., 2018; Pacheco et al., 2020).

This sub-sector creates jobs for thousands of farmers leading to the rapid expansion of palm oil plantations in some regions of the world (Mwaikambo, 2018; Purba, 2019; Suzana et al., 2020).

Kigoma Region has been the main producer of palm,accounting for 80 percent of the country's palm oil production since the early 1920s (George, 2014; Mwaikambo, 2018). More recently, the crop acquired additional uses including the production of local soap. local cooperatives collect and sell about 150,000 litters of palm oil annually to local refineries and soap producers in Dar es Salaam (Barcelos et al., 2015; Carrere, 2010). At the local level, women are in charge of boiling, milling palm oil and sellingits products (Mwaikambo, 2018; Uckert et al., 2015). As demonstrated in other economies, with proper focus on the production of commodities of large-scale commercial values, improvement of palm oil through value addition can effectively mitigate the poverty level in Tanzania, especially in the Kigoma region (Mwaikambo, 2018).

Despite palm oil subsector potentiality to Tanzania poverty alleviation, income generation and increasing of food security, little investiment have made to modernize and suporty development of industry. Mostly of palm oil grower in Kigoma are small farmers with low tectnology and little or no value addition of palm oil products. However, recently there increasing of palm oil demand at local and global market due to its high value and versatility in replacing trans-fat oil. This present the opportunity for growth of Tanzania palm oil sub sector and improving of rural economy particular in Kigoma.

Therefore this study critical investigate of value addition activities of palm oil sub-sector in Kigoma regional. Specificlaaly focus on identifying actors, value additional activites, contribution to on impriving rural economy and living standard in general and addressing existing challenge hinder growth and development of palm oil sub sector in Kigoma region, Tanzania,

Literature Review

This study used supply chain theory as an analytical tool for analysing value-adding activities and opportunities with regards to sourcing of factors of inputs, production, processing and delivery of the finished product. Supply chain development has become a reliable tool for stimulating sustainable agricultural investments (Donovan et al., 2015). An agro supply chain consists of a series of activities that add value to a final product; beginning with raw material production, linking with processing, getting the final product, marketing, sale to the end-user or consumer (Ofosu-Budu and Sarpong, 2013).

The supply chain analysis, however, starts from the perspective of the end market to determine the products they want and how the greatest value can be shared down the chain as the actors work to produce those products (Gereffi and Fernandez-Stark, 2016). For the case of this study, the supply chain theory is used to analyse the value addition of the palm oil industry in Kigoma, Tanzania. The theory focuseson poverty alleviation through the integration of smallholder farmers and the small palm oil industry to participate in global trade.

The theory also emphasizes on each point or linkage in the supply chain thus presenting an opportunity for people to engage in innovative activities for income and employment. The total benefit that can be derived by a supply chain actor is directly proportional to several activities conducted by actors. The theory further explain that value addition activites differe in each stage thus, producers have opportunity of choose type of activity that generates more reward. This connection, Webber and Labaste (2010) indicated that supply chain is the same as marketing chains, supply chains, productive chains and distribution chains because it involves the supply of logistics, value addition, transactions and market linkages (Trienekens, 2011).

Supply chain of agricultural produce

The agricultural supply chain encompasses all the input supply, production, postharvest, storage, processing, marketing and distribution and consumption functions along the "farm-to-fork" continuum for a given product (be it consumed fresh, processed and/or from a food service provider), including the external enabling environment (Manzini & Accorsi, 2013). These functions typically span other supply chains, geographic and political boundaries and often involve a wide range of public and private sector institutions and organizations (Kano et al., 2020). Agricultural supply chain includes networks that typically support physical product flows includes physical product movements from input suppliers to producers to buyers to final customers (Arias Carballo & Laura, 2013).

Then financial flows which includes all credit terms and lending, payment schedules and repayments, savings, and insurance arrangements. The last one is information flow which coordinate physical product and financial flows. Logistics and communications are embedded in all of these flows, and poor logistics and communications are often a major source of problems facing the agricultural supply chain (Saberi et al., 2019).

