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ARTICLES

Research Articles

Constraints and opportunities to upgrading Uganda’s rice markets: A value chain approach 386
Dan Makosa

Market diversification opportunities for namibian fish and fish products 400
Teweldemedhin M. Y. and Chiripanhura B
Constraints and opportunities to upgrading Uganda’s rice markets: A value chain approach

Dan Makosa

Department of Agricultural Economics, Tokyo University of Agriculture, Tokyo, Japan.

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Most of Uganda's rice is produced by smallholder farmers with the purpose of marketing for family income. However, poorly developed market system is a major problem to rice producers. Based in Namutumba district (Eastern Uganda), the study involved both structured interviews with several stakeholders and focus group discussions with three farmers groups and three rice miller groups, each comprising of ten people. Using value chain approach, the study analyzes constraints and upgrading opportunities along the marketing channels. Low rice quality attributed to poor postharvest practices where foreign matter mixes with paddy during drying is a major challenge. High energy cost amounting to 69% of electricity operated and 89% of diesel operated machines during milling lowers farmers’ income. Small volumes of rice supplied by individual farmers to the market also weaken their bargaining power. In addition, there is mistrust between farmers and millers since the latter can only recover up to 70% of financial credit advanced to the former. The above challenges are compounded by limited market support activities by the development partners. Strengthening group cohesion through horizontal coordination, improving relationships between chain actors at different chain nodes through vertical coordination and rural electrification are some of the possible considerations.

Key words: Uganda, rice market, upgrading, value chain, farmers, rice millers.

INTRODUCTION

Unlike most of the food crops grown to satisfy household consumption and food security requirements, rice is consumed more in urban areas, where it is one of the major foodstuffs at homes, schools, hospitals and prisons (Ahmed, 2012). Rice is grown almost throughout the country but mainly in the Eastern and Western Uganda due to availability of lowlands with high moisture contents throughout the growing season. However, these (Eastern and Western) regions’ lack of market access is the most significant explanation to their food insecurity (McKinney, 2009). In the same regard, Odogola (2006) precisely observed that 70% of the rice farmers in Kamwenge district (Western Uganda) and 48% of their counterparts in Iganga district (Eastern Uganda) have poor marketing systems. The main problems cited as constituents of poor market access include: Lack of market information, poor road network, small paddy quantities, low quality paddy and inadequate postharvest handling skills (Odogola, 2006).

With the larger share of locally produced rice ending up
in domestic markets, it is imperative that access to a well-functioning market will be required to improve the livelihood of smallholder farmers who are the majority rice producers in the country. There is need for an efficient and effective linkage between the rural producers and the urban consumers. This linkage can be well understood through the concept of value chain. Kaplinsky and Morris (2000) refers to value chain as a full range of activities required to bring a product or service from conception, through different stages of production, delivery to final consumers and final disposal after use. There are many rice value chain studies which have been conducted in Uganda by government agencies such as Ministry of Agriculture Animal Industry and Fisheries (MAAIF, 2009) and Plan for Modernization of Agriculture (PMA, 2009) plus several bilateral and donor organizations either directly or through consulting agencies (Trias, 2012; USAID, 2008; Kilimo Trust, 2012; ACF, 2014). In most of the above studies, the emphasis has been placed on market structure mapping and gross margin analysis with less focus on upgrading opportunities and yet it is mandatory for market access by rice producers. Mitchell et al. (2011) defines upgrading as a means of acquiring the technological, institutional and market capabilities that allow resource-poor rural communities to improve their competitiveness and move into higher-value activities.

The purpose of this study was to assess the rice value chains in Uganda in the context of upgrading by: (i) Studying various marketing channels; (ii) Identifying constraints and opportunities along the marketing channels, and (iii) Analyzing the upgrading strategies. Upgrading of rice value chains enables farmers earn higher prices as well as helping consumers access high quality rice at a relatively lower price (JICA, 2013).

### The concept of value chain analysis

The concept of value chain can be traced back to the 1960s when French scientists developed the *filiere* approach for studying contract farming and vertical integration in agriculture (Mitchell et al., 2009; UNIDO, 2009). They later applied it on export commodity production of cotton, rubber, coffee and cocoa in France’s former African colonies. The emphasis of this approach was analyzing how local production system was linked to processing industry, trade, export and final consumption (Nang’ole et al., 2011). At the time, the focus of *filiere* approach was on production and commercialization without the elements of governance, transformation and value addition (UNIDO, 2009).

In the 1970s a related concept ‘sub-sector analysis’ was developed which involved studying the networks and relationships linking suppliers, processors, transporters and traders in ways that connect producers and enterprises to final consumers of goods and services (Nang’ole et al., 2011). A sub-sector thus involves a set of activities, actors and rules governing those activities.

The term value chain was first used and popularized by Michael Porter (1985) where he sought to assess the contributions of various primary and supportive firm activities to the overall added value of its business. The primary activities include inbound logistics, operations, out-bound logistics, marketing, sales and service which can directly add value to the production of goods and services (Nang’ole et al., 2009). On the other hand, support activities include procurement, human resources management, technology development and firm infrastructure which are necessary for the effectiveness and success of the firm (UNIDO, 2009). Porter’s approach was aimed at highlighting actual and potential areas of competitive advantage and the interdependencies and linkages between vertically arrayed actors in the creation of value for the firm (Rich et al., 2009). The weakness of Porter’s approach to value chain is that it restricts analysis to firm level without considering upstream and downstream activities beyond the company (Fasse et al., 2009).

The concept of Global Commodity Chain was developed by Gereffi and Korzeniewicz (1994) who applied it to development issues. Whereas Porter’s approach focused on within firm linkages of several activities, the Global Commodity Chain was modified and the focus was on inter-firm linkages while emphasizing the governance structure between several actors. Gereffi identified four elements: (i) Input-output structure; (ii) Territorial (international) structure; (iii) Institutional framework, and (iv) Governance structure (Nang’ole et al., 2009; Fasse et al., 2009).

Another modification of Global Commodity Chain, “Global Value Chain” was coined in the early 2000s by Kaplinsky and Morris (2002). They defined a value chain as a full range of activities required to bring a product or service from conception, through different stages of production, delivery to final consumers and final disposal after use. Kaplinsky and Morris (2002), distinguish the value chain from supply chain by emphasizing the relationships and linkages both within and between actors at each stage of production. According to Rich et al. (2009), this has considerable merit of highlighting the constraints and opportunities at and between stages of the chain and can thus be used to develop integrative policy recommendations that target chain inefficiencies and address distributional issues. More recently, the concept of value chain analysis seems to have become synonymous to market analysis as it involves the role of policies, institutions and laws in shaping markets (Nang’ole et al., 2011). However, the relevance of Global Value Chain approach in developing countries is questionable as it emphasizes vertical integration with emphasis on international markets leaving behind many
smallholder farmers who depend on local and regional markets (Riisgaard, 2009; Tran et al., 2013; Mitchell and Coles, 2011; Trienekens, 2011). Integrating horizontal and vertical coordination is a requirement for developing the value chains of rural farmers (Mitchell and Coles, 2011). Also, agricultural value chains are buyer-driven, meaning buyers have more powers in deciding what to produce (Mitchell et al., 2009). To reduce the power of buyers, developing country chain actors need to upgrade by building technological and managerial capacity that allows them to participate effectively in value chains (UNIDO, 2009). Value chain upgrading is therefore one of the main focus in developing countries (Trienekens, 2011).

