**THE INTERPLAY BETWEEN MARKETING ENVIRONMENT AND POST-HARVEST FISH LOSS IN LAKE VICTORIA SARDINE FISHERY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF BUSINESS ADMINISTRATION OF THE OPEN UNIVERSITY OF TANZANIA**

**2017**

# CERTIFICATION

The undersigned certify that I have read this dissertation and I am satisfied that it can be submitted to the Open University of Tanzania for the dissertation titled, ‘The Interplay between Marketing Environment and Post-Harvest Fish Loss in Lake Victoria Sardine Fisheryin partial fulfilment of the requirement for the award of the Masters of Business Administration of The Open University of Tanzania.

……………………………..

Dr. Raphael Gwahula

(Supervisor)

.................................................

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# DECLARATION

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Date

# DEDICATION

This work is dedicated to members of the African Network for Fish Technology and Safety (ANFTS).

# ACKNOWLEDGEMENTS

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**ABSTRACT**

The objective of this study was to examine the interplay between marketing environment and post-harvest fish loss in Lake Victoria Sardine fishery. The main research question was how the marketing environment aggravate post-harvest fish loss problem? The research was prompted by persistence of high post-harvest fish loss in small-scale fisheries irrespective of high demand for fish to feed the growing human population and efforts being taken to reducing it. The study applied exploratory research techniques using Lake Victoria Sardine fishery as a case study. The sample comprised of 600 respondents. Data for this study were collected by using qualitative method and analysed using SWOT analysis. Micro-marketing environment actors and macro-marketing environment forces were independent variables whereas post-harvest fish loss was the dependent variable, and transaction time as moderating variable. The findings revealed that there are lots of macro-marketing environmental forces that affect actors’ capability to efficiently get Lake Victoria Sardine to target markets. Consequently, it takes over 50 days to place much of the produce to market, as opposed to an average of 20 days shelf-life. The delay exacerbates quality degradation and post-harvest fish loss. The study has concluded that, post-harvest fish losses should be considered not only in terms of microbiological, autolysis and rancidity, but also by influences exerted by marketing environmental actors and forces. In this regard, policies need to be reviewed to creating conducive market environment as a basis for reducing high post-harvest fish losses.

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# LIST OF ABBREVIATIONS

CAS Catch Assessment Survey

CCRF Code of Conduct For Responsible Fisheries

FAO Food and Agricultural Organization of the United Nations

FBOs Fishers’-Based Organizations

ICT Information Communication Technology

IFLAM Informal Fish Loss Assessment Method

KIFM Kilumba International Fish Market

LT Load Tracking

LVFO Lake Victoria Fisheries Organization

LVS Lake Victoria Sardine

ME Marketing Environment

MALF Ministry of Agriculture, Livestock and Fisheries

NRI Natural Resources Institute (UK)

PHFL Post-Harvest Fish Loss

QLAM Questionnaire Loss Assessment Method

SC Supply Chain

SSFs Small-Scale Fisheries

SSI Semi-Structured Interview

SWOT Strength, Weakness, Opportunity and Threats

TAFIRI Tanzania Fisheries Research Institute

# CHAPTER ONE

# 1.0 INTRODUCTION

* 1. **Background**

Small-Scale Fisheries (SSFs) employ the majority of fishers and fish workers in Tanzania, contributing substantially to food security and livelihoods through their role in providing nutritious food and income. Inland fisheries are particularly important, especially that of Lake Victoria which alone produces over 60% of annual fish landing in the country (URT, 2015). As in the case of many SSFs of the world, Lake Victoria fishery faces a number of challenges one being high post-harvest fish lossthat diminishes potential socio-economic benefits.

The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Securityand Poverty Eradication (The SSF Guidelines)advocate all countriesto find ways to reducing post-harvest fish loss and waste, and seek mechanisms to create value addition(FAO, 2015). That sounds laudable, howevergetting there is no simple task, when thorough understanding of root causes of post-harvest fish loss problem is lacking. It is for this reason that this study was deemed important.

The FAO (2014) estimated total global food loss to be 1.3 billion tons per year, which is about one-third of the total world food production for human consumption. This figure includes post-harvest fish losses, which are reductions in the quantity, quality or monetary value of fish in the supply chain. With regard to fisheries, Akande and Diei-Ouadi (2010) reported that though post-harvest fish loss occur in all fisheries of the world but due to structural shortcomings the problem is more compounded in Small-Scale Fisheries (SSFs) than in industrial fishery. The situation is indeed more serious in tropical countries where high ambient temperatures associated with delays in placing products to target markets favour rapid spoilage of fish and thus exacerbating post-harvest loss.

High post-harvest fish loss in SSFs affect global objective to secure food security in terms of availability, accessibility, stability and utilization. Likewise, the negative impact of post-harvest fish loss is significant because the sub-sector comprises several activities and various operators at all stages of the supply chain, including; fishing, handling fish on board, unloading, processing, storage and fish distribution. These activities are vital to fishers’ livelihoods and also provide employment to many rural people. Several authors (ECA, 1984; McGoodwin, 1990; McConney, 1994; Devereux and Maxwell, 2012).have reported that post-harvest loss also affect resource sustainability since high loss triggers increased fishing effort as a coping strategy to compensate for potential loss

In Tanzania, post-harvest fish loss occurs virtually in all fisheries, especially the Sardine fishery of Lake Victoria. Studies on post-harvest fish loss (PHFL) assessment conducted between 1995 and 2008 found that,the country lands over 290,000 tons of fresh Lake Victoria Sardine annually (LVFO, 2015). However, over 5% of the catch is lost as physical loss and quality degradation along the supply chain causes quality loss of over 27% (Ward, 1996; FAO, 2008). Translated into financial terms, total loss in Tanzanian Lake Victoria Sardine fishery is estimated to be over 60 billion Shillings per annum (FAO, 2014). Given the figures, it is obvious that reduction of the losscould increase fishers’ income, food fish availability and tax revenue to the government. Despite the good currency for loss reduction, it has been difficult to reduce post-harvest loss in this fishery as articulated in SoEAR (2008) and SmartFish, (2012).

Different intervention measures that have been tried over the years, including introduction of improved fishing and processing techniques, have largely rendered mixed results and post-harvest fish losses remain prevalent as exemplified above. In view of this situation, it is important to widen the search in order to understand better root causes of the problem. One potential search areas, in this context, is the marketing environment which can influence the speed of moving a product along its supply chain. The perishable nature of fish and fishery products requires an efficient marketing system to avert losses, failure to that microbial activity and chemical reactions can exacerbate spoilage causing high losses.

Discussing marketing environment, problems and strategies, Gopalaswamy (2009) maintains that, irrespective of the technology adopted in production, marketing efficiency is crucial in dealing with agricultural products that are characterized by bulkiness, perishability, seasonality, dispersed production, need for processing before consumption, and availability of wide variety.The Lake Victoria Sardine (LVS) fits in this characterization since it happen to possess all the stated criteria. Hence, the importance of auditing marketing environment, as a base for determining marketing efficiency, cannot be overemphasized.Bagachwa*et al* (1994) expound the subject by suggesting that, because it perishes so quickly, fish needs to be processed and distributed as soon as possible after being caught.

In tropical climates it can spoil within four to five hours. They estimate that some 10-15% of fresh fish is lost in Tanzania, and 25-30% of dried or cured fish follows the same pattern. This underscores the need for speedy processing and distribution of the fish. In turn, it calls for improved marketing efficiency and system. How to go about improvising the marketing efficiency and system? To answer this paradox, Cravens and Piercy (2009) suggest that, marketing efficiency is highly influenced by prevailing marketing environment, and thus an ideal starting point is to audit the micro and macro marketing environmental actors and forces.

Worthington and Britton (2006) point outthat, success of any business in achieving its goal depends largely on the ability to understand prevailing marketing environment. They defined marketing environment as actors and forces that affect marketing ability to develop and maintain successful transactions with target markets. Poor marketing environment creates barrier to trade causing negative consequences to the business. It can lead to ballooning of production cost and impair quality, especiallyfor perishable products since the longer it takes to place it to market the higher the spoilage rate and finally high losses(Gopalaswamy, 2009). With this background information, it made it necessary to examine the interplay between marketing environment and post-harvest fish loss in small-scale fisheries, taking Lake Victoria Sardine (LVS) fishery as a case study.

* 1. **Statement of the Problem**

The demand for fish in both domestic and international markets is increasing mainly due to rapid growthin human population, which is taking place at the time fish supply from world capture fisheries is declining (FAO, 2014). Given the situation, one would have expected spontaneous reduction in levels of post-harvest fish loss to mitigate the expanding supply-demand gap. However, this has not been the case; studies on fish loss assessment show continual occurrence of huge post-harvest fish loss, especially in Small-Scale Fisheries as observed by FAO (2015).

Several studies have been conducted on fish loss and wastageof potential food and revenue resulting from non-optimal utilization of the fish being caught amid food fish shortages in certain areas (FAO, 1995; Ward, 1996; Teutscher, 1999;Akande and Diei-Ouadi, 2010). Also, that some technical intervention measures have been attempted over the past four to five decades but with mixed results (Diei-Ouadi and Mgawe, 2011). What could be the problem that curtails optimal utilization of fish for direct human consumption? Why the technical intervention measures being taken do not produce expected results, that of reducing high post-harvest loss? This anomaly compelled a research to find out missing links. And since most of the previous efforts have been directed on production and product orientations, it was realistic to broaden the scope of the search to including the marketing aspects.

Worthington and Britton (2006) maintain that all businesses operate in markets, whether they are localized, national or international. The business process takes place against a background of external influences, which affect the business and its activities. This external environment is complex, volatile and interactive, but cannot be ignored in any meaningful analysis of business activity. Unfortunately, knowledge with regard to linkages between marketing environment and post-harvest fish loss is limited, thus the need for this research.

* 1. **General Objective**

The main objective of this study was to examine the interplay between marketing environment and post-harvest fish loss in Lake Victoria Sardine fishery.

### **Specific Objectives**

1. To examine marketing environment factors contributing to post-harvest fish loss
2. To determine transaction time of Lake Victoria Sardine in each step of supply chain
3. To identify potential strategies that can improveLVS marketing performance.
   1. **Research Questions**
4. What are the marketing environmental factors that disrupt efficient market accessibility of Lake Victoria Sardine?
5. How long does it take to transact Lake Victoria Sardine in each step of supply chain?
6. What marketing strategies do those successful employ in creating improved marketing environment for shortening transaction time and loss reduction?
   1. **Significance of the Study**

This study contributes to solving food fish insecurity problem, which is one of major global concerns as expressed in various instruments. The FAO Code of Conduct for Responsible Fisheries (CCRF) urges states to achieve full utilization of aquatic resources particularly those suitable for direct human consumption, by improving practices throughout the production and supply chains in fisheries and eliminating wastage (FAO, 1995; FAO, 1996; WorldFish Centre, 2008). Furthermore, value chains, post-harvest and trade are grouped as one of nine key thematic areas expressed in the FAO’s Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (FAO, 2015). At national level, post-harvest fish loss is one of priority research themes expressed explicitly in national fisheries research agenda (2015-2020) (URT, 2015).

The findings from this research would help policy makers internalize the linkages between marketing environment and post-harvest fish loss, and thus stimulate review of policies for creation of conducive marketing climate to speed-up placement of LVS to target market. Consequently, it would help in reducing post-harvest fish loss and thus enabling fishers to secure greater post-harvest benefits. This findings would also be used as reference for conducting further studies on post-harvest fish loss subject.

* 1. **Scope and Limitation of the Study**

The dispersed nature of Lake Victoria Sardine fishers coupled with resource constraints made it rather difficultto cover large number of fishing communities. Hence, it ended up engaging a relatively small sample of a larger fishery. Also, multiplicity of marketing environment actors and forces compelled heavy reliance on qualitative rather than quantitative research techniques to understanding the interplay between marketing environment and post-harvest fish losses.

## **Organization of the Study**

This study report is organized in six chapters; Chapter one provides introduction including background, objective, research questions, significance and scope of the study. Chapter two presents literature review whereas Chapter three is on research methodology. On the other hand, Chapter four highlights results from the study that are discussed in Chapter five. Conclusion and recommendations are provided in Chapter six.