The underlying objective of agricultural supply chain management is to provide the right products (quantity and quality), n the right amounts, to the right place, at the right time, and a competitive cost and to earn money doing so. For governments, there may be broader objectives involved, especially where the supply chain is especially strategic for trade or critical in the domestic food system (Morgan et al., 2019). These broader objectives might relate to maintaining low inflation, maintaining social stability and -sub-regional development.

The agricultural supply chain should be designed to illuminate the problems that can endanger the achievement of these (and other) performance objectives by farms, firms and the supply chain as a whole (Lezoche et al., 2020). The supply chain participants can be located domestically or outside the national borders. Even within the national borders, the supply chain participants and activities can be spatially dispersed (Kano et al., 2020). Some participants and services are specialized, while others are involved in several different supply chains. Support service providers can be from both the public and private sectors (Mangan & Lalwani, 2016)

Logistical support services include transport and communication and information technology. Technical support includes a range of research and business development services, but also technical assistance and financial services (Lai et al., 2020) . In the global economy, support service providers and the services themselves can easily cross the national borders. An agricultural supply chain may be subjected to or experience multiple risks, with farmers and firms facing risks from different sources (Gereffi & Luo, 2014; Vroegindewey & Hodbod, 2018).

Sarku (2014) examine contribution of value addition in agriculture to socio-economic development regarding the oil palm industry in Kwaebibirem District Ghana. The researcher collected data by using a

questionnaire with a quantitative approach to data analysis. The study findings revealed that value addition activities are undertaken from the Oil Palm Research Institute (OPRI) to the final consumption of oil palm products. At OPRI, improved planting material called tenera‟ was produced in commercial quantities and supplied to farmers and nursery operators in the district. Small and large-scale producers of the oil palm add value to the crop by applying fertilizers, herbicides, pesticides and other value-adding materials. The findings of the study also revealed that palm oil production increasesthe employment and income of the majority of rural farmers (Sarku & Appiah, 2017) .

Adebo et al., (2015) examined the contribution of palm oil production to income generation among Small-scale Farmers in Ekiti State, Nigeria. The study used a sample of 120 small-scale farmers who were selected from the farming communities and whose data were collected using astructured interview. The study findings revealed that palm oil production has potential benefits among small farmers as it creates employment and income and food security. However,the majority of farmers experience different challenges which hinder the realization of the full potential of palm production, these include labour shortage and yield variation due to climate change.In addition, high costs of labour and processing equipment were considered as the main constraints for palm production in Nigeria (Adebo et al., 2015).

Agboje and Omonona (2013) conducted a study on growth in oil-palm supply chain under micro enterprises in delta state in Nigeria. The primary objectives of the study were to examine the factors influencing growth in oil palm supply chain in Delta state. Specifically the research identifies various actors in the smallholders' oil-palm supply chain of the state, measures the value each actor adds and identifies the factors as well as the constraints facing the development of the smallholders in the chain. The research used quantitative methods whereby Primary data were used, obtained through a structured questionnaire. The major actors in the chain include the oil-palm producers/growers, processors (oil-extractors), marketers (wholesalers and retailers) and consumers of palm oil, kernel oil and palm-wine. The findings from the study report that each category in the chain adds higher value at off- seasons ranging from N 6, 00 to N 3, 800, also sales growth and working hours experienced by the marketers of oil-palm products were influenced by the relationship between years of operation and size of labour also the sales growth is constrained by transportation cost, social conflicts and high cost of inputs (Arias Carballo & Laura, 2013).

The current study focuses on the contribution of value addition activities and their role in rural poverty reduction in the palm oil supply chain. This is because this area has not been adequately focused on previous studies in agriculture, particularly concerning the oil palm industry in Kigoma, Tanzania.

Research Methodology

Research design

The study adopted a case study research design to investigate value addition activities in the palm oil supply chain in Kigoma District in Kigoma region. The case study design was used because the study intended to make a detailed and intensive investigation on a variety of issues pertaining to activities and actors in the oil palm industry in Kigoma District.

Study area

The study was conducted in Kigoma region, Tanzania. The region is located on the shores of Lake Tanganyika at the North - West corner of Tanzania. The region is situated between Longitudes 29. 5 and 31.5. East and Latitudes 3.5 and 6.5 South of the Equator. It shares boundaries with Burundi and Kagera region to the North, Shinyanga and Tabora regions to the East, Congo to the West and Rukwa region to

the South. The region is divided into Kasulu, Kigoma district council, Kigoma-Ujiji Municipality, Uvinza, Buhigwe, Kakonko and Kasulu town (National Bureau of Statistics, 2012).

