Upgrading the rice value chain through improving market access for smallholder rice farmers: A case study of Mahiga Irrigation scheme, Kwimba district, Mwanza -Tanzania

A Master thesis presented to Van Hall Larenstein University of Applied Sciences in Partial Fulfilment of the Requirements for the Degree of Masters in Agricultural Production Chain Management specializing in Horticultural Chains

By
Rose Crispin Marijani

Van Hall Larenstein (VHL) – University of Applied Science, Velp – The Netherlands
September, 2018
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Msc. Thesis
Agricultural Production chain Management specialization in Horticultural chain

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Assessor: Janssen Koen

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DEDICATION

I dedicate this thesis manuscript to my parents, family and to my lovely son Godwinurryson I. Richard for their encouragement and prayers throughout my studies despite the family responsibilities. Further to Prophet B.G Malisa, Pastor Suzanne B.G Malisa, Mr. Andrew M. Mwenga, Dr. Theresia C. Marijani and Pastor Oluyede Ajayi for their moral and prayer support during my study in Netherland.
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<table>
<thead>
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<th>Full Form</th>
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<tbody>
<tr>
<td>ESAFF</td>
<td>Eastern and Southern Africa Small Scale Farmers’ Forum NEWSLETTER</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organisation</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International cooperation Authority</td>
</tr>
<tr>
<td>MALF</td>
<td>Ministry of Agriculture livestock and fisheries</td>
</tr>
<tr>
<td>MATIU</td>
<td>Ministry of agriculture livestock and fisheries training institute Ukiriguru</td>
</tr>
<tr>
<td>MT</td>
<td>Metric tonnes</td>
</tr>
<tr>
<td>FGD</td>
<td>Focus Group Discussion</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>SWOT</td>
<td>Strengths, Weaknesses, Opportunities and Threats</td>
</tr>
<tr>
<td>PESTEC</td>
<td>Political, Economic, Social, Technical, Environmental and Cultural</td>
</tr>
<tr>
<td>EUCORD</td>
<td>European Cooperative for Rural development</td>
</tr>
<tr>
<td>TBS</td>
<td>Tanzania bureau standard</td>
</tr>
<tr>
<td>GO</td>
<td>Government</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>TFDA</td>
<td>Tanzania food and drugs authority</td>
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Abstract
Rice is the second most important cereal in Tanzania occupying 18% of cultivated land and is mostly used as a cash crop. This study conducted at Mahiga Irrigation scheme in Kwimba district aimed at identifying opportunities and strategies for improving access to markets by small holder rice farmers in the scheme. Primary data was collected from farmers in three villages using a structured questionnaire and focus group discussions while retailers, wholesaler, institutional consumers, extension agents, supporters and processors were surveyed using checklist tools. A transect walk was used also used to observe the features in Kwimba district. The data collected were then processed and analysed with the aid of SPSS version 23, Excel, chain map, Venn diagram, PESTEC, and SWOT analysis to give the overall picture of market access. Results indicate that many farmers do not have full market access due to lack of market information, unreliable markets, low price, quality demand, low production, minimum contact with the extension officers, lack of organised groups and mistrust by traders (brokers on farm). The research concludes that there is a significant price difference between farmers who use the formal in contrast with informal market channels. Moreover, only (27%) farmer use formal channels. The study recommends mobilisation of stakeholders’ forum, establish mobile-based electronic market information system, adoption of warehouse receipt system, intensive farmer training on marketing issues, provision of improved inputs in a timely and affordable manner. Additionally, processors need to have access to affordable capital to improve their rice processing machines, wholesaler, traders and should be licenced and buy their product in warehouse receipt system. It is also recommended that retailers should buy their product from licenced trader and, consumers should buy their product from licensed retailers in order to ensure that they purchase high quality products.
CHAPTER ONE: INTRODUCTION

1.1 Background information

Rice (Oryza sativa spp) is the main food for over half the world’s population. Approximately 480 million metric tons of milled rice is produced annually. China and India account for 50% of the rice grown and consumed. Rice provides up to 50% of the dietary caloric supply for millions living in Asia and is, therefore, critical for food security. It is also becoming an important staple food in both Latin America and Africa (Muthayya, 2014).

In 2007, the total quantity of milled rice consumed in Africa was estimated at 25 million tons with an average per capita consumption of 24 kg per year (Elsevier, 2010).

Tanzania has about 95.5 million ha of land, out of which 44 million ha are suitable for agriculture, 10.1 million ha are under cultivation, and 0.33 million ha are currently in use in irrigated agriculture. Tanzania’s agriculture is dominated by small-holder farmers who have between 0.2ha and 2ha of land. About 70% of land cultivation depend on hand hoes, 20% on ox-ploughs and 10% on tractors (Tomitaka, 2012).

Average total rice production in Tanzania is 1.35 million tonnes per year. Most rice is grown by smallholders farmers under rain fed conditions while others grow under schemes that are introduced and controlled by the government (FAO, 2015).

Rice production in Tanzania as explained by Barreiro-Hurle (2012) covers approximately 681 000 ha, representing 18 percent of cultivated land. Virtually all rice (99 percent) is grown by smallholder farmers using traditional seed varieties. Rice is grown in different areas in the country mainly within three main ecosystems:

(a) Rain fed lowlands (68 percent): average productivity 3.5 mt/ha;
(b) Rain fed uplands (20 percent): average productivity 1.2 mt/ha;
(c) Irrigated rice cultivation (12 percent): average productivity 3.8 mt/ha.

Most irrigated plots are part of small village-level schemes however, some are part of large-scale schemes that were formerly state-managed farms. Nearly half of the country’s rice production is concentrated in the regions Shinyanga, Morogoro, Mwanza, Tabora and Mbeya (Barreiro-Hurle, 2012). See (appendix 8), according to FAO rice information in Production zone( Regions) Harvested area.

1.2 Tanzania Rice marketing

Rice in Tanzania is important in realizing commercialization of agriculture for the following two reasons: a high potential of increasing production from the technical point of view and rice is one of the major cash crops in the country. The productivity per household has increased by the average of about 20 per cent: before the intervention in mid 80s productivity was 25 - 30 bags per acre but during 2011 the harvest increased to 35 - 42 bags per acre (ESAFF, 2011).

The rice commodity chain has a two-channels marketing system: firstly, Local traders buy small quantities directly from farmers and transport to mills where it is milled. The dominant channel characterized by a large number of small traders operating between the farmer and the rice mills. Secondly, the rice sold to inter-regional traders or local retailers or directly to consumers. The inter-regional traders ferry the rice to large consumer markets, particularly in Dar es Salaam and Zanzibar (Kadigi, 2003).
1.3 Rice marketing in Kwimba

In Kwimba district where Mahiga irrigation scheme is located, smallholder farmers are mainly led in rice production. They access markets as producers by selling their produced rice, which is mainly sold through the informal channel. These markets are characterized by limited information flows, high transaction costs and power imbalances leading to limited choices and constrained bargaining power for farm households. As a consequence, farm gate prices are low and production incentives are distorted (Kürschner, 2016). Hence, improving market access is critical to enable farm households to enhance their food security and increase their incomes. Also the Ministry of Agriculture Livestock and Fisheries training institute Ukiriguru (MATIU) help them in training on marketing rice with supported funds for training under JICA program through TANRICE – Project.

1.4 Problem statement

Generally smallholder farmers are typically engaged in the primary production and rarely participating in any value addition activities. They usually lack the capital to invest in quality inputs, processing, irrigation or even marketing. They often live in remote areas, far from good roads and markets. As such they have limited access to market information on; other players in the market, prices, product varieties needed, quality standards and other market related information. They consequently do not know how much their produce is really worth, and how much more they might earn if they were to transport it to the nearby town rather than sell to the trader who arrives at the farm gate with a truck. In such situations where they do not control the terms on which they participate in the value chain, they thus have little bargaining power against traders (KIT et al. 2006).

As a result, they sell their crops at low prices. This limitation to market access ultimately leads to low income (Kürschner, 2016). Even though in Kwimba district, despite having access to irrigation technology irrigation infrastructure for rice production and extension services from MATIU, the smallholder rice farmers in the Mahiga irrigation scheme still have limited knowledge and access to rice markets.

1.5 Problem owner

Ministry of agriculture livestock and fisheries training institute Ukiriguru (MATIU) is my employer who supports smallholder farmer’s training in Mahiga irrigation scheme.

1.6 Research Objective

To identify opportunities and recommend strategies for improving access to markets by small holder rice farmers producing under the Mahiga irrigation Scheme Kwimba district.

1.7 Research questions

1. What is the current rice value chain (market) situation in Kwimba district?
   (i) What are the stakeholders and their functions?
   (ii) What are the relations between the different stakeholders?
   (iii) What are the market channels in the rice value chain?
   (iv) What is the value share of each main actor in the rice value chain?
   (v) What challenges do small scale farmers face in producing rice and marketing their rice?

2. What are the possible opportunities for improving market access for the Mahiga irrigation scheme farmers in the Kwimba District Rice value chain?
   (i) What are the quality and quantity requirements for rice in the rice value chain?
   (ii) What is the contribution of Mahiga irrigation scheme association in the rice market?
   (iii) What current interventions/possibilities do all stakeholders have in relation to market access?
1.8 Justification of the study
Small holder farmers have no influence over the management of the chain. In general, farmers are not well linked to markets, so the production is not well tailored to what the market needs. The chain concept development is to support the farmers to improve their farming abilities. This will help them to produce higher yields, more consistent quality, and produce which is best suitable for the market. This enables them to make more money and improve their livelihood. Upgrading is very vital if changes in the market are to be met. Modifications may be needed in the product, process or function; usually, a combination of all three is needed (KIT et al. 2006).
As one of the major Sustainable Development Goals – No poverty and No hunger, the value chain development is a very important tool to improve the livelihood of small holder farmers in order to eradicate poverty and hunger. Hence the Ministry of Agriculture training Institute Ukiriguru, train the farmers to increase their income by increased production of rice and link them to market. This study therefore seeks to recommend on the upgrading of the rice value chain and thereby improving their income by connecting farmers in Mahiga irrigation scheme to access a good market.

1.9 Definition of concepts
The following terms used in the study and their operational definitions are given.

- **Actors** are those involved in producing, processing, trading or consuming a particular agricultural product. They include direct actors who are commercially involved in the chain (producers, traders, retailers, consumers) and indirect actors which provide financial or non-financial support services, such as bankers and credit agencies, business services service providers, government, researchers and extensionists (KIT et al, 2006).
- **Bargaining power** is the ability to influence the price or terms of a business transaction and can enable producers to negotiate for better prices, such as a long-term supply agreement or access to business services. Bargaining power depends on different factors such as important is scarcity, the availability of alternative marketing options, and market information.
- **Chain Upgrading** is the process where smallholder farmers move from low value to a relatively high value in rice production activities for improved market linkages through increase production efficiency and value addition activities (Mitchell, 2009).
- **The formal chain** is supply chain where actors support each other so that they can increase their efficiency and competitiveness. They strive to satisfy consumer needs so that they can increase profits (KIT et al, 2006).
- **The informal supply chain** is set of linkage between actors in a chain who do not seek to support each other and have no binding relationships either formal or informal apart from when transacting agreements involving the exchange of products and money (KIT et al, 2006).
- **Smallholder rice farmer** is a farmer who owns 0.25 – 2 ha of the farm for income generation and food consumption (Author, 2018).
- **Stakeholders** are people who are directly involved in the rice value chain. These include actors, chain supporters and chain Influencers.
- **Value chain concept** is defined as the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformation and delivery to final consumers, and eventual disposal after use (KIT et al, 2006).
- **Value shares** are the percentage of the final, retail price that the actor earns (KIT and IIRR, 2008).
- **Villages** are local authority areas which are made up of hamlets and each hamlet is represented by a Village chairperson (Author, 2018).
1.10 Conceptual framework

- To conduct this research work the following conceptual framework was used to make the required information concerning the current situation of the rice value chain and create strategies to upgrade the rice value chain by all actors from the study area.

**Figure 1: Conceptual framework**

Source: Author, 2018

Figure 1 shows that to identify value chain analysis and market access opportunities for small holder rice farmers in the Mahiga rice scheme, the current value chain situation were analyzed to accomplish the following: know the stakeholders and their roles, discover the constraints in the subsector, assess the quantitative plus qualitative information about market access. The existing rice marketing strategies for the farmers in the Mahiga rice irrigation scheme were described and analyzed in the research process. Conclusions were then drawn and recommendations made on how better market access can be attained.
CHAPTER TWO: LITERATURE REVIEW

This chapter presents related information derived from the literature study. The information provides a greater understanding of the value chain concept and smallholder farmers of rice at Mahiga irrigation scheme. The first part contains information about the rice production and market access, second in the value chain

2.1 Rice sector in Tanzania

In Tanzania, rice production is dominated by smallholders under rain-fed conditions. Historically, rice has been categorized under the staple food crop rather than commercial/cash crop. However, in recent years with the rapid growth of cities and towns pushed by rapid population growth, the country has experienced an enormous increase in rice demand. With negligible percentages of rice imports, most of the rice demanded and consumed by the urban population is sourced from the rural rice producing areas that have stagnating production capacities. For this reason, rice has therefore been transformed into a commercial crop. Due to climatic reasons, most of the wetlands which are major rice producing areas lack alternative food and cash crop making rice the only source of cash and staple food (RLDC, 2009)

2.2 Rice in the irrigation scheme

The irrigation potential in Tanzania is 29.4 million hectares out of which 2.3 million hectares are high potential, 4.8 million hectares are medium potential and 22.3 million hectares is low potential. Currently only about 264,388 ha are under irrigation that is about 2% of the cultivated area (Droogers and Bastiaanssen, 2008).