# CHAPTER TWO

**2.0 LITERATURE REVIEW**

## **2.1 Definition of Terms**

### **2.1.1 Marketing Environment**

Marketing environment refers to actors and forces that affect marketing management’s ability to develop and maintain successful transactions with the target market (Jobber and Fiona, 2013).It can affect business capability to operate effectively in providing products and services to its customers. In many cases, marketing environment is classified into two categories; micro-marketing environment and macro-marketing environment.Different authors (Kotler and Amstrong, 2001; WorthingtonandBritton,2006;Thuo, 2008; Jobber and Fiona, 2013) assert thatthe marketing environment actors dimension includes; suppliers, intermediaries, customers and competitors whereas the later constitutes marketing environment forces; political, legal, economic, socio-cultural, technological and ecological aspects.

### **2.1.2 Marketing Environmental Auditing**

Finch *et al,*(2001) describe marketing environmental auditing as a systematic examination of a business marketing environment, objectives, strategies and activities, with a view to identifying key strategic issues, problem areas and opportunities. It provides the basis for developing a plan of action to improve marketing performance.

**2.1.3 Post-Harvest Fish Loss**

Post-harvest fish loss has been defined by Ward and Jeffries (2000) who refer it to fish that is either discarded or sold at relatively low price because of quality deterioration or owing to market dynamics. It means fishers lose potential income out of the loss, while less fish of good quality is made available to customers. Others authors (Akande andDiei-Ouadi, 2010) highlight that the loss has a negative impact on food security since it dissipates the amount of food which could potentially mitigate food and nutrition problem.

### **2.1.4 Transaction Time**

Transaction time has been defined by Almas (1981) as an average length of time it takes to handle and move a product in different steps along the fishery supply chain. The longer the fish is kept, especially exposed to high temperatures, the faster it spoils mainly caused by microbiological action and chemical reactions which remain active even after the death of fish. Hence, it is very important to keep fish for shorter period of time in order to minimize spoilage, and thus reduce post-harvest fish loss.

## **2.2 Theoretical Literature**

### **2.2.1 Marketing Environment**

The theory of marketing environment stems from business orientation theory, Raman and Kumar (2008) point that businesses have been passing through different phases or orientations. Initially, businesses adopted production-orientation, which gave way to product-orientation, then sales-orientation and later on marketing-orientation.On this aspect, Thuo (2008) reported that production-orientation era took place during the industrial revolution, characterized by mass production with much emphasis placed on encouraging efficient production and in solving operational problems. The assumption was that consumers preferred products that were widely available and inexpensive.

The product era which followed thereafter, was characterized by production of superior products in terms of quality, performance, and innovative features without much thought for customer needs. On the other hand, Thuo (2008) observed that the sales-orientation focused on addressing the problem of selling mass-produced products. The emphasis was placed on salesmanship and advertising, which resulted into excessive promotion as well as high advertising and sales costs.

Gopalaswamy (2009) accounted that difficulties encountered during sales era gave rise to an idea that products should be marketed instead of merely being sold, which led to market-orientation era. The emphasis is on designing customer-centered strategies and processes in order to realize lifetime value of customers. Accordingly, businesses today learn to succeed by adopting marketing –orientation, which puts thrust on marketing efficiency. They will need to produce superior products, sell smarter, and understand the market as a whole, especially the changing marketing environment. Basically, marketing environment is classified into micro-marketing environment actors and macro-marketing environment forces. Jobber and Fiona(2013) contend that conducive marketing environment would make business thrive whereas poor environment results into marketing inefficiencies and less productive business.

### **2.2.2 Micro-Marketing Environment Actors**

The micro-marketing environment actors are defined by Jobber and Fiona (2013) as part of the marketing environment which include suppliers, distributors or intermediaries, customers, and competitors. The strength and weakness of these actors, when it comes to dealing with perishable products produced by small-scale rural producers, determine the efficacy of marketing system. Furthermore, Gopalaswamy (2009) asserts that their peculiar characteristics including production pattern and their products need to be considered since much of marketing complexities stem from dispersed production, bulkiness, perishable nature of the product, and seasonality of production cycles.

The complexities are compounded by marketing forces coupled with inadequate capital associated with lack of credit facilities, low level of technology as well as poor and high cost of transportas observed by Thuo (2008). Given the condition as expressed above, Worthington and Britton (2006) maintain that optimal production of producers should go hand in hand with efficient marketing system. In this case, as observed by Jobber and Fiona (2013), actors have to be empowered, and many intermediaries are needed to operate between producer and consumers. Failure to that, it is rather difficult to overcome marketing inefficiencies leading to persistent high loss as a result.

The important role of micro-marketing environmental actors is expounded by Akande and Diei-Ouadi (2010) who faulty an assumption that maintaining quality alone will increase the value of the fish and income of the operator, rather something more has to be done. Increased returns to the fishermen or trader are dependent upon other variables including the purchasing power of the fishmonger, fish processor or the final consumer. This is also related to market access issues given that if the sellers had access to different buyers – perhaps in a city, they would be able to sell out their produce before much spoilage and thus reduce losses.

### **2.2.3 Macro-Marketing Environment Forces**

Thuo (2008) point out that opportunities and threats facing any business are shaped by the macro-marketing environment forces. Marketing environment forces such as policies, regulatory framework, technology and ecological landscapes can influence marketing decisions by determining the rules for conducting business and transaction time. Gopalaswamy(2009) suggest that the impact of such forces could be detrimental, especially when marketing perishable products.He maintain that excessive regulations, for example, are key obstacle to doing business since the red tapes cause widespread informality in many kinds of businesses. The same observation is made by Thuo (2008) suggesting that those who cannot afford the cost of formalization are excluded from formal business transactions and their access to public services such as formal sources of finance required to boost their businesses are restricted.

Again, burdensome and unnecessary regulations cause considerable costs for businesses, which in turn reduces the scope for productive investment and operation. Frequently, the complex regulations are abused by bureaucrats who extract bribed from businesses that either cannot afford the time and cost or who are just willing to pay bribe to speed up processes as reported by IBRD/World Bank (2010). On the other hand, Djankov*et al* (2002) argue that deregulation of the regulatory business environment could stimulate entrepreneurship and unleash economic growth benefiting especially the informal poor such as small-scale fisheries operators who suffer most from unfair regulations. Reforms to achieve this objective can easily be implemented by policy makers and could be less costly.

Similarly, Hubbard (1995) suggestthat where the marketing environmental forces are more favourable, say in fostering intra-regional and international trade,it would stimulate trade and foster economic development. Given such situation, businesses are better positioned to take advantage of new opportunities to grow. Hence, rather than resorting to protectionism, policy makers should help struggling marketing actors by cutting red tape and burdensome procedures required to export and import by adopting market-orientation tenets. Unfortunately, this has not been the case; as observed by Gopalaswamy (2009) who insists that many developing countries have instituted a number of tariff and non-tariff trade barriers in order to protect local consumers which create barriers to trade.

The macro-marketing environmental forces can exert pressure from different angles, for example, there is a strong policy argument that promotion of export trade can affect domestic supply through direct shipment of food to other countries, and thus developing countries should refrain from doing it as stated by Bailey and Jentoft(1990) and supported by Hersoug(1992) as well as Jansen(1997). Notwithstanding potential trade-offs, Gopalaswamy (2009) insists that restricting efficient flow ofperishable products like fish to places with higher demand could result into constraining potential market size, causing delays in placing perishables to target markets, and thus exacerbate post-harvest loss.

**2.2.4 Post-Harvest Fish Loss**

Akande and Diei-Ouadi (2010) state that post-harvest fish lossis the sum of all types of fish losses including physical, quality and market forces losses. Physical loss represents fish that is either thrown away, stolen or consumed by animals whereas quality loss is the difference between the potential value of fish and the actual value after quality degradation. On the other hand, Ward and Jeffries (2000) point out that market force loss occurs through marketing dynamics like supply and demand phenomenon. The theory of post-harvest fish loss revolves around the notion of production of food and nutrients with minimum direct benefits to human being.

Furthermore, Akande and Diei-Ouadi (2010) argue that the multitude of fish species, different fishing gear and methods, numerous landing sites and application of different processing and storage techniques are some of the challenges that make it rather complex dealing with post-harvest fish loss problem. The situation is further compounded by multi-channelled distribution system. Consequently, huge amount of fish, especially in small-scale fisheries is lost or its quality degrades before reaching consumers. This is happening when demand for fish to feed the growing human population is mounting. It is for this reason that the loss constitutes a major concern, particularly in regions where millions are short of food and suffer numerous socio-economic vulnerabilities as observed by FAO (2015).

### **2.2.5 Transaction Time**

Almas (1981) outlines three ways that fish spoils; through microbial activities, oxidation of fat in fish body and digestion of the flesh done by enzymes. However, the rate of spoilage is mainly determined by time and temperature. The longer the fish is kept, especially exposed to high temperatures, the faster it spoils. Therefore it is important to preserve and keep fish for a short period of time in order to reduce spoilage and post-harvest fish loss. On this aspect, Gopalaswamy (2009) argue thattransaction time can be reduced only when the marketing environment is conducive to enable actors preserve, store and sell out their fishery products within shorter periods of time. Hence, assuming other factors remain constant, the shorter the transaction time implies the less the post-harvest fish loss.

## **2.3 Review of Empirical Studies**

### **2.3.1 Empirical Studies from Outside Tanzania**

FAO (2014) reviewed secondary data from various technical reports whichsuggestevery year 1.3 billion tons of food is lost globally. With the current world population expected to reach 10.5 billion by 2050, this food loss, if managed and prevented, can feed future generations. Also, based on review of secondary data, Gustavsson*et al* (2011) found that about 25% of every calorie grown is not consumed by humans because of food loss across all stages of the food value chain. About 24% of total food loss occurs at production or harvest, 24% at handling and storage, 4% at processing and packaging, 12% at distribution and marketing, and 35% at consumption.

Similarly, relying on food balance-sheet information, Devereux and Maxwell (2012) conducted food security assessments and other analyses, which considered projections of future food needs.They found that food loss per household in Europe and America range from 280-300 Kg/year, and are about 120-170 Kg/year in Sub-Saharan Africa and South/Southeast Asia. Notwithstanding where the loss occurs, the problem has negative impact on food security globally.With regard to fisheries industry, FAO (2008) outlines that the sector employs over 32 million people in the world, with over one billion people relying on fish as their primary source of protein.

The industry is dominated by small-scale fishers who form over 90% of fish workers in the world. However, the industry is characterized by high post-harvest fish loss which occurs in both commercial and small-scale fisheries. For example, Alverson, *et al*(1994) reviewed secondary data from 800 papers on fisheries by-catch and discards and revealed that, between 17.9 and 39.5 million tons (average 27.0 million) of fish are discarded at sea, and thus lost each year in commercial fisheries. The highest quantities of discards are from the Northwest Pacific while tropical shrimp trawl fisheries generate a higher proportion of discards than any other fishery type, accounting for one third of the global total.

In the case of sub-Saharan Africa, review of secondary data made by Ames (1992), estimated post-harvest fish losses in small-scale African inland fisheries to be about 20% of the total catch. Reviewing case studies in five sub-Saharan African countries;Ghana, Kenya, Mali, United Republic of Tanzania and Uganda,Akande and Diei-Ouadi, 2010) found that physical and quality losses occur in some supply chains assessed in all the countries, with quality loss reported to account for more than 70% per cent of total loss, while physical losses seldom exceed 5% of total fish landed.

Another study conducted back in 2011, FAO (2011) compared losses that occur in cereals, root and tubers, oil seed and pulses, fruit and vegetables, meat, fish and sea food as well as milk. The focus was placed onloss percentages for various commodity groups in different steps of Food Supply Chain (FSC) in sub-Saharan Africa. On fish and sea food, the study revealed that distribution stage, which happens to be one of the marketing mix, is the most critical stage along the supply chain, where about 15% is lost (Table 2.1)

**Table 2.1: Estimated % Loss for Different Food Commodity in Sub-Saharan Africa**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type of food** | **Production** | **Handling &**  **storage** | **Processing &**  **packaging** | **Distribution** | **Consumption** |
| Cereals | 6% | 8% | 3.5% | 2% | 1% |
| Root and tubers | 14% | 18% | 15% | 5% | 2% |
| Oil seed and pulses | 12% | 8% | 8% | 2% | 1% |
| Fruit and vegetables | 10% | 9% | 25% | 17% | 5% |
| Meat | 15% | 0.7% | 5% | 7% | 2% |
| Fish and seafood | 5.7% | 6% | 9% | 15% | 2% |
| Milk | 6% | 11% | 0.1% | 10% | 0.1% |

**Source***: FAO (2011)*

### **2.3.2 Empirical Studies from Tanzania**

A study on positive and negative experiences in Tanzania with regard to utilization of shrimp by-catch conducted by Clucas and Teutscher(1999) revealed that, 50-75% equivalent to 5000-7500 tons of fish caught as by-catch in industrial shrimp fishery was being discarded at sea. Lack of on-board means of preservation and the unwillingness of trawler owners to regularize collection of by-catch at sea by small-scale fish traders were major constrains to reducing the problem.

