

THE EFFECT OF AN INTEGRATED QUALITY MANAGEMENT SYSTEM ON A
LEADING FISH PRODUCT MANUFACTURER: A PRE-IMPLEMENTATION
VIABILITY STUDY

by

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ABSTRACT

There are many optimistic and pessimistic views on integrated quality management systems based on international standards. Many businesses have not benefited in terms of operational, quality or business performance, while many others have indicated that the implementation of integrated quality management systems based on an international system standard or other standards has led to improved operational performance and quality, which in turn has resulted in improved business results. The main research problem is therefore to identify the effect of an IQMS on a fishing company and, secondly, to determine whether such a system is compatible with the fishing industry as a whole. By addressing these questions, a perception of the value of an IQMS for the fishing company under study was obtained.

The main research question was: *“What is the effect of an integrated quality management system on a leading fish product manufacturer*

Different research approaches were used to determining the value of such an IQMS in a leading fish product manufacture. The study confirmed that the IQMS has a positive effect on the fish product manufacturer.

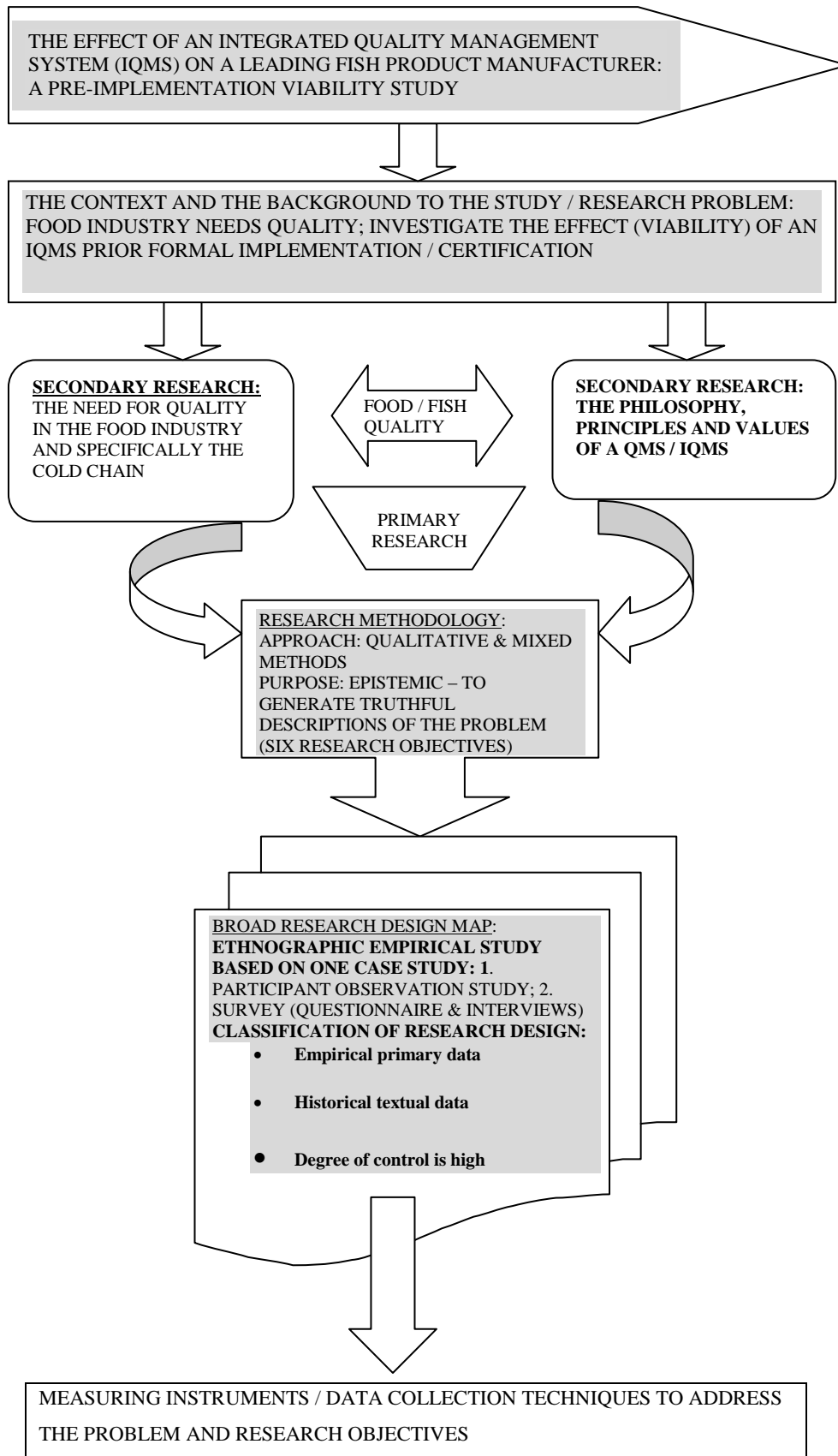
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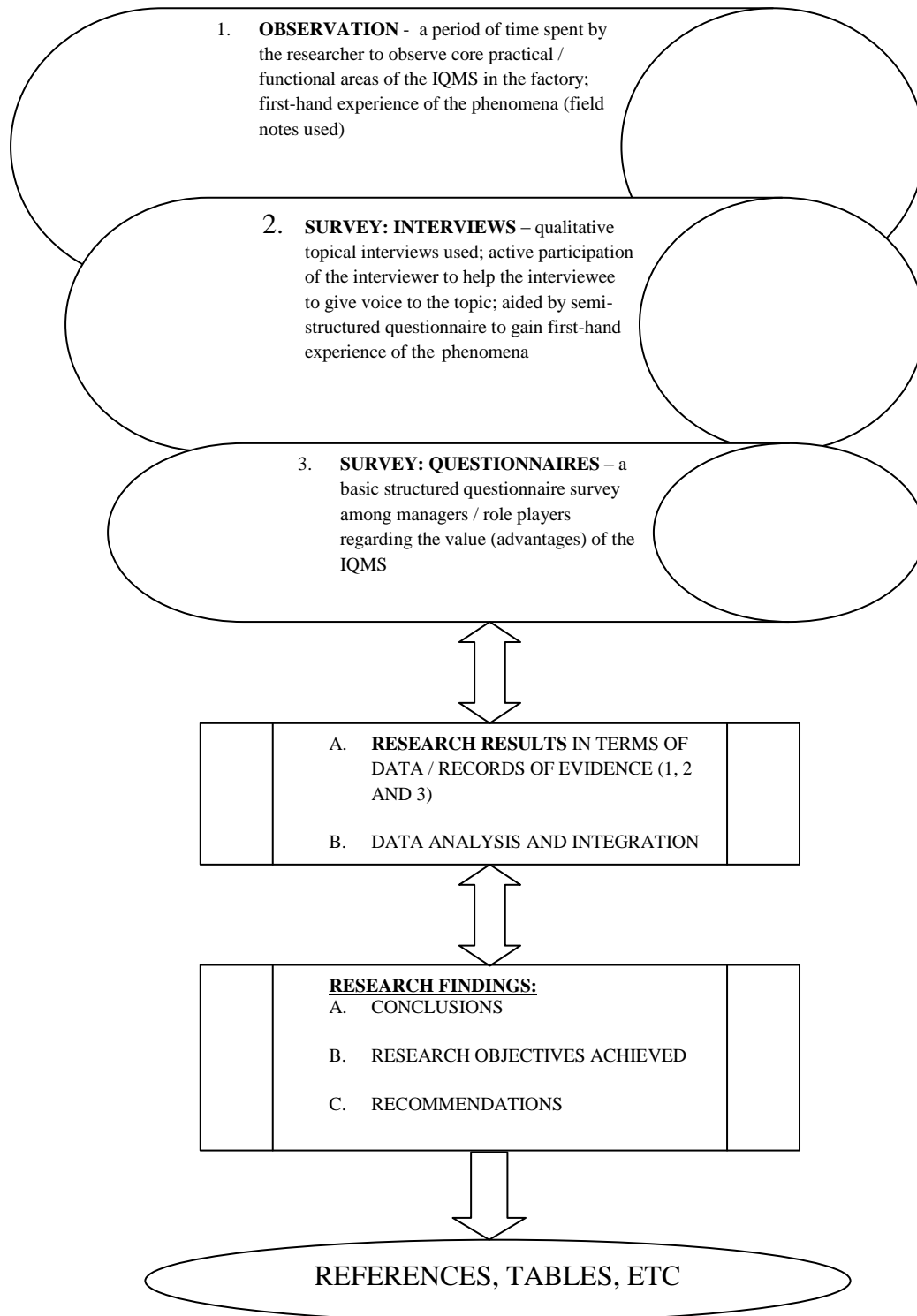
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Key terms:

Integrated quality management system; Quality management; Quality management systems; HACCP; ISO 9000; Fishing product manufacturer; Quality assurance; People; Benefits; Value

CASE STUDY – FRAME WORK





DECLARATION

I declare that **THE EFFECT OF AN INTERGRATED QUALITY MANAGEMENT SYSTEM ON A LEADING FISH PRODUCT MANUFACTURER: A PRE-IMPLEMENTED VIABILITY STUDY** is my own work and that all the sources that I have quoted have been indicated and acknowledged by means of complete references.

.....

SIGNATURE

(M J van Heerden)

.....

DATE

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Firstly, I would like to thank God for giving me the strength, desire and support to complete this degree and research report.

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DEDICATION

To my wife, Petra, and two sons, Tiaan and Hugo, for their endless patience and encouragement throughout my studies - without their love and support it would have been impossible for me to complete my degree.

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CHAPTER 1: INTRODUCTION

1.1 TITLE

The effect of an integrated quality management system on a leading fish product manufacturer: a pre-implementation viability study.

1.2 INTRODUCTION

The population of the world is roughly 6.875 billion. Since 1960, the world population has grown by 3.8 billion. This is mainly because of increased agricultural productivity and advancements in the medical field. According to the Living Planet Report (2012), human demands are stripping the earth of all its natural resources.

The Ecological Footprint (2012) also shows that the demand for natural resources had already increased by 1.5 earths as from 1966, and as the human population grows, the resources of two earths will be needed by 2030 to meet all human needs.

As much as 81% of all fish products are consumed by humans and 20% of all protein intake is from fish. According to Worm (2009), 63% of all assessed fish stocks require rebuilding. The impact of increasing food prices and the global economic crisis, means that millions of people worldwide will now face uncertainty in food security. Fisheries and aquaculture have traditionally been regarded as a solution to the problem and a means of supplying people with work (FAO 2010; Worm 2009). Because of advanced fishing technology and over-exploitation of fishing, stocks increased from 10% in 1974 to 32% in 2008. According to Worm (2009), the widening gap between sustainable production levels versus real consumption rates is now recognised as a leading environmental and socioeconomic problem in the marine realm with far-reaching effects on the global community.

Harrison (2011) stated that in South Africa, the regulation of marine resources is highly effective, and companies have to re-apply yearly for their fishing quotas. Each year fishing data are analysed and consumption figures are set, based on the data.

Quotas can be increased, decreased or kept the same. Quality management systems (QMS's) are implemented by all leading fishing companies in South Africa, and these systems assist them by increasing quality benefits and making the companies more productive and eco-friendly and also increasing their profits. Some of these companies have implemented formal QMS's that are certified, where some of them implement their own systems, they have developed which are informal systems and not been certified as a QMS.

This study will look at the impact that an integrated quality management system (IQMS) has on one of South Africa's leading fishing companies. The findings of this study will help to determine whether or not the implementation of such a system would enable the fishing industry to be more successful, and at the same time assist the environment.

1.2.1 History of fishing

Fishing is an ancient practice that dates back to the beginning of the Palaeolithic period, about 40 000 years ago. Many examples of this industry can be found in the Bible, as many of the disciples were fisherman. Fishing is nearly as old in the new world as the presence of humans, according to Sandweiss, Richardson, Reitz, Hsu, Fieldman (1998) and Keefer, De France, Richardson and Alvanez (1998). Isotopic analysis of skeletal remains of a 40 000-year-old man, confirms that people of that era consumed fresh fish on a regular basis. Archaeological studies on shell middens, discarded fish bones and cave paintings show that seafood consumption was an important part of humans' survival and lifestyle.

In ancient times, the people of Egypt used the Nile River as a source of food, of which fishing was one. People caught fresh fish for trading or consumption purposes. According to the History of Fishing (2011), later on, people also started to dry fish, for subsequent consumption.

Before large civilisations developed, most fish was consumed almost immediately after being caught. As time went on, people became more skilled and started learning the trade of the preservation and storage of fish. In the Mesolithic period,

about 6 000 to 10 000 BC, civilisation relied heavily on the fishing industry. As time went by, people started developing the skills needed to produce tools that could assist in harvesting more fish for consumption. According to Keep American Fishing (2010), for the first time, people had the tools and the knowledge to harvest large quantities of fish without wasting a significant portion because of deterioration.

As the population grew, the demand for food also increased which meant that fishermen started to catch more fish to meet the demand of consumers. This in turn led to people building larger boats with bigger nets. With bigger nets more fish could be caught at a time, which led to boats returning with better quality fish because of the shorter sailing time (History of Fishing 2010).

Many noticeable and important changes in the fishing industry have come about during the past 150 years. The first major change came with the mechanisation of fleet. By the 1800s sailboats were being replaced by steamships. The era of the steamship was short-lived since these ships were replaced by motor-driven vessels in the early 20th century. The next major advance came in the 1940s when instrumentation was introduced into the fishing industry. At this time, echo sounders and later sonar were introduced.

As time passed the fishing industry grew larger and so also did the technology that went with it. A major advancement was mechanical net making which enabled people to create larger and more durable nets.

In the 1980s, ships became fully automated, which is still the situation today. These days, boats have high-technology support systems on board, which help fishermen to target specific fish species and reduce the incidence of by-catches. This means that fewer non targeted fish are being caught, which in turn, helps to rebuild fish resources.

Worldwide, the fishing industry consists of many different activities ranging from catching and possessing the product to the selling and marketing of fish products. Harrison (2011) identifies the following three principal industry sectors:

- the commercial sector, which comprises enterprises and individuals associated with wild catch or aquaculture resources and the various means for the transformation of those resources into products for sale
- the traditional sector, which comprises enterprises and individuals associated with fishery resources from which aboriginal people derive products in accordance with their traditions
- the recreational sector, which comprises enterprises and individuals associated with fish resources for the purpose of recreation, sport or sustenance from which fish products are derived that are not for sale

Most fishing companies that capture fish for commercial purposes, pursue fish far into the ocean. People who fish for sport and pleasure make up only a small part of the total annual fish quota that is captured worldwide.