According to Tanzania Population and Housing Census the population of Kigoma region is at 2,127,930 (www.nbs.go.tz). Economic activities of the region include agriculture, salt mining, trading and fishing. Oil palm is cultivated only in Kigoma municipality, Kigoma district council and Uvinza district. Thus, the study was conducted only in the districts which have a total population of 810,664 (National Bureau of Statistics, 2012).

Study population

The target population in this study included oil palm producers (large, small and medium farmers), traders (assemblers,wholesalers and retailers and processors),non-governmental organization "Farming for Energy and Better Livelihoods in Southern Africa" (FELISA) and government officers dealing with the agricultural sector in Kigoma District together with final consumers of oil palm products. Other participants included those working in small-scale oil palm mills, local soap makers, consumers, machine operators andexporters of palm and kernel oil.

Sample size

Sample size refers to the number of respondents who complete a survey or project. The study used a sample of 130 respondents to collect information form respondents. Te sample size was obtained by using using (Yamane 1967) formula.

Yamane provides a simplified formula for calculating sample size.

The formula is:

$n = N/ (1+N) (e)$.

Where by N = Total population

Precision of error = 10%

n= sample size to be included in the study

1 is constant

Sampling strategy

The study adopted multiple sampling strategies,including snowball sampling procedure to select the processors to whom the researcher referred by other processors; purposive sampling techniques were used to select government officers and simple random techniques were used to select local traders, middlemen and other small farmers.

Data collection methods

Interview, questionnaire and focus group discussion were used to collect primary data and documentary reviews were used to collect secondary data. In addition, non-participatory observation, observation notes and photos were also used as a means of data collection. Different sources were used to collect data using multiple methods cited above for triangulation purposes. The pretesting of data collection instruments was conducted on a few participants who were not used in the main study.

Using pretesting results, a few items that needed clarification were rectified and those found redundant or irrelevant were dropped to achieve validity and reliability of the research instruments.

Data management and analysis

The data collected from the primary sources were verified, coded and summarized before the analysis using the Statistical Package for Social Sciences (SPSS) version 20 . Descriptive statistics was the main analytical procedure used to analyse data by using pie charts, bar charts, and frequency distribution tables.

Ethical clearance

Ethical issues such as confidentiality and personalisation were carefully observed and taken into consideration throughout the data collection and analysis. During the interviews and filling of questionnaires, respondents were assured of confidentially. The questionnaires were designed in such a way that disclosure of the names of the respondents was optional to the respondents. Likewise, during the treatment and consolidation of data, the study used number codes to link the questionnaires and respondents. The researcher did not disclose the names of the respondents to anyone outside the research team.

Study Findings and Discussion

The study sought to find out activities that generate value along the chain of production and service delivery in Kigoma oil Palm Industry.

To achieve this objective, the studysought to identify palm oil supply chainactors andtheir roles in adding value to thepalm oil chain in each phase (upstream, midstream, and downstream). The study findings are presented as follows.

Supply chain Actors of Palm Oil Industry in Kigoma

Supply chain actors in Kigoma Palm oil industry include all firms and individuals who assume different functions in the supply chain, engaging directly in the production, processing, trading and marketing. The main actors include farmers, traders and palm oil processors, government and non-government organisations as indicated in Table 4.7.

Table 4.7 shows supply chain actors of palm oil industry in Kigoma

Actors Along the Supply chain	Respondents Number	Percentage
Farmers	51	46.4%
Processor and traders	42	38.2%
NGOs include (FELISA)	7	6.3%
Government agents (officers)	10	9.1%

Source; Researcher Conceptualization (2022)

The study findings in Table 4.7 revealed that 46.4 percent of the respondents were farmers, 38.2 percent were palm oil processors and traders, 9.1 percent were government agents (officers) and the rest of respondents that is 6.3 percent were from NGOs,specifically from Farming for Energy and Better Livelihoods in Southern (FELISA).