Likewise, analysis of quantitative data on post-harvest fish loss in Lake Victoria Sardine (LVS) fishery in Tanzania conducted in early 1990s, indicated that about 3-5% of LVS product is physically lost, whereas quality loss in the fishery reduces the total optimal value of total landing by over 25% (Ward, 1996).Another study conducted under the auspices of FAO between 2006 and 2008, revealed that about 5% of the total catch of Lake Victoria Sardine in Tanzania is lost as physical loss whereas quality loss was estimated to be over 27% of total optimal value (FAO, 2008). The study (*ibid*) enumerated sources of the loss as presented in Table 2.2

**Table 2.2: Post-Harvest Fish Loss in LVS Fishery in Tanzania**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Reasons for loss** | **%** | **Fresh**  **Wt.**  **(tons)** | **Dry**  **Wt. eq.**  **(ton)** | **Loss**  **(in mil.**  **TSh.)** |
| 1. | Estimated total LVS annual landing | 100 | 197,200 | 69,020 |  |
| 2. | Physical damage during fishing | 0.9 | 1,775 | 621 | 1,242.40 |
| 3. | Animal predation | 2.0 | 3,944 | 1,380 | 2,760.80 |
| 4. | Discard following prolonged rain | 4.0 | 3,155 | 1,104 | 2,208.60 |
| 5. | Theft | 0.1 | NA | 35 | 70.00 |
| 6. | Sinking during boat transportation | 0.7 | NA | 520 | 1,040.00 |
| 7. | Quality degradation due to presence of by-catch | 2.5 | NA | 1,750 | 3,500.00 |
| 8. | Quality degradation through rain | 11.0 | 22,400 | 7,840 | 14,112.00 |
| 9. | Rancidity ( change in colour) before getting to consumers | 30.0 | NA | 21,000 | 10,500.00 |
| 10. | Fragmentation due to poor packaging and transportation | 8.0 | NA | 5,600 | 10,080.00 |
| 11. | Marketing malpractices especially stealing | 11.0 | NA | 7,700 | 15,400.00 |
| 12. | Loss due to insect infestation | Not quantified | | |  |
| 13. | Loss through tax evasion | Not quantified | | |  |
| **Total estimated loss** | | | | | **60,913.80** |
| *NA= Not Applicable* | | | | | |

**Source:** *FAO (2008)*

In financial terms, FAO (2014) estimated total post-harvest fish loss in Lake Victoria Sardine fishery in Tanzania to be over 60 billion Shillings per annum. The socio-economic consequence of the post-harvest fish loss in this regard is overwhelming, since it compound food fish insecurity and poverty, especially among small-scale fisheries operators.

## **2.4 Research Gap**

From the analysis of theoretical and empirical studies, it is evident that high post-harvest fish loss is one of the major challenges in fisheries and has a significant impact on food security to the growing human population. Similarly, there is evidence suggesting initiatives being made to addressing the problem. However, most of the efforts have been directed on improving preservation and quality of fishery products ignoring constraints posed by market accessibility. Therefore, little is known about linkages between marketing environmentand post-harvest fish loss variables, especially in small-scale fisheries

The very fact that post-harvest fish loss issue has not even been mentioned in any part of the Fisheries policy in Tanzania (URT, 2015) means the awareness is still low, and thus the importance of conducting a study on this subject cannot be overstated. The Lake Victoria Sardine fishery in Tanzania presents an ideal case study because of large amount of catch,its wide distribution, in both domestic and regional markets, as well as high post-harvest fish losses amounting to over 60 billion shillings as highlighted in literature review.

## **2.5 Conceptual Framework**

High post-harvest loss in fisheries is associated with perishable nature of fishery products which are highly susceptible to spoilage as articulated by Almas(1981). FAO (1982) assert that inefficient fishing and handling practices, as well as weak distribution system aggravate the problem. Broadly, there are three ways fish spoil; through oxidative rancidity, autolysis (self-decomposition) and most importantly microbiological action. However, FAO (1986) insist that the rate of spoilage, is determined by time and temperature. The longer the fish is kept exposed to a high temperature, the faster it spoils and thus the need to keep it cool and for a short period. For the cured products like LVS, the cooling-based solution is rarely applied, leaving the time factor as a foundation for preventing much of spoilage and losses.

In this case, the time it takes to keep cured fish is largely determined by the marketing environment. Better marketing environment could reduce the keeping time, and thus mitigate much of post-harvest loss. However, studying the interplay between marketing environment and post-harvest fish loss, it is necessary to delineate certain key variables which influence transaction time. The independent variables which determine the speed at which the product can move along the supply chain and the dependent variables which in some ways lay down the basic goal, for example loss reduction. The former variables; micro-marketing environment actors and macro-marketing environment forces would determine transaction time. The longer the transaction time the higher the losses, and the shorter the transaction time the lower the loss, and thus influencing a dependent variable. The conceptual framework for examining this paradox is outlined in Figure 2.1

**Independent variables:** These are variables that can be controlled and manipulated. In this study the independent variables were micro-marketing environment actors and macro-marketing environment forces.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Independent variables** | |  |  |  | **Dependent variable** |
| Micro-marketing environmental actors: | |  |  |  |  |
| * Suppliers | |  |  |  | Post-harvest fish loss: |
| * Intermediaries | |  |  |  |  |
| * Customers * Competitors | |  |  |  | * Level of losses * Reduction of losses |
|  | |  | Transaction time (shorter/longer) |  |  |
|  |  |  |  |  |
| Macro-marketing environmental forces: | |  |  |  |  |
| * Political and Legal | |  |  |  |
| * Socio-cultural | |  |  |  |  |
| * Technology | |  |  |  |  |
| * Ecology | |  |  |  |  |
| **Source:**Self adopted from Literature | | | | | |

**Figure 2.1: Conceptual Framework for Examining Interplay between Marketing Environment and Post-Harvest Fish Loss**

**Micro-Marketing Environment:**The micro-marketing environment consists of actors including suppliers, distributors or intermediaries, customers, and competitors. The strength and weaknesses of these actors determine the efficacy of a marketing system.

**Macro-Marketing Environment:**The macro-marketing environment consists of forces emanating from political and legal, economics, socio-cultural, technology and ecological dimensions.The opportunities and threats facing any business are shaped by the macro-marketing environment forces that influence operative capacity of actors.

**Transaction Time:** This is a moderating variable once the independent variables, in this case the micro and macro-marketing environments, are conducive it would take less time to transact the product and thus reducing the rate of quality degradation and minimize loss. On the other hand, if the marketing environment is not business friendly, it would take relatively longer to transact the product subjecting it to high spoilage and loss.

**Dependent Variable:** The dependent variable in this study is level of post-harvest-fish loss. This happens to change when independent variable changes. The supposition is that nature and degree of post-harvest fish loss is influenced by independent variables, the micro-marketing environment actors and macro-environment forces. The loss pattern would change once the independent variables change assuming other factors remain constant (*ceterusperibus*).

# CHAPTER THREE

# 3.0 RESEARCH METHODOLOGY

## **3.1 Research Paradigm**

This study adopted an interpretative research philosophy which fits-well with the complex nature of LVS fisheries, characterized by numerous small-scale suppliers, dispersed production sites and intermediaries targeting different markets. Poulter *et al* (1988) suggest that small-scale fisheries are labour-intensive and are conducted by large number of fishers whose level of formal education, income, mechanical sophistication, quantity of production, fishing range, political influence, market outlets, employment and social mobility are low, constraining their operational capacity. Again, fishers are highly migratory and thus operate from numerous remotely located landing sites.

Given the situation, it was appropriate to conduct an in-depth investigation using qualitative data collection technique to get details of the interplay between marketing environment and post-harvest loss in LVS fisheries including the reality behind the details through intensive probing. According to Saunders *et al* (2009) the interpretive approach has comparative advantages including being socially constructed, subjective and captures social phenomena. The approach was rather flexible more importantly, its subjective meanings motivate actions.

On this aspect, Akande and Diei-Ouadi (2010) assert that working on small-scale fisheries, it is preferable to ensure that the research is value-bound using small samples but with in-depth qualitative investigations. The rationale behind adopting the interpretive approach was further fueled by experience articulated by Jobber and Fiona (2013) who maintain that interpretive orientation allows the use of inductive approach, where a researcher interacts and get a feel of what is going on, to understand better the nature of the problem employing a more flexible structure to permit changes of research emphasis as the research progresses. Through induction approach one can first collect data concerning the context in which the phenomena under study are taking place, and develop theory as a result of data analysis. This position is supported by other authors including Kent (2007) and Kothari (2004).

## **3.2 Research Design**

This study was an exploratory research largely using qualitative method. The aim was to discover true inner meanings and new insights of post-harvest fish loss problem through interpretation of qualitative data, extraction of its meaning and converting it into useful information. Qualitative research is less structured than most quantitative approaches as observed by Blaikie (2000) Zikmund and Babin (2007) and Fisher (2010). They maintain that this design does not rely on self-response questionnaires containing structured response formats. Instead, it is more researcher-dependant in that the researcher must extract meaning of some experience from unstructured response.

Furthermore, Saunders *et al* (2009) observe that using qualitative approach the focus is usually not on numbers but on oral, textual, visual portrayals and meaningful characterizations, interpretations and other expressive descriptions of the problem. The most important thing, in this context, is that qualitative research technique enabled elaborative interpretations of market environment phenomena without depending much on numerical measurements.

## **3.3 Study Area**

The field work was conducted at *Yozu* Island, *Kabangaja* fishing village and at Kilumba International Fish Market (KIFM) in Mwanza region. Other areas included, *Nyang’ombe* fishing village and Sirari border town in Mara region as well as Kariakoo market in Dar es Salaam. These areas were deliberately selected to enable exploration of LVS production and distribution pattern on small fishing islands and shore-based fishing villages. Also, it allowed load tracking of LVS along major supply chain; to major domestic urban markets and border towns for products destined to regional market.

## **3.4 Data Types and Sources**

The study used qualitative primary data from the field and secondary data, especially from fisheries statistical bulletins (URT-Fisheries Statistics). Similarly, secondary data from fisheries frame surveys that are conducted jointly by the three Lake Victoria riparian countries of Kenya, Uganda and Tanzania (LVFO, 2015), were used in this study.

## **3.5 Study Population**

The fisheries frame surveys (URT, 2014)suggest that there are about 101,250 primary fishers working on Lake Victoria fisheries with about 30% of them directly engaged in Lake Victoria Sardine fishery. Also, the same report *(ibid*), suggest that over 500,000 people are working in secondary LVS sub-sector including traders, transporters and labourers could be more than 500, 000 people.

## **3.6 Sample Size**

The sample size for the study was 600 respondents, which was determined using Fisher’s formula. Fisher *et al* (1991) suggest that provided the total population size is greater than 10,000, sample size needed to measure a given proposition with a given degree of accuracy at a given level of statistical significance can be calculated by using a simple Fisher formula:

*n* =



|  |  |  |  |
| --- | --- | --- | --- |
| Where: |  |  |  |
|  | n | = | The desired sample size (when population is greater than 10,000) |
|  | z | = | The standard normal deviate, usually set at 1.96 (or simply more than 2), which corresponds to the 95 percent confidence level. |
|  | p | = | The proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate, then use 50 percent (0.50), |
|  | q | = | 1.0-p |
|  | d | = | Degree of accuracy desired, usually set at 0.05 or occasionally at 0.02 |

*n* =



**n= 600.25; n=600**

The emphasis was placed on one’s engagement and possession of expertise as well as experience with regard to any undertaking along LVS supply chain. Consideration was made to ensure inclusion and representation of relevant characteristics such as gender, socio-economic groupings and age structure. As suggested by Adam and Kamuzora (2008), this sampling method proved to be less expensive and quick in selecting a sample taking note of the nature of the study, which involved several respondents with different role and experience in LVS business.

## **3.7 Data Collection Techniques**

The research began with a review of secondary data including research reports, fishery sector reviews, development plans and policy framework for information on post-harvest fish loss, and how the loss is considered in national policies. The findings helped in reviewing check-list for qualitative data collection in the field. Thereafter, a pilot study was conducted in order to test the check-list (see appendix 1), and familiarize with field scenario and stakeholders. As suggested by Kothari (2004) and Kent (2007), detailed research was then conducted by using qualitative research techniques including observation, Semi-Structured Interviews (SSI) and focus group interviewing.

The following pattern was adopted; first, group interviews were conducted involving a cross-section of stakeholders from respective location or community. The team and objectives of research work were introduced before engaging respondents in Semi-Structured Interview. The SSI provided the understanding of loss in general, context and operator’s perception regarding marketing-oriented factors that exacerbate post-harvest fish loss as advocated by Ward and Jeffries (2000) Akande and Diei-Ouadi, (2010).

Thereafter, key informants or focus groups were interviewed in order to verify data collected in large groups and understand loss issues in detail. Similarly, observation technique was employed to internalize linkages between marketing environment and post-harvest loss. Triangulation techniques as proposed by Ward (1996) was applied throughout data collection period in order to generate a detailed understanding of loss, validate, cross-check and build on information from group interviews, and provide case studies describing interplay between marketing environment and post-harvest fish loss.

Before leaving a locality or community, validation meetings were held to present key findings to a cross-section of stakeholders. These meetings aimed at cross-checking whether the findings were accurate, reflecting the real situation and to provide an opportunity for the team to discuss the data and to fill in any knowledge gaps. This form of triangulation helped much in validating the findings. The transaction time were measured in terms of hours or number of days a batch of LVS takes in each step of the supply chain. On the other hand, changes in product quality were measured by using sensory or organoleptic quality assessment as recommended by several authors (Akande and Diei-Ouadi, 2010; FAO, 2005; Ward and Jeffries, 2000; Cederberg*et al,* 2011). This was conducted by a panel of trained and experienced LVS operators on the basis of evaluation framework as practiced by operators.

The study involved 50 extended interviews carried out mainly in fishing villages, landing beaches and fish markets engaging fishermen, traders of various kinds, proprietors of boats, transporters and consumers as sub-samples. Also, Likert-scaled questionnaire was administered to a group of 40 key informants to authenticate data generated through semi-structured interviews, especially on transaction time that LVS takes in each step of the supply chain.

## **3.8 Data Analysis**

The data analysis was conducted by using SWOT analysis tool (Table 3.1) as adapted from Jobber and Fiona (2013) who maintain that, the tool is one of the most useful techniques in analysing micro and macro-marketing environmental actors and forces respectively. The strength of this method is supported by Blaikie (2000), Worthington and Britton (2006) and Thuo (2008) who assert that SWOT is particularly powerful as it helps to enumerate strengths of marketing environment actors, who are well-placed to exploit the marketing system and understanding their weaknesses. Also, it allows a critical analysis of macro-marketing environment forces in terms of opportunities and threats

**Table 3.1: SWOT Matrix for Marketing Environment Analysis**

|  |  |  |
| --- | --- | --- |
| **Micro-marketing environment actors**  (suppliers, intermediaries, customers, competitors) | **Strength** | **Weaknesses** |
| What are the things that a corresponding micro-marketing environment actor does well in facilitating speedy flow of LVS along the supply chain? | What are the things, associated with a particular micro-marketing environment actor, that hinder speedy placement of LVS to market? |
| **Macro-marketing environment forces**  (political and legal, socio-cultural, technology, ecology) | **Opportunities** | **Threats** | |
| What trends of a corresponding macro-marketing environment force is working out in favour of speedy placement of LVS to target market? | What external forces arising from a corresponding macro-marketing environment variable could impact negatively on the pace of placing LVS to market? | |

**Source:**Jobber and Fiona (2013)

On the other hand, data on transaction time, as collected by using Likert-scaled questionnaire, were analysed by SPSS computer programme to verify validity and reliability of the research instrument. The interpretation was made by making pertinent inferences and drawing conclusions concerning the meaning and implications of a research investigation.

## **3.9 Definition and Measurement of Variables**

**Table 3.2: Measurements of Variables**

|  |  |  |
| --- | --- | --- |
| **Type of Variable** | **Name of Variable** | **Definition of variable/ Measurement** |
| Dependent variable | Post-harvest fish loss | Period of time it takes to place LVS to major markets versus the 20 days’ lead time, before flow in of new stock from next fishing cycle, and significant changes in LVS colour, perceived to be an indicator of quality degradation. |
| Independent variable | ME actors | |
| Suppliers | Time it takes to harvest and sell out LVS catch, as well as strength and weaknesses of the actors |
| Intermediaries | Time it takes to transact LVS along major supply chain, as well as strength and weaknesses of the actors |
| Customers | Perception with regard to changes in product quality with time, as well as strength and weaknesses of the actors |
| Competitors | Sources of competition and types of substitute products, as well as strength and weaknesses of the actors |
| ME forces | |
| Political and Legal | Types of Laws and administrative procedures that encumber speedy placement of LVS |
| Economics | Size, age distribution and regional distribution of population |
| Socio-Cultural | Changes in consumers lifestyle and values that have bearing on LVS trade |
| Technology | Technological changes taking place that have impact on LVS trade |
| Ecology | Trends in public concerns regarding LVS production and trade |

**Source:**Field Data of this Study 2017

# CHAPTER FOUR

# 4.0 RESEARCH FINDINGS

**4.1 Socio-Demographic Profile of Respondents**

Overall, most of respondents for this study were men (65.5%) whereas women constituted less than half (34.5%). The low representation of women could be a result of a long held tradition of men’s dominance of the fishing industry. Bagwachwa*et al* (1994) observed that, of the 128,759 workers involved full-time in fishing activities in Tanzania only 1,200 (approximately 1%) were women.

**Table 4.1: Socio-Demographic Characteristics of Respondents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Frequency**  **(n=600)** | **Sex (Ratio)** | | **All (%)** |
| **Male** | **Female** |
| **Sex** |  |  |  |  |
| Male | 393 |  |  | 65.5 |
| Female | 207 |  |  | 34.5 |
| **Age (years)** |  |  |  |  |
| 20-25 | 139 | 118 | 21 | 23.2 |
| 26-30 | 281 | 203 | 78 | 46.8 |
| 31-35 | 106 | 35 | 71 | 17.7 |
| 36-40 | 54 | 25 | 29 | 9.0 |
| 41-45 | 11 | 7 | 4 | 1.8 |
| 46-above | 9 | 5 | 4 | 1.5 |
| **Fishers** |  |  |  |  |
| Fishermen | 162 | 162 |  | 27.0 |
| Fish processors | 225 | 55 | 170 | 37.5 |
| Intermediaries | 64 | 64 |  | 10.7 |
| Traders | 33 | 28 | 5 | 5.5 |
| Consumers | 42 | 17 | 25 | 7.0 |
| Fisheries Officials | 26 | 19 | 7 | 4.3 |
| Transporters | 48 | 48 |  | 8.0 |
| **Marital status** |  |  |  |  |
| Single | 307 | 189 | 118 | 51.1 |
| Married | 141 | 107 | 34 | 23.5 |
| Divorced/Separated | 103 | 80 | 23 | 17.2 |
| Widow | 49 | 17 | 32 | 8.2 |
| **Education** |  |  |  |  |
| Primary education (or below) | 432 | 256 | 176 | 72.0 |
| Secondary education | 120 | 92 | 28 | 20.0 |
| Post-secondary education | 48 | 45 | 3 | 8.0 |

## **Source:** Field Data of this Study

On the other side, however, the important role of women in processing and community-based LVS trade was evident; out of the 225 respondents under this category 170 (76%) were women. With regards to marital status, many respondents (51%) were single, mostly fresh from school with little experience in fish trade. The same issue of inexperience could apply, when it comes to age structure where 46.8% of respondents were below 30 year of age. Regarding formal education, majority (72%) had primary school education or below something which could be compromising their competitiveness, especially in placing LVS inregional market. The profile of 600 respondents involved in this research is presented in Table 4.1

## **4.2 Marketing Environment Factors Contributing to Post-Harvest Loss**

Several marketing environment factors have been identified that contribute to slowing down speed of placing LVS to target markets exacerbating post-harvest fish loss. The micro-marketing environment actors in particular, were found to have a number of weaknesses that overwhelms strengths. Likewise, threats exerted by macro-marketing environment forces weaken the opportunities. Together, the weaknesses and threats prolongs transaction time contributing to high post-harvest loss.The findings with regard to strength and weaknesses of micro-marketing environment as well as opportunities and threats of macro-economic forces are presented below.

### **4.2.1 Suppliers**

There are a good number of small-scale fishers engaged in LVS fishing who supply the product throughout the year. Production pattern is governed by lunar cycle of moon-light and dark-moon periods with fishing conducted during the 14-15 days of dark-moon period. The cycle provides an important benchmark, in terms of transactional time along LVS supply chain. Failure to place much of the product to market, within the 15 days of lead time, causes stock overlaps and market glut which negatively affect selling price of old stocks. Despite the predictable benchmark, this study revealed that it takes over 8 days to just move a batch of LVS from production centres, in remote villages, to secondary markets. This leaves a short interval of transaction time to move the product to other steps of supply chain causing excessive stock overlaps, lowering prices of old stock significantly. Details regarding strengths and weaknesses of LVS suppliers are outlined below (Table 4.2).

**Table 4.2: Strengths and Weaknesses of Suppliers**

|  |  |
| --- | --- |
| **Strengths** | **Weaknesses** |
| Bulk production, with raw material processed right in fishing village. Fishing, transport and landing operations take place within 14 hours, 1 hour of selling out fresh LVS, and another 8 hrs for sun drying the product. | Much of production takes place in dispersed and remotely located islands, which are difficult to access. Consequently, it takes an average of 8 days to move out much of their produce. |
| Predictable supply pattern governed by changing lunar cycles of dark-moon and moon light periods, fishing is conducted within 14-15 days of dark-moon period. | Cyclic lunar production pattern provides alead time of 14-15 daysonly, before an inflow of new and better quality stock whereas in practice, placement to target markets takes more than the 15 days’ timeframe resulting intomarket glut. |
| The LVS fishers are highly mobile moving erratically from places with low catches to relatively rich fishing grounds. This operational strategy ensures steady supply of LVS. | Migratory tendency among suppliers (fishers) makes it rather difficult to strengthen marketing linkages, thus delayingassembly and placement of LVS to markets. |

**Source:** Field Data of this Study

### **4.2.2 Intermediaries**

Large number of intermediaries was observed to be engaged in post-harvest sub-sector of Lake Victoria Sardine fishery, especially in handling processing, and trade. It includes agents responsible for assembling fish in villages, wholesalers mainly in secondary markets and retailers who can be found in all corners of the country. In addition, there is over 80 regulartraders from neighbouring countries, mainly Democratic Republic of Congo, engaged in purchasing LVS for the regional market.

**Table 4.3: Strengths and Weaknesses of Intermediaries**

|  |  |
| --- | --- |
| **Strengths** | **Weaknesses** |
| There is a good number of experienced intermediaries including LVS assemblers (agents), wholesalers and retailers handling large volumes of LVS. | Vastness and uneven spread of production points lead to having only one or two traders operating at a site, limiting ability to quickly move out much of the produce. |
| There are small ferry boats, transport canoes and trucks engaged in transportation of LVS from production points to secondary markets. | Poor logistics, storage, handling and transport exacerbate delays in placing LVS to secondary markets for over 8 days. |
| There are many distribution channels connecting production centres and target markets, both in domestic and regional LVS markets. | Limited number of secondary markets (only 3; *Kilumba*, *Mwigobero* and *Muganza*,), where all produce have to pass through before further distribution. Cumbersome administrative procedure causes delay of over 15 days. |
| There is more than 80 LVS traders from neighbouring countries. They purchase large volumes to sell into regional market, where their familiarity give them competitive advantage in distributing LVS to an expansive market size. | Foreign traders are not allowed to purchase LVS directly in fishing villages, they have to get their supplies from agents at secondary markets. Consequently, it takes over 25 days to arrange purchase and take LVS across borders. |
| LVS retailers are widely distributed all over the country | Inadequate capital, lack of entrepreneurship skills and experience to trade in regional market among local intermediaries constrain their competitiveness applying same inefficient practices to a dynamic market. |

**Source:** Field Data of this Study

Intermediaries purchase LVS from dispersed suppliers for placing it in domestic and regional markets. They take an average of 8 days collecting LVS from primary suppliers, 10 days sorting out administrative and regulatory procedures at secondary markets, another 15 days to distribute LVS in domestic markets, and over 25 days to cross borders for those targeting the regional market. The strengths and weaknesses of intermediaries with regard to transaction time are outlined in Table 4.3.