Most large fishing companies comply with the Southern African Sustainable Seafood Initiative (SASSI) guidelines and do not catch any fish that have been red-listed by this organisation. The decline in catches, together with a decrease in the size of the fish caught, led to a call for the protection of line fish stocks and the establishment of the South African Marine Line Management Association. The aim of this association is to restore species and help to remove them from the endangered red list, preserving them in sufficient numbers for the future. Some fish companies have Marine Stewardship Council (MSC) accreditation, which means that they comply fully with the prescribed rules and regulations for sustainable fishing. The MSC is the world's leading certificate and eco-labelling programme for sustainable seafood. This and other regulations support a drive towards quality management. The perishable nature of the food chain and the cold chain suggests a need for professional quality management and related systems.

1.2.2 History of the South African fishing industry

Trawling in South Africa started in 1890 and has developed into the country's most important and mature fishing industry. In the beginning, the hake trawl fishery started as a "modern" and to an extent vertically integrated industry with trawlers, processing

infrastructure and a well-organised distribution network. Overall, this industry is highly capital intensive.

At the turn of the century, fisheries in South Africa mostly targeted Agulhas sole. Hake was only targeted when sole requirements were met and it was thus landed as an incidental catch. According to Payne, Miao, Miller and Modesitt (2005), for a period of two decades Agulhas and West Coast sole remained the major targeted species, but in the early 1960s this had changed to hake, owing to its abundance and the fact that it is not a target species.

South Africa has a large commercial fishing industry, supporting a large part of the economy with exports and imports of products. It is also a major provider of employment to many South Africans. More than 22 000 people make their living from the fishing industry. In South Africa, there are in excess of 4 500 commercial fishing vessels. The principal species of shoal fish caught by coastal trawlers are anchovy, pilchard and herring, while the deep sea trawlers focus on hake, sole and squid. Species such as tuna, snoek and yellow tail are caught on hand lines. According to Harrison (2011), Cape lobster is also caught along the west coast of South Africa. Deep sea trawling for the hake species *Merluccius Capensis* and *Merluccius Paradoxus* is the most important part of the fishing industry in South Africa.

Since the 1970s, South African fisheries have been controlled mainly by means of allocating quotas within a conservative total allowable catch (TAC). Currently, there are two main role players in the fishing industry in South Africa. In 2012, all quota holders in South Africa received an extra 10% quota owing to the sustainable growth of the South African fishing industry and its excellent management.

South Africa exports about 60% of its fish every year. Most of the fish is exported to Europe and Australia. Hake, in both fresh and frozen form, heads the list of fish that is exported to Europe. Only the best quality hake is chosen for export. The product has to be managed from when it is caught, through the production process and finally to distribution, which is the last process in the supply chain. The greatest challenge in exporting fish is keeping it at a constant temperature from the time it is

caught until it arrives at the customer, locally or overseas. Quality systems are implemented to manage this process throughout the supply chain.

1.3 INTEGRATED QUALITY MANAGEMENT SYSTEM (IQMS)

The leading fish product manufacturer where the study was conducted has its own IQMS that complies with all national and international standards but is not yet formally certified. The integrated system consists of several different QMS which form the total system. This IQMS is based on several international standards (Brewer, Nash & List 2005).

The purpose of this case study was to determine the way forward in terms of the status quo, to gauge the effect of the current IQMS on the company and whether the system is compatible with the rest of the fishing industry. The company currently uses a variety of management systems and has linked them to create an integrated system. The questions are: are these standards, regulations and systems sufficient? and should the integrated system be improved or not?

The current IQMS is based on the following international and local standards:

(1) Hazard Analysis and Critical Control Points (HACCP) is a management system in which food safety is addressed through the analysis and control of biological, chemical and physical hazards from raw material production and procurement. HACCP enables the food-processing and catering industries to introduce and maintain a cost-effective and ongoing safety programme. It also identifies the steps that are critical to the safety of the products that are being produced (www.fda.gov/food/foodsafety/hazardanalysiscriticalcontrolpointshaccp).

(2) The British Retail Consortium (BRC) Global Standard evolved out of an initiative of British private label retailers. It is the leading trading organisation in the United Kingdom. It is a business-to-business standard, guaranteeing minimum standards. It includes quality management system audits in food-processing companies. Since most products of the company under study are exported to Europe, it has to adhere to BRC standards to do business with the European Union

(EU). This certification is of crucial importance to the export of fish (www.brcglobalstandards.com).

(3) South African Food Safety Inspection Service (SAFSIS) is an audit with which companies must comply in order to deliver fresh or frozen products to any Pick n Pay outlet in South Africa (Pick n Pay is one of the largest food retail franchises in South Africa). By not meeting these standards, companies can be delisted and thereby prohibited from delivering products to Pick n Pay (www.thefoodsafetynetwork.co.za).

The audit is based on the guidance document drawn up by the Global Food Safety Initiative (GFSI). The audit consists of the key selected elements of:

- (a) GHP (good hygiene practice)
- (b) GMP (good manufacturing practice)
- (c) R918 (regulations governing general hygiene requirements for food premises and transport of food)
- (d) SABS 049 (South African Code of Practice Food Hygiene Management)
- (e) Principle 1 of HACCP (requiring the listing of food safety hazards and measures to control the hazard)

(4) All South African Bureau of Standards (SABS) regulations were transferred to the NRCS (National Regulations for Compulsory Specifications). This legislation is the culmination of a ten-year process intended to align South Africa with the world's best regulatory practice and to meet requirements of the World Trade Organisation (<http://www.nrcs.org.za>).

NRCS-regulated food and food products must comply with the following regulations:

- (a) quality and composition
- (b) packaging and labelling
- (c) the Foods and Associated Industries (FAI) administrators food safety regulation on
 - canned fish, marine molluscs and crustaceans
 - frozen fish and marine molluscs
 - frozen lobster

- frozen shrimps, langoustines and crab
- smoked snoek

(5) Woolworths Australia Audit, WQA (Woolworths Quality Assurance) applies to all companies that supply Woolworths (South Africa) with fresh and Woolworths brand products, and includes exported Woolworths products in Australia and New Zealand. The WQA standard is benchmarked against global standards and international retailing best practices. The WQA focus is on food safety, quality and legality (<http://www.wowlink.com.au/wps/portal>).

To achieve WQA standards a company is required to:

- develop, document and implement a QMS that meets the requirements of the WQA Standard
- have its QMS audited and certified by a Woolworths Approved Certification body

(6) Metric Stream Inc manages Woolworths South Africa's total quality management initiative. This initiative focuses on quality, safety, audit, policy and regulatory programmes. Systems have been developed to which Woolworths' suppliers have to adhere, in order to supply products to stores.

(7) The EFSA (European Food Safety Authority) is the key risk assessment authority for food and food safety in the European Union. NRCS is being certified by EFSA in South Africa to manage products that are exported to the European Union. NRCS ensures that all products that are exported to Europe comply with EU specifications (<http://www.efsa.europa.eu>).

These elements or subsystems of the IQMS may be adequate, but it is important to determine whether or not they should be improved.

1.4 BACKGROUND TO THE PROBLEM

The entire food chain is a competitive economy in which profit margins are typically low, hence it is often challenging to maintain profitability. Another primary challenge of the food chain is to prevent the effects of food waste, which is a concern for any company in the food industry and especially in the cold chain. Meanwhile worldwide technology and globalisation have revolutionised the way people and companies manage the growth, transport, processing, packaging, purchasing and preparation of food (Ehrenfeld 2003).

In an increasingly competitive South African fish market, corporate companies have come to rely on quality certification programmes to maximise their efficiency. Price plays a huge role in every industry in South Africa, especially in the fishing industry where imports and exports are highly sensitive to any change in the exchange rate. Since the economic downturn, most people buy according to price rather than brand, which is completely normal economic behaviour. This trend has forced most businesses in South Africa to start competing on the price and not the quality of the product, where the company under study went the other way by supplying its customers with quality products. By doing so, most companies have had to adjust their strategies in the short and long term to stay profitable and competitive in a sustainable business. In the current market situation, this is the main challenge for the fishing industry to overcome.

QMSs are a critical part of the fishing industry. With quality control, the quality of the product has to be maintained at a level that satisfies and justifies customer and end-consumer needs. Effective quality control increases profitability by improving quality-related issues. Customers can be supplied with products of quality and uniformity, by working each system at its optimal level to deliver the best quality end product at the lowest input cost.

Loss of profitability occurs when fish products do not comply with local or international regulations, which means that the product cannot be sold or has to be downgraded to a sub-standard product. Maintenance of quality is essential for branded products, because a brand name becomes associated with a particular

quality level. Lowering quality standards causes the customer to lose confidence in the brand, which will lead to loss of sales (Chernatony, McDonald & Wallace 2011).

Most food industries today explore the viability of the implementation of a formal QMS, based on standards such as HACCP, ISO 22000 and many others. According to Aranda and Christensen (2009), the need for such a system in the fish product manufacturing industry is constantly emphasised owing to the prevalence, in some parts of the world, of inefficient management of resources and people.

It is therefore a challenge for the fishing manufacturing industry in general to establish an integrated quality management system which will meet its needs and promote competitiveness in the market, whilst meeting consumers needs on a daily basis by supplying them with quality products at competitive prices. These standards need to be achieved by the company that formed the basis of this study, in order to render a sustainable, profitable business, while retaining a market leader position in the fishing manufacturing industry.

1.5 PROBLEM STATEMENT

Fishing manufacturers worldwide acknowledge a need for quality assurance and several different QMS are used. However, since many variations are used, it is difficult to know which of the different systems should be used as a benchmark. The challenge is therefore to determine the viability of one particular custom-designed, IQM (Wild 2008).

Since management systems are usually based on international system standards and are widely used in other industries, it was decided, for the purpose of this study, to determine the viability and values of an IQMS (based on several international standards) applied to the South African fish industry with particular reference to a fish product manufacturing unit in the company. The large scope and cost of such a project justifies this pilot study to predetermine the likely value of further formal implementation and maintenance of an IQMS.

1.6 AIM OF THE STUDY

The problem was addressed by means of a pilot study conducted to determine the viability and value of a custom-designed IQMS for the fishing product manufacturer. In this study, the aims were to determine the effect that such a system would have on the different units in the company and also whether this IQMS is compatible with the fishing industry as a whole. By determining the effect it has on the company, examination of compatibility for the fishing industry could also be gauged. All the objectives of the case study were analysed in detail in the pilot study and the information gathered by means of this would be used to determine the viability and value of the IQMS.

The pilot study was done at the fish product manufacturer, where information was gathered to determine the value of the project. This pilot study examined the interaction and viability of the IQMS system that is currently being used.

1.7 RESEARCH OBJECTIVES

The outcomes of the study are summarised in terms of six specific research objectives:

- (1) To determine whether the integrated quality management system, which is based on different international standards (see section 1.4), is valid and applicable to a fish product manufacturer unit (of the company)
- (2) To determine whether this IQMS is ideal for quality assurance in the fish product manufacturing industry
- (3) To determine collective qualitative and quantitative values of the IQMS, as a whole (for the enterprise/manufacturer) and for internal and external customers
- (4) To determine other unique subsystem benefits/value of the IQMS
- (5) To determine the potential value of the IQMS for employees at different management levels
- (6) To determine specific values relating to cost of quality (COQ) statistics regarding defects, rejects, rework and so on.

1.8 OUTCOMES AND CONTRIBUTIONS OF THE STUDY

To address the research problem by means of six research questions:

- (1) Is the IQMS effective as a whole in terms of its primary purpose, namely quality assurance (QA)?
- (2) Is the IQMS effective in terms of its secondary purpose, that is, adding value to the company?
- (3) What areas of the IQMS need improvement and should the system be based on multiple system standards?
- (4) What are/is the other indirect internal benefits/value of the current IQMS?
- (5) What are/is the external benefits/value of the current IQMS?
- (6) Will the other subsystems benefit from the IQMS?

The results will determine whether the use of the current IQMS has had a significant positive effect on the company and if there have been and still are benefits from using such a system. The results will also show the effect that this IQMS system has on all levels of management and the value it adds to the business as a whole. A clear picture of whether such a system is compatible with the fishing industry will also be obtained.

1.9 UNIT OF ANALYSIS

The sample within the single case study (the fish product manufacturer) was selected according to managers (role players and stakeholders) who understand the IQMS and who are directly part of and involved with the system.

People were drawn out of the different operating units in the company to assist in the case study. A total of 100 people were selected. These participants were from all management levels, lower, middle and top management. They completed the questionnaires, participated in interviews and were observed to get a clearer picture of the effect of the IQMS. These findings were compared to the literature review and historical data from the company were also analysed.

1.10 DEFINITION OF TERMS

- ISO 9001-2008: International Organisation for Standardisation is a series of standards, which were developed and published by the ISO that define, establish and maintain an effective quality assurance system for manufacturing and service industries (<http://www.webopedia.com>).
- QMS: A quality management system is a set of coordinated activities, which direct and control an organisation in order to continually improve the effectiveness and efficiency of its performance (<http://www.businessballs.com>).
- COQ: Cost of quality measures the cost of complete realisation of satisfaction for customers throughout the business process (www.btaplus.ca).
- HACCP: Hazard Analysis and Critical Control Points is a food safety system that ensures the manufacture of safe food products. The HACCP system identifies potential hazards and puts control measures in place at specific points in the manufacturing process (<http://www.haccpacademy.co.za>).
- QA: Quality assurance is any systematic process of checking to see whether a product or service that is developed, meets specified requirements (<http://searchsoftwarequality.techtarget.com>).
- MSC: The Marine Stewardship Council is the world's leading certification and eco-labelling program for sustainable seafood (www.msc.org).
- TAC: Total allowed catch is the catch limit set for a particular fishery, generally for a year or a fishing season. TACs are usually expressed in tonnes of live-weight equivalent, but are sometimes set in terms of numbers of fish (stats.oecd.org/glossary/detail.asp).
- WWF: The World Wildlife Fund is a global, independent, multicultural and nonparty political organization (www.wwf.org.za).
- NASA: National Aeronautics and Space Administration is the US government agency responsible for the nation's civilian space program and for aeronautics and aerospace research (<http://www.nasa.gov>).
- LSM: The Living Standards Measure is a widely used marketing research tool that divides the population into 10 LSM groups, graded as 10 (highest) and 1 (lowest) (www.saarf.co.za/LSM/lsm.htm).

- By-catch: Is the term usually used for fish caught unintentionally in a fishery while intending to catch other fish. By-catch is a species different from the targeted species (www.greenpeace.org/international/en/oceans/bycatch).
- IQMS: An integrated quality management system is a single system (consisting out of different quality systems) used by an organisation to manage the totality of its processes (www.thecpi.org).

1.11 CHAPTER SUMMARY

This chapter provided an overview of the history of the fishing industry as a whole, as well as in South Africa. All aspects of the history of fishing were covered from where and when people started fishing to how fishing has evolved over the years. The history of the South African fishing industry was outlined, to give a clearer picture of how huge this industry is and the effect it has on employment and the economy. Owing to the fact that 60% of the fish caught and processed in South Africa are exported to other countries, the impact of this on the South Africa economy is massive.

Some of the South African fishing companies are also rated among the best in the world by international standards, in terms of the quality of the product that is supplied. The products that these companies manufacture are of world class and are in high demand. This is one of the reasons why 60% of South African fish and fish products are sold overseas.