**Upgrading in value chains**

Upgrading is a key contribution of value chain analysis with regard to understanding how incomes of poor people can be augmented. It refers to acquiring technological, institutional and market capabilities that allow firms or communities to improve their competitiveness and move into higher-value activities (Mitchell et al., 2009). The purpose of upgrading is to enhance the rewards and or reduce the risks to actors in production and marketing. If the anticipated rewards gain or risk reduction is not realized, the actor may choose to revert to previous or less functions. Such a scenario is referred to as downgrading and is the opposite of upgrading (Khiem et al., 2010). Different upgrading strategies have been suggested in various studies (Kaplinksy and Morris, 2002; Mitchell et al., 2009; Mitchell and Coles, 2011; Trienekens, 2011) to help in development of developing countries’ value chains. Such strategies are briefly explained as follows:

**Horizontal coordination**

One of the main obstacles facing small-scale enterprises in developing countries is the very fact that they are small-scale. Horizontal coordination is the process of firms (which can be as small as individual actors) collaborating within a functional node (for example input supplies, production, processing, trading or retailing) to achieve a strategic balance between competition and collaboration (Mitchell and Coles, 2011). The purpose of horizontal coordination is to address shared constraints, interests and entry barriers associated with scale. These include high transaction costs, low and poor quality output, weak negotiating power and lack of capital and management of common property resources. According to Mitchell et al. (2009), horizontal coordination is often 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. In developing countries, horizontal coordination takes the form of producer associations or cooperatives (Trienekens, 2011).

**Vertical coordination**

The process of strengthening relationships between functional nodes of the value chain, involving the shift away from one-off spot transactions toward developing longer-term business connections for instance contract farming (Mitchell et al., 2009; Mitchell and Coles, 2011). In practice, vertical coordination is often a slow and difficult process because it involves the building of trust relations between the buyer and the seller. As such, it rarely takes place in isolation from other upgrading strategies. More formal contracts are often associated with higher performance requirements, such as higher-quality products, larger volumes and delivery schedules that are more frequent and reliable. Overcoming the barriers associated with these requirements may necessitate a preliminary step of horizontal coordination (Mitchell and Coles, 2011).

**Functional upgrading**

This is also referred to as vertical integration; it involves changing the mix of functions performed by actors in the value chain. This can be through adding new activities by an individual or firm, for instance agricultural producers starting to process some of their output to add value or starting to produce the inputs by themselves. In some instances, the individual or firm may decide to delete some activities (downgrading) if deemed necessary. The resulting distribution of functions among actors in the chain should maximize its efficiency and competitiveness by attaining the optimal level of specialization versus integration (Mitchell et al., 2009; Mitchell and Coles, 2011). Integrating functions vertically offers the possibility of transforming raw materials into new products and thereby increasing the proportion of value captured. Trienekens (2011) identifies functional upgrading as a key issue in developing country value chains as most exports in are raw material form.

**Process upgrading**

This 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 and technologies which reduce postharvest losses (Mitchell et al., 2009). Process upgrading focuses on the one hand on upgrading the
product and on the other hand on optimization of production and distribution processes. The latter includes introduction of new technologies such as automated production and packaging lines, cooling installations and modern transportation technology as well as improved communication facilities in the supply chain such as internet connection, GPS systems or the intense use of mobile phones in production and transportation planning (Trienekens, 2011).

**Product upgrading**

This involves introducing new products or improving old products faster than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links (Kaplinsky and Morris, 2000). Along the same line, Mitchell and Coles (2011) defines product upgrading as making better products that hold greater value and fetch higher prices. One of the most common and intransigent barriers for the rural poor is that their output fails to meet market specifications, both in terms of quality and volume. Raising product quality and increasing the efficiency of production are critical prerequisites to accessing and competing successfully and beneficially in markets (Mitchell and Coles, 2011). Process and product upgrading are closely related because improving product quality often involves improvements to the production process (Mitchell et al., 2009).

**Inter-chain upgrading**

This is where chain actors introduce value adding processes from other chains to offer new products or services, for instance a farmer who enters into tourism activities (Trienekens, 2011). The new value chain is usually more profitable than the previous one for example shifting from growing traditional commodities to high quality export horticulture. Unfortunately, the upgrading process often has significant barriers to entry for the poor and vulnerable to access the more lucrative value chain (Mitchell et al., 2009).

**Upgrading of the enabling environment**

Although not an upgrading strategy in a strict sense, 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 (Mitchell et al., 2009; Mitchell and Coles, 2011). Such things as standards and certification, rules and regulations regarding contracts, etc. must be in place for successful upgrading in value chains to take place.

**MATERIALS AND METHODS**

The study was carried out in the eastern district of Namutumba. Carved out of Iganga district in 2006, Namutumba is located at coordinates 00 51N, 34 41E along Tirinyi road (Mbale-Iganga highway). It occupies a total area of 802 km² of which 138 km² is covered by water bodies. Administratively, the district is divided into six subcounties of: Namutumba, Magada, Bulange, Nsineze, Ivukula and Kibale. Given its abundant swamps and proximity to Lake Victoria, climate is tropical with small seasonal variations in temperature (22-27°C) and rainfall (900 to 1150 mm). As of 2011, the population estimate was 213,000 people of whom 51.5% were females. Smallholder subsistence farmers comprise 84% of the population. They engage in rearing livestock such chicken, cattle, goats, etc and growing crops such as rice, cassava, groundnuts, millet and coffee. Namutumba, together with the nearby districts of Iganga, Pallisa, Tororo, Butaleja, Bugiri and Busia form the main rice growing region of Uganda. The district is easily accessible due to its location along the highway.

Nsineze subcounty was purposively selected since it has most of the rice value chain activities taking place there. It has many rice farmers and rural millers and the nearby Busembatya trading center has a lot of rice milling and trading transactions which makes it to act as a link between rice farmers and urban traders. The researchers first conducted a desktop research to have basic idea about rice farming as a business in the study area. This was followed by discussions with key informants who included the chairperson farmers’ forum, representative from National Agricultural Advisory Services (NAADS), local council leaders and farmer group leaders. Focus group discussions were then carried out with 3 farmer groups each containing 10 people. Each group was a representative of a single parish. In addition, discussions with 3 groups of rice millers were conducted. One group of rice millers was in the rural farming area of Nsineze subcounty while the other two groups were in Busembatya trading center. This was necessary since millers from the rural village had different characteristics to those of town millers. For the purpose of cross checking the information got from group discussions, 15 farmers and 5 rice millers were selected for individual interviews. The major processing company in the region which is involved in purchasing the rice paddy from farmers and traders was interviewed to gather data on processing.

Analysis was done in the context of value chain upgrading as suggested by Trienekens (2011) with the help of descriptive statistics, tables, figures and gross margins.

**RESULTS AND DISCUSSION**

**Overview of value chain actors**

According to the group discussions, rice farmers own about 2 ha per household. Table 1 is a summary of landholding and land under rice cultivation which was captured from the individual household interviews.

The average land holding is 2.2 ha which is the same as reported in group discussions is. The actual landholding, however, varied significantly from 0.8 ha for
Table 1. Household landholding and rice cultivation.