In Kwimba district has a total arable land of 358,584ha out of which 42,645 ha is suitable for irrigation. 18,495 ha have been identified as suitable for traditional irrigation farming, using rain fed irrigation. A total of 3,350 ha suitable for construction of irrigation infrastructure for rice paddy and horticultural crops are surveyed. A total 250 ha have surveyed in Mahiga dam and only 170 ha has developed in Mahiga irrigation scheme for paddy cultivation have been constructed (URT 2004).

According to Kwimba report (2009) irrigation in Kwimba practiced in the river valley where paddy is grown by impounding run-offs into paddy fields. Irrigation in Kwimba is justified by the need to overcome erratic rains to enable the district to produce in surplus especially in areas potential for irrigation.

According to RLDC (2009) report on rice strategy indicated that small irrigation farmer—cultivates about one hectare of land of rice in an irrigation scheme often controlled by the irrigation scheme association. Farmer has the land from the scheme, which provides him with the water paid for each season.

2.3 Rice marketing

Rice is a staple food consumed in both rural areas and urban. Dar es Salaam, a large urban area is the major end market and accounts for about 60 percent of national consumption (Table 1) whereby Shinyanga, Morogoro Mwanza, Tabora and Mbeya Regions are the main sources of supply (FAO, 2015). The estimates of Tanzania consumption and production in tonnes of milled rice as shown in Table 1, indicates how rice is produced and consumed.
Table 1: Estimates of Tanzania consumption and production, 2001-2011 (tonnes of milled rice)

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumption</th>
<th>Imports</th>
<th>Exports</th>
<th>Seed</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>824 447</td>
<td>139 053</td>
<td>4 768</td>
<td>34 000</td>
<td>724 162</td>
</tr>
<tr>
<td>2002</td>
<td>857 805</td>
<td>76 530</td>
<td>9 055</td>
<td>37 000</td>
<td>826 610</td>
</tr>
<tr>
<td>2003</td>
<td>88 197</td>
<td>189 621</td>
<td>11 006</td>
<td>37 000</td>
<td>746 582</td>
</tr>
<tr>
<td>2004</td>
<td>924 299</td>
<td>181 986</td>
<td>2 487</td>
<td>42 000</td>
<td>786 800</td>
</tr>
<tr>
<td>2005</td>
<td>976 646</td>
<td>67 495</td>
<td>10 618</td>
<td>45 000</td>
<td>964 769</td>
</tr>
<tr>
<td>2006</td>
<td>1 033 891</td>
<td>90 480</td>
<td>10 093</td>
<td>43 000</td>
<td>996 504</td>
</tr>
<tr>
<td>2007</td>
<td>1 084 885</td>
<td>45 187</td>
<td>20 176</td>
<td>43 000</td>
<td>1 158 631</td>
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<tr>
<td>2008</td>
<td>1 132 699</td>
<td>64 147</td>
<td>34 197</td>
<td>55 882</td>
<td>1 230 121</td>
</tr>
<tr>
<td>2009</td>
<td>1 177 027</td>
<td>39 607</td>
<td>48 218</td>
<td>44 483</td>
<td>1 353 714</td>
</tr>
<tr>
<td>2010</td>
<td>1 250 465</td>
<td>1 493</td>
<td>62 239</td>
<td>42 503</td>
<td>1 423 236</td>
</tr>
<tr>
<td>2011</td>
<td>1 332 078</td>
<td>32 884</td>
<td>76 260</td>
<td>47 782</td>
<td>1 423 236</td>
</tr>
</tbody>
</table>

Source: Stryker and Amin, 2012

2.4 Rice quality and quality
Rice quality and quantity is very important. According to Rutsaert et al (2013), attributes are product characteristics that are either intrinsic, like taste, texture or colour, or extrinsic to the product, like packaging, brand or label. Another attribute classification distinguishes between search, experience and credence attributes. Search attributes are available for product evaluation before purchase.

2.5 Consumer preferences
This may depend on the consumers. Generally, in EAC region consumers prefer aromatic, long grain (not more than 20-30% broken), clean (no foreign matter especially stone), non-sticky, well packed and brand. (Kilimo trust, 2017).

2.6 Marketing constraints
In Tanzania the challenges faced by each actor in the rice value chain are explained by Nkuba et al (2016):

- Farmers in a paddy or rice farms are small, about 0.5 ha and have low rice yield (rain fed: 0.7 - 1.75 t ha-1 and irrigated: 2.5 - 4.25 t ha-1). The rice yield is low due to low use of improved technologies, declining soil fertility, increasing pressure of pests and diseases (rice yellow mottle virus, stalk-borer), birds and climate change. Other causes were unavailability and high prices of inputs, and low level of mechanization of farm operations (use of push-weeder was less than 5%) leading to high production costs and untimely weeding operation; Limited access to microfinance institutions for saving and credit services; Limited market information leading to low market prices. In all sites, there was no mechanism for disseminating market information to the farmer; Low use of appropriate pre and post-harvest technologies, increasing rice loss from the field through storage to processing; Inadequate access to extension services; Farmers have no strong marketing groups, associations or cooperatives. Sometimes microfinance institution gave loans to farmers and delayed paid back in the form of paddy rice at harvesting time.

- Challenges facing collectors were: lack of storage facilities; all collectors used bags to store rice and had no storage godown; limited access to loans from institutions due to lack of collaterals; lack of contractual agreement with traders; and unfaithful farmers.

- Rice retailers’ constraints were: limited by capital and storage facilities; lack of market information on the supply side; frequent fluctuation in the supply of rice from large traders of local and imported rice; and no formal associations or groups were registered.
Challenges faced by processors were: irregular and unreliable supply of paddy rice due to fluctuation in production; unreliable markets where due to limited buyers, paddy is sold; product price fluctuations. Even with good quality and graded rice traders are not ready to purchase at a high price; high cost of equipment installation. Machines are old and their efficiency low; small working capital caused by inaccessibility to bank loans due to lack of collateral; high taxes charged by local government; inadequate training on processing techniques; and unskilled labour in machine operation.
2.7 Value chain

According to KIT (2006) in the value chain empowerment, actors keenly pursue to support each other to increase their efficiency and competitiveness. They invest time, effort and money, and build relationships with other actors to reach a common goal of satisfying consumer needs — so they can increase their profits.

Kaplinsky and Morris (2002) define a value chain as the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformation and delivery to final consumers, and eventual disposal after use. In Kaplinsky and Morris’ approach, value chain analysis seeks to characterize how chain activities are performed and to understand how value is created and shared among chain participants.

Furthermore according to Kaplinsky and Morris (2002) value chain analysis is particularly useful for new producers – including poor producers and poor countries – who are trying to enter global markets in a manner which would provide for sustainable income growth. Finally value chain analysis is also useful as an analytical tool in understanding the policy environment which provides for the efficient allocation of resources within the domestic economy, notwithstanding its primary use thus far as an analytic tool for understanding the way in which firms and countries participate in the global economy.

2.8 Value share

Value share is the amount of value that each actor in the chain adds. It is the difference between the price the actor pays for the produce, and the price he sells it for (KIT and IIRR 2008).

It can be calculated by the formula:

\[
\text{Value share} = \frac{\text{Added value} \times 100}{\text{Final retail price}}
\]

\[
\text{Added value} = \text{Price received by actor} - \text{Price paid by actor}
\]

Source: KIT and IIRR 2008

Value share is the percentage of the final, retail price that the actor earns. Can be calculated simply by added value divided by the final retail price. Then multiplied by 100 to give a percentage.

2.9 Value chain upgrading constraints

The main aim of a value chain is to produce value added products or services for a market, by transforming resources and by the use of infrastructures - within the opportunities and constraints of its institutional environment. Therefore, constraints for value chain development are in the view of related to market access (local, regional, international) and market orientation (Trienekens, 2011).

2.10 Strategies for chain development with small scale farmers

The day-to-day work of supporting the integration of small-scale farmers into supply chains is very practical: It may involve identifying a buyer, solving a quality problem, or improving packing. But behind these practicalities are more strategic issues. How should the supply chain be designed? Who should do
what task? Who should have what skills and capacities? Where should the power lie? What should an organisation and intuition arrangements look like? It is explained by KIT et al (2006) that small scale farmers can participate in value chains in many different ways. These types of participation can be shown in two dimensions: types of activities that farmers undertake in the chain and the involvement of the farmer in the management of the chain.

2.11 Global value chain (Local versus international markets)

Most small holder farmers produce both for home consumption and the local market. It is important to strengthen their ties to local markets before linking them to much more complex international markets. Also, intermediary organisations should always assess the potential to scale up from initial pilot work. Interventions will be biased towards those that can reach larger numbers of beneficiaries at the outset, as it is easier to scale up from a larger starting point, i.e. many farmers groups, than from a smaller pool of beneficiaries (KIT et al, 2006). African farmers and organisations that serve them are often poorly informed about policy, roles and regulations and development programs. They are typically isolated from decision makers. So rural and organisations need to organize so they can lobby for the better business environment (KIT et al, 2006).

2.12 The small holder farmers upgrade in value chains

Upgrading means acquiring the technological, institutional and market capabilities that allow our target group (resource-poor rural communities) to improve their competitiveness and move into higher-value activities. In short, upgrading is the process of trading up, which allows poor people to access viable value chains or improve their position in existing value chains. There are seven different types of strategy to upgrade the position of the rural poor in value chains (Mitchell, 2009):

- **Horizontal coordination**
  This process is typically a producer group. This form of upgrading is very important for poor people in rural areas because coordination with others allows producers to achieve economies of scale in supplies and to reduce transaction costs. Often, it is the first step in a sequence of interventions that ultimately result in access to the market, and is a prerequisite for other forms of upgrading.

- **Vertical coordination**
  This means building a trust relationship between buyer and seller, for instance contract farming, whereby a processor or exporter will contract horticultural out-grower farmers. This form of upgrading is important because it can result in greater certainty about future revenue flows for poor participants. In practice, vertical coordination is often a slow and difficult process, as their produce on the spot market when prices are higher than specified in the contract).

- **Functional upgrading**
  Small holder farmers take new activities in the chain. Also this refers to changing the mix of functions performed by actors in the value chain –increasing (upgrading) or reducing (downgrading) the number of activities performed by individuals and firms. For instance, an agricultural producer starting to process some of their output to add value to it represents functional upgrading. Often, horizontally coordinated institutions are best able to provide these value-adding activities (such as grading and packaging of produce). It is very rare for poor people to functionally upgrade themselves without carrying out other upgrading strategies.

- **Process upgrading**
  Process upgrading involves improving value chain efficiency by increasing output volumes or reducing costs for a unit of output. Examples of this include improving agronomy to enhance yields that result in
higher sales or own consumption, or both. This may be the result of improved planting techniques, planting materials or investments, such as irrigation infrastructure.

- **Product upgrading**
  It means producing the same product more efficiently. Improving the quality of the product of the value chain has become increasingly important as the richer Northern economies have become more quality conscious and as standards have risen. Some standards are driven by lead buyers (i.e. supermarkets requiring traceability of food products. Therefore process and product upgrading are closely related because improving product quality often involves improvements to the production process.

- **Inter-chain upgrading**
  This is the use of skills and experience developed in one value chain to productively Engage with another – usually more profitable – value chain. The shift from growing traditional commodities to high-quality export horticulture. Inter-chain upgrading often has significant barriers to entry for the poor and vulnerable to access the more lucrative value chain.

- **‘Upgrading’ of the enabling environment**
  Although not an upgrading strategy in a strict sense, the competitiveness of the enabling environment for value chains is a major contributing factor in the success of the operations of a value chain. Improvements to the support, services, institutional, legal and policy frameworks in which value chains operate are often a productive area in which development agencies can intervene to improve the functioning of a chain
CHAPTER THREE: METHODOLOGY

This chapter covers study area, research framework, data collection strategy and the way the gathered data was analysed. The approach of this research was comprised of both quantitative and qualitative research based on primary data collected from a survey and case study. Secondary data were obtained from the study of literature, documents and from internet sites.

3.1 Research area

The study was conducted at Mahiga Irrigation scheme in Kwimba district which is located in Mwanza region, in the Lake Zone part of the Mainland Tanzania. It covers an area of 3,472 km² and is one of seven (7) administrative districts are constituting Mwanza region. The district lies between Longitude 33° and 33.30' West and Latitude 2° 45' and 3° 53 South of the Equator (URT, 2003). In Kwimba district rice production is the major source of income. Almost every household is engaged in rice production. This area was chosen because of its high potential for rice production and most smallholder farmers in the district have limited access to the market.