The company where the pilot study was conducted is a world leader in the fishing industry and primarily catches hake. Locally it has broadened its product range by selling some imports in addition to its existing hake basket. The company is the leading fish brand in the South African market. It has about 1 500 employees and is vertically integrated. It catches its fish using its own fleet of trawlers and reworks the fish in factories. All its hake products are MSC approved and it was also the first South African company to be accredited with the MSC chain of custody.

To address the various quality systems with which the company has to comply, an IQMS has been implemented that adheres to all the relevant international and local standards, for selling products abroad and locally. This system has also assisted the company to grow its South African market share. The IQMS has increased the company's competitiveness and enabled it to build a strong brand that is linked to a quality product.

Chapter 2 provides a detailed literature review of the fishing industries of the world. A short history of the industry will be given, including the development of deep sea fishing. The impact of QMS in the industry will be reviewed and the reasons behind their implementation discussed. Finally, a glimpse is given of the current world trends in the industry and the global impact of fishing on existing fishing resources. QMS are directly linked to the restoration of fishing resources and to the minimisation of future adverse impacts.

The importance of certification in the industry is discussed, and the reasons behind the use of certification are examined, in order to provide possible solutions to current problem in the fishing industry. The main aim for the future is to support sustainable fishing through QMS that fishing companies implement worldwide.

CHAPTER 2: LITERATURE REVIEW OF THE INTERNATIONAL FISHING INDUSTRY

2.1 INTRODUCTION

Fisheries globally are managed using a broad range of institutional structures. The global marine fish catch is approaching its upper limits (FAO 2010). The number of overfished populations, as well as the indirect effects of fisheries on marine ecosystems, indicate that present management have failed to achieve its principal goal, this being sustainability (Fish for the Future 2010). Pauly, Christensen, Dalsgaard, Froese and Torres (1998), Jackson, Fink and Gillet (2001) and Myers and Worm (2003) state that in the last few years the media has given a lot of attention to the decline, collapse and negative impact that fishing has had on the marine ecosystem. This argument is also supported by Watling and Norse (2008). Failure is primarily due to the continued increase in harvesting rates because of the growing demand for fish.

2.2 THE HISTORY OF MODERN FISHING

People have been fishing commercially for the past 200 years, but in recent years, fishing activity has intensified hugely, owing to the high demand for fish. This has led to the fishing industry becoming the world's largest industry according to Harrison (2011). Most fishing-related industries are capital driven and do not give a lot of thought to the impact they might have on the environment due to overfishing. According to Hillborn, Orensanz and Parma (2005), overfishing has been repeated in the majority of unregulated fisheries around the world.

Deep-water fishing was initiated in 1973 as a hand-line fishery for wreck fish on the upper slope. This type of fishing was gradually replaced by bottom gillnets and bottom long lines as stated by Barcellos, Peres, Wahlich and Barison (1991), Haimovici, Castello and Vooren (1997) and Peres and Haimovici (1998). According to Valentini, D'incao, Rodrigues, Rebelo Neto and Rahn (1991), Haimovici, Brunetti,

Rodhouse, Csirke and Leta (1998) and Castro (2000), Brazilian waters suffered from overfishing in the 1990s. All over the world the same trends in fishing practices have led to overfishing. This statement is supported by analyses that have revealed that global fishing stocks have been declining because of systematic overfishing, according to Watson and Pauly (2001), and also as a result of declines in the biomass of marine predators, according to Christensen, Guenette, Heymans, Walters, Watson, Zeller and Pauly (2003). These trends of overfishing have had a huge effect on social and economic costs, as indicated by Haedrich and Hamilton (2000). In South Africa, laws were passed to halt the reduction of fish stocks and to increase the growth of all marine resources. This process has taken years to implement and results will not be seen in the near future. However, with some species, like hake, success was quickly realised, and after only four years of decreased quotas, in 2010 there was an increase in the total allowed catch (FAO 2010).

2.3 QUALITY MANAGEMENT IN THE WORLD FISHING INDUSTRY

With the emergence of the global economy, the world shrinking and a reduction in key fishing manufacturing operations all over the planet, it has become imperative for companies to IQMS into their businesses (Pauly et al. 2002).

According to Pauly et al. (2002), ongoing resource constraints globally have made it even more critical for fishing product manufacturing companies to implement QMS for their survival. Customers are also becoming more aware of the significance of quality and are demanding consistent quality at market-related prices. This factor has led to companies being proactive and using quality systems to achieve their objectives. With the implementation of such systems, companies are able to be consistent in their product offerings which, in turn, increases their competitiveness. According to Pauly, Alder, Bennet, Christensen, Tyedmery and Watson (2003), QMS help companies in the global fishing industry to increase their customer satisfaction and also to improve the work required from their employees.

QMS combine the operational structures, processes, procedures, resources and production of final products. With these systems in place, fishing companies are now producing products with ensured consistent quality and are able to render satisfactory service to their customers. Quality plays a critically important role in the fishing industry globally and for this reason QMS are imperative to most companies that can afford them, especially if they have future expansion plans.

QMS aim to produce products of good quality, to maintain customer satisfaction, to increase revenue, to reduce waste and to improve teamwork. According to Aranda and Christensen (2009), these are the core aims of QMS and the pillars on which the success of fishing manufacturing companies rests.

2.4 THE IMPORTANCE OF QUALITY IN THE FISHING INDUSTRY

In the last few years, following the food and economic crises, quality systems have been introduced in the European agriculture and food sector. According to Mensah and Julien (2011), this trend has been fuelled by the growing demands of customers and their undermined trust in food safety, hygiene and overall quality.

According to Schiefer and Rickert (2004), Hatanaka, Bain and Busch (2005) and Theuvsen, Plumeyer and Gawron (2007), quality assurance schemes are becoming extremely popular in the food industry. The reason for this growth is recent demands by customers and large retailers for companies to abide by the rules and regulations set by government, following the undermining of customers' trust in food safety. Gawron and Theuvsen (2007) agree that implementing schemes, such as the International Food Standard, is the obligation of each and every company. With certification, there are certain rules and regulations that link the particular certification to quality assurance. Certification ensures that for customers and companies, products comply with specific quality standards.

Meawissen, Velthuis, Hogenven and Huire (2003) state that certification is a voluntary assessment and approval by an accredited party on standards. These certifications are normally done by an independent third party. By passing an audit,

companies receive a certification that can be used to reduce the uncertainty encountered by buyers. According to Pfeifer (2002), certification can be for systems, processes or products. In the context of the current study, this could imply that fishing companies that have these quality systems in place have an advantage over companies that do not, when it comes to selling their products to customers.

2.5 WORLD TRENDS

The global supply of seafood is growing and demand is driven by people who want to live a healthier lifestyle and also by the fact that seafood is seen as a key source of protein. World catches have remained static, mainly because of pressures caused by environmental factors and overfishing. This has led to an increase in cost for the industry and ultimately higher prices for the consumer. According to Food and Agriculture Organisation (2010), global costs have been driven up, because of reduced supply, increased demand and high inflation.

According to Heilbronn and Ravussin (2003), the main problem with fishing today is the fact that there are individuals that make their living out of overfishing. In this day and age everything is profit driven and some companies over exploit marine resources. Many of the world's fishing companies are characterised by a race to fish, where individual fishermen compete with one another to catch a limited stock of fish in order to survive financially.

The growth area in the industry over the past few years has been in the chilled and fresh fish categories, when compared with the frozen seafood category. Most European countries prefer fresh hake, which makes it lucrative for fish companies around the world to export their fresh hake to Europe, if the exchange rate is favourable, and if not they try to sell hake locally at a lower margin.

There is an ever-increasing awareness and focus on environmental issues, with particular emphasis in Europe and the United States of America, on sustainable fishing practices. As mentioned, the key focus is still sustainability in fishing, which is mainly driven by the MSC, which has made significant progress in this field in a very

short time, according to the final report by Agnew, Grieve, Orr, Parker and Barker (2006).

The primary challenge is to apply management systems that have been put in place by governments to regulate the fishing industry, so that fish stocks are sustainable for the future. Currently, the drive towards sustainability abroad is led by retailers such as Wal-Mart and Tesco and Pick n Pay locally, where commitments have been made to ensure that all seafood products will be MSC-certified within the next three to five years. Some countries do manage their fishing quotas properly, South Africa being one of these.

2.6 WORLD IMPACT

Fishing the oceans is a significant human enterprise. Fishing provides direct employment to over 200 million people worldwide (WWF 2011). One out of every three people relies on fishing as their only source of income, or fish as their staple food or sole source of protein according to Fish for the Future (2010). Fish also accounts for 19% of the total human consumption of animal protein. It is clear that the ocean plays a huge role in the sustainability of the global population. An increase in fish populations and other marine animals has spurred commercial fishing to become one of the world's largest industries. Over 75% of the world's fish catches are sold on the international market, according to Watson and Pauly (2001). Fish is exported all over the world. Most of the fish caught in South African waters is exported to Europe and Australia.

2.7 FUTURE SOLUTIONS

Global consumption of fish has doubled since 1973, and the developing countries are responsible for most of this growth (FAO 2010). Owing to growing populations and urbanisation, developing countries tend to have the greatest increases in the consumption of animals products, including fish products (FAO 2010). Because of rapid growth in fish consumption over the past 40 years, countries have had to come together to find a solution to the problem of overfishing. Solutions have had to be found to ensure a future for marine life and resources.

In a recent meeting of the European Parliament, “Fish for the Future”, Maria Damanaki (Member of European Commission) told the delegates that 91% of the world’s fish stocks will be endangered within a decade if nothing is done to assist in the fight for sustainability. She also stated that any decline in fish stocks will have a negative effect on the human population, in the sense that many jobs will be lost, which will affect unemployment figures. Chris Davies, the founder of “Fish for the Future”, states that Britain’s fish stocks plummeted in the 1960s and 1970s when they were managed independently, and that the EU common fish policy has brought no overall improvement (Fish for the Future 2010).

According to Pauly et al. (2003), globally the landing of fish is on the increase, and this is a growing concern that many fish agencies are attempting to address, by adopting a variety of management approaches. Watson and Pauly (2001) state that fishing statistics that have been presented by China were exaggerated through the late 1990s and have contributed to a false belief that global fish landings are stable. Prince and Myers (2008) also maintain that many of the fish populations close to shore have been completely depleted, which means that other species deeper in the sea are being targeted.

2.8 CONCLUSIONS

As stated earlier, the fishing industry is at a point where drastic steps need to be taken globally to ensure the sustainability of fish species. Without the correct

management of the fishing industry, most marine life will be depleted within the next decade. Globally end consumers are forcing companies to comply with rules and regulations, which have been put in place to ensure the sustainability of marine life. One of these agencies is MSC, which has drawn up rules and regulations with which responsible fishing companies comply.

2.9 CHAPTER SUMMARY

This chapter broadly summarised the current global fishing industry. The challenges that lie ahead for the industry as a whole were explained and future solutions proposed. The main problem the industry faces is the sustainability of current fish resources. Globally, the demand for fish is growing which has led to overfishing by many countries. This has put a lot of strain on marine resources.

Worldwide, the answer to the problem of sustainable fishing is to implement QMS that support the drive to restore fish resources. In many countries, the local fish industry does not conform to annual quotas laid down by governments, which has led to overfishing. The media have focused intensively on this problem, which has led to more people being educated about the sustainability of fishing resources.

Many companies worldwide have started endorsing the need for sustainable fishing and have started to comply with WWF and MSC rules and regulations. These certifications have assisted fishing companies towards being more competitive, because of public interest in and education on sustainable fishing prompted through the media. Certification has given the public the option to choose what they would like to buy, certified or uncertified fish.

The future trend will be to protect resources from being overfished and assist the WWF and MSC in their work to secure the future survival of natural fishing resources.

This chapter dealt with the history of the world fishing industry and the factors that have had an effect on it. Chapter 3 is a literature review, which will promote a clearer

understanding of what people in the fishing industry have to say about QMS, focusing in particular on IQMS. Chapter 3 explains what a quality management system is, how it works and the impact it has on a company. These discussions will support a better understanding of the term “quality management systems”, and will reveal the positive as well as the negative aspects of QMS in the manufacturing industry.

The different QMS standards that are of importance in a variety of industries today, will be discussed with particular reference to the fishing industry.

CHAPTER 3: LITERATURE REVIEW OF QUALITY MANAGEMENT SYSTEMS

3.1. INTRODUCTION

This chapter contains a brief literature review, dealing with the background to quality, quality management, quality management systems (QMSs) and QMS standards. The chapter also covers the benefits of QMSs, the challenges of implementing a QMS and concludes with the critical success factors of QMS implementation.

With reference to chapter 2, food quality has become a huge issue in the fishing sector over the past decade. Since the big drive on the quality of food began in developing countries it has been clear that it would be used to gain competitive advantage for product sales in the future. In developing countries, food quality problems may prevent international trade because of the increasing number of food quality regulations. This means that nowadays each country has its own guidelines concerning quality management. Any product that is to be exported to a country abroad has to comply with that country's QMS. Adherence to QMS costs money, sometimes causing companies to stop exporting their products, because they cannot afford the required investment. For such companies the cost does not justify the returns on foreign business, which also has a negative influence on companies' attitudes towards QMS.

3.2 THE HISTORY OF QUALITY MANAGEMENT

The concept "quality" first emerged following the European Industrial Revolution of the 19th century. According to Wisniewski (2001) the roots of quality management can be traced back to the early 1920s with ideas about production quality control and notably the concepts developed in Japan beginning in the late 1940s and 1950s, pioneered there by the Americans, Feigenbaum, Juran and Deming.

Previously, goods had been manufactured from start to finish by the same person or team of people, with handcrafting and customising the product to meet “quality criteria”. Mass production brought huge teams of people together to work on specific stages of production where one person would not necessarily complete a product from start to finish. In the late 19th century, pioneers such as Frederick Winslow Taylor and Henry Ford recognised the limitations of the methods being used in mass production at the time and the subsequent varying quality of output. Scheele (2003) established quality departments to oversee the quality of production and the rectification of errors, and Ford emphasised standardisation of design and component standards to ensure that standard products were produced.

According to Scheele (2003), the President of Ford Motor Company, management of quality was the responsibility of the quality department and was implemented by the inspection of product output in order to find defects. Application of statistical control came later as a result of World War II production methods. Quality, as a profession and the managerial process associated with the quality function, was introduced during the second-half of the 20th century, and has evolved since then. Over this period, few other disciplines have seen as many changes as the quality profession. The quality profession grew from simple control, to engineering, and finally, to systems engineering.

3.3 QUALITY MANAGEMENT SYSTEMS

Various QMS are in use all over the world. The following are some of the most prominent QMS standards that are used: the Malcolm Baldrige National Quality Award (USA); the European Quality Management Award; the Australian Quality Award; the Deming Prize (Japan); the Scottish Quality Management System; and the ISO 9000 International Code of Practice for Quality Management Systems (Filipovic, Njari, Cvrtila Fleck, Miokovic, Zdolec & Dobranic 2008)

A QMS is defined as a set of coordinated activities or sub-systems to direct and control an organisation in order to continually improve the effectiveness and efficiency of its performance (Stuedel 1996).