### **4.2.3 Customers**

The sensory quality assessment revealed that, it takes an average of 20 days before a batch of LVS is relegated from good to poor quality grade, selling as animal feed as opposed to product for direct human consumption. Again, new stock flows into the supply chain after every 14-15 days governed by cyclic lunar production pattern of about 15 days on and 15 days off, negatively affecting price of old stock. The strengths and weaknesses of customers with regard to transaction time are outlined below (Table 4.4)

**Table 4.4: Strengths and Weaknesses of Customers**

| **Strengths** | **Weaknesses** |
| --- | --- |
| The market size of LVS is increasing due to population growth, expanding intra-regional trade and improved communication technology and transportation. | Increased demand for LVS, as source of raw material for animal feed, reduces the amount of LVS sold at high price causing high quality loss. |
| Much of LVS is retailed in concentrated rural and urban markets in both domestic and regional markets, which help to shorten transaction time and losses. | Difficulties in accessing high opportunity market segment in rural areas prolongs placement time, and thus compound post-harvest losses. |
| Customers’ preference is predictable; many prefer buying newly produced stock under Last In First Out (LIFO) pattern. | LVS is mostly sold in larger heaps instead of convenient small packs considered by many customers to be economical, in line with changing usage habit. Consequently, it takes longer to sell out given stock, with old ones selling as animal feed at lower prices. |
| Diversification through production of new products such as smoked and fried LVS is attracting increased number of customers. | Much of LVS still being processed by using traditional sun drying on sandy beaches, shunned by increasing number of customers constraining potential market. |
| The LVS nutritive superiority and comparatively low price attract large number of customers. | Customers perceive LVS stored for more than 20 days to be of inferior quality. Consequently, large quantities of old stocks are sold at half the price of new stocks. |

**Source:** Field Data of this Study

### **4.2.4 Competitors**

Major competitors for LVS include different species of sardines, especially from Lake Tanganyika, Lake Nyasa and from marine waters. Also, plant protein and assortment of vegetables, pose stiff competition to LVS exacerbating post-harvest loss. The strengths and weaknesses of competitors’ landscape are outlined below (Table 4.5).

**Table 4.5: Strengths and Weaknesses of Competitors**

|  |  |
| --- | --- |
| **Strengths** | **Weaknesses** |
| The LVS has comparative advantage for being rich in animal protein, micronutrients, vitamin and minerals required to maintain health human body. | With improved transport increased volumes of substitute products are penetrating traditional market niche of LVS. This reduces demand, prolong transaction time exacerbating high post-harvest loss. |
| Low selling price of LVS provides a strong competitive advantage over species of sardines from other sources such as Lake Tanganyika and Lake Nyasa sardines. | Oversupplying limited markets causes laxity in speeding up placement of LVS to market resulting into high quality losses. |
| LVS is produced and supplied throughout the year as opposed to many of the plant protein and vegetables. | LVS catches are high during rainy season when sun drying preserving technique becomes obsolete paving way for avariety of substitute plant proteins gain a competitive edge. Consequently, it takes longer to trade LVS. |
| There is increasing demand for LVS as chief source of protein for the growing animal feed industry. | Availability of relatively cheaper plant proteins such as *soya* beans affects demand and market size of LVS, which in turn prolongs transaction time and compound post-harvest loss. |

### **Source:** researcher, 2017

### **4.2.5 Political and Legal Forces**

Strengthening of economic ties under the East African Community (EAC) was found to be a major opportunity for expanding market size of LVS through improved intra-regional trade. On the other hand, however, unpredictable and flawed policies, regulatory constraints, as well as political insecurity in some of the countries in the region curtail speedy placement of perishable LVS in regional market. The opportunities and threats emanating from political and legal forces that impact transaction time and losses are outlined below (Table 4.6).

**Table 4.6: Opportunities and Threats of Political and Legal Forces**

|  |  |
| --- | --- |
| **Opportunities** | **Threats** |
| Allowing increased number of rich traders from neighbouring countries to purchase LVS directly from primary suppliers could increase demand, shortening transaction time and mitigate post-harvest loss. | The regulation which requires LVS to be sold through limited number of distantly located secondary markets continue to slow down speed of placing LVS to market exacerbating post-harvest loss. |
| Regional integration under the East African Community (EAC), with its zeal to promoting intra-regional trade, expands potential LVS market size,minimizingtransaction time as well aspost-harvest loss. | NTBs including excessive documentations issued by several authorities with overlapping functions, myriad road blocks, numerous physical inspections, and corruption continue to stifle timely placement of LVS exacerbating loss. |
| Strengthening of EAC could mitigate trade barriers including unpredictable and flawed policies that prolongs transaction time causing high losses. | Political instability and insecurity in the region continue to affect the time it takes to place much of LVS to the large regional market causing high losses due to longer transaction time. |
| Establishment of one stop border posts like the one at Sirari, Tanzania and Kenya border, helps to cut down Custom clearance time and clean up corruption. The fast tracking helps to reduce loss. | Multiplicity of tax and levies continue to encourage black marketing of LVS, which in turn prolongstransaction time and compound losses. |

### **Source:** researcher, 2017

### **4.2.6 Economic Forces**

The increased demand for fish, largely caused by rapid human population growth amid declining supply from capture fishery, is driving a shift from high-value species to eating low-value fish species. This trend provides an opportunity for LVS to capture large market share, and thus avert much of potential post-harvest loss. On the other hand, inadequatecapital associated with lack of credit facilities among actors and oversupplying traditional markets, stifle their ability to timely place large quantities of perishable LVS to market. Details of opportunities and threats emanating from economic forces are outlined below (Table 4.7).

**Table 4.7: Opportunities and Threats of Economic Forces**

| **Opportunities** | **Threats** |
| --- | --- |
| Market development and diversification through increased sales of LVS traditional brand and new products to new markets could shorten transaction time and avert much of losses | Market glut caused by plummeted demand in traditional markets amid steady supply of new stocks exacerbate delays and compound quality loss. |
| Economic growth and improved purchasing power in domestic and regional market trigger increased demand for fish including LVS, and thus contribute to shortening of transaction time and loss reduction. | Growing middle income group shifts demand for fish towards high-value species relegating large amount of low-value LVS, to sale at low prices compounding transaction time and loss. |
| Rapid human population growth in domestic and regional markets coupled with propensity to consume fish, taking place at the time production from capture fishery is declining, stimulate increased demand for LVS, and thus could reduce transaction time and losses. | Failure to diversify LVS product to meet changing product specifications of increased number of able to pay customers, continue to make it difficult to timely place large amount of LVS to markets exacerbating losses. |
| Increasing cost of living and unemployment compel large number of people in domestic and regional markets to opt eating low priced LVS, and thus contribute to shortening transaction time and mitigate post-harvest losses. | Lack of capital associated with inadequate credit facilities make production and processing of LVS remain rudimentary associated with poor quality, low demand, longer transaction time and high losses. |

**Source:** Field Data of this Study

### **4.2.7 Socio-Cultural Forces**

The study found that demand for LVS in urban markets is increasing mainly due to growing population in urbanite slums, which constitute large number of low income people. Retailing increased volumes of LVS to these markets presents an opportunity to speed up transaction, and thus could help to reduce post-harvest loss. However, such opportunity is wasted due to a number of social-cultural threats as outlined below (Table 4.8).

**Table 4.8: Opportunities and Threats of Socio-Cultural Forces**

| **Opportunities** | **Threats** |
| --- | --- |
| Some NGOs, are helping LVS fishers to get organized into Fishers’-Based Organizations (FBOs) in order to promote market linkages. The arrangement is helping to shorten transaction time and thus mitigate losses. | Many of FBOs are weak, incapable of fostering effective market linkages. The divided actors face financial and operational risks individually, which in turn slows down placement of LVS to markets. |
| Market development initiatives and awareness campaigns on nutritive values of LVS could increase demand, and thus help in shortening transaction time and loss. | Uncoordinated and piece-meal promotional campaigns, constrain market expansion, causing longer transaction time and persistent high post-harvest loss. |
| East African common market initiative promotes movement and interaction of people across cultural boundaries smoothening barriers to trade, this could reduce transaction time and post-harvest fish loss. | Cultural diversity, language barriers, and social exclusion of women from active engagement in intra-regional trade constrain and slow down placement of LVS to regional markets exacerbating high post-harvest loss. |
| The concentration of people in urban areas could make it relatively easy to access an expanding market, potentially reducing time required to transact LVS, and thus cut down loss. | Failure to diversify product offering to meet new lifestyles and increased demand for convenient product and packs constrains demand, delay retailing and increase losses. |
| LVS is *halal* food across many religious faiths in domestic and regional markets. This comparative advantage could promote the product, expand market and reduce losses by shortening transaction time. | Poor branding of LVS, largely considered to be animal feed material as opposed to quality food for direct human consumption, stifles demand, delay transaction causing high loss to persist. |

**Source:** Field Data of this Study

### **4.2.8 Technological Forces**

The study observed some ongoing technological innovations to mitigate losses and value-addition challenges. The initiatives, including production of fried and smoked LVS which provides an opportunity for addressing post-harvest loss. However, micro-marketing actors are yet to take full advantage of the opportunity due to poor market linkages and other threats as outlined below (Table 4.9).

**Table 4.9: Opportunities and Threats of Technological Forces**

| **Opportunities** | **Threats** |
| --- | --- |
| Simple and cost-effective harvesting, processing and preservation methods attract large number of actors into handling, processing and LVS trade, which could leverage transaction time and post-harvest loss. | Limited access to sources of finance to invest in better technologies and infrastructures compel actors to maintain same practices including drying on sandy beaches producing poor quality products which take longer to sell causing high post-harvest loss. |
| The use of mobile phone imbedded with mobile money payments capability (such as *M-Pesa* and Tigo-*pesa*)could enhance increased market penetration and sales, whileshortening transaction time and loss. | Failure to re-skill operators in the advent of increased quality and safety requirements in fish trade leads to production ofsame poor quality product,constraining market expansion and slow down placement of LVS to markets. |
| Increased use of outboard engines and better roads reduce cost of transport, while allowing much of LVS to access expanded market in good time, and thus could reduce post-harvest loss. | Improved road transport stimulates intrusive competition from increased distribution of substitute products such as sardine from Lake Tanganyika and Lake Nyasa which prolongLVS transaction time, exacerbating loss. |
| Some Research and Development (R&D) initiatives are resulting into product diversification, with new lines of production targeting new markets. This could reduce potential loss associated with traditional brand. | Inadequate innovations due to limited investment in R&D and extension servicesresult into poor market linkages,longer transaction time and persistenthigh post-harvest loss. |

**Source:** Field Data of this Study

### **4.2.9 Ecological Forces**

The study found that most of LVS catches is sun dried on bare sandy grounds along beaches, as a means of preservation. The technique is simple and less costly, which attract increased number of actors into the sub-sector. The growing number of operators provides an opportunity for speedyhandling and processing of the catch. On the other hand, growing public concerns about quality and product safety threatens efficient marketing of LVS, delays in accessing markets exacerbates post-harvest losses.

**Table 4.10: Opportunities and Threats of Ecological Forces**

| **Opportunities** | **Threats** |
| --- | --- |
| LVS production is on increasing trend with no signs of over-fishing. This guarantees steady supply,stimulating increased support for LVS development including loss reduction measures. | Increased production when processing, storage and marketing system remain the same compound delays causing persistent high post-harvest loss. |
| Although there is a certain degree of public concerns about pollution caused by drying LVS on sandy beaches but it has not reached an extent of affecting existing production practice. | Agitation over unhygienic production and safety of LVS, in the absence of alternative or new technology, constrains processing capacity, causing delays and aggravate losses. |
| Large segment of LVS consumers are not sensitive to product safety, a situation that continue enabling large volumes to access markets, and thus help to reduce potential loss. | Consumerism agitates increased demand for quality standards and certification of LVS. The movecould constrains market accessibility and exacerbate loss of traditional product. |
| Product diversification initiatives are reducing pollution and ecological impact caused by production of traditional sun dried product, which in turn could reduce agitation and potential loss. | Production of fried and smoked LVS products increases the use of fuel-wood, which causes environmental degradation, fuelling up increased agitationwhich could result in maintaining old practice linked to high loss. |
| Hunger due to drought and other elements of climate change propel increased demand for LVS in regional market, and thus could help shortening transaction time and post-harvest loss. | Unpredictable changes in whether pattern continue to impair efficient processing and preservation of LVS exacerbating post-harvest loss. |

**Source:**Field Data of this Study

## **4.3 Transaction Time of LVS in Each Step of Supply Chain**

Transaction time in different steps of the supply chain, as determined in the field and authenticated through validated Key Informants questionnaire interview (appendix 2),suggest that much of the LVS takes over 50 days to get to target markets.

### **4.3.1 Transaction Time in Each Step of Supply Chain**

The findings with regards to transaction time are presented in Table 4.11

**Table 4.11: Time it Takes to Transact LVS in Each Step of Supply Chain**

|  |  |  |  |
| --- | --- | --- | --- |
| **S/N** | **Activities along supply chain** | **Av. time taken**  **(in days/ hours)** | |
| 1. | Pre-fishing preparation including sailing to fishing ground | 0.17 | (4 hrs) |
| 2. | Fishing operation including setting of lights, nets and hauling | 0.33 | (8 hrs) |
| 3. | Transportation to landing site either on island or at shore | 0.08 | (2 hrs) |
| 4. | Selling at landing site including bargaining time | 0.04 | (1 hr) |
| 5. | Transportation to processing site including spreading on ground | 0.04 | (1 hr) |
| 6. | Sun drying starting after spreading on ground to collecting in heaps | 0.33 | (8 hrs) |
| 7. | Storing in remote islands waiting for transport boats | 8 |  |
| 9. | Transportation to transit market | 1 |  |
| 10. | Licensing and export formalities | 5 |  |
| 11. | Storing at transit market including time for negotiation | 10 |  |
| 12. | Selling at transit market including settling financial transactions | 2 |  |
| 13. | Transportation to distant domestic markets/ major border towns | 3 |  |
| 14. | Storing at border town including time for approval of documentations | 8 |  |
| 15. | Whole selling in domestic markets including time the agents spend | 10 |  |
| 16. | Transportation across a border including nocturnal border crossing | 4 |  |
| **TOTAL AVERAGE NUMBER OF DAYS** | | **52** |  |

**Source:** Field Data of this Study

### **4.3.2 Validity Test**

The IBM SPSS statistics data editor computer program was used in testing the validity of questionnaire administered to Key Informants (Appendix B). The Pearson correlation (2-tailed) validity test provided an output as appended (Appendix C). Based on the significant value obtained by the sig: (2-tailed) of 0.000 <0.05, it can be concluded the 1 item to 17 item was valid.

### **4.3.3 Reliability Test**

Likewise, testing of consistency and reliability of Key Informants’ questionnaire conducted by using Cronbach’s Alpha obtained an average value of 0.809. Based on decision-making criterion in reliability test, Cronbach’s Alpha value obtained, 0.809, is greater than the 0.600 benchmark, 0.809> 0.600, thus it can be concluded that the research instrument was highly reliable.

## **4.4 Potential Strategies that can Improve LVS Marketing Performance**

The study identified strategies that can be used in reducing transaction time, and thus reduces post-harvest loss. The strategies are presented in Table 4.13.

**Table 4.13: Marketing Strategies that Could be used in Reducing Transaction Time**

| **S/N** | **ME actors/forces** | **Strategies** |
| --- | --- | --- |
| 1. | Suppliers | Build capacity of FBOs to create reliable centresfor bulk purchase of LVS by intermediaries, which would reduce collection and storing time in rural communities. |
| 2. | Intermediaries | Provide support to intermediaries so that they are able to operate efficiently, and thus shortening transaction time. Also, enable them explore new markets, especially in rewarding regional market. This would expand market size promoting speedy placement of the product. |
| 3. | Customers | Launch nationally coordinated market penetration campaigns aimed at increasing consumption of LVS product in present markets, taking advantages ofnutritive superiority of the product. |
| 4. | Competitors | Sensitize production of sand-free products to differentiate, and enhance comparative advantages of LVS over many substitute products. This would lead to capturing larger market share, speed up transaction and thus reduce loss. |
| 5. | Political and Legal | Provide incentives for increased number of traders to venture into cross-border LVS trade, while reducing trade barriers. The market size would expand driving speedy placement of the product to the market. |
| 6. | Economics | Strengthen FBOs to effectively mitigate weaknesses and threats caused by marketing environment. The intervention would enable actors to speed up placement of the product to target markets. |
| 7. | Socio-cultural | Public and Private institutions including NGOs take initiative to re-brand LVS from animal feed material to food for direct human consumption. This would increase market size and speed up placement of the product to target markets. |
| 8. | Technological | Dedicate limited financial resources available to R & D in order to come up with innovations for diversifying product offerings, providing new products that can sell to new markets, increasing market size and speed up placement. |
| 9. | Ecological | Develop and enforce quality standards for LVS so that the product can secure larger market share, especially in regional market, reducing transaction time and post-harvest loss. |

**Source***:* Field Data of this Study

# CHAPTER FIVE

# 5.0 DISCUSSION

## **5.1 Marketing Environment Factors Contributing to Post-Harvest Loss**

The findings of this study reveal that marketing environment factors contribute greatly to high post-harvest loss, especially in small-scale fisheries which are often characterized by dispersed bulk production in poorly accessible remote areas.In the case of LVS, the study found thatthough the fish is a natural product, easily preserved, nutritious and transportable but is associated with persistent high post-harvest lossmainly caused by delays in getting the perishable product to target markets. The placement process is a long and complicated one, highly influenced by multiple macro-marketing environmental forces. There are lots of marketing inefficiencies, weaknesses and threats, whichencumber ability of actors to facilitate speedy transactions of LVS along the supply chain (as presented in chapter 4).

With the results from this study, one would not be wrong suggesting that high post-harvest lossin this fishery, estimated to be over 60 billion shillings per annum (FAO 2014), has persisted mainly due to simplistic diagnosis of the root cause. Focusing on fighting microbiological action, fat oxidation and autolysis while overlooking crucial influence that unfriendly marketing environment exertscannot resolve the problem. The various preservation techniques thathave been tried to reducing microbial activities and destruction of fishery products have failed to reduce the loss, and thus the need to move from production and product-oriented solutions to embracing marketing orientation approach. Creation of an enabling marketing environment could be an ideal starting point as identified in this study.

This finding compares well with previous studies, for example, Almas (1981) emphasises that, the rate of spoilage and quality degradation in fishery products is essentially determined by time and temperature. The longer the time the fish is kept exposed to high temperature, the faster it spoils. The moral is to keep fish cool and for a short time, and for cured products it is more to do with the time factor, which in turn largely depends on marketing environment.

Gopalaswamy (2009) asserts that, when marketing perishable products especially from rural areas,it is necessary to know the conditions of the markets and marketing, which are governed by ever changing environment. The marketing environment affects the ability to place a product to target market at the right time. Worthington and Britton (2006) are of the same opinion that, good marketing environment is essential for competitiveness of all businesses of all types, and poor marketing environment could dissipate potential benefits from any kind of business. Also, Cateora and Graham(2010) stress the point by saying, failure to internalize prevailing marketing environment is tantamount to poor diagnosis of existing problems along supply chains.

## **5.2 Transaction Time in Each Step of Supply Chain**

The study found that, it takes over 50 days to transact LVS in various steps of major supply chain. The long transaction time has detrimental effect on post-harvest loss because dried LVS has a shorter shelf-life of about 20 days. Beyond that timeframe its quality degrade faster, changing colour from silvery to brownish. Customers employing sensory method in assessing fish quality pay less for poor quality product. Hence, failure to shorten transaction time has great impact on post-harvest loss and operators’ income.

Furthermore, LVS production is cyclic governed by alternating lunar cycles of roughly two weeks of moon-light and two weeks of dark-moon periods, with fishing conducted during the later period. The fishing pattern provides a 14-20 days’ benchmark for selling out the catch from a particular fishing cycle. Failure to do so in 20 days could lead to stock overlapping and market glut. This makes it harder to sell old stocks due to Last in First out (LIFO) consumers’ purchasing preference. Consequently, the product has to sell for a long span of time at reduced prices contributing to high post-harvest loss.

The findings compares well with previous studies, Almas (1981) maintain that drying of fish can cause browning of the product, loss of volatile aromatic substances, fat oxidation, and physical changes, all of which can cause quality degradation if the fish is not kept for a short time.FAO (2008) points out that dried LVS lose its quality to below 40% of its optimal valueafter 20 days’period of time.

## **5.3 Potential Strategies that can Improve LVS Marketing Performance**

The analysis of strengths and weaknesses of micro-marketing environment as well as macro-marketing environment forces, as presented in chapter 4, providesa base for devising effective strategies that can be used increating conducive marketing environment. The enabling environment would in turn facilitate speedy placement of perishable fishery product to target market, and thus contribute to reducing post-harvest loss. Further to what has been presented under section 4.5 in chapter 4, much of the identified marketing environment gaps require policy and regulatory intervention.

The policies and regulations that create barriers to trade should be reviewed, where appropriate should be modified, harmonized or eliminated to enable much of LVS get to target markets within 20 days’ timeframe as opposed to over 50 days as observed in this study. The regulatory framework in particular, characterized by multiple regulations and regulators with overlapping functions, has to be revisited in order to shorten transaction time along supply chain. The same applies to multiplicity and high rates of taxes, bureaucratic procedures,corruption, numerous road blocks and several physical inspection when transporting the product. Another strategy is to develop and enforce harmonized Quality Standards in order to trade effectively, and capture increased market share in growing quality and safety conscious market.

Regarding supply and demand, the findings show that domestic market can hardly absorb increased quantities of LVS produced. Therefore, market expansion strategy could be an ideal strategy in dealing with post-harvest loss issue. Placement of present product in new regional markets that can consume much of the produce could open up marketing bottleneck, shortening transaction time, and in the process help to reduce losses. However, for this to happen policy and regulatory barriers that encumber growth in intra-regional LVS trade, as presented in chapter 4, need to be addressed. The policy has to be reviewed to create enabling environment for efficient and effective engagement of both local intermediaries and those from neighbouring countries in the business.

The perception that intermediaries are villains just there to reap off primary producers need to change, they should rather be supported and treated askey players in facilitating market linkages. This argument compares well with other studies, for example, Gopalaswamy (2009) asserts that intermediaries need to be supported because they play a key role in stocking up the product or move it from their point of origin to final destinations. In doing so they add value to the product, provide places, possession utilities and time, which allow for the distribution process to take place. They help in promoting products to the right market and carry finance and risk management, and thus their performance is critical in ensuring efficient placement of products to target market.

The Gambian government employed this strategy by empowering intermediaries in overcoming many of the marketing environment snags,as the ones identified in this study, with significant degree of success. For example, they provided trucks to groups of fish mongers (known in the Gambia as *banabana*) to facilitate efficient delivery of perishable fishery products from rural areas to urban markets. To a large extent, the initiative contributed much in reducing loss and wastage in rural fishing communities of Tankurar and Kemoto as observed by Mgawe (1989).

## **5.4 Comparison with Previous Studies**

The findings of this study compares well with previous studies as highlighted in the literature review, especially with regard to the fact that post-harvest loss emanates from different fronts including difficulties in accessing market. The rationale is that, a fishery consists of not only primary production but it is a larger system including up and down-stream activities among which fish processing and marketing are of major importance. Akande and Diei-Ouadi(2010) observe that while good handling and processing practices are crucial in addressing contamination and rapid fish spoilage through microbial action and chemical reactions, the time-sensitive perishable product requires efficient marketing system to tame high losses.

## **5.5 Contradictions with Previous Studies**

This study does not contradict with previous research but has rather expanded the scope of analysing post-harvest fish loss by including marketing environment actors and forces. In other researches, (Ward, 1996; FAO, 2008;Akande and Ouadi, 2010), the definition of market forces was largely limited to articulating supply and demand phenomenon, over supplying the market or market glut notion without digging dipper into the market environment dimension. Such over simplification of the complex issue made it difficult for policy makers to clearly understand the negative impact of marketing environment forces and how the broken parts can be addressed. Consequently, the high post-harvest loss problem has remained sturdy for quite long.

## **5.6 Key and New Lessons from the Study**

The key and new lesson from this research is that, it is a misnomer to expect post-harvest fish loss in small-scale fisheries to subdue without creating conducive marketing environment to enable actors shorten transaction time in different steps of supply chain. In the case of LVS, most of the catches are finally sold cheaply as animal feed product as opposed to direct human consumption largely due to unnecessary delays in placing perishable product to target markets. Therefore, until the marketing environment gaps are closed, it is not possible to reduce loss in this fishery (*ceteresperibus*). The findings call for expanding the scope of dealing with the loss problem by tackling it beyond production and product-oriented approaches to embracing marketing-orientation intervention.

Growth in intra-regional trade in fish and fishery products provides great potential for increasing market size necessary for mitigating transaction time and thus high post-harvest loss in small-scale fisheries. However, success in regional fish trade, as exemplified in this study, is contingent on creating a marketing mix which matches the needs and preferences of the target market. Therefore, actors should be empowered to meet the varied complexities such as the need to understand differences between countries and culture including language, social customs and government policies. Also, supporting traders from neighbouring countries, who have expertise in marketing operations within their respective countries, could help in facilitating efficient placement of perishable products in regional market and thus help to shorten transaction time and reducing the loss.

Another important lesson from this study is that competition between local and fish traders from neighbouring countries should be taken as a way to enhancing required marketing efficiency. Otherwise, setting protective measure and barriers could conflict strategic marketing tenets, which favours horizontal relationships for conquering regional or international markets as observed by Doole and Lowe (2008), Cravens and Piercy (2009), and Dibb*et al*, (2012). The same position has been emphasized by other authors including Kotler (1965), Miracle (1965) and Porter (1980) who point that, competition could expand tradition channel of distribution coverage and gain the advantage of market knowledge in regional market.

Given the marketing environment surrounding Lake Victoria Sardine, as analysed in this study, the starting point to addressing the loss problem should be raising awareness among policy makers that existing policy and regulatory framework are flawed. The perishable fish and fishery products need fast-tracking placement if losses have to be reduced. Also that the financial implication of the loss is far greater than the collected taxes and levies that are behind enacting excessive bureaucratic procedures and delays causing high losses. For example, in the case of LVS the loss stands at over 60 billion shillings as opposed to 2-3 billion Shillings accrued by government annually as taxes and levies from the fishery (FAO, 2014; URT 2015).

This study, however, does not preclude the need for increased efforts to improving product quality, it has rather revealed the crucial role of marketing environment in dealing with post-harvest loss issue. And, it has provided a methodology that could help in improving current post-harvest fish loss assessment protocol by including marketing environment auditing dimension.

# CHAPTER SIX

# 6.0 CONCLUSION AND RECOMMENDATIONS

## **6.1 Summary**

The main objective of this study was to examine the interplay between marketing environment and post-harvest fish loss in Lake Victoria Sardine fishery. The research was triggered by persistent high loss that occurs in small-scale fisheries irrespective of efforts being takento reducing the loss levels and increased demand for fish to feed the growing human population. The study employed exploratory research technique to explore interplay between marketing environment and post-harvest fish loss. Critical analysis of strengths and weaknesses of micro-marketing environmental actors have been made together with opportunities and threats posed by macro-marketing environmental forces.

Based on findings, it is evident that while microbiological, chemical and technological dimensions are central drivers behind fish spoilage,the post-harvest loss problem is compounded by unfriendly marketing environment. It happen so because the rate of fish spoilage is mainly determined by the time it takes to place the perishable product to potential customer; the longer it takes, the higher the spoilage culminating into high loss. On the other hand, shortening of transaction time depends largely on prevailing macro-marketing environment forces which impact operational capacity of micro-marketing environmental actors.

With regard to LVS, this study found a marketing system conditioned by an ever changing environment, unfortunately the actors are failing to cope with pressure being exerted by the changes largely emanating from macro-marketing environmental forces. The study has identified several weaknesses pertained to micro-marketing environment actors, and threats exerted by macro-marketing environment forces that retard speed of transacting LVS in different steps of supply chains causing high loss. The disorganization of actors, failure to recognize key role played by intermediaries, poor branding of the LVS product and increased competition from substitute products are some of the major weaknesses that have been identified as barriers to reducing post-harvest loss.

The threats include burdensome policy and regulatory framework which curtail speedy placement of perishable LVS to market causing a batch to take over 50 days to cross a boarder as opposed to 20 days’ shelf life of the product. The multiplicity of taxes, bureaucratic procedures and corruption are in particular major barriers stifling operational capacity of disorganized actors. Given the identified weaknesses and threats, an ideal solution should be to capitalize on existing strengths and opportunities to improve the marketing environment as a basic requirement for effective reduction of post-harvest fish loss.

The major lesson learnt from this study is that the fight against high post-harvest fish loss cannot be won just by improving preservation technology as prescribed by the fisheries policy (URT, 1997), the efforts must be supported by improved marketing environment. Although most of the marketing environment forces are external, but change in policy and regulatory framework could reduce bureaucratic procedures that constrains expansion of LVS market size, which is key to shortening transaction time and stimulation of loss reduction.

**6.2 Conclusion**

One third of the food produced globally is lost or wasted along production and supply chains, while almost 800 million go hungry. It is for this reason that the United Nations’ Sustainable Development Goals (SDGs) advocate sustainable consumption and production pattern. The objective is to halve per capita global food waste at retail and consumer levels as well as reduce food losses along production and supply chains, including post-harvest losses by 2030 as articulated by the United Nations (UN-SDGs, 2015).

With regard to fishing industry, high post-harvest loss remains one of major issues alongside overcapacity, over fishing, illegal fishing and environmental degradation. Small-scale fisheries in particular suffer much of the loss due to existing complexities including bulk production in widely dispersed remote areas, low level of technology, poor and high cost of transport, seasonality and unfriendly marketing environment. The loss levels have remained high irrespective of efforts being taken amidst increased demand for food fish to feed the growing human population. The appalling result could suggest that the root cause of the loss is poorly understood.

Many previous studies, as outlined in literature review chapter, focused on assessing post-harvest loss levels for prioritization to pave ways for technological intervention. Very little effort was made to explore the interplay between marketing environment and post-harvest loss. As revealed in this study, the marketing environment is critical in dealing with high post-harvest loss problem because the rate of fish spoilage, especially for cured fishery products, is largely dependent on time; the longer it takes to transact it, the higher the post-harvest loss.

Many broken parts of marketing environment have been identified and analysed. It is expected that the prescription would allow informed fixing of policy and technical gaps, creating supportive environment for effective loss reduction. The analytical framework of the finding would enable key stakeholders such as policy makers, managers, extension officers and fishers internalize the interplay between marketing environment and fish loss, for them to effectively deal with post-harvest issues especially in small-scale fisheries.

In conclusion, post-harvest fish losses should be considered not only in terms of microbiological, autolysis and rancidity, but also by influences exerted by marketing environmental actors and forces. In this regard, policies need to be reviewed to creating conducive market environment as a basis for reducing high post-harvest fish losses.

**6.3 Policy Implications and Recommendations**

This study has found that, despite suffering an estimated loss of over 60 billion shillings emanating from just one fishery, the fisheries policy in Tanzania hada very short statement on this major issue. The statement itself is rather simplistic, attributing high post-harvest fish loss to poor transport and distribution network only. Following such narrow diagnosis, the policy (URT, 1997)provides an equally simple solution; promotion of appropriate technologies in post-harvest handling and processing to improving the shelf-life of fish and fish products for local consumption and export. The revised version, National Fisheries Policy of 2015(URT, 2015), does not even mention post-harvest loss issue at all.

The undermining or omission of post-harvest loss issue in existing fisheries policy could suggest that the problem is still not well understood to be internalized and worked upon by policy makers. Therefore, this study would contribute in raising awareness of policy makers and other key players regarding the interplay between marketing environment and post-harvest fish loss. It will, within its scope, have some influence on policy makers, the government and other key stakeholders who seek inputs and advice on how best to deal with the challenge of high post-harvest fish loss, especially in small-scale fisheries.

Based on findings of this study, it in highly recommended that policies and legal framework need to be reviewed in order to help actors to effectively meet the marketing environmental forces, shortening transaction time, and thus reduce losses. Also, post-harvest fish loss assessment methodology be expanded to including marketing environmental auditing. Specific areas for urgent policy intervention should include;

1. Empower suppliers (fishers) to get organized under strong fishers’ based organizations (FBOs) in order to strengthen their technology upgradation, entrepreneurship skills, and build their capacity to meet the market accessibility challenges;
2. Recognize and support intermediaries as key players in speeding up placement of perishable product to target markets, which is an important undertaking in loss reduction;
3. Plan and implement consistent promotional campaign for LVS based on its various economic and nutritional comparative advantages. This would help to expand the market size, reduce transaction time and post-harvest loss;
4. Policy review be conducted aimed at addressing marketing environment weaknesses and threats as revealed in this study, if post-harvest loss problem is to be mitigated;
5. Regulatory framework be reviewed in order to reduce transaction time, and enable expansion of market size in and outside the country, which is a prerequisite for reducing post-harvest loss;
6. Post-harvest fish loss assessment protocol currently in use be reviewed to include marketing environment dimensions to better highlight the problem for easy internalization, and effective policy formulation and implementation.

## **6.4 Suggestion for Future Studies**

The scope of this study was rather limited, mainly dealing with marketing environment in domestic market, hence further researchis recommended to explore and capture prevailing marketing environment in regional and international markets.Also, it is important to conduct detailed studies to identify ways that would enable extensive market development and penetration of LVS to the present and new markets, as well as product development and diversification for present and new markets for the product.

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# APPENDICES

Appendix A: Check-list for conducting Semi-Structure Interviews (SSI)

|  |  |  |
| --- | --- | --- |
| **Micro-Marketing Environment Actors** | | |
| **A** | **Suppliers** | |
| 1. | What is the outlook for the availability/ supply of LVS? |
| 2. | How long does it take on average to harvest and sell out LVS? |
| 3. | What trends are occurring among suppliers in their patterns of selling LVS? |
| 4. | How does production pattern including seasonality affect supply of the product? |
| 5. | What marketing strategies can be used to reduce storing time in villages? |
| **B** | **Customers** | |
| 1. | What is happening to market size, growth and geographic distribution? |
| 2. | What are the major market segments/ targets? |
| 3. | How do customers judge the LVS on reputation, product quality and price? |
| 4. | How long does it take on average for quality of LVS to degrade by 50%? |
| 5. | What evolving needs and satisfactions are the LVS buyers seek? |
| 6. | What strategies can be used to increase the number of LVS consumers? |
| **C** | **Competitors** | |
| 1. | What are the major competitors to LVS? |
| 2. | What are the trends of competitors regarding market share? |
| 3. | What trend can be foreseen in future competition and substitutes for the LVS? |
| 4. | What strategies can be used to make LVS become a more competitive product? |
| **D** | **Intermediaries** | |
| 1. | What are trades channels used in placing LVS to customers? |
| 2. | How long does it take on to transact LVS at different points along the chain? |
| 3. | What is the minimum practical time it can take to transact LVS at each stage? |
| 4. | What factors constrain minimizing LVS transaction time at different stages? |
| 5. | What is the outlook for the cost and availability of transport service? |
| 6. | What is the outlook for the availability of warehousing facilities? |
| 7. | What is the outlook for the cost and availability of financial resources? |
| 8. | How effectively is LVS promoted? |
| 9. | What barriers encumber speedy placement of LVS to target markets? |
| 10. | What strategies can be used to shorten transaction time along supply chain? |
| **Macro-marketing environment forces:** | | |
| **A** | **Economics** | |
| 1. | How do economic variables such as shortages of inputs including fishing gear and processing equipment, capital and credit availability affect LVS business? |
| 2. | What effects have economic variables such as size; age distribution and regional distribution of population exert on LVS trade? |
| 3. | What strategies can be used to improve the situation for speedy LVS transaction? |
| **B** | **Technological** | |
| 1. | What kind of infrastructural services available? |
| 2. | What major changes are occurring in harvesting and processing technology of LVS? |
| 3. | What are the major generic substitutes that are replacing Lake Victoria Sardine products? |
| 4. | What strategies can be used to addressing technological shortfalls to allow speedy placement of LVS to target market? |
| **C** | **Political/legal/regulatory** | |
| 1. | What laws are affecting marketing strategies and tactics of LVS? |
| 2. | What administrative procedures encumber effective trading of LVS? |
| 3. | What are the different taxes/levies imposed on LVS trade? |
| 4. | What are the coping strategies employed by operators to meet the various challenges? |
| 5. | What strategies can be used to mitigate political and regulatory framework for speedy placement of LVS to target markets? |
| **D** | **Socio-cultural** | |
| 1. | What attitude is the public taking towards the type of LVS products? |
| 2. | What changes in consumer lifestyles and values have a bearing on target market? |
| 3. | What cultural barriers are there impending expansions of LVS market? |
| 4. | What strategies can be used to mitigate socio-cultural barriers for speedy placement of LVS to target markets? |
| **E** | **Ecological** | |
| 1. | Are there public concerns about effects such as pollution from LVS? |
| 2. | What is happening with pollution control in LVS fishing and processing? |
| 3. | What is happening with regard to health and safety issues associated with LVS products? |
| 4. | What strategies can be used to mitigate ecological barriers to speedy placement of LVS to target markets? |

**APPENDIX B: Questionnaire for Key Informants (KI)**

**Introduction**

The study is carried out in support of the research entitled: The interplay between marketing environment and post-harvest fish loss in Lake Victoria Sardine fishery in fulfilment of studies at the Open University of Tanzania. The major aim of the study is to find out to what extent prevailing marketing environment impact post-harvest fish losses in LVS fishery. I would be grateful to have your candid views.

1. Village/ Island/Town………………………District………………………………….
2. Your job:

Primary fisher [ ]

Fish processor [ ]

Fish trader [ ]

Field worker [ ]

Others; Specify…………………………………………………………………………..

For how many years have you worked in Lake Victoria Sardine fishery? [ ]

1. Your gender : Male [ ] Female [ ]
2. Your age: [ ] years
3. Education level

Primary Education [ ]

Secondary Education [ ]

Post-Secondary Education [ ]

**Average period of time it takes to transact LVS in different steps of supply chain**

Please provide your response on how much you agree or disagree with the following statements in relation to average time it takes to transact Lake Victoria Sardine at different stage of supply chain in the context of post-harvest losses.

**1= Strongly Disagree; 2= Disagree; 3=Moderate; 4= Agree; and 5=Strongly Agree**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **Statement** | **1** | **2** | **3** | **4** | **5** |
| 1 | Pre-fishing preparations takes about 4 hrs |  |  |  |  |  |
| 2 | Fishing operation takes about 8 hrs |  |  |  |  |  |
| 3 | Transportation to landing site takes about 2 hrs |  |  |  |  |  |
| 4 | Selling at landing site takes about 1 hr |  |  |  |  |  |
| 5 | Transportation to processing site takes about 1 hr. |  |  |  |  |  |
| 6 | Sun drying process takes about 8 hrs |  |  |  |  |  |
| 7 | Storing in remote islands takes about 8 days |  |  |  |  |  |
| 8 | Storing in shore-based villages takes about 1 day |  |  |  |  |  |
| 9 | Transportation to secondary market takes about 6 hrs. |  |  |  |  |  |
| 10 | Licensing and export formalities takes about 5 days |  |  |  |  |  |
| 11 | Storing at transit market takes about 10 days |  |  |  |  |  |
| 12 | Selling at transit market takes about 2 days |  |  |  |  |  |
| 13 | Transportation to distant markets takes about 3 days |  |  |  |  |  |
| 14 | Transportation to border towns takes about 3 days |  |  |  |  |  |
| 15 | Storing at border town takes about 8 days |  |  |  |  |  |
| 16 | Retailing in domestic markets takes about 10 days |  |  |  |  |  |
| 17 | Transportation across a border takes about 4 days |  |  |  |  |  |

THANK YOU FOR YOUR COOPERATION

# APPENDIX C: SPSS data analysis print outs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptive Statistics** | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Item\_1 | 40 | 2 | 5 | 4.05 | .714 |
| Item\_2 | 40 | 3 | 5 | 4.23 | .660 |
| Item\_3 | 40 | 2 | 5 | 4.13 | .648 |
| Item\_4 | 40 | 3 | 5 | 3.93 | .616 |
| Item\_5 | 40 | 3 | 5 | 3.97 | .530 |
| Item\_6 | 40 | 3 | 5 | 4.03 | .480 |
| Item\_7 | 40 | 3 | 5 | 4.03 | .423 |
| Item\_8 | 40 | 3 | 5 | 4.05 | .504 |
| Item\_9 | 40 | 3 | 5 | 3.88 | .607 |
| Item\_10 | 40 | 3 | 5 | 3.83 | .501 |
| Item\_11 | 40 | 3 | 5 | 3.97 | .530 |
| Item\_12 | 40 | 3 | 5 | 4.13 | .516 |
| Item\_13 | 40 | 3 | 5 | 3.93 | .417 |
| Item\_14 | 40 | 3 | 5 | 3.95 | .597 |
| Item\_15 | 40 | 3 | 5 | 4.13 | .563 |
| Item\_16 | 40 | 3 | 5 | 4.05 | .504 |
| Item\_17 | 40 | 2 | 5 | 4.03 | .733 |
| Valid N (listwise) | 40 |  |  |  |  |

| **Correlations** | | | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Item\_1 | Item\_2 | Item\_3 | Item\_4 | Item\_5 | Item\_6 | Item\_7 | Item\_8 | Item\_9 | Item\_10 | Item\_11 | Item\_12 | Item\_13 | Item\_14 | Item\_15 | Item\_16 | Item\_17 | Score total |
| Item\_1 | Pearson Correlation | 1 | .139 | .097 | .242 | .274 | .296 | .081 | -.007 | .074 | .240 | .274 | .331\* | .271 | .066 | .175 | -.007 | .536\*\* | .512\*\* |
| Sig. (2-tailed) |  | .393 | .552 | .132 | .087 | .064 | .621 | .965 | .650 | .135 | .087 | .037 | .090 | .685 | .279 | .965 | .000 | .001 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_2 | Pearson Correlation | .139 | 1 | .112 | .043 | .163 | .225 | .439\*\* | .428\*\* | .328\* | -.033 | .163 | .367\* | .063 | .159 | .336\* | .351\* | .147 | .523\*\* |
| Sig. (2-tailed) | .393 |  | .490 | .794 | .315 | .163 | .005 | .006 | .039 | .840 | .315 | .020 | .700 | .326 | .034 | .026 | .365 | .001 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_3 | Pearson Correlation | .097 | .112 | 1 | .538\*\* | .308 | .237 | .175 | .216 | .497\*\* | .227 | .308 | .182 | .320\* | .017 | -.044 | .059 | -.115 | .483\*\* |
| Sig. (2-tailed) | .552 | .490 |  | .000 | .053 | .141 | .279 | .181 | .001 | .158 | .053 | .260 | .044 | .919 | .788 | .718 | .481 | .002 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_4 | Pearson Correlation | .242 | .043 | .538\*\* | 1 | .308 | .354\* | .106 | .178 | .523\*\* | .123 | .308 | .273 | .377\* | .129 | .324\* | .260 | .118 | .615\*\* |
| Sig. (2-tailed) | .132 | .794 | .000 |  | .053 | .025 | .515 | .272 | .001 | .451 | .053 | .089 | .016 | .427 | .042 | .105 | .469 | .000 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_5 | Pearson Correlation | .274 | .163 | .308 | .308 | 1 | .103 | .117 | .389\* | .388\* | .273 | 1.000\*\* | .199 | .107 | .320\* | .182 | .197 | .199 | .647\*\* |
| Sig. (2-tailed) | .087 | .315 | .053 | .053 |  | .526 | .472 | .013 | .013 | .089 | .000 | .218 | .510 | .044 | .260 | .224 | .217 | .000 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_6 | Pearson Correlation | .296 | .225 | .237 | .354\* | .103 | 1 | .376\* | .207 | .275 | .125 | .103 | .194 | .266 | .094 | .368\* | .313\* | .144 | .532\*\* |
| Sig. (2-tailed) | .064 | .163 | .141 | .025 | .526 |  | .017 | .200 | .086 | .441 | .526 | .230 | .097 | .564 | .020 | .049 | .376 | .000 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_7 | Pearson Correlation | .081 | .439\*\* | .175 | .106 | .117 | .376\* | 1 | .235 | .312\* | .142 | .117 | .338\* | .011 | .107 | -.013 | -.006 | .246 | .426\*\* |
| Sig. (2-tailed) | .621 | .005 | .279 | .515 | .472 | .017 |  | .145 | .050 | .381 | .472 | .033 | .947 | .513 | .934 | .971 | .126 | .006 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_8 | Pearson Correlation | -.007 | .428\*\* | .216 | .178 | .389\* | .207 | .235 | 1 | .524\*\* | .036 | .389\* | .173 | .018 | .435\*\* | .248 | .192 | -.003 | .535\*\* |
| Sig. (2-tailed) | .965 | .006 | .181 | .272 | .013 | .200 | .145 |  | .001 | .827 | .013 | .287 | .911 | .005 | .122 | .235 | .983 | .000 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_9 | Pearson Correlation | .074 | .328\* | .497\*\* | .523\*\* | .388\* | .275 | .312\* | .524\*\* | 1 | .179 | .388\* | .215 | .266 | .478\*\* | .272 | .105 | .007 | .681\*\* |
| Sig. (2-tailed) | .650 | .039 | .001 | .001 | .013 | .086 | .050 | .001 |  | .268 | .013 | .183 | .097 | .002 | .090 | .520 | .965 | .000 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_10 | Pearson Correlation | .240 | -.033 | .227 | .123 | .273 | .125 | .142 | .036 | .179 | 1 | .273 | .087 | .181 | .056 | -.102 | .036 | .082 | .330\* |
| Sig. (2-tailed) | .135 | .840 | .158 | .451 | .089 | .441 | .381 | .827 | .268 |  | .089 | .594 | .263 | .733 | .530 | .827 | .615 | .038 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_11 | Pearson Correlation | .274 | .163 | .308 | .308 | 1.000\*\* | .103 | .117 | .389\* | .388\* | .273 | 1 | .199 | .107 | .320\* | .182 | .197 | .199 | .647\*\* |
| Sig. (2-tailed) | .087 | .315 | .053 | .053 | .000 | .526 | .472 | .013 | .013 | .089 |  | .218 | .510 | .044 | .260 | .224 | .217 | .000 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_12 | Pearson Correlation | .331\* | .367\* | .182 | .273 | .199 | .194 | .338\* | .173 | .215 | .087 | .199 | 1 | .164 | .187 | .033 | .271 | .263 | .524\*\* |
| Sig. (2-tailed) | .037 | .020 | .260 | .089 | .218 | .230 | .033 | .287 | .183 | .594 | .218 |  | .312 | .247 | .839 | .090 | .102 | .001 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_13 | Pearson Correlation | .271 | .063 | .320\* | .377\* | .107 | .266 | .011 | .018 | .266 | .181 | .107 | .164 | 1 | .088 | .369\* | -.104 | -.245 | .357\* |
| Sig. (2-tailed) | .090 | .700 | .044 | .016 | .510 | .097 | .947 | .911 | .097 | .263 | .510 | .312 |  | .591 | .019 | .524 | .127 | .024 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_14 | Pearson Correlation | .066 | .159 | .017 | .129 | .320\* | .094 | .107 | .435\*\* | .478\*\* | .056 | .320\* | .187 | .088 | 1 | .248 | .094 | .120 | .461\*\* |
| Sig. (2-tailed) | .685 | .326 | .919 | .427 | .044 | .564 | .513 | .005 | .002 | .733 | .044 | .247 | .591 |  | .123 | .565 | .461 | .003 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_15 | Pearson Correlation | .175 | .336\* | -.044 | .324\* | .182 | .368\* | -.013 | .248 | .272 | -.102 | .182 | .033 | .369\* | .248 | 1 | .158 | .116 | .452\*\* |
| Sig. (2-tailed) | .279 | .034 | .788 | .042 | .260 | .020 | .934 | .122 | .090 | .530 | .260 | .839 | .019 | .123 |  | .330 | .475 | .003 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_16 | Pearson Correlation | -.007 | .351\* | .059 | .260 | .197 | .313\* | -.006 | .192 | .105 | .036 | .197 | .271 | -.104 | .094 | .158 | 1 | .135 | .376\* |
| Sig. (2-tailed) | .965 | .026 | .718 | .105 | .224 | .049 | .971 | .235 | .520 | .827 | .224 | .090 | .524 | .565 | .330 |  | .405 | .017 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Item\_17 | Pearson Correlation | .536\*\* | .147 | -.115 | .118 | .199 | .144 | .246 | -.003 | .007 | .082 | .199 | .263 | -.245 | .120 | .116 | .135 | 1 | .391\* |
| Sig. (2-tailed) | .000 | .365 | .481 | .469 | .217 | .376 | .126 | .983 | .965 | .615 | .217 | .102 | .127 | .461 | .475 | .405 |  | .012 |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Score total | Pearson Correlation | .512\*\* | .523\*\* | .483\*\* | .615\*\* | .647\*\* | .532\*\* | .426\*\* | .535\*\* | .681\*\* | .330\* | .647\*\* | .524\*\* | .357\* | .461\*\* | .452\*\* | .376\* | .391\* | 1 |
| Sig. (2-tailed) | .001 | .001 | .002 | .000 | .000 | .000 | .006 | .000 | .000 | .038 | .000 | .001 | .024 | .003 | .003 | .017 | .012 |  |
| N | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| \*. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | | | | | | | | | | | | |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | | | | | | | | | | |