



**Assessing the Role of Modern Supply Chain Management Practices in  
Fish Farming Towards Availability of Farmed Fish in Lilongwe City  
(Malawi).**

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**Abstract**

The purpose of this study was to explore supply chain management aspects in Fish Farming, by assessing the role of contemporary supply chain management practises towards increased availability of farmed fish in Lilongwe city. The objective of this study was to assess how adoption of contemporary supply chain management practises in fish farming would lead to increased availability of farmed fish through effective production and distribution of farmed fish. .

This study was important because it gives an insight into different supply chain management techniques which can be used by the fish farmers in ensuring effective distribution of fish which will reduce costs and improve services delivery.

Through a survey that was carried out with fish farmers, it was established that the post-harvest section of fish farming is still under developed which leads into substantial losses especially during the rainy season. Predominant causes are due to inability to preserve fish stocks, and lack of key equipment suitable for controlling temperature considering the perishability of fish as well as lack of market orientation which led to failure in identifying stable and reliable markets.

The study recommends that the Government and private sector stakeholder groups need to create a centre which will be responsible for coordinating the fish farmers and the customers. The above mentioned centre will be responsible for market research so that the farmers find reliable and stable fish markets.

It also recommends that establishment of farmers association will also help in availability of farmed fish through consolidation of fish quantities at club level and selling them in bulk. This will be particularly important in such a way that it will give the association greater negotiation power when selling their fish products hence more bargaining power on determining fish prices

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**List of Acronyms**

SCM: Supply Chain Management

FAO: Food and Agriculture Organisation

NGOs: Non-Governmental Organisation

SSC: System Science Consultants

NAC: National Aids Commission

WHO: World Health Association

JIT: Just in Time

ICT: Information and Communications Technology



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## **Chapter One: Introduction**

### **1.0 Introduction**

The purpose of this study was to assess how contemporary Supply Chain Management (SCM) practices can contribute towards the success and profitability of fish farming. The study aims at establishing the link between effective SCM of fish farming and value creation to satisfy customer needs in cost effective manner.

### **1.1 Background and Rationale**

SCM as a discipline has gained influence in how entities run their operations, with high competition and demanding customers, firms are reconfiguring their business operations in order to survive. One of the business areas is that of managing upstream and downstream value added flow of raw materials, work in progress, finished products and information among suppliers and customers. (Lysons and Farrington 2006).

With ever changing business environment SCM is a critical business discipline (Slack, et al 2001), both for society and the business world, the former being attributed to reduction in energy use; pollution while the latter boosts customer services by ensuring availability of right quality products and streamlining organisation's processes to reduce costs and improve service delivery.

It is evident that SCM principles apply to all sectors and the fish farming industry is no exemption.

Fish farming in Malawi began in 1906 with introduction of rainbow trout (*Onchorhynchus mykiss*) for angling, (Balarin 1987), It follows that there are currently over 4050 fish farmers who own 9500 fishponds which produced an estimated 800 tonnes of fish annually in 2002.(NAC, 2002 and SSC, 2005).However fish production from farmers increased to 2500 tonnes in 2010 (The Malawi Government Annual Economic Report, 2011)).

## **1.2 Problem Statement**

The Malawi Government Annual Economic Report, (2011) reveals that fish production from small holder farmers has steadily increased from 1,600 tonnes in the year 2008 to 2,500 tonnes in 2010. This production comprised 93 per cent tilapia 5 per cent catfish and 2% exotic species of common carp and rainbow trout (*Onchorhynchus mykiss*).

Despite this increased production the current average per capita consumption of 7.3 kg/year in 2010 is by far less than the recommended 13-15 kg of the World Health Organisation (WHO). There has been a declining trend since 1976 when per capita annual supply was 12.9 kg falling gradually to 9.4 kg in 1990 to the current levels. This report suggests that though fish production has

increased but the demand for farmed fish is very high as compared to the current supply levels. Banda, L *et al*(n.d).state that the demand for fish and fish products is steadily growing in Malawi however, fish is still in short supply.

Furthermore, Phiri, L, *et al*(2013);Matiya, G. and Yoshikazu, W. (2010); Banda, L *et al* also unveil that in Malawi's fish farming, considerable attention has been geared towards increasing volume of output whilst there remain few attempts by policy makers to change the terms of inclusion in downstream value chains. Value chain studies in Malawi have been conducted incrops like soya bean, tobacco but less research has been done in fisheries sector concerning supply chain. (Phiri, L, *et al*. 2013).

Therefore, this study explored supply chain challenges faced by fish farmers which led to non-availability of the right quantities of fish stocks to satisfy customer demand in a cost effective manner.

### **1.3 Aim**

The aim of the study was to assess the role of modern supply chain management practices in fish farming towards availability of farmed fish in Lilongwe city.

### **1.4 Objectives of the study.**

- Assess current SCM practices done by the fish farmers
- To explore supply chain challenges faced by fish farmers.
- Assess role of modern SCM practices towards increased availability of farmed fish
- Make recommendations on appropriate SCM strategies which will reduce costs and improve availability of farmed fish.

### **1.5 Research questions**

- What are the current supply chain practices done by the fish farmers?
- What are the supply chain challenges that have incapacitated the supply of farmed fish?
- To what extent is supply chain knowledge applied in the fisheries sector?

**1.6 Significance of the Study**

The intent of this study was to assess how modern supply chain management practices in fish farming can contribute to the availability of farmed fish. This study is important because it explores different supply chain management techniques which can be used by the fish farmers ensuring effective distribution of fish stocks. It also helps fish farmers to understand the key concepts of supply chain management which are vital for the success of their fish farming venture.

## **1.7 Dissertation Structure**

### **Chapter One**

This chapter has explored the purpose of the study, the research objectives have also been clearly explained as well as the significance of this study particularly for the fish farmers.

### **Chapter Two**

This chapter presents the literature review. Insights by experts that have written on topics related to the research questions are outlined and reviewed in this chapter.

### **Chapter Three**

This chapter stipulates the technical approach and methodology used in sampling, data collection, analysis, interpretation and presentation. It also describes the research approach that guided the whole research work including the limitations of the study.

### **Chapter Four**

This chapter presents the analysis of data and discusses survey findings guided by research questions and objectives. The evaluation and interpretation of data involved classifying opinions attitudes and perceptions through the use of charts, graphs and tables.

## **Chapter Five**

This final chapter is a presentation of conclusions and recommendations that have been arrived at on the basis of the study findings.

### **1.8 Chapter Summary**

This chapter has introduced the study overview with its problem and the reasons why the research was to be conducted. It also looked at what questions the study was answering and their objectives as well as the significance of the study.



## **Chapter2: Literature Review**

### **2.0 Introduction**

Literature review is carried out to learn what other researchers have already done in the area of study and identify gaps in the field of study. It guides and informs the research (Collin and Hussey 2003). Saunders et al (2008) suggests that literature review offers an understanding into significant previous research and developments that have arisen in the field of study.

The literature to be studied will confer a sample of published texts that clarify the interfaces of various parts of the SCM in relation to fish farming sector.

### **2.1 Key Theory**

This research is governed by the theory of demand and supply, with much emphasis on collaborative supply chain among players in the fish farming sector. The research focused on supply chain management practises that can enhance the production, distribution of fish and fish products in a cost effective manner while increasing service delivery to the customer.

### **2.2 Definition of Terms**

Aquaculture – is the farming of aquatic organisms such as fish, crustaceans, molluscs and aquatic plants. It implies some form of intervention in the rearing

process to enhance production, such as regular stocking, feeding, and protection from predators (FAO 2008).

Food security- refers to the availability of food and one's access to it. A household is considered food-secure when its occupants do not live in hunger or fear of starvation. It is a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors including droughts, and economic instability. (FAO Agricultural and Development Economics Division June 2006).

Supply chain management - the management of upstream and downstream flow of products and the associated information aiming at reducing overall costs and improved service delivery (Lysons and Farrington, 2008).

### **2.3 Overview**

Fish farming is considered to be one of the fastest growing aquaculture sectors in most undeveloped countries, (Tacon, 2001). The Food and Agriculture Organisation (FAO, 2007) highlights that aquaculture is an important source of high-quality animal protein and other vital nutrition at reasonable prices to the poorer sections of the community. FAO(2007), further stresses that aquaculture has become increasingly essential in supplying fish to feed the world. Evidence

reveals that 106 million tonnes of fish was consumed globally in 2004 of which. 43 per cent was produced by aquaculture, (FAO, 2007).

The Food and Agriculture Organization (FAO, 2000) further reaffirms the significance of fisheries sector in the economy. In its report FAO (2000) assessed the worth of fish which was traded over the world to be US\$ 51 billion per annum cited in (Tidwell, 2001). Additionally, it was established that above 36 million individuals are engaged in aquaculture, and as many as 200 million people gain direct and indirect income from aquaculture, (Garcia and Newton, 1997 in Tidwell, 2001).

### **2.3.1 Recent trends in Aquaculture and Fisheries**

Recent body of literature establishes that aquaculture from both inland and marine waters produced about 148 million tonnes of fish valued at US\$ 217.5 billion (FAO 2012).

In 2010 aquaculture produced 60 million tonnes with an estimated value of US\$ 119 billion. Therefore, the importance of aquaculture to developing countries as a potential driver of local and national economic development as well as for the critical role that fish can play in the food and nutrition security of people cannot be underestimated.

However, this study focused on the role of modern supply chain management practices in contributing to the availability of farmed fish in Malawi, and in the city of Lilongwe, in particular.

Hambrey, (1999) contends that aquaculture has positive impacts on other food supply sources. For example, nutrient water produced by aquaculture can help increase the creation of other species. On the contrary, Oloo Rebecca (2011) in her research paper provides negative environmental impacts associated with aquaculture. Evans, et al. (2007) advises that environmental aspects are of increasing concern due to the hasty growth and often unregulated aquaculture industry.

Previous research such as Piedrantha, (2003); Ellis & Turner, (2007) points out that aquaculture has been associated with a range of uncertainties together with habitat dilapidation, water systems that are contaminated, rises in fish diseases, and the introduction of strange species.

Ellis & Turner, (2007),’s research reveal that China’s waterways were exceedingly contaminated rendering food security a main issue for Chinese aquaculture. This justifies why modern supply chain management practices can

facilitate in alleviating the adverse environmental impact of fish farming through proper selection of site and practicing corporate social responsibility.

Generally speaking, high food prices are normally generated by food scarcity (Haddad, 2000; Timmer, 1997). By supplying fish and other products, aquaculture can absolutely affect food access by lowering the prices of seafood and hence making them more reasonably priced to consumers (Haddad, 2000; Timmer, 1997). The study concurs with Timmer (1997), and suggests that adoption of proper supply chain management methods can increase the food supply and reduce the purchase price of the fish products. However other factors like supplier's bargaining power need to be taken into consideration.

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#### **2.4 Supply Chain Management.**

Supply chain management is viewed as an emerging field of practice, it intends to link supply chain partners to maximise productivity (Finch. 2006) with the aim of enhancing sustainable competitive advantage by cost reduction without compromising customer satisfaction. (Mentzer et al .2001).

Porter, (1998) argues that sustainable competitive advantage can only be attained by performing strategically significant activities more cheaply or superior than the competitors. He further states that competitive advantage is ultimately measured by the market share that the firm holds.

On the other hand, the study notes that sustainability of the generic strategy depends to a large extent on the barriers that make imitation of the strategy difficult which can be achieved through investing in supplier relationships. Ellram and Copper (1990) ascribe that competitive advantage arise through a sequence of partnerships between firms working together and jointly share information, risks and rewards. Prescutti,(1992) suggests that organisations cannot rely only on their strategic competences and capabilities but also need to utilise capabilities of suppliers by establishing links and relationships.

On the other hand, fruitful relationships aim to incorporate network policy to elude redundancy and overlap whilst looking for a level of collaboration (Lassar and Zinn, 1995). Therefore relationship with suppliers forms a critical component in managing supply chain.

Taggar,R.and Girl, S. (2011) argues that supply chain relationships are based on either power or trust. In power based, the stronger party usually exploits the weaker one; the stronger party benefits at the expense of the weaker one.However, there is no sustainability which results in deterioration of relationship or the overall performance of the supply chain. The study equates this to traditional supply chain where emphasis is on win-lose scenario. However modern trends in SCM refute traditional supply chain which is characterised by adversarial relations, (Matthyssens and Van den Bulte, 1994; Carr, 1999). Saunders (1997;255) contends that in traditional supply chain

gains by one partner are perceived as being at the expense of the other. This philosophy can be traced back to (Porter, 1998) who suggested that firms must adopt adversarial relationship to maximise their bargaining power. Traditional relationship is the one that uses short term contracts basing on price (Leenders and Flynn, 1995).

## **2.5 Fish Farming and Economy**

A Small Medium Enterprise (SME) is any firm that is operated and controlled under direct supervision of the proprietor (Meulenberg, 2004, Bhutta et al, 2007). However The Ministry of Industry and Trade (MoIT) categorizes businesses into 'micro', 'small', 'medium' and 'large' based on employment, defining 'micro' as having 1-4 employees and an annual turnover of USD \$7143, Small enterprises are defined as firms with 5 to 20 employees and an annual turnover of USD \$7143 to \$71428. Medium enterprises are defined as firms with 21 to 100 employees and an annual turnover of \$71428 to \$357 142.

Fish farming as a form of aquaculture has been grouped among SMEs which are given much attention for the reason that they significantly contribute to the national economy (European Union, 2005).

Worthington and Britton (2006) suggest that SMEs play an important role in the economy by increasing consumer demand for specialised and customised

products. Technological improvements allow SMEs to reach global markets which erode larger firms' technological edge and economies of scale.

Knapp, G. (2013) argues that in a developing country mainly in more labour – intensive regions, fisheries provide important supplementary seasonal employment, not only that but it also supports agricultural livelihoods and may also provide a 'labour buffer' function.

Duc (2008) conducted a research with 120 farmers in Vietnam. It was established that aquaculture positively impacted Vietnam economic development as it contributed 30-40% to total national fisheries production (FAO and NACA, 1997 in Duc, 2008). Aquaculture proceeds constituted 4% of Vietnam GDP in (2003) and in 2004 the country earned \$2.35 billion from aquaculture exports, representing 10% of the country's total export revenue.

Oloo Rebecca (2011) mentioned in her study that research need to be conducted to scrutinize the role of supply chain management practices in aquaculture in creating customer satisfaction. The aim of this study was to assess the role of modern supply chain management practices in fish farming towards achieving food security and economic development for fish farmers.



## 2.6 Fish supply chain

Fig 1 Fish supply chain



### Adapted from Fispace. (2014)

The supply chain shows the full range of activities which are essential to bring a product or service from origin, through the different phases of innovation and distribution to final consumers. (Porter 1998).

Martinez et al. (2006) contends that the food chain does not just concern the supply of products but rather it is a series of interrelated flows of goods, services, inducements and information between the different stakeholders in the market chain.

Thorpe and Bennett (2004: 42) provides an elaborate definition of fish supply chain as “a set of interdependent agents (fishers, processors, distributors and retailers/fishmongers) working together, consciously or unconsciously, to convey fish derived products to the eventual consumer.

Thorpe and Bennett, (2004) argues that fish chain has advanced over time with the growth of international fish trade as well as market integration and establishment of the extended fishery zones in the 1980s. However, suppliers of aquaculture products to the retail trade face similar challenges as other food manufacturers confronted by a food retailing sector which is dominated by giant retailers operating in several countries and with strict quality, timing and labelling requirements. This fact stipulates that there is high competition between and among the fish supply chain partners.

Hanssen (1996: 27) further distinguishes fish sector from other agri-food industries. He argues that the fish sector has the added complication of supply variation and product perishability (Hanssen 1996: 27). It can be argued that due to high perishability of fish, extra care should be observed during transportation of the fish products.

### **2.7 Role of ICT in supply chain management**

The use of ICT by organizations is essential for the effective control of today's multifaceted Supply Chains. Sweeney, E (2006) argues that managing the information flow is one of the most crucial aspects because the movement of materials is initiated by information flow. Evans et al, (1993); Mason-jones and Towill, (1998) propose that effective management of materials and money in the supply chain is the direct result of effective management of information flow.

Fasanghari, et al (2008), highlight that for a Supply Chain to realize its supreme level of effectiveness and efficiency as regards to materials, money and information flows then the whole chain must be administered in an integrated and holistic manner, focusing on overall service and cost objectives.

Nedelko, (2008) suggests that Information and Communication Technology (ICT) is a hub aimed at cybernetic organization of supply chain. He further suggests that ICT connects dispersed supply chain participants. For example in the fish farming business where there is a wide geographical spread between the fish farmers and the customers. ICT can help in coordinating flow of information and materials amongst the supply chain partners.

Davidow and Malone, (1995) provides significant features and advantages of virtual organization which include ability to link globally dispersed members of virtual organization and collaboration. Warner and Witzel, (2004) also add that it facilitates the exchange of transactional data between members of virtual organization. In this case there may be greater collaboration between the customers and suppliers.

Simchi-Levi et al., (2003; 267), assert that the purpose of Information technology in SCM is to provide information which facilitates a distinct point of

contact of data; thereby decisions are grounded on total supply chain information and collaboration.

Lee et al. (1997) also emphasise that when supply chains are coordinated by ICT it results into minimised bullwhip effect among all the players in the supply chain.

Bowersox and Daugherty (1995); Walton and Gupta (1999) suggest that ICT is vital in supporting companies to create strategic advantage by enabling integrated strategic planning with day-to-day centralized processes. Information sharing between supply network partners is necessary for reaching operational agility (Bruce, M., Daly, L., Towers, N. 2004).

Pokharel, (2005), suggests that the use of ICT is absolutely connected with enhanced organizational performance. However Snider et al., (2009); Welker et al., (2008) contend that ICT systems do not always result in improved performance. These conflicting views leave a theoretical gap which needs to be addressed to develop a fuller understanding of the role of ICT in supply chain management (Hoek, 2001).

However, the researcher suggests that ICT is an originator of cooperation providing a steady platform for inter-organizational collaboration thus between producers, distributors, retailers and consumers.

## **2.8 Supply chain collaboration/ integration**

Anderson and Lee (1999) assert that effective supply chain integration and harmonization can reduce excess inventory, reducing lead time and increase customer service. Kumar (2001) advocates that collaborative supply chains surpass mere exchanging and integrating of information between buyers and suppliers, rather it encompasses strategic joint decision making about partnerships and network design. Water et al (2001) concur with Kumar (2001), that high performing collaboration focuses mainly on relationship building.

Quinn (1999) suggests that benefits of supply chain collaboration are influenced by the degree of goal alignment between trading partners. Karahannas and Jones (1999) also depict trust as a prerequisite for organisation to realise greater benefit from collaboration in the supply chain.

Kampstra, et al (2006) argues that the key to achieving improved relationships will come through better understanding of the ways in which entities in supply chains work together. Cox (1995) provides the implication of managing contractual relationship by offering a continuum from adversarial leverage to

strategic supplier alliance. Lysons and Farrington (2008) suggest that the imminence of the buyer-supplier relationship influences and can be influenced with operational factors for example, number of suppliers, length and type of the supply contract and amount of information as well as the level of supplier development offered by the purchaser.

Copper et al (1999) highlight the importance of working together in supply chain in order to successfully formulate appropriate strategy in a particular customer or supplier situation. Lawson, R.H. (2003) concurs with Copper et al (1999) by suggesting that supply chain advocates the alignment and integration of key business processes across the entire supply chain emphasising on efficiency, responsiveness and agility. However, the researcher observes that commercial relationships may vary widely in their intensity, mutuality, trust and commitment hence the type of integration depends on the contingencies of the situation.

Gagalyuk *et al*, (2009) in their paper evaluate that increasing pressure from consumers for high quality, safety, and environmental sustainability of seafood products as well as the demand for continuous supply are the prominent driving forces of vertical cooperation in the fisheries sector.

The researcher observes that vertical cooperation between the fish farmers and consumers cannot be made possible without tackling supply chain network.

Humphries and Mena, (2003) argue that supply network is a set of interrelated supply chains encompassing both the upstream and downstream co-operative relationships. Harland and Knight, (2005) assert that supply chain networks are formed to stimulate and satisfy end customer demand through introduction of innovative products, services and network structures particularly in a global dynamic environment.

Omta et al. (2001) characterise supply network as long term and continuing relationships among more than two supply chain partners. They also symbolize multilateral coordination and address more than just the goals of individual business (O'Toole 1997). Therefore supply chain networks are strategic, goal-oriented networks that have strategic importance for organizations establishing them (Gulati et al. 2000; Provan and Kenis 2007).

Gagalyuk *et al*, (2009) further suggest that issues of quality, safety and sustainability together with goals of the individual network partners need that supply chain networks are properly managed. They further argue that understanding of how to manage a supply chain network successfully can be achieved only if one understands what the success of supply chain network is.

Their paper focused on developing and testing the model of supply chain network success for the firms that play a part in the fish supply chain networks.

## **2.9 Customer Relationship Management (CRM)**

Customer Relationship Management (CRM) is a business approach, which aims at securing new customers and maintaining existing ones to increasing competitive advantage. Lysons and Farrington (2008) argue that all the processes in the supply chain must produce value to the ultimate customer. This highlights the importance of satisfying the customer in the supply chain. Khalid Rababah (2011) ascribe that knowing customers enables firms to serve them better and keep them loyal to the organisation. Nguyen, J (2007) concurs with Khalid Rababah (2011), describing CRM in the organisation as essential in eliminating obstacles in its implementation. Chang, H (2007) argues that CRM combines marketing efforts, business processes and technology which help the firm in knowing its customers.

On the other hand, Kincaid (2003), observed CRM as a strategic device that handles customer relationship during customer life cycle. Hence, it integrates technologies to satisfy the requirements of the customer (Buttle, F 2004). Pan, S.L and Lee, J.N(2003); Romano, N.C (2000), Romano, N.C (2003), propose that CRM plays a critical role in attaining profit customers and removing economical unviable customers.



The researcher suggests that gratifying the needs and requirements of the customer is a major part of the whole supply chain.

### **2.10 Relationship Between supply Chain Management and Profitability**

Generally, supply chains can be categorised into three, lean, agile and hybrid supply chains. Lean supply chain aims at continuous improvement of processes to eliminate waste or non-value adding activities (Lysons and Farrington 2008). It is argued that lean supply chain can offer higher profits and internal manufacturing efficiency. Lamming (1996) considers lean supply chain as an arrangement which provides a flow of goods, services and technology from the supplier to the customer without waste. Goldsby et al (2006) assert that the objective of lean supply chain is to produce the right amount of goods at the right time.

Bruce, et al (2004), emphasises that increasing customer value can only be achieved from cost reduction on the supply side. They further suggest that waste is hugely expensive, the more accurate the demand forecast the greater the profitability.

Mohammed et al, (2008) concur with Lamming (1996) that it is necessary to eliminate muda in the supply chain. On the other hand Brown and Bessant (2003), Prince and Kay (2003) attribute agile supply chain as more responsive

to changes in the market. Christopher (2000) extends the concept of agility into logistics.

Naylor et al (1999) summarise that leanness aims at creating the value stream to eliminate waste while agility depends on the use of market knowledge and virtual corporations to get match from the rapidly changing market opportunities.

In attempting to eliminate all non-value adding activities the researcher suggests JIT philosophy which is a concept concerned with the reduction and elimination of waste.

JIT as demand led system is known as a pull system. There is a greater certainty, deliveries and storage can be accurately planned, aims at reducing supplier lead times and buyer stockholding (Lysons, K. and Farrington, B. 2006). It is based on positively inventory management policy. However optimum performance is achieved unless suppliers hold inventory of the required component.

Slack, et al (1998) state that responsive suppliers are required for JIT to work effectively. In addition Lysons, K. and Farrington, B. (2006), highlight that JIT

provides the best current application of stock control systems but rely heavily on management commitment and technology to make the operation work.

Singhal, R. V (2005) suggests that excessive inventory holding diminishes organisation's profitability. As such, stock control ensures that an organisation does not carry too much inventory nor run out of stock. Raman (1997), Fisher (1997), Lee et al. (1997), Radjou (2002) state that excessive inventory has a negative impact on supply chain performance hence affect organisation's profitability.

The researcher suggests that consignment stocking system can help organisations in improving their cash flow problems at the same time eliminating opportunity cost of storage. Similarly, vendor managed inventory which delegates responsibility to the suppliers to store and manage the buyer's inventory within the acceptable framework (Lysons and Farrington, 2006). This helps in freeing administration time to focus on more strategic activities.

Sarch & Allison, (2000) argue that managing fish stocks need understanding of distribution chains. Distribution of fish and fish products is also another important element which affects the profitability of the fish farming venture. For example, the movement of fingerlings from source of supply to the ponds as

well as transporting mature fish to the customer considering the perishability of the product.

Distribution can be seen as a complex business area encompassing a wide variety of individual functions which include storage and transportation. Baker (2003) describes distribution as the Cinderella of marketing that is based on the marketing mix concept where distribution forms part of the place.

Lysons and Farrington, (2006), Slack, et al (1998) suggest that the role of distribution has been elevated particularly due to increased global competitiveness with the growth of ICT. Organisations are working towards cost reduction and gains in both efficiency and effectiveness (Lysons and Farrington, 2006). Organisation can attract additional customers by offering better services or lower prices through distribution improvements.

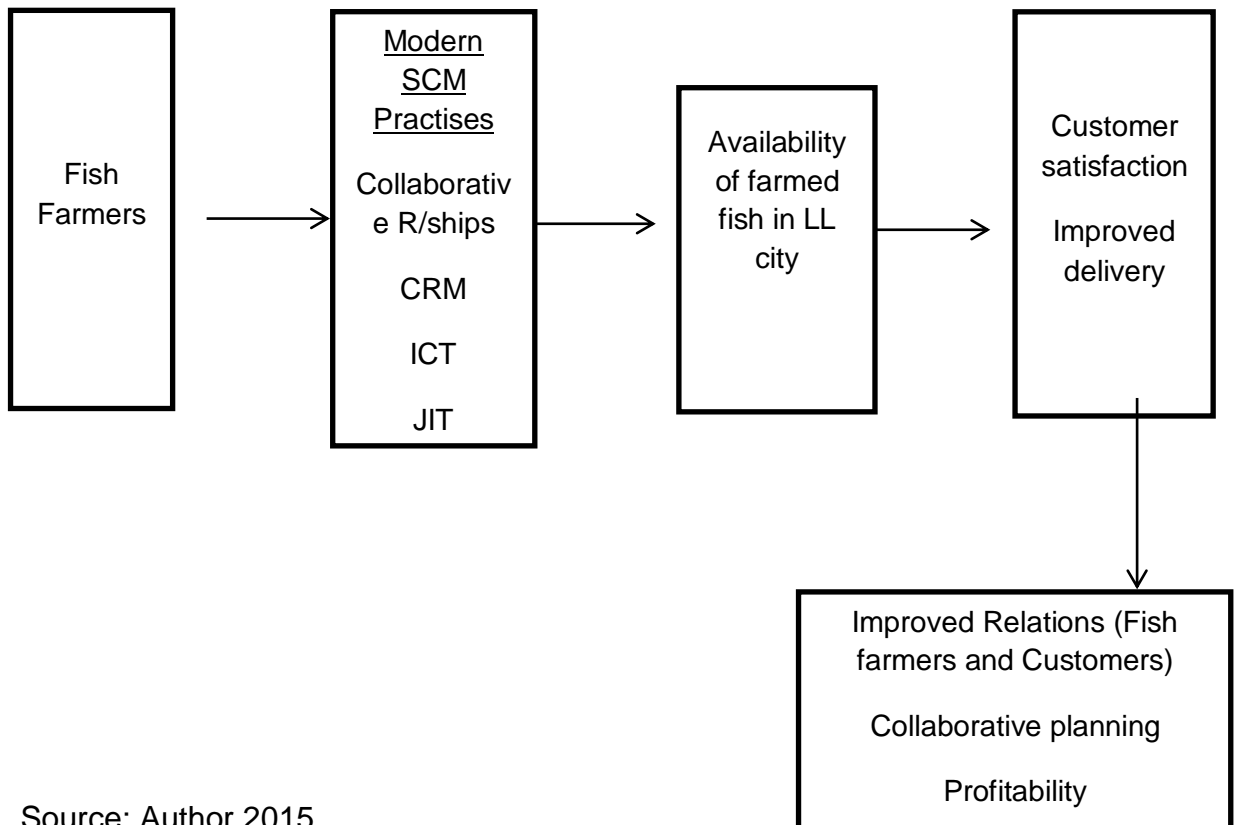
The researcher suggests that storage and distribution should not function in isolation but rather should form an integral part of organisation logistics strategy. Coyle, et al, (1992) suggest that logistics is the process of planning and controlling the efficient flow of goods and related information from point of origin to the point of consumption. However there are scenarios when goods flow in the opposite direction. This is referred as reverse logistics, with the purpose of improving customer service offering and gaining from return of

usable stock. Hughes, (1999) highlight that the prime objective is to minimise the on-cost of handling, while maximising the value from the disposal.

Schonberger, R. (2010) argues that logistics implies that just sufficient quantities should be made to meet immediate needs. Therefore, appropriate use and implementation of logistics within organisation's strategy can cut costs, speed up work as well as provide a basis for improvements in effectiveness and efficiency and improve customer service.

## 2.11 Conceptual Framework.

Fig 2, Conceptual Framework



Source: Author 2015

If the fish farmers adopt the modern supply chain management practises it will lead to increases availability of farmed fish in Lilongwe city which ends up satisfying customer demand and in return there would be improved relationship between the fish farmers and customers as well as collaborative planning which might increase profitability of fish farming venture.

## **2.12 Conclusion**

The literature review has explored that modern supply chain management practises has an influence in the fish farming sector. Therefore further research is required to explore how adopting initiatives like supply chain integration, information and communications system (ICT), customer relationship management (CRM), Vendor Managed Inventory (VMI), JIT principles and lean supply chains can help in addressing supply chain challenges in the fish farming sector. Effective management of the supply chain can improve the supply of farmed fish of the right quality, in the right quantities in a cost effective manner.

## **Chapter 3: Research Methodology.**

### **3.1 Research Paradigms**

Saunders, (2003) defines a research paradigm as a way of examining social phenomena from which specific understandings of these occurrences can be gained and explanations can be attempted. Collins and Hussey (2003:47) suggest that it guides how the research should be conducted as well as it comprise accepted set of theories and techniques of defining data.

### **3.2 Positivism paradigm**

It seeks facts or causes of social phenomena with little regard to subjective state of the individual. Assume that social reality is independent of human behaviour (Saunders et al. 2003). The researcher is independent of what is being researched; reality is singular and unbiased (Creswell 1994:5). The core belief of positivism is that knowledge is based on science. Saunders et al (2003) elaborate that under positivism paradigm the researcher is concerned with facts rather than impressions. Such facts are consistent with the conception of 'observable social reality' which is comparable to that engaged by the physical and natural scientists.

Saunders et al. (2003), also suggest that under positivism philosophy the study is undertaken in a value-free way. The researcher is deemed to be external to the process of data collection in the sense that there is little that can be done to alter the substance of the data collected. In other words it assumes that the



researcher is sovereign of and neither affects nor is affected by the subject under study (Remenyi et al., 1998:33).

### **3.3 Interpretivism paradigm**

Saunders et al. (2003), argue that Interpretivism originates from two intellectual traditions namely; phenomenology and symbolic interactionism. Where the latter refers to the way in which humans make sense of their world around them while the former, advocates that humans are in a continual process of inferring the social world around them. Hence they interpret the actions of others with whom they interrelate and this understanding leads to fine-tuning of meanings and actions.

They further suggest that it is critical under Interpretivism for the researcher to embrace an empathetic stance. On the other hand they recognise the challenge for the researcher to enter into the social world of their research subjects and understand their world from their perspectives (Saunders et al 2003). It is also important to note that, the interpretivist would contend that generalizability is not of crucial importance because of relentlessly changing sphere of business organisations. Bearing in mind that if we accept that current circumstances may not entirely apply in the future as well as that all organisations are unique then generalisation is less valuable (Saunders et al 2003).

Therefore Interpretivism will tend to focus on interpretive understanding and not making laws. Researcher believes that to experience is the way to gain knowledge Saunders et al. (2003) and Neumann (1997) suggest that it is a schematic analysis of socially meaningful action through which the direct observation of phenomena in natural settings helps the researcher to draw understanding of how people create their social worlds. (Neumann 1997).

### **3.4 Research approaches**

#### **3.4.1 Qualitative approach**

It is based on meanings conveyed through words rather than numbers. It's subjective; scrutinizes perceptions, opinions to comprehend social and human activities, falls under Interpretivism paradigm. Data collection, for example, is by ethnography. (Saunders et al. 2003).

#### **3.4.2 Quantitative approach**

Baker (2003:21) regards quantitative approach as robust leading to actionable results and recommendations.

Involves collecting and analysing numerical data which is quantified to help the researcher in answering the research question, It's under positivistic paradigm.

### **3.4.3 Triangulation**

The use of multiple research methods, (Saunders et al. 2003).

Mixed model research combines both quantitative and qualitative approaches at other phases of the study such as research question generation. This means that quantitative data can be qualitisied, thus, altering it into narrative then evaluated qualitatively. On the other hand one may quantities the qualitative data, converting it into to statistical codes so that it can be statistically analysed. (Saunders et al. 2003).

Saunders et al. (2003) further suggest that mixed methods provide an opportunity for triangulation to take place. For instance, semi-structured group interviews may be a valuable way of triangulating data collected by a questionnaire.

Smith, (1975), reveals that quantitative and qualitative data collection techniques and analysis procedures do have their own strengths and weaknesses. The results of the research is likely to be affected by the methods and procedures employed in the study, since different procedures will have different effects, combination of qualitative and quantitative data collection techniques will cancel out the 'method effect' there by leading to greater

confidence being placed in conclusions emanating from the study (Saunders et al. 2003). .

In assessing the role of modern SCM practises in fish farming the researcher adopted mixed model study so that comprehensive knowledge on the impact of modern SCM on availability of farmed fish in Lilongwe city could be exploited. The use of multiple data collection tools helped the researcher in ensuring that the study addressed key issues by eliminating the 'mode effect' (Saunders et al. 2003).

For example large samples which are used in quantitative study helped the researcher in providing the true reflection of the supply chain challenges faced by fish farmers. In other words, the researcher would be able to generalize the research findings. For example the recommended solutions would be applied in other areas where there are SCM challenges.

Similarly, opinionated data which is mainly used in qualitative approach increased validity, and confidence level and the quality of research results.

### **3.5 Research Strategies**

Since the preferred approach is a mixed model case study and survey strategies have been considered.

#### **3.5.1 Case study**

Scrutinizes a single instance of some broader class of phenomena to generate a rich understanding of what is being researched. It's an empirical enquiry that investigates a contemporary phenomenon taking place with a real life context, particularly when the boundaries between the phenomenon and context are not clearly defined (Yin, 1989).

Sekeran (2003) contends that a case study allows the researcher to give a holistic account of the subject under study. He further states that it enables the researcher to focus on the interrelationships between all the variables, such as groups, people, technology and policies that make up the case studies. Most importantly it uses a variety of research methods and can well accommodate qualitative material and quantitative data.

However, he quickly points out that case studies certainly lack representativeness. The researcher cannot claim that what happened in one case is typical of all cases rather in many occurrences the power of the case study lies in its capacity to provide understandings and resonance for the reader (Sekeran, 2003).

Watson. T, (1994) provides a different view, in the sense that case studies do enable generalisations but are rather theoretical generalisations and not statistical generalisations which are used in surveys (Yin 1994: 10, 30–32).

### **3.5.2 Survey strategy.**

Aims at producing generalisations about populations by gathering information from samples, (Saunders et al. 2003). It allows collection of large amount of data from a sizeable population in a highly economic way by using a questionnaire instrument. Sekeran, (2003), suggests that random surveys of a suitably large sample allow the researcher to control what is average and the variations around the average to a definable level of statistical confidence. The data collected through the survey is standardised which allows easy comparison between variables (Saunders et al. 2003). In addition, the survey strategy is perceived as authoritative by people in general and is both comparatively easy to explain and to understand.

Furthermore, survey strategy also allows the researcher to scrutinize the connections between the variables measured in the study and to establish whether any associations or correlations are significant or just random effects (Saunders et al. 2003). Surveys require the researcher to distinguish, in advance of the study, the phenomena that are to be studied from the contexts that influence or affect the phenomena.

However, surveys therefore are not efficient means of studying the complexity of things in particular.

Survey strategy has been chosen because it allows the researcher to collect large amounts of data from a sizeable population in a highly economical way using a questionnaire. Since the data collected can be standardised it is easy to compare the variables and deduce meaning from the findings.

### **3.6 Population and sampling**

#### **Population of the study**

The population for this study comprised 80 fish farmers in Lilongwe city. . Saunders et al. (2003:206) suggest that where it would be impracticable for the researcher to collect data from the entire population, then the researcher can select a sample from that population. They further argue that sampling saves time, which is an important consideration when the researcher has tight deadlines as administration of data collection is more controllable as fewer respondents are involved.

Sekeran, (2003:266), describes a sample as a subset of a population, generally contains some members selected from it, which enables the researcher to draw

conclusions about the entire population by studying the sample and hence generalize the results to the entire population.

Saunders et al. (2003) provide two sampling methods; probability and non-probability sampling. In probability sampling, each member of the population has a known likelihood of being selected. Methods used include simple random sampling, stratified random sampling, and cluster sampling.

It follows that the sample drawn should be representative of the whole population where the study has an interest (Kumar 2005).

Non-probability sampling is based on the researcher's subjective judgement. It includes judgement sampling, convenience sampling. However it is prone to bias.

This study adopted a simple random sampling. The following elements were taken into account, the size of the sample, relevant population, sampling frame, as well as the cost. To provide truthful and reliable results the study adopted the below formula in determining the sample size (Sample Size Table 2006).

$$SS = \frac{Z^2 * P * (1-P)}{C^2}$$



- Where = Z Value (1.96 = confidence level 95%)
- P = percentage picking a choice, expressed as a decimal (0.5 Given used for sample size needed)
- C= confidence interval, expressed as decimal ( 0.1 or 10% = +or-10 )

$$\text{Calculations} = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.1^2}$$

$$\frac{0.9604}{0.01}$$

$$= 96.04$$

$$= 96.04$$

Sample Size – Finite Population (where the population is less than 50,000)

$$\text{New SS} = \frac{\text{SS}}{(1 + (\text{SS} - 1)) \text{ Population}}$$

$$\text{Calculations} = \frac{96.04}{1 + (96.04 - 1)}$$

$$\frac{96.04}{2.188}$$

$$= 43.89$$

= 44

Sample size of 44.

This gave a true reflection on challenges of SCM in fisheries sector in the said area.

### **3.7.0 Data collection**

#### **3.7.1 Questionnaire**

A questionnaire was used to evaluate SCM challenges affecting the supply of farmed fish (See appendix 1). The questionnaire also tested the role of modern SCM practises in fish farming. The questionnaire was distributed to a sample of forty four practising fish farmers.

A questionnaire was preferred because it saves the researcher's time since large sample was used and it provided standardised data which was quantified to provide valid results.

The questionnaire was complemented with structured interviews. (In appendix 1)

### **3.7.2 Pilot testing**

The researcher pilot tested the questionnaire. The questionnaire was delivered to ten practising fish farmers who were randomly selected. This helped in refining the questionnaire for easy understanding of the questions and to increase validity.

### **3.7.3 Data Collection**

The study used primary data which was obtained from original source being investigated (Saunders et al, 2003). Due to insufficient literature, primary data has been more useful in order to come up with appropriate recommendations.

### **3.7.4 Proposed approach for gathering primary data.**

- a)** Questionnaire was delivered by hand to forty four respondents and they were requested to complete the questionnaires.
  
- b)** Respondents were assured of confidentiality and encouraged to answer the questionnaires as honestly and accurately as possible.

### **3.8 Data Analysis**

“Data analysis is the process of bringing order, structure and interpretation to the mass of collected data” (Marshall & Rossman 1999:150). Quantitative data collected was analysed using Microsoft Excel. The results were further simplified by the use of diagrams, tables and graphs.

On the other hand, opinionated data was analysed basing on classifications that were set from emerging themes. This enabled description of patterns and their relationships. This enabled the researcher to compare components of data and identify relationships (Saunders et al, 2003).

### **3.9 Research Validity**

The research findings should represent accurately what is happening in the situation and a likelihood of obtaining the same results if the study is repeated. (Saunders et al, 2003). However credibility of the researcher depends on training, experience and the presentation itself. This study used external validity which involves establishing the domain to which the study’s findings can be generalised. (Yin 1989). The results would be generalised because the study has population validity due to randomly selected fish farmers and large sample

size for Lilongwe city which would allow meaningful statistics (Saunders et al, 2003).

### **3.10 Research Ethics**

To ensure that the aim of the research is achieved, the following guidelines will be followed.

1. Confidentiality – their identity, organization, age, were kept secret.
2. Consent – was sought from respondents before embarking on interviews.

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## Chapter Four: Data analysis and interpretation

### 4.0 Introduction

This chapter presents findings from data collected through questionnaires and an analysis on the assessing the role of contemporary supply chain management practices in Fish Farming towards the availability of farmed fish in Lilongwe city.

Questionnaires were distributed to the designated population. Quantitative data have been presented using tables and diagrams to illustrate the results of the findings.

#### 4.1.1 Demographics

Table 1.presents the demographics of the respondents.

**Table 1. Demographics**

Category	Number of Respondents	Percent %	Valid Percent %	Per
<b>Age of Respondents</b>				
Below 20 years	1	2	2%	
21-30 years	9	21	21%	
31-40 years	9	20	20%	
41-50 years	14	32	32%	
Above 50 years	11	25	25%	
<b>Gender of respondents</b>				
Male	30	68	68%	
Female	14	32	32%	

**Source: Field Data 2015**

From the gender perspective 68 percent of the respondents were male fish farmers while 32percent of the respondents were female, though the Malawi government promotes gender equality the results revealed that fish farming

business is mostly dominated by men. However 32percent of female fish farmers indicate that women are not entirely ignored in this particular business venture.

The age of the respondents was particularly important in this study because it indicated that fish farming was adopted by different age groups and therefore the responses would be a representation of fish farmers in the age groups.

#### 4.1.2 Experience in fish farming

Table 2 presents the experience in years of the fish farmers in the fish farming sector in Lilongwe.

**Table2. Experience in fish farming**

<b>Experience in Fish Farming</b>	<b>Number of respondents</b>	<b>Percent %</b>	<b>Valid Per cent %</b>
0-5 years	9	21	21
6-10 years	26	59	59
10+ years	9	20	20

**Source: Field Data 2015**

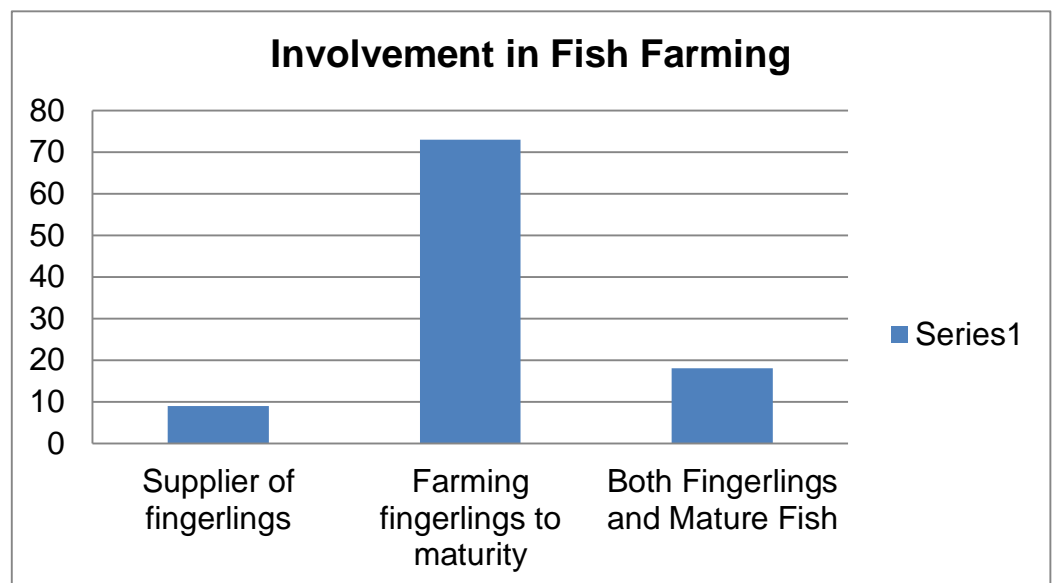
The study also aimed at exploring experience level of the fish farmers in the fish farming sector based on the general principle of the learning curve effect whereby the more the experience the higher are the chances of reducing the costs of the business operations. The study revealed that twenty one percent of the respondents had below five years of experience suggesting that they had just begun their fish farming business. It was also revealed that fifty nine percent of the farmers had more than five years' experience in fish farming but not more than ten years. Only twenty percent of the respondents had more than ten years' experience in fish farming.

### 4.1.3 Involvement in Fish Farming

The following chart presents farmers involvement in the fish farming business.

**Fig 3.**

Involvement  
in Fish  
Farming



**Source: Field Data 2015**

Under fish farming business an organisation may involve itself either selling only fingerlings or selling mature fish to the market, or both. The study revealed that 73 percent of the respondents sold mature fish, while 18 percent sold both fingerlings and mature fish. On the other hand 9 percent focussed on the selling fingerlings. This indicates that most of the fish farmers sold mature fish however they failed to meet the required demand in Lilongwe city.



#### 4.1.4 Environmental Management

In the literature review chapter it was advised that environmental aspects are of increasing concern due to the hasty growth and often unregulated aquaculture industry which often results into contaminated water systems together with habitat dilapidation. The study further explored if the fish farmers were aware of the negative environmental aspects of fish farming and how they dealt with waste management.

**Table 3. Negative Environmental aspects in Fish Farming**

<b>Negative Environmental aspects in Fish Farming</b>	<b>Number of respondents</b>	<b>Percent %</b>	<b>Valid Percent %</b>
Yes	31	70	70
No	13	30	30

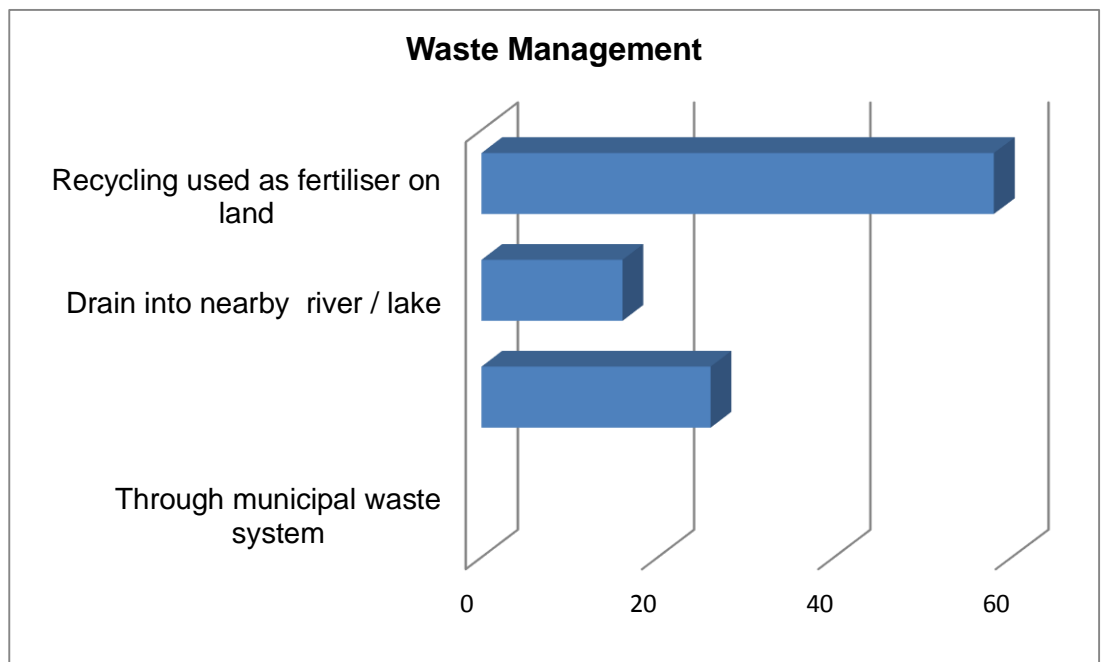
**Source: Field Data 2015**

It was revealed that 70 percent of the respondents were aware of the negative environmental aspects of fish farming while 30 percent of the respondents were not aware. It can be argued that effective public awareness initiatives regarding fish farming and its impact on the environment should be promoted so as to reduce negative environment impacts caused by fish farming.

#### 4.1.5 Waste Management

With the increasing pressure by the world community for ethical considerations as regard to disposal of effluents emanating from fish farming operations, the study also explored how the fish farmers managed waste which emanated from their fish farms. Figure 4 below presents the findings.

**Figure 4. Waste Management**



**Source: Field Data 2015**

The study revealed that 58 percent of the fish farmers recycle their waste from the fish farms, while 26 percent of the farmers use the municipal waste system as a way of waste management system and 16 percent of the farmers used the rivers as an outlet of fish farms waste.

It is imperative to caution fish farmers that improper waste management strategies will lead to habitat dilapidation for example the farmers who use the rivers or lakes as outlets for fish farm waste, not only that but is also violates

ethical principle specifically on the environment which mandates that enterprises to safely dispose waste (ISO 1400). This brings as to understanding that 16 percent of the fish farmers do not adhere to ethical principles as stipulated in ISO 1400 environmental standard. Therefore, there is a need to raise awareness on the importance of proper waste management in fish farming.

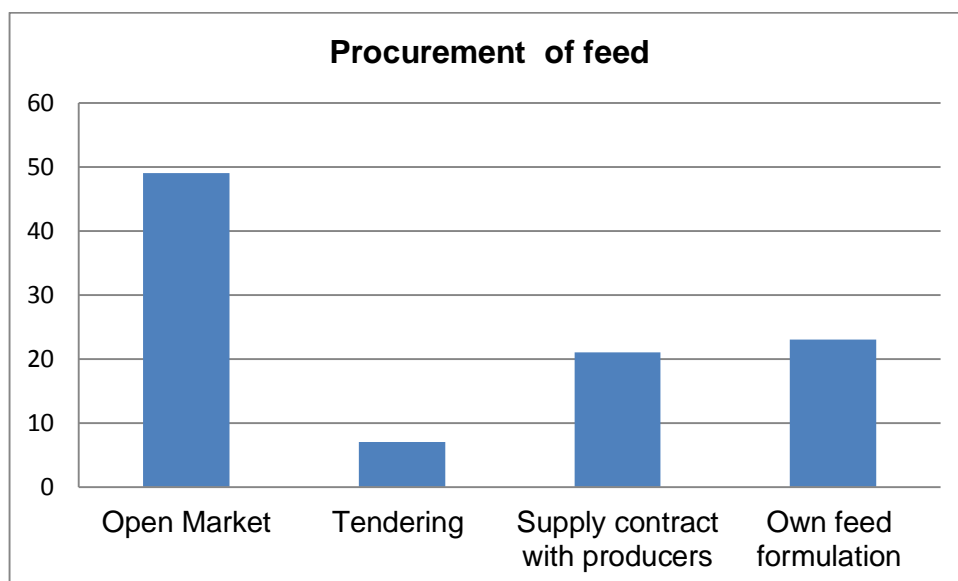
#### 4.2.0 Supply chain aspects in fish farming

Generally, fish supply chain can be referred as a set of interdependent agents (fishers, processors, distributors and retailers/fishmongers) working together, consciously or unconsciously, to convey fish derived products to the eventual consumer (Thorpe and Bennett (2004: 42).

#### 4.2.1 Procurement of Feed

The respondents were asked on the methods which they use to obtain feed for their fish farms, Figure5 summarises the findings.

**Figure 5 Procurement of feed**



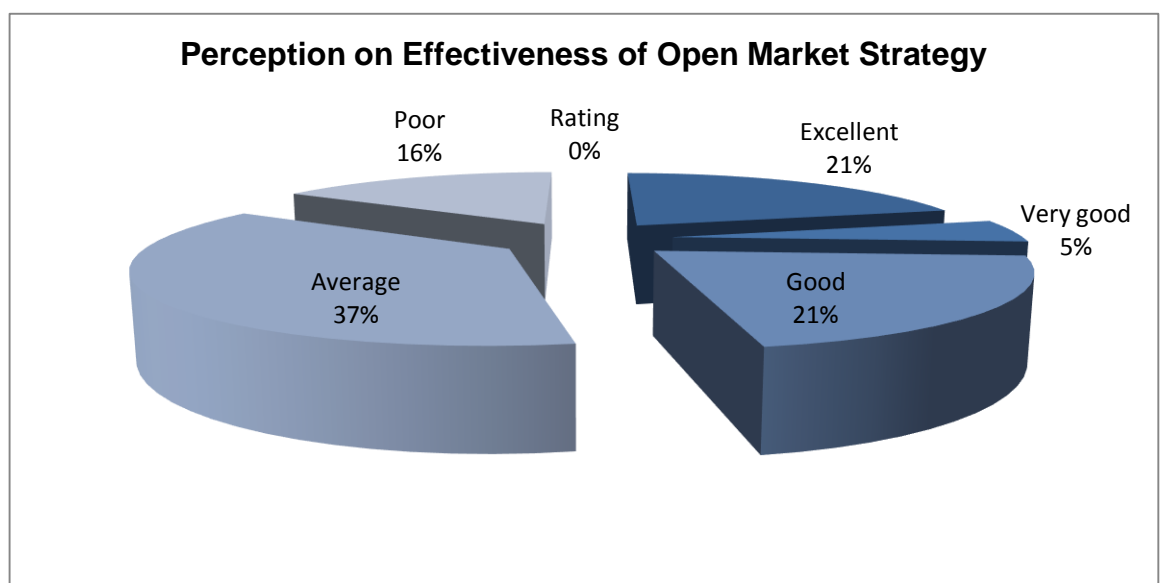
**Source: Field Data 2015**

It was revealed that forty nine percent of the respondents used open market as their procurement strategy to procure fish feed, while 23 percent of the respondents preferred in-house making of (home-made) feed unlike using the ready produced feed. On the other hand, 21 percent indicated that they had contractual relationship with feed producers who replenish their feed stock once they have reached a reorder level. Similarly, 7 percent of the respondents used tendering once they need replenishment of feed.

These findings show that the farmers need to be aware that the method of procuring the materials has a direct relationship with the cost of production and its associated profits of the business venture.

**4.2.2 Perceptions on Effectiveness of Procurement Strategies**

The study went further to explore the perceptions of the farmers on the effectiveness of each of the procurement strategy that was used. Figure 6 presents the views of the farmers on the appropriateness of each the procurement strategy.

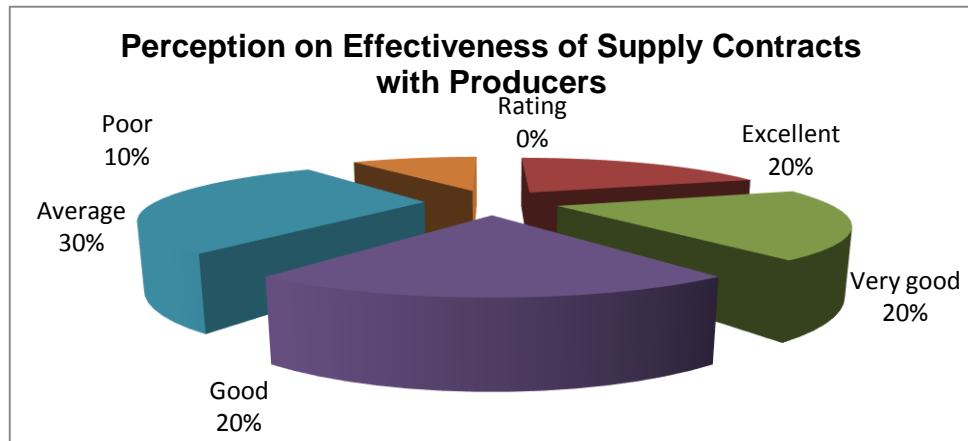
**Figure6 Perceptions on Effectiveness of Open Market Strategy**

**Source: Field Data 2015**

The study revealed mixed reactions on the effectiveness of open market as a procurement strategy for their fish farming needs as 21 percent rated it as excellent, 5 percent rated it very good , while another 21 percent of the segment rated the strategy as good while 37 percent considered it to be average and 16 percent rated it poor.

A similar approach was taken in evaluating the effectiveness of supply contracts with the producers of feed. Figure 7 presents the findings.

**Figure7 Perception on Effectiveness of Supply Contracts with Producers**



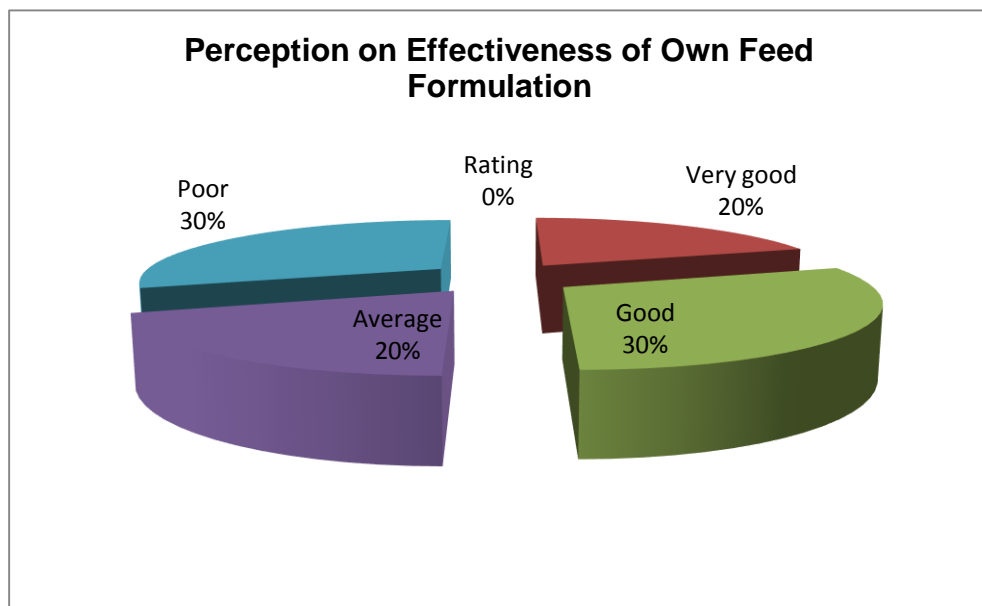
**Source: Field Data 2015**

Amongst the respondents who had supply contracts with producers of feed twenty percent of them perceived this method as excellent, while another twenty percent rated it as very good, another twenty percent of the segment rated this

method as good, on the other hand thirty percent of the respondents rated it as average and ten percent considered it to be poor.

Similarly the segment which made their own feed was also asked on their rating of the method which they used. Figure 8 presents the findings.

**Figure 8 Perception on Effectiveness of Own Feed Formulation**

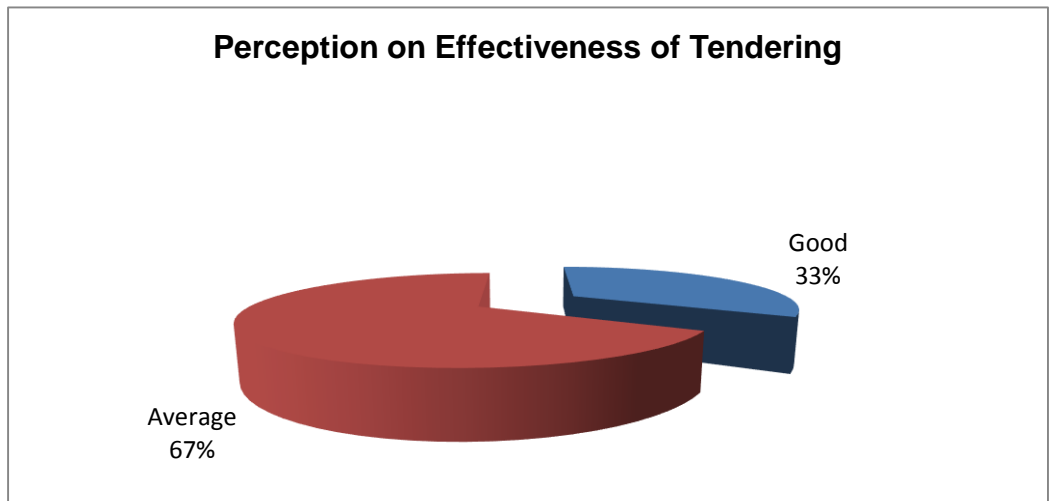


**Source: Field Data 2015**

Amongst those who formed the feed, twenty percent rated it very good, thirty percent rated it good another twenty percent of the segment rated it average and thirty percent of the segment perceived it to be poor.

Furthermore those who used tender were also asked to rate its appropriateness in acquiring feed for their fish farms. Figure 9 presents the findings;

**Figure9 Perception on Effectiveness of Tendering**



**Source: Field Data 2015**

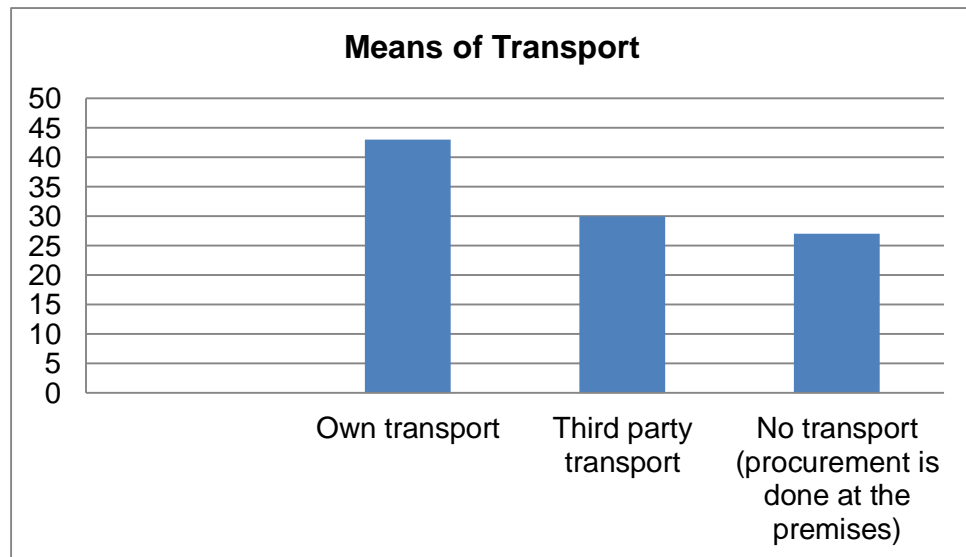
It was revealed that thirty three percent perceived it to be good while sixty seven percent rated it to be average.

These mixed reactions indicated that in fish farming, the procurement strategies which were used to purchase feed needed to complement each other.

### 4.3. Means of Transport

Basically transport is considered as one of the fundamental elements in supply chain, though when used unnecessarily it is regarded as a waste. Figure 10 presents findings on the means of transport for inputs into fish farming.

**Figure 10 Means of Transport**



**Source: Field Data 2015**

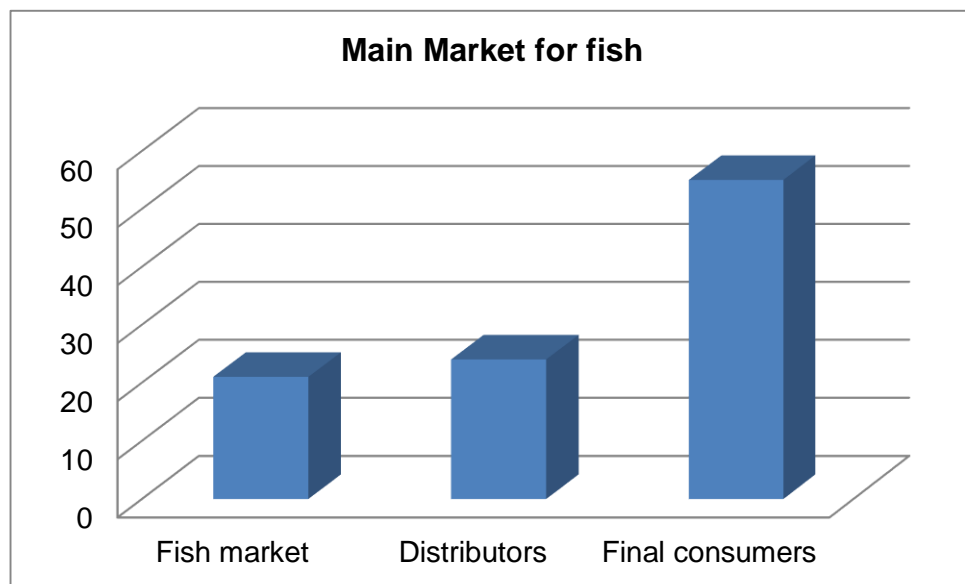
The study revealed that 43 percent of the respondents had in-house transporting facilities while 30 percent used third party logistics providers for their requirements, similarly 27 percent highlighted that procurement was done at their premises. It ought to be remembered that transport element forms great part on the total cost of acquisition (Slack, et al.1998) and, the choice of whether to choose in-house logistics facilities or to use special logistics providers need careful attention since it has a total bearing on the overall costs of production.



### 4.3.1 Main Market for fish

The study also explored the main market for the fish; Figure 11 presents the findings.

**Figure11 Main Market for fish**



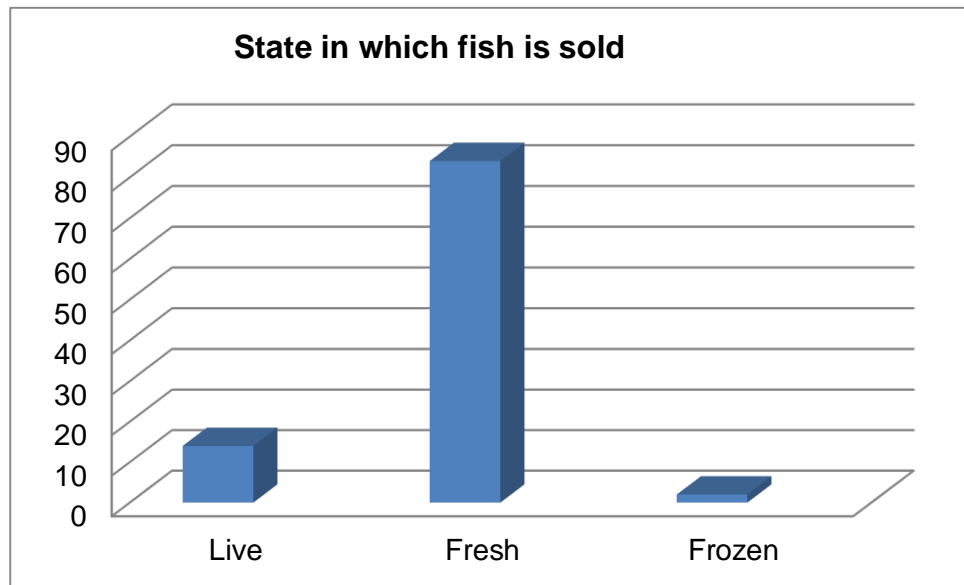
**Source: Field Data 2015**

It was revealed that 55 percent of the total production output of the farmed fish was sold to the final consumer specifically those who dwelt near the fish farm while 24 percent of the fish was sold to distributors who were also regarded as middlemen and 21 percent of the fish stocks were brought to the fish market. This indicates inability of the fish farmers to bring the farmed fish to the market thereby incapacitating the supply of farmed fish.

### 4.3.2 State in which fish is sold

It was imperative to know in which form they were sold especially considering high perishability of fish. Figure 12 presents the findings.

**Figure12 State in which fish is sold**



**Source: Field Data 2015**

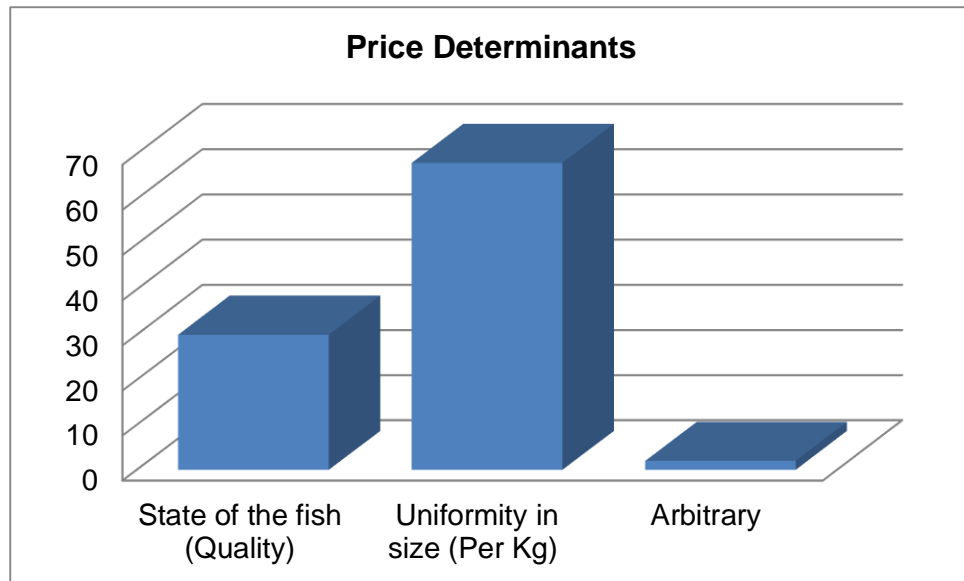
Generally, there are several forms in which fish and fish products can be brought to the market. For example they can be sold live, fresh, frozen, salted and smoked.

The study revealed that 84 percent of the respondents sell fresh from pond fish, while 14 percent of the farmers sell live fish, and only 2 percent of the respondents sell frozen fish. The higher percentage on the sale on fresh fish suggests lack of key equipment that can be used to process or preserve the harvested fish. It also indicates that other forms in which fish can be sold have not been fully exploited by the fish farmers.

#### 4.3.4 Price Determinants

In as far as matching supply and demand is concerned, price of the product plays a critical role. The general principle states that when the supply is higher than the actual demand then the price of the product falls; similarly when the demand is high but the supply is low the price of the product increases assuming all factors are held constant. In light of the above principle figure 13 presents a summary on how prices are determined by the fish farmers.

**Figure13 Price Determinants**



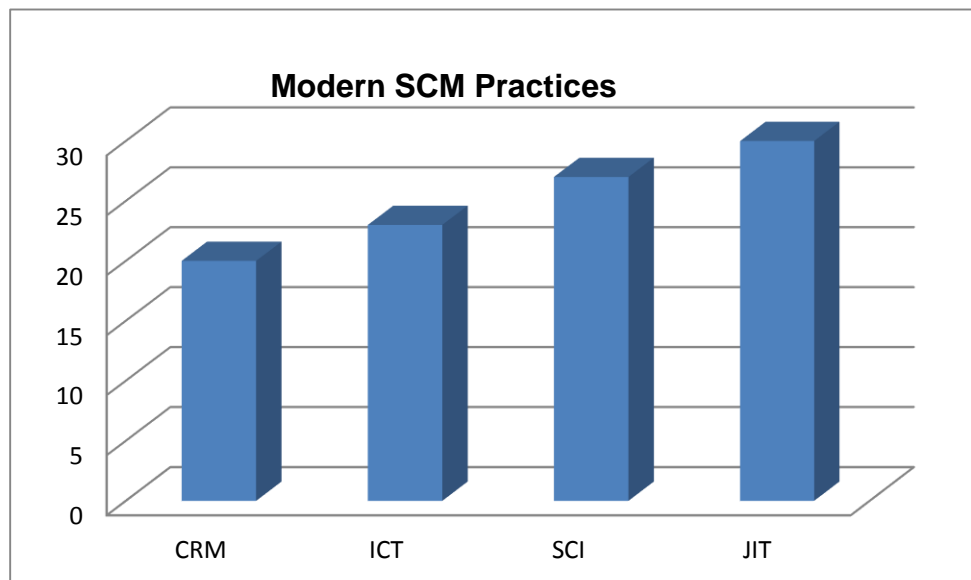
**Source: Field Data 2015**

The study revealed that 68 percent of fish farmers determined the prices on which to sell their fish basing on the size of the fish or depending on the weight of the fish, while 30 percent of the respondents used quality of the fish as there sole determinant of price. However 2 percent of the fish farmers set their prices arbitrary. It ought to be remembered that pricing of products or services has a direct impact on the business profit margin and hence affects the overall performance of the organisation not only that but also that it forms a part of the distribution element.

#### 4.3.5 Modern SCM Practices

With competitive pressures to increase profits by the business community it is imperative that organisations seek new ways of doing things in order to reduce their costs of operation and increase customer satisfaction levels. One of the ways is adoption of the contemporary supply chain management practises which can be used to ensure that there is an effective linkage between the supply chain partners including the final consumer. The study also explored how the contemporary supply chain management principles have been adopted by the fish farmers. Figure 14 presents the findings.

**Figure14 Modern SCM Practices**



**Source: Field Data 2015**

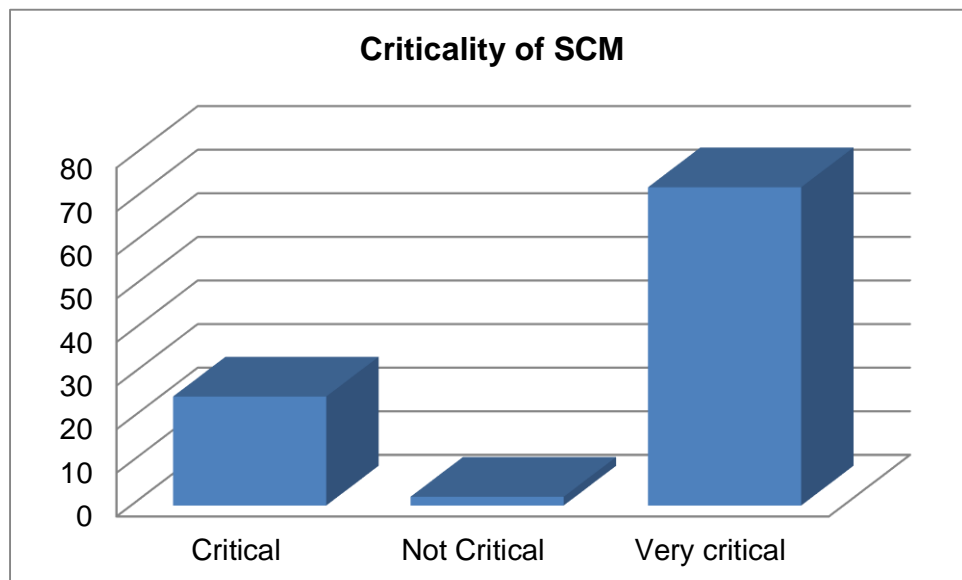
The study revealed that 30 percent of the respondents used just in time purchasing of raw material and manufacturing of feed for their fish farming venture, while 27 percent advocated that they placed much emphasis on the supply chain integration as a means of effectively managing both the suppliers of inputs into fish farming and the customers.

It is a well-known fact that the business community is going digital, 23 percent of the respondents advocated the increase use of information and communication technology in their fish farming venture. On the other hand 20 of the respondents stipulated that customer relationship management was crucial to the success of their business venture.

#### 4.4.0 Supply Chain Integration

The respondents were also asked on their perceptions on supply chain management as an integral part of fish farming. Figure 15 presents the findings.

**Figure15 Criticality of SCM**



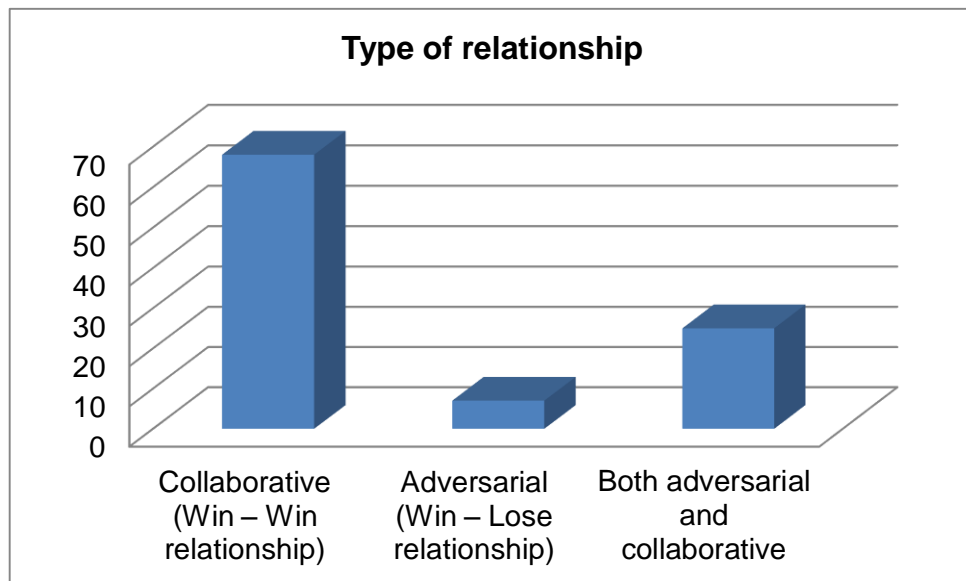
**Source: Field Data 2015**

The study revealed that the 73 percent of the fish farmers regarded supply chain management very critical to the operations in their fish farming venture, whilst 25 percent of the respondents viewed supply chain management as critical to fish farming. However 2 percent perceived SCM as not integral to the availability of farmed fish.

#### 4.4.1 Type of relationship

The study further attempted to establish the level of integration between the supply chain partners hence it explored the type of relationships which were exerted upon the supply chain partners in the fish farming supply chain, especially the type of relationships that the fish farmers used towards their suppliers and their customers. Figure 16 presents the findings.

**Figure16 Type of relationship**



**Source: Field Data 2015**

The study revealed that 68 percent of the fish farmers used win-win relationship when dealing with their supply chain partners while only 7 percent of the fish farmers used adversarial type of relationship. However 25 percent of the respondents used both strategies when dealing with their supply chain partners.

However this brought another point whereby it was imperative to assess which part of the supply chain did the fish farmers have a stronger level of integration.

Table 4 summarises the findings.

**Table 4 Stronger level of integration**

<b>Stronger level of integration</b>	<b>Number of respondents</b>	<b>Percent %</b>	<b>Valid Percent %</b>
Supply side	28	64	64
Demand side	16	36	36

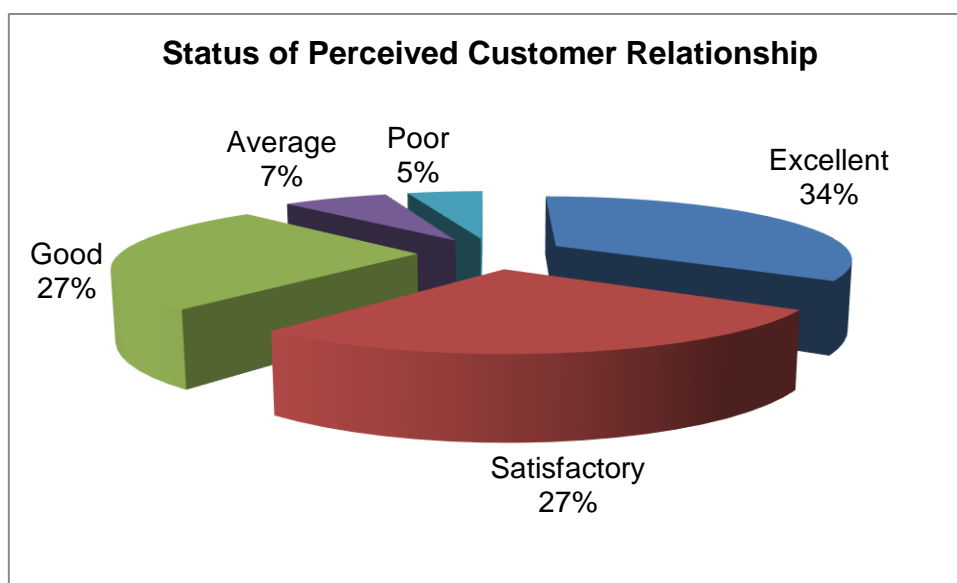
**Source: Field Data 2015**

From the above table it is clear that fish farmers have greater level of integration with the suppliers representing 64 percent, on the other hand 36 percent indicated greater integration with the customer side of the supply chain.

#### **4.4.2 Status of Perceived Customer Relationship**

The study also explored the perceptions of the fish farmers on the status of relationship which they had with their customers. Figure 17 presents the findings.

**Figure17 Status of Perceived Customer Relationship**

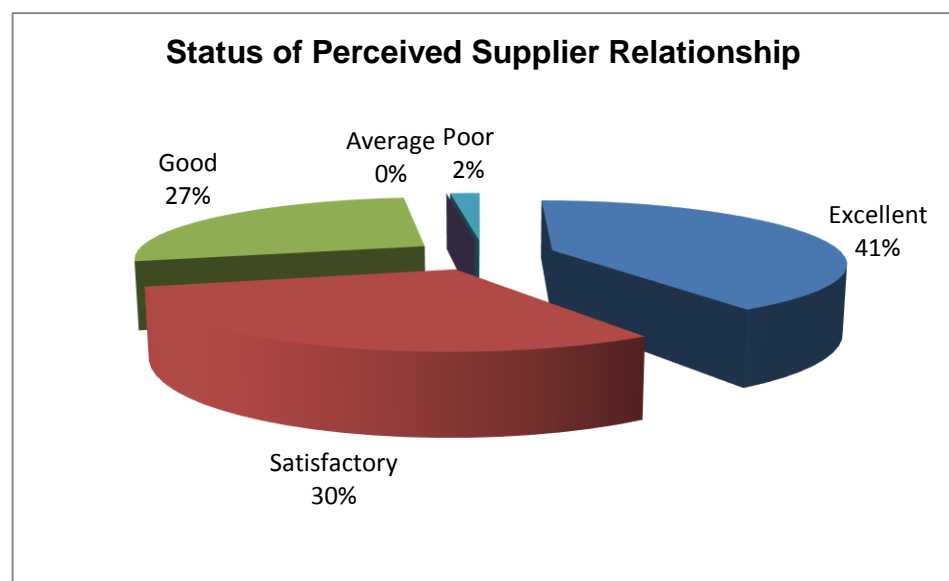


**Source: Field Data 2015**

The study revealed that 34 percent of the respondents perceived to have excellent relationship with their customers whilst 27 percent of the respondents professed their relationship with their customers as satisfactory. Similarly another 27 percent gauged their relationship as good. Meanwhile 7 percent disclosed that it was average whereas 5 percent perceived the relationship as poor.

**4.4.3 Status of Perceived Supplier Relationship**

In addition the perceptions of the fish farmers on the status of relationship which they had with their suppliers were also explored. Figure 18 presents the findings.

**Figure 18 Status of Perceived Supplier Relationship**



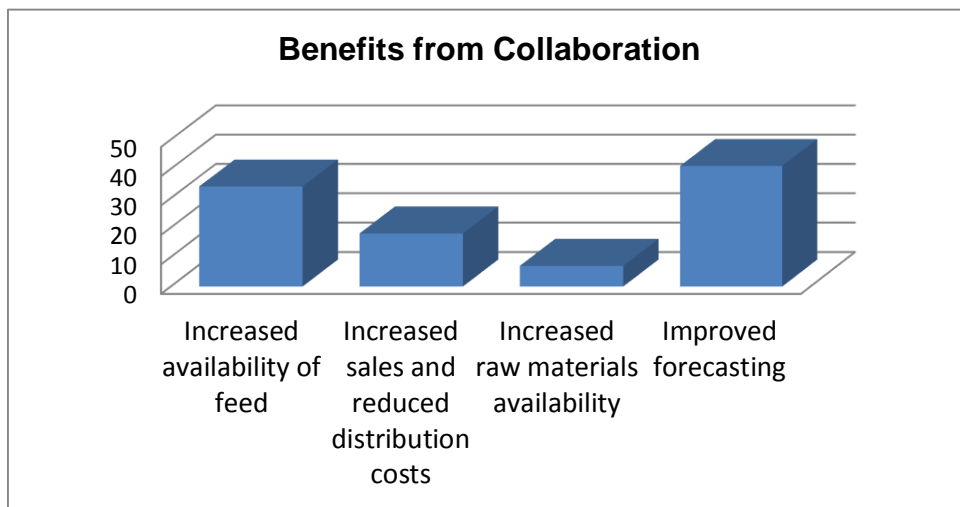
**Source: Field Data 2015**

The study revealed that 41 percent of the respondents rated their relationship with suppliers as excellent while 30 percent considered it to be satisfactory; yet another twenty seven percent rated it good unlike two percent of the respondents who perceived their relationship with their suppliers as poor.

#### **4.4.4 Benefits from Collaboration**

The study also examined how the fish farmers benefited from collaborative relationship with supply chain partners. Figure 19 presents the findings.

**Figure19 Benefits from Collaboration**



**Source: Field Data 2015**

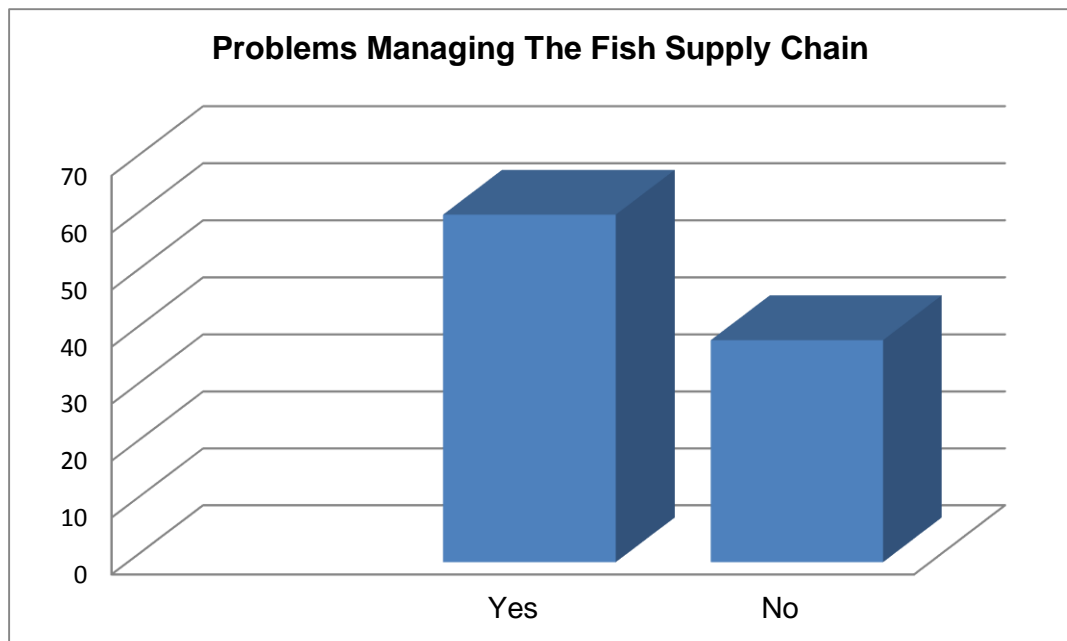
The study revealed that forty one percent of the respondents benefitted a lot from collaboration through improved forecasting, while thirty four percent benefitted through increase availability of feed, on the other hand eighteen

percent benefitted a lot through increased sale and reduced distribution costs whilst seven percent benefited through increased availability of raw materials.

#### 4.5.0 Managing the fish supply chain

The respondents were asked on whether they had problems with fish supply chain. Figure 20 presents the findings.

**Figure20 Problems in Managing Fish Supply Chain**



**Source: Field Data 2015**

The study revealed that 61 percent of the respondents experienced problems with the fish supply chain while 39 percent of the respondents had a well-established supply chain. This indicated that the majority of the fish farmers had problems in managing the fish supply chain. This could be attributed to the fact that most of the fish farmers did not have adequate information on fish production and marketing. The absence of marketing and technical information could have affected fish production and sales.

#### 4.5.1 Supply Chain Challenges

Lack of funds to finance to day to day operations of the farm and to acquire capital assets that are central to production of farmed fish.

Price decrease of farmed fish by powerful buyers.

Failure to produce as per required quantity which leads into failure to breakeven hence operating at a loss.

Scarcity of feed and fingerlings.

Scarcity of proper fishing gear for example, the cost of acquisition is very high for individual fish farmers. As well as modern techniques on how to properly harvest mature fish.

Inability of the fish ponds to sustain water which leads to low water levels hence loss of fish through animal predation and even production stoppage.

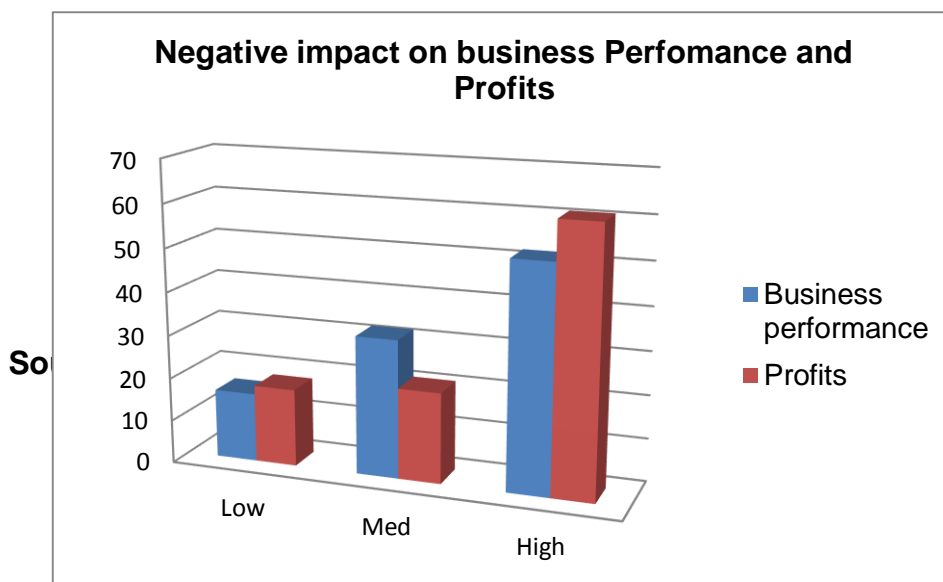
Human and animal predation for example (birds).

Climate change.

#### 4.5.2 Assessing the Negative Impact on Business Performance and Profits.

In light of the above mentioned challenges, the study went further to assess negative impact on the performance of the fish farming business and profit. Figure 21 presents the findings.

**Figure 21 Negative Impacts on Business Performance and Profits.**



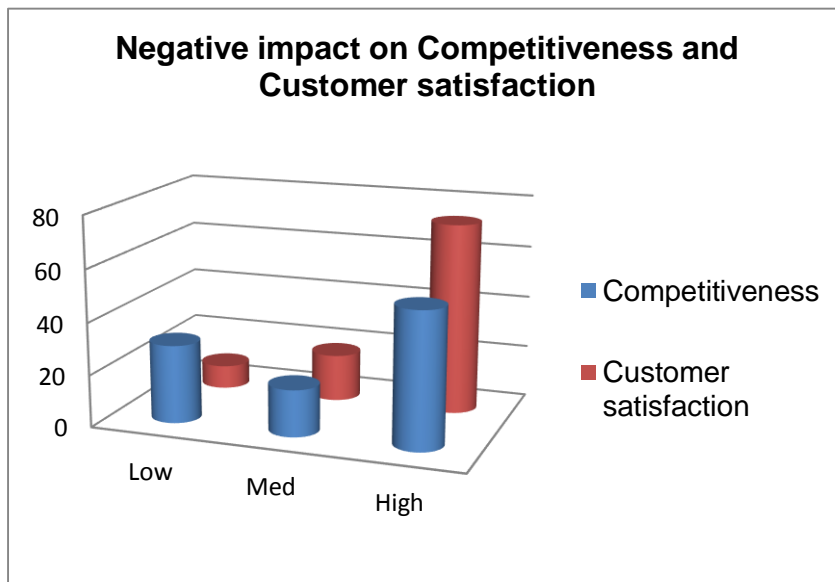
The study revealed that 18 percent of the respondent stated the challenges had a low impact on their profits while 21 percent had medium impact unlike 61 percent whose profits were greatly affected.

Similarly, 16 percent of the respondents stated that the challenges had a low impact on the business performance while 32 percent stated that the impact of the challenges on business performance was medium unlike 52 percent who were highly affected by the mentioned challenges.

#### 4.5.3 Assessing the Negative Impact on Competitiveness and Customer satisfaction.

In addition, negative impact on competitiveness and customer satisfaction was also assessed. Figure 22 presents the findings.

**Figure 22 Negative Impact on Competitiveness and Customer satisfaction.**



**Source: Field Data 2015**

The study also revealed that 30 percent of the respondent stated the challenges had a low impact on their competitiveness while 18 percent had medium impact unlike 52 percent whose competitiveness was greatly compromised.

Similarly 9 percent of the respondents stated that the challenges had a low impact on the Customer satisfaction while 18 percent stated that the impact of the challenges on business performance was medium unlike 73 percent who were highly affected by the mentioned challenges.

#### **4.6.0 Discussion of the findings**

The study set out to investigate current SCM practices done by the fish farmers as well as to explore supply chain challenges, in addition examining the role of contemporary SCM practices towards increased availability of farmed fish particularly in Lilongwe city.

The study has revealed that contemporary SCM practices play a critical role in as far as fish farming is concerned. This has been elaborated by how fish farmers benefit from an integrated supply chain. The study has also revealed current supply chain management practises that are done by the fish farmers in relation to acquisition of inputs for their fish farms, and farmers' perceptions on effectiveness of each of the procurement strategy that was used as required by the day to day operations of their business venture.

From the findings though many fish farmers used open market it is was perceived to be ineffective for the requirement of the fish farming business it could have been complimented with supply contracts with producers. This could have helped in increased efficiency and communication between the fish farmers and the producers of feed. There by providing an opportunity for continuous improvements for the fish farmers and producers leading to increased farmed fish production.

Furthermore, the study revealed that most fish farmer applied just in time systems in their farming business when acquiring raw materials. The study suggests that just in time purchasing of materials alone would not improve the availability of farmed fish in Lilongwe city but also by encouraging greater supply chain collaboration and integration with the supply chain partners which can ease the production and distribution of fish.

The study has also revealed that most of the fish farmers fail to produce required quantities to meet the demand. Several factors have been explored for example, inability of the fish ponds to sustain water during summer, theft, animal predation and scarcity of feed and fingerlings, hence affecting the supply of farmed fish.

In addition, lack of technical support on how to package and transport fish stocks to the market was also mentioned by the majority of the respondents, the study revealed that currently the fish farmers packed their produce in reed or bamboo baskets sometimes in gunny sacks, which do not protect the fish stocks from physical forces such as crushing and most of the times leads into contaminations of the fish from other goods which travel together with the fish when there is a mixed consignment.

The study revealed that most of the fish farming business's lacked market orientation as most of the respondents cited failure to identify reliable and stable markets when the fish are at maturity level. This suggests that most of the fish and fish products sold at markets are not a result of consumer research, not only that but also that it suggest that fish retail market facilities are poor and inadequate which results into disordered presentation and contamination of fish and fish products. For example displaying fish, on sacks on benches without ice.

Environmental management by the fish farmer was also explored mainly in terms of waste management whereby 16 percent of fish farmers drained their waste in the rivers. This calls for civic education amongst the farmers to advocate proper waste disposal to comply with environmental regulations.

**4.6.1 Limitation of the study.**

The limitation of the study is that it focussed on how contemporary supply chain management practises can contribute towards increased availability of farmed fish. Due to limited time and financial resources it was narrowed to Lilongwe city. The researcher found problems in accessing relevant secondary data on SCM in fish farming in Malawi context. However this does not have an effect on the findings.

**4.7.0 Response Rate.**

The research study realized a 100% response rate. All the forty four questionnaires that were prepared for data collection were answered. Therefore the research can be widely accepted in the area.

**4.8.0 Chapter Summary.**

The chapter has given an overview of the primary data that has been collected together with an analysis and discussion with specific reference to addressing the research question and research objectives. In the next chapter, a summary of the whole project is done followed by conclusions and recommendations.



## **CHAPTER FIVE: CONCLUSIONS**

### **5.0 Conclusions, Recommendations**

This chapter aims at making conclusions and recommendations. Areas of further research on assessing the role of contemporary supply chain management practices in fish farming towards availability of farmed fish will also be provided in this chapter.

### **5.1 Conclusions from the findings.**

The study has highlighted the current supply chain management practices that are done by the fish farmers as well as the challenges that have affected the production and supply of farmed fish. The study has also assessed how the fish farmers adopted contemporary supply chain management practices in order to increase productivity and supply of farmed fish in Lilongwe city.

The study concludes that to increase availability of farmed fish in Lilongwe city there is need to develop the post-harvest section of fish farming. This could be done by capacity building of the fish farmers through trainings and other technical support.

The training will provide the fish farmers with know-how on processing and preserving of fish stocks after harvesting from their farms.

Provision of key equipment suitable for distribution of fish stocks for example cooler boxes or temperature controlled units during transition of harvested fish from the fish farms to the market would greatly improve the post-harvest section.

The study also revealed that climate change has affected fish production. For example in warm water, oxygen dissolves less readily which leads into breeding parasites and many pathogens, higher water temperatures makes fish farming more difficult and may cause fish to use the available nutrition less efficiently.

In general climate change has increased fish mortality rate as seen in the study where during the summer period most of the fish farmers had breaks in production as a result of drying up of ponds.

In conclusion, the study has explored some of the challenges that have affected the supply of farmed fish, the study has also explored the current supply chain management practices which are done by the fish farmers in relation to acquisition of inputs into the fish farms. It has also looked at how contemporary supply chain management practises such as just in time, information and communication technology, customer relationship management and supply chain collaboration were adopted by the fish farmers in order to increase the productivity and supply of farmed fish.

## **5.2 Recommendations.**

### **Creation of Research centre**

To improve the availability of farmed fish government, NGOs and the wide stakeholder group has a major role to play. It will be necessary to create a centre which will be responsible for coordinating the producers and the customers of fish. The above mentioned centre will be responsible for market research so that the farmers find reliable and stable fish markets.

## **Infrastructure Development**

In addition, the centre will also help in developing a necessary infrastructure adapted to produce fish products that would meet the satisfaction of the ultimate customers at all levels of the distribution chain. Examples of infrastructure that need to be improved include means of transport, processing facilities and storage facilities through rural electrification programmes so that the fish farmers can have readily available ice.

In other words the fish farmers should be in a position to access temperature controlled units (for example cooler boxes or cold rooms) as well as effective mode of transport from their fish farm to the market.

## **Capacity Building**

It is also important that the government and the wider stakeholder groups should intensify trainings and workshop for fish farmers, coaching them contemporary methods of feeding and post-harvest state of fish in order to reduce losses during the harvesting period.

## **Extension Workers**

In addition, more of extension workers should be engaged to ensure effective coverage of fishing zones, as well as strengthening group collaboration among the fish farmers.

**Formation of fish farmers association**

Furthermore, formation of farmers association will also help in availability of farmed fish through consolidation of fish quantities at club level and selling them in bulk. This will be particularly important in such a way that it will give the association greater negotiation power when selling their products hence more bargaining power on determining fish prices. Through consolidated quantities it will also help in utilizing transport facilities

**Investing in Technological innovation**

There is a need to invest in technological innovations and leverage the latest information technology by the wider community which would help in increase level of monitoring and planning between all the actors that are involved in the fish supply chain.

In addition, to curb the effects of climate change there is a need to ensure that fish ponds are artificially supplied with enough cool, high oxygen water especially during the summer period. Therefore investment in equipment such as water pumps (solar, fuel or wind driven) are prerequisite for continual water supply hence assurance of effective production, as well as increasing the depth of the ponds.

**Developing Quality Standards**

It ought to be mentioned that developing quality standards and guidelines for fingerling producing hatcheries for example National Aquaculture Centre (NAC) and fish farmers is very important. This initiative will help to ascertain that fingerlings or table size fish produced are of high quality. This will boost sales of

the farmed fish in major hotels and restaurants. In the absence of these quality standards effective supply of the farmed fish will remain affected.

### **.Flexible Credit Facilities**

The government and other stakeholders should work hand in hand with the fish farmers by providing credit facilities to ensure the availability of resources and key inputs into fish farming, for example fishing gear. The credit facilities would also enable the fish farmers to increase the workforce.

### **5.3 Areas of further research.**

Supply chain management in the fisheries sector is a very wide area that involves many issues, the motivation in this study was to assess the role of modern supply chain management practices in fish farming which according to the findings, modern supply chain management practices plays critical role in ensuring increased availability of farmed fish. However, further areas that need to be researched include impact of contemporary SCM practices on profitability of fish farming business.

### **5.4 Chapter Summary**

From the case findings it can be concluded that the aim and objectives of the study have been met.

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## **Appendices**

### **Appendix 1: Questionnaire**

#### **BACKGROUND**

This study is being conducted to gather information on Assessing the Role of Modern Supply Chain Management Practices in Fish Farming towards Availability of Farmed Fish in Lilongwe city

It is being administered by a student who is pursuing Masters' Degree in Supply Chain Management at University of Bolton as a partial fulfilment for the requirements for the award of the Masters' Degree.

This study is aimed at determining how Contemporary Supply Chain Management Practices in Fish Farming can contribute to the availability of Farmed Fish in Lilongwe city.

The objectives of the study are;

To assess current SCM practices done by the fish farmers

To explore supply chain challenges faced by fish farmers.

To assess role of modern SCM practices towards increased availability of farmed fish

To ensure confidentiality you are not required to disclose your name. The data collected will only be used for the purpose of this academic research only.

Thank you in advance for having taken your time to fill this questionnaire. We will be grateful if your answers are checked to ensure that no question is missed.

If you may have any questions concerning this research study please call me on 0999 03 67 54 or email at wonganigunde@gmail.com

Wongani Gunde

## **INSTRUCTIONS**

This questionnaire has five sections

You are being requested to answer all the questions in all the sections

## **SECTION A**

### **GENERAL INFORMATION**

#### **Instructions**

**Please tick one option in each of the questions below**

1. Your age

- a) Below 20 years.
- b) 21-30 years
- c) 31-40 years
- d) 41-50 years
- e) Above 50 years

2. Your gender

- a) Male
- b) Female

3. Your level of education

- a) PLSC
- b) JCE
- c) MSCE

- d) Diploma []
- e) Degree []
- f) Masters []
- g) PHD []
- h) Other (specify) []

4. Number of employees (including yourself)?

- a) 1 – 3 []
- b) 4 - 7 []
- c) 8 – 20 []
- d) 21 or more []

5. Annual turnover

- a) K 0 to Mk 1 million []
- b) K 1 Million to K 10 million []
- c) K 10 Million to K 50 Million []

6. How long have you been involved in fish farming?

- a) 0-5 years []
- b) 6-10 years []
- c) 10+ years []

7. At what level of the fish farming are you involved?

- a) Supplier of fingerlings []
- b) Farming fingerlings to maturity []
- c) Both Fingerlings and Mature Fish []

8. Are you aware of the negative environmental aspects of fish farming,

- a) Yes []
- b) No []

**If No proceed to Q 10**

**If yes**

**9b** how do you take care of your farm in terms of the environment for example disposal of waste from your ponds? (Tick one)

- a) Through the municipal waste system [ ]
- b) Drain it into a nearby river/lake [ ]
- c) Recycling solids and used as fertiliser on land [ ]

## **SECTION B: ORGANISATION'S PROCUREMENT**

### **Instructions**

**Please tick one option in each of the questions below**

9. Where does your organisation buy raw materials it uses in Fish Farming?

- a) Rural market [ ]
- b) Urban market [ ]
- c) International market [ ]

10. What procurement strategies are being used for sourcing feed?

- a) Open Market [ ]
- b) Tendering [ ]
- c) Supply contract with producers [ ]
- d) Own feed formulation [ ]
- e) Other Specify----- [ ]

11. How long have the above strategies been used?

- a) 1 to 2 years [ ]
- b) 3 to 4 years [ ]
- c) 5 to 6 years [ ]
- d) Over 6 years [ ]

12. How do you rate the appropriateness of the procurement strategies being used with the current requirements?

- a) Excellent..... [ ]
- b) Very Good..... [ ]
- c) Good ..... [ ]
- d) Average..... [ ]
- e) Poor..... [ ]

13. If (d) or (e) what can be done to improve the procurement strategies?-----

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14. How is feed delivered from place of buying to the organisations stores?

- a) Own transport [ ]
- b) Third party transport [ ]
- c) no transport (procurement is done at the premises) [ ]
- d) other specify [ ]

### SECTION C: OUTBOUND LOGISTICS

#### Instructions

Please tick one option in each of the questions below

15. Which is the organisation's main market for fish or fingerlings?

- a) Fish market [ ]
- b) Distributors [ ]
- c) Final consumers [ ]
- d) Other – specify [ ]

16. In what form are they sold?

- a) Live
- b) Fresh
- c) Frozen
- d) Salted
- e) Smoked
- f) Other..... Specify

17. What factors determine the price at which you sell the fish?

- a) (a) State of the fish (Freshness)
- b) (b) Uniformity in size
- c) If Others (please specify) -----

18. Have you ever experienced short supply of feed to meet production requirement for the past two years?

- a) Yes,
- b) No.

**If Yes** please answers the question below, **If No**, please go to **Q21**

19. How does your firm meet customer demand when there is short supply?-----

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20. Amongst the Modern supply chain practices listed below which ones do you think can be applied in your business?

- a) **Customer Relationship Management (CRM)**

**Definition of CRM;** is a system for managing a enterprise's relations with current and future customers by using technology to organize, automate and coordinate sales, marketing, customer service, and technical support.

b) **Information and Communications Technology (ICT)** [ ]

**Definition of ICT;** the use of computers and other electronic equipment and systems to collect, store, use, and send data electronically:

c) **Supply chain collaboration/ integration** [ ]

**Definition of Supply chain collaboration;**a process where two or more business's work together to realize shared goals

d) **Just in Time** [ ]

**Definition of Just in Time** is a system in which materials or products are produced or acquired only as demand requires in order to minimize inventory costs.

21. How can the above supply chain management practises generate benefits for your business?-----  
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22. Which ones can be considered to be the key in ensuring increased availability of farmed fish?-----  
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**SECTION D: SUPPLY CHAIN INTEGRATION**

**Instructions**

**Please tick one option in each of the questions below**

**Supply Chain Management** defined as management of material and information flow in a supply chain to provide the highest degree of customer satisfaction at the lowest possible cost.

23. To what extent is supply chain management a critical operation of your organisation?

- a) Not critical
- b) Critical
- c) Very critical

24. Please explain and give reasons to your answer in above question-----

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25. What type of relationship do you have with your supply chain partners?

- a) Collaborative (Win – Win relationship)
- b) Adversarial (Win – Lose relationship)
- c) Both adversarial and collaborative

26. Which part of the supply chain network does the organisation have stronger level of integration?

- a) Supply side
- b) Demand side

27. (On average) How is the status of relationship you have with your customers?

- a) Excellent..... [ ]
- b) Satisfactory ..... [ ]
- c) Good ..... [ ]
- d) Average..... [ ]
- e) Poor ..... [ ]



28. If (d) or (e) what can be done to improve the relationship?-----  
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29. (On average) How is the status of relationship you have with your suppliers?

- a) Excellent..... [ ]
- b) Satisfactory  
..... [ ]
- c) Good ..... [ ]
- d) Average..... [ ]
- e) Poor..... [ ]

30. If (d) or (e) what can be done to improve the relationship?-----  
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31. How does your organisation benefit from collaboration?

- a) Increased availability of feed [ ]
- b) Increased sales and reduced distribution costs [ ]
- c) Increased raw materials availability [ ]
- d) Improved forecasting [ ]

**SECTION E: SUPPLY CHAIN CHALLENGES****Instructions****Please tick one option in each of the questions below**

32. Does your business experience any problems with managing the fish supply chain?

a) Yes (b) No 

33. If your answer above **is Yes**, please state the problems that you face in your business. **If No** go to **Q36**

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34. List down some of the common challenges you encounter with your fish distribution system?

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35. How the challenges indicated above impact the performance of the organisation in terms of the following?

Number	Variable	Negative Impact		
		Low	Med	High
1	Business performance			
2	Profits			
3	Competitiveness			
4	Customer satisfaction			

36. In your own opinion what should be done to improve the distribution of farmed fish?-----  
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**End of questionnaire**

**Thank you.**

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