QMSs have been established as tools to assist management, albeit in different revisions. In this chapter, there will be a discussion on the difference between quality management, quality assurance, total quality management (TQM) and quality management systems. The main focus will be on QMS to see their effect in a fish-manufacturing unit. According to Dick (2000), the standard, conformity and application of standardised quality system models in business are considered to be one of the most important phenomena in quality management development and globalisation. Foster (2008) posits that QMS standards can be adapted and applied to many different industries because of the broad construct of generically written standards.

Martinez-Lorente, Dewhurst and Dale (1998) state that there was a growing interest in quality management from 1978 until 1998 (their date of the publication) as attested by the number of scientific publications on the subject.

Schoefler, Buzzel and Heany (1974), Buzzel and Wiersema (1981), Craig and Douglas (1982) and Phillips, Chang and Buzzel (1983), and findings by Maani, Putterille and Sluti (1994), Jacobson and Aanker (1987), Flynn, Schroeder and Sakakibara (1994), Forker, Mendez and Hershaur (1997) and Adam, Corbett, Flores, Harrison, Lee, Rho, Ribera, Samson and Westbrook (1997) all support the proposition of the quality gurus, Crosby (1979) and Deming (1986), that better quality has a positive relationship with business performance. Quality management is a competitive dimension that sets one company apart from another. Quality is a generic performance objective to support effective quality management strategies and systems that will provide a competitive advantage.

According to Orris and Whitehead (2000), QMSs are indispensable in every sector of the food industry, because of the need to ensure safe quality food for consumers. The number of businesses in the food industry, which adopt QMS to enhance their competitiveness in the global market, continues to increase (Beatty 2006; Kapripidis, Athanassiadis, Aggelopoulos & Giompliakakis 2008:15). Kanter (2000) maintains that certification increases total sales made by businesses. In support of this statement, Carlingo, Leong, Chia and Mohamed (1995) posit that ISO 9000 certified companies

have better quality systems, customer satisfaction, competitive advantage and fewer quality problems than their competitors. Both their findings are consistent with Kayne (2000) who also reports benefits such as better communication and an increase in operational efficiency.

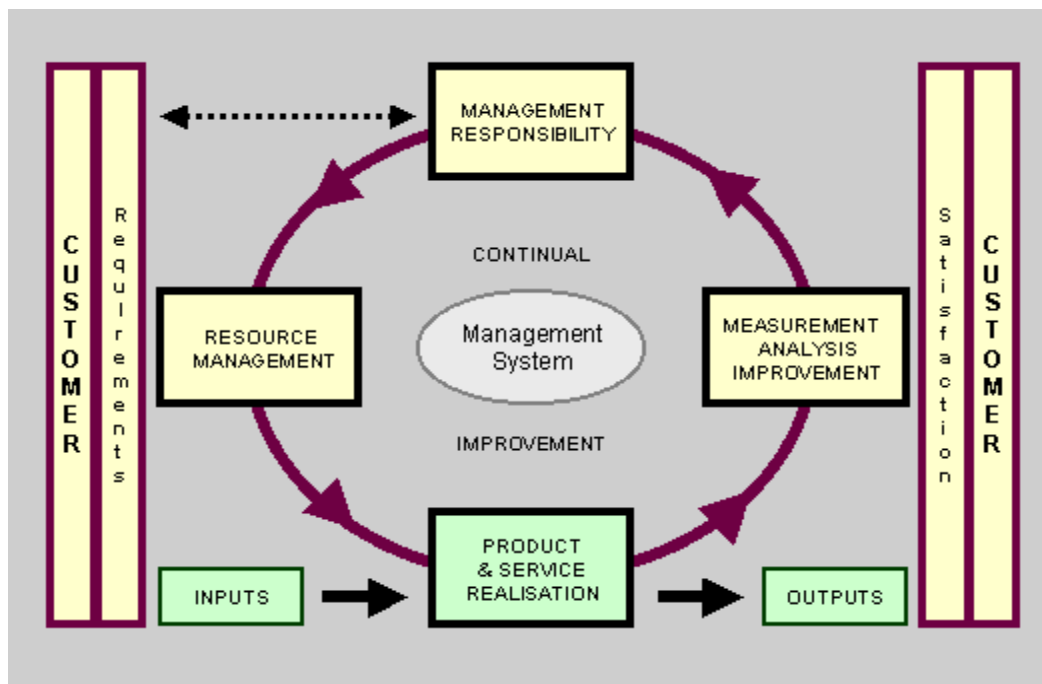
According to Stevenson and Barnes (2001), the application of a QMS is an approach that promotes continual improvement. It is a factual approach to decision-making, mutually-beneficial supplier relationships, customer focus, leadership, people involvement and a process approach. A QMS is a tool to integrate these principles and help manage quality.

Quality management also refers to the pursuit of quality in an organisation. It has four main components: quality; control; quality assurance; and quality improvement. Quality management is focused not only on product quality, but also on the means to achieve it. It therefore uses quality assurance and the control of processes as well as products to achieve more consistent quality. A QMS focuses on converting inputs into outputs that will satisfy the customer's requirements as well as those of the company. This is illustrated in figure 1 on the next page.

Goetsch and Davis (2006) define quality management as the process in which all policies, procedure, plans and so forth, are taken together. These factors define how the organisation works and how quality is managed.

Quality management is what the organisation does to fulfil and achieve the following: (1) the customer's needs; (2) the applicable regulatory requirements; (3) customer satisfaction; and (4) continuous improvement of its performance in the pursuit of these objectives (see figure 3.1). According to Jacobson and Aaker (1997), a quality product has a positive influence on the company in relation to return on investment as well as to market share and price. Forker, Mendez and Hershauer (1997) and Flynn et al. (1994) concur with this statement.

Figure 1: Model of a process-based QMS



Source: Biazzo & Bernadi (2003:165)

According to Beatty (2006) and Kapripidis et al. (2008), the number of food industries that have adopted a QMS to enhance their competitiveness on the global market grows by the day.

However, Batchelor's (1992) study reported that only 15% of firms in the United Kingdom gain from quality systems. This statement is also supported by Terziovski, Samson and Dow (1997). According to Merli (1990), customer satisfaction is regarded as the only relevant objective for ensuring stable and continuously increasing business.

3.4 HAZARD ANALYSIS AND CRITICAL CONTROL POINTS (HACCP)

3.4.1 The history of HACCP

In the years, 1959 to 1960, NASA decided to produce food for astronauts with zero adverse effects when it was eaten. They requested the Pillsbury Corporation to develop a food safety management system which led to the birth of HACCP. The

HACCP system for the assessment of an operation was introduced in 1996. HACCP was also applied in Europe in all food industries in the same year.

HACCP is an internationally recognised, science-based, food safety system that is used to help ensure the manufacture of safe food products. It is designed to prevent, reduce or eliminate potential biological, chemical and physical food safety hazards. According to Morris (1997), in the United States, HACCP was mandated through regulation for seafood in 1994, for meat and poultry in 1996 and proposed for fresh fruit juice in 1998, with regulations for other food industries expected to follow. Peters (1997) and Dean (1990) saw the same trend in Australia, New Zealand and Canada where companies were encouraged to implement HACCP. According to Merican (1996), companies adopted HACCP in developing countries because they wanted to export food products to industrialised markets.

Buzby, Roberts, Lin and MacDonald (1996) and Dean (1990) indicate that food-borne illnesses occur in many countries, including the United States, owing to lack of quality systems. Motarjemi, Kaferstein, Moy, Miyagawa and Miyagishima (1996) and Moy, Hazzard and Kaferstein (1997) emphasise the importance of reducing food-borne illnesses for developing countries. According to Caswell and Hooker (1996), HACCP is a standard that was motivated first by food safety concerns and only secondly by a desire to facilitate trade.

In developing a HACCP system for the company assessed in this study, potential hazards must first be identified and specific measures put in place at certain control points in the manufacturing setup. HACCP is not a standalone system. It builds on other quality management programmes and works with them. HACCP prioritises and controls potential hazards in food production. By controlling major food risks, the industry can better assure consumers that its products are as safe as good science and technology allow. It reduces food-borne hazards and public health protection is strengthened. Hence HACCP is a QMS that assists companies in looking for hazards, or anything that could go wrong regarding product safety, and as a consequence, companies are able to implement controls to ensure that the product will not cause harm to the consumer. This QMS also focuses on identifying and preventing hazards that may lead to product deterioration.

Food manufactures have the maximum control over their products and can have a great impact on the safety of the food they produce. In HACCP, the responsibility for the management and control of safety lies with the company. This implies that the effectiveness of any QMS that has to be managed by the company depends on how it is implemented.

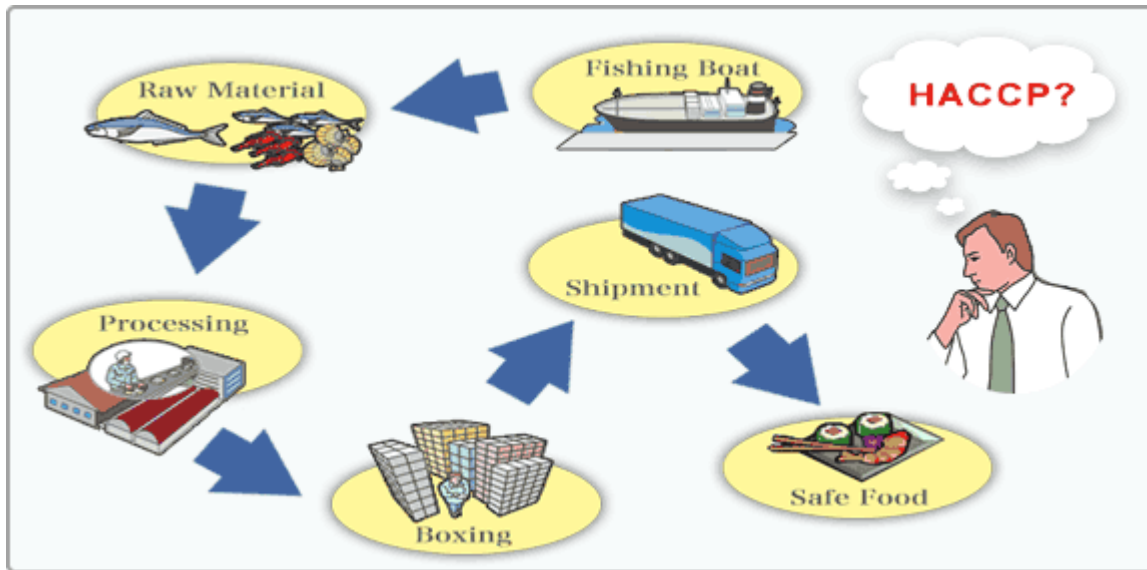
3.4.2 The HACCP system standard

Pierson and Corlett (1992) state that HACCP is widely recognised in the food industry as an effective approach to establishing good production, sanitation and manufacturing practices that produce safe foods. The HACCP system regulates the process by identifying those points in production that are most critical for monitoring and control. HACCP can be applied to control any stage of the food-processing system and is designed to provide enough feedback to direct corrective measures. The HACCP structure is based on seven basic principles and 12 steps, with the additional requirements for a QMS (Food Safety Management 2008). Thus HACCP is a QMS that helps companies that implement it to operate successfully and produce products that fulfil all the expectations of their customers.

HACCP improves the scientific basis of safety and control processes by focusing on critical control points as can be seen in figure 2. According to Pierson and Corlett (1992), a critical control point is any point in the chain of food production from raw materials to finished products where the loss of control could result into an unacceptable food and safety risk. HACCP is not a QMS that is designed to replace management decision making, but is there to improve product safety. HACCP is a food safety management system that assists companies that implement it to be more effective in running their businesses.

In the fishing industry, this QMS is of great value because fish is a highly perishable product. Because of the huge export market for fish, companies have to see that their products comply with all the rules and regulations that apply to the export of fish to other countries, as well as for the local market. The use of the HACCP system in the fishery industry is now global (Suwanrangsi 2000).

Figure 2: Diagram of the HACCP system

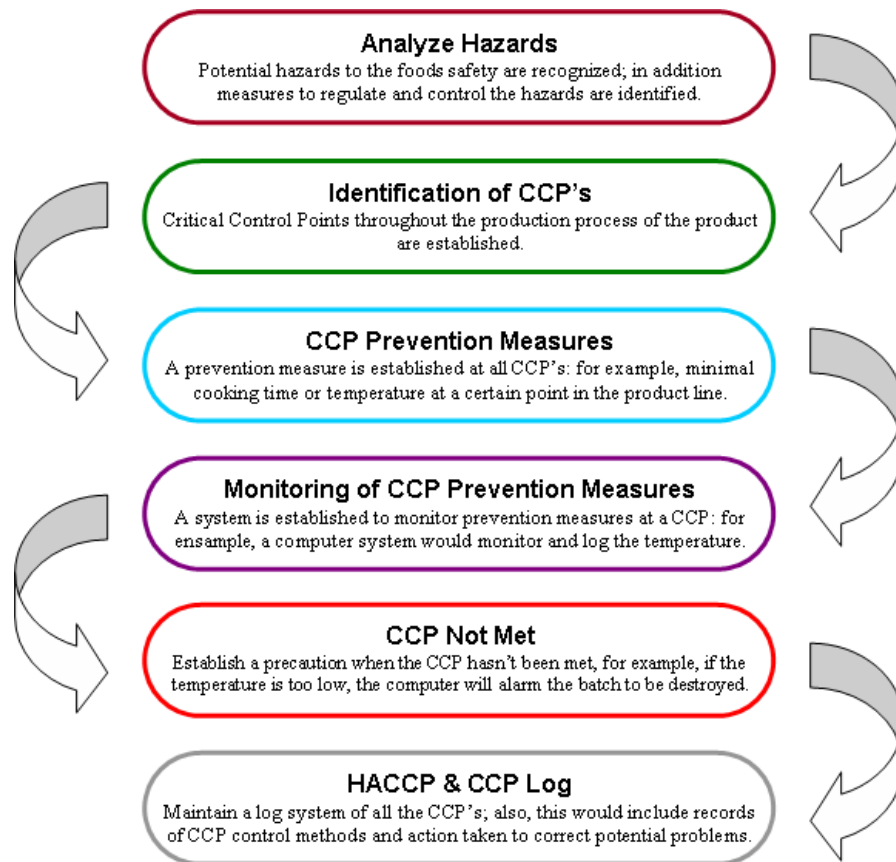


Source: Azuma Foods (2012)

The HACCP approach consists of the following seven basic principles: (Food Safety 2005)

- (1) *Conduct a hazard analysis.* By doing this potential hazards that could occur in the food production process are identified.
- (2) *Identify the critical control points (CCPs).* These are the points in the process where potential hazards could occur and can be prevented or controlled.
- (3) *Establish critical limits.* A critical limit must be met with each critical control point.
- (4) *Establish monitoring requirements for all the critical control points.* This ensures that the CCPs stay within their limits. Implementation of this principle may require the installation of devices to measure and monitor the CCP process.
- (5) *Establish corrective action if a CCP is not within its limits.* Where a problem occurs, corrective action must be taken to ensure that no public hazard occurs.
- (6) *Establish effective record keeping.* See that the HACCP documentation system works perfectly.
- (7) *Establish procedures for verifying that the HACCP system works properly.*

Figure 3: Seven HACCP principles



Source: Josh Levy-Kramer (2005)

3.4.3 Benefits of implementing HACCP

Besides the food safety protection that HACCP provides to its customers, it also has a number of other benefits for the food industry. Mazzocco (1996) and Henderson, Holt and Northen (1998) suggest that there are operating efficiencies to be gained once HACCP is in place. These are as follows:

- *Increases the focus on and ownership of food safety.* Food safety is the responsibility of everyone in the food supply chain. By implementing HACCP, the employees of the company become more aware of food safety and their roles in maintaining and contributing to food safety. This increases awareness that leads to increased ownership and pride in the production of a safe product.
- *Increases buyer and consumer confidence.* There is an increase in buyer confidence when suppliers comply with HACCP. Food processors, who implement HACCP, provide buyers and consumers with safe food products.

- *Maintains or increases market access.* As HACCP becomes more common, market access is limited for processors who do not comply with it. In many cases, buyers demand HACCP implementation at their suppliers. Thus a company has to have HACCP in order to maintain market share or gain access to previously inaccessible markets. HACCP can also help companies to re-enter markets that were previously lost.
- *Provides business liability protection.* By implementing HACCP, the company can be assessed to have some degree of increased business liability protection, which may lead to reduced insurance premiums.
- *Reduces operational costs.* The implementation of HACCP requires the entire manufacturing process to be reviewed and analysed and a written procedure developed. By doing this, areas are often revealed where operational costs can be streamlined.
- *Provides efficient oversight.* HACCP implementation provides companies with ongoing and efficient oversight. The monitoring of activities that are performed on a regular basis, allows the company to maintain control over its facilities.
- *Improves product quality and consistency.* The implementation of HACCP, may indirectly enhance product quality. The standardisation of procedures may also lead to an improvement in product consistency.
- *Reduces wastage.* HACCP allows a company to control costs by minimising the amount of product requiring rework or rejection. It also focuses on areas that have been identified as critical in the manufacturing of safe food products. With HACCP, most problems are addressed before they escalate and before products are dispatched. By identifying a problem early, the cost of waste is automatically reduced.
- *Aligns with other management systems.* An HACCP-based quality management system is compatible with other quality management systems such as ISO 9001:2000.

As can be seen from the benefits discussed above, HACCP provides business with a cost-effective control system on food safety, from the beginning, through all the different production processes, to the end, where the product is finally sold to the

customer. HACCP not only improves the food safety management of the product, but also complements the other QMS that are in place.

3.4.4 Disadvantages of HACCP

There are also some disadvantages when implementing HACCP. Everyone always presents the positive side of HACCP, but seldom looks at the other side of the system. The following disadvantages are commonly found when implementing HACCP:

- *Qualified people.* Workers have to be qualified in HACCP and need to understand the fundamentals and principles to apply the system correctly in the workplace. Many people do not apply the HACCP system correctly in their workplaces.
- *Cost.* Implementation of HACCP brings additional costs (training, establishment of systems, etc.).
- *Processes.* HACCP requires the introduction of additional processes during the production cycle.
- *Salaries.* When people become more skilled in the principles of HACCP, they normally demand higher salaries because of the extra responsibilities and education.
- *Consumers.* Because of the costs incurred when implementing HACCP, producer's input costs rise, which leads to consumers having to pay more for the products they buy, which can have a negative impact on business. Most people buy according to price and are no longer brand loyal in today's unstable economy.

Most of the disadvantages are linked to the cost of implementing HACCP and maintaining it, through ongoing training and upgrading of systems. These disadvantages need to be taken into account when companies are considering the implementation of HACCP.

The overall picture reveals that when implementing HACCP, there are many more advantages to this system than disadvantages. The cost factor stands out as the

primary disadvantage, but over time, the savings that are generated through the implementation of the system, far outweigh the costs.

3.5 INTERNATIONAL ORGANISATION FOR STANDARDISATION (ISO)

3.5.1 The history of ISO

ISO 9000 was developed in response to the need to harmonise dozens of national and international standards relating to quality. According to Seddon (1997), ISO 9000 grew out of BS 5750, a standard published by the British Standards Institution (BSI) in 1979. Initially, it was used only in manufacturing industries. ISO 9000 is now employed across a variety of other types of businesses. It is a set of international standards for quality management systems.

The history of ISO 9000 dates back to Mil-Q-9858a, the first quality standard for military procurement established in 1959 in the USA. By 1962, NASA had developed its quality system requirements for suppliers. In 1965, NATO (the North Atlantic Treaty Organisation) accepted the AQAP (allied quality assurance procedures) specifications for the procurement of equipment.

In the beginning, ISO 9000 was implemented exclusively by large companies. But by the mid-1990s, an increasing number of small and mid-sized companies began to implement these standards.

According to West (2002:45), "the object of ISO 9000 is to promote the development of standardization and related world activities with a view to facilitating international exchange of goods and services and to developing cooperation in the sphere of intellectual, scientific, technological and economic activity."

Any company or organisation that has been independently audited and certified to be in conformance with ISO 9000 may publicly state that it is "ISO 9000 certified" or "ISO 9000 registered". Certification to an ISO 9000 standard does not guarantee any

quality of end-products and services, but actually certifies that formalised business processes are being applied.

3.5.2 ISO 9000 as a QMS standard

Goetsch and Davis (2006) maintain that ISO 9000 is an international quality standard for goods and services. With the ever-increasing globalisation of world markets, international standards have become even more important than ever before. Roa, Ragu-Nathan and Solis (1997) note the global interest that existed a decade ago. According to Martinez-Costa, Martinez-Lorente and Choi (2008), that in more recent times the global nature of certification and the growth in registration is becoming increasingly non-European. Quazi, Hong and Meng (2002) have pointed out the same trend in Asian companies.

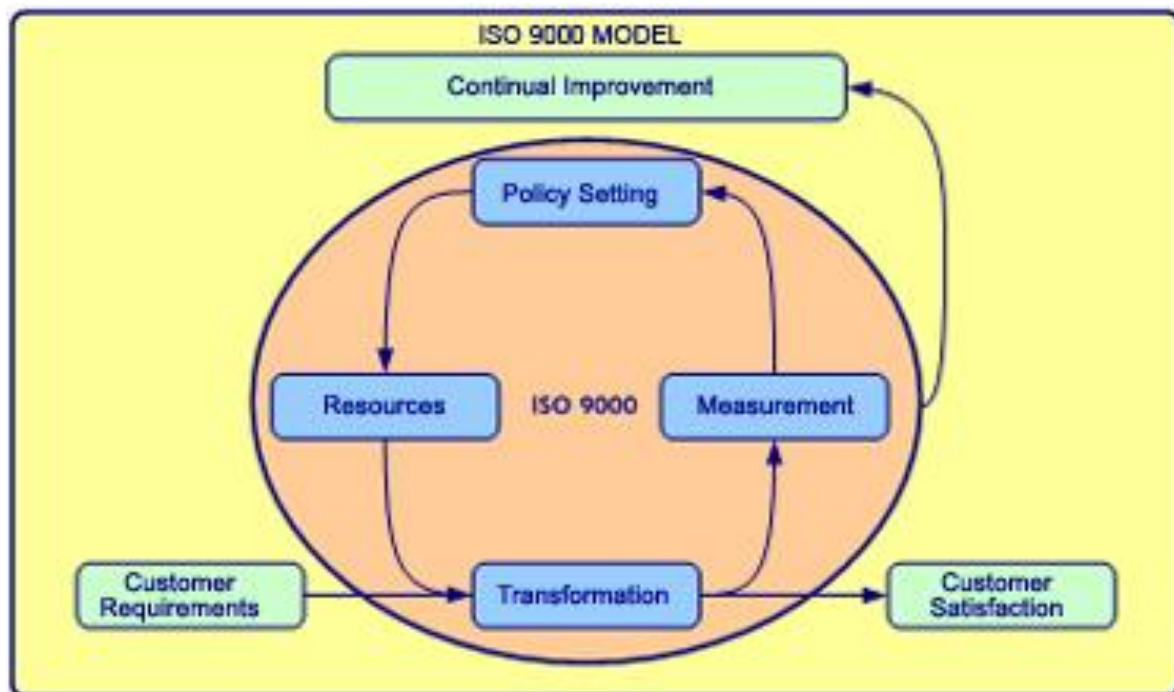
The ISO 9000 series are standards used for external quality assurance purposes and are designed for internal use (figure 4). Lamprecht (1992) provides exceptional insight into the process of ISO 9000. (ISO registration does not guarantee a quality product, as indicated in figure 5). According to Lee (1998), customers in Sweden demand that firms become certified in ISO 9000 and that they have to be certified to stay in business. Elmunti and Kathawala (1997) believe that ISO 9000 improves operational efficiency and communication in an organisation and hence results in greater customer loyalty, market share and higher stock prices. Webster (1997) suggests that ISO 9000 helps companies to look closely at their manufacturing and management practices and identify areas where improvement is possible.

Chittenden, Poutziouris and Muhktar (1998) find that companies that have adopted ISO 9000 are normally large, multiproduct manufacturing companies. However, Struebing (1996) reports that ISO 9000 is used by small and medium-sized businesses and not only large businesses. Most businesses that became ISO 9000 registered do so because of the evidence of increased operational efficiencies and reduced costs (Struebing 1996).

According to Brown, Van der Wiele and Loughton (1998), Lee (1998), Quazi and Padibjo (1998), Casadesus and Jimenez (2000) and Singels, Ruel and Van de Water (2001), ISO 9000 is justified for its internal and external benefits.

Ho (1999), however, sees ISO 9000 more as a vehicle to help implement TQM in companies. Gotzamani and Tsiotras (2001) point out that ISO 9000 is the first step to TQM in any business. Taylor (1995), Tummala and Tang (1996), Baena Lopez (1998), Skrabec (1999), Sun (2000) and Escanciano, Esteban and Vazquez (2001) agree with this statement. Sun (2000) suggests that in order to benefit from ISO 9000 certification, it must be seen as a means towards TQM.

Figure 4: The ISO 9000 model



Source: ISO [s.a.] (2011)

3.5.3 ISO 9000 quality management principles

According to Corrie (2009) there are eight quality management principles applicable to ISO 9000 standards:

- customer focus
- leadership
- involvement of people

- process approach
- systems approach to management
- continual improvement
- factual approach to decision making
- mutually beneficial supplier relationships

There are nine technical sectors to which ISO 9000 can be applied:

- generalities, infrastructures and sciences
- health, safety and environment
- engineering technology
- electronics, information technology and telecommunication
- transport and distribution of goods
- agriculture and food technology
- materials technologies
- construction
- special technologies

3.5.4 The fundamental elements of ISO 9000

The following elements form the basis of ISO 9000 and constitute the key part of ISO 9000 when implemented:

- *Process flow management.* According to Lee, Hareton, Leung and Chan (1999), ISO 9000 is basically a list of norms on how to manage the processes in the company.
- *Information and data gathering.* Tummala and Tang (1996), Lee et al. (1999) and Gotzamani and Tsiotras (2001) contend that ISO 9000 does not require analysis of data.
- *Use of statistical tools.*

Ho (1999) maintains that all around the world, ISO 9000 registration is encouraged by governments in countries such as Hong Kong, Malaysia, Singapore and China. Drucker (1974) aptly describes the success of ISO 9000 as follows: “long term

thinking is moulding the future by understanding the consequences of what we do today”.

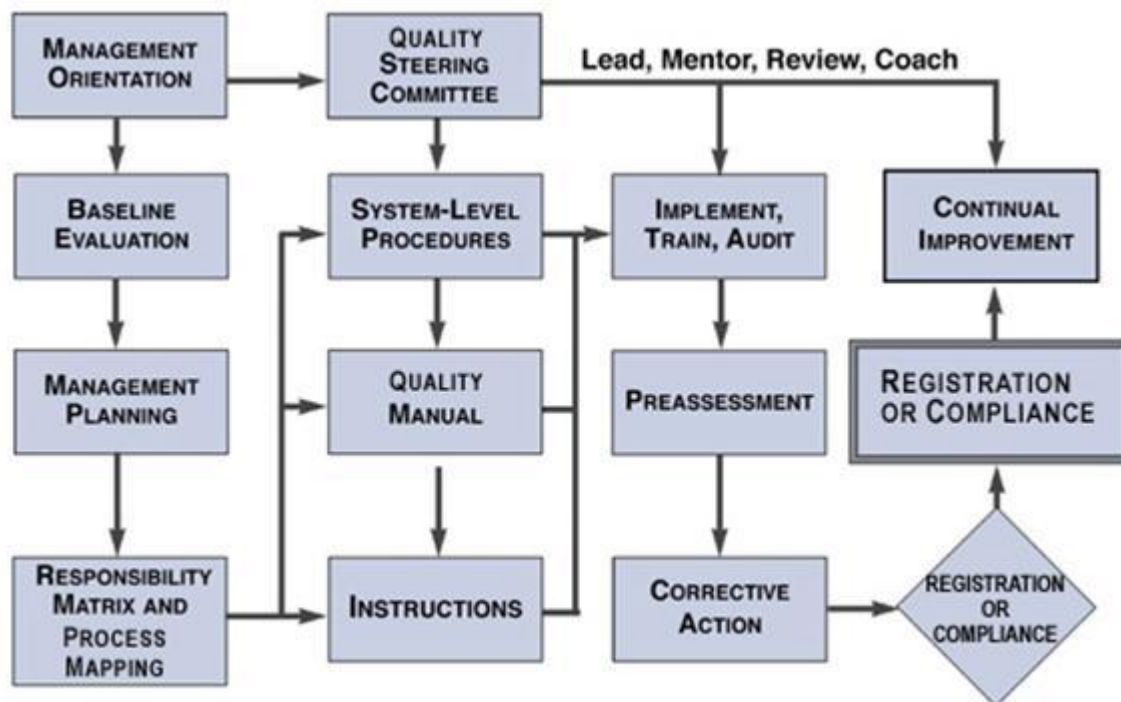
Mann and Kehoe (1994) note that quality certification is associated with improved business performance, while Buttle (1997) contends that firms having a certified quality system claim, benefit from improved operations and marketing gains. Similar findings are reported by Casadesus and Jimenez (2000) and Quazi and Padibjo (1998). However, a large study by the Lloyd's Register of Quality Assurance Ltd (1993), the Institute of Quality Assurance (1993) and Breka (1994) report that the greatest gain from a certified quality system is widening market opportunities rather than any improvements in quality per se.