<table>
<thead>
<tr>
<th>Farmer</th>
<th>Total land owned (ha)</th>
<th>Total land cultivated (ha)</th>
<th>Land under rice (ha)</th>
<th>Rice area as % of cultivated</th>
<th>Yield (tons/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.8</td>
<td>0.8</td>
<td>0.3</td>
<td>40.0</td>
<td>1.6</td>
</tr>
<tr>
<td>2</td>
<td>1.2</td>
<td>0.8</td>
<td>0.4</td>
<td>50.0</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>1.2</td>
<td>1.0</td>
<td>0.4</td>
<td>40.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4</td>
<td>1.4</td>
<td>1.4</td>
<td>0.4</td>
<td>28.6</td>
<td>3.3</td>
</tr>
<tr>
<td>5</td>
<td>1.6</td>
<td>1.4</td>
<td>0.8</td>
<td>57.1</td>
<td>3.8</td>
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<tr>
<td>6</td>
<td>1.6</td>
<td>1.4</td>
<td>0.6</td>
<td>42.9</td>
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</tr>
<tr>
<td>7</td>
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<td>0.6</td>
<td>37.5</td>
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<tr>
<td>8</td>
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<td>2.0</td>
<td>0.8</td>
<td>40.0</td>
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<td>50.0</td>
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<td>10</td>
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<td>25.0</td>
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<td>0.6</td>
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<tr>
<td>13</td>
<td>4.0</td>
<td>3.2</td>
<td>0.8</td>
<td>25.0</td>
<td>2.5</td>
</tr>
<tr>
<td>14</td>
<td>4.0</td>
<td>3.6</td>
<td>1.0</td>
<td>27.8</td>
<td>3.3</td>
</tr>
<tr>
<td>15</td>
<td>4.0</td>
<td>4.0</td>
<td>1.6</td>
<td>40.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Mean</td>
<td>2.2</td>
<td>2.0</td>
<td>0.7</td>
<td>36.7</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Source: Survey interview (Sep-Oct, 2013)

the smallest farmer to 4.0 ha for the largest. In contrast, the average land holding in region as reported in the agricultural census of 2008 is about 0.8 ha per household. This implies that rice farmers own on average more land than their non-rice farming counterparts. Average cultivated land was 2.0 ha of which 36.7% was under rice. The average rice yield was 2.7 tons/ha. This yield was achieved using seed from the previous harvest and without fertilizer application or irrigation. Chemical herbicide for *striga* weed was however applied.

Rice millers in the survey area can be categorized into two: (i) Rural village millers (hereafter referred to as ‘village millers’) who are located in deeper villages where rice farming mostly takes place, and (ii) Rural town millers (hereafter referred to as ‘town millers’) who operate from the trading centers. Using the results of group discussion, Table 2 compares these two categories of rice millers. The village millers are relatively new (2 years old) in business and use diesel as power source. The milling capacity of their machines is low (3.2 tons/day).

Despite their proximity to farms, they receive relatively low volumes of paddy ranging from 0.3 tons/day to 1.3 tons/day depending on the season. Due to high diesel price, they charge a relatively higher milling fee (100000 Ush/ton). On the other hand, the town millers have accumulated relatively more experience as they have spent 5 years on average in milling business. They use electricity as a source of power and the milling capacity of their machines is quite large (18 tons/day). Although the quantity of paddy received is larger, it’s well below the amount required by their milling machines. Because they are far from farmers and electricity is cheaper than diesel, their milling charges are relatively low.

Interviews with the manager of processing company revealed that it was started by individual entrepreneur with the support of government and other donors in Jinja town (in 2006). The company has a large milling machine with a milling capacity of 2 tons per hour and a mechanical dryer with a capacity of 5 tons per hour. It currently supports 10000 clients across the country with some as far as Western Kenya. The clients are mainly smallholder farmers who bring paddy by themselves when from Busoga sub-region (where the company is located) or offered transport service (when from elsewhere). Besides farmers, there are some 300 traders who bring paddy.

At the company premises there are several services which include drying, milling, branding, storing and marketing. Milling is of high quality as all foreign matter and unfilled grains are separated from paddy before milling. Commission is charged for these services on the clients after selling milled rice.

Rice market structure

Figure 1 illustrates the rice market structure in the study area. Most of the dried paddy is taken by individual farmers to rural rice millers for milling. The remaining paddy is either taken by individual farmers to medium scale processor (Upland Rice Millers) or sold to paddy traders who in turn take it to the processing company. The processing company works with up to 300 traders.
who source paddy from all parts of Uganda and other East African regions such as Western Kenya and Northern Tanzania. The paddy taken to the rural rice millers is sold immediately after milling to the waiting buyers. The buyers are mostly village assemblers who bulk the rice before selling to wholesaling traders from urban areas such as Iganga, Jinja and Kampala.

The paddy taken to processing company is dried to required standards (14% moisture content), milled, graded and branded before it is sold. Grading is based on the percentage of broken rice as all foreign matter is removed by the machine during milling. The graded rice is then branded according to varietal features of milled rice: (i) ‘Kayiso’ for lowland long and narrow grains; (ii) ‘Upland’ for NERICA varieties, and (iii) ‘Super’ for lowland short, thick, sticky and aromatic grains. These brands have some meaning attached to them. For example ‘Kayiso’ literally means needle shaped and comes from indigenous Ugandan varieties. Due to their promotion since 2003, NERICA cultivars are the most popular upland rice varieties in Uganda. To this end, the words ‘NERICA’ and ‘Upland’ are often used interchangeably by
farmers and consumers. ‘Super’ brand is associated with its superior cooking qualities. The branded rice is either sold to the distributors (wholesalers, retailers or exporters) or to final consumers (individuals, public and private institutions).

Besides rice, the processing company also produces other byproducts such as bran (for livestock and poultry feed) and husks which are currently being used as organic fertilizers in maize fields but plans are underway to be used for fuel supply.

**Limited market support**

Rice sector in Namutumba district boasts of a good network of governmental and non-governmental organizations. Table 3 indicates different organizations rendering support to farmers and the value chain activity supported. With the help from Japan International Cooperation Agency (JICA), the Uganda National Agricultural Research Organization (NARO) is constantly engaged in development of new rice cultivars and agricultural technologies. Organizations such as Sasakawa Africa Association (SAA), Africa 2000 Network (A2N) and National Agricultural Advisory Services (NAADS) are putting great efforts in rice farming technology dissemination and extension. The support however does not go beyond the farm level as shown by the interventions of various support organizations in the survey area. Besides the East African regional organization “Kilimo Trust”, which supports marketing initiatives through its private partnerships, there is minimum assistance in the area. Through the program ‘Development of Inclusive Markets in Agriculture and Trade (DIMAT)’, which is a partnership with Upland RiceMillers Ltd, Kilimo Trust is expected to reach 3000 rice farmers in the area of rice marketing. The outcome of the aforementioned rice marketing partnership is yet to be seen, however, as the program is still new and not yet rolled out. Bulk marketing which was promoted by SAA could not be sustained after the closure of the project although it was positively viewed by farmers. During the project period, farmers did not actively participate in the bulk marketing project. Instead, they would pack their rice and wait for the group leaders under SAA facilitation to come with the truck and take rice for milling. As a result there were no skills attained by participants during the project and this lead to the collapse of the initiative following the project closure. The rest of the organizations have concentrated on production with little assistance in postharvest handling and marketing. This is contributing to low quality rice produced by farmers. More support which is focused on quality improvement is required.

**Mistrust between farmers and millers**

In terms of financial credit, only one rice miller (former carpenter) was able to access credit from a microfinance institution (Pride Microfinance Ltd). Most millers used their own savings or borrowed from friends for their startup capital. Limited financial support is one of the reasons for low quality rice due to poor drying facilities. Efforts by millers to give financial credit to farmers have been futile due to failure in recovering. This has created mistrust between millers and farmers thereby derailing future hopes of credit offer.

Table 4 highlights credit recovery success by millers. All the millers who advanced financial credit to individual farmers recovered at most 70% of the total amount with the rest being defaulted. Since the buying and selling of rice takes place at the milling machine, informal agreement is formulated where farmers are supposed to mill their rice from the lender’s premises and credit be repaid after milling either in cash or in-kind. If applied appropriately, this arrangement is fair to farmers since sometimes interest rates are not factored into the recovery amount as millers anticipate a steady supply of paddy for the smooth flow of their business.

Unfortunately, more often the farmers fail to honor the agreement after harvesting and mill their rice from elsewhere due to misallocation of credit funds. However, one miller who gave credit to a group of farmers was successful and recovered 100% of the amount. In

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**Table 3. Interventions by support organizations.**

<table>
<thead>
<tr>
<th>Organization</th>
<th>Support activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research</td>
</tr>
<tr>
<td>Sasakawa Africa Association*</td>
<td>√</td>
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<tr>
<td>Africa 2000 Network</td>
<td></td>
</tr>
<tr>
<td>NAADS</td>
<td></td>
</tr>
<tr>
<td>NARO</td>
<td>√</td>
</tr>
<tr>
<td>JICA</td>
<td></td>
</tr>
<tr>
<td>Kilimo trust**</td>
<td></td>
</tr>
</tbody>
</table>

*Project activities in the survey area completed. **Still in pilot phase. Source: Farmers survey (September to October, 2013).
Table 4. Credit recovery by millers.

<table>
<thead>
<tr>
<th>Miller</th>
<th>Credit to farmers*</th>
<th>Amount recovered*</th>
<th>Recovery rate (%)</th>
<th>Lending modality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500000</td>
<td>300000</td>
<td>60</td>
<td>Individual</td>
</tr>
<tr>
<td>2</td>
<td>300000</td>
<td>200000</td>
<td>67</td>
<td>Individual</td>
</tr>
<tr>
<td>3</td>
<td>1200000</td>
<td>1200000</td>
<td>100</td>
<td>Group</td>
</tr>
<tr>
<td>4</td>
<td>1000000</td>
<td>700000</td>
<td>70</td>
<td>Individual</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Unit of measurement is Uganda Shilling (1US$ = 2500 Ush, as of Oct, 2013). Source: Survey (September to October, 2013).

addition, this miller did not offer financial credit but rather provided tarpaulins in-kind which were valued in cash for the purpose of repayment. Based on this model, it is recommended that credit be offered in form of tarpaulins to farmer groups through their leaders.

Price formation mechanism

Figure 2 is a sketch of price forming mechanism. Through interactions with other farmers or rice millers over phone or face-to-face, farmers get to know the possible rice price range for a particular day before taking it for milling. On the other hand, village assemblers also come to the miller with fair knowledge of the prevailing price after consultations with other buyers through phone. Since most traders come from distant locations and are interested in large volumes, they do not directly purchase from farmers but buy from village assemblers who bulk the rice. Price is determined through negotiations between the farmer and the village assemblers. It depends on the perceived quality as determined by the amount of broken rice and presence of foreign matter. Since there are no quality standards, the perceptions are done in comparison to other available rice. Other factors which influence price on a given day include: Number of traders, volume of rice and bargaining power of a particular farmer.

Village assemblers hold the market power

Farmers in the survey area engage in growing various varieties of rice which can be branded either as Super, Kayiso or Upland in the wholesale and retail markets. Unfortunately, at farm gate it is sold as single category irrespective of how distinct it may appear. During drying, different varieties are usually mixed either voluntarily by farmers due to limited space or involuntarily by birds when spread separately but adjacent to each other. Because the rice offered by farmers to the market is mixed, village assemblers pay the price for the lowest quality brand even if it constitutes a minor share of the farmer’s rice. Farmers in the survey area grow mainly NERICA as a result of previous assistance by Sasakawa Africa Association. However, their rice has been bought at a price comparable to that of Kayiso instead of Upland which is the true brand for NERICA rice varieties. After reaching the wholesale market, traders sell it as Upland without adding any value. Given that prices for various brands are different, farmers lose money in this process.

Table 5 gives rice prices at different marketing levels. ‘Kayiso rice’ is the cheapest, followed by ‘Upland rice’ with Super brand being the most expensive at wholesale and retail price. This implies traders hold power and influence in rice markets at the expense of farmers. Farmers will need to be more coordinated and practice appropriate postharvest procedures if they are to benefit from high price of their rice. Worth noting however, whereas the wholesale and retail prices are quoted from the nearby market, it’s important to note that most of rice produced in survey area is procured and taken by Kampala traders.

Market constraints to farmers

Striga weed is the most severe problem at the production stage. The weed causes many unfilled grains and consequently a low milling recovery. It also increases labor costs as it is cumbersome to eradicate and thus necessitates agricultural chemicals. The weed is more destructive to certain rice cultivars than to others. NERICA 4, the mostly grown cultivar in the survey area is so susceptible and can result into significant crop losses. However, NERICA 10, a newly introduced variety in Uganda is resistant to striga weed (Rodenburg et al., 2015). Given that it gives higher yields, switching from growing NERICA 4 to NERICA 10 is a viable consideration.

The most market related challenge to rice farmers is lack of drying facilities. Paddy is dried on bare ground and as a result it ends up mixing with a lot of foreign matter. Coupled with poor moisture control, this leads to low milling quality. Failure of farmers to dry different rice varieties separately lowers their potential income. There is need for post-harvest oriented training with emphasis on drying. Training alone without investment in basic drying facilities such as tarpaulins and moisture meters may not be of much help. Given that farmers do not have the financial ability for investing in the drying facilities, collaboration with other value chain actors mainly millers...
for financing is essential. However, there is no trust between farmers and millers which hampers any financial credit advancement possibilities. Therefore, processes aimed at building trust between various stakeholders such as horizontal and vertical coordination are encouraged.

Table 5. Monthly rice prices (Uganda shillings, Ush).

<table>
<thead>
<tr>
<th>Distribution point</th>
<th>Brand</th>
<th>Average monthly price (Ush/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm gate</td>
<td>Kayiso, Upland, Super</td>
<td>1700</td>
</tr>
<tr>
<td></td>
<td>Kayiso</td>
<td>1750</td>
</tr>
<tr>
<td>Wholesale</td>
<td>Upland</td>
<td>2400</td>
</tr>
<tr>
<td></td>
<td>Super</td>
<td>2850</td>
</tr>
<tr>
<td>Retail</td>
<td>Kayiso</td>
<td>2100</td>
</tr>
<tr>
<td></td>
<td>Upland</td>
<td>2700</td>
</tr>
<tr>
<td></td>
<td>Super</td>
<td>3200</td>
</tr>
</tbody>
</table>

Source: Survey (September to October, 2013), Infotrade Uganda database
Table 6. Constraints to rice milling.

<table>
<thead>
<tr>
<th>General challenge</th>
<th>Specific problem</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster power supply</td>
<td>Frequent disconnection due to poor payment of bills by cluster members</td>
<td>Each individual should be allocated a separate meter</td>
</tr>
<tr>
<td>Low milling quality</td>
<td>Paddy usually contains foreign matters such as stones and dirt</td>
<td>Training of farmers in post harvest handling</td>
</tr>
<tr>
<td>Lack of trust between</td>
<td>Recovery of credit advanced to individual farmers by millers has been unsuccessful</td>
<td>Credit should be advanced to a group of farmers for easy monitoring should be emphasized</td>
</tr>
<tr>
<td>millers and farmers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable paddy supply</td>
<td>Available paddy is far below the milling capacity, this worsens during off-season</td>
<td>Productivity and market improvement</td>
</tr>
</tbody>
</table>

Source: Survey (September to October, 2013).

Table 7. Daily gross margin by rice millers.

<table>
<thead>
<tr>
<th>Item</th>
<th>Rural village millers</th>
<th>Rural town millers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue (Ush/day)</td>
<td>130000</td>
<td>-</td>
</tr>
<tr>
<td>1.3 tons at 100000</td>
<td>-</td>
<td>200000</td>
</tr>
<tr>
<td>2.5 tons at 80000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total revenue-A</td>
<td>130000</td>
<td>200000</td>
</tr>
<tr>
<td>Operating costs (Ush/day)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Labor</td>
<td>7000</td>
<td>20000</td>
</tr>
<tr>
<td>Electricity</td>
<td>-</td>
<td>75000</td>
</tr>
<tr>
<td>Diesel</td>
<td>65000</td>
<td>-</td>
</tr>
<tr>
<td>Oil at 3200/L</td>
<td>3200</td>
<td>6400</td>
</tr>
<tr>
<td>Rent</td>
<td>-</td>
<td>8000</td>
</tr>
<tr>
<td>Total operating costs -B</td>
<td>75200</td>
<td>109400</td>
</tr>
<tr>
<td>Profit (A-B)</td>
<td>54800</td>
<td>90400</td>
</tr>
</tbody>
</table>

Source: Survey (September to October, 2013).

Challenges facing small scale millers

Small scale rice milling is done by diesel operated machines in villages and electricity operated machines in towns. To minimize on defaulters by the power company, rice millers were advised to form clusters through which they were to be connected to electricity. However, the initiative was not successful as several members were operating without paying the fees. The end result was frequent disconnection from the electric power grid due to defaulting cluster members. The faithful members who committed themselves to paying their fees have not been spared. They are suffering to service the debt of their defaulting counterparts so that they can sustain their business. Since clusters seem to have failed, allocating each miller individual electric meter is worth trying. The power cost is also high as it constitutes 69 and 86% of total costs to town millers and village millers respectively. Table 6 summarizes the challenges facing rural rice millers. Besides the aforementioned power related challenges, the amount of paddy available keeps fluctuating. During off season this problem worsens forcing some millers out of business. Low paddy quality also affects the milling machine thereby necessitating frequent servicing.

With all the above challenges, small scale rice milling is still worth conducting due to its profitability. Table 7 shows daily profits accrued by village and town rural millers as calculated by the difference between income and operating costs. It is 54800 and 90400 Ush per day for village and town millers respectively. On monthly basis the average profit of village millers translates into 1.6 million Ush which is more than tenfold the average household income in Eastern Uganda (155500 Ush).

Constraints and coping strategies by the processing company

The company regularly evaluates its activities and
Table 8. Constraints to rice processing.

<table>
<thead>
<tr>
<th>Value chain function</th>
<th>Previous challenge</th>
<th>solution/upgrading opportunity</th>
<th>New/potential challenge</th>
<th>planned solution/upgrading opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drying</td>
<td>Drying was mostly by sun on tarpaulins moisture content difficult to control, paddy spillage and some consumed by birds, crashed by workers during spreading, washed away by rains</td>
<td>High capacity mechanical dryer (5 tons/h) installed</td>
<td>Power shortage as a result of biweekly load shedding</td>
<td>Contemplating production of power from rice husks to avoid power disruptions</td>
</tr>
<tr>
<td>Storing</td>
<td>Limited storage space which encourage pests and diseases to emerge</td>
<td>Modern warehouse (3000 tons) has been constructed where farmers' rice is stored freely before and after milling</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Milling</td>
<td>Unstable supply of paddy necessitating imports from Kenya</td>
<td>Partnership with other stakeholders to increase local production (e.g., 3000 new farmers will be supported by KILIMO TRUST)</td>
<td>Milling capacity of currently used machine (2 tons/h) may not be enough during peak hours</td>
<td>A higher capacity milling machine is in the plans of being installed</td>
</tr>
<tr>
<td>Sorting and grading</td>
<td>Four grades produced: A, B, C, D. A (no broken), B (less broken), C (more broken) and D (all broken). C grade comprises highest proportion due to poor drying</td>
<td>Mixing grades B &amp; C to allow farmers get high income</td>
<td>Quality compromised and consumer trust lost</td>
<td>Plans are underway to equip the laboratory with various testing capabilities to minimize broken and foreign matter</td>
</tr>
<tr>
<td>Branding and marketing</td>
<td>Three brands are produced: kayiso (80%), upland (18%) and super (2%). Super is highly demanded but low supply due to unsuitable soils</td>
<td>Paddy for super brand imported</td>
<td>Higher price (27%) compared to locally produced varieties</td>
<td>Suitable soils have been identified in Soroti area and through several partnerships, local production is to be intensified</td>
</tr>
</tbody>
</table>

Source: Survey (September to October, 2013).

designs new strategies to overcome current and future challenges. Table 8 shows such innovations according to different processing functions. Originally paddy was sun dried on tarpaulins. Due to a number of challenges associated with sun drying, a high capacity mechanical dryer was purchased. Shortage of power supply due to load shedding, however, emerged as a fresh challenge. The company is now planning to start power generation from rice hulls as a backup source. Economic viability of such option needs to be assessed before the company starts the initiative. Since many sugar companies in the country are now producing their electricity from bagasse, there is genuine optimism. The increasing number of paddy supplying clients had put pressure on available storage place. This meant that many paddy and rice bags were crammed which in turn resulted into conducive environment for disease and pests outbreak. In response to this challenge, the company set up a modern and spacious (3000 tons) warehouse which has significantly improved storage quality. There is periodic shortage (15%) in the amount of paddy received especially in period of February to May each year. The company tried to overcome this challenge by importing from Kenya for the short term. Partnerships with other organizations are being signed to increase local rice production to stop paddy importation. It is believed, such arrangement with no doubt will avail more paddy than the milling capacity of the current machine.

To prepare for this anticipated challenge, the plans are underway to install a higher capacity milling machine. Currently, milling results into four grades of rice: (i) A (100% wholly milled rice), (ii) B (up to 30% broken rice), (iii) C (31-70% broken rice) and (iv) D (more than 70% broken rice). Rice price decreases with grades from A to D, with A being the most expensive. Due to poor postharvest handling, farmers’ rice is always dominated by grade C which commands lower price in the market and consequently low income. To help farmers earn more, the company has been marketing three grades (A, B-C and D) by mixing grades B and C. However, this has
been done at the compromise of product quality which deteriorates consumer trust.

The company is now encouraging farmers to bring freshly harvested paddy so that it can be dried from the premises. At the same time it is equipping the laboratory with chemicals and other instruments for various quality tests to reduce percentage of broken rice and improve milling quality. Super rice, is the most demanded brand, is in limited supply since its varieties do not grow well in most Uganda soils. Most of the paddy for Super rice is currently imported from Tanzania. This has resulted into higher prices which average consumers cannot sustain. Countrywide soil testing has been carried out and Soroti area soils been identified as ideal for Super rice cultivars. Through public-private partnerships, efforts to promote production of Super rice in Soroti are into consideration.

An appraisal of upgrading practices in the study area

Horizontal coordination

To a small extent the farmers were organized into farmers groups. In reality however the groups seemed non-existent as no activity was carried out in group apart from trainings. Initially, input purchase and paddy marketing were done collectively through groups with the help of Sasakawa Africa Association. Trucks, often coordinated by Sasakawa, would move from member to member gathering the paddy after weighing, take it for milling before selling to major buyers. Members would then be paid depending on the proportion of their paddy. This process ensured higher selling prices and lower marketing (mainly transportation) costs. In this way, farmers would earn more than if they sold individually. Since members played a passive role in marketing activities, they did not acquire the skills required for sustainability of the initiative. Consequently, collective marketing collapsed after the completion of Sasakawa project in the area. For the rural town millers, the only coordination they had was sharing the power through clusters. Failure by some members to meet their obligation of contributing to the utility charges has led to accumulated debt thereby resulting into frequent disconnection from the power grid. A lot of training on cluster benefits and management should be conducted by the electricity company. Meanwhile, downgrading to individual electricity meters in the short term is worth considering.

Vertical coordination

Even though there is no formal relationship between different chain actors, they occasionally coordinate. Rural rice millers have been trying to lend money to farmers to help in rice production. Because they do it in an informal way, recovery of credit has been difficult. As a result, they have cut off such arrangements due to the loss of trust in farmers. The medium scale processing company has contracted traders to help in collecting paddy from farmers. In collaboration with other development partners, the company is also hiring agricultural specialists to train farmers in modern rice production and postharvest technologies. In addition, farmers are provided with drying and storage services on the company premises.

Functional upgrading

Previously farmers would sell their paddy to village collectors who would move from farmer to farmer. This trend has recently changed as most of the paddy is currently taken by farmers for milling before selling. This can be viewed as a form of functional upgrading as farmers are taking up the role of paddy traders. The processing company, which used to sell rice bran to livestock and poultry feed manufacturers, has started making feeds itself before selling. The company is also in the process of turning the rice husks into power supply source which will be used as a backup in case of electricity load shedding. Plans to add diversified products like chips, cakes, flour and wholegrain cereals are underway.

Process upgrading

To improve productivity in rain-fed rice farming system, farmers in the survey area adopted the cultivation of NERICA 4 which requires less amount of water. Unfortunately, the cultivar is susceptible to striga weed which is causing significant yield losses. Switching to NERICA 10 which is more yielding and resistant to the weed will be a worthwhile venture. Poor drying of paddy results into poor milling quality. Most rural millers have tarpaulins at their premises to help drying the rice to required moisture content before milling. However, they do not possess the moisture meters for observing the recommended moisture contents. To obtain optimally dried paddy, they will need to purchase moisture meters. The medium scale processing company has installed a mechanical drier which is more efficient in paddy drying.

Product upgrading

This form of upgrading is still the most challenging to rural farmers and millers. Paddy is usually sun dried on bare ground leading to quality deterioration of milled rice. In some cases paddy mixes with metals such as nails which keep damaging the milling machines. The viable solution is drying on tarpaulins but rural rice millers do not have enough financial credit to support the farmers. To dry 2.0 tons of paddy (average output per farmer), 4
pieces of tarpaulin worth 200000 Uganda shillings are required. This implies that rice millers would need considerable investment beyond their capability to support farmers. The medium scale processing company has a mechanical dryer which ensures optimum moisture content and minimizes foreign matter in the paddy. It also has a destoner incorporated into the milling machine which removes stones and other foreign matter from the paddy before milling. The newly constructed spacious warehouse provides good aeration which prevents diseases and pest infestation during storage. The quality standard of the rice, however, is still questionable as it is not yet certified by the national certification body.

**Inter-chain upgrading**

During paddy shortage, rural rice millers always divert to milling of maize into flour. In that way, they are able to smooth their income throughout the year. In the same way, paddy traders always venture into maize and coffee trading during paddy shortage.

**Upgrading of business environment**

This has been observed by agreements and partnerships between the processing company and other development agencies in the area. One such partner is Kilimo Trust which aims at improved market opportunities for smallholder farmers.

**Conclusion**

Ugandan rice value chain is long with many actors who hold varying degrees of power and influence. There are many smallholder farmers who produce rice either individually or in groups. However, marketing is mostly done on individual basis which significantly reduce the power of farmers. Given that most rice millers provide milling services at a commission rather than engaging in buying of rice, market power remains with rice assemblers who purchase rice from farmers and sale to wholesalers. Farmers tend to have low bargaining power due to the small volumes of rice they individually supply to the market. For farmers to raise their bargaining power there is need for horizontal coordination and aggregate their produce before selling. Currently, many farmers have joined groups aimed at joint production. Formation of these groups has been facilitated by several development organizations. However, marketing receives less attention and is supported by few agencies. More marketing support in terms of group formation, trust and management skills is required.

In liberalized rice sector of Uganda, bargaining power alone is not enough to improve the incomes of farmers. The high rice milling costs will need to lower for farmers to improve the profitability of rice farming. Although both diesel and electricity costs are high, farmers can save significantly if they mill their rice using electricity operated machines. Similarly, rice millers make a better profit with electricity operated compared to a diesel operated machine. A program aimed at rural electrification is beneficial to all stakeholders and can play a major role in improving the competitiveness of rice produced by Ugandan farmers.

Lower cost contributes to competitiveness to a certain extent and the rest is covered by high quality. Unfortunately, the quality of Ugandan rice is still low due to poor postharvest handling and simple milling machines without cleaning and grading capabilities. The most critical stage of postharvest handling is drying where foreign matter mixes with paddy leading to further quality deterioration as paddy is spread on the bare ground. If farmers were trustworthy, they would get advance financial credit from millers to invest in basic drying equipment like moisture meters and tarpaulin to improve the quality of their rice. However, farmers’ failure to repay the credit has led to mistrust between them and their lenders and as a result hampered any credit advancement. This necessitates strengthening of the linkages between different chain actors through vertical coordination. Vertical coordination is essential in building the relationship and trust between several actors across the chain which can result into a win-win scenario for all the participants.

Since the predominantly grown rice variety (NERICA 4) is susceptible to parasitic weeds, farmers lose potential income through yield losses and quality reduction. It is therefore advisable that various stakeholders involve in sensitization of farmers about available weed resistant and high yielding varieties such as NERICA 10.

Whereas this paper explores the challenges affecting Ugandan rice sector amore and highlights low rice quality as one of the major constraints. More research on how to improve the quality is recommended.

**Conflict of interest**

The authors have not declared any conflict of interest.

**ACKNOWLEDGEMENT**

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Full Length Research Paper

Market diversification opportunities for namibian fish and fish products

Teweldemedhin M. Y.1* and Chiripanhura B2

1Department of Natural Resources and Agricultural, Polytechnic of Namibia, 13 Storch Street, Windhoek, Namibia.
2Department of Economics, University of Namibia, Namibia.

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Decision Support Model (DSM) used to identify realistic export opportunities using a subsequent filtering process. The filtering process includes four sequential filters; the first filter includes a political and commercial risk assessment as well as a macro economic analysis. The second filter consists of the detection of possible export opportunities by means of market size and both short- and long-term market growth. The third filter identifies realistic export opportunities utilising a market accessibility index, which includes the following parameters. The fourth and final stage of the filtering process involves the analysis of the identified export opportunities in terms of their ranking according to accessibility and performance. The DSM identified the top seven export opportunities; these include in descending order: The United States of America, Japan, China, Germany, Spain, Thailand and France.

Key words: Namibian fish, diversification, Decision Support Model (DSM).

INTRODUCTION

Namibia is regarded as an upper middle income country, with a GDP per capita of approximately US$ 5,293. Despite this status, the country is characterised by many social and economic challenges. Income inequality is high, estimated Gini coefficient of 0.59 but has been falling over the past 20 years (IMF, 2013). The level of poverty and the cost of living are high, and thus quality of life is not in unison with the macro indicators. The incidence of poverty is estimated at about 30% of the population, and it is estimated that about half the poor population is in severe poverty. The majority of the population is rural-based, but urban poverty is deeper than rural poverty. The human development index rate is very low, at 0.61 (ranked 128th out of 186 countries), and unemployment averages about 30% of the labour force, and is worst among the youth. The economy relies on exports, mainly of primary products, to raise necessary foreign currency. Thus, apart from internal social and economic challenges, Namibia is largely an open economy, and it is therefore vulnerable to the vagaries of world economic fluctuations. This situation is further worsened by the heavy reliance on South Africa for basic vital import commodities (NSA, 2013).

As part of the initiatives to address the above challenges, the nation crafted national vision 2030 operating within five-year National Development Plans
(NDP). And there are many other intervention initiatives. That includes Targeted Intervention Programme for Employment and Economic Growth (TIPEEG), which sought to promote labour intensive growth to promote ‘star’ industries for expansion and employment creation. The tourism and fisheries sectors were identified among the exhibiting significant growth potential (NSA, 2013).

The fisheries sector contributes about 3.5% to Real GDP, even though the contribution is small. However, it regarded as an important sector due to (i) it is the fourth-largest foreign currency earner (as of 2012); (ii) it is a biggest employer, especially in the Erongo region; and (iii) it has potential to contribute to food security and income generation (NSA, 2013).

Namibia’s coastline falls within the Benguela current system, a system that is rich in pelagic (deep sea) and demersal fish, supported by plankton production driven by intense coastal upwelling. Such systems support a relatively low diversity of species, but are, at the same time, among the most productive habitats in the world. Because of the desert coastline, the Namibian coast has few urban settlements, unlike most other coastlines in the world, which tend to be very densely populated. The lack of dense settlements means that there is not much pollution in Namibia’s marine waters, which could adversely affect the marine ecosystem (IMF, 2011).

This paper also argues that, to get maximum benefits from the fisheries sector, there is need for diversification and increased investment. Thus this will help to stimulate local economic development and employment. Diversification would also lower the sector’s vulnerability to economic shocks that affect the export markets (like the recent financial crisis). Export development by means of market diversification creates trade through unlocking additional supply potential. The exploration and analysis of alternative markets will comprise of in-depth market analysis and supply strategies for the most lucrative export opportunities. This will allow the industry to make wise decisions, as the industry’s profit potential is largely determined by how it positions itself in order to take advantage of opportunities and overcome potential threats.

**METHODOLOGICAL AND DATA APPLICATIONS**

In this study two methodological approaches were used that includes (i) The Decision Support Model (DSM), modelling realistic export opportunities and (ii) Bubble graph produced from trade statistics for international business development

**The Decision Support Model (DSM): Modelling realistic export opportunities for Namibian fish products**

The DSM was first developed by Cuyvers et al. (1995:173-186) in order to identify the product-country combinations with the highest export potential for a specific country. It was specifically designed to provide export promotion organisations with a more scientific way to determine the products and destination countries on which to focus their scarce export promotion resources.

The DSM starts with all countries and products worldwide, then, through a screening process, identifies realistic export opportunities (REOs). The DSM consists of four consecutive filters that sequentially eliminate less realistic/interesting product-country combinations in an effort to categorise and prioritise REOs for the country for which it is applied. The filtering process is based on Walvoord’s (1983) cited Chasomeris (2007) model of international market research, and is illustrated in Figure 1.

Filter 1 assesses the political and commercial risks of doing business with every possible importing country worldwide. It investigates macro-economic indicators to determine if the importing countries have adequate overall market size and growth potential. Filter 2 assesses the import demand for the various HS 6-digit products in the remaining countries by analysing the import size and growth. Filter 3 examines the accessibility of each market by assessing the degree of market concentration and the barriers to entry. After the third filter, a list of export opportunities (product-country combinations) with potential can be extracted. Finally, Filter 4 categorises these potential export opportunities based on the strength of the exporting country’s relative market share (compared to that of the top six competitors) and the import size and growth in each of the identified markets. Each filter is discussed in detail following.

**Filter 1: Identifying preliminary market opportunities**

In this filter, countries that pose high political and/or commercial risks to the exporting country (filter 1.1) and do not show adequate economic size and growth (Filter 1.2) are eliminated. Starting with all possible trading partners (that is, the rest of the world).

**Filter 1.1: Political and commercial risk assessment**

Commercial risk: That include (i) economic and financial indicators (e.g. devaluation of the currency, real interest rates, GDP growth and inflation), (ii) indicators that reflect the country’s payment experience; and (iii) indicators that characterise the institutional context in which local companies operate (e.g. corruption index, transition economy) (ONDD, 2014).

Political risk: Assessment of the country’s economic and financial situation. (i) country’s economic situation is evaluated using three sets of indicators, namely economic policy performance indicators (e.g. fiscal policy, monetary policy, external balance, structural reforms), growth potential indicators (e.g. income level, savings, investments), and external vulnerability indicators (e.g. export diversification and aid dependency); (ii) assessment of the political situation, which is based on a quantitative analysis of the political risks associated with doing business in the country, and (iii) payment experience analysis (ONDD, 2014).

**Filter 1.2: Macro-economic size and growth**

Countries that pass through Filter 1 have to pass another set of filtering criteria based on a country’s size (measured by GDP and GDP per capita) and growth (GDP growth and GDP per capita growth values) (Cuyvers et al., 1995:178).

**Filter 2: Identifying possible opportunities**

Filter 2 assesses the import demand for the various HS 6-digit product categories in the remaining countries in order to identify product-country combinations (markets) with adequate import size and growth. Three criteria are used in this filter, namely short-term
import growth, long-term import growth, and import market size (Cuyvers et al., 1995:185).

**Filter 3: Identifying probable and realistic export opportunities**

Cuyvers et al. (1995:180) note that selecting an export market on the basis of size and growth does not necessarily mean that entry into that market will be easy. For this reason, filter 3 takes into account trade restrictions to further screen the remaining possible export opportunities. Filter 3 considers two categories of barriers to trade, namely the degree of concentration (Filter 3.1) and trade restrictions (Filter 3.2) (Cuyvers, 2004:261).

**Filter 3.1: Degree of import market concentration**

A highly concentrated market is difficult to enter (Cuyvers et al., 1995:180). A highly concentrated import market is one where a few exporting countries hold a relatively large market share and therefore have a lot of knowledge about the market. It will be inefficient for national export promotion agencies with limited resources to focus on heavily concentrated markets for which the chances of successful exporting are relatively small.

**Filter 3.2: Trade barriers**

This filter incorporates information on the trade barriers the exporting country would face in international trade. These include tariffs, non-tariff barriers, trade costs, trade time, distance, infrastructure and logistics.

**Filter 4: Final analyses of opportunities**

The last filter categorises and prioritises the realistic export opportunities identified in Filters 1 to 3. There is no market elimination, and for each market from Filter 3, the relative market share of the exporting country (country $i$) of product category $j$ in country $i$. 

**RESULTS AND DISCUSSION**

Market diversification opportunities for Namibian fish and fish products: DSM

Table 1 summarises the realistic export opportunity by country and HS product code. It considers the market share and potential of importing countries (and total exporting capacity of more than USD500million for Namibia), the following countries listed below comes top:

1. The United States of America: It is a top market for frozen shrimps and prawns, whether or not in shell (HS30613); and also for frozen fish fillets (HS30420). It is also a potential market for fish fillets and other fish meat,
whether or not minced (excluding 30302 and HS30420).
It is characterised by a large product market with long-
term growth, and thus general market potential.
2. Japan: Top market for frozen shrimps and prawns,
whether or not in shell (HS30613); and also for frozen
fish fillets (HS30420). It falls under large product market
with short- and long-term growth, thus it offers general
market potential.
3. China: Constitutes a market for frozen fish not
elsewhere specified (excluding fillets and other fish meat
of 03.04/livers and roes: HS30379). It passes for general
market potential and a large product market with long-
term growth.
4. Germany: is a potential market for frozen fish fillets
(HS30420). It is filtered as a growing market (short- and
long-term), and therefore a product market to be
considered.
5. Spain: Has a market for frozen shrimps and prawns,
whether or not in shell (HS30613); it passed for a larger
market with general market potential.
6. Thailand: is a potential market for frozen skipjack/stripe-bellied bonito (Euthynnus Katsuwonus pelamis) (HS30343).
7. France: Is a potential market for Pacific salmon/Atlantic
salmon/Danube salmon (HS30212) and frozen fish fillets
(HS30420).

However as indicated in the table, Namibia does not have
specialisation in all exportable fish commodities (Column
8). There is need for more work and investment towards
producing some of the fish products identified. Namibia
has potential export capacity to increase exports of
different fish products to the USA, Japan, China,
Germany, Spain, France, Thailand, France and Italy.

Prospective diversification of fish export markets:
Bubble graph
Further analysis of the export opportunities and
prospective market diversification opportunities also
tested using bubble graph from the International Trade
Centre (ITC, 2014) data base that is at product
level. The bubble graphs below produced for potential
export markets for products HS03 (fish, crustaceans,
molluscs, aquatic invertebrates (representing all the
general fish and fish products)) and HS0303 (frozen fish,
whole). Namibia has comparative advantage in the latter,
and it constitutes the largest proportion exported, in both

Table 1. Realistic export opportunities based on Market share and potential importing countries.

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In the above table Namibia defined relatively small and potential importing countries for more than USD500 million included.
Figure 2. Bubble graph for export market diversification for product HS03 to the rest of the world. Source: Trade statistics for international business development (12/2014) (http://www.trademap.org).

Product HS03: Fish, crustaceans, molluscs and aquatic invertebrates

The bubble graph illustrates exports to certain main destinations for particular fish and fish products. This would provide the prospective of market growth and demand to the specific region.

The figure shows that the annual growth of partner countries’ imports from the world are concentrated around 20%, with bigger bubbles for Japan and USA. Spain shows the largest portion share of Namibian exports (nearly 30%), followed by the DRC and South Africa respectively. However, Namibia’s fish exports growth to Spain and to South Africa is less than the two countries’ exports to the world.

Analysis of prospective exports to the African market alone shows four main destinations for Namibian fish and fish products – DRC, South Africa, Mozambique and Angola. The rest of the countries individually constitute less than 1% of market share (Figure 2).

Among the top export markets, the growth of Namibian exports to the DRC and to Mozambique is larger than the growth of the growth of the two countries from the world (Figure 3). This means there is potential for enhancement of market share in these countries. However, the situation is different when it comes to South Africa and Angola: Namibia’s exports to the two countries hags behind world exports to the two. This indicates markets where there is competition, with Namibia being in a disadvantageous position.

The analysis of HS03 exports to Asia is shown in Figure 4. It shows that Namibia’s exports to Asia are very low (at less than 1%), which may be indicative of the lower demand for the product HS03 in that region.

There could be several reasons for this: distance could be one, and that some fish harvested in the Atlantic has less fat than similar types harvested from the Indian Ocean. Many of the countries may also be able to produce their own fish, perhaps more cheaply.

Figure 5 shows the perspective export of product HS03 to the EU. Many of the countries fall within the zero to 5% growth band. Even within these, Namibia has better export potential in trade with Germany, the UK and Poland where the country already has exports growing faster than the three countries’ imports from the world.

Namibia also has potential to increase exports to Italy, Ireland, Portugal, Sweden and France where its export growth has been lagging behind that of the rest of the world to the five countries. Spain is an outlier consuming nearly 30% of Namibia’s output of product HS03. Like to the five EU countries above, Namibia has potential to increase exports to Spain, as attributed as the majority of the fish exporter companies are from Spain.
Figure 3. Bubble graph for export market diversification for product HS03 to Africa. Source: Trade statistics for international business development (2014) (http://www.trademap.org).

Taking the market diversification analysis to a more specific product, frozen fish, Figure 6 shows higher growth in Mozambique, South Africa, Spain and DRC compared to the other importing countries.
As for Asia (Figure 7), the only opportunities exist in Japan and China. Overall, fish trade with Asian countries is low. As for exports of frozen fish to the EU and to Africa, the same picture emerges as in the bubble graphs above. To the EU, Spain, Italy, Portugal and France remain growth potential markets because Namibia’s exports growth to these countries is less than growth of imports from the rest of the world to the countries. The other markets, where export growth is larger from the rest of the world, may be important niches that exporters need to maintain. In Africa, the situation is different for the DRC: there is potential for growing the exports of frozen fish to that country, as is the case with South Africa and Angola. Cameroon appears as a high growth market where Namibian frozen fish has dominance.

Figure 8 presents an interesting perspective regarding worldwide growth of the consumer demand for fish, pegged at 7%. The very high demand for fish in Zambia is an outlier. Given the geographical proximity of Zambia to Namibia there is potential to exploit this market opportunity. In general, the diagram shows above average growth in consumer demand in several African countries.

In Europe, Spain remains the main market for Namibian fish. Although Italy and France have been observed to be markets with growth potential, the figure above seems to indicate that they will be highly competitive given the low growth in demand for fish.

CONCLUSIONS AND IMPLICATIONS

Decision Support Model (DSM) used to identify realistic export opportunities using a subsequent filtering process. The filtering process was applied to 150 countries and included 32 fish and fish products classified according to the 6-digit Harmonised System nomenclature. The filtering process includes four sequential filters; the first filter includes a political and commercial risk assessment as well as a macro economic analysis. The second filter consists of the detection of possible export opportunities by means of market size and both short- and long-term market growth. The third filter identifies realistic export opportunities utilising a market accessibility index, which includes the following parameters: Market concentration for each product per importer; shipping time (including inland transport and handling, obtaining relevant documentation, customs clearance and inspection and

Conflict of Interest

The authors have not declared any conflict of interest.

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