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Global Commodity Value Networks:
Supply Chain Rigidities and Business Survival in Uganda's Fishing Sector

By

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ABBREVIATIONS AND ACRONYMS

FAO	Food Agricultural Organization
WB	World Bank
UNCTAD	United Nations Commission for Trade and Development
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
DFR	Department of Fisheries Resources
OECD	Organization of Economic Cooperation and Development
IISD	International Institute for Sustainable Development
BMU	Beach Management Unit
LVFO	Lake Victoria Fisheries Organization
NAFIRRI	National Fisheries Resource Research Institute
UFPEA	Uganda Fish Processors and Exporters Association
WCED	World Commission for Environment Development
UNMDG	United Nations Millennium Development Goal
NEMA	National Environment Management Authority
UFFCA	Uganda Fisheries and Fish Conservation Association
NARO	National Agricultural Research Organization
UPTOP	Uganda Programme for Trade Opportunities and Policy
FTI	Fisheries Training Institute
IADC	Impact Associates Development Consultants
UBOS	Uganda Bureau of Statistics
WRI	World Resources Institute
UFFCA	Uganda Fishers and Fish Conservation Association
PPP	Public Private Partnership
CPR	Common Property Resources

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ABSTRACT

Rationale: Uganda's competitiveness and growth highly depends on primary productivity of natural resources. The fisheries sector has emerged to be a key foreign exchange earner by generating USD 143,168 million in 2005 representing approximately 12 % GDP. This study under the auspices of creating an enabling Investment Climate and Business Environment (ICBE) went out to investigate how the supply chain rigidities affect business survival in the fishing sector. This was triggered by the assumption that though the supply chain may exist and seen to be producing impressive economic growth indicators, it may not be managed efficiently and effectively for long-term competitiveness and economic growth. This observation was supported by the widely held view that the fisheries fraternity in Uganda experience high levels of impoverishment amidst a very profitable and seemingly thriving enterprise. The cause of the deprivation was understood in terms of supply chain rigidities that affect business survival. The rigidities were examined in the context of both efficiency and effectiveness of the fish value chain in meeting supply chain objectives of reliability in quality, quantities, price and timely deliveries.

Methodology: The study employed an applied and participatory learning action research methodology, embedded in the systems thinking approach. The study was built on three types of information: quantitative data, qualitative data and policy reviews. Similar data was gathered from different sources 'triangulation' in order to strengthen data quality.

Main Findings: The main findings of the study indicated that learning, had taken place in the value chain. The sector had also experienced growth in commercial industrialization, employment and export values. However, the growth has been achieved, due to pursuit of short-term gains at the expense of sustainable long-term economic aspirations. Inefficiency due to short-term gains accounted for annual losses above USD 400 million. Conversely, efficiency for sustainable fishing could raise sector incomes by 4 fold compared to value sharing. Constraints for efficiency include information and power asymmetry, weak partnerships, lack of coordination among government agencies. Also, commercialization of the sector resulted into producing unsustainable quantities of fish. Current production levels were above 420,000 tons yet the recommended MSY is 330,000 tons per year of which 60,000 tons (raw material) is destined for export. Data analysis revealed a sustainable yearly production of 220,000 tons of which utmost 45,000 tons (raw material) could sustain the

export market. The gap strengthened existence of information asymmetry embroiled with accusations and counter-accusations. This painted a picture of a market failure.

Conclusion: With the above background, the study concluded that the Regulatory Agency (Department of Fisheries Resources) has been pursuing a Strategic Stretch Approach *(reacting to market conditions)* rather than a Strategic Fit *(matching resources with demand)*. This study proposes a business policy and strategic framework, to revamp the fisheries sector. Key strategies proposed include; professionalism through training and certification of fishers, classification of fishing permits, promotion of long-line fishing, progressive reduction in number of fish factories to match estimated Nile Perch fish stocks, closed factories to engage in processing alternative species such as Tilapia with high demand in regional markets, promotion of aqua-culture to produce Catfish as baits for Nile Perch fisheries and table fish (Tilapia and Catfish) for both domestic and regional market.

Introduction

Fish is an important source of protein for the world population. Worldwide more than 38 million people are directly engaged in fishing and fish farming as a source of income (FAO, 2004). The fishing sector is a source of income for firms and individuals and contributes to poverty alleviation as well as achieving food security. The total world trade of fish and fish products reached US$58.2 billions in 2002, depicting a rise of 45% in terms of value and 41% in terms of quantity since 1992 (FAO, 2004). Whereas Thailand was the main exporter of fish and fish products from 1993 – 2001, and reported export values of US $ 3.7 billions, it was surpassed by China in 2002 with export values of US$4.5 billions (FAO, 2004).

Developing countries, presently account for 70% of the world fish market. This figure represents an increase in foreign exchange earnings from US$11.6 billions in 1992 to US$17.4 billions in 2002. The earnings are significantly higher than those from other agricultural products such as rice, coffee, cocoa and tea (FAO, 2004). Uganda joined the fish international market after adopting the market liberal reforms in early 1990's (Marriot *et al.,* 2004).

Uganda is endowed with fresh water bodies. This gives her a unique opportunity to supply fresh water fish worldwide and a niche in the international market. The *Nile Perch* is the dominant species for export (MAAIF, 2006). Currently, over one million Ugandans are involved in artisan fishing and related activities of fish processing, fish transportation, fish trade and boat building. Approximately 17 million people derive their nutrients from fish (MAAIF, 2006).

As a result of the export trade, about a dozen fish processing firms have emerged[1] in the country in the last ten years accounting for a total investment value of more than US $ 10 million. This growth in capital investment has resulted in a 2500% growth in fish export earnings for Uganda i.e. from a decimal 4,751 tons or US $ 5,308 million in 1991 to 36,600 tons or US $ 143,168 million in 2005. Currently, the fish sector contributes up to 12% of the Gross Domestic Product GDP (MAAIF, 2006). The National vision over the next 25 years for the fisheries sector is to ensure sustainable exploitation and development of the fisheries

[1] Government, Business Associations, Non-Governmental Organizations and Donor agencies have all invested substantial resources in improving fisheries management as well as production and marketing of fish and fish products.

resources in order to maintain fish availability for both present and future generations without degrading the environment (MAAIF, 2004).

In terms of the supply chain, approximately 60 per cent of the fish landed is marketed fresh, while 20 percent is processed by traditional methods, mainly smoking. Industrial processing is still limited, almost exclusively to fish for export. Chilled and frozen Nile perch fillets are the main export products. The European Union, is the major importer and accounts for approximately 70 per cent of the total exports from Uganda. Japan, Singapore, Hong Kong, Australia, Israel, United Arab Emirates, Egypt, South Africa and USA are among others the main export destinations for Uganda's frozen fish. Other cured fish, mainly tilapia, are exported to the regional market in neighboring countries such as Kenya, Tanzania and Democratic Republic of Congo and Southern Sudan. Sun-dried *Mukene* is utilized in the formulation of animal feeds, but is also a significant contributor to fish consumed locally.

1.1 Definition of Supply Chain: Global Commodity Value Networks

The concept of value networks is synonymous with the concept of supply networks and/or chains. In 1990's, Gereffi and others developed a framework known as global commodity chains that linked the concept of value-addition, to a direct chain of global organizations (Gereffi, 2005). Commodity chains differ from other chains (e.g., auto mobiles), because they are basically in primary or extraction industry, involving products such as fish, hides and skins, coffee, rice, copper etc. Lysons and Farrington (2006) defined a supply chain as a network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the consumer. From this context, a supply chain may exist but may not necessarily be managed (Teng & Jaramillo, 2006). The demand to have an efficient and effective supply chain, responsive to customer or consumer needs raises the concept of supply chain management philosophy.

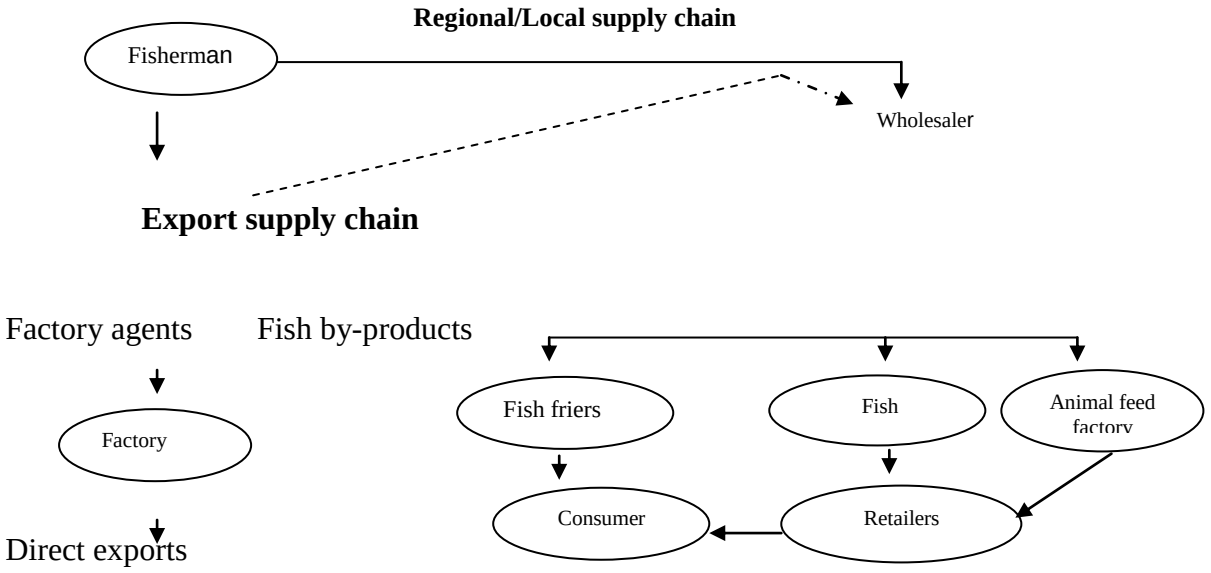
Supply chain management as a management philosophy is described by Lysons and Farrington (2006, pp95) as having the characteristics of a systems approach such as:

1. Viewing the supply chain as a whole and managing the total flow of goods inventory from the supplier to the ultimate consumer,
2. Ensuring strategic orientation towards cooperative efforts to synchronize and converge intra-firm and inter-firm operational and strategic capabilities into a unified whole, and

3. Having a customer focus to create unique and individualized sources of customer value leading to customer/consumer satisfaction.

The above philosophy describes an efficient and effective supply chain as focusing on end-customers or consumers. Information sharing, partnership building and innovation are the basis for continuous improvement in quality, lead-time, cost reduction, logistics management and integration within the supply chain.

Figure 1: Diagram for fish supply chain in Uganda

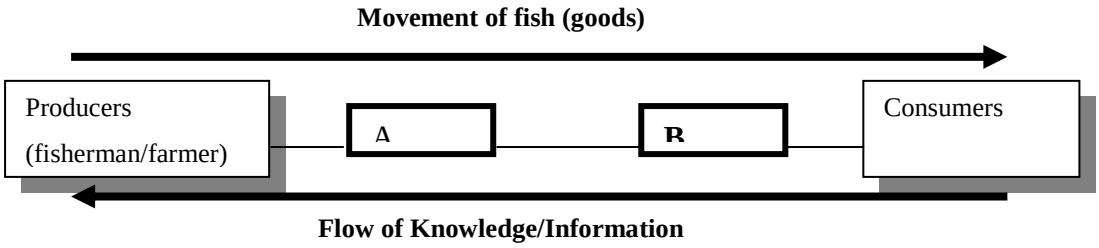


Source: Adopted with Modifications from Marriot et al., 2004.

The Uganda fish supply chain has elements of International, regional and local supply chains. Whereas the international supply chain caters for direct exports, the regional/local supply chain is made up of fishermen/fish farmers as the primary fresh fish producer. Others include the wholesalers/retailers and the consumer who accordingly interrelate in the supply chain (see figure 1 above). Fish is also supplied smoked. This category mainly targets the regional market. The international supply chain relates the fisherman with the factory agent and the processing factory. From the factory, fish is eventually exported to the international market. The supply chain is defined by the relationship between supply of goods (fish) and knowledge flow.

The model below (figure 2) substantiates the interrelationships between the above key players in the Ugandan fish supply chain.

Figure 2: Flow of goods and information in the fish supply chain



Source: adopted from Lysons & Farrington (2006)

The consumer/customer is driven by quality, quantity, price and delivery time of fish and fish products. This is communicated to the fisherman/farmer along the supply chain through several players such as retailers, wholesalers, exporters denoted in the above model as A and B. Conversely, the fisherman is expected to respond to consumer/customer demands. However, in the process of satisfying the consumer, the fisherman as well as all intermediaries in the supply chain confronts several bottlenecks and new experiences that threatens their sustained ability to meet customer wants. While some relate to meeting standards, others are associated with business management while others are routed in the legislative framework. There are factors linked to character or orientation of the individual players and others associated with the support system on network of colleagues and advocacy structures in the fishing fraternity. Overall, there has been concern in the circles of the fisheries fraternity of high levels of impoverishment amidst a very profitable and seemingly thriving enterprise (MAAIF, 2004; Nyeko *et al.*, 2005; Odongkara *et al*, 2005). This complex of deprivation can be partly explained by rigidities in the fish supply chain.

1.2 Problem Statement

The fisheries fraternity in Uganda experience high levels of impoverishment amidst a very profitable and seemingly thriving enterprise. This complex of deprivation has been partly addressed by the Department of Fisheries Resources (DFR) through implementation of provisions of the fish policy. However, the technical support and a host of key stakeholders have not eliminated this deprivation understood in terms of supply chain rigidities that affect business survival in the sector. This study intended to highlight the complexity of these rigidities within the entire fisheries supply chain and propose possible interventions.

1.3 General Objective

The general objective of the study was to examine whether supply chain rigidities affect business survival in the fishing industry.

Specific Objectives

- ✓ To examine the importance of knowledge sharing to business survival.
- ✓ To examine the importance of partnerships to business survival.
- ✓ To examine the role of the Regulatory Agency (DFR) in influencing a conducive business climate for business survival.
- ✓ To examine a hypothetical question of whether focusing on optimum efficiency in fish harvest (sustainability) yields far better income benefits for business survival and thus poverty alleviation as compared to equal income distribution along the value chain.
- ✓ To investigate the interface between impact of policy innovations and business survival.

1.4 Major Research Question

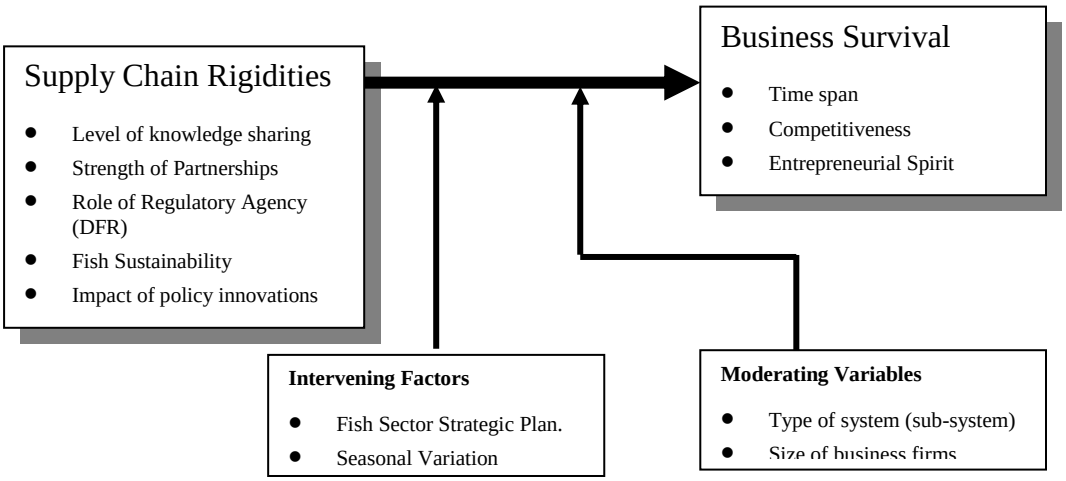
The major research question of the study was to investigate how supply chain rigidities affect business survival?

Specific Questions

- ✓ How does knowledge sharing in the supply chain enhance business survival?
- ✓ What is the strength of partnerships in the supply chain to facilitate business survival?
- ✓ To what extent does the Regulatory Agency (DFR) influence a conducive business climate for business survival?
- ✓ To what extent does focusing on optimum efficiency in fish harvest (sustainability) contribute to better income benefits for business survival and thus poverty alleviation as compared to equal income distribution along the value chain?
- ✓ How do policy innovations affect business survival in the fishing industry supply chain?

1.5 Conceptual Framework

Figure 3: An illustration of the conceptual framework



Source: Authors

The philosophical assumption adopted by this study was the systems theory approach. The systems theory recognizes that in this stage of global interdependence, everything is "interrelated" with everything else (Skerritt, 2007): *"Systems thinkers have the ability to see connections between issues, events and data points – the whole rather than parts"*. During supply chain modeling, stakeholders and players in the supply chain learn to think in a systematic way and to be able to solve the rigidities that affect business survival in the supply chain.

The Skerritt´s systems approach and systems thinking adopted in this study but modified to suit the supply chain model relies on three premises:

- ✓ Supply chain is a system constituted by sub-systems. The Sub-systems are constituted by different elements and role players many of which bond or inter-depend to attain specific system/sub-system goals;
- ✓ The supply chain system has complex social, technical and biological sub-systems that interact with different variables in similar or different ways,
- ✓ The supply chain can be distinguished into three sub-systems; i.e. international, regional and local markets.

The research team unpacked and characterized the sub-systems so as to define the sub-system rigidities and business survival characteristics within the broader context of the supply chain system in the fishing sector.

The dependent variable of this study was business survival, which refers to ability of a firm to operate in the same line of business without a risk of closure or change of form for a prolonged period of time. According to Klepper (2002), firm survival can be measured by duration of time. Further, the business need to be competitive, and the presence of entrepreneurial spirit are key ingredients for business survival. However, survival has an element of sustainability. Although fish resource is subject to biological self-renewal, if there is no balance between supply and demand, the supply base will be depleted resulting in business failure. Sustainability issues in the supply chain were examined using the Gordon-Schaefer bio-economic model (Gordon, 1954; Campbell et al., 1997). The study employed this model in discussing fish yields and corresponding income generated in order to determine optimal sustainable yields for long-term business survival at both macro and micro levels. Further, the study went ahead in examining a hypothetical question; to what extent does inefficiency in fish harvest explain observed impoverishment among fishing communities (upstream chain players), compared to unequal income distribution (value sharing) along the supply chain for long-term business survival (IISD 2005).

The study identified hardware and software issues within the supply chain. Hardware issues included physical inputs such as *fishing gears, sizes of fish harvested, quality of boats and vehicles,* and software issues included *quality standards and enforcement mechanisms* for survival in the sector. Hardware issues (inputs i.e., size of fish harvested) and income generated (outputs) were used to ascertain efficiency of the supply chain. Efficiency and effectiveness are measures of firm performance. In the fishing sector supply chain, a balance must be struck in the market structure to ensure sustainability of the supply base of the renewable resource (fish) leading to long-term business survival. Optimum efficiency and effectiveness give rise to cost reductions along the supply chain, thus addressing poverty and sustainable economic growth.

On the other hand, enhancing relationship between the regulatory agency and fish harvesters is cardinal. Knowledge acquisition and information sharing can improve and close bonds within the supply chain thereby eliminating confrontation and promoting fish sustainability for business survival. Sharing of information and knowledge acquisition (learning) between buyers and suppliers, in areas of cost of investments, work methods, access to credit facilities and availability of alternative business ventures promotes business survival. When players understand challenges facing buyers and suppliers in the supply chain, they can form

partnerships that can further facilitate information sharing and openness in business dealings thereby eliminating competitive and exploitative relationships.

When buyers-suppliers advance to this level of co-operation, quality philosophies such as *"right first time"* becomes a responsibility of every player in the supply chain thus, contributing to business survival.

The role of DFR in linkage with other government agencies and donors in creating a favorable operations business environment was considered. The personal wellbeing of the individual actors and the quality of infrastructure that supports the fisheries community are both important in understanding business survival. The study examined the impact of public health concerns such as HIV/AIDS, sanitation and eco-systems eutrophication on business survival as well as accessibility, reliability and usability issues relating to the community physical infrastructures (i.e., roads, schools).

Ultimately, innovation is the essence of firm survival. Only firms that are able to successfully innovate are able to establish and maintain a competitive advantage in the market. Innovation was measured through creativity and the how the new policies have impacted on fish sustainability and in promoting industry competitiveness.

The study recognizes both the fish sector strategic plan and seasonal variations as intervening factors. The plan would enhance or inhibit business survival especially if implementation does not take care of varied interests and rights of players or if enforcement makes it hard for players to survive in the sector. However, both the fish sector strategic plan and seasonal variations were not measured; this is because the plan was still in the offing and the seasonal variations are acts of God beyond man's control.

On the other hand, the study is moderated by type of system, and size of firms; the nature of sub-systems in the supply chain. This adds complexity to the analysis of the supply chain. In this study, business survival was understood in terms of each sub-system i.e. international, regional and local supply chains and the players were also categorized as 1st tier suppliers [fishers, boat owners, gear owners and boat crew managers], 2nd tier suppliers [big and small fish traders, factory suppliers/agents], 3rd tier suppliers [factory export processors].

1.6 Scope

The research covered the major lakes in Uganda, namely; Lake Victoria, Lake Kioga and Lake Albert. The study analyzed factors in the entire supply chain system relating to the domestic, regional and International fish market. However, a lot of emphasis was put to understanding the dynamics in the local fish supply chain including communities involved in fishing activities, local distribution channels, and processing plants in the domestic markets. The traders and consumers in the regional and international supply chain [beyond Uganda's borders] were not explored due to financial limitations. However, information relating to these supply chains was explored from their representatives in Uganda and using available secondary literature.

The next of the document covers literature review in chapter two, methodology in chapter three, presentation and discussion of main findings in chapter four and lastly summary and recommendations in chapter five.

2. Literature review

2.1 Introduction

This chapter reviewed relevant literature about the study on supply chain rigidities and business survival. The variables under review include; business survival as dependant variable and its relationship with following supply chain rigidities; level of knowledge sharing, strength of partnerships, role of regulatory agency, fish sustainability and impact of policy innovations.

2.2 Concepts of Business Survival and Supply Chain Rigidities

2.2.1 Business Survival

Business survival is considered as the ability of a firm to operate in the same line of business without risk of closure or change of form for a prolonged period of time (Klepper, 2002; English, 1996; Brandt, 2004; Wren & Storey, 2002; Cefis & Marsili; 2005). However, Auster (1988) asserts that business survival implies that a business has persisted in the market, regardless of whether it was breaking even or absorbing losses.

A number of studies measures business survival in terms of time or life span (Lester, Albert, Cannella, 2006; Klepper, 2002, Brandt, 2004). Taylor (1999) asserted that 40% of business started, do not survive past the first year. Aghion *et al.,* (2007) contend that 10-30% of new firms do not survive past the first two years and that firms that surpass the initial 2 years,

have 40-80% of surviving for more five years. Headd (2003) corroborated the findings of U.S. Census Bereau which showed that 66% of new firms survived 2 years or more, 50% survived 4 years or more and 40% survived 6 years or more; with those of Philips & Kirchoff which showed that 75% survived 2 years or more, approximately 50% survived 4 years or more and about 40% made it to 6 years and above. All results strikingly displayed a similar pattern of business survival rates. Littunen & Hyrsky (2000) carried out a study on family versus non-family run businesses and revealed that family businesses had a high survival rate of 79 % after 6 years compared to non-family that showed 72% survival rate; after 8 years family business had 73 % and non-family 62 % survival rate. All these results revealed that during infancy, rate of business dropout was high, but as business stays longer, then rate of dropout decreases.

Bonn (2000) study included the dimension of competitiveness as indicator for business survival. A company was classified as a survivor if it retained its position among the leading 100 firms for a period of 10 years. This indicated that competitiveness was central to survival, because a business which is not competitive was bound to be edged out of the market. Munene *et al.,* (2005) pointed out that a business is considered a survivor if it was a major supporter of family welfare. An indicator which contributes to poverty alleviation, in developing economies, to meet the United Nations Millennium Development Goal (UN MDG) No 1. Smith (2006) asserts that entrepreneurial spirit was a key ingredient for business survival. He argues that entrepreneurs, especially fishers who perceive fishing as a calling will stay in business through thick and thin periods. They could achieve their dream by starting alternative businesses or engaging in marginal work, to supplement on the fish business (Smith, 2006).

Current thinking does not dispel these ideas, but compounds all of them together as measures of business survival. Therefore, this study measured business survival by considering entrepreneurs who had overcame the 5 years gestation period, thus survivors. The indicators of competitiveness and entrepreneurial spirit were also included.

2.2.2 Supply Chain Rigidities

Rigidity is a concept synonymous with constraints and/or barriers to trade (Lagace, 2008; Mambula & Sawyer, 2004). Extending the concept to the supply chain discipline, rigidity simply refers to blockages, constraints, barriers that hinder the smooth functioning of the supply chain, efficiently and effectively in flow of products and knowledge.

2.3 Supply Chain Rigidities and Business Survival

Most studies on business survival have been carried out mainly in the western and/or developed economies (Mudambi & Zahra, 2007; Wiren & Storey, 2002; Cefis & Marsili, 2005; Aidis & Adachi, 2007; Kauermann *et al.*, 2005; Taylor, 1999; Price & Evans, 2006; Auster, 1988; Forsyth, 2005; Bonn, 2000; Key & Roberts, 2006). Studies in business survival are not common in developing economies especially Africa, save for Mambula & Sawyer (2004). This portrayed the urgent need for research in this area to support policy makers in decision making for sustaining entrepreneurial activities, majority of which are family based and thus, sustaining livelihoods in developing economies (FAO, 2007).

Earlier studies considered the following variables as predicators of business survival. Headd (2003) contend that survival is a function of business traits (financing, industry, location, employer, home based, number of owners) and owner traits (gender, race, age, education, motivation for starting and previous experience). Key & Roberts (2006) examined government payments and survival, Wren & Storey (2002) investigated government assistance in form of consultancy services in relation to sales turn over, employment and survival. Mambula & Sawyer (2004) examined internal and external constraints such as; lack of financial capital, inadequate infrastructure, competition from large firms, unfavorable government policies, paucity of raw materials, incompetent planning, poor organizational skills and limited knowledge.

Most of the predicator variables enumerated above were captured and investigated in this study. Particular emphasis was laid on variables considered as supply chain constraints to business survival such as; level of knowledge sharing in form of information awareness and learning, strength of partnerships, role of regulatory agency, fish sustainability and impact of policy innovations.

2.3.1 Level of knowledge sharing

Earlier studies mainly focused on information asymmetry as a major cause of market failures (Akerlof, 1970; Spence, 2002; Stiglitz, 2002). These studies described information asymmetry, as a situation where information was known to some parties, but not all parties involved in the transaction. To correct the imbalance in the market place, policies are designed to avail perfect information to all participants. Though this strategy may have been successful in developed economies, developing economies operating under market forces, have greatly suffered from information asymmetry, which distorts prices, costs and benefits

in the market (Kristiansen, 2002). This ultimately jeopardizes business survival and eventually may lead to business or market failure.

However, the advent of the machine that changed the world refocused market strategy and operations from arm's length relationships ie., profit maximization to supply chain connectivity. This described knowledge management systems as a 'life blood' of supply chains (Kevin & Chattarai, 2003). Hence, competitiveness in the global economy was far beyond information management, but knowledge acquisition (learning) and flow in supply chains, as the cornerstone. Drucker (1993) cited by Kevin & Chattarai (2003) contend that knowledge is no longer like any other resource for economic production such as labor, land and capital – but it is 'the' resource. A similar finding obtained by World Bank (WB) sponsored studies, rated knowledge acquisition and management as one of the prime movers for the breakthrough of the East Asian economic 'miracle', (Stiglitz, 1999; Mamdani, 2007). Therefore, this study, considers a situation where there is lack of proper knowledge management and flow in a supply chain, as 'knowledge asymmetry'. Knowledge asymmetry is a concept that has been found to only have been examined by Sharma (1997).

According to Hong & Kuo (1999) knowledge sharing is part of business activities and it centers on humanity, to aid market analysis. In their study they suggested that knowledge sharing was composed of two major attributes; knowledge sharing and wisdom sharing. These were further broken down into sub elements: knowledge sharing – information sharing that is knowing where information is and sharing the situation; implicit knowledge sharing – sharing how but not why; explicit knowledge sharing – sharing both how and why, 'that is knowing both the process and the reasons and suggesting innovative ways of improving the process'. On the other hand wisdom sharing is understood to be composed of beliefs and values. Further still, Bessant *et al.,* (2003) emphasized that for sustainable growth and development to be achieved, supply chain actors needed to master knowledge and apply it to all economic activities.

According to Szwejczewcwski *et al.,* (2005), players in the supply chain are expected to be knowledgeable about the following attributes: quality, quantities, prices, operational costs, deliveries, product specifications etc. Therefore, this demonstrated the need for knowledge to flow between supply chain linkages. Any supply chain system, experiencing knowledge flow blockages, is bound to suffer dire consequences such as; declining profit margins, declining

market share, declining return on assets and revenue resulting into possible bankruptcies, closures and customer dissatisfaction (Kevin & Chattarai, 2003).

The study explored most of above mentioned knowledge attributes, including whether decision to invest in a particular sector was based on an informed point of choice to enhance business survival.

2.3.2 Strength of Partnerships

Efficient and effective flow of knowledge in a supply chain necessitates connectivity of linkages between players in form of partnering or networking. Partnering through joint action can take a form of vertical relationships between buyer and supplier or horizontal relationships among competitors (Schmitz, 1999a) also termed as cooperative groups (Wagenaar & D'Haese, 2007). Joint action has been found to be instrumental in enhancing collective efficiency to enable small firm competitiveness and profitability in global markets (Schmitz, 1999a, 1999b). Street & Cameron (2007) found out that accessibility to informal and formal business networks significantly contributed to business growth and survival.

Contrary to the widely held view that, partnerships are crucial in commodity vertical chain integration (Schmitz, 1999a; UPTOP, 2007), the study of Szwejczewski *et al.*, (2005) disagrees with this perspective. They argue that partnerships are desirable to knowledge intensive sectors such as auto-mobiles but not commodity chains. They propose that commodity chains should be based on 'arm's length relationships' because the driving force is price not need for innovation.

Partnerships are measured by examining the strength of connectivity of participants involved in the business transactions. According to Lemke *et al.*, (2003) they investigated the strength of connectivity by examining attributes such as level of trust, commitment, cooperation, sharing of information, dependency, sharing risks and rewards, closeness and focus on continuous improvement. If the connectivity of these attributes is found to be strong, then a strong partnership is said to exist among business organizations or individuals. On the other hand, if the connectivity of the attributes is weak, then a weaker partnership is in operation and it is usually based on transactional costs or profit maximization known as an 'arm's length' relationship.

Though the study of Lemke *et al.*, (2003) investigated the above partnership attributes along vertical supply chain relationships (buyer/supplier), this study investigated these attributes

both vertically (buyer/supplier) and horizontally (among competitors). This study measured strength of major attributes that is trust, cooperation, openness, and quality of feedback. The study examined dependency variable by examining aspects such as offering information on prices, assisting in finding new markets, provision of credit facilities and negotiation of good prices.

2.3.3 Role of Regulatory Agency: Management of Common Property Resources

Worldwide fisheries are considered to be common property resources (FAO, 2002). Common property resources are the ones where no individual has exclusive property rights such as: village pastures, community forests, village ponds, water bodies etc.

According to Wikipedia encyclopedia website, the term Common Property Resources (CPR's) is synonymous with 'the tragedy of the commons' in an article published by Hardin in 1968. Tragedy of the commons was defined to be a form of economic social trap involving a conflict between resource users and the common resource. This theory is traced back to Thucydides (460-395 BC) and Aristotle (384-322 BC) who generally observed that, what was considered common to everybody had the least care tended upon it. The theory was then picked up by Lloyd in 1833 who studied the nature of herdsmen in the scramble for the common pasture grounds. He observed that herdsmen who used a common pasture land had a tendency of enlarging their stocks. However, if unchecked, the enlarged herds used to exceed the capacity of the grazing grounds leading to over grazing.

Gordon (1954) introduced the concept of common property resources, when he studied the relationship between low earnings and over fishing among Canadian fishermen. Then Hardin in 1968 is credited to have introduced this idea in an article "the tragedy of the commons", thus opening up an ongoing academic debate for over the past 30 years. The tragedy of the commons by Hardin referred to grazing rights for a hypothetical village of commons. The article was based on the following assumptions: individual self-interests over rides interests of the community as a whole; the environment is limited; the resource must be collectively owned and freely open to any user.

Extending Hardin's assumptions in the context of fisheries, these three factors in totality are said to contribute to an economic decline of a profitable fisheries, due to an upsurge of more fishermen trying to maximize resource rents (FAO, 2002). The FAO report further argues in

the context of Hardin's, that every new boat a fisherman adds to a common resource pool gains him almost +1, whereas consequences of fish depletion are shared by all, and his loss amount to a fraction of -1.

However, Berkes (1985); Durrenberg & Pallson (1987) as cited in FAO report (2002) contend that most fisheries are not in reality open access common property resources as portrayed by Hardin's article in 1968. They argued that either government or the local community exercised control and therefore individual interests had to be aligned with collective community interests.

In Uganda, most of the fisheries resources belong to government and they are regulated by the Fisheries Act 1964 (MAAIF, 2004) but "(Amended 1967) the Fish Act. Cap.197" (Kizza et al., in LVFO report 2005, p. 35). This Act mandates Department of Fisheries Resources (DFR) with powers to regulate the fishing sector on behalf of Uganda government in terms of: control of fishing, conservation of fish, purchase, sale, marketing and processing of fish and any other matters that may arise. Such a mandate cannot be achieved by DFR alone, thus requiring a multi-sector policy approach with other stakeholders and agencies.

The study investigated the role played by DFR in creating a conducive policy and regulatory business environment for business survival in terms of: Responsibility for fish management; Implementation of policy conservation measures under co-management arrangements; Fairness in application of regulations to the business community in the value chain; Linkages with other government and non-government agencies i.e., Works, Healthy, Donor Community, Local Communities and Local Governments to improve the operational business climate. The main key players and their responsibilities in Uganda's fishing sector are illustrated in Box 1 below.

Box 1: Institutional framework of Uganda fisheries

Department of Fisheries Resources (DFR), under the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

• Regulatory agency

• Competent authority on application of EU food safety regulation on fish

Lake Victoria Fisheries Organisation (LVFO) (see LVFO 1999)

• intergovernmental organization

• members: Kenya, Tanzania and Uganda

• deals with common resource management on Lake Victoria for ensuring sustainable development and maintaining a healthy ecosystem

National Fisheries Resources Research Institute (NAFIRRI)

• research on socio-economic aspects of fisheries

• research on fish stock assessments

• research on fish biology and ecology

• research on invertebrate food

Kajjansi Aquaculture Research and Development Centre

• research on aquaculture, mostly on production and biology

District Fisheries Officers (LFOs), under the Ministry of Local Government

• extension services

Beach Management Units (BMUs)

• community-based organizations with the purpose of co-managing fisheries resources with government

Uganda Fisheries and Fish Conservation Association (UFFCA)

• NGO established in 1993

• national collective of community-based fisheries-related organization

• aims at mobilizing and organizing fisher communities into community-based organizations and build their capacity to undertake natural resource management and development processes

Uganda Fish Processors and Exporters Association (UFPEA)

• industry association representing all fish processors and exporters in the country

• promotes Ugandan fish, provides information

• facilitates the provision of technical support services to members

• collaborates with government in developing policies and programmes in the sector

• coordinates activities in relation to quality assurance

Quality Assurance Managers Association

• association representing quality managers of fish processing plants

• started in 1997 as a result of the first EU ban

• tackles technical issues related to quality in the fish industry

Sources: MAAIF, 2006; 2003; 2004 and LVFO, 2005

Box 1 shows the linkages among different key stakeholders in the fisheries sector, to facilitate a favorable business climate and promotion of sustainable fisheries.

2.3.4 Fish Sustainability

The Economic Commission for Africa (ECA) asserts that;

> Enhancing and sustaining competitiveness in Africa in the area of natural resources is of paramount importance for the development of the continent (ECA, 2001 p. 3).

The Department for International Development (DFID) echoed a similar statement like the one of ECA as follows;

> Uganda is highly dependent on primary productivity and the environmental goods and services such as Lake Victoria and forest systems are already under very high pressure (DFID, 2000 in FAO report, 2002 p. 22).

The World Bank (WB) and European Commission (EU) issued a joint statement during the proceedings of the regional stakeholders' conference organized by LVFO in 2005 as follows:

> Lake Victoria is a source of livelihoods by providing incomes, food, bio-diversity, water, transport and moderating regional climate. These values require a significant level of support and co-operation to ensure sustainable management (LVFO report, 2005 p. ix).

The above citations indicate the need for fish sustainability to support the country's economy and human livelihoods or survival. Fish sustainability or sustainable fisheries is a concept derived from sustainable development, and is a core objective of DFR in Uganda (MAAIF, 2004; 2006). FAO (1999) described sustainable development as one that provides a balanced cost benefit analysis of various policies to enhance long-term aspirations rather than short-term gains as depicted by the traditional economic models for growth and development. The World Commission for Environment Development (WCED) report of 1987 defined sustainable development as 'development that meets the needs of the present generation without compromising the ability of future generation to meet their own needs'.

Sustainable development is mainly measured using three major dimensions, that is: the environment, economic and social (Utne, 2006). However, FAO (1999) included the governance and/or institutionalism as a fourth dimension. The environment dimension is concerned with stewardship exploitation of the fisheries with long term perspective in mind and therefore involving setting Optimum Sustainable Yields (OSY). OSY simply implies

amount of fish catches that do not cause the fisheries to collapse (Okedi, 2005; FAO, 1999). The environment dimension also involves measuring levels of acidification (Utne, 2006). On the other hand, the social and economic dimensions include employment, revenue/profitability, quality and safety of workforce (FAO, 1999; Utne, 2006). The governance is about compliance to standards and level of power sharing between government and local community users (FAO, 1999).

Reports indicate that the Maximum Sustainable Yield (MSY) for Uganda water bodies is 330,000 tonnes per year (UIA, nd; NEMA; 2004/05). But current exploitations are beyond 430,000 tonnes per year (Balirwa & Kamanyi; Kaberuka during the UMI Fisheries Stakeholders Workshop, 2007). This suggests that the fisheries eco-systems are under intensive pressure which may result into fish depletion.

This study examined the governance dimension under role of regulatory agency (see previous section 2.3.3) while this section investigated fish sustainability in the context of socio-economic dimensions of quantities and correspondent revenues generated from fish catches at both macro and micro levels. This enabled in assessing efficiency and/or inefficiency in fish extraction i.e., sizes and quantities of fish harvested in relation to bio-mass and thus determining Optimum Sustainable Yields for long-term revenue generation, business survival and poverty alleviation.

2.3.5 Impact of policy innovation

Innovation is a key ingredient in determining firm's success, survival and competitiveness both in domestic and global markets (OECD, 2000; UNCTAD, 2000). Innovation is basically a new development involving creation of new products, services, process (methods) to improve firm's operational efficiency (Barret & Sexton, 2006; Cefis & Marsili, 2005). Barret & Sexton (2006) observed that there are two main schools of thought on drivers of innovation for economic growth and development:

The first is the market based view that considers market conditions as the providers of the context that enhances or constrains the direction and quantity of innovation by firms. Extending this view to the fisheries sector in Uganda, price and profitability (market conditions) can be considered as the major drivers of increasing commercialization and technological innovations in the sector. As a result, fishermen exacerbate self-interests and use disruptive fishing gears (unscrupulous innovations), contributing to resource depletion due to open access (common resource property) and ultimately affecting business survival

(Berkes, 1987; Okedi, 2005; Yongo *et al.,* 2005). This form of rapid creativity is called 'destructive innovation' as described by Joseph Schumpeter in the 1930's, and it may be appropriate to intensive science sectors (automobiles, steel) but not commodity sectors such as fisheries subjected to open access.

The second is the resource-based view of innovation which argues that market driven orientation do not provide a secure foundation for formulating innovative strategies for markets which are dynamic and volatile rather firm's own resources provide a more stable context in which to build its innovations and shape it's markets in its own image. Extending this perspective to the fisheries sector, innovation would be done from an informed knowledgeable position on levels of stock, and impact of the new technology or process on the whole eco-system. This means incremental innovation by building on traditional knowledge and technology for fish sustainability would be appropriate for fisheries.

The above expressed views from the two schools of thought, sets public policy dilemma's between those who agitate for free market forces and those who ascribe to the need for government action to regulate fisheries resources. New Zealand as a case study experienced a similar situation (Dana, 2003) and the local community on Stewart Island shifted their mind set from being hunter-gatherers to becoming farmers of the seafood; their project involved re-seeding a commercial catch of *paua*. To avoid over-fishing, the annual catch was voluntarily reduced from 150 tonnes to 90 tonnes, and this meant that the local community was foregoing $2 billion a year to ensure the long-term survival of the fishing sector. This innovative policy strategy of enhancing long-term business survival was clearly based on the resource based view analysis that assesses sector capabilities and resources available to determine optimum supply levels to market demands i.e., strategic fit approach.

This study examined the innovation in terms of commercialization and fish farming and how they have impacted on long-term business survival and/or sustainability of the sector.

2.4 Conclusion

Review of related literature, revealed that time span, competitiveness and entrepreneurial spirit are measures of business survival. The following were considered as constraints to business survival, that is; lack of financial planning, inadequate infrastructure, competition from large firms, unfavorable government policies, paucity of raw materials, incompetent planning, poor organizational skills and limited knowledge. The studies fell short of examining the constraints in the context of supply chain management.

To our knowledge, through the systems thinking approach as paradigm of analysis, this study is the first to investigate the effect of supply chain rigidities on business survival and thus poverty alleviation.

3. Methodology

3.1 Introduction

This chapter presents the study design approaches, the six study phases, reliability and validity testing, procedure and study limitations.

3.2 Study Design Approaches

Consistent with WB (2001) sponsored studies in developing nations including Uganda, the study employed an Applied and Participatory Action Learning Research, embedded in the Systems Thinking Approach. The systems thinking theory enabled studying the linkages considered as units of analysis in this study, which could not be studied in isolation. The study was cross-sectional in design with a major focus on the upstream players in the value chain involved in primary production. The researchers and stakeholders were engaged in the study to gain clear ownership and learning of the process and integration of lessons for improvement. The objective was to assist the system/sub-system to shift from position A (*status quo*) to position B (*improvement in the value chain*) in terms of both efficiency and effectiveness.

To achieve the above objective, the study examined supply chain rigidities in the context of efficiency and effectiveness in meeting supply chain goals of reliability in quality, quantities, price and timely deliveries for long-term business survival. The following supply chain rigidities were investigated; level of knowledge sharing, strength of partnerships, role of regulatory agency, fish sustainability and impact of policy innovations.

Variables such as level of knowledge sharing, strength of partnerships, role of regulatory agency and impact of policy innovations were investigated by collecting mainly qualitative data. On the other hand, the variable of fish sustainability was investigated by collecting mainly quantitative data spanning for a longitudinal period of 1980 to 2005/06. This variable happened to be the central gist of the study in answering a hypothetical question; to what extent does inefficiency in fish harvest explain observed impoverishment among fishing communities (upstream chain players), compared to unequal income distribution (value sharing) along the value chain for long-term business survival.

Data relating to the dependant variable was both quantitative and qualitative. The dimension of time span involved data relating to years spent in business. The dimension of competitiveness was measured in the perspective of psychology construct studies (Lemke *et al.,* 2003, Munene *et al.,* 2005). Participants were requested to select a certain number of business peers whom they have spent a similar length of time in business. They were then requested to assess their competitiveness against each of the selected peer. This approach has the strength in that when the respondent is being asked to select peers, does not know the reason for doing so in advance and thus, minimizing prejudices (Lemke *et al.,* 2003). The dimension of entrepreneurial spirit was included to assess motivation for business start-up and whether the entrepreneurs had been able to diversify their businesses, to supplement income generated from fishing for continued business survival.

3.3 Research Phases

The study went through six chronological phases involving; stakeholder consultations and issues identification, team building and process design, situation analysis/desk review, primary data collection, data analysis and documentation, dissemination. The research strategy was to have a chronological building up of the study, to collect three types of information; quantitative data, qualitative data and policy reviews. This facilitated in testing data quality by 'triangulation', i.e., gathering similar data from different sources (Marriott *et al.,* 2004).

Phase One: Stakeholder consultations and issues identification

In the first phase, reconnaissance surveys and stakeholder consultation were conducted. The main thrust of this phase was to engage stakeholders in identifying key issues that were to be emphasized by research team. A work shop was held by key stakeholders in the fisheries sector (Workshop report available). Output from this activity, lead into the next phase of team building and process design.

Phase Two: Team building and process design

During the second phase, team building and process design was undertaken. Team members underwent capacity building to familiarize with the objectives of the research. This phase sought to enlist ownership of the research process and outcomes as well as understanding the research objectives.

Phase Three: ***Situation analysis/desk review***

The third phase involved a situational analysis. There existed bounty of secondary data about the fishing supply chain. However, it was essential that this data be synthesized and harmonized and gaps filled through a primary data collection. Primary data collection tools were designed; questionnaire survey, participatory appraisal (focus group discussions), key informant interviews and observation check lists. The instruments were pre-tested in Jinja and Mukono districts [not part of sample study] and improved in consultation with peer review team.

Phase Four: ***Primary data collection***

The fourth phase was the main thrust of the study where supply chain rigidities and business survival were examined from the situation analysis. Primary data was collected July 07 – October 07 [from local governments] and November 07 – January 08 [National stake holders, see categories under key informant interviews]. We began by purposive selection of water bodies[2] for the study sites based on regional balance and uniqueness of features such as types of fish harvested (mainly Nile Perch and Tilapia considered as commercial species), quantities and intensity of business activities on the lakes. The purpose was to study commercial water bodies that service the international and regional/local markets, relevant to the supply chain concept. The lakes chosen were: Victoria, Kioga and Albert. We then used simple random sampling technique to select the local governments surrounding the above water bodies. A total of six local government districts were selected from the possible 24 surrounding the water bodies. These included (i) Wakiso, (ii) Mayuge, (iii) Rakai, (iv) Kamuli, (v) Nakasongola and (vi) Buliisa (formerly part of Masindi). In each local government five (5) BMU's 'landing sites', two (2) fish farmers and the District Fisheries Officer were selected for inclusion in the sample.

[2] As stated in background of the study, there are about 17 million people involved in fishing activities in the country with over 10,000 landing sites (gazetted and ungazetted) where fishing actually takes place. There are currently 17 fish processing plants in the country (Department of Fisheries, 2006). There are 3 big lakes and 2 small lakes (all fresh water bodies). There are 24 local governments (which 12 these are Kampala, Jinja, Masaka, Rakai, Mayuge, Iganga, Busia, Bugiri, Mukono, Wakiso, Mpigi and Kalangala are bordering lake Victoria, 6 in kyoga and these are Kamuli, Soroti, Kumi, Palisa, Apach, Nakasongola area and 4 in Albert line these are Buliisa, Hoima, Nebbi and Bundibugyo) sharing the big lakes and 3 local governments share the small lakes these are Kabarole, Bundibugyo and Kasese as per the current Map of Uganda.

With respect to BMU's among the 30 expected to be sampled, we managed to sample only 26 in number. We could not access the rest due to impassibility of the roads (see front page picture). This also affected us from achieving our target sample population of 80 respondents per district totaling to 480 respondents for the survey questionnaire. However, we achieved 453 respondents (94.3 percent) which is quite high compared to an average of 50-70 percent by many studies (Crean & Wisher, 2000; Szwejczewski *etal.,* 2005).

The following data collection methods were applied;

Survey Questionnaire – was subjected to BMU stakeholders such as fishermen, boat owners, gear owners, traders and factory agents/suppliers. Since, we were studying business survival, we only considered entrepreneurs who had surpassed the gestation period of 5 years. The aim was to learn how they copied with environmental dynamics for continued business survival. This kind of approach was also employed by the study of Aghion *et al.,* (2007). Similarly, Pena (2002), considered only young firms of three to four years that were struggling to overcome the gestation period. We worked hand in hand with BMU Executive Committee members in identifying these people and participation in the study was based upon those who turned up that day. This form of selection is commonly used with fisheries studies (Sumaila & Louise, 2007).

Focus Group Discussions – was subjected to BMU Executive Committees, Women Fish Entrepreneurs, Men Traders. Each group was handled separately to encourage members answer questions without fear of intimidation.

Key Informant Interviews – Six DFO's, Three Fish Factories visited and had discussion with total of 5 officers [General Managers and Production/Quality Controllers], Policy Executives and Officers in DFR, NAFIRRI and LVFO.

Observation Check list – this was developed to guide the video/camera person to capture important events for triangulation of data with the above methods. Pictures speak more than words.

Phase Five: ***Data analysis and documentation***

Fifth phase was the data analysis and documentation phase. Statistical data analysis was done using SAS version 9.13. Statistical data analysis entailed both descriptive and analytical statistics. Descriptive statistics entailed, graphical approach -line and compound bar graphs and summary statistics –frequency counts, proportions and the five number summary.

Analytical statistics involved obtaining the chi square measure of association which was used to establish if relationships existed among the different variables collected. Qualitative data was handled using content analysis. All tests were done at a 5% level of significance.

Phase Six: *Disseminations*

Sixth phase is information dissemination. A policy dialogue for decision makers (consultative team) and other relevant stakeholders was held. Results were presented, improvements captured including those from peer reviews, and recommendations integrated to strengthen firm/sector performance, business survival, policy and institutional change. The stakeholders proposed strategies for translating the research findings into action areas. Stakeholders were called upon to translate the key messages of the research material into user-friendly booklets for public and stakeholder consumption.

Publication of knowledge and scientifically credible data is being explored. The journal of supply chain management among others was contacted for this purpose. The journal is relevant to the research and it comes out on a quarterly basis. It is available on the emerald website which is widely read by many scholars and practitioners.

3.4 Reliability and validity of measure

3.4.1 Reliability

To ensure that the measure is consistent overtime across all items in the instruments, the instruments were subjected to a test-retest procedure. The measure was tested using the cronbach´s alpha coefficient (cronbach, 1946). Variables that scored below 0.7 were deleted and replaced were possible, for rendering consistency in commercial studies (Berthon *et al.*, 2008).

3.4.2 Validity

This test was done to ensure that our instruments are authentic and all relevant items were included so that the concept of supply chain is measured in full. This was also to confirm that in the design of our instruments we took into account the fact that every instrument used realistically measured the concept. We sent the instruments to peer review members both in industry and academics for critical reviews.

3.4.3 Procedure

The study team sought for the authority of the Chief Administrative Officer to access the Local Governments. A contact person (focal point) was assigned to the research team. UFPEA was conducted to enable the researcher's access the fish factory processors. The rest of the appointments were done directory by an introduction letter from UMI addressed to the policy governing institutions.

3.5 Study Limitations

The study excluded business failures thus depicting successful business ventures only. This may have introduced some biasness by failing to learn why some firms failed to survive in the business environment. A longitudinal study design that can follow up the growth of business would be more appropriate, than a cross-sectional design which this study employed. Further, the dimension of competitiveness was measured from a psychological discipline by allowing business firms to rate themselves against competitors. This may have reduced the strength of the findings. More robust study designs such as focused case studies may be more appropriate in assessing the competitiveness of one firm to another.

The next chapter presents and discusses the main findings.

4. Presentation and discussion of main findings

In this section we present the major findings of the research based on data collected by an administered instrument, interviews, focus group discussions and observations in the field. We shall discuss issues by themes.

4.1 Business Survival

The study measured business survival using indicators of life span (business age), competitiveness and entrepreneurship.

Table 1: Fish Business Age (N= 453)

Length years	Frequency	Percentage
5	53	11.70
6-10	179	39.51
11+	221	48.79

Source: Primary Data

In table 1 results reveal that 11.7 % (53) respondents had been in fish business for 5 years, 39.5% (179) had spent 6-10 years and almost half (50 %) of the respondents interviewed had spent 11 years and above in fish business. Earlier literature using longitudinal surveys showed that during infancy business dropout was high but when business age increased the rate of dropout decreased. This was attributed to the fact that as business entrepreneurs stay long, they learn and adopt survival dynamics in the business environment. This partly explains the trend of results in table 1 showing that majority of respondents were 11 years and above in business. Participants were then asked to rate themselves with peers in business competitiveness such as growth in sales or expansion, customer growth, income and employment.

Table 2: Competitiveness

	Area of competitiveness	**Above all peers**	**Same level with all peers**	**Below all peers**
a	Growth in sales/ sales turn over	22.32 (98)	23.23 (102)	54.44 (239)
b	Having more customers	23.45 (102)	29.89 (130)	46.67 (203)
c	Increase in income	23.8 (104)	17.39 (76)	58.81 (257)
d	Use of family labour	29.8 (90)	29.14 (88)	40.73 (123)
e	Use of hired labour	21.36 (85)	38.44 (153)	40.2 (160)

Source: Primary Data, Note: Numbers varied by question; *-Frequency count in parentheses ( )*

Table 2 indicates that 58.8 % of respondents were below all their peers in income growth, followed by 54.4 % being below in business growth or expansion, 46.67 % being below in having more customers and 40 % considered themselves below all peers in number of personnel employed as family and hired labor.

We also investigated the dimension of entrepreneurial spirit through motivations for business start-up and diversification of businesses and/or starting up alternative businesses to reduce high dependency of families on fisheries.

Almost equally (50 %), respondents acknowledged having alternative businesses as source of income. They cited meeting family needs such as food, tuition for children, health bills and having some money in the pocket as motivations for starting business. Surprisingly, none mentioned anything to do with self-esteem and self-actualization as a driver. Such a finding was in conformity with hierarchy of needs theory developed by Abraham Maslow in 1950's, which suggest that meeting survival needs pre-occupies micro-business (upstream players).

The viability of the businesses was tested by asking respondents to identify sources of income contributed to family welfare in terms of children's education, food bills, a major business source of income for past 12 months and meeting medical bills (see Table 3).

Table 3: Proportions of source of family income in meeting specific needs

	Below identify your major sources of income when meeting your specific needs	**Spouse**	**Fish business**	**Other business**	**Paid employment**	**Relatives**
a	Education of children	1.6	88.4	9.1	0.2	0.7
b	Food bills at home	1.8	82.1	15.7	0.2	0.2
c	Major source of income for past 12 months	0.4	87.9	10.8	0.7	0.2
d	Medical bills when sick	0.7	88.9	8.9	0.7	0.9

Source: Primary Data

From table 3 it can be observed that fish business is the major contributor in meeting family survival needs (education, food and medical) considered as MDG's goals and at the same time fish business remained the major source of income for the last 12 months. This clearly demonstrated lack of entrepreneurship among upstream players and thus, heavy reliance on fish business as source of income. This finding can be attributed to the way they perceived business survival when the question was posed to them:

> *For us survival is about trading in fish year after year, to meet education bills for children, feed family and take our children to hospital when sick (FGD women entrepreneurs).*

The comment points to a fact the drive for small players to stay in business is much to do with biological and physiological needs as opposed to esteem and self-actualization needs for big entrepreneurs.

We next examined the interplay between supply chain rigidities and business survival in the fisheries sector.

4.2 Level of Knowledge Sharing

Knowledge measurements in the supply chain were drawn from the study of Szwejczewski *et al.*, (2005) and these included; quality assurance, quantity, prices, operational costs, reliability information (decision to invest), planning and market research. The variable was divided into information awareness and then learning (knowledge acquisition).

4.2.1 Results of Information Awareness Dimensions

Examination of Table 4, in Annex, with respect to quality assurance parameters reveals that 95.7 of respondents acknowledged of being aware of the recommended sizes of fish to be harvested. However, when they were asked to state the sizes only 20 stated the required sizes of Nile Perch (20 inches and above) and 56.8 stated the required sizes for Tilapia (11 inches and above). This clearly demonstrated an information gap which accounts to the prevailing illegal activity of immature fishing. When asked whether they were aware of the reasons for harvesting only the recommended sizes (see fig. 4 below) of fish, 72 of respondents agreed and gave reasons related to sustainability. On the aspect of maintaining hygiene standards 70 of respondents agreed that they were aware and almost a similar percentage stated the fish need to be carried in a clean iced container citing reasons of guarding against contamination and requirement to meet international standards. Interestingly no one mentioned the need for meeting local standards, pointing to the poor standards of fish handling in the local supply chain (see fig. 5c below).

Figure 4: Portrait displaying information of recommended sizes of NP and Tilapia for harvest (GOU, EU & LVFO)

Source: Field Data from one BMU

The respondents were also asked to mention the source of their information, (94) mentioned Fisheries Officers, BMU's, UFFCA & Researchers. Only four percent mentioned traders.

This implied that the supply chain with respect to quality assurance was not operating efficiently as expected, because as fish flows to final consumers then in reverse information relating to consumer expectations must flow back to producers for quality improvement. Undermining quality assurance is costly in maintaining competitiveness of the fish sector in global markets, as one European Fish Buyer commented:

> *If the Ugandan partner is deficient and supplies faulty products, our whole firm group [-a conglomerate of a dozen food firms-] can suffer in terms of reputation. The relationship of our group with retailers can suffer: we can get punished from our client. If things go very wrong, for instance the press mentions wrong firm names in this context, the overall group name suffers. We can be kicked out by the supermarket chain, not only in Germany but other European countries where our products are listed. Such dynamics happened recently when one supermarket in Germany found gene-manipulated rice in a sushi product of a firm [not the firm of the conglomerate]. All sushi products [of all firms] were taken out of the supermarkets immediately. Supermarkets here can react quite drastically. Thus, quality reliability of the Ugandan firm is so important… there is a rejection clause in the contract. In practice, however, the clause is difficult to apply and enforce (UPTOP, 2007).*

The statement shows that buyers along the downstream supply chain are so risk sensitive in meeting consumer needs in the food chain. The threat of press involvement and business closure would entail our local fish processors including traders of both local and regional chain to prioritize quality and integrate it along the supply chain from the source of production to final consumers. Reflecting back from the observation field data, this may not actually be the case. Figures 5 - 6 shows fish handling process at BMU's destined for the international market. Majority of fish landed by boats is un-iced, it is then transferred using un-iced buckets to the fish handling sheds i.e., placed on slabs and finally loaded to trucks with cooling facilities. The earlier assertion by respondents that fish was handled with iced buckets is quashed implying that the talk was not the walk in the sector. This observation renders support to earlier works by Argylis & Schon who simply said that, espoused theories of individuals often conflicted with the theory in use (Sun & Scott, 2003).

Figure 5: Fish destined for international supply chain transferred from boats to loading area in fig 6

Figure 6: Fish destined for international supply chain being loaded to iced trucks

Source: Field Data

We then posed this question to factory processors, how integrated was their quality assurance management within the fish supply chain given that fish suppliers were also complaining of frequent rejects by factories. This was the response;

> *"At BMU's responsibility is with DFR and they are in charge of issuing compliance certificates and it is on the basis of that certificate that we receive fish. However, Ugandans are smart, the certificates are got even after loading fish and when we re-inspect it here we find some defects" (production/quality manager)*

The above statement certifies that quality assurance was still a challenge especially upstream supply chain 'landing sites'. The mention of fish suppliers obtaining compliance certificates after loading suggests rent seeking behaviors by staff of the regulatory authority 'DFR'. This renders the regime of quality assurance being just a ritual consequently damaging the country's reputation abroad. The observation of DFID & GTZ experts meeting (2007) attests to this observation that quality management in Uganda starts from factories, however the majority of the landing sites lacked basic hygiene standards and EU was contemplating issuing barns in the future.

With respect, to the regional/local supply fish chain, quality assurance is really considered. The process of landing from boats to fish slabs remained the same, however with transportation, you hardly find any value added. Figures 5c-d shows the mode of transportation of fish for domestic and regional market respectively. In most circumstances,

fish destined for the regional market is either smoked or sun dried due the long distances involved.

Figure 7: Fresh fish destined for local supply chain.

Figure 8: Women Doing Business – Smoked fish destined for regional supply chain

Source: field data

We then asked respondents whether they aware of the market demand for fish in international and local markets. All of them expressed ignorance. We again asked the respondents whether they were aware of the annual maximum sustainable yield which currently is referred to optimum sustainable yield of their water body. All of them expressed ignorance. Both questions were also posed to BMU FGD's, DFO's (District Fisheries Officers), Factory Processors and all of them could not project figures. It is only the Executives of the Fisheries Organizations who gave a figure of 430,000 tons as current annual catches. The researcher again asked the processors on what basis (information) are factories licensed by UIA to operate and this is what one of them said:

> *Six years back from now, we were not more than 10 factories and the fish supply was enough for all of us. However, as more factories were licensed that is when we started experiencing supply scarcity indicating overcapacity in the sector. Through UFPEA we raised up the matter with the concerned authorities including the President requesting not to license more factories, but we were informed that this was a free market system. However, later they came to realize that we were right and they are no longer licensing more factories. (CEO Factory Processor).*

The respective answers regarding fish demand and supply indicated that the sector was operating in an information asymmetry market system. In addition, comments by the respondents (see table 4, statement 2 c & 5 a) justified that basic principles of economics such as matching demand with supply for continued fish economic sustainability were not applicable in the sector. This also partly explains the frequent use of water beating 'tycoon'

an ‘illegal’ fishing method to threaten the fish to come out of its hiding place so that it can be caught. This greatly affects the breeding and rate of recruitment resulting into resource depletion and degradation as fish is constantly on the run. Gordon (1954) described this behavior as ‘too many fishermen chasing small fish’, due to lack of information by fishermen on the rate of fish recruitment. This also renders co-management (DFR/BMU’s) fruitless because they lack verifiable information on rate of harvest in relation to fish replenishment.

The third aspect measured was information awareness of fish prices in international/regional/local (District Town) markets. Findings revealed that players were only aware of prices at their point of operations. This was confirmed by statements captured in table 4 (see section of prices with quotes). We posed the same question to FGD BMU Executives, inquiring that since the Chairman and Secretary usually attended DFR workshops, have they ever raised the issue of knowing the price per kg of Nile Perch in the international market and this is what the Chairman said:

> *”we raised the issue however, they could not tell us. We realized it is a secret between DFR and factory processors, they think if we get to know, we will demand for high prices”.*

All the above statements implied that the fisheries sector operates in an information asymmetry mechanism were by issues of prices are kept confidential, despite the rapid growth in globalization of market information.

With regard to the fourth aspect of operational costs, 97 of respondents were aware of their own business costs, 40 were aware of their suppliers costs and 9 were aware of their buyers costs. This strengthens the earlier findings on fish prices showing that there was much secrecy in business dealings. This suggested weak partnerships between buyers and sellers along the supply chain, despite the long period they had spent in business. We then asked them whether they were aware of market prices for their business inputs (nets, engines, cooling vessels). Majority of them knew (93), they stated the prices for some of the items (see table 4, section 4) and suggested that a reduction of prices by 50 through the government subsidy ‘bona bagagawale’ program would be appropriate.

Borrowing from the Brazilian Public Policy on fisheries subsidies their experience showed that rural credit is linked to fish depletion, if not properly planned (Abdallah & Sumaila, 2007). Lowering input prices as suggested by respondents is an issue that needs careful assessment given a fact that fisheries ecosystems are already exhibiting high signals of

overcapacity especially for commercial species (MAAIF, 2006). For instance lowering prices of nets would imply that fishers will buy more nets, and put more pressure on the diminishing stocks. One would argue that the nets are of the recommended sizes and therefore this solves the problems of immature capture and use of illegal gears and fishing methods. From the surface of the argument, it seems objective, but field data showed that even fishers using legal gears were using illegal fishing methods. The gears 'legal' could be cast thrice deep 'illegal method' rather than single, resulting into capturing fish 'mature' but meant for breeding and replenishment.

4.2.2 Relationship between Learning and Business Survival

We then tested the level of dependency between learning and business survival indicators using Chi-square analysis. The hypothesis is stated below:

H_o: There is no association between time span in business and some learning dimensions.

H_a: There is an association between time span in business and some learning dimensions.

Table 4: Results of association between time span in business and following learning dimensions

Dimensions of learning	χ^2	**P value**
Identify and sort out good quality fish	17.8991	0.0013*
Plan for income generated	1.6510	0.7996
Minimize costs and gain better profit margin	7.8365	0.0978
Access and improve marketability of fish	7.7961	0.0993
Cheap Business inputs of good quality	6.4468	0.1682

*Source: Primary Data * statistically significant at 5 df= 4*

Table 5 indicated a significant dependency between having knowledge in quality and staying in business for a long-time (p=0.0013). The rest of learning variables did not show any association at 5 level of statistical analysis but at 10 they could possibly reveal an association. Therefore, we reject the null hypothesis and accept the alternative hypothesis, that there is an association between some learning dimensions and time span in business. The results confirmed that quality assurance is a key contributor for an entrepreneur to stay in business for a long time.

We then tested whether there was an association between competitiveness indicators for business survival (growth in sales, having more customers, increase in income, use of family labor and use of hired labor) and dimensions of learning.

H_o: There is no association between growth in sales and some learning dimensions.

H_a: There is an association between growth in sales and some learning dimensions.

Table 5: Results of association between Growth in sales/sales turn over and learning dimensions.

Dimensions of learning	χ^2	P value
Identify and sort out good quality fish	5.2058	0.2668
Plan for income generated	11.9634	0.0176*
Minimize costs and gain better profit margin	8.0900	0.0883
Access and improve marketability of fish	13.7193	0.0082*
Cheap Business inputs of good quality	5.0264	0.2846

*Source: Primary Data * statistically significant at 5 df = 4*

Results in table 6 indicated a significant positive relationship between having knowledge in marketing of commodities (p = 0.0082), followed with planning for income generated (p = 0.0176) and growth in sales or business expansion. Therefore we reject the null hypothesis and accept the alternative hypothesis.

H_o: There is no association between increase in income and some learning dimensions.
H_a: There is an association between increase in income and some learning dimensions.

Table 6: Results of association between Increase in income and learning dimensions.

Dimensions of knowledge sharing	Chi square value	P value
Identify and sort out good quality fish	8.7602	0.0674
Plan for income generated	11.9521	0.0177*
Minimize costs and gain better profit margin	13.9072	0.0076*
Access and improve marketability of fish	12.1964	0.0159*
Cheap Business inputs of good quality	4.3882	0.3560

*Source: Primary Data, * statistically significant at 5 df = 4*

Results in table 7 indicated a significant positive association between having knowledge in cost analysis for better profit margins (p=.0076), followed with market research (p=.0159), then planning for income generated (p=.0177) and increase in income. Therefore we reject the null hypothesis and accept the alternative hypothesis.

H_o: There is no association between use of hired labor and learning dimensions.
H_a: There is an association between use of hired labor and learning dimensions.

Table 7: Results of association between Use of hired labor and learning dimensions

Dimensions of learning	χ^2	**P value**
Identify and sort out good quality fish	18.7103	0.0009**
Plan for income generated	8.6174	0.0771
Minimize costs and gain better profit margin	13.4183	0.0094*
Access and improve marketability of fish	18.8492	0.0008**
Cheap Business inputs of good quality	5.5605	0.2345

*Source: Primary Data, *statistically significant at 5 df=4*

*** highly statistically significant at 5*

Results in table 8, indicated a highly significant positive association between having knowledge in market research (p=.0008), followed with quality assurance (p=.0009), cost analysis for better profit margin was just significant (p=.0094) and use of hired labor. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

4.2.3 Conclusion

From the analysis of associations between learning dimensions and business survival indicators, we were able to draw the following inferences as lessons for micro businesses:

(1) Among the five indicators for business competitiveness only three explain business survival from in the perspective of learning dimensions, that is; hired labor (most significant) followed by increase in income and lastly growth in sales. Indicators of having more customers and use of family labor revealed no significant associations, suggesting that they are not important for business competitiveness in relationship to learning.

(2) Employment of hired staff rather than family labor improved business competitiveness and high chances of staying in business. This implies that hired labor is acquired taking into consideration of the persons experience (knowledge acquired) to run a business.

(3) Among the five indicators of learning in relationship to time span (business age) only quality assurance was found to be significant. The rest of the indicators (planning for income generated, cost analysis for better profit margin, market research and sourcing of cheap business inputs of good quality) revealed no associations at 5 level of significance. This implied that quality assurance in this case measured by 'fish freshness' enhanced business age or continued stay in business, but this does not reveal whether a business was breaking even or not.

(4) Among the five indicators of learning in relationship to business competitiveness, market analysis and quality assurance were found to be most significant, while cost analysis for

better profit margin and planning for income generated was just significant. No significant associations were found with sourcing cheap business inputs of good quality with business competitiveness. The results clearly demonstrated that while most of the learning dimensions had no significant associations with business age, but had a higher association with business competitiveness leading to business survival.

The findings do not necessarily contradict earlier literature which shows some direct relationships between knowledge acquisition or learning dimensions and business age (Headd, 2003). The difference is attributed to study paradigm of analysis approaches. Earlier studies measured business survival using longitudinal approaches implying that, business competitiveness indicators were amalgamated together with time span in the assessment of business survivors and failures. This study clearly separated the two (time span and competitiveness) and it used a cross sectional survey design for only business survivors.

4.3 Strength of Partnerships

Partnerships were assessed in form of vertical relationships [buyer / supplier] along the supply chain, and horizontal relationships among competitors commonly known as cooperatives (Wagenaar & D'Haese, 2007). Dimensions to test the strength of the relationships included trust, cooperation, openness and quality of feedback (Lemke *et al.,* 2003; Scwejczewski, *et al.,* 2005).

4.3.1 Role of Cooperatives and Stakeholders

Respondents were asked whether any active fisheries cooperative association was operating at their local BMU. Majority of respondents (85) acknowledged that there was no active cooperative association and 15 of respondents agreed that it existed. For those that said it existed we asked them to give us the name of the association and whether they were members. Majority of respondents (75) said they were not members and the reasons for non-membership was attributed to a fact that they did not see any usefulness of being members. When we investigated the names and roles played by the named associations, we realized that most of them were not geared towards assisting fish business enterprises but were for assistance in areas such as 'Muno mukabi' say tragedy has occurred and majority were for women credit revolving funds.

We then asked members to assess roles played by the following stakeholders in contributing to their survival in the fisheries sector.

Table 8: Roles played by stakeholders for business survival.

	Roles played by Stakeholders	**BMU**	**DFO**	**Coops**	**Buyers**	**Fellow Traders/ fishermen**	**Suppliers**	**Banks/MFI**
a	Offering information on fish prices	3.1 (13)	1.2 (5)	-	78.7 (326)	15.5 (64)	1.5 (6)	-
b	Assisting in finding markets	1.8 (7)	0.3 (1)	0.8 (3)	79.9 (314)	15.8 (62)	1.5 (6)	-
c	Assisting in Provision of equipment, inputs (ice)	1.6 (5)	1.2 (4)	0.9 (3)	52.5(169)	32.6 (105)	3.1 (10)	8.1 (26)
d	Assisting in giving loans/credit/revolving fund	1.3 (4)	1.0 (3)	5.2 (16)	44.8 (139)	27.1 (84)	1.9 (6)	18.7 (58)
e	Assisting in negotiating good prices	6 (20)	0.9 (3)	0.6 (2)	*72.5 (240)	18.7 (62)	0.9 (3)	0.3 (1)

*Source: Primary Data, Note: DFO-Staff of Fisheries Department, BMU-Beach Management Unit Executives, Coops-Cooperative Association, MFI-Micro Finance Institutions. In brackets are numbers but differing by question. * buyers determined price (no negotiations).*

Results in table 9, revealed that buyers played the major roles such as assisting in finding markets (79.9), offering information on current fish prices (78.7), assisting in negotiating good prices (*72.5), provision of inputs (52.5) and in giving credits (44.8). The results also revealed an increased role of fellow traders/ fishermen [competitors] in assisting each other with business inputs (32.6), assistance in giving credits (27.1), negotiation of better prices (18.7) and lastly finding new markets and exchange of information being in range of 15.8 and 15.5 respectively. Micro finance institutions also played a role of giving credits to respondents (18.7).

Therefore this study confirms that in Uganda's fisheries sector cooperatives hardly exist at local BMU levels save for Uganda Fish Processors and Exporters Association (UFPEA) which operates at National level for Fish Exporters only. The role of negotiating better prices by buyers was earmarked by an 'asterisk' [*72.5] because respondents said that in actual sense there were no negotiations because buyers determined the buying price of the day. They also added [both those who sell at BMU's & those who take to domestic/regional markets] that at times they could cooperate together [fellow traders/fishermen] and refuse the price offered by buyers, however their efforts were thwarted by the fact that they trade in fish 'a perishable product' yet they have no icing facilities to preserve it as they wait for better

offers. This reinforces the need for government policy of 'bona bagawale' to be invested in installing cooling facilities at BMU's and Domestic market stalls, to reduce on post-harvest losses and improve negotiating powers of fishermen/traders.

We then analyzed the strength of the dimensions of partnerships among the business classes to determine dynamics of possible partnerships either vertically or horizontally (see table 10).

Table 9: Proportions of Strength of Relationships in Business Dealings

		Buyers			Fellow Traders/ fishermen			*Suppliers*		
	Dimensions	H	M	L	H	M	L	H	M	*L*
a	Extent of trust	33.8	43.6	22.6	50.7	33.7	15.6	34.9	33.6	*31.5*
b	Extent of cooperation	41	44.1	14.9	53.8	33.9	12.2	38.1	35.2	*26.7*
c	Extent of openness	29.9	45.8	24.3	48.6	34.1	17.3	35.3	35.7	*28.9*
d	*Quality of feedback*	*22.8*	*44.9*	*32.3*	*43.4*	*32.0*	*24.5*	*29.5*	*33.3*	*37.1*

Source: Primary Data, Note: H-high, M-moderate, L-low.

Results in table 10 revealed that highest levels of strength of relationships were found among fellow traders/fishermen scoring as (53.8) for cooperation, (50.7) for trust, (48.6) for openness and (43.4) for feedback. The findings suggest that strong relationships exist among competitors (horizontally) rather than vertically (buyer/supplier) in the supply chain. We posed the question to factory processors about business dynamics in terms of trust and cooperation with their suppliers and this is what they said:

> *"Initially we could trust our suppliers on basis of one or two years relationship experience, but after advancing him large sums of money he could vanish. Currently, we require a guarantee or security before advancing a loan either in cash or fishing inputs" (Production Manger processing factory)*
>
> *"No partnerships, suppliers go where best price is being offered" (General Manager processing factory)*

The statements indicated the quality of business relationships along the vertical supply chain, suggesting weak partnerships due to distrust. Also, the relationships were based on 'arm's length' relationships were by the best bidder 'offering best price' is the taker of the day. Such relationships do not result into business competitiveness because the players are far de-linked from each other in enhancing quality assurance and long-term survival in times of economic recess.

Therefore, since results revealed weak relationships along the vertical chain, formation of cooperative groups [among competitors] geared by members themselves and not initiated by government [top – down approach] would enhance business competitiveness and survival. Literature supports this observation (Wagenaar & D'Haese, 2007), for business survival especially in global commodity value chains.

4.3.2 Relationship between Dimensions of Partnerships and Business Competitiveness

We then tested associations using chi-square between dimensions of partnerships and business competitiveness indicators, to determine the test of dependency. The following hypotheses were tested and results presented starting with cooperation among fellow traders/fishermen and increase income:

H_0: There is no association between extent of cooperation among fellow traders/fishermen and an increase in income.
H_a: There is an association between extent of cooperation among fellow traders/fishermen and an increase in income.
We reject the null hypothesis at a 5 level of significance and conclude that an association exits between extent of cooperation among fellow traders/fishermen and a rise in their income, the chi square value was 13.9352 at (p value 0.0075, df =4).

We then tested cooperation among suppliers and having more customers;

H_0: There is no association between extent of cooperation among suppliers and having more customers
H_a: There is an association between extent of cooperation among suppliers and having more customers

We reject the null hypothesis at a 5 level of significance and conclude that an association exits between extent of cooperation among suppliers and having more customers, the chi square value is 11.445 with (p value 0.0261, df = 4).

We then tested extent of openness among suppliers and having more customers;

H_0: There is no association between extent of openness among suppliers and having more customers.

H_a: There is an association between extent of openness among suppliers and having more customers.

We reject the null hypothesis at a 5 level of significance and conclude that an association exits between extent of openness among suppliers and having more customers, the chi square value is 17.3765 with (p value of 0.0061, df =4).

4.3.3 Conclusion

The results of the analysis showed a significant positive association between cooperation, openness and having more customers, yet an analysis between learning dimensions and having more customers failed to do so. This implied that having more customers has little to do with knowledge. Therefore, entrepreneurs who wish to be competitive in the business environment need to build core competencies based on the heart 'social-capital' rather than knowledge. It is the social capital values [cooperation, openness] that are cornerstones for enhancing and strengthening business relationships with customers. This finding does not contradict literature but supports the view expressed by Pousner (2002) that it is human networks 'social capital' not computer networks and human intellect 'knowledge based' that make things happen.

In addition, the analysis revealed that cooperation among fellow traders/fishermen would enhance their incomes contrary to working as individuals. Therefore, this observation reinforces the need for formation of cooperatives among themselves to increase their efficiency and bargaining power in the marketplace.

4.4 Role of Regulatory Agency (DFR) in Creating a Conducive, Policy and Business Climate.

The role of the regulatory agency was assessed in terms of the co-management arrangements with BMU's. Variables under examination were drawn from the Provisional Fisheries Sector Strategic Plan of Uganda (MAAIF, nd) and other related studies in fisheries sector for comparison and contrast (FAO, 2004; IISD, 2005; Wagenaar & D'Haese, 2007; Crean & Wisher, 2000). The four roles examined were: responsibility for fish management; level of enforcement of conservation measures; linkage with donors/communities/other government departments to improve business operational environment; fairness in application of immature fish law to business community members.

4.4.1 Responsibility for Fish Management.

We asked the respondents (N=453) whether they aware of the existence of DFR, BMU and NAFIRRI. All respondents acknowledged being aware of the BMU's, 73.85 were aware of the existence of DFR and 57.3 were not aware of the existence of NAFIRRI. Respondents were then asked to identify responsibility centers under co-management of the following conservation measures in table 11.

Table 10: Results for Co-management arrangements

	Functions in fish conservation	**DFR/DFO**	**BMUs**	**Others [specify**	**Do not know**
a.	Estimation of fish stock in the lake	54.96 (249)	18.98 (86)	3.09 (14)	15.67 (71)
b.	Deciding on conservation measures to be used	57.17 (259)	46.35 (210)	1.10 (5)	2.80 (13)
c.	Enforcement of fish regulations	46.79 (212)	62.47 (283)	0.60 (3)	2.20 (10)
d.	Assurance of fish quality	49.22 (223)	46.57 (211)	0.44 (2)	5.51 (25)
e.	Policy planning	40.39 (183)	37.74 (171)	0.22 (1)	15.01 (68)

Source: Primary Data, Note; number of respondents varied per question; -Frequency counts in parentheses

Results in table 11 revealed that BMU's had an upper hand in enforcement of fish regulations (62.47) while DFR had much responsibility in estimation of fish stocks in the lake (54.96). This portrays a picture were by the function of fish stock assessment being more of scientific and technical required those with necessary knowledge, where as enforcement was more of a community job that could be carried out by BMU's themselves since they knew each other well. Participants perceived that the rest of the functions had to be managed based on a consultative approach of power sharing. As we go further in the next sections we will assess whether this was the case.

4.4.2 Level of Enforcement of Conservation Measures.

Respondents were asked to rate how the following fish conservation measures were being enforced in the fisheries sector (see table 12).

Table 11: Results for level of enforcement of conservation measures (percentage frequencies)

	Extent of application of fish conservation measures	**Highly applied**	**Limited application**	**Not applied**
a	Gear restrictions – controlling illegal fishing gears/practices	32.82	54.40	12.78
b	Limiting number of fishermen in the lake	5.52	24.28	70.20
c	Restricted entry into fish breeding grounds	17.88	33.11	49.01
d	Limiting number of fishing vessels/boats on the lake	7.33	20.22	72.45
e	Availability of data on number of fleets and their catches	31.25	45.31	23.44
f	Enforcing the ban on harvesting immature fish	28.54	55.53	15.93

Source: Primary Data

Results in table 12 revealed that limiting number of fishing vessels and fishermen on the water bodies was not entirely enforced (72.45 & 70.20) respectively. Limited application was observed on enforcement of the ban on immature fishing and control of gear restrictions (55.53 & 54.40), and lastly restricted entry to fish breeding grounds was not entirely done (approximately 50) and data collection was at limited application (45.31).

Failure to regulate number of fishers and fishing vessels demonstrate that fisheries in Uganda are of open access. Despite the involvement of local communities [BMU's] into resource management; enforcement on ban of immature fishing, control of fishing gears [see fig 6, illegal gears used openly] and access to fish breeding grounds was quite highly wanting. In addition, data collection for effective assessment of catches in relation to stocks was found to be far lacking.

Figure 9: Line of Boats with Monofilament nets 'illegal gears' packed at BMU

Source: Field Data

4.4.3 Fairness in Application of Immature Fish Law to Business Community Members

We then asked respondents to assess the fairness of application of enforcement laws especially among the business community members and the results are presented in table 13.

Table 12: Results showing fairness in application of immature fish law

	Fairness in application of immature fish law to stakeholders	**Percentage frequencies**		
		Highly favored	**Some how favored**	**No favors**
A	Industrial processors	36.97 (156)	21.8 (92)	41.23 (174)
b	Fishermen	5.97 (27)	36.28 (164)	57.75 (261)
C	Male fish traders	7.54 (34)	37.69 (170)	54.77 (247)
d	Female fish traders	12.16 (54)	39.86 (177)	47.98 (213)
E	Factory agents/suppliers	24.15 (106)	28.25 (124)	47.60 (209)

Source: Primary Data, Note: number of respondents varied per question. - frequency counts in parentheses

Results from table 13 revealed that fishermen faced the most harassment from law enforcers (57.75) while traders (male, female and factory agents/suppliers) scored an average treatment by law enforcers. Industrial processors happened to enjoy favorable treatment from law enforcers as results for highly favored and no favors are strikingly similar (approx. 40).

We collaborated, these findings with interviews by FGD's [BMU Executives, Traders/Fishermen, Women Fish Traders]; DFO's; Factory Processors; Executives of Government Agencies in Fisheries Sector. The results are presented below;

Box 2: Quotes from field data relating to enforcement activities

"Sustainability a problem because politicians and high profile people are involved in the fish trade and harvesting, were by BMU's are unable to intervene. Monofilaments are supplied by government agents who are untouchable". *BMU Executives*

"Lack of cooperation among players is responsible for illegal and immature fishing. For instance if other factories refuse buying immature fish others buy because they have a 'mayinja' untouchable high profile person in government. If factories cooperated and stopped buying immature fish, definitely illegal fishing would be eliminated because there would be no market for it". *BMU Executives*

"Immature fish is on demand in international markets and factories demand so. There is also a circular by the Commissioner that prohibits us carrying out patrols on roads to check factory vehicles". *DFO*

"Free market is the best system – liberal environment, however strong people should not destroy the weak, if this is guaranteed then ok". *CEO Government Fisheries Agency*

"URA frustrates us in stopping importation of illegal nets 'monofilament', because they earn taxes from these consignments". *CEO Government Fisheries Agency*

"Co-management is not doing well due to absence of natural laws 'indigenous knowledge. The Chinese and Japanese developed because of traditional laws. If you have things u have been doing well, and instead of building on them, we just keep on changing 'reforming' and in the end of the process we have no roots". *CEO Government Fisheries Agency*

"BMUS were put in place as parallel bodies not co-management, the system of up-bottom is still prevalent, BMU's are supervised by CAO and they can report directly to Commissioner. We gave them a lot of activities such as revenue collection, enforcement etc, than they can handle". *DFO*

"BMU's came from above and were given authority cards, so the Community sees BMU's as another authority, rendering service to government not for them, this cripples their effectiveness". *DFO*

'Capacity to implement laws not available mainly due to lack of funding. BMU committee members are also part of illegal practices. Therefore turning them into Police is also a challenge albeit some small achievements done'. *CEO Government Fisheries Agency*

"There is a lot of corruption that is why illegal fishing is still prevalent. The law enforcers always target the poor fishermen and get their nets, but they get money from the rich fishermen. The BMU's are not working as Fisheries used to do, so we suggest they should be removed, they even sell illegal gears". *Traders/Fishermen*

"There is no co-management, because there is a big gap between BMU's, Marine Police and Fisheries department. Marine police has even an upper hand because they collect a monthly fee from BMU's to allow illegal activities". *Women Traders*

"Open access has led to many fishers and boats entering the lake. There is a need to review this approach" *BMU Executives*

'The government has made an investor to be above everybody. When we inform government about any illegal activities say buying immature fish or pollution, they send us people with guns warning us that any body seen near factory premises will be prosecuted'. *BMU Executives*

"The fisheries sector is far centuries ahead of DFR management systems, therefore we no longer manage but we do postmortem to bridge the gaps". *DFO*

The responses above indicated that 'immature fishing' remained a big threat to business survival of the fisheries sector at both 'macro' and 'micro' levels. The responses also demonstrated that 'power asymmetry' existed where by big players had an upper hand in influencing policy trend into their favor. Current literature does not contradict this position, but renders it support as per the statement written below extracted from the study of Ponte (2005, p. 15):

> In late 2003, MAAIF even suspended the application of the 'Immature Fish Law' under pressure from the President Museveni. Exporters had convinced the President that Europeans have an appetite for small fish fillets, and that Kenya and Tanzania do not prohibit (or do not enforce) the catching and trading of immature fish. In apparent response to a public 'uproar' (by conservationists, MPS, and Academics), the government retraced its steps re-imposed the ban on immature fish two weeks later (The New vision, 9 December, 2003).

This statement provides the background for discussing the letter issued by the Commissioner for Fisheries/Chief Fisheries Officer, dated 15th March, 2007, addressed to; Authorised Officers, Enforcement Agencies and District Officers and copies distributed to Ministers and Permanent Secretary in MAAIF and all District Resident Commissioners. The contents of the letter are described in Box 3 below:

Box 3: Contents of Letter in relation to enforcement activities

POSTURE FOR MCS DURING ONLAND OPERATIONS

I write to direct immediate cessation of un-coordinated on-land operations under the **Fish Act, Cap 197 Laws of Uganda** related to enforcement of the Fish (Immature Fish) Instrument, 2002.

Any agency or person intending to enforce the above must clear with the Chief Fisheries Officer upon presenting:

(a) Operational plan indicating personnel involved for identification and status of **Authorization under Fish Act** including informers;

(b) A budget for the operation and proof of funding prior to the operation;

(c) Strategy and posture deployed and documentation of procedures for enforcement.

These measures have been taken to promote accountability; prevent harassment of bonafide businessmen and pre-empt tendency towards corrupt practices by enforcers. Any agency or persons deviating from these procedures will receive no support from this office and could be prosecuted individually for any infringements by the public.

The above letter by the **Chief of Fisheries** had the following implications to the sector:

(a) The letter targeted on-land operations only (favoring big players), implying that small timers who extract fish from water 'the fishers' where still subjected to the law. It is the fishers who deliver fish 'on-land', then transactions are carried out between fishers and factory agents/suppliers were fish is loaded into trucks.

(b) Big players have powers to influence trend of policy into their favor and therefore enforcers had no powers to inspect factory trucks anymore. This implied that the market playing field was not fairly competitive, since by 'weak' or poor had no voice.

(c) Co-management was rendered useless because BMU and Communities were not involved in discussing this new development. This thwarted their expectations of power sharing arrangements as revealed by results in table 11. Therefore co-management was still a top-down approach and being a Donor driven package, rendered its success in balance (Nunan, 2006).

(d) A requirement of obtaining authority from the Chief Fisheries Officer after producing an operational plan including proof of funding casts doubt on the effectiveness of enforcement given a fact that since these are illegal activities, that cannot wait approvals from government bureaucratic procedures, yet government hardly release any funding to the respective

agencies. This clearly signified 'a trap' of failing law enforcement and protection of the big players.

(e) This greatly explains the recent poor performance of the fisheries sector in form of declined income from fish exports [for period of July 06 – July 07] by 19.8 from the previous year for both international and regional trade (BOU, 2007), and possibly the recent closure of Uganda Marine Products due to failure to breakeven whereby 60 fish suppliers were demanding above Uganda shillings 600 million (USD 350,000) and also 100 workers had missed salary for last two months (Daily Monitor, Tuesday, November 13, 2007).

The continued decline in fish catches that had resulted to frequent factory shut downs most of the time caused members of UFPEA to undertake collective action responsibility to stop the vice of immature fishing. On 17th July 07 the Members together with the Chief of Fisheries signed a memorandum of understanding for sustainable fisheries and they agreed that all factories should not buy fish below 16 inches [40 cm though recommended is 50 cm] length and consequently they set up a self-policing mechanism in conjunction with DFR to apprehend [implementation started September/October, 2007] any member who was found to violate the agreement through penalties such as temporary suspension from operations. This kind of intervention confirmed earlier statements [see box 2] that power belongs to factories and therefore they influence trend of decision making. Such Private Public Partnership initiatives paints a bright future for sustainability of the fisheries sector for business survival rather than the co-management approach that was a Donor driven package that seems to have failed to yield expected benefits, despite having been launched way back in 1999 (Imende *et al.*, 2005).

A case is presented below were the research team found a Donor project sign post at one of the BMU's [see fig. 4] funded by EU, LVFO and GOU bearing information on sustainability. Basing on this, we posed a question to the BMU Executive during an FGD as follows; How come illegal fishing prevails yet a Donor sign post with information on sustainability measures exist?

> *''the problem is that people do not come for meetings. So long as prices are good the fisherman's concern is to bring kgs for cash. However, if the factory says that we are not buying this size of fish, the fishermen listen'*

The statement points to areas were Donor efforts and funding need be emphasized. Factories wield a lot of power in the fish supply chain and therefore they determined the governance model of the sector. Co-management was a Donor-driven idea (Nunan, 2006), with good intentions of enhancing sustainability of the resource mainly for the poor 'communities' who entirely depend on the fish for their livelihood. The problem with this kind of approaches is the continued replication of donor-driven participatory pre-packaged models to different fisheries (Ponte, 2005), without proper assessment of the environment 'terrain' in terms of political, economic and social governance in place. The case of Uganda has shown that without the recent intervention by UFPEA [power movers in the supply chain], the fisheries sector was soon joining the list of failed fisheries in the world (FAO, 2005), with dire negative consequences to the National economy and a multitude of more than 700,000 people who depend on fisheries as source of employment for their survival.

4.4.4 Role of DFR in liaising with donors, communities and other government agencies in creating a favorable business operational environment for business survival.

We then assessed the contribution of DFR in liaising with other agencies such as Works, Health etc., to create a favorable business environment in terms of: controlling pollution of water bodies; enhancing safety and security of both personnel and their property; improving status of social amenities such as schools, dispensaries, roads etc; sensitization of communities about public health; availability of fish handling sheds.

Table 13: Results for role of DFR in liaising with other Agencies (percentage frequencies)

		Yes	**No**	**Do not know**
a	Facing increasing pollution/contamination of the water body	65.27 (295)	34.07 (154)	0.66 (3)
b	Safety and security of personnel & property properly kept	23.78 (107)	76.00 (342)	0.22 (1)
c	Improvement in social amenities (schools, dispensaries, roads etc	28.21 (121)	71.79 (308)	
d	Received awareness seminars on HIV/AIDS, sanitation and hygiene	78.57 (352)	21.21 (95)	0.22 (1)
e	Have fish handling facilities (built sheds) at the landing site	54.83 (244)	45.17 (201)	

Source: Primary Data, Note: Number respondents varied per question - frequency counts in parentheses ( )

Results in table 14, revealed that business operational environment was not conducive for business survival. Majority of respondents identified insecurity as the biggest threat (76) followed by social amenities especially roads and sanitation (71.79) and lastly increasing water pollution (65.27). Majority of respondents acknowledged that they had received sensitization seminars on HIV/AIDS (78.57) while availability of fish handling sheds was scored average.

The presence of high levels of insecurity was mainly attributed to attraction of thugs to the sector especially fishermen who are assumed to be moving with lots of money after a day's catch. Insecurity was also attributed to lack of enforcement of wearing life jackets were by boats have capsized resulting into deaths. In addition respondents cited frequent loss of boat engines and nets. They said this encouraged use of 'kokota' beach seines an illegal net because they were assured of being in control of the process unlike the legal nets.

The status of the social amenities especially most of the roads to the landing sites were impassable during wet seasons. Even the dry season, all most all roads were full of pot holes which renders doing business costly. This implied that a prospective entrepreneur was not able to estimate the cost of logistics due to the poor infrastructure. For example the cost of vehicle repairs, were quite high due to frequent breakdowns and the life span of the vehicle is highly reduced. During rainy seasons a loaded fish truck would spend two days trapped in a pot hole and the cost of retrieving it from the mud was estimated to be between Uganda shillings 300,000 – 500,000 (USD 175 – 300) assuming the vehicle was trapped only in one area [see fig 7 below]. Such a scenario does not auger well in a fisheries business which is considered a highly 'perishable' item, given the fact that it was considered to be the highest foreign exchange earner to the country (interviews by Commissioner Fisheries). Our sources from the field indicated that one BMU was able to generate an income of Uganda shillings 9 billion [USD 5,294,117] in 2006, yet the road was impassable.

Figure 10: International Supply Chain Fish Trucks stuck in impassable 'muddy' roads for days

Source: Field Data

Water pollution was also a threat as respondents mainly indicated changes in water color relative to what it was a decade back. Some cited the presence of flower farming farms near lake shores including factories as sources of pollution. Current literature does not discount these observations since it cites hyper-eutrophication as a major threat to fish sustainability in Lake Victoria more than over-fishing (Njiru *et al.*, 2008; Okedi, 2005).

4.4.5 Conclusion

This section discussed the role of DFR in linkage with government agencies such as Works, Health, NEMA etc., in creating a favorable business climate for business survival in the fisheries sector. Findings revealed that power asymmetry has affected both co-management arrangements and compliance in enforcement of regulations. The sector was also found to be facing a poor infrastructure especially in terms of roads, the dispensaries and also sanitation at landing sites. A workshop sponsored by DFID & GTZ in May 2007 that took place in Mauritius, identified poor quality controls including poor sanitation at Uganda's landing sites as sources of effecting future barns by EU of fish imports from Uganda if not addressed in time. This study did not intend to judge policy based on how much has been reaped back to the sector (Stiglitz, 1996), but what has the government done to create a conducive business operational climate for a 'booming' sector to enhance and sustain competitiveness.

4.5 Fish Sustainability

Fish sustainability was analyzed in the context of socio-economic benefits to determine optimum sustainable yields for long-term business survival and thus poverty alleviation.

The study intended to contribute to the world wide debate by examining a hypothetical question that; focusing on optimum efficiency in fish harvest yields far better income benefits for business survival as compared to equal income distribution along the value chain. Results will shed light where policy makers should put emphasis either on optimizing efficiency in fish extraction or the continued agitation for equal value sharing that has mainly dominated the WTO dialogues.

Schurman (1996) argued that the economic sustainability of fisheries resources depended on availability of low cost investments and internationally competitive fish prices. To maintain such a trend of events means that the rate of exploitation should not exceed rate of fish bio-mass replenishment. This study examined the current rates of fish exploitation relative to predicated levels of stock maintenance levels of MSY and corresponding incomes generated both at macro and micro levels.

4.5.1 Harvest Rates at Micro Levels

Respondents were asked to rate effectiveness of the current conservation measures in relationship to the increase of populations for two species [Nile Perch and Tilapia]. The responses for those who said there was an increase and those who cited a decrease where all most of equal magnitude (32.82 & 42.41 percent) for Nile Perch and for Tilapia (39.46 & 37.41 percent). The rest cited that there was no effect on population changes.

We then asked the respondents to indicate which sizes of fish were commonly harvested. Majority of respondents (70 percent) said for both Nile Perch and Tilapia was below the recommended size. A similar percentage was also given to the research team during FGD and personal interviews. A study by LVFO (2006) asserts to this fact where by a frame survey (fisheries census) in Lake Victoria using trawls indicated that 70 percent of Nile Perch was below the recommended 50 cm length. This suggested that the sector was experiencing an increase in fishing pressure than it could contain, encouraging the frequent use of illegal gears [see fig 6] to capture the available immature sizes of fish in the lakes.

Respondents were then asked to indicate weights of fish caught/bought both in good [July – December] and bad seasons [January – June] (Mkumbo et al., 2005). Data presented combines fishermen [primary producers] and traders [small, big and factory suppliers]. This is so because some players had integrated backwards in the supply chain were by they played multiple roles of harvesting and buying.

Table 14: Fish Catches/Traded both Good and Bad Seasons per trip

Catch(kg)	Number	Minimum	Lower Quartile	Median	Upper Quartile	Maximum	Mean	*SD*
Bad Season	268	1	5	9	10	1000	17	*71*
Good Season	271	5	25	50	80	3000	87	224

Source: Primary Data

Results in table 15 showed that during peak season (good) the minimum catch was 5kg, and the median was 50kg, and maximum was 3,000kg. During the off-peak season the minimum was 1kg, median was 9kg and maximum was 1000 kg. The maximum figures belonged to those involved in supplying factories or factory suppliers. It should be noted that by the time we collected data [July – October] supposed to be a peak season, the behavior of fish catches was similar to that of an off-peak season. This trend suggested that the eco-system water bodies had experienced intensive fishing pressure resulting into a decline of fish catches. This view is supported by Bank of Uganda study were fish exports declined by 19.8 percent in 2006/07 relative to 2005 figures of fish exports. This could mainly be attributed to increased immature fishing were by the rate of exploitation was higher than rate recruitment, since the juvenile fish being harvested had not reproduced. Field observations also indicated that most of the factory suppliers could spend a week at landing sites to get 1,000kg of fish, yet most vehicles had capacity of 4,000kg. With respect to factory processors, some factories were operating in region of 10-15 tons per day while others it was 15-20 tons per day and others could finish a day without operations due to fish scarcity. Current operations were considered to be below installed capacity level in the region of 40 percent. Due to scarcity of fish supplies some processors were only keeping a skelton of permanent staff and the rest were called in when needed ‘part-timers’. Such a revelation does not auger well given efforts done by UIA to woo investors in Uganda for job creation and subsequent announcement of number of jobs created yet on the ground this is not the case. Possibly this explains why there is a paradox between the annual impressive growth of more than 6 percent but hardly materialized on the ground due to increasing poverty and job hunting.

Figure 11:'Juvenile' Nile Perch fish being smoked and destined for Regional Market

Source: Field Data

Figure 12: 'Juvenile' Nile Perch fish destined for International Market. 'man obscuring camera photographer'.

Source: Field Data at one of the BMU

4.5.2 Trend of Harvest and Export Volumes at Macro Level

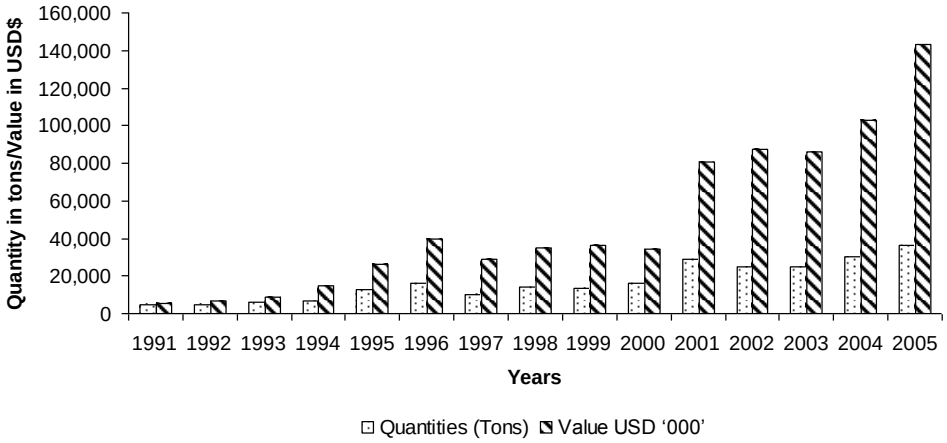
Reliable fish data management is still a challenge in Uganda's fisheries sector. Records discussed here are based on Nile Perch because it is major commodity for export and it represents over 32 percent of catches, the highest being Dagaa (44 percent) but mainly for Animal industry while Tilapia was 10 percent of catches and remaining balance is shared among other species (LVFO, 2006). The sector has 17 fish processing plants with an average capacity of 40 tons per day of production, though one was closed last year in November. Data available indicated that the recommended MSY for Uganda's water bodies was estimated to be 330,000 tons per year [all fish species] and 60,000 tons [unprocessed] was set as the quota per year for export (MAAIF, 2004; NEMA, 2004/5). The 60,000 tons of fish export are mainly attributed to Nile Perch yielding approximately 24,000 tons of fish fillets per year. The conversion rate was obtained from interviews with fish factory processors, and also confirmed with other studies (Ponte, 2005; UPTOP, 2007). We then present data for fish exports in volumes from Uganda for a period of 1991-2005.

Table 15: Fish Exports Data and Fish Capture for all Water Bodies

Capture for all Water Bodies		Exports Data		
Year	**Quantities'000 tons'**	**Year**	**Quantities (Tonnages)**	**Value USD '000'**
1980	165.9	1991	4,751	5,308
1981	167.8	1992	4,831	6,450
1982	170	1993	6,037	8,807
1983	172.1	1994	6,563	14,769
1984	199.2	1995	12,971	25,903
1985	171.1	1996	16,396	39,781
1986	202.9	1997	9,839	28,800
1987	167.84	1998	13,805	34,921
1988	214.25	1999	13,380	36,608
1989	213.61	2000	15,876	34,363
1990	245.22	2001	28,672	80,398
1991	219.57	2002	25,169	87,574
1992	224.1	2003	25,110	86,343
1993	276.8	2004	30,057	102,917
1994	218.94	2005	36,614	143,168
1995	227			
1996	218.4			
1997	218.4			
1998	217.1			
1999	229.51			
2000	219.5			
2001	220.72			
2002	221.89			
2003	241.81			
2004	402.57			
2005	416.75			

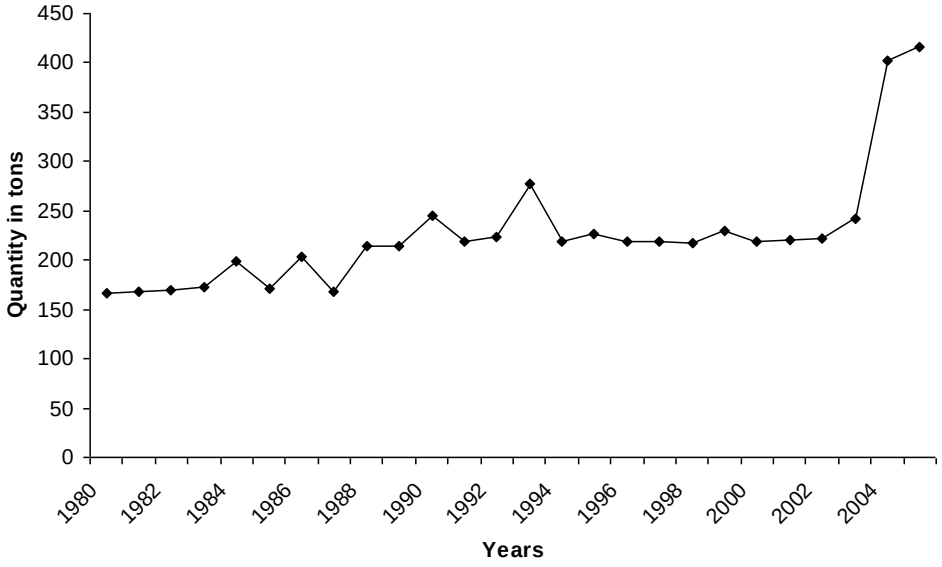
Source: MAAIF 2006; Note: Data for Regional exports not inclusive

Figure 13: An illustration of volume of fish exports and value



Source: Data extracted from table 16

Figure 14: Time series data for fish landed '000 tons'(1980-2005)



Source: Data extracted from table 16

Results from table 16 and figure 9 shows the volume of fish exports since 1991 when the industry was liberalized and investors started entering the sector in early 90's. From 1991 to 1996 there was a steady increase in volume of fish exports accompanied by a sudden drop in 1997 with a slow growth rate up to 1999. The mid-decline was due to the EU barn over quality issues. This impact was felt in the industry because EU is the biggest purchaser (approx. 70 percent) of the commodity. When the industry complied by installing HACCP quality control procedures, the EU lifted the barn and growth in exports was re-experienced since early 2000 to-date, with a slight increase in volume accompanied with tripling in value earnings.

On the other hand, table 16 and figure 10 shows quantities of fish landed for all Uganda's water bodies for a period of 1980 – 2005. Figures show a general stable trend with minor fluctuations with the peak being in 1990 yielding 245,000 tons. This was followed with a slight decrease stabilizing in the range of 220,000 tons for the next two years. In 1993, there was a sharp increase yielding 276, 800 tons which was followed with a sharp drop to 220,000 tons from 1994 – 2002. In 2003, there was a slight increase followed by a sudden sharp increase the following two years to values above 400,000 tons. It should be recalled that in 2003 was the year when factory processors lobbied the policy makers and President Museveni to allow immature fishing (Ponte, 2005). Though on paper the decision was reversed after public outcry, these sudden increased figures confirmed that immature fishing went on unabated leading to fish scarcity. This revelation also supports what one of the factory fish processors said that fish supply was enough for all of them when they were not more than 10 factories in the country at least six years back [statement recorded in 2007].

Using these figures to compare with the estimated MSY of 330,000 tons the following can be deduced: Studies have shown the presence of Nile Perch biomass to have been approximately 41 percent in 2002 (Bahigwa & Keizire, 2003 cited by Ponte, 2005) and at 38 percent in 2005/2006 (LVFO, 2006). Using an average figure of 40 percent we get approximately 132,000 tons of Nile Perch in terms of biomass. LVFO (2006) showed that 70 percent of the Nile Perch was below the recommended size of 50 cm for harvest. Hence, 30 percent of [132,000] is considered mature resulting into approximately 40,000 tons including fish to maintain reproduction. Therefore, the set figure of 60,000 tons for export seems to be at a higher side and this partly explains the origin of conflicts due to scarcity as volumes of fish exports [see fig 13] increased to 28,672 tons in 2001 then falling back to 25,000 tons the next two years [2002 – 2003]. Further analysis of the data, the manageable volumes of fish exports could range from 15,000 – 17,000 tons of processed an equivalent of 37,500 – 42,500 tons unprocessed [see fig 9 & table 16, years 2000 & 1996 maximum yield]. These figures can be considered optimum and hardly contradict estimates of 130 tons/day as quota allocation for factories in Uganda (IADC 2002 cited by Ponte, 2005). If this is converted at a basis of 300 - 360 days in a year, it yields 39,000 - 46,800 tons [unprocessed material] an equivalent of

approximately 15,000 - 18,000 tons processed material. The implication is that, only six fish processing factories (40,000/6,300)[3] should have been licenced.

Therefore, the current presumed MSY figures [330,000 tons- harvest] and 60,000 tons export may have been arrived at more by educated guesswork, given an assumption that an estimated 70,000 tons of raw material (21 percent) was classified under Illegal, Unregulated and Unreported and smuggled to neighboring countries (MAAIF, nd). According to figure 10, an annual harvest of 220,000 tons appears to be more consistent overtime, suggesting that this could be the MSY for Uganda's waters.

4.5.3 Assessment of Efficiency and Economic benefits at Macro and Micro Levels

Prior observations have been quite centered on unequal distributive economic effects (value sharing) in the supply chain (Nyeko *et al.,* 2005; Ondongkara *et al.,* 2005). There is hardly any study that has assessed the losses incurred both at macro and micro levels due to inefficiency in utilization of resources, save a study by Okwach *et al.,* (2005) that examined the loss incurred by using beach seines at micro level. This study does not disagree with unequal distribution of economic benefits, but continual dwelling on this issue has caused accusations and counter accusations, blinding us from examining our internal market failures. For instance when we posed a similar question to various respondents why there was a general cry from fishing communities on unfairness in distribution of economic benefits in a 'booming golden' enterprise and these were the responses:

> "Fishermen are rich amidst poverty, their problem is that they lack guidance in saving and credit culture" (one of the DFO's)
>
> "Middlemen taking biggest share, they buy 'lowest prices/credit/fail to pay' from fishermen and sell at good prices to factories due to intensive competition among processors" (factory production manager)
>
> "Factories are cheats!!! They grade fish in 3 categories A,B,C each with a different price. Category C is classified reject but not returned to you, if you insist on return of rejects, they give you back the fish but without fish bladder. Also they do not give us genuine delivery notes and payments take months and times not even paid, government should do something to save us from this exploitation" (factory supplier)

[3] 40,000 tons was arrived at as an average volume of unprocessed material (37,500 + 42,500) and 6,300 tons of fish was arrived at by considering an average of 17.5 tons (15 + 20) tons as optimum production per day for 360 days, thus yielding 6 factories.

"Buyers in EU set a price tag" (CEO factory processor).

"Operating under market forces or trade liberalization, you are not supposed to disturb the system. Therefore, unless they cooperate, that is when they can increase their bargaining power in the market" (CEO of one the Fisheries Public Agencies)

The statements alluded to the fact that hardly there was any centre in the supply network willing to shoulder responsibility. The Ugandan fish exporters felt exploited by their foreign buyers when they cited that fish prices were set by buyers [foreign market, while the factory suppliers felt being exploited by factory processors and the trend went on up to fishing communities (see placard in fig 11)]. However, all in all these accusations and counter accusations gave a pointer to a situation of a market failure. The purpose of this study is not to continue this kind of debate, but we present you data to explain the economic losses incurred since 2004 as a result of immature fishing both at macro and micro levels. We contend that the losses incurred within our domestic economy, far outweighs those attributed to exploitation along the fish value chain. Next we present you data on losses incurred due to inefficiency both at macro and micro business levels, based on Nile Perch.

Figure 15: Placard displayed (suggesting exploitative relationships) at one of the BMU offices

Source: Field data

Table 16: Loss of Income due to inefficiency in fish supply chain at Macro level (Nile Perch)

Quantity/Income in USD '000'	**2004**	**2005**	**2006**
Q_1 tons	30,057	36,614	36,461
I_1	102,917	143,168	145,837
Q_2 tons	75,142.5	91,535	91,152.5
Q_3 tons	52,599.75	64,074.5	63,806.75
Q_4 'number of heads'	105,199,500	128,149,000	127,613, 500
Q_5 tons	210,399	256,298	255,227
Q_6 tons	232,941.75	283,758.5	282,572.75
Q_7 tons	93,176.7	113,503.4	113,029.1
I_2 max & min	465,883.5; (max) 372,706.8 (min)	567,517; (max) 454013.6 (min)	565,145.5; (max) 452,116.4 (min)
I_3 max & min	362,966.5; (max) 269,789.8 (min)	424,349; (max) 310,845.6 (min)	419,308.5; (max) 306,279.4 (min)

Data Sources: MAAIF (2006) & UBOS website (2008) for rows 1 & 2. Q-quantity, I-income

KEY:

Q_1 = Fillet in tons (processed);

I_1 = Value generated from Q_1 in USD;

Q_2 = Raw materials in tons (un processed fresh fish) – obtained from Q_1 whereby fish yield in form fillets is estimated to be at 40 percent of raw material (UPTOP; 2006; UIA, nd; Ponte, 2005) and field interviews;

Q_3 = Immature fish in tons – estimated to be 70 percent biomass (LVFO, 2006) and field data mainly captured by nets of mesh size 4 inches and below (see fig 6);

Q_4 = Immature number of heads from Q_3 at 500g – majority of fish was 500g as per interviews with fish factory processors. Also scientific study on mesh sizes in LVFO report (2000) by Asila et al., confirmed that nets of mesh size 4 inches captured fish of not more than 500 g;

Q_5 = Immature fish in tons from Q4 if allowed to mature to legal size of 50 cm – it weighs at least 2 kg (Ponte, 2005; Asila et al., in LVFO report 2000) and field data. Nile Perch of this size (50 cm) was found to be sustainable because it was not so destructive to other species in the eco-system (Asila et al., in LVFO report 2000);

Q_6 = Total tonnage of unprocessed fish (Q_5 + 30 percent of Q_2 considered as mature fish);

Q_7 = Fillets in tons (processed material from Q_6);

I_2= Income generated from Q_7 at maximum and minimum – price range of USD 4 - 5 per kg of fillet was captured during field data with factory processors including observation of some commercial quotations.

I_3 = Loss of income ($I_2 – I_1$) at maximum and minimum.

Note: Dollar exchange rate 1 USD = 1700 UGX as per Bank of Uganda (BOU), February 21, 2008.

Results in table 17 revealed that the fisheries sector had a potential of bringing in an income of more than USD 500 Million [Uganda Shillings 850 Billions] if the fish harvested [Nile Perch] was allowed to mature to the legal recommended size of 50 cm. However, due to

inefficiency we earned in the region of USD 140 Million per year both 2005 and 2006 resulting into a loss of more than USD 400 Million for each year. According to Uganda's budget for 2007/08, Uganda shillings 1,201 billion is expected to be funded by Donor Community. Therefore, we can conclusively say that an earning of more than USD 500 Million represents more than 70 percent of Uganda's budget support by Donors. Thus this painted a picture of a market failure, since such a big percentage could be used to support the budget.

We then assessed losses incurred at micro levels. During field interviews and data presented in table 15, respondents acknowledged that in a good season they could get at least 5 – 20 kg per trip [mainly non-motorized] and 20 – 50 kg per trip [mainly motorized]. A statement from a fisherman about catches is captured below to assist in triangulation of the findings:

> "I have been in fishing on this lake [Victoria] for 22 years. When I began fishing, I used to have 10 fishing nets and get a catch of at least 100 kgs of different species. Today I have 70 nets, but I get a catch of less than 50 kg" (fisherman, New Vision, Wed, Feb 6, 2008).

The statement suggested an increase in fishing effort by seven fold with corresponding returns decreasing by 50 percent in form of catches. This implied that though fishers were able to get profits but the costs of investment had gone up and therefore with reference to Gordon's model (1954) of managing 'tragedy of the commons', this points to a picture of mixed feelings among resource users. Though we asked the respondents to indicate their incomes and expenditures so that we could gauge how many were breaking even, we could not rely on such data given because fishers and small business operators are too skeptical in revealing their true incomes given also a fact that they rarely maintain any records. This is not unique for only Uganda, Smith (2006) study about fishers in United Kingdom revealed a similar pattern. Therefore, this study relied on the range of fish prices at BMU's [Uganda Shillings 1,800 – 2,500 per kg] to estimate the fishers earnings and losses incurred due to inefficiency in harvesting. To increase on reliability of findings, data on monthly fish catches was adopted from the study done by NAFIRRI (Ponte, 2005) which indicated that motorized boats ranged from 400 – 900 kg and for non-motorized it was 130 – 250 kg. The fishing grounds were considered to be 2 - 4 hours away from the landing site, suggesting that fishers were able to deliver daily catches. Data on economic losses due to inefficiency is presented in table 18 below;

Table 17: Loss of Income due to inefficiency in fish supply chain at Micro level 'Boats'

Quantity/Income in Shillings	Motorized	Non motorized
Q_1	900; max 400 min	250; max 130 min
I_1	1,935,000; max 860,000 min	537,500 max 279,500 min
Q_2	630; max 280 min	175; max 91 min
Q_3	1260; max 560 min	350; max 182 min
Q_4	2520; max 1120 min	700; max 364 min
Q_5	2790; max 1390 min	775; max 439 min
I_2	5,998,500; (max) 2,988,500 (min)	1,666,250; (max) 943,850 (min)
I_3	4,063,500; (max) 2,128,500 (min)	1,128,750; (max) 664,350 (min)

Source: Field data and NAFIRRI data (2002) extracted from Ponte (2005)

KEY:

Q_1 = fish monthly catches;

I_1 = Income generated from Q1- average price at landing sites UGX 2,150/=;

Q_2 = Immature fish –70 percent of fish (Q_1) captured is considered immature;

Q_3 = Number of heads of immature fish at 500 g – generated from Q_2;

Q_4 = Weight of immature fish from Q_3 if allowed to mature at size 50 cm weighing 2 kg;

Q_5 = Total weight of fish (Q_4 + 30 percent of Q_1 considered mature);

I_2 = Income generated from Q_5;

I_3 = Loss in income ($I_2 – I_1$).

Results in table 18 showed that motorized boats had the capacity of monthly earnings ranging from Uganda shillings (UGX) 3–5 millions [USD 1765–2950] while non-motorized 1–1.7 millions [USD 588–1000] with accompanying losses in range of UGX 2–4 millions [motorized] and 0.65–1.1 million [non-motorized]. The boat on average employed 3 fishermen 'barias' who go fishing and a boat owner 'entrepreneur' or investor. By the time of the study there were three systems of wage distribution between fishermen and boat owner. The first one was a 50–50 percent , the second was 75–50 percent and the last is where the boat owner bought fish from his/her fishermen but not using a weighing scale, then the boat

owner would take fish to the weighing scale and the increment is his/hers. The third system seems strange with respect to the common share system in fisheries worldwide, but it rose as a result of inducing fishermen not to sell fish in waters because when this was done the boat owner could get nothing since fishermen constantly reported no catches. However, in all wage systems the routine operational costs were deducted first since most of the times the boat owner had to finance the trips. Non-motorized boats on average used Uganda shillings 3,000 per trip whereas motorized boats depending on distance and engine capacity an average of Uganda shillings 30,000 was spent per trip as cost of fuel was quite high at Uganda shillings 2,500 per litre with an average difference 400 /= from urban centers.

Therefore, from above data, a motorized boat owner would be able to earn UGX 2.5–1.0 million and the 'barias' each would earn UGX 830,000–330,000 per month as opposed to their current earnings of UGX 500,000-160,000 respectively due to inefficiency. These calculations have been done after deduction of a monthly operational cost of UGX 900,000 for motorized and it meant that currently a boat that was capturing 400 kg was not breaking even. For non-motorized, the boat owner would earn UGX 788,125–426,925 and the 'barias' each would receive UGX 262,708-142,308 per month contrary to current figures of UGX 223,75–189,500 and the 'barias' UGX 74,583–63,166 per month due to inefficiency respectively. All the calculations were based on 50 percent share system and for non-motorized UGX 90,000 was deducted as monthly expenditures. Strikingly the current earnings reflected a similarity with those of NAFIRRI study (Ondongkara, 2002 cited by Ponte, 2005) for motorized and non-motorized boat owners respectively. However, Ondongkara treated crew 'baria' earnings [UGX 35,000] to be the same for both motorized and non-motorized despite stating that it was a share system. It is also evident that the calculated crew earnings were far below the boat owners earnings because the crew receives almost an equivalent of boat owner and they divide among the 3 members and this would have given UGX 145,667 for each 'baria' on motorized and UGX 62,300 for each 'baria' on non-motorized boats contrary to the UGX 35,000 stated. Further, it was not mentioned in the study whether operational costs were taken into account or not. Which ever basis of calculation was applied by Ondongkara, this study has established that motorized boats could hardly break-even if the monthly catches were at an average of 400 kg. This kind of event could be supported by our field findings which showed that during good season 92.3 percent of businesses were able to break-even [make a profit] while for off-peak season only 65.5 percent could break-even. Therefore, the higher earnings by motorized boats is attributed to

their capacity to venture into far waters with minimal competition unlike the non-motorized that happen to crowd in near waters. However, their businesses [motorized] were mainly profitable in peak seasons but during off-peak due to higher input costs 'fuel' they cannot compete with non-motorized boats.

4.5.4 Efficiency versus Value Sharing: Comparative Income Analysis

With respect to efficiency, findings have revealed that Uganda's fish value chain is inefficient due to high losses of income linked to harvesting and dealing in juvenile fish. The ratio of expected earnings to actual earnings is approximately 4:1($ 565,145:145,837) at macro level and 3:1 (UGX 1,666,250:537,500) at micro level (see tables 17 & 18 respectively). Contrasting these ratios with what would be expected earnings by equal distribution of economic benefits shades light to were more efforts would be needed. Our field findings including Ponte (2005) revealed the following prices of Nile Perch: wholesale prices in EU in range of Euros 4.5–5 per kg [US$6.5–7.2]; retail prices varied significantly within EU member states. In Holland, supermarket chains Nile Perch was being packaged in 200 – 400g yielding Euros 20 per kg. In Italy wholesale prices were Euros 4.8 per kg, while retail prices were about Euros 9.9 per kg. Researchers interviews with factory processors we established that prices [international market] for fish fresh fillet were in range of $4–5 (FOB Entebbe) and frozen fillets $4–4.5 per kg (CIF Kampala). This information is true because the researcher saw a commercial invoice in one of the Executive Office of the processor bearing a price of $4 per kg of fish fillet. Basing on wholesale[4] prices the ratio is in range of [minimum 1.6:1 and 1.4:1 maximum] that is ($6.5:4; $7.2:5) for EU: Uganda, Nile Perch exports respectively. This implied that correcting deficiencies by harvesting the legal size of Nile Perch offered better economic benefits than focusing on re-dressing unequal distributive economic benefits in the supply chain.

4.5.5 Conclusion

The study intended to contribute to the world wide debate by examining a hypothetical question that is focusing on optimum efficiency in fish harvest yields far better income benefits for business survival and thus poverty alleviation, as compared to equal income distribution along the value chain. Results have shown that focusing on efficiency yields income benefits in the ratio of 4:1 and 3:1 at macro and micro levels along the value chain

[4] wholesale price basis applied because Ugandan fish exporters are not running retail supermarkets, thus selling to wholesalers. i.e., they have not integrated vertically along the value chain.

respectively. On the other hand, focusing on agitating for equal income distribution (value sharing) along the value chain yields income benefits in ratio of 1.6:1 and 1.4:1 maximum and minimum respectively for EU : Uganda.

The findings clearly sheds light whereby policy makers need to pursue efficiency as a medium-term strategy in order to optimize income benefits for long-term business survival and poverty alleviation. The agitation for equal income distribution that happens to dominate most fisheries studies (IISD, 2005), should be pursued after correcting a situation of market failure due to gross inefficiencies.

4.6 Impact of Policy Innovations

The fisheries sector has experienced intensive commercialization especially after adopting the market forces policy framework by the government of Uganda. Commercialization has brought impressive economic growth with the 'booming' Nile Perch exports but if not properly managed, the gains may remain short term and leave a permanent scar to most of the small entrepreneurs and fishing communities that derive income, employment and food security from fisheries eco-systems due to fish depletion (NEMA, 2004/5). The study assessed the impact of two major policy innovations that is the drive of increasing volume of fish exports and encouraging fish farming on resource sustainability and business survival.

4.6.1 Impact of increasing volume of fish exports

We posed a question to respondents whether factory processors were involved in fish harvesting. All most all the respondents said it was not so, though they had tried to do it earlier, but the government intervened and restricted them not to involve in fish harvesting. Then we asked the respondents to rate the extent in which a drive for increase in volume of fish exports affects resource sustainability and their long term survival in business. Almost 50 percent of respondents acknowledged that resource sustainability was highly affected and 18 percent considered the effect to be moderate. With respect to business survival 42 percent respondents considered being highly affected and 27 percent said they were moderately affected. The rest said there was no effect in all circumstances. Then we posed this similar question in interviews with different stakeholders such as DFO's, FGD's of BMU executives, FGD's of women entrepreneurs, FGD of traders, Factory Processors and Central Government Officials in the fisheries sector. Generally, most of them subscribed to the idea that there was need to control volume of fish exports in relationship with ability of supplies from the eco-systems. They said that if this is not promptly acted upon, very soon Uganda would

experience a resource depletion resulting into business closures and failures with the fishing communities bearing much of the brunt.

> *"The policy drive targets mainly one specie [Nile Perch] which is on high demand and this encourages illegal use of gears resulting into fish depletion. At this BMU some fishermen can tell you that we have finished a whole week without fishing due to absence of fish in the lake. We propose that the government reduces tonnage of fish export for this specie to maintain sustainable harvests and to ensure long-term profitability and peoples livelihoods"*

The findings showed a picture of the need for controlling volume of fish exports (see fig 9) for long-term benefits rather than the short-term gains that seemed to have accrued by now. Borrowing from experience of other countries that felt such a situation of tragedy for the commons, they applied a policy control on volume of fish exports and they have been successful. New Zealand experienced a similar situation, and the local community on Stewart Island shifted their mind set from being hunter-gatherers to becoming farmers of the seafood; their project involved re-seeding a commercial catch of *paua*. To avoid over-fishing, the annual catch was voluntarily reduced from 150 tonnes to 90 tonnes, this meant that the local community was foregoing $2 billion a year to ensure the long-term survival of the fishing sector (Dana, 2003). Critics may argue that this was possible because fishers in New Zealand had individual quotas unlike Uganda were it is open access. This criticism does not stand as exemplified by Senegal coastal communities operating under open access, that voluntarily reduced catch rates and gained much income (WRI, 2005). Therefore, if Senegal on the same continent of Africa as Uganda did so and succeeded, then Uganda can emulate the same policy strategy innovation for long-term benefits. Failure to this, then Uganda's fisheries sector is likely to face fish depletion due to short-term gains 'hot money' emanating from fish exports as was the case with Chile (Schurman, 1996).

4.6.2 Impact of fish farming

The government of Uganda introduced fish farming as a strategy of decreasing pressure on capture fisheries. We asked respondents to evaluate the contribution of this strategy [on the scale of high, moderate and no contribution] in alleviating the problem in relationship to resource sustainability, long-term survival of their businesses, limiting new entrants into capture fisheries and lastly some fishers exiting from capture fisheries.

Majority of respondents 50 percent said there was no contribution while 27 percent considered that there was a moderate contribution to fish sustainability. On long term business survival 46 percent considered this strategy not able to contribute to their long-term

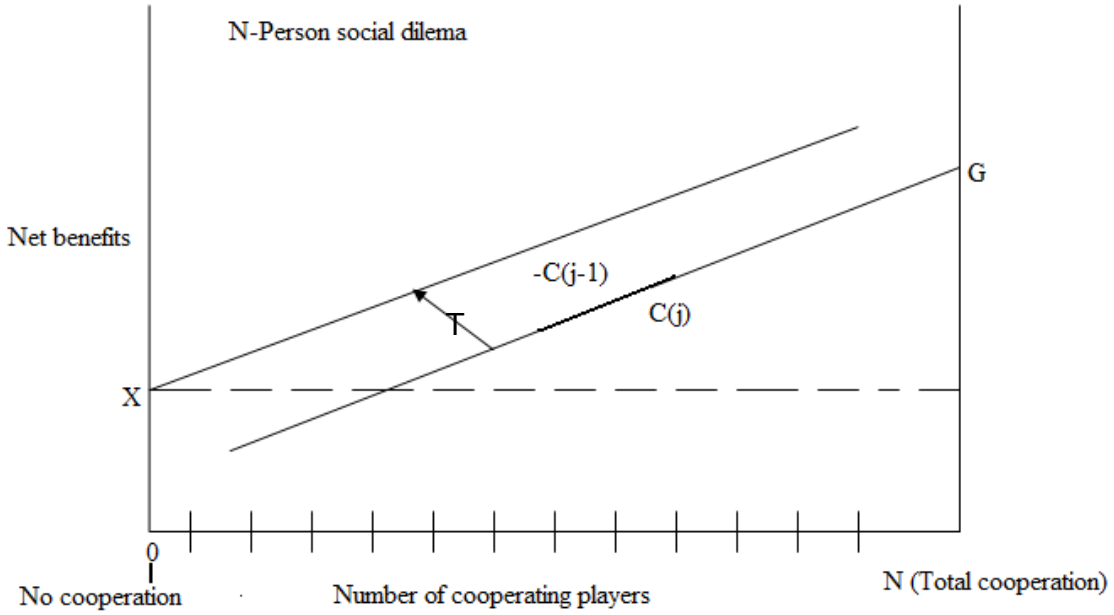
stay in business while 41 percent said a moderate contribution would be achieved in future but not now. On limiting new entrants to capture fisheries, 47 percent said there was no contribution and 36 percent said there was a moderate contribution, citing that people who would have joined from the hinterland could undertake fish farming. With respect to some fishers exiting from capture fisheries, responses were equal for those against and those who said moderately (36 percent). However, they cited that though some people had quit capture fishing, they could hardly tell whether they actually joined fish farming.

Literature supports the above revelations. According to MAAIF 'Provisional Fisheries Sector Strategic Plan' said aqua-culture was dominated by small-scale subsistence pond farming mainly operated by rural agricultural households. This suggested that most of the private sector entrepreneurs have not yet invested in this venture to make it productive. Therefore its success still remains in balance, yet the current fish demand is estimated to be 1,082,000 tons for international/regional and local markets (Mushi *et al.,* 2005). This creates a big gap since currently Uganda's production is still below 500, 000 tons per year.

4.6.3 Conclusion

Findings have shown that commercialization of the fishing sector partly with UIA policy initiatives of increasing volume of exports to create jobs and earn foreign exchange is not sustainable. Fig 9 & 10 confirms this, whereby the previous impressive earnings have been attributed to a strategic stretch approach driven by market forces resulting into rampart juvenile fishing. This has greatly led to huge economic losses to the whole country, and an urgent need of exploring the application of the N-Person Social Dilemma Model, for collective action to redress the imbalance (see fig 12).

Figure 16: N-Person Social Dilemma of benefits for cooperation and non-cooperation



Source: Ostrom (1998)

NOTE: N players choose between cooperating (C) or not cooperating (-C). When individuals cooperate, their pay offs are always lower than the (j-1) to that of individuals who do not cooperate. The predicted outcome is that no one will cooperate and all players will receive X benefits. The temptation (T) not to cooperate is the increase in benefit any cooperator would receive by switching to non-cooperation. If all cooperate, they all receive (G-X) more benefits, than if all do not cooperate receive (X) less benefits.

On the other hand a strategy of encouraging fish farming as a viable option of reducing pressure on capture fisheries seems to have yielded insignificant results. The only remedy is to strengthen collective action through efforts of self-policing under UFPEA/DFR.

The next chapter presents a summary of the study and recommendations.

5. Summary and recommendations

5.1 Summary

The major research question of the study was how supply chain rigidities affect business survival in Uganda's fishing sector. The rigidities were examined in the context of both efficiency and effectiveness of the fish value chain in meeting supply objectives of reliability in quality, quantities, price and timely deliveries. Results revealed that learning, a sub-variable of knowledge flow or sharing had taken place in the value chain. The sector had also experienced growth in commercial industrialization, employment and export values, thus resulting into being a second largest Uganda's foreign exchange earner. However, the growth has been achieved, due to pursuit of short-term gains at the expense of sustainable long-term economic aspirations. The sector was found to be facing constraints of information asymmetry, weak partnerships, uncoordinated inter-government agencies in facilitating a conducive business climate, high economic losses due to immature fishing and finally power asymmetry exercised by lead firms.

The major research question was broken down into the following specific research questions: To examine the importance of knowledge sharing to business survival; To examine the importance of partnerships to business survival; To examine the role of the Department of Fisheries Resources (DFR) in facilitating a favorable business climate for business survival; To examine a hypothetical question of whether focusing on optimum efficiency in fish harvest (sustainability) yields far better income benefits for business survival and thus poverty alleviation as compared to equal income distribution along the value chain; To investigate the interface between impact of policy innovations and business survival.

Knowledge sharing was divided into sub-variables of information awareness and learning. Results revealed that learning had taken place along the value chain. First tier suppliers in the supply chain had mastered key skills in managing personal businesses, in areas of quality 'fish freshness', planning for income generated and searching for better prices in the local market with the help of mobile phones. On the other hand, market information awareness to assist in marching supply with demand was low. In particular, participants had completely no information about sustainable supply quantities or yields for their water bodies, they could not tell prevailing fish prices on the international market. This pointed to a situation of an information asymmetry in the fisheries sector suggesting a market failure.

The strength of partnership ingredients were analyzed in building social capital linkages both vertical [between buyers and suppliers] and horizontal [among competitors] in the supply chain for business survival. The study revealed that at present, fishers and traders were highly involved in accusations and counter-accusations of being exploited by one party. This pointed to a situation of not only information asymmetry but also power asymmetry causing distortions in prices, supply quantities and affecting sustainable income earnings through use of illegal methods of fishing. Further, trade transactions were based on individual to individual one-off profit maximization known as 'arm's length' relationships. This kind of trade arrangements left mostly the primary producers 'fishers' more vulnerable to exploitation due to lack of negotiation powers, given a fact they deal in a highly perishable product 'fish', yet they lacked preservation facilities. On the other hand, the hypothesis tests revealed that meaningful close cooperation along the supply chain, could only take place horizontally (among competitors i.e., fishers). If this is done, then their bargaining powers and increase in information awareness would improve, to strengthen their long-term survival in business.

The Regulatory Agency (DFR) in collaboration with donors and other related government departments and authorities is expected to create a favorable business climate to enhance economic growth and reduce poverty as defined in the Poverty Eradication Action Plan (PEAP). Weak inter-agency coordination prevailed in the fisheries sector. For instance, Uganda Investment Authority was more interested in announcing number of investments attracted and number of jobs created with disregard to potential of fish stocks available. Similarly, Uganda Revenue Authority was more concerned on surpassing revenue collection ceilings at the peril of curbing importation of illegal gears 'monofilaments'. The sector was also found to exhibit high haulage logistics costs due to poor road infrastructure, and the levels of eco-system eutrophication and sanitation of the landing sites were posing a potential threat for continued business survival. To this effect, EU 'the major fish market importer' was contemplating effecting barns in the near future (DFID & GTZ, 2007).

The fourth goal of examining the hypothetical question of whether focusing on optimum efficiency in fish harvest (sustainability) yields better income benefits as compared to equal income distribution along the value chain, formed the gist of this study. Results showed that the sector suffered gross inefficiencies in the fish value chain both at macro and micro levels. At macro the country lost annual income by more than USD 400 Million 2004-2006. By

undertaking a comparative income analysis, results showed that if efficiency in extraction of fish resources was done for the same period, income distribution along the value chain would have been 4:1(400 percent rise) and 3:1(300 percent rise) at macro and micro levels respectively. Conversely, by examining the export price differentials at macro level, the ratio was 1.6:1(60 percent) and 1.4:1(40 percent) as maximum and minimum EU: Uganda. The findings portrayed that efficiency in fish extraction yields better income benefits for business survival and thus poverty alleviation, more than agitating for equal income distribution. Therefore, the study does not underestimate the agitation for equal income distribution in relation to efficiency in the fish value chain. But focusing on the former, while neglecting the latter, does not offer sustainable long-term economic aspirations.

Uganda undertook market liberalization policy reforms in the early 1990's, as an innovative policy framework for allowing markets work better, with minimum government intervention. The analysis of the fisheries sector indicates that although growth in exports has grown remarkably as a result of trade liberalization, but this has been achieved at the expense of foregoing long-term economic sustainability of the fisheries resources. The findings point a gap in the current fisheries policy framework where focus is placed on short-term economic gains at the expense of enforcement of regulations to promote a sustainable country's competitiveness and reputation in the global market.

5.2 Way forward and policy options

The supply chain philosophy is about efficiency in product flow 'fish' from producer to consumer and in reverse direction knowledge flow, to enhance supply product reliability in quality, quantities, price and delivery schedules. To achieve this, requires a holistic supply chain management approach undertaken in a systems thinking. However, the dilemma facing the sector is putting in place such an appropriate management strategy to enhance both competitiveness and sustainability for long-term benefits. This study proposes the following strategic approaches based on findings of this study and the final discussions held during a de-briefing fisheries sector policy dialogue on July 17, 2008 at UMI:

***First,* evidence shows that DFR has been operating using a *Strategic Stretch* [responding to market forces] rather than a *Strategic Fit* [matching resources with demand]. In lieu of this, we propose a Strategic Fit Management Approach for fish sustainability encompassing the following strategies;**

- Classification of fish products into Commercial species and Non-Commercial species, basing on level of economic contribution to the sector.
- Classification of fishers into Commercial and Non-Commercial fishers to match estimated stocks of commercial and non-commercial fish products. This approach addresses the issue raised by DFID & GTZ (2007) that DFR mainly focuses on resource management based on technical measures [mesh net size limits] neglecting human resource parameters.
- Classification and branding of fishing permits for commercial fishers in categories such as 'Premium Permit' for Nile Perch, thus higher fees. This kind of strategy is already applicable in our local economy especially with transport sector whereby permits are issued reflecting class of vehicle. A case study using this licensing approach in fisheries was Guinea – Bissau (Kaczynski & Fluharty, 2001) and Canada (Kumar, 2005).
- Similarly to fishing permits, universal licensing of boats at UGX 30,000 to be discarded and therefore also boat owners 'entrepreneurs' to pay licensing fees reflecting the class of fish to be harvested.
- Progressive promotion of long-line fishing method as opposed to gill-netting. Studies so far done point out that long-line fishing is cost effective to Nile Perch fisheries compared to gill nets (LVFO, EU, NARO & NAFIRRI, 2006). The study indicated that gill-nets had a higher tendency of getting lost and thus, continued capturing fish which end-up rotting, thus being an environmental catastrophe and reducing volume of fish landed.
- Re-introduce closed fishing grounds and seasons to enable fish reproduction.
    - Fish factories to declare some months closed for purposes of maintenance and repair of equipments while allowing fish reproduction. This is possible through the self-policing mechanism introduced by factories.
    - Fishermen to take holidays and engage in other alternative business ventures.
- Institute quotas for each water body based on credible scientific stock assessment data.
    - Improve on data collection by training a BMU staff and to be paid a daily allowance from taxes raised by a particular BMU. This solves the issue of lack of motivation cited by BMU staff responsible for data collection.

- Reduce multiple landing sites into economically manageable landing sites to facilitate data capture of fish landed and also reduce illegal activities.

- The volume of fish exports need to be revised downwards to an average of manageable quantities of 40,000 tons unprocessed material. Case studies that applied this approach include New Zealand (Dana, 2003) and Senegal Coastal Communities (WRI, 2005).
    - Number of factories need to be reduced from 17 to 6 to achieve efficient optimum production at an average of 17.5 tons per day per factory for 360 days.
    - To maintain effective competition and avoid monopoly, fish factories that happen to be run under a conglomerate but bearing different names, should have some of their licenses not renewed until the number goes below 10 factories in operation.
    - Closed factories should be encouraged to explore processing of Tilapia and 'Daaga' which are still in favorable stocks for the booming regional market, i.e., Southern Sudan, Democratic Republic of Congo.
    - Reduced incomes in the short-run but increased incomes in long-term by 4 fold across the spectrum in the whole sector.

***Second,* the supply chain is characterized by knowledge flow in terms of information awareness and learning. Results revealed that learning i.e., knowledge that enables managing personal businesses had taken place, but the sector experienced market information asymmetry. The following strategies are proposed;**

- Professionalism of the industry by setting minimum entry requirements to reduce on open access.
    - Fishers to be certified by undergoing at least a three months training at the Fisheries Training Institute – Entebbe. The training to re-tool their attitudes *'fish is God given and so abundant, but hiding',* in understanding optimum sustainable yields of the local water bodies in relation to fishing effort. Quality management to be emphasized to minimize post-harvest losses.
    - Set a code of ethical conduct whereby certification requires them to abide by the code and also belong to a fisher's registered professional body. Research studies have shown that belongingness to professional bodies enhances adherence to ethics thus promoting efficiency, because the professional body

has powers to revoke temporally or permanently the practicing certificate (Mugabira, 2006).

- Use the fisher's professional body as a spring board for cooperation in fisheries resource management and increasing their market bargaining power.

- Documentation of indigenous knowledge in fisheries training and management.
- Prepare fishers to develop a saving culture through development of alternative business investment plans for proceeds coming from fishing, for their retirement. Such a policy strategy of encouraging savings from workers is highly credited as one of the pillars among others for the Japanese economic 'miracle' (Stiglitz, 1996).

***Third,* adoption of a coordinated multi-sectoral inter agency policy framework to foster a competitive business climate.**

- Recentralize the activity of issuing permits and licenses back to DFR, as Local Governments have tended to pay much attention to short-term economic gains at the expense of fish sustainability and long-term economic aspirations.
- Roads leading to major landing sites need to be recentralized for maintenance by the Ministry of Works in close collaboration with DFR. This is because local politics in local government is mainly geared towards maintaining roads where the politicians are likely to garner votes during elections.
- Build upon the Industry Public Partnership self-monitoring approach initiated by fish factories to control illegal fishing activities. This approach will solve the power asymmetry syndrome i.e., voices of the weak silenced, existing in the value chain. Berkes (2004) asserts that lead firms in the value chain i.e., fish factories influence trend of decision making in value chains.
- DFR in close collaboration with BMU's to undertake Central Data Capture of all first tier suppliers (fishers 'boat crews', boat owners, gear owners) and traders and issuing them with Identification cards bearing serial numbers. This will minimize multiple registration of fishers and facilitate easy follow up of migrants and wrongdoers.
- DFR to collaborate with the Private Sector Foundation to attract potential investors in aqua-culture.

    - Unleash rural entrepreneurship in production of Catfish as baits for Nile Perch fisheries. This strategy improves fish farmer's earnings due to the available market and also may attract decongestion of capture fisheries as fishers engage in fish farming. Studies showed that the demand for baits in Uganda was One

Million per day, while in East Africa it was estimated at Three Millions per day (Walekwa, 2005).

- Re-stocking of minor lakes and dams with commercial species such as Tilapia and Catfish with a high demand in both the local and regional market.
- Piloting of cage culture for Nile Perch and other species in minor lakes by entrepreneurs in collaboration with research institutes, will give a grounded approach for scaling up and replication into major water bodies.

- NEMA in close collaboration with DFR, need to draw a Master Plan Land Management use for guiding the establishment of economic activities. This will solve the issue of flower farms situated along shores of Lake Victoria that are contributing to eutrophication problems in the water body.
    - Institute payment of affluent charge fees per volume of waste discharged by all factories and farms in water bodies.
    - Installation of meter counting devices at factory premises along waste discharge lines will necessitate factories to innovate alternative waste discharge in order to minimize affluent taxes.
- Creation of Regulatory Authority - speedy transformation of DFR into the Fisheries Authority as per the action government's plan need to be effected from paper work to visibility. This will minimize public bureaucracy and political influence in policy implementation.
- Engagement of URA in control of importation of illegal gears. Prior, URA has been more concerned with surpassing ceiling of revenue collection with disregard to importation of monofilaments 'illegal gears'.
- Engagement of UIA to license fish factories after through consultation with DFR and key stakeholders. Prior, UIA has been more interested in announcing number of investments attracted and number of jobs created with disregard to potential of fish stocks available.

***Fourth,* most of the respondents echoed provision of government's subsidies in form of 'soft loans' part of the 'Bona bagagawale' framework in the sector. Borrowing from the Brazilian public policy on fisheries subsidies, their experience showed that rural credit is linked to fish depletion, if not properly planned (Abdallah & Sumaila, 2007). The study proposes that;**

- The funds in form of soft loans should be used in facilitating the training and certification of commercial fishers. Involvement of the Private Sector Foundation in training fishers in developing an investment plan will be crucial.
- Funds should be geared towards enhancing quality to reduce on high post-harvest losses estimated to be 20-40 percent by UFPEA.
    - Provision of ice and cooling vessels at landing sites and local market stalls.
    - Provide better fish drying processing lines for fish destined both for regional and local market.
    - Only vehicles with in-built ice facilities into compartments should be licensed to transport fish in the local market. Compartments are desirable to facilitate a number of traders to load their fish cargo on one vehicle and thus minimize costs of haulage.
- Provide fishing gear inputs for fishers of other species such as 'Daaga, Tilapia' which are still in optimum quantities.
    - Some fishers of Nile Perch 'highly threatened with depletion' will be attracted to exit and licensed to join fishing of other species accessing credit facilities. This reduces fishing pressure on the Nile Perch, with a high demand on the international market.
- As a medium-term strategy, part of the funds should be used in payment of data collectors at all recognized BMU's and setting up a central data capture of all fishers.

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Annex: Table 4

Table 18: Information Awareness (N=453)

Dimensions	**% ages**	***Comments / "Quotes"***
1. Quality assurance:		
a. awareness of recommended sizes of fish	95.74	
b. state the sizes Nile perch (NP) & Tilapia(T)	20 (NP) 56.8 (T)	
c. awareness of why (reasons) for harvesting recommended sizes & state reasons	72	*Conservation or sustainability; gaining more income or profitability.*
d. awareness on hygiene standards	70	
e. state hygiene standards of handling/carrying vessels	67	*Iced in a clean fish carrying container*
f. awareness of reasons for keeping hygiene standards & state them	66.59	*Guarding against bacteria, requirement to meet international export standards*
g. source of information	94	*(94)Fisheries Officers, BMU,s, UFFCA & Researchers; only 4 attributed source from fellow traders/buyers; less than 1 said media and 2 family members.*
2. Quantities		
a. awareness of est. tons of fish both local & international market	0	*Respondents acknowledged not being aware. However, processors and fisheries staff this what they generally said;* *"the demand is too big in the international market, we cannot meet it"*
b. state the tons (Nile Perch & Tilapia)		
c. awareness of MSY for your water body	0	*"God created the lake so big that fish cannot be exhausted, it just hides" (fisherman)*
d. state MSY (Nile Perch & Tilapia)		
e. source of information		
3. Prices		
a. awareness of fish price in different markets (international/regional/local/BMU		*All respondents were only aware of their local BMU prices. (17 & 15) of respondents were aware of local market (District Town) of T & NP respectively while (6 & 3) of respondents acknowledged being aware of regional market for T and NP respectively.* *"prices is a secret of buyers, they do not want us sellers to know because we shall know their profit margin" (FGD fishermen/traders).* *"one time I overheard a telephone conversation between an Israel Buyer and Local Processor mentioning a price of $ 5 per Kg, after the conversation I asked him how much the Buyer was paying, then he also asked me can you tell me how much you are buying today*

		from the fishermen, both of us laughed because nobody was willing to reveal the price" (factory supplier/agent)
4. Operational costs		
a. awareness of average operational costs of: personal; suppliers; buyers businesses	97 40 9	
b. source of information		*"own experience; for my business, suppliers and buyers I can calculate and estimate the cost of operations" fishermen/traders*
c. awareness of market prices of business inputs	93	
d. state prices you know & what you can afford		*Price of 25 hp engine 3.0 – 3.5 Million shs; price of hiring cold chain vehicle was at 500,000 shs per week. Respondents were willing to pay 50 of the above prices.*
5. Decision to invest		
a. before investment was market research undertaken: number of players; need for licensing; capital requirements	12 27 34	*"there was no need to seek information, the Nile Perch 'emputa' was dying in mass numbers and the market was readily available and people were getting a lot of money. Therefore, I also joined the business" (fisherman)*
b. source of information		*Mainly from business players (68).*

Source: Primary Data