According to Seddon's (1997) case study, ISO 9000 has a negative effect on the performance of a business when implemented. In contrast to the latter findings, Jones, Arndt and Kustin (1997) and Chapman, Murray and Mellor (1997) found that companies that only seek certification are not as successful as companies that fully support and drive the ISO 9000 system.

There are many reasons why companies implement QMS, but the two main reasons for putting into place a system like ISO 9000 are as follows: (a) market-related reasons; and (b) reasons associated with the improvement of internal procedures (Lipovatz, Stenos & Vaka 1999). In figure 5, the whole process of implementing ISO 9000 is illustrated. There are several stages in the implementation of ISO 9000 in a company, and the benefits only become apparent in the long-term. All stages have to be followed to attain the sought for end result – certification.

3.5.5 Stages of implementation of ISO 9000

Figure 5: Implementing of ISO 9000

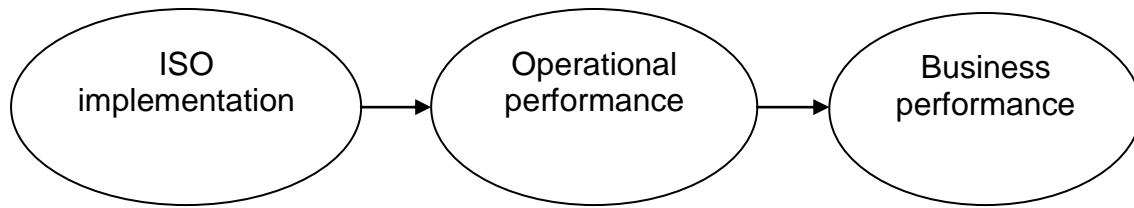


Source: Textile Today (2010)

3.5.6 Benefits of an ISO 9000 system

Various studies, including those done by Elmunti (1996), McAdam and McKeown (1999), Huarng, Hong and Chen (1999), Lipovatz et al. (1999), Yahya and Goh (2001), Arauz and Suzuki (2004), Casadesus and Karapetrovics (2005) and Briscoe, Fawoette and Todd (2005) demonstrate the benefits of implementing ISO 9000 in companies. By implementing such a system it is possible to improve operational and business performance. This finding is confirmed by Romano (2000), Corbett, Montes-Sancho and Kirch (2005) and Sharma (2005). Chow-Chua, Goh and Wan (2003) note that most companies increase their overall sales following the implementation of ISO 9000. Fuller and Vertinsky (2006) also concluded in their study that there is a definitive increase in the overall sales of a company after implementing ISO 9000. According to Choi and Eboch (1998) and Zucker (1987), companies that only implement ISO 9000 because of external requirements also have a continuous flow of contracts and the goodwill of external constituents.

Figure 6: The impact of the ISO standard on business performance



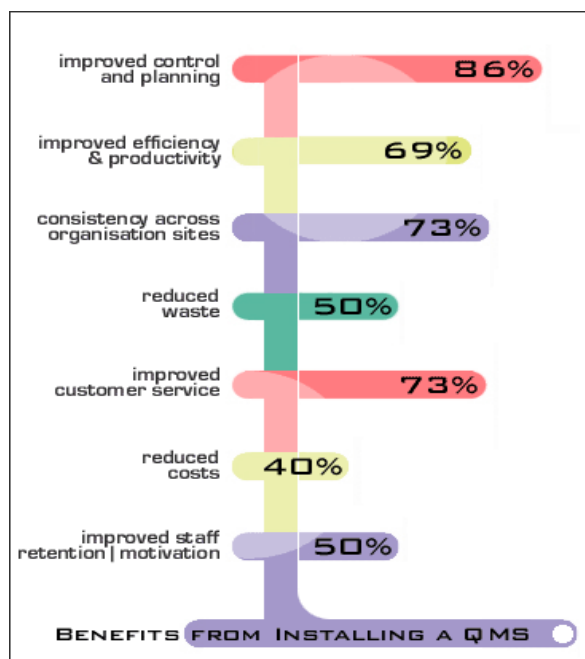
The implementation of ISO 9000, not only benefits the business sector, but also society as a whole. It introduces a situation in which there is more competition, which leads to increased choice for customers. The standards that ISO 9000 sets, also help companies to become competitive internationally and give customers a quality product. Hayes (1994) postulates that the new set of standards, promulgated by ISO is likely to have a greater impact on quality practice around the world than any other quality concept.

Another benefit of ISO 9000 implementation is that it is a structured, documented quality system that leads to cost reductions and a improved control of business (Huarng et al. 1999; McAdam & McKeown 1999). Lipovatz et al. (1999) maintain that ISO 9000 improves the production process of a company in which it has been implemented (see figure 6). Dick (2000) also holds that a quality management system can improve quality, which leads to less waste and a better quality product for customers. Elmunti and Kathawala (1997) and Renuksa and Venkateskwara (2006) also agree with this statement.

According to Beattie and Sohal (1999), reducing production costs is one of the main benefits of implementing ISO 9000 in any company, based on the survey conducted by Magh (2006). In this survey, Magh (2006) shows that the three most important benefits when implementing ISO 9000 are improvements in efficiency, better documentation procedures and increases in quality awareness in the business. Naveh and Marcus (2005) confirm that ISO 9000 has a positive effect on operational performance when implemented in a company (figure 6), which leads to better business performance. Tari, Molina and Claver (2002), Heras, Dick and Casadesus (2002) and Nasser, Karbhari and Mokhtar (2004) also found this link between ISO 9000 registration and business performance in a company.

McAdam and McKeown (1999) also state that ISO 9000 certification results in benefits for companies. According to a study by Berry (1991), ISO 9000 has a significant cost reduction effect, which results in improved performance. Buttle (1997) found that there is an improvement in the operations of the business that is linked to a QMS like ISO 9000. Sun (2000) finds that Norwegian firms that are ISO 9000 certified have fewer customer complaints and improved profitability and productivity.

Figure 7: Benefits of installing a QMS: ISO 9000



Source: TQM & Business Excellence (2009)

Figure 7 clearly illustrates the effect of implementing a QMS like ISO 9000. From when it is first implemented, positive effects are seen all over the business. The main effect that a QMS like ISO 9000 has on a company is the improvement in the planning and control of its resources. As indicated in figure 7, after implementation, the improvement in controlling and planning is about 86%, which is far greater than the other improvements illustrated in the diagram. In general it can be said that all aspects of the business are affected positively, which helps the business to be successful and grow in the future. Figure 7 also illustrates that a QMS has a positive influence on the business chain as a whole. It starts by reducing waste and improving productivity, which ultimately improves staff motivation. Figure 7 shows

that a QMS like ISO 9000 looks at the whole value chain and all the improvements are interlinked.

Sissell (1996) reports on a survey conducted with 1 880 respondents to determine the success of ISO 9000 certification. The results of this survey are listed below. The remarkable statistics in the study reveal that close to 95% of companies reported internal benefits and 85% showed external savings.

According to Sissell (1996), the benefits of implementing ISO 9000 as set out below, were found by companies.

External benefits

- (1) Higher perceived quality (83%)
- (2) Competitive advantage (70%)
- (3) Reduced customer quality audits (56%)
- (4) Improved customer demand (29%)
- (5) Increased market share (18%)
- (6) Quicker product to market (6%)

Internal benefits

- (1) Better documentation (88%)
- (2) Greater quality awareness by employees (83%)
- (3) Enhanced internal communication (53%)
- (4) Increased operational efficiency (40%)

As seen from Sissell's (1996) survey, most benefits are quality benefits, while two secondary factors are market advantage and customer demand.

According to Sissell (1996), the following are additional benefits: (1) standardisation; (2) consistent dissemination of information; (3) improvement in using statistics; (4) global acceptance; (5) enhancement of customer responsiveness; and (6) continual encouragement and improvement.

These benefits will be of great value to the fishing industry being studied, if ISO 9000 is implemented correctly. In this study, these benefits will be measured to see if the outcomes are the same as those in Sissell's (1996) study.

3.6 INTEGRATED QUALITY MANAGEMENT SYSTEMS (IQMS)

Many companies utilise a combination of available system standards to customise their own QMS. These can be referred to as integrated QMSs. A company can also formally certify this QMS or selected parts of it.

The company under study has an IQMS which consists of different systems amalgamated to effectively form one QMS. An IQMS combines all related components of a business into one system in order to simplify management and operations. Quality, environmental and safety management systems are combined. In an IQMS, no standard is supposed to be used as a rigid inflexible legal guideline. The unique circumstances and specific needs of the custom design require the consideration of a combination of several standards. By means of custom design, the manufacturer under study has formulated a system that helps it to comply with all specifications and demands that different customers, both local and international, have in relation to its retail and seafood service markets.

According to Conti (2006), quality is becoming an integrated system in which the best of all approaches are merged into unique systems that engage the entire business, as opposed to a single function. Quality enables an entire interrelated operational philosophy and organisational culture to be developed by the management team, as the core dimension of its way of working. An integrated management system is a management system, which integrates all components of a business into one coherent system. Watkins (2006) states that to be effective, a QMS must evolve into a business management system. It has to address and incorporate the whole company into the business management systems approach, by focussing on the use of knowledge management to understand and manage the organisation's "dynamic complexity".

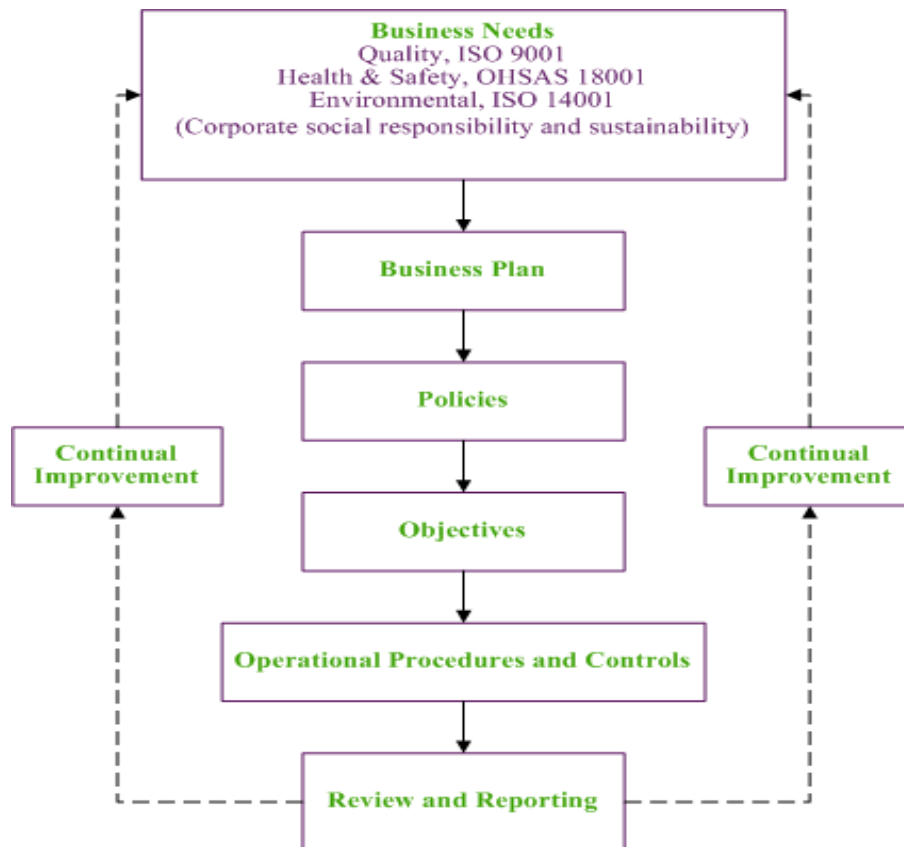
An IQMS needs to conform to standards such as ISO 9000, ISO 14000, and BS 8800 (figure 8). An IQMS has a structure similar to that of the Malcolm Baldrige National Quality Award, with 1 000 points distributed over ten categories: senior executive leadership; process analysis and management; human resource development and management; strategic planning and alignment; strategic information and analysis; customer value; employee satisfaction; supplier quality and relationships; operations and business results; and environmental impact on society. An IQMS is built on a clear corporate mission and on core values like customer retention, customer satisfaction and corporate performance results.

With an IQMS, each function becomes aligned behind a single goal, improving the performance of the entire organisation. An integrated system provides a clear, holistic picture of all aspects of the organisation, how they affect each other and their associated risks. Such a system helps to reduce duplication and to facilitate the adoption of a new system in the future, should one be needed.

Having a fully developed IQMS in place enables an organisation to meet the challenge to drive operational efficiency and to improve overall compliance. While market globalisation has vastly increased the potential for profit for manufacturers and other businesses, it has also intensified competition and the pressure to produce products more quickly and less expensively.

Effective IQMS take into consideration all activities that have an effect on the business and are implemented at all levels in an organisation, regardless of its size or function, as can be seen in figure 8. Implementation of an integrated system takes time and all processes have to be interlinked.

Figure 8: Integrated systems flowchart



Source: North East Integrated System (2011)

3.6.1 Benefits of an integrated quality management system

IQMS have the following benefits:

- improved focus on company objectives
- reduced business risk
- clearly defined roles and responsibilities for managing the integrated management system
- reduced documentation
- promotion of a single system
- reduced resources to manage the system
- improved prioritisation of key issues
- more concise reporting structures
- more efficient system – removes duplication
- easier management
- improvements with multi skilling

Building an integrated management system to address the various requirements promotes a streamlined flow of information throughout the company, as well as improved recognition and understanding of responsibilities and interrelationships.

With a company working as an integrated whole, operational efficiency is increased and overall performance improved, and risks are reduced as responsibilities become clearer (Conti 2006). In addition, integrating the management systems approach can also reduce costs, time and disruptions that may be incurred while handling separate outside audit and certification programmes (Watkins 2006).

3.7 THE IMPORTANT FACTORS OF QUALITY MANAGEMENT SYSTEMS VIEWED BY RESEARCHERS

In table 1, the different views of some of the researchers mentioned have been summarised to illustrate whether they agree or disagree on certain outcomes associated with QMS. Five random dimensions of QMS were chosen in order to compare the findings of ten different researchers.

Table 1: Researchers views on QMS

		Anderson	Sihal	Samson	Terziovski	Evan	Struebing	Corbett	Dick	Magh	Handfield
1	Improve leadership	+	+	+	+						
2	Customer focus	+	+	+	+	+					+
3	Performance			+	-		+	+	+	+	+
4	Reduce cost		+				+			+	+
5	Financial benefit				-		+	+	-		+

+	Positive
-	Negative

Regarding the first factor in table 1, four of the researchers state that a QMS improves the leadership of the department or team where it has been implemented. Along with the QMS that is being implemented, there also comes responsibility. People who have to run such a system need to have leadership qualities and the QMS assists them in improving leadership and running an effective team.

Some researchers also believe and have proven that a QMS is customer focused. The whole process with any QMS is to satisfy the end consumer through the product that is being produced. All QMS are customer focused and are driven by the team leader on a daily basis. When a company decides to implement a QMS , the first factor that will be examined is whether the system will make a difference to the end result, which is to satisfy customers.

Most researchers support the view that a QMS improves the operational performance of a company. The researchers also show and prove that a QMS like ISO 9000 improves production processes where it has been implemented. By improving production process, waste is reduced and the quality of the product for the end consumer is improved, which again proves that a QMS is customer focused.

QMS improve the production process which leads to waste reduction and better production runs, and they thus reduce the costs involved in business. Longer production runs, less damage and less wastage create a direct saving which improves the profitability of the business.

Some researchers find that a QMS has a positive financial effect on a company, while others do not. Struebing (1996:18) did a survey of some companies in which QMS were implemented and all of them reported a positive financial effect on their businesses. Reducing waste and damages has a direct positive impact on a company's financial performance. This statement is also supported by other researchers. Some researchers say that although a QMS improves operational performance, it does not improve the company's business performance. One of the reasons, according to some is that a QMS is not financially beneficial, because of the high cost of implementation. According to Terziovski et al. (1997), in none of the companies they surveyed did a QMS have any positive effects, nor did it lead to any financial benefit for the company.

All these findings are interesting and they will be compared with the findings of this study, which aims to see if an IQMS has had a positive or negative effect on the company.

3.8 CHAPTER SUMMARY

The chapter reviewed the literature and focussed on the origin and history of QMS. The discipline started with the birth of HACCP, which was used to assist NASA in its quest to produce food with zero adverse effects. HACCP was a quality system that was used to identify potential hazards that could occur in food manufacturing. This system provided operational benefits to the companies that implemented it. It also had its negative effects, the main one being the need to have skilled people to understand its principles and functioning.

Another QMS, which in recent years has taken over from HACCP but has incorporated HACCP principles is ISO 9000. ISO 9000 is a world-renowned quality system. It is built on eight principles of which the most important one today should be customer focus. Because all industries are customer focus driven, this system can be used in all industry sectors. There are also many similarities between ISO and TQM. As in all QMS, ISO has its internal as well as its external benefits.

Lastly, there is the system that is used by the company under study here, which is an IQMS. An IQMS comprises a number of different systems that are combined into one system. It takes into account all the necessary aspects of all the different quality systems that have to be adhered to, for production of a range of products. The main aim of such a system, is to be customer focused, by supplying a quality product at a competitive price. All the different researchers that have been quoted, have their own views on the value of implementing a QMS, some positive and some negative.

In chapter 4, several different research designs will be used, to see if the existing IQMS adds value to the company under study. These research designs will be used to gather information to obtain a clear overall picture of the impact of such a system. Information will be gathered to assist in making a decision about whether or not there are benefits to be gained from this IQMS. The instruments that will be used are questionnaires, interviews, observation and historical data. There will also be a discussion about which of the measuring instruments will be used to assist in evaluating each of the objectives that were put forward, in order to determine the viability of an IQMS. In so doing, there will be a much clearer picture of the effect that

such a system has had on the people who use it and on the operation in general. This analysis will assist the researcher to determine whether or not the IQMS that has been implemented, adds value to the company.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

This chapter briefly describes the research approach and method used to address the research problem. The methods selected were those appropriate for the research approach, the research problem, the objective of the survey and to increase the reliability and validity of the results.

“Research in the broadest context is a planned process based on scientific principles and methods utilized to unearth new knowledge in terms of discoveries, trends, correlations, theories and others” (Flick 2009). The broad research presents a goal that depends on the type of problem being investigated.

The three main types of research that can be conducted are exploratory research, descriptive research and explanatory research. The research methods that will be used for this research relate to personal qualitative research by means of the case study method. This in-depth study allowed the researcher to use multiple measuring instruments to achieve the objective, which was the determination of the viability of the current IQMS in a fish factory.

4.2 RESEARCH PROBLEM

All fishing manufacturers worldwide acknowledge a need for quality assurance, and several different QMS are used. It is difficult to benchmark individual systems against a worldwide standard, because not a lot such standard exists. The solution to the problem is therefore to determine the viability of this particular IQMS. Since the management system is based on international standards, which are widely used in other industries, it was decided to determine the viability and value of such a management system, which is based in the South African fishing industry, with particular reference to a leading fishing product manufacturing unit. The scope and

cost of such a project justified a pilot study to determine the long-term implications of the implementation and maintenance of an IQMS.

The research objectives of the study were as follows:

- (1) To determine whether the IQMS, which is based on different international standards, is valid and applicable to a fish manufacturing unit in Saldanha
- (2) To determine areas for improvement of the current informal QMS, and whether or not a formal implementation and certification is recommended
- (3) To determine collective qualitative and quantitative values of the QMS, as a whole (for the enterprise/manufacturer) and for internal and external customers
- (4) To determine other unique subsystem benefits/value of the QMS
- (5) To determine the potential value of the QMS for employees at different management levels
- (6) To determine specific value related to the cost of quality (COQ) statistics pertaining to defects, rejects and re-work

4.3 RESEARCH DESIGN

“Research design is an overall plan or blueprint of how a study is going to be conducted with specifications for enhancing the study’s integrity” (Polit & Talano-Beck 2008:30). The research approach selected here was based on the research problem in terms of an industry-specific problem with a unique and small population. This scenario was ideal for a qualitative, in-depth study, based on the case study method.

This in-depth investigation took the form of a case study using an experimental, descriptive and explorative design to determine the effect that the IQMS has on this fish product manufacturing company. Researchers can choose from the following research approaches to conduct a case study: (1) qualitative research; (2) quantitative research; and (3) a combination of both. According to Patton (1990:39), the choice of the research paradigm should depend on the purpose of the research. The primary purpose of this research was to focus on the IQMS of the company

under investigation. This implied a qualitative approach, because the study was primarily for the purposes of internal validity.

A qualitative approach was therefore followed, with elements of quantitative research in terms of measurements and amounts. Qualitative research originated in the social and behavioural sciences and is concerned with exploring and understanding phenomena in order to answer questions that have been posed. The qualitative approach is multi method and naturalistic, and studies things in their natural setting (Shank 2002). Qualitative research analyses the unstructured information that is gathered through questionnaires, interviews, face-to-face encounters and historical data. With this information, insight can be gained into people's attitudes, behaviour, value systems, culture and motivation. This information can then be used to inform business designs, policy formation, communication and research.

4.4 POPULATION

The population of a survey can be defined as all the people with the characteristics the researcher wishes to understand. The population is the study object and consists of individuals, groups, organisations, human products and events, or the conditions to which they are exposed.

Newman and Benz (1997:203) argue that a population is an abstract concept, because it can never truly be frozen for measurement. A population also refers to the characteristics of interest to the researcher that meet criteria he/she is planning to study. The population of this study can be defined as all the fishing product manufacturers who consider the formal implementation of an IQMS based on international standards. The target population for this case study was lower, middle and top management people in the different units of the chosen fish product manufacturing company. Top management of the fishing company also gave their insight into the QMS used in the factory, to gain more information for the study. In so doing, information was gathered at all levels of the business which gave a clear picture of the current IQMS.

4.5 RESEARCH METHODS

Research methods refer to the measuring instruments used to address the research problem. The overall method is the case study of a fishing manufacturer that is considering the effects of an IQMS based on international standards. This method implies an in-depth study by means of multiple self-constructed measuring instruments. These instruments are interviews, questionnaires, observation and historical documents.

There are several unique factors that contribute to successful results in a case study:

- There is a synergy among respondents, as they build on each other's ideas and comments.
- Respondents are more active than in a structured survey.
- The researcher can probe beyond the initial responses rationale.
- The observation of non-verbal communications is a valuable contribution to the analysis.
- The opportunity to engage with respondents assists the researcher in recording spontaneous reactions and responses and reduces inhibitions.

4.5.1 The case study method

The case study method is one of many other qualitative research techniques (Yin 1994). Qualitative research is ideal to gain a better and deeper understanding of a situation, including human behaviour. The focus is not merely on *what*, but also on *why* and *how*. The other advantage of the case study method is that phenomena occur in their actual, natural setting. The researcher is the gathering instrument and the study can evolve and the design can change as the study unfolds. Data can be in the form of documents, figures, pictures, objectives, behaviour and verbal feedback. Qualitative data are rich but more time-consuming to obtain than quantitative data. The main drawback is that the researcher becomes subjectively immersed in the subject matter (Yin 2009).

4.5.2 Scope and size of the case study

The case study method was used here to study an individual case (or programme) in the fishing industry to gain an in-depth understanding of an uncertain (poorly understood) situation in terms of QMS.

The specific methods (measuring instruments) used were questionnaires, interviews, observation and documents (historical data).

Data analysis was done by summarising details, categorising the data, identifying patterns and integrating findings.

The primary advantage of the case study method was access to several sources of information. In the current study, the measuring instruments was applied to 100 staff members of the company.

The staff complement of this fish product manufacturer comprises 1 500 competent people. The sample of 100 people consisted of 50 from lower management, 30 from middle management and 20 from top management, representing all the different units of the company, except the IT and finance departments. This exclusion was due to the fact that these two departments are not involved in the daily operation of the business where the IQMS has been implemented. All 100 people each had more than ten years of experience in the fishing industry.

The reason for choosing people from different management levels was to gain a better overall picture of the effect that the current integrated quality management system has had on the business. The fact that their positions are spread across all units in the business, enabled the researcher to gain a clear picture of the effect that this system has in all areas.

4.6 CASE STUDY SAMPLE

A sample is a subgroup of the total population of interest selected to participate in the study, and is representative of the total population being studied (Polit & Talano-Beck 2008:731). The sample in this survey was a single case study of one fishing manufacturer representing a significant part of the fishing industry in South Africa.

In this case study, 50 members from lower management, 30 from middle management and 20 from top management, working in the fish factory were selected to participate. This sample was therefore highly representative of the management corps of the company.

The case study required respondents who were directly involved in the quality management processes.

4.6.1 Sampling criteria used in the case study

Sampling criteria refer to the characteristics essential to the members of the target population (Burns & Grove 2011). The production staff and management who were required for this case study needed to satisfy the following criteria:

- permanent employees in the fishing company
- work in the different units
- more than ten years' experience
- lower management
- middle management
- top management

The reason for the above criteria is that only people experienced in their jobs, who had been employed for some time, would know the difference between performance levels before and after the integrated systems had been introduced. They also had to be from all the different management groups, to obtain a clear picture of the effect of the system in all management sectors.

4.7 MEASURING INSTRUMENT

The reliability of measuring instruments determines the validity of the findings (results) (Kimberlin & Winterstein 2008). A personal survey is reliable in terms of the direct contact and interaction between the researcher and the respondent. A case study also promotes the use of multiple instruments to further increase validity, via cross-checking and triangulation. The following instruments were used in the current study: questionnaires, interviews, observation and historical data.

One of the most important factors in research is to collect accredited responses from respondents. There are different methods of collecting data from respondents. In this case study, questionnaires, face-to-face interviews, observation and historical data were used as the data collecting instruments.

4.7.1 Questionnaire survey

A questionnaire is a printed document comprising a series of questions used to obtain information from respondents. It is a list of questions that is prepared so that the questions are put to each respondent in exactly the same way (McNiel & Rainwater 1998). In a questionnaire, respondents read the questions put to them in written form and respond in written form. Questionnaires are easy to analyse and also more cost effective than most other data collection methods (Popper 2004). They are also less intrusive than telephone or face-to-face surveys. Questionnaires were used as the primary data collection method in this case study. With the questionnaire, the researcher is able to obtain a lot of useful research data (Edward & Talbot 1999).

The questionnaire was the primary instrument used to collect data for this case study, because most people are familiar with it and nearly everyone has completed a questionnaire at some point in their life. Questionnaires also tend to make people less apprehensive. A respondent can complete a questionnaire in his/her own time with no intimidation from the researcher. Questionnaires also reduce interviewer bias. In a questionnaire, all the responses are gathered in a standardised way, which

makes it more objective to use. Also, the information can be collected quickly and quite easily from large groups.

Questionnaires have to be standardised and it is essential that the researcher explains in advance any points that may be misunderstood. It is necessary to be careful when doing this, because in some cases, questionnaires cannot be used as a research tool if the respondents are poorly educated and thus cannot read (Polit & Beck 2008). The researcher has to be sure that everyone can read and understand the questions that have been asked. Open-ended questions can also generate large amounts of data, but these data can take a long time to analyse. Questionnaires must be as compact and to the point as possible (Polit & Beck 2008). It is important to be aware that not all written information is necessarily correct, for example, if respondents are in a hurry they will simply write anything in order to complete the questionnaire as quickly as possible.

The questionnaire was designed on the basis of the objectives of the case study. These questionnaires were completed by members of middle and lower management in each of the company's units. By using these questionnaires as a measuring instrument, it was possible to determine what value the IQMS has brought to the company as a whole, and what effect the integrated system has had on the people and the different units of the company.

Briefing sessions were held with the respondents to explain the format and purpose of the questionnaire. These sessions were also used to guide respondents and to answer any questions that they had. It was an opportunity to give them a clearer picture of the case study, explain its importance, and to emphasise that the information they submit should be as accurate as possible. The session was attended by the middle and lower management personnel of each department involved in the case study.

4.7.1.1 Questionnaire content

The content of the questionnaire tested lower and middle management employees, who were selected to complete it, on their knowledge of the current IQMS that are in

place, as well as the impact that the IQMS has had on the business and its performance. It also determined their broad knowledge of QMS. The questions were based on the objectives of the case study. The following options were provided for answering the questions:

- (1) Yes
- (2) No
- (3) Don't know
- (4) Remarks

The column for remarks was added to yield more specific information which could lead to a better understanding of the current IQMS that is in place.

4.7.1.2 Pretesting the questionnaire

The questionnaire was pretested by a consultant who works in the quality management industry, but his responses were not included in the data set for the current study. It took him 20 minutes to complete. The questionnaire was pretested to determine whether the questions would obtain reliable and structured information that would assist in this case study, and if the questions asked could be clearly understood by the respondents. All the questions were understood perfectly and yielded clear answers. If this had not been the case, the researcher would have had to guide the respondents to ensure that they understood the questions being asked or redesign the questions.

4.7.2 Survey by means of interviews

Interviews are conversations between two people where one person puts questions to the other, in order to obtain information. Together with questionnaires, interviews make up the survey method of data collection (Sarantakos 1998:2460). Bogdan and Biklen (1998:96) also describe interviews as a purposeful conversation between two people, with the aim of obtaining information. According to Mason (1996:63), "one would want to use interviews when one is engaged in qualitative research".

This qualitative approach assists researchers to delve deep into issues and challenges. In interviews, researchers broaden their horizons, by interacting with the people they are interviewing. An interview allows the researcher to look more widely into the topic, in order to obtain more quality information that can be analysed. Interviews are also used to gather descriptive data in the subjects' own words. According to Bogdan and Biklen (1998:1–198) a researcher also has the obligation to listen carefully to the interviewees.

Interviews were scheduled with selected top management employees from all units. A semi structured interview guide was compiled to assist in the face-to-face interviews. The researcher conducted a 30-minute interview with each of the selected staff members. Before starting the interview, a clear explanation was given regarding the purpose and the reason for conducting each interview. A notebook was used to record all the information, related to the case study. The purpose of the face-to-face interviews was to find out what effects the integrated quality management systems have had on the different units in Saldanha.

4.7.3 Survey by means of field notes

Qualitative and personal observation by definition means to experience by means of the senses (sight, smell, sounds, etc.). The internal climate and working relationships can also be observed.

The research techniques of observation solely involve the researcher in making observations to assist in the study. Mason (1996:84) considers observation to be a useful technique to gather particular information (field notes). According to Henning, Van Rensburg and Smit (2004:81), observation has to be focused on the research questions that are being asked in the study.

In this case study, the researcher observed how the different units operate when working and field notes were recorded. In so doing, the researcher was able to gather more information on how personnel operate and use the systems that were being studied.

Observation is considered to be a valid and strong form of research. Observed research findings are the best available approximation to the truth of a given proposition, inference or conclusion. Observational research findings are considered strong in validity because the researcher is able to collect a depth of information about a particular behaviour in certain situations.

Observational research may only reflect a unique population for internal validity and therefore cannot be generalised to other populations. A negative aspect of observation is that the researcher can only see what he/she wants to see, which can lead to subjectivity. The researcher has to see the big picture and be consistent in his/her observations.

Field notes were taken, when observing and then analysed later. Observation is normally flexible and does not need any structure. By observing, it is possible to obtain a clearer picture of the different teams and how they operate.

Observational research was done at the company only on the behaviour of the different units in the company, to determine their reactions in the workplace and also in certain situations. An unobtrusive observation technique was used.

The people were observed from a distance and did not know that independent observations were being made. They were thus able to perform their tasks as they usually would. This method of observation enabled the researcher to have a clearer picture of the employees, in certain situations in the different units, than would otherwise have been possible. The only negative aspect of observation is that the researcher may only see what he/she wants to see, which could lead to subjectivity.

The following elements were observed in each unit:

1. How the people function in the different units. Do they work as a team or individuals, and do they use the quality management system?
2. Do they understand the IQMS (the outcome of the system) that is implemented in their unit, and do they know the benefits of such a system?
3. Do they know the impact that it has on them and the company and do they observe the results that this system has brought to the company?

4. How do they react in certain complex situations and how do they adjust in situations where there is a problem?
5. Do they follow the guideline' of the system to their full extent and do they know and understand the system?
6. Does the integrated quality management system work for this fish manufacturer and is this system a benefit to the company?

4.7.4 Historical data

Historical data refer to information about the company's past. Only data that have been recorded can be regarded as historical data. Historical data were used to assist in the case study to determine what impact the integrated management system has had on the different departments over the past four years. These data were an important part of the case study because they gave direct answers to questions about what the IQMS had accomplished during the past four years. The data were obtained from financial reports for the past four years, to see if there has been a trend of improvement in the different departments and in the company as a whole.

4.8 RESEARCH OBJECTIVES AND APPLICABLE MEASURING INSTRUMENTS

By setting out these objectives, it was possible to obtain a clear picture of the impact that the current IQMS has had on the fishing company. The research instruments used to address the different objectives are shown in table 2.

Table 2: Different measuring instruments and objectives

Research objective	Measuring instruments
(1) To determine whether an IQMS is valid and a benefit to the fish manufacturing factory in Saldanha	Historical data, interviews
(2) To determine whether an IQMS, based on an integrated system, is ideal for quality assurance in the fish manufacturing industry	Historical data, interviews

(3) To determine collective qualitative and quantitative value of the QMS as a whole (for the enterprise, manufacturer) and for internal and external customers	Interviews, questionnaire, observation
(4) To determine other unique subsystem benefits/value of the QMS	Interviews
(5) To determine the potential value of the QMS for employees at different management levels	Interviews
(6) To determine specific value relating to cost of quality (COQ) statistics pertaining to defects, rejects, re-work and so on	Historical data, interviews

Research objective 1

To achieve objective 1, historical data were used as well as information collected from interviews that were conducted with top and middle management. The aim was to determine whether the current system is valid in the fishing industry and whether it adds value to the company and the different subunits.

By using historical data it was possible to determine whether the current system has provided benefits to the company and also if it is valid for a fishing product manufacturer. Historical financial data over the past four years gave a good indication of how the company has performed, and whether it has benefited from the implementation of the current integrated system. Under scrutiny were the operating costs of the vessels, the yield on the vessels and the factory, the through-put over the past four years and distribution and sales. These figures helped determine the benefits delivered to the company by this system and also its viability.

The interviews with top management provided the researcher with information on their attitudes towards the system that has been implemented over the past four years. Because they are in contact with this system daily and the people who

operate it, they were be able to provide clear opinions on its viability and whether or not it provides benefits for their subunits and also for the company. If not, they would speak their minds.

Research objective 2

The historical data indicated whether or not the system has had an effect on the quality assurance of the products that were manufactured. Because the company supplies to both local and export markets, the determining factor was to look at sales over the past four years, abroad and locally. Internationally, the quality of the product plays a huge role. Because of the high demand for international standards, not many companies succeed in exporting products. By looking at sales in the international market over the past four years, a clear picture could be obtained of the impact that the integrated system has had on the company, owing to the fact that it is high quality that sells fish products abroad.

Interviews with staff in the production and international/ local sales subunits provided a picture of the quality assurance system and the impact it has had over the past four years. The historical data provided information on the financial impact, whereas the interviews provided information on the direct effects that the system has had on the units, through its managers. The managers were able to provide a true reflection of the impact that the system has had on quality in their departments.

Research objective 3

From the interviews it was possible to gain a clear picture of the value that this integrated system provides for the company and its customers. In the interviews, top management gave their views on the effects it has had. Internally, there were various methods and sources of information that could be used to establish its effect, but to assess the external impact it was necessary to focus on the people who work on a daily basis with this system and its links with external customers.

By assessing lower and middle management's responses to the questionnaire, it was possible to see if all aspects of the system are beneficial to the company and to its external customers, because lower management operate the system on a daily basis and are also in close contact with external customers. Lower management also have direct contact with their internal customers and can give a clear indication on the effect the system has on internal customers (the next subunit).

Observation in the factory helped the researcher to see the effect of the system internally and externally. By focusing on the employees over a period, it was possible to see their attitude towards the system and whether or not they comply with the rules and regulations of the system. This exercise also showed the effects on external customers and whether or not the value of the system helps them to be more successful in their business. The sales department is one of the areas where value to the external customer will have a direct effect. Increased sales indicate that customers see the products as a benefit to their company, which makes them more successful in their business. This factor gave a clear picture of the value the system has for external customers.

Research objective 4

Research objective 4 was one area of focus in the interviews. The aim, through the interviews, was to determine whether or not the IQMS also influenced other factors that do not form part of the system. When implementing the system in one department was there an effect on the other departments or units linked to the system?

The interviews with top management gave an indication of the extent to which this system affects other components of the business that were not targeted or part of the QMS. From these interviews, it was thus possible to see the broader effect of such a system in the fish product manufacturer.

Research objective 5

Here the aim was to determine the growth that such a system has brought to the people who work with it through the different departments. Did it help them to be more responsible? Did it broaden their view of the business and its different subunits? Because people can measure themselves and their team, they should be more competitive and they should want to improve on the previous year's results.

Top and middle management provided the facts to help determine whether the system has had an effect on people by encouraging them to show their true potential, and the value it has had for people in uplifting and improving their skills and knowledge about the system and the company.

Research objective 6

To determine this objective, interviews and historical data were used. There should be a direct correlation between the answers obtained from the two measuring instruments because both of them should show either a positive or negative answer toward the use of an integrated QMS. Historical data should back up the findings from the interviews.

Through the interviews, the aim was to gain a first-hand picture of the effect that the system has had on the different units. The interviewees from top management were asked about the cost impact that the system has had on their unit and on the company. Companies implement systems, to be more competitive, to grow and, in the long run to reduce costs. During the interviews, each unit manager was asked about the savings that were made by his/her unit and what the implications of such savings were on the unit.

These savings should have reflected in the historical data, which would have strengthened or weakened the interview responses. If the historical data and interview data did not match, then either the data were questionable, or the managers had a false impression of what was actually happening in their individual units.

By comparing the two sets of answers it was possible to have a clear indication of the impact that the integrated system has had on the business, as a whole, from where it starts with the fleet, right through to the end consumer.

4.9 RELIABILITY AND VALIDITY OF THE RESEARCH INSTRUMENT

Reliability refers to the quality of measurement, while validity refers to the consistency or repeatability of the measurement. According to Lawrence, Duffield, Bishop and Spencer (1997:368), reliability is not said or done, but is expected and anticipated. In the context of the current study, this means that the information that was gathered had to be of quality in order to help achieve the objectives and aims of the study.

Validity refers to the degree to which an instrument measures the factors that have been targeted. According to Lawrence et al. (1997:327), validity refers to the degree to which the explanation of a phenomenon matches the realities of the world. Sherman and Webb (2001) also refer to validity as the degree to which the participants' observation achieves what it was purported to discover. It also refers to the correctness of the measurements in the case study. In this case study, it means that the questionnaire and interviews had to obtain information from the respondents and interviewees that determined whether or not the IQMS benefit the fish product manufacturing company.

The researcher requested the assistance of a quality assurance expert to help him in evaluate the validity of the instruments that were used to extract information from the interviewees and respondents in various forms.

4.10 CHAPTER SUMMARY

A variety of methods were used to collect the data that were required for this case study to determine the value of the IQMS. The four methods used were questionnaires, interviews, observation and historical data. The people targeted for this case study were all top, middle and lower management personnel from all but

two departments in the business. The only departments that were not used in this case study were the IT and finance departments. The reason for this is that these departments are not directly involved in the daily operational business where the full impact of the QMS is witnessed.

The sample consisted of permanent employees in the company and in the departments where QMS have been implemented and are being assessed. The aim of using these methods of retrieving information was to gain a clear picture of the impact that the system has had, not only on the individual departments, but also on the business as a whole.

In chapter 5 all the information that was retrieved by the different measuring instruments will be analysed in detail. This analysis will enable the researcher to gain an understanding of and draw conclusions about the impact that the integrated quality management system has had on the business. Historical data were also used to support the outcomes obtained from the questionnaires, observations and interviews. The historical data of the past four years were analysed in detail to draw conclusions on the effect that the IQMS has had on business. The effect of the IQMS on personnel was analysed in each of the different departments, as well as the impact it has had on their performance.

CHAPTER 5: PRESENTATION AND DISCUSSION OF THE RESULTS

5.1 INTRODUCTION

The preceding chapters provided the orientation (chapter 1) to the study, a literature review (chapter 2), a full exposition of the study (chapter 3) and the research design and methodology (chapter 4).

The results of the case study and survey are presented in the sections of this chapter that follow.

Primary research, also called field research, involves the collection of data that do not already exist, which means collecting original data. Primary research is often conducted once the researcher has gained some insight into the issue by collecting secondary data. Primary data can be collected via numerous means, including questionnaires, interviews, direct observation and telephone interviews.

Qualitative data can come from interviews, focus groups and participant observations, while quantitative can come from controlled laboratory experiments, fieldwork, questionnaires, surveys and ethnographies.

The following data collection methods were used in the case study:

- Questionnaires were conducted in order to determine the effect of the IQMS in the fish-processing factory.
- Interviews were conducted with people from lower and middle management. From these interviews it was possible to determine the knowledge these employees have of the IQMS and the effect it has on them and their departments. Interviews were also conducted with top management. These managers are in charge of a range of different departments and their inputs helped to determine the effect of the IQMS, not only in their departments, but also on the company as a whole.
- Observations were made on boats, in the factory and in the cold store. The observations were made to see how people react and adhere to the regulations

stipulated by the IQMS. These observations helped to give a clear indication of the effect of the IQMS.

- Historical data were used to determine the effect the IQMS has on the company financially, from when it was implemented. The effect it has had on the company's results during the past four years was analysed, in order to determine the advantages and disadvantages of the system.

Secondary research involves a detailed literature study, and is also known as desk research, that comprises a summary, collation and/or synthesis of existing research, in contrast to primary research, which collects data from, say, research subjects or experiments.

In this chapter, the results of the research conducted will be presented and interpreted to obtain a clear picture of the case study. These results will be aligned to the objectives that were stated at the beginning of the case study. In this case study, the specific methods (measuring instruments) used were questionnaires, interviews, observation and documents (historical data), to help determine whether an IQMS does or does not add value to the business studied and if it is compatible with the fish product manufacturing industry.

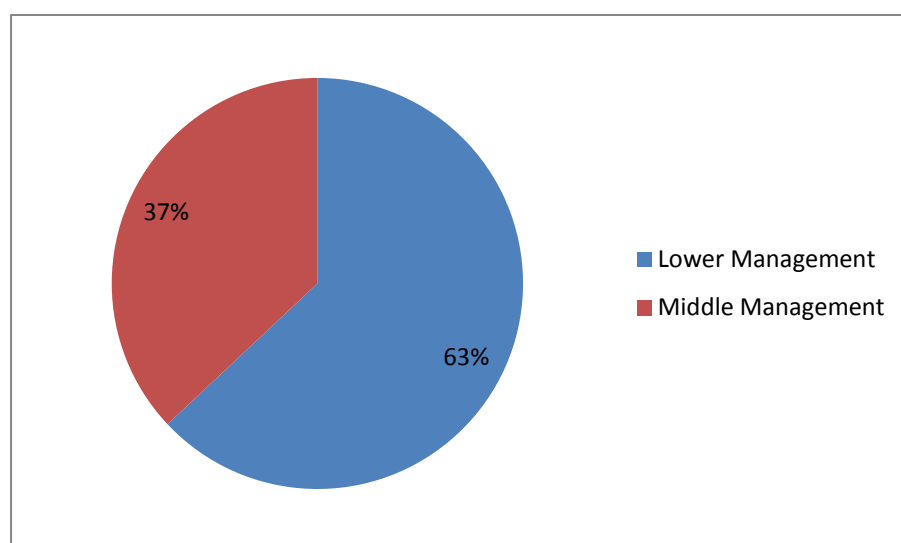
5.2 RESULTS OBTAINED FROM THE QUESTIONNAIRE SURVEY

The people selected for the questionnaire were from lower and middle management in the fishing company. These are the people who are reliant on the QMS to help them reach their unit's Key Performance Area (KPA), and they were therefore able to provide reliable responses to the questions posed. Eighty people were selected to complete the questionnaire. As indicated in table 3 and figure 9 below, 63% of the respondents who were included were from lower management and 37% were from middle management.

Table 3: Frequency of different management levels: questionnaire