Figure 2: Tanzania map and Kwimba district in Mwanza region


3.2 Research design

This research was done by desk study (literature review) and field study. Where desk research was done to incorporate the strategies by reviewing rice market strategy. The data for the field study was analysed separately. The results were then compared in the discussion section of the report with literature found. In the end, conclusions and recommendation were formulated for a strategy which improves access to
markets by small holder farmers’ rice farmers producing under Mahiga irrigation scheme Kwimba district. Therefore, the results and discussion to finalize the report. The research framework is illustrated in figure 3.

**Figure 3: Research Frame work**

![Research Framework Diagram](image)

**Source: Author, 2018**

**3.3 Research strategy**

A combination of desk study, transect walk, survey, case study, and focus group discussion methods were used to answer the research questions and objective of the research. An interview guide was developed, and a semi-structured interview was conducted for selected respondents. Interviews with farmers, Extension Agents, supporters (MATIU), wholesalers, traders, and retailers connected to rice value chain was carried out to gather information related to the research questions and objective. This served as the primary unit of analysis for this study (See table 2).

Data from desk research, survey, case study and focus group discussion were collected. Data collection on farmers in Mahiga irrigation scheme in Kwimba district were done from all three villages Mwang’halanga, Mahiga, and Ngudulugulu. Farmers were surveyed using a structured questionnaire (see appendix 1), while retailers, wholesalers, and processors by surveyed using a checklist tool, finally leaders from farmer community were targeted through focus group discussion to gain more insight on marketing.
Table 2: Data and tools used to get information

<table>
<thead>
<tr>
<th>Sub question</th>
<th>Data</th>
<th>Data source and sample</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Stakeholders in rice value chain</td>
<td>45 farmers, processors (3), retailers (3) and wholesaler (2) FGD (12) farmers</td>
<td>Questionnaires and checklist</td>
</tr>
<tr>
<td>1.2</td>
<td>Market channel</td>
<td>45 farmers, processor (3), retailers (3), wholesaler (3) and FGD (12) farmers</td>
<td>Questionnaires and checklist</td>
</tr>
<tr>
<td>1.3</td>
<td>Value share</td>
<td>45 farmers, processors (3), retailers (3), wholesaler (3) and FGD (12) farmers</td>
<td>Questionnaires and checklist</td>
</tr>
<tr>
<td>1.4</td>
<td>Challenges to farmers in producing and marketing their rice</td>
<td>45 farmers FGD (12) farmers</td>
<td>Questionnaires and checklist</td>
</tr>
<tr>
<td>1.5</td>
<td>Challenges to marketing their rice</td>
<td>Processors (3) retailers (3) and wholesaler (2) Supporters (2) extension agent (2)</td>
<td>Checklist</td>
</tr>
<tr>
<td>2.1</td>
<td>Quality and Quantity</td>
<td>45 farmers, processors (3), retailers (3) and wholesaler (2) FGD (12) farmers</td>
<td>Questionnaires and checklist</td>
</tr>
<tr>
<td>2.2</td>
<td>Contribution of Mahiga irrigation association</td>
<td>45 farmers, FGD (12) farmers</td>
<td>Questionnaires, checklist</td>
</tr>
<tr>
<td>2.3</td>
<td>What intervention is needed to address the needs in relation to market access?</td>
<td>45 farmers, processors 3, retailers 3 and wholesaler 2, extension worker 2, Institutional consumers (2) FGD (12) farmers</td>
<td>Questionnaires and checklist</td>
</tr>
</tbody>
</table>

Source: Author, 2018

3.3.1 Desk research
Prior to the commencement of the fieldwork, desk research was carried out to obtain information on the smallholder farmer of rice value chain. Information was obtained through currently available books on the internet, books, journals and annual reports of the Ministry of Agriculture Livestock and Fisheries (MALF) as well as reports from related stakeholders and organizations such as FAO were also used as supplementary information.

3.3.2 Transect walk
A transect walk is a starting point tool for the survey in describing and showing the location and distribution of resources, features, landscapes, main land uses along with a given transect (World bank, 2013). It is both formalized observation and explanatory inquiry. Also it was a systematic walk of the pre-planned route (transect) for information gathering and observations. It is a key component of preliminary field work. This helped in observation of the area to see the farmer’s field, processors areas, institutional consumer’s areas etc. also to be formalized within the study area. The transect walk was done in the study area to observe different activities in Kwimba district related to market access. The researcher saw rice farms, river, Mahiga dam, roads for transporting rice.
3.3.3 Focus Group Discussion (FGD)

A focus group is a planned discussion to investigate opinions in a nonthreatening environment. This allows the participants to agree and not agree. A typical focus group discussion involves a moderator leading a discussion on a topic of interest with 6 to 12 participants. This can be done with the assistance of an interview guide, designed to focus on topics of interest without using specifically worded questions. Focus groups provide much data, often more quickly than would a survey. The interaction that transpires between participants during the course of the focus group contributes to a widespread range of information, including a deeper understanding of the respondents’ opinions (Wiggins, 2004).

In this research two focus group discussions were held with small groups of six (6) small holder farmers per group, managed by the mediator (interviewer - Researcher) in a loosely structured discussion of various topics of interest but with emphasis on the challenges of producing, marketing and suggested intervention. The course of the discussion was planned in advance and the moderator relied on a pre-planned outline to ensure that all topics of interest are covered. Two focused group discussions were done with female (6) members only participants and a combined group of males (3) and females (3) focused discussions done. Separating the participants according to gender was aid the gathering of gender issues when participants feel more conducive see table 3.

Participants for the focused group discussions were sampled from clusters of randomly stratified rice farming farmers from three villages (Mwang’halanga, Mahiga and Ngudulugulu), and a list female producers. For each sex, 2 people were chosen from each village only for second FGD (see table 3). Data from the FGDs captured by using a tape recorder & notes. The FGD guide questions (checklist) are attached in appendix 2.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Activity: Focus group discussions with smallholder farmers from different villages</th>
<th>Gender</th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>FGD 1</td>
<td>Interviews from Ngudu</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Interviews from Mahiga</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Interviews from Ngudulugulu</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FGD 2</td>
<td>Interviews from Ngudu</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Interviews from Mahiga</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Interviews from Ngudulugulu</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total number of interviews</strong></td>
<td></td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Author, 2018

3.3.4 Survey

A survey was conducted in three villages: Mahiga, Ngudulugulu, and Mwang’halanga. All these are villages have farmers involved in producing rice in Mahiga irrigation scheme. The survey was done in July 2018. A sample of 15 members from each village was randomly selected, ensuring members to have the same probability of being chosen in order to avoid bias (See table 4). The survey questionnaires were filled by the selected rice farmers’ members assessing market access and chain analysis. Based on the selling price, challenges in rice marketing and other data such as personal data and rice production data was collected (See appendix 1).
Table 4: List of select respondents from three villages

<table>
<thead>
<tr>
<th>Village name</th>
<th>No of member select</th>
<th>Selection criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahiga</td>
<td>15</td>
<td>These were randomly selected from the farmer group member register.</td>
</tr>
<tr>
<td>Ngudulugulu</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Mwang’halanga</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author, 2018

3.3.5 Case study

A case study was carried out in the rice value chain, using interview, with a checklist. Those checklists were used to carry out these case studies with retailers, processors, wholesaler, Extension Officer and supporters. It was combined with observation and content analysis of reports in order to obtain in-depth information on the whole rice value chain. Details of the nature of interviews are shown in table 5.

Table 5: Details of respondents

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of respondents</th>
<th>Appendix no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview with three processors</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Interview with one village Extension worker from the study area and district extension worker</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Interview with wholesaler</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Interview with supporters of the chain</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Interview with retailers</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Interview with institutional consumers</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total number of interviews</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author, 2018

3.4 Sampling

Stratified random sampling was used with the population divided into non-overlapping subgroups of similar people called strata, using existing information. For instance, a group in the village was subdivided into a group of men and a group of women. Then, a random sample from each of the subgroups was taken. Together, these samples made up the stratified random sample (Laws, 2013).

A sample size of 71 respondents (45 farmers from different 3 villages, 14 respondents from a wholesaler (2), processors (3), retailers (3), Extension worker (2), institutional consumers (2), supporters (2) were randomly selected. Other separate focus group discussion (12). It also is based not random on those most accessible or most willing to take part. The sampling frame was a registered member in the irrigation association were 15 respondents in each village were picked at random.

3.5 Data analysis

After administering the questionnaires to the respondents, the data obtained were fed into a computer. The descriptive data regarding respondent statements, and scores for each statement were analysed using the statistical analysing programme SPSS version 23.

Analysis of the existing rice value was done by use of a value chain map. Cost price and selling price information obtained from the different actors along the chain then be used to calculate; profitability and
value shares shall be done by using Microsoft Excel 2013. For qualitative data on challenges of marketing, PESTEC and SWOT analysis used (see table 6). Using the PESTEC tool the external factors which affect the market were analysed along the Political, Economic, Social, Technological, and Environmental and Cultural sphere (Chamontri, 2009). The SWOT was used to understand the; Strengths and Weaknesses, and to identify both the Opportunities open to the organisation and the Threats they are facing (UNICEF, 2015). The Venn diagram, a participatory analytical tool used to identify and assess current stakeholder partnerships and to articulate the desired relationship (Lelea, 2014). Details of all the tools used and their utility to this research are as shown in table 6.

**Table 6: Analytical tool and justification**

<table>
<thead>
<tr>
<th>Sub Question</th>
<th>Data</th>
<th>Analytical tool</th>
<th>The justification for an analytical tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Stakeholders in rice value chain</td>
<td>Chain map</td>
<td>-Stakeholders matrix - Venn diagram</td>
<td>Those used to analyse stakeholders their roles and power in the chain.</td>
</tr>
<tr>
<td>1.2 Market channel</td>
<td>Chain map</td>
<td></td>
<td>It was to help analyse how market information passes through the chain</td>
</tr>
<tr>
<td>1.3 Value share</td>
<td>Chain map</td>
<td>-Excel</td>
<td>To analyse who had power and coordination in the chain</td>
</tr>
<tr>
<td>1.4 Challenges to farmers in producing and marketing their rice</td>
<td>SWOT -PESTEC -scoring and ranking</td>
<td></td>
<td>To analyse external factors that influence and arranging them according to one affect most</td>
</tr>
<tr>
<td>1.5 Challenges to marketing their rice</td>
<td>SWOT -PESTEC -scoring and ranking</td>
<td></td>
<td>To analyse external factors that have influence and arranging them according to one affect most</td>
</tr>
<tr>
<td>2.1 Quality and Quantity</td>
<td>Chain map</td>
<td>SPSS</td>
<td>To analyse the quality and quantity required in rice value chain</td>
</tr>
<tr>
<td>2.2 The contribution of Mahiga irrigation association</td>
<td>Chain map</td>
<td>SPSS</td>
<td>To analyse the level of relationship and partners in the association</td>
</tr>
<tr>
<td>2.3 Interventions to address the needs in relation to market access</td>
<td>Scoring and ranking</td>
<td></td>
<td>To analyse interventions according to their significant impact</td>
</tr>
</tbody>
</table>

*Source: Author, 2018*
CHAPTER FOUR: RESULTS

This chapter presents the information gathered from the interviews conducted with the respondents in the survey, case study as well as focus group discussion with farmers.

4.1 Survey results

This section is about the survey results of interviews conducted with 45 smallholder irrigation rice farmers in the study area through a semi-structured questionnaire.

4.1.1 Characteristics of Respondents

This information of characteristics respondents offers insight into the attributes of the farmers who were randomly selected.

Gender

Figure 4 shows that about half (51%) of the smallholder rice farmers were female while male constitute 49%. Rice farmers interviewed were engaged in the rice farming activities as a main source of the household income.

Figure 4: Gender respondents interviewed

![Gender respondents interviewed chart]

Source: Farmers in Kwimba district, 2018

Age distribution

The results show that among the interviewed respondents, the age of most of the respondents (23 out of 45) is range 41-60 years. The second group (18 persons) is medium aged who are between 20 and 40. Only a few respondents (9 persons) were above 61 years. See table 7 below. In addition to this findings female were more (13) and male (10) respondents to this group (41-60) years. Also in additional the data
was further processed in Microsoft Excel and came up with the average age for all respondents which is 42 years.

**Table 7: Age structure of the respondents interviewed**

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative percent</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 40</td>
<td>18</td>
<td>40</td>
<td>40</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>41 – 60</td>
<td>23</td>
<td>51</td>
<td>91</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Above 61</td>
<td>4</td>
<td>9</td>
<td>100</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100</td>
<td>-</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>

*Source: Interviews with farmers in Kwimba district, 2018*

**Education level**

91.1% of the respondents have accomplished primary school level, 4 %secondary level, while only 4% never been to school. Therefore most respondents were literate. More of the female are literate (22) than men (21), but male farmers more often have secondary education compared to female. See table 8.

**Table 8: Education level of respondents**

<table>
<thead>
<tr>
<th>Education level</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative percent</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never been to school</td>
<td>2</td>
<td>4.4</td>
<td>4.4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Primary level</td>
<td>41</td>
<td>91.1</td>
<td>95.6</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Secondary level</td>
<td>2</td>
<td>4.4</td>
<td>100</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100</td>
<td>-</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>

*Source: Interviews with farmers in Kwimba district, 2018*

**Experience in farming**

According to table 9, respondents interviewed had most of the respondents (19) have 10 -19 years of experience in farming rice. Most of the male (13) farmers have experience in farming (10-19) years more than female.

**Table 9: Experience in farming**

<table>
<thead>
<tr>
<th>Experience in farming</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative percent</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 9</td>
<td>15</td>
<td>33.3</td>
<td>33.3</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>10 – 19</td>
<td>19</td>
<td>42.2</td>
<td>75.6</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Above 20</td>
<td>11</td>
<td>24.4</td>
<td>100</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100</td>
<td>-</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>

*Source: Interviews with farmers in Kwimba district, 2018*
Experience in farming and age
This is very interesting that the results show in table 10, that most of the respondents (11) have experience in farming (10–19) years. And most of the respondent’s age (41–60) years, and most of them are female (13).

Table 10: Experience in farming and Age

<table>
<thead>
<tr>
<th>Age</th>
<th>1 - 9</th>
<th>10 - 19</th>
<th>Above 21</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 40</td>
<td>13</td>
<td>5</td>
<td>0</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>41 – 60</td>
<td>2</td>
<td>11</td>
<td>10</td>
<td>23</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Above 61</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>19</td>
<td>11</td>
<td>45</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Interviews with farmers in Kwimba district, 2018

Land Ownership
The results showed that all respondents who were interviewed do own the land that they cultivate. The range of land size owned by the farmers is 0.3 to 8 acres. The data was further processed in Microsoft Excel and came up with the average production land for all respondents which is 1.85 acre. The land size distribution for all respondents is indicated in figure 5.
Figure 5: Area of the farm under rice cultivation

Source: Interviews with farmers in Kwimba district, 2018

4.2 Market Channels
Most of the small holder farmer used informal marketing channels (67%) while 27% use formal channel such as selling their rice to local traders with the mill and the rest sold their rice to local market, as illustrated in table 11. Most of the female farmers 73% use informal channel (Brokers on the farm) while men are few only 55%.

<table>
<thead>
<tr>
<th>Market Channel</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative percent</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brokers (informal channel)</td>
<td>30</td>
<td>66.7</td>
<td>66.7</td>
<td>12 (55%)</td>
<td>18 (73%)</td>
</tr>
<tr>
<td>A local trader with a mill (formal channel)</td>
<td>12</td>
<td>26.7</td>
<td>93.3</td>
<td>8 (36%)</td>
<td>4 (17%)</td>
</tr>
<tr>
<td>Local market (seasonal)</td>
<td>3</td>
<td>6.7</td>
<td>100</td>
<td>2 (9%)</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100</td>
<td>-</td>
<td>22</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Interviews with farmers in Kwimba district, 2018
4.3 Cost and returns of rice production from smallholder farmers

The result below shows in table 12 the average cost, return and profit margin of paddy production per season per year. The average gross income from rice production was 658,500Tsh with the profit margin of 60% per season per year. The farmers produced an average of 20 bags per acre, where by one bag is 90kg and the selling price of one bag is Tshs 54,000.

Table 12: Costs and returns of paddy per season per acre per farmer (1 Euro = 2600Tsh)

<table>
<thead>
<tr>
<th>Items cost</th>
<th>Total cost (Tshs)</th>
<th>Total cost (Euros)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input costs (agro-chemicals, seeds)</td>
<td>20,000</td>
<td>7.69</td>
</tr>
<tr>
<td>Irrigation charges</td>
<td>15,000</td>
<td>5.76</td>
</tr>
<tr>
<td>Land preparation</td>
<td>60,000</td>
<td>23.07</td>
</tr>
<tr>
<td>Planting costs (Nursery and transplanting)</td>
<td>80,000</td>
<td>30.76</td>
</tr>
<tr>
<td>Weeding costs</td>
<td>90,000</td>
<td>34.61</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>20,000</td>
<td>7.69</td>
</tr>
<tr>
<td>Birds for one month</td>
<td>40,000</td>
<td>15.38</td>
</tr>
<tr>
<td>Slashing</td>
<td>10,000</td>
<td>3.84</td>
</tr>
<tr>
<td>Harvesting charges (cutting, Threshing)</td>
<td>50,000</td>
<td>19.23</td>
</tr>
<tr>
<td>Post-harvest handling (winnowing &amp;drying)</td>
<td>10,000</td>
<td>3.84</td>
</tr>
<tr>
<td>Transport</td>
<td>20,000</td>
<td>7.69</td>
</tr>
<tr>
<td>Marketing costs (bags, rope and needle)</td>
<td>16,500</td>
<td>6.34</td>
</tr>
<tr>
<td><strong>Total Cost (TC)</strong></td>
<td><strong>421,500</strong></td>
<td><strong>165.90</strong></td>
</tr>
<tr>
<td><strong>Revenue from rice (RV)</strong></td>
<td><strong>54000Tshs</strong></td>
<td><strong>20 bags</strong></td>
</tr>
<tr>
<td><strong>Gross income (GI)</strong></td>
<td><strong>RV – TC (1,080,000 - 421,500)</strong></td>
<td><strong>658,500</strong></td>
</tr>
<tr>
<td><strong>Gross margin (GM)</strong></td>
<td><strong>GI/RV*100%</strong></td>
<td><strong>60.97%</strong></td>
</tr>
</tbody>
</table>

*Source: Interviews with farmers in Kwimba district, 2018*

This calculation was based only on variable costs; the margin would be lower once fixed costs were included. Most of the smallholder rice farmers mentioned that the farm was bought a long time ago, and the maintenance costs are minimal. Hence it was very difficult to obtain a fixed cost from the smallholder rice farmers because they don’t keep a record. These cost and return data for rice production is an average taken from the data collected from the interviewed farmers and the focus group discussion farmers.

4.4 Value shares of smallholder rice farmer in Kwimba District

This information was gathered from the survey, a case study was used to calculate the value share of different actors involved in formal and informal rice marketing channel in the study area as shown below in table 13. The data used to calculate the variable costs of smallholder rice farmers produce one kilo per season were

Selling price= Cost of 1 bag/weight of 1 bag = 54,000/90kg =600Tshs for formal market channel
Selling price =Cost of 1 bag/weight of 1 bag =63,000/90kg = 700Tshs for informal market channel

This data are from local traders with a mill (formal market channel) and local traders (informal market channel).
Table 13: The value share of producers involved in formal rice marketing channel

<table>
<thead>
<tr>
<th>Chain actors</th>
<th>Revenue (selling price) (Tshs.)</th>
<th>Added value Revenue – previous actors revenue</th>
<th>Value share (%)</th>
<th>Source: All Interviews (all stakeholders) in Kwimba district, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice farmer</td>
<td>600</td>
<td>600</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Processor</td>
<td>1000</td>
<td>400</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Wholesaler</td>
<td>1100</td>
<td>100</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Retailer</td>
<td>1300</td>
<td>200</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

The results show the rice farmers that sell paddy through brokers on the farm, the rice can earn 100Tsh/kg more than the rice farmers that sell paddy to the processor, see in table 13 and 14.

Table 14: The value share of rice producers in informal rice marketing channel

<table>
<thead>
<tr>
<th>Chain actors</th>
<th>Revenue (selling price) (Tshs.)</th>
<th>Added value Revenue – previous actors revenue</th>
<th>Value share (%)</th>
<th>Source: All Interviews (all stakeholders) in Kwimba district, 2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice farmer</td>
<td>700</td>
<td>700</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Brokers on farm</td>
<td>1150</td>
<td>450</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Retailers</td>
<td>1300</td>
<td>150</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
Value share

The rice farmers have the highest value shares in the informal chain than in formal chain as illustrated in figure 6.

*Figure 6: Value share formal and informal chains*

![Value share diagram](image)

*Source: All Interviews (all stakeholder) in Kwimba district, 2018*

4.5 Challenges experienced by farmers producing rice

The results show that poor infrastructure (40%) is the highest challenge for farmers followed by drought (29%), destroyer birds (16%), pests and diseases (11%) and weeds (4%). See figure 7.

*Figure 7: Challenges experienced by farmers in producing rice*

![Challenges diagram](image)

*Source: Interviews with farmers in Kwimba district, 2018.*
4.6 Challenges facing farmers in marketing their rice

Most of the respondents show that Unreliable market (42%) is highest challenges followed by Lack of markets 38%, low price 20%, high quality demand has got zero percent and low production volume (quantity).

Table 15: Challenges facing farmers in marketing their rice

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unreliable market</td>
<td>19</td>
<td>42.2</td>
<td>42.2</td>
</tr>
<tr>
<td>Lack of market information</td>
<td>17</td>
<td>37.8</td>
<td>80.0</td>
</tr>
<tr>
<td>Low price</td>
<td>9</td>
<td>20.0</td>
<td>100</td>
</tr>
<tr>
<td>High quality demand</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Low production volume (quantity)</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Interviews with farmers in Kwimba district, 2018

4.6 Current interventions (Opinions) on how to get better market access

Most of the respondents said that for better market access a good information flow with other stakeholder is needed with the highest percentage of 49% followed by Electronic services in markets have a percent of 47% of the respondents see figure 8. The data was further processed in Microsoft Excel and came up with the counts Male (13) and female (8) on good information flow with another stakeholder, and Intervention of electronic services in marketing the data counts female (15) male (7) the rest are few.

Source: Interviews with farmers in Kwimba district, 2018
4.7 Quality and quantity of rice required

All the interviewed respondents said their customers like the long grain with good aroma (see picture 1). The quantity is available in 1kg, 5kg, 10kg, and 100kg packed bags according to consumer preferences. Most common is 5kg and 10kg packed rice see picture 2. Others customers buy without packed bags depend on their preferences.

Picture 1: A long grain rice with good aroma

Picture 2: Packed rice in 10kg

4.8 Case study results

This section contains the case study results of 14 the non-farmer 14 respondents: retailers, processors, wholesalers, traders (brokers on the farm) extension agents, institutional consumers and supporter (MATIU).
### 4.8.1 Stakeholders and their functions

Every actor has their own functions in the chain as shown in table 16.

**Table 16: Actors and their functions**

<table>
<thead>
<tr>
<th>S/N</th>
<th>ACTORS</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Input supplier</td>
<td>Supply inputs especially seed and agrochemicals</td>
</tr>
<tr>
<td>2.</td>
<td>Producers</td>
<td>Producing paddy and selling to traders or middlemen</td>
</tr>
<tr>
<td>3.</td>
<td>Traders</td>
<td>Buying paddy to farmers adding value and selling.</td>
</tr>
<tr>
<td>4.</td>
<td>Processor</td>
<td>Milling paddy to get rice</td>
</tr>
<tr>
<td>5.</td>
<td>Retailers</td>
<td>Selling rice to the small shops on the streets.</td>
</tr>
<tr>
<td>6.</td>
<td>Whole sales</td>
<td>For selling in bulk the rice to retailers, supermarkets and exporters</td>
</tr>
<tr>
<td>8.</td>
<td>Consumers</td>
<td>Final users of the final/end product</td>
</tr>
</tbody>
</table>

*Source: Kwimba district office data, 2018*

### 4.8.2 Chain supporters and their functions

Chain supporters in the chain and their function as indicated in table 18.

**Table 17: Supporters and their functions**

<table>
<thead>
<tr>
<th>S/N</th>
<th>SUPPORTERS</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Government (GO) – District council - GO</td>
<td>- Facilitating and providing technical training and advice to farmers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Planning budget for projects</td>
</tr>
<tr>
<td>2.</td>
<td>JICA(TANRICE) – Non government</td>
<td>- Provide training on the market, finance access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Support in accessing infrastructures</td>
</tr>
<tr>
<td>3.</td>
<td>Input suppliers - Agriculture Seed Agency (ASA) and Agro-dealers in the District - private</td>
<td>- Multiplication, Supply of Seeds, breeding, fertilizer, pesticides, agriculture tools</td>
</tr>
<tr>
<td>4.</td>
<td>MATIU - government</td>
<td>- Provide training to farmers and ensure compliance with rules and regulations</td>
</tr>
<tr>
<td>5.</td>
<td>Research Institute - government</td>
<td>Advice farmers type of soil to grow a certain crop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Research on pest and diseases</td>
</tr>
<tr>
<td>6.</td>
<td>Financial institutions Banks and SACCOS- Private</td>
<td>Providing loans</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Providing savings</td>
</tr>
</tbody>
</table>

*Source: MATIU reports, 2018*
4.8.3 Chain map

Mahiga irrigation scheme association chain maps in Kwimba district, formal chain map and informal, it is indicated informal chain map, farmers getting higher value share compared to formal chain map. They get profit extra 100 Tshs/kg when they use informal chain map. Based on the information of all interviews the chain maps were composed. There is two chains (formal chain and informal chain) see figure 9.

Most of the stakeholder involves in formal chain like TFDA they check food safety, Government check for regulation and MATIU provides trainings and research also ASA provides see
Figure 9: Chain Map (Kwimba District)

RICE VALUE CHAIN MAP IN KWIMBA DISTRICT

**FUNCTION**

**CONSUMING**

**RETAILING**

**WHOLESALER**

**PROCESSING (RICE MILLING)**

**COLLECTION**

**PRODUCERS (RICE)**

**INPUT SUPPLYING OF QUALITY SEED**

**ACTORS**

**INFORMAL CHAIN**

**INSTITUTION CONSUMERS**

**HIGH INCOME CONSUMERS**

**LOW INCOME CONSUMERS**

**INSTITUTION CONSUMERS**

**HIGH INCOME CONSUMERS**

**LOW INCOME CONSUMERS**

**INFORMATION FLOW**

**TFDA, TBS**

**SUPPORTERS**

**MINISTRY OF AGRICULTURE TRAINING INSTITUTE UKIRIGURU AND RESEARCH
JICA AND OTHER NGOs
GOVERNMENT OF TANZANIA
FINANCIAL INSTITUTION**

**FLOW OF GOODS**

**FLOW OF MONEY**

**INFORMATION FLOW**

**MINISTRY OF AGRICULTURE TRAINING INSTITUTE UKIRIGURU AND RESEARCH
JICA AND OTHER NGOs
GOVERNMENT OF TANZANIA
FINANCIAL INSTITUTION**

TRADE PRICES:

- **1000 Tshs/kg**
- **1100 Tshs/kg**
- **1150 Tshs/kg**
- **1300 Tshs/kg**
- **1500 Tshs/kg**

INFORMATION FLOW:

- **TFDA, TBS**
4.8.4 Relations between different stakeholders

The relations between different stakeholders as indicated in figure 10. The data information is from different stakeholders. According to the Venn diagram analysis some stakeholders have a relationship and few do not have a relationship with each other.

*Figure 10: Venn diagram*

Source: MATIU reports, 2018

**Actors relationship**

These Agro dealers supplying inputs to farmers, Farmers producing the crop for the consumers, there is no written contract between producers and consumers, From May to July is the harvesting period, marketing began from harvesting period to December whereby at this time the relation is strong. In January to May, the relation is less strong.

**Supporters and actor’s relation**

Ministry of agriculture livestock and fisheries training institute Ukiiriguru (MATIU), Research and ASA institutions have a direct relation to farmers as the research institution conducts research on soil and suggests the kind of crop to grow in a specific area. The training institute MATIU provide training to
farmers from production to marketing level. Also, ASA institution which facilitates and controls the multiplication of improved seeds has relation with research and agro dealers.

Coordination of the chain

The Rice chain is coordinated by traders as they have all the power in the chain, they have information about buyers and market of the product. All this data is coming from stakeholders who interviewed.

**Flow of information**

The information flow is in both directions (vertical and horizontal) actors in the chain.

- Information on appearance, smell, price and volume flows from consumer to the retailers and retailer to consumer.
- Information on volume flow from wholesaler to retailers and from retailer to wholesaler.
- Information on demand and price is shared by processors and wholesalers.
- Technical information about improved varieties, diseases and control measures flows from the local government to farmers.
- Information on volume and distance from producer to producers flows from producers to traders like middlemen and larger rice buyer companies
- Information on fertilizer and chemicals types, quality and quantity, flow from input suppliers to producers and vice versa

Some of the information is missing like price and size.

**The vulnerability of relations between actors**

Farmers are a vulnerable group who are farmers because the share he/she gets is little compared to the big work done on the farm from production to harvesting rather than for the other actors who mostly only began working after the harvesting season.

**4.8.5 Discussion with Traders**

Rice traders are among the important players in the rice value chain, it is important to have their opinion about the market access. 2 wholesaler traders and 3 retailers were approached for the interview;

Wholesalers indicated that they buy their paddy from farmers as indicated in picture 2. And process it themselves from different villages including Mahiga, Mwang’alanga, Ngudulugulu, Igoma and Mwadubi. They however prefer to buy processed rice at Tshs 1000/= per kilogram. Sometimes they used to transport rice to a nearby district and others in Sirari which is the boarder of Tanzania and Kenya also to Rwanda and Uganda. Also they buy bags of paddy and put a stock as shown in picture 1 and one bag of 90kg is Tshs 54,000/= The traders have some challenges of high transport cost and lack of capital.
4.8.6 Interview with Rice retailers

Rice retailers mentioned that they buy rice at Tshs1000 per kilogram and sell it for Tshs 1300 per Kilogram. See picture 3 for how rice is sold. The processed rice products are packaged in 1 kg, 5kg, and 10kg. See picture 4 for how rice is sold in 10kg (packed rice).

4.8.7 Interview with Processors

The researcher interviewed 3 processors. They process their rice for regular customers is Tshs 150 per kg and for traders Tshs 60 per kg. Most of the processors only process paddy on request from their customers. Before processing paddy they make sure the paddy is dried well by testing it using their hands by scratching it. If it found to be long grain without breakage it means it is well dried and it is put into destoner- a machine used for removing small stones, sands and other bad impurities. Then processor will process the rice using rice processor machines as shown in
picture 5. They are licenced. Also have some challenges of lack of capital to buy a modern machine, and sometimes are missing some information to farmers like where to get good quality rice.

![Picture 7: Rice Machines for processing rice to add value](image)

### 4.8.8 Interview with Institutional consumer

Two respondents were interviewed, Ngudu Secondary school and Ngudu Prisons. The results show that the institutional consumers desire rice with good quality long grain with good aroma. They buy from their supplier at Tshs1700 per kilogram. The respondent from Ngudu Secondary usually buys one tonne for their 418 students and use it for one month. Another respondent from prison office said that the office buy rice and use 600kg per month. Both institutional consumers interviewed said that they use quotation procedures which is a governmental producer by paying using Invoice payment.

### 4.8.9 Interview with MATIU

It was nice to interview (MATIU) staff who work under the Ministry of agriculture and supported by JICA to train farmers in rice marketing.

MATIU is an organisation which train students and farmers in agriculture production and marketing. The organisation provides training in production techniques and market access linkage services to farmers and other players in the rice chain. Also MATIU provides good quality seeds SARO 5 to key farmers for seed multiplications. Farmers are provided with subsidised services on production techniques and market linkages. Exporters and input suppliers are serviced on policy and advocacy issues at which MATIU is responsible for presenting policy matters that need amendments or improvements to the Government level.

The main focus of the interview with MATIU was about market access training, with the aim of connecting farmers to markets. The discussion came up with the responses as described in the following: The MATIU usually done their training to selected key famers at an institute called residential training and another training is infield training. This is done in the field before after harvest. The respondents from MATIU suggest that the government can invest in ware houses receipt system, improved electronic market, good irrigation system, Access to good roads, use of leaflets, and use of modern machines in order to add value.
Challenges in MATIU’s work while implementing farmers training are as follows, follow up is difficult because of money, they depend on JICA, staff are few, limited of funds some places have a rough road so it is difficult to reach farmers especially in rain seasons.

4.8.10 Interview with Extension Agents

Two extension officers interviewed from Kwimba district. The interview made with Extension officer study revealed that, Kwimba district agricultural office provides professional advice to farmers in order to produce high yield and make sure food security is controlled also provide training of post-harvest techniques and how to access market. They provide services through farmers groups and a few individual farmers. There are some challenges that faced them implementing their services to the farmers or other actors in the chain:

- Staff are few
- Lack of transport cost
- Lack of funds
- Few types of equipment

The Kwimba district agricultural office provide farmers training from their own local funds and other funding is from NGOs like Dalberg project funded by Bill and Melinda gates. The opinions of the extension officers for intervention needed to improve the rice market are as follows;

- Stakeholder forum
- To have a rice variety which is needed like Saro 5,
- To have Rice committee
- Ware house receipt help the farmers to get a loan and buy inputs
- Electronic markets
- Establish more farmers group
- Use of leaflets and brochures

4.9 Focus group

Two FGDs were conducted with small holder farmers (12) of rice farmers from three (3) villages namely Mahiga, Ngudulgulu and Mwang’halanga to get a general perception of the access to rice marketing. The issues captured from these deliberations are summarised as in the following subsections.

4.9.1 Challenges

The information from focus group discussion with farmers are challenges faced by farmers in producing and marketing rice in the Kwimba district were put together using PESTEC technique. Where by challenges are indicated by Political, Economical, Technical, Environmental and Cultural as shown in figure 11.
Figure 11: PESTEC of Rice chain in Kwimba district

Source: Focus group Interviews in Kwimba district, 2018
The collected information on challenges in producing and marketing rice in the Kwimba district are summarised using SWOT analysis. The challenges are categorized by Strengths, Weaknesses, Opportunity and Threats as illustrated in figure 12.

Figure 12: SWOT analysis of Rice in Kwimba district,

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Availability of land for irrigation</td>
<td>1. Lack of market information</td>
</tr>
<tr>
<td>2. Availability of source of water in Mahiga dam</td>
<td>2. Unreliable market</td>
</tr>
<tr>
<td>3. Arable land for paddy production</td>
<td>3. Low price of rice</td>
</tr>
<tr>
<td>4. Availability of Agricultural tutors (MATIU)</td>
<td>4. Lack of knowledge</td>
</tr>
<tr>
<td>5. Presence of ox and power tillers</td>
<td>5. Improper management of water in the farm from rainfall and natural flowing rivers</td>
</tr>
<tr>
<td>6. Availability of feeder roads</td>
<td>6. Limited access to working capital</td>
</tr>
<tr>
<td>7. Presence of paddy buyers (Traders)</td>
<td>7. High transport cost</td>
</tr>
<tr>
<td>8. Roads from to regions</td>
<td>8. Post-harvest losses</td>
</tr>
<tr>
<td>10. Presence of rainfall for paddy production</td>
<td>10. Uses of local seeds</td>
</tr>
<tr>
<td></td>
<td>11. Low Production volume (quantity)</td>
</tr>
<tr>
<td></td>
<td>12. Drought</td>
</tr>
<tr>
<td></td>
<td>13. Poor infrastructure</td>
</tr>
<tr>
<td></td>
<td>14. Destroyer birds</td>
</tr>
<tr>
<td></td>
<td>15. Pest and diseases</td>
</tr>
<tr>
<td></td>
<td>16. Weeds</td>
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<tr>
<td>OPPPORTUNITIES</td>
<td></td>
</tr>
<tr>
<td>1. Availability of supportive policy</td>
<td></td>
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<tr>
<td>2. Availability of national and international market for rice</td>
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<tr>
<td>3. Availability of NGO’s and research institutes</td>
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<tr>
<td>4. Commitment of the local government to improve the sector</td>
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<td>5. Availability of agro dealers</td>
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<tr>
<td>6. Availability new rice warehouse receipt</td>
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<td>7. Availability of new building for rice market</td>
<td></td>
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<tr>
<td>8. Availability of rice machine</td>
<td></td>
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<td></td>
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<tr>
<td>THREATS</td>
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<tr>
<td>1. Drought</td>
<td></td>
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<tr>
<td>2. Unstable agricultural market</td>
<td></td>
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<tr>
<td>3. Trade restriction</td>
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<td>4. Occurrence of pest and disease</td>
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<td>5. Unpredictable weather changes</td>
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<tr>
<td>6. Shortage of agricultural tutors</td>
<td></td>
</tr>
<tr>
<td>7. Market completion with other countries and district which producing rice</td>
<td></td>
</tr>
</tbody>
</table>

Focus group Interviews in Kwimba district, 2018

The contribution of Mahiga scheme

4.9.2 The contribution of Mahiga irrigation scheme association in rice marketing.

According to FGDs said that Mahiga irrigation scheme association contributed to the building of rice market warehouse receipt for keeping rice in collaboration with the Kwimba district council. Installing a rice processor machine, they also making roads from field to the godown (warehouse d wait help them to sustain their life while waiting for price to be high. And organise rice marketing training with collaboration with MATIU and giving farmers some information about rice marketing.
4.9.3 Opinion on improving market

According to FGDs discussion suggest some interventions that can be done to address all stakeholders in relation to market access were to create electronic market, Improve field roads, to install electricity in order to use electrical machine for processing in order to add value, to find institutional consumers who can buy the farmers’ rice in good price, to get good customers like supermarkets. Use of warehouse receipt system.

4.10 Transect walk

Observation from transect walk showed that farmers in the district have various activities of rice farming and market access (Figure 12) like rice machines, rice farms, Mahiga dam, homestead, livestock keepers, market place and rice warehouse. This confirms the result from the interviews.

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Rice machines and markets</th>
<th>Roads</th>
<th>Home</th>
<th>Livestock keepers</th>
<th>Rice farms</th>
<th>Trees along river</th>
<th>River and Mahiga dam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing rice and marketing</td>
<td>Rice machines and markets</td>
<td>Roads</td>
<td>Home</td>
<td>Livestock keepers</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
</tr>
<tr>
<td>Transpo rice</td>
<td>Processing rice and marketing</td>
<td>Roads</td>
<td>Home</td>
<td>Livestock keepers</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
</tr>
<tr>
<td>Getting shelter</td>
<td>Processing rice and marketing</td>
<td>Roads</td>
<td>Home</td>
<td>Livestock keepers</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
</tr>
<tr>
<td>Getting Manure for their rice farms</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
<td>Irrigation</td>
<td>Control soil erosion</td>
<td>River and Mahiga dam</td>
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<tr>
<td>Rice cultivation</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
<td>Irrigation</td>
<td>Control soil erosion</td>
<td>River and Mahiga dam</td>
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</tr>
<tr>
<td>Control soil erosion</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
<td>Irrigation</td>
<td>Control soil erosion</td>
<td>River and Mahiga dam</td>
<td></td>
</tr>
<tr>
<td>Irrigation and fishing</td>
<td>Rice farms</td>
<td>Trees along river</td>
<td>River and Mahiga dam</td>
<td>Irrigation</td>
<td>Control soil erosion</td>
<td>River and Mahiga dam</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 13: Transect walk at Kwimba, Source: Author, 2018*

Pictures show some 6, 7, 8, and 9 of features observed during the transect walk in Kwimba district.

*Picture 8: Receipt ware house at Mahiga village*
Picture 9: New rice machines at Mahiga

Picture 10: New market place

Picture 11: Paddy farm at Mahiga village
CHAPTER 5: DISCUSSION

This chapter provides general observations about the results and integrates the findings of the study with existing literature.

5.1 Background of respondents

The study established that the respondent's average age is 42 years. Age is one of the significant household characteristics used to describe households. It is assumed that age would have an association with the farmer’s benefit. Similar findings of age distributions were revealed by Chenyambuga et al. (2008) and Amponsah et al. (2018). This suggests the potential and needs for mechanised interventions in rice market access and information. It is expected that they can make good rice farming.

The education level of the family head has been found to influence market participation because heads of family with relatively more education may have better abilities to negotiate and have more information than those with relatively less education Lubungu et al. (2012). Similar to rice farmers in Kwimba district level of education help them to participate in marketing decisions. It found that this high experience provided them with sufficient grounds to provide relevant information for improving market access.

Having the area of an average 1.85 acres and middle age group needs of this age need simply mechanised in rice production.

5.2 Rice stakeholders

Stakeholders in the rice value chain map include the value chain actors, value chain supporters and chain influencers. Value chain actors are stakeholders who are directly involved with products as it passes from production to the last consumer. These include input supplier and service providers of seeds, agrochemicals and farm equipment’s, producer including their organizations, processor including both small and large scale processors and those who add value to the raw material like rice in other forms, Both formal and informal traders, retailer and consumers of rice products.

Chain supporters are stakeholders who are not directly deal with the product but provide services that add value to the product. These include extensionists, donor agencies, local government authorities, transporters. Chain influencer includes the regulatory framework, policies, infrastructure at the local, national and international level (Roduner, 2007). As it indicated in the results findings that different stakeholders involved in the chain such as agrodealers, farmers (producers), Processors, traders, wholesaler, consumers, retailers and supporters.

Roduner, 2007 indicated that the value chain actors who directly deal with the products, i.e. produce, process, trade and own them. Value chain supporters: The services provided by various actors who never directly deal with the product, but whose services add value to the product. Value chain influencers: The regulatory framework, policies, infrastructures, etc. (at the local, national and international level). This is similar to this study where by rice farmers as a producer, brokers on farm as a traders, processors as a local trader with a mill as processor, consumers as institutional consumers, low and high consumers and supporters like MATIU, financial institutions, research institutions who can provide services like trainings, funds and sometimes some supporters like government can influence rice policy.
5.3 Market Channel

The study showed that, there are two marketing channels for rice chain: informal and formal marketing channels. Majority of the farmers sell their paddy through the (Brokers on the farm (informal marketing channel). Others farmers sale through the local trader with a mill (formal marketing channel), and the rest sale through the local market (seasonal market).

5.3.1 A local trader with a mill (Formal rice market channel)

The interviewed farmers sell their paddy through formal rice marketing. This type of market comprises the channel through which smallholder rice farmers deliver their paddy directly to the rice processing mill or to rice traders who buy rice from the rice farmer and sell it to the processor. Retailers have the role of supplying the processed rice products that are mainly demanded by the consumers that can influence the processor to produce more according to the consumer’s demand. Formal paddy (rice) marketing operates in a planned system of rice collection, by means of well-established bulking and transport infrastructure.

According to EUCORD, 2012 rice millers are licensed for both milling and the retail trade. Millers, as the owner of milling machines, have dual roles in rice trading. Firstly, they are involved in milling the rice; secondly, they purchase milled rice for themselves, storing it to sell later. They sell the rice to urban distributors and consumers. Similarly in this study, the rice millers are licenced to mill and trade. Some who have capital can purchase and store rice to sell it later.

Previously, rice was milled and marketed by government-owned businesses (parastatals). Today the rice milling sector has been completely privatized (EUCORD, 2012). This opened opportunities for millers (processors), wholesaler and another trader to fill the gaps created by the exiting parastals at all levels of the rice value chain. This also had the effect of making rice an extremely attractive crop to grow.

Interesting in this study, more women use informal marketing channel than men. This has also been reported by Jost, et al, 2016 that rural women in particular are not mobile like men because of their household responsibilities such as childcare and the collection of firewood and water can make women particularly stay at home doing their work also because they are taking on more agricultural work as men migrate from the farm labour market.

5.3.2 Brokers on the farm (Informal market channel)

This research findings showed that, most of the interviewed respondents sell their paddy (rice) through the informal channel. However, the majority of the rice farmers were chosen to sell their paddy through informal chain where they get the premium price per kilogram. The farmers sell their rice to brokers on the farm which is the very easier for them because they do not travel so they save transport cost. According to EUCORD, 2012 said that brokers on the farm are unlicensed traders who are often involved in the wholesale trade. Brokers don’t have a warehouse, but facilitate the buying and selling of other traders and sometimes make their own purchases.

5.3.3 Local market (Seasonal) Markets

According to EUCORD, 2012 reported that the markets are placed in remote areas which are usually held once a week. Urban assemblers are few in number and purchase rice from producers during market days. They sell to wholesalers only to get a better price. Farmer’s transport rice to the nearest markets using pack animals, animal carts and vehicles. Similarly, in this study few farmers indicated
that they sell their rice using this outlet with the frequency of its use ranging from once a week to once a month.

5.4 Cost of returns
The cost of returns is obtained by subtracting the inputted value of the operators owned capital and entrepreneurship. However, profit is calculated here by subtracting the cost from marketing margin shows that different types of marketing agents had different amount of profit; it depends upon the seller and buyer of the product (Hayami, 1999) This study established that farmers got the highest amount of cost of return at more than fifty percent which helps them to sustain their livelihood. According to Moshi, (2013) reported that the cost of production found (1,015,979Tsh) per acre could be higher for some, and lower for some due to variations in input combination and total yield/acre. Though the profitability analysis shows a profit of 485 946Tsh (47%) per acre, the case is not always the same when the test is done to every individual. The figure resulted from the calculation is too general as it was based on average costs of production and average revenues. Similarly, in this study the calculation based on the average cost of production was (1,080,000Tsh) per acre and farmers get a profit of 658,500 per acre which is 60% of an acre, therefore farmers gain in rice farming. These costs depend on the area of land if it is fertile and if they follow good agricultural practices.

Additionally, the above calculations were based only on variable costs; the margin would be lower once fixed costs were included. Most of the smallholder rice farmers mentioned that the farm was bought a long time ago, and the maintenance costs are minimal. Hence it was very difficult to obtain a fixed cost from the smallholder rice farmers because they don’t keep records.

5.6 Value share
Field data indicate that most farmers using an informal market channel are getting higher value share than those who use the formal channel. Most of the farmers in an informal market channel high value share compared to wholesalers, processors (local trader with mill) and retailer. Mushi, (2013) asserts that the producer share increases due to decreased marketing costs, but again as it was reported, domestic consumption for rice is still low. This study data conclusive indicates that farmers are getting high value share than any other actors. Also according to Kaplinsky and Morris (2001) explained that in determining the distribution of values shares among actors in the chain; one can identify who benefitted in its participation in the chain and which actors will benefit more when support is provided. They added that, ‘this is particularly important in the context of developing countries, given concerns that the poor in particular are vulnerable to the process of globalization.

5.7 Challenges experienced by farmers during producing and marketing their rice.

5.7.1 Challenges in producing rice
Bottlenecks cited in rice production in Mahiga irrigation scheme are poor infrastructure, drought, destroyer birds, pest and diseases, use of local seeds and weeds and lack of credit. Farmer have to raise money collectively to repair some of the infrastructures. According to Msangya and Yihuan (2016) plant disease were incomplete infrastructure, pest and diseases, use of seeds from the previous year's harvest while few used improved rice varieties where significant setbacks to small-scale farmers are. The use of a hand hoe, oxen plough, and lack of credits reduced the timeliness of farm operations and limited the efficacy of cultivation and weeding.

5.7.2 Challenges in accessing their market
According to Nkuba et al, (2016) reported that farmers faced challenges like limited market information leading to low market prices. In all sites, there was no mechanism for disseminating market information
to the farmer, unreliable markets, limited access to micro-finance institutions for saving and credit services; inadequate access to extension services. Sometimes microfinance institution gave loans to farmers and delayed paid back in the form of paddy rice at harvesting time. Limited capital, due to fluctuation in the production of rice; unreliable markets, paddy is sold; product price fluctuations. This is similar to this study the results found that the farmers in Kwimba district have some challenges which hinder them in accessing their rice market the highest challenges being an unreliable market, lack of market information, low price, the last but not least are High quality demand and low production (volume).

5.8 Quality and quantity of rice.
Generally, in East African Community region consumers prefer aromatic, long grain (not more than 20-30% broken) clean, (no foreign matter especially stone) no sticky, well packed and brand. (Kilimo trust, 2017). The study finding suggests these preferences are still valid. Quantity packed and other not packed depend on consumer preferences. EUCORD, 2012 observes that the rising market provides an opportunity for medium to large-scale processors to invest in the development of outgrower schemes to improve the supply of premium quality rice for processing. Additionally, by sourcing premium quality unmilled rice from smallholder farmers, processors and other supporters provide an incentive to producers to gain more income derived from producing a premium quality product. In this study, MATIU provides incentives like a good variety of seeds (SARO 5) in line with customer demand and taste.

MINAGRI-RSSP survey (2013) shows that Tanzanian rice is of good quality and expensive. It is mainly consumed in hotels rather than individual households. This study established that rice with good quality long grain and aroma is packed and exported to the countries like Kenya and Rwanda because of its good quality.

5.9 Contribution of Mahiga Scheme association

According to FGDs farmers said that Mahiga irrigation scheme association contributed a lot to the association to the build paddy (rice) market warehouse receipt for keeping rice in collaboration with the Kwimba district council. Installing a rice processor machine, they also making roads from field to the godown (warehouse receipt), and organise rice marketing training with collaboration with MATIU and giving farmers some information about rice marketing.

5.10 Intervention to market access

Nyamba (2012) asserts that the electronic market by using mobile phones could connect different stakeholders in maize value chains (Morogoro region Tanzania) in an interpersonal relation level for fast, easy and flexible agricultural information sharing despite distance and extension service troubles. Jensen 2007 also reports on the improvement of market functioning with the improvement of mobile phone coverage in Kerala, India.

The interventions most mentioned by rice farmers in Mahiga irrigation scheme were better information flow with other stakeholders, investment in electronic services in the rice market to bring markets near to farmers and use of modern machines to add value.

Among the intervention mentioned for investing in electronic services, most of the female farmers said that it is good to invest in electronic services because it helps them to reduce the time to access market information. Similar interesting report from GSMA, (2013) indicated that most women realised mobile phones has many advantages. They can immediately call the wholesale market to inquire about prices and place direct orders. So mobile phones have eliminated the middleman and reduce the time taken to access such information.
CHAPTER 6: CONCLUSION

In this chapter the aim of the study was to identify opportunities and recommend strategies for improving access to markets by small holder rice farmers producing under the Mahiga irrigation Scheme Kwimba district. This chapter awards the conclusions about the current situation of Mahiga irrigation farmers in market access and improving the situation.

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Rice is the major food and income generation crop of small scale farmers in Kwimba district. Through this crop, small scale rice farmers managed to sustain their livelihood.

6.1 Current situation of rice value chain market in Mahiga scheme

Currently, rice has many stakeholders who are working together to sustain and improve the development of the district. The stakeholders involved are farmers, processors (local traders with mill), wholesalers, traders (brokers on the farm) retailers, extension agents, institutional consumers and supporter (MATIU). Every actor has their own functions in the chain. While the producer producing the rice other traders sell rice and consumers use the product, processors process the rice and supporters provide training and other services.

Relationship of stakeholders is very important because it strengthens the stakeholders. This study found that there is a relationship to some stakeholders which will help them in developing the chain and improve market access in Kwimba district.

Also traders are buying rice in bulk and they used to export to the neighbouring country, by doing, so they increase the market for rice in the district. Processors are licenced. Farmer has a more value share in an informal channel than in formal. The research concludes that there a significant price difference between farmers who use the formal channel and those who use the informal channel. Moreover, only a few farmers use a formal channel which is the best for them. Because it has the advantage of food safety easily to traceability, easy to measure quality control.

Most of the challenges experienced by farmers in producing rice are poor infrastructure, drought, destroyer birds, pest and diseases, use of local seeds and weeds and lack of credit. Farmer has had to raise money collectively to repair some of the infrastructures.

Other challenges experienced by farmers are an unreliable market, lack of market information, low price, the last but not least is high quality demand and low production (volume).

6.2 Possible opportunity for improving market access in rice value chain

Mahiga Irrigation scheme in Kwimba district has good quality rice which will help them marketing, where by most of the farmers said their customers prefer long grain with good aroma and the quantity packed and other not packed depend on consumer preferences.

Rice farmers in Mahiga irrigation scheme have an association which contributed a lot to the building rice market by using warehouse receipt for keeping rice in collaboration with the Kwimba district council.
Installing a rice processor machine, they also making roads from field to the godown (warehouse receipt), and organise rice marketing training with collaboration with MATIU and giving farmers some information about rice marketing.

Most of the intervention mentioned are as follows:

To create the electronic market information system Stakeholders will get - better services, efficiency more farmers will be reached in a short time. This mobile channel can be effective since most farmers and value chain actors have access to a mobile phone and are literate.

Another intervention which will work better in improving the market access for rice smallholder farmer is to have stakeholders forum.
Explore the use of warehouse receipt system which will help farmers to keep their rice in the warehouse and wait for the price to be higher and they give them a small amount of loan money which will help them to sustain their life while waiting for the price to be high.

Improve field roads, to install electricity in order to use the electrical machine for processing in order to add value, to find institutional consumers who can buy the farmers’ rice at a good price, to get good customers like supermarkets. Use of warehouse receipt system.
CHAPTER 7: RECOMMENDATIONS

This chapter proposes strategies for improving access to markets by small holder rice farmers producing under the Mahiga irrigation Scheme Kwimba district. Improving smallholder rice farmers involves the collaboration among the actors themselves. Each stakeholder should play their role to allow others to make effective use of the information system.

7.1 Recommendations

Based on the finding from the study the following suggestions are made:

Rice farmers

Development of an electronic market information exchange platform. This can facilitate timely market information to farmers and other stakeholders. By consulting Vodacom mobile network to install the system to farmers. This will help also to expand extension service of (MATIU) to farmers on rice market access and value chain as a whole.

To create a stakeholders forum in order improving access to market and information on rice value chain, this is in line with current plans MATIU. By having a consultation with stakeholders, and conducting workshops on markets days will create a mutual relationship amongst.

Also use of Reliable marketing channels should be established in and use of farmers should start using a warehouse receipt system

Inputs required by farmers such as improved seeds and fertilisers need to be available at affordable rates and be timely.

Smallholder farmers as an association must be engaged in value adding activities such as processing some of the rice to increase their value share in the local market based chain.

Farmers must seek for intensive training through their association with supporters (MATIU) of the chain to improve on marketing issues, record keeping, entrepreneurship and good financial management.

Improve infrastructure especially at the dam, farmers contribute water fee which will help in constructing a place for improvement.

Use of warehouse receipt system which will help them to put in bulk hence better prices of inputs to farmers.

Simple mechanization like an animal drought for production processing to increase productivity at the farm level.

Improve infrastructure especially at the dam, farmers contribute water fee by the end of October, 2018 which will help in constructing a place for improvement.

Supporters (MATIU)

Another corrective action for MATIU is to develop an alternative income by establishing private students where it will earn money for training farmers and less dependency for the government.

Another corrective action for MATIU is to develop an alternative income by establishing private students where it will earn money for training farmers and less dependency for the government.

Training farmers on improved seed multiplication to addresses the issue of low productivity and to give seeds to key farmers to multiply and give to intermediate farmers to continue multiply then to another farmer.
**Extension agents**

The extension agents in Kwimba district should collaborate with MATIU and other organisation in organising the farmer groups and establishing a consolidation and selling point where farmers make joint selling in the warehouse. Also to train farmers in marketing this will help them to access the market efficiently and profitably hence improve market access value chain.

Strengthening capacity of farmer groups for effective farmer networks which can advocate for the interests of its members and help access credit easily (SACCOS)

**Processors**

The other recommendation for processors the need to have the capital to run their business nicely and improve their processing machines in order to add the value of rice they need to use modern machines for processing.

**Wholesaler, traders and retailers**

Also wholesaler, traders and should be licenced and buy their product in warehouse receipt system. Retailers should by their product to the licenced trader. The last is consumers should by their product to a licensed retailer in order to make sure the quality is good.

Retailers should by their product to the licenced trader.

The last is consumers should by their product to a licensed retailer in order to make sure the quality is good.

**Institutional consumers**

These should buy the rice to licenced traders who take care of quality, easily traceability, easily to measure quantity by using regulatory bodies like TBS.
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Jensen, R., 2007 *The digital provide: Information (technology), market performance and welfare in the South Indian fisheries sector*

APPENDIXES

Appendix 1: Farmers’ survey questionnaires

Introduction to the study.
I am Rose Crispin Marijani, Conducting academic research on the Rice value chain in Kwimba District. Your participation in this study will also help me to understand the challenges faced in the rice value chain especially in improving market access.

Section 1: Socio-demographic information
1. Village name..............
2. Farmers’ group/station name.....................
3. Age ....................
4. Sex ......
5. What is your level of education?
   a) Never been to school b) Primary level c) Secondary level d) Certificate level e) College level
6. What is the area of the farm under rice cultivation?......................
7. Why are you growing rice?
   (a) Domestic use only (b) both a and b (d) others specify....................
8. For how long have you done this rice farming?......................

Section 2: Rice production & Marketing
9. What is the main reason why you joined the scheme?
   a) Guaranteed market b) Inputs provision and credit advances c) Access to training and information d) Others (specify)..................
10. Are you involved in any other farming group? ..................
11. If you are in a group, is the group registered by the government? .................
12. What benefits do you get from this group?
   (a) Market information (b) training (c) both (d) Others specify..................
13. Who do you normally sell your rice to?
   a) Brokers on farm b) A local trader with mill c) Government Miller d) others specify
14. Are you satisfied with your current main channel price? Yes___ No___.
15. What is your reason for your choice of buyer above?
   a) Provides transport b) transparent payment mode c) offers better price d) buys without quality conditions e) immediate payment f) I sell to any buyer that is available
16. What other services/incentives do you receive from your buyer?
17. How many kilogrammes of rice do you plant on your farm? ........
18. How many kgs of rice do you harvest? ................................
19. How many kgs of rice do you eventually sell to the buyers? ........
20. Where do you buy your inputs?
   a) Kwimba central market b) Government stores c) Other specify..................
21. What costs do you incur per year? Tsh..................

Specific costs per acre (Calculate with respondent)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Quantity/amount</th>
<th>Unit cost</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input costs (agro-chemicals, seeds)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation charges</td>
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<td></td>
<td></td>
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<tr>
<td>Land preparation (Rotation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planting costs (Nursery and main)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Weeding costs (Manual)
Harvesting charges (cutting, Threshing)
Post-harvest handling (winnowing & drying)
Marketing costs
Total

22. What revenue do you get from your rice farming on a seasonal basis? Tsh.................

**Specific revenue per acre** (Calculate with respondent)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Quantity/amount</th>
<th>Unit price</th>
<th>Total revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice harvested</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other; specify</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23. What are the challenges you face in producing rice? ...............  
24. What are the main challenges faced in marketing rice?

Challenges ranks: 1-7: with 1 being the highest challenges)

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>High marketing cost</td>
<td></td>
</tr>
<tr>
<td>High quality demand</td>
<td></td>
</tr>
<tr>
<td>Lack of market information</td>
<td></td>
</tr>
<tr>
<td>Low production volumes (Quantity)</td>
<td></td>
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<tr>
<td>Unreliable market</td>
<td></td>
</tr>
<tr>
<td>Payments (time)</td>
<td></td>
</tr>
<tr>
<td>Others......</td>
<td></td>
</tr>
</tbody>
</table>

25. What is the price of rice per 90kg bags of rice during harvesting? __________
26. Who normally buys your rice?  
   (a) Local markets (b) institution (c) supermarkets (d) others specify
27. What is the quality of rice that your customers require? (a) Long grain (b) short grain
28. If long grain, what type of smell do the customers prefer? (a)Aromatic (b) neutral
29. What variety of rice is it? (a) Supper (b) Kalamata (c) Saro 5 (d) others specify
30. How far is it from your farm to the nearest collection centre (Hrs. /Min) .....  
31. What is your main source of labour in rice cultivation?  
   Hired labour b) Family labour c) Both (Hired and family labour)
32. What is your source of farming inputs? a) Local agro-shops b) Government inputs programme c) Others specify
33. What is your main source of finance for the rice farming? a)SACCOS loan b) Bank loans c) Personal savings d) Village money lenders e) From family members f) Other (specify)
Section 3 Rice marketing opportunities

34. Do you get support from elsewhere (other actors) apart from Mahiga Irrigation scheme? If yes, from who? a) NGO’s b) Government (MATIU) c) Inputs suppliers d) Financial institutions e) Others (specify)
35. What kind of support do you get? a) Training b) Financial c) Inputs d) Others (specify)
36. What is your opinion to address the market access? a) Electronic services in marketing b) Good information flow with other stakeholders c) Others specify

Thank you
Appendix 2: Checklist for Farmers: Focus group discussion

Village..................                  Date ............................

1. What are the reasons for joining the scheme? Rank the reasons in order of importance.
2. What are the stakeholders in the chain and their functions?
3. What are the market channels in the rice value chain?
4. What is the average production cost per year?/season?
5. How do you decide on a price?

6. What are the challenges faced by farmers in producing rice in the current scheme?
7. What are the challenges faced by farmers in marketing rice in the current scheme?
8. What are the quality and quantity requirements for rice in the rice value chain?
9. What is the contribution of Mahiga irrigation scheme association in the rice market?
10. What are interventions can be done to address all stakeholders in relation to market access?

Appendix 3: Transcript/response from Checklist for Focus group discussion (male and female)

Village: Mahiga, Ngudulugulu and Mwang’halanga                  Date: 05/07/2018

1. What are the reasons for joining the scheme? Rank the reasons in order of importance.
   • Building the infrastructure of irrigation scheme
   • Easy way of getting the farmers training in group
   • Working together as group
   • Effective irrigation farming
   • Easy way of getting marketing information
   • Easy way of getting agricultural inputs
   • Improve rice farming
   • To be known by government

2. What are the stakeholders in the chain and their functions?
   • Producers – Producing rice
   • Traders – Buying and selling rice
   • Processors – Buying and processing rice
   • Retailers – Buying and selling rice
   • Consumers – Buying and eating

3. What are the market channels in the rice value chain?
   • Small traders
   • Large traders

4. What is the average production cost per year?/season?
   One acre (1 acre)
Table 1. Cost of production per one acre

<table>
<thead>
<tr>
<th>Cost items</th>
<th>Total cost/acre (Tshs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input costs (agro-chemicals, seeds)</td>
<td>30000</td>
</tr>
<tr>
<td>Irrigation charges</td>
<td>15,000</td>
</tr>
<tr>
<td>Land preparation</td>
<td>30,000</td>
</tr>
<tr>
<td>Planting costs (Nursery and transplanting)</td>
<td>50,000</td>
</tr>
<tr>
<td>Weeding costs</td>
<td>30,000</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>30000</td>
</tr>
<tr>
<td>Birds for one month</td>
<td>15,000</td>
</tr>
<tr>
<td>Sleshing</td>
<td>10,000</td>
</tr>
<tr>
<td>Harvesting charges (cutting, Threshing)</td>
<td>60,000</td>
</tr>
<tr>
<td>Post-harvest handling (winnowing &amp; drying)</td>
<td>10,000</td>
</tr>
<tr>
<td>Transporting</td>
<td>30,000</td>
</tr>
<tr>
<td>Marketing costs: Bags</td>
<td>15,000</td>
</tr>
<tr>
<td>Rope and needle</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>326,500</strong></td>
</tr>
</tbody>
</table>

Selling cost 54,000

5. How do you decide on a price?
   After getting update market information

6. What are the challenges faced by farmers in producing rice in the current scheme?
   - Drought
   - Diseases and pests
   - Destroyed birds

7. What are the challenges faced by farmers in marketing rice in the current scheme?
   - Low price cost
   - No market information
   - Unpredictable market

8. What are quality and quantity requirements for rice in the rice value chain?
   - Long grain with good aroma
   - Quantity – small customer’s starts with 1kg and wholesaler customers starts with 1 bag of 90 kg.

9. What is the contribution of Mahiga irrigation scheme association in rice market?
   - Building godown for keeping rice
   - Installing rice processor machine
   - Making roads from field to the godown
   - Rice marketing training
   - Giving farmers some information of rice marketing

10. What are interventions can be done to address all stakeholders in relation to market access?
    - To create electronic market
    - Improve field roads
    - To install electricity in order to use electrical machine for processing in order to add value
Appendix 4: Transcript/response from Checklist for Focus group discussion (Female only)

Village: Mahiga, Ngudulu gulu and Mwang’halanga Date: 06/07/2018

1. What are the reasons for joining the scheme? Rank the reasons in order of importance.
   - Effective irrigation farming
   - Rice farming production
   - Easy way of getting marketing information
   - Easy in exchanging ideas
   - Easy way of getting development
   - Improve income
   - Easy way of getting the farmers training in group

2. What are the stakeholders in the chain and their functions?
   - Producers – Producing rice
   - Traders – Buying and selling rice
   - Processors – Buying and processing rice
   - Retailers – Buying and selling rice
   - Consumers – Buying and eating

3. What are the market channels in the rice value chain?
   - Small traders
   - Large traders

4. What is the average production cost per year?/season?
   One acre (1 acre)

<table>
<thead>
<tr>
<th>Table 1. Cost of production per acre</th>
<th>Total costs/acre (Tshs)</th>
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<tr>
<td>Land preparation</td>
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<tr>
<td>Planting costs (Nursery and transplanting)</td>
<td>80,000</td>
</tr>
<tr>
<td>Weeding costs</td>
<td>90,000</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>25,000</td>
</tr>
<tr>
<td>Birds for one month</td>
<td>40,000</td>
</tr>
<tr>
<td>Sleshing</td>
<td>10,000</td>
</tr>
<tr>
<td>Harvesting charges (cutting, Threshing)</td>
<td>50,000</td>
</tr>
<tr>
<td>Post-harvest handling (winnowing &amp;drying)</td>
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</tr>
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<td>transporting</td>
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</tr>
<tr>
<td>Marketing costs: Bags</td>
<td>15,000</td>
</tr>
<tr>
<td>Rope and needle</td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>446,500</strong></td>
</tr>
</tbody>
</table>

Selling cost 54,000

5. How do you decide on a price?
After getting update market information from business people

6. What are the challenges faced by farmers in producing rice in the current scheme?
   - Insect pest
   - Destroyed birds
   - Drought
   - Broken infrastructure, canals

7. What are the challenges faced by farmers in marketing rice in the current scheme?
   - Mixed price
   - Unpredicted price
   - Low price cost
   - No market information
   - High transport cost
   - Rough road

8. What are quality and quantity requirements for rice in the rice value chain?
   - Long grain with good aroma
   - Quantity – small customer’s starts with 1kg and whole saler customers starts with 1 bag of 90 kg.

9. What is the contribution of Mahiga irrigation scheme association in rice market?
   - Building godown for keeping rice
   - Installing rice processor machine
   - Making roads from field to the godown
   - Rice marketing training
   - Giving farmers some information of rice marketing

10. What are interventions can be done to address all stakeholders in relation to market access?
    - To create electronic market
    - Improve field roads
    - To install electricity in order to use electrical machine for processing in order to add value
    - To get institutional consumers who can buy their rice
    - To get good customers like supermarkets.
Appendix 5: Checklist for Wholesaler/ traders/ retailers

Name of respondent……………………… Place……………………… Date…………………………

1. Where do you buy your rice
2. What criteria do you use to determine the price
   - Transport
   - Matereals for processing
3. What challenges do you face during marketing your product
4. What are quality required for rice in the market
5. What quantities do you normally need per day? Or per week?
6. What should be improved so that more rice is supplied to you?

Appendix 6: Transcript/responses for retailers

Name of respondent: Lispa Paulo    Place:  Date: 26/07/2018

1. Where do you buy your rice
   I buy from processor
2. What criteria do you use to determine the price
   - Transport
   - Matereals for processing
3. What challenges do you face during marketing your product
   Unreliable market
4. What are quality required for rice in the market
   • Long grain with good aroma
5. What quantities do you normally need per day? Or per week?
   100kg
6. What should be improved so that more rice is supplied to you?
   Farmers could produce more

Appendix 7: Transcript/responses for Wholesaler

Name of respondent: Lameck Chibije  Place:  Date: 01/08/2018

7. Where do you buy your rice
   I buy from farmers in Mahiga, Igoma, Ngudulugulu and Mwang’halanga
8. What criteria do you use to determine the price
   - Transport – power tiller
   - Matereals for processing – buy bags , ropes
   - others specify
9. What challenges do you face during marketing your product
   Unreliable market, high price
10. What are quality required for rice in the market
    • Long grain with good aroma
11. What quantities do you normally need per week?
    1000kg
12. What should be improved so that more rice is supplied to you?
    Farmers could produce more, open more borders to sell outside country, currently I sell Sirari border of Kenya.
Appendix 8: Checklist for Processor

Name of respondent.......................... Date................................................

1. How do you decide on a price?

-Processing cost
- Material for packing

How much do you buy the rice per kg?

How much do you sell a kg of rice after processing?

2. What challenges do you face while marketing your product?

3. What are quality required for rice in processing and market?

4. What is the quantity do you require to process and market?

Appendix 9: Transcript/responses for processor

Name of respondent: Augustine Joseph          Date: 26/07/2018

1. How much do you process rice per kg?
   - For business people 1kg is Tshs 60
   - And for normal people 1kg is Tshs 150

2. What challenges do you face while processing your product?
   - broken rice
   - not well dried
   - Some of pad contaminate with water or moisture
   - Some over dry in the farm

3. What are quality required for rice in processing for market?
   - Well dried
   - Drying moisture 75% from the farm
   - Heavy rice which is not easily broken
   - Long grain with good aroma

4. What is the quantity do you require to process for market?
   - 1 bag with 90 kg for business people
   - 1 small tin with 2kg for normal people
Appendix 10: Transcript/responses for Wholesaler

Name of respondent: Deogratius Butondo Date: 30/07/2018

1. How much do you process rice per kg?
   • For business people 1kg is Tshs 60
   • And for normal people 1kg is Tshs 150

2. What challenges do you face while process your product?
   • not well dried
   • Some over dry in the farm, delay in harvesting

3. What are quality required for rice in processing for market?
   • Well dried

4. What is the quantity do you require to process for market?
   • 1 bag with 90 kg for business people
   • 1 small tin with 2kg for normal people

Appendix 11: Transcript/responses for processor

Name of respondent: Musa Elias Date: 26/07/2018

1. How much do you process rice per kg?
   • For business people 1kg is Tshs 60
   • And for normal people 1kg is Tshs 150

2. What challenges do you face while process your product?
   • broken rice
   • not well dried
   • Some of pad contaminate with water or moisture
   • Some over dry in the farm

3. What are quality required for rice in processing for market?
   • Well dried
   • Drying moisture 75% from the farm
   • Heavy rice which is not easily broken
   • Long grain with good aroma

4. What is the quantity do you require to process for market?
   • 1 bag with 90 kg for business people
   • 1 small tin with 2kg for normal people
Appendix 12: Checklist for supporters -MATIU

1. Supporter:
2. Address:
3. Name of correspondents:
4. Gender:
5. Services/support offered
6. What kind of services are you offering to the farmer or another actor?
7. How are these services provided?
8. What are the challenges that you have faced in implementing your services to the farmers or other actors in the chain?

9. Where do you get funds for training?
10. What intervention needed to improve rice market?

Appendix 13: Transcript/responses for supporters –MATIU

1. Supporter: MATIU
2. Address: P.o.Box 1434 Mwanza.
3. Name of correspondents: Winza Amos Nzaga
4. Gender: Male
5. Services/support offered: Training
6. What kind of services are you offering to the farmer or another actor?
   Rice marketing training
7. How are these services provided?
   Group of farmers, Ordinary farmers, Key farmers, Intermediate farmers.

8. What are the challenges that you have faced in implementing your services to the Farmers or other actors in the chain?
   - Financial support (Jica)
   - Adoption is low
   - Follow up is difficult because of money
   - Climatic condition in case they are not getting rainfall
   - Some of farmers group leaders of that area are not strong
   - If there is no Saccos or warehouse to farmers is difficult to train in practical session
   - No market information
   - Some of villages have rough roads so it is difficult to reach the place.

9. Where do you get funds for training?
   - Funds from Jica

10. What intervention needed to improve rice market?
    - Government should intervene to invest in warehouse
    - Market information improved
    - Electronic market should be introduced
    - Dams for irrigation should be increased in order farmers to increase yield.
    - To introduce warehouse
    - Access to good road
    - Provision of modern rice milling machine in order to add value.
Appendix 14: Transcript/responses for supporters –MATIU

1. Supporter: MATIU
2. Address: P.o.Box 1434 Mwanza
3. Name of correspondents: Chacha Ryoba
4. Gender: Male
5. Services/support offered: Training
6. What kind of services are you offering to the farmer or another actor?
   - Rice market and market strategies
7. How are these services provided?
   - In field training where farmers are visited in premises and through residential training where farmers visit training institute.
8. What are the challenges that you have faced in implementing your services to the farmers or other actors in the chain?
   - Lack of funds
   - Farmers fail to get market information
   - Farmers are not organised
   - Some scheme do not have storage facilities (warehouse receipt system) so difficult to teach them practical part of storage
9. Where do you get funds for training?
   - JICA
   - Local government (respective district)
10. What intervention needed to improve rice market?
    - Farmers formulate rice committee
    - Warehouse receipt system installation
    - Have modern milling machines to add value

Appendix 15: Checklist for Extension Officer

Place ………………………………….

1. Position:
2. Address:
3. Name of correspondents:
4. Gender:
5. Services/support offered
6. What kind of services are you offering to the farmer or another actor?
7. How are these services provided?
8. What are the challenges that you have faced in implementing your services to the farmers or other actors in the chain?
9. Where do you get funds for training?
10. What intervention needed to improve rice market?

Appendix 16: Transcript/responses for Extension Officer

Place : Ngudu

1. Position: DAICO (District Agricultural
2. Address: P. Box 88 Kwimba
3. Name of correspondent: Pancras Rugaimuki
4. Gender: Male
5. Services/support offered
6. What kind of services are you offering to the farmer or another actor?
   • Professional advice to farmers in order to produce high yield and make sure food security is controlled also provide training of post-harvest techniques
7. How are these services provided?
   • By using farmers group
   • By using individual farmers
8. What are the challenges that you have faced in implementing your services to the Farmers or other actors in the chain
   • Adopting new technology is low
   • Staff are few
   • Lack of transport cost
   • Lack of funds
   • Few equipment
9. Where do you get funds for training?
   • Local funds
   • Dalberg from Bill and Melinda gates
10. What intervention needed to improve rice market?
    • Stakeholder forum
    • To have a rice variety which is needed
    • Rice committee
    • Warehouse receipt system help the farmers to get loan and buy inputs
    • Electronic markets

Appendix 17: Transcript/responses for Extension Officer
Place: Mahiga

1. Position: Agricultural field Officer
2. Address: P.o. Box 88 Kwimba
3. Name of correspondent: Mayengela Kaishele
4. Gender: Male
5. Services/support offered
6. What kind of services are you offering to the farmer or another actor?
   • Extension services in general to farmers
7. How are these services provided?
   • Meeting/seminars/training
   • By using individual farmers visit
   • Farmers Group visit
8. What are the challenges that you have faced in implementing your services to the Farmers or other actors in the chain
• Altitude of farmers (not follow the knowledge which they get)
• Lack of transport cost
• Lack of funds

9. Where do you get funds for training?
   • Dalberg helping in transport and material and provide training to famers on getting right statistics and keeping records.
   • Local government

10. What intervention needed to improve rice market?
   • A ware house
   • Warehouse receipt system help the farmers to get loan of 80% and buy inputs
   • Electronic markets

Appendix 18: Checklist for institutional consumers

Name of respondent……………………… Place……………………… Date……………..

1. Gender:
2. What quality of rice do you prefer?
3. What quantity of rice do you require?

Appendix 19: Transcript/responses for institutional consumers
Name of respondent: Henry Gabriel Place: Ngudu Secondary school Date 31/07/2018

1. Gender: Male
2. What quality of rice do you prefer?
   • Long grain with good aroma
3. What quantity of rice do you require?
   • 1000kg per month for 418 students
   They request orders for rice by using quotation system (invoice payment)

Appendix 20: Transcript/responses for institutional consumers
Name of respondent: Silage Abdul Place: Prison Office Date 31/07/2018

1. Gender: Male
2. What quality of rice do you prefer?
   • Long grain with good aroma
3. What quantity of rice do you require?
   • 600kg per month
   They request orders for rice by using quotation system (invoice payment)
**Appendix 21: Table of Production zone and harvested rice area in percentage.**

<table>
<thead>
<tr>
<th>Production zone (Regions)</th>
<th>Harvested area (% total harvested area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shinyaga</td>
<td>16.28</td>
</tr>
<tr>
<td>Morogoro</td>
<td>15.82</td>
</tr>
<tr>
<td>Mwanza</td>
<td>14.40</td>
</tr>
<tr>
<td>Tabora</td>
<td>11.57</td>
</tr>
<tr>
<td>Mbeya</td>
<td>10.90</td>
</tr>
<tr>
<td>Rukwa</td>
<td>8.70</td>
</tr>
<tr>
<td>Mtwarra</td>
<td>5.23</td>
</tr>
<tr>
<td>Coast &amp; DSM</td>
<td>4.65</td>
</tr>
<tr>
<td>Ruvuma</td>
<td>2.64</td>
</tr>
<tr>
<td>Lindi</td>
<td>2.57</td>
</tr>
<tr>
<td>others</td>
<td>7.24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: FAO 2015

**Appendix 22: Pictures taken from different stakeholders and different features**

Local machines

New storing house for paddy

Local machines

New Machine for Association
New Market place Mahiga village

Group discussion meeting with women

Curnal for rice farm irrigation

Paddy farms

The river which supplies water to Mahiga Dam

Paddy ready to harvest
A survey interview with farmer Mahiga village

An interview with trader

Broken infrastructure by floods

Mahiga dam

One tin of paddy is Tshs 1800

One tin of processed rice which is equal to one kg is Tshs 1300
Preparation for Packing rice

Packed rice 10kg ready for sell