The study findings indicate that the majority of actors in the Palm oil industry are farmers followed by processors and traders while non-government and government agents arethe minority.

The findings imply that the development of the palm oil industry is likely to be slow and poor because the actors that constitute the majority in the palm oil supply chain are smallholder farmers whose production is low. Similarly, the participation of non-government and government agents is low because they constitute the minority among the supply chain actors. Thus, this is likely tolead to poor and low agriculture output in the Kigoma palm oil industry. These findings are in line with the findings in a study by John (2014) revealed that the main supply chain actors in Edible Oilseeds Produced in Tanzania particularly in Ikhanoda village include QDS producers, agro-dealers, extension officers, farmers and traders (John, 2014).

The farmers constitute the majority in the palm oil supply chain and these are therefore the primary producers of palm oil in Kigoma. Thus, the production of palm, which is done by the majority of farmers, ison small scale and small land sizes mostly of between one to two and a half hectares, which is incongruentfor large consumption and commercial purposes. After production,the farmers sell all of FFBs directly to middlemen for TZS 800 to 1,200 per FFB; however, the prices fluctuate depending on the oil content of their fruits. Similar findings are reported in a study by Fuchs (2016) who reveal that farmers dominate the palm oil industry in Kigoma (George, 2014).

In another study, Sarku (2017) revealed that in Ghana palm oil is a dominant cash crop, which ismainly produced by smallholder farmers farming on small land sizes of about 1.5 to 2.5 hectares (Sarku, 2014).

Processors and traders constitute another group involved in Kigoma palm oil supply chain. This group is dominated by women whoprocess palm fluids and kernels, and who are also involved in the making and selling of soap. However,today men are also involved in the processing and selling of palm oil due to shortage of employment but men's involvement is not as much asthat of women's. The study finding reveal further that some farmers are involved in harvesting and processing palm oil products, but these areonly those who own Burundi expeller, a local palm oil processing machine or pay to use a neighbour's machine.

The involvement of processing enables farmer-processors to have a competitive advantage over other producers through a flow of income during off-seasons. It is further argued that farmer-processors are engaged in a series of activities on small scale, which can be characterized as value addition (Sarku, 2014). This finding concurs with the findings in a study by Mwaikambo (2018) revealing that farmers are involved in processing activities due to seasonal fluctuation of income (Mwaikambo, 2018; Sarku, 2014).

A non-governmental organisations (NGOs) form another group of participantsin Kigoma palm oil supply chain.According to interviewed respondents, FELISA is the only popular NGO dealing with palm oil in Kigoma and introduces different value additional strategies. The existence of few NGOs and the company investing in palm oil activities reflect weak participation of the sector in Kigoma resulting in a poor or low level of development and productivity of the palm industry as it is conducted traditionally despite its high demand in the local and international markets.

The findings of the current study correspond to the findings in a study by Sarku and Appiah (2017) revealing that few companies invest in palm oil in Ghana, the most popular among them is Ghana Oil Plantation Development Company (GOPDC), which manages the largest oil palm plantation in Ghana and in the district.

The company introduces innovative value addition strategies in the oil palm industry and employs most of its workers from the surrounding communities (Ofosu-Budu and Sarpong, 2013). The presence of monopolist elements weakens the development of the palm industry though it is highly demanded by the market within and outside Ghana (Ofosu-Budu & Sarpong, 2013; Sarku & Appiah, 2017).

The level of government involvement in Kigoma Palm oil industry is still low, though the government recently acknowledged the potentialof the palm oil industry in poverty reduction and development as a whole. Accordingly, the government has taken various initiatives through its agents such as SIDO Kigoma, Tanzania Prisons Service and Tanzania Agricultural Development Bank (TADB) to invest in the industry by providing both agricultural and financial support. According to the findings from government officers, the government devised a plan of setting aside some US$4.3 million to develop

plantation area and increase output of the crop, upgrading the palm oil processing facility in Kwitanga Prisons and making the Prison the National Research Centre of Palm oil in Kigoma region (URT, 2017)

Supply chain (value additional activities) in Kigoma palm oil industry

A supply chain is a full range of interconnected value addition activities required to bring a product or service through different phases from production to the consumption phase. In Kigoma Palm oil Industry, there are several value addition activities, which are pursued along the chain from production to consumption. These activities are categorised into upstream (production), midstream (processing) and downstream (commerce) as presented in Figure 1.

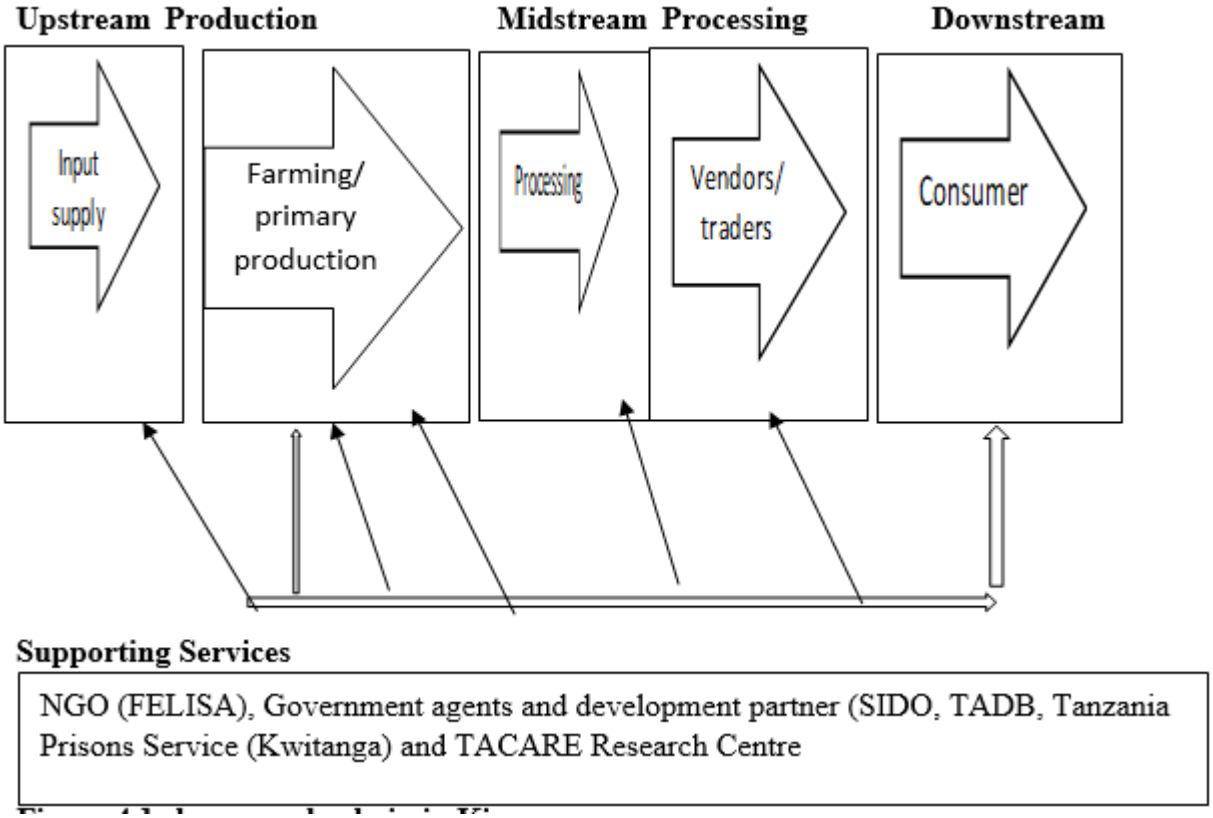

Figure 4.1 show supply chain in Kigoma

Source Researcher Conceptualizations (2022)

Upstream Production

The upstream operations include the development of oil palm plantations, cultivation of oil palm, management of estates and milling of fresh fruit bunches (FFB) for CPO and CPKO. In Kigoma palm oil industry, upstream supply chain involves several activities including input value addition ranging from research, seed production, nursery, cultivation and harvesting.Participants in the upstream (production phase) include farmers, government agents (Kwitanga prisons service in Kigoma) and non-government organisation (FELISA).

The Kwitanga prisons service in Kigoma, FELISA, TACARE Research Centre and Seed Change, conduct different researches aimed at engineering oil palm seeds to maximize both FFB yields and oil content in FFBs aimed at increasing productivity level. According to the interviewed respondents from FELISA, different value additional activities involved in the palm oil industry include distribution of hybrid seed lings to 29 farmers' groups (about 990 farmers) in collaboration with stakeholders such as

Care International and Red Cross Society). All these activities, begin with value addition in agriculture. This is because innovation derived from research leads to theproduction of seeds that are meant to boost farmers' income. Farmers play a greater role in value adding activities as they are the main participants in the preparation of land, land demarcation, cutting of pegs, making the layout of roads and planting blocks undertaken on the farm. The respondents reported as using family labour to prepare and plantpalm trees

FELISA is also involved in upstream production, the company owns 100 hectares of oil palm plantation located 75km from Kigoma town with 4,258 hectares of land 150km from Kigoma, where they plan to plant oil palm. The respondents from FELISA reported beinginvolved in several upstream value additional activities including input supply, production and harvesting of palm oil. The company produces and supplies hybrid seed to farmers and provide technical advice to major palm tree cultivators, which have high products. The respondents from FELISA revealed further that, they normally work in collaboration with other stakeholders such as Care International and Tanzania RedCross Society to enhance the supply chain of Kigoma Palm industry.

Midstream Processing

The processing isa second phase of palm oil supply chain activity in which both farmers and middlemen are involved. The activities involve the processing of crude palm/kernel oil by refining, fractionating and distilling into marketable forms, which are suitable for manufacturing food and non-food products. The study respondents reported that some farmers sell all of their FFBs directly tothe middleman and leave processing activities to them; however, farmers sell their palm at a low price and normally have no powersof dictating prices. These findings concur with the Mwaikambo (2018) findings which revealed that farmers who do not have processing machines sell their FFBs directly to the middlemen at low pricesranging from TZS 800 to 1,200 per FFB and that, the pricesnormally fluctuate depending on the oil content of their fruits which are assessed by the middlemen.

The processing activity is also carried out by farmers particularly those owning processing machines (Burundi expeller or local processing machine), which are used to extract crude palm oil (CPO) from their fresh fruit bunches (FFBs). According to the respondents,normally family labour is used in the processing process. However, this traditional method results in low production of palm oil from each fruit and is not a viable option for supply chain development as it does not contribute much to the chain (Mwaikambo, 2018). Similar findings are reported in a study by Ohimain and Izah (2014) who revealed that 80 percent of Nigerian palm oil processors comes from dispersed smallholders who harvest semi-wild palm fruits and use manual processing techniques, which are labour intensive and highly inefficient, with low-value palm oil. Similarly, Mwaikambo (2018) findings indicate that farmers-processor produce low FFBs as a result of traditional ways of processing palm (Mwaikambo, 2018; Ohimain & Izah, 2014)

Vendors and or traders are also considered as important value additional groups in the palm oil industry. According to the study findings, traders act as middlemen in a chain and they normally set the price of the product. Farmers are price takers, and traders normally provide market information to farmers which in turn affect farmers and benefit traders who aim at maximizing profit. The interviewed trades reported that they sell palm oil products at a local market and export it to Burundi and Dar es Salaam, although political instability in Burundi together with poor infrastructure and lack of investors affect the growth of palm oil industry.

Downstream production involves manufacturing and marketing of food and non-food products from refined and crude palm and kernel oil. The main users of CPO are households, local food vendors, restaurants and institutions. According to the interviewed respondents, the CPO has several uses including industrial use whereby middlemen sell their CPO to different institutionsincluding SIDO in Kigoma and to other private entrepreneurs who use CPO to make soap, baskets and animal feed. The respondent from FELISA revealed further the potentiality of palm oil particularly in the local market as it is used for making cooking oil, cosmetics, pharmaceuticals, and in the generation of e biogas for cooking, heating and production of electricity. Local consumption of palm oil in Kigoma is estimated as high, with an estimated yearly consumption of 6.7 litres per person. With approximately 2.2 million people living in Kigoma region, this accounts for 14,870,000 litres of palm oil a year.

Therefore palm oil in Kigoma is highly demanded. These study findings concur with the findings of a study by Sarku (2014) in Ghana who revealed that CPO is used for different commercial purposesincluding the production of baskets and brooms from the branches and veins of palm leaves respectively.

Palm fronds are used for constructing thatched roofs, fences and fodders for feeding goats. The dried shells are used by blacksmiths, bakers and charcoal burners. Palm and kernel oil are renewable energy sources. Therefore, electricity is generated from steam as a result of burning shells, EFBs, and fibres.

Olabisi, Tschirley et al. (2018) findings also emphasise the potentiality of palm oil in Tanzania's commercial world as it is used for making different products including cooking oil, soap, shampoo, bucket, animal feed, cosmetics and pharmaceuticals products (Olabisi et al., 2018; Sarku, 2014)

Conclusions

The study sought to investigate value addition contribution in agriculture to the development of palm oil industry in Kigoma District, Tanzania. Based on the summary of findings, the following conclusions were made;

The main value addition activities in Kigoma palm oil industry can be categorised into upstream (production), midstream (processing) and downstream (commerce). In upstream, the main activities involve input value addition ranging from research, seed production, nursery, cultivation and harvesting. Participants in the upstream (production phase) are farmers, government agents (prisons service in Kigoma) and non-government organisations (FELISA). At the Midstream (Processing) the main activities include processing of crude palm/kernel oil by refining, fractionating and distilling into marketable forms, which are suitable for manufacturing food and non-food products. The main participants are farmers and middlemen, government agents (SIDO), Companies (FELISA) and NGOs or SACCOS. The main activities in the downstream include marketing of food and non-food products from refined and crude palm and kernel oil. Since the main users of CPO are households, local food vendors, restaurants and institutions are the main buyers of palm oil products.

The main participant in selling palm oil products are women, though today the number of men traders hasincreased due to lack of employment and seasonal nature of agriculture activities Palm oil industry in Kigoma has a significant contribution to the social-economic development of Kigoma residents as it contributes positively toward employment creation, improving farmers' living standards, income generation and promotion to the growth of other sectors. However, the level of contribution is still low due to the presence of many challenges in the palm industry. The main challenges identified in this study include shortage of capital among small farmers in Kigoma, unreliable local and international markets,

poor infrastructure network in Kigoma rural areas and low level of technological application in the palm industry.

Recommendations

Despite different measures taken by the government inensuring that value addition activities contribute to the improvement of the palm oil sector in Kigoma, there are still many constraints hinderingthe sustainable growth of the palm oil sector in Kigoma as identified in the current study. The following recommendations provide viable solutions to the identified challenges.

***Increasing of research and development strategy in agriculture*;** there is a need to focus research activities on innovative ways of adding value to agricultural products particularly in palm oil because it is highly demanded in the local and international market. Though the government through FELISA and Prison in Kigoma in collaboration with other NGOs and private companies recently invested in palm oil production, more research is required to achievecost-effectiveness and high productivity of palm oil. Alternatively, research activities in agriculture can have a specific Unit that will investigate value addition initiatives in collaboration with local experts.

Capacity building of small farmers in Kigoma; growing demand for palm oil products in the domestic and international market calls for a need to ensure that farmer-processors adhere to standard procedure in the food industry. It is expedient that the government invest in projects and institutions to provide technical assistance to stimulate quality standardsin food production. In addition, an appropriate institution should be entrusted with the mandate of ensuring that small-scale agro-food processors have improved capacity in participating in palm oil production activities to enable them to realise profits.

Investment in Infrastructure Network, infrastructure network is a serious problem hinderingthe growth and development of the palm oil industry in Kigoma. The presence of seasonal roads, poor railways facilities and poor and seasonal inertial roadsaffect logistics and transportation sector in Kigoma. The improvement of infrastructure such as roads and railway construction, irrigation facilities, electricity and water facilities, construction of processing industries at large will improve and enhencet5he the growth of the palm oil sector in Kigoma.

***Increasing government support to small farmers*;** the government through its agents like SIDO, TBS, TFDA, financial institutions, the Ministry of industry and other public institutions should play an active role by organising seminars or training programs for farmers-processors. Training programs should be based on how farmers or processors can develop marketing and business strategies, and basic accounting and numeracy skills. Knowledge of business development skills will enable them to accrue more income. Training programs will also encourage agro-processors to engage in innovative value-adding activities or improve upon existing skills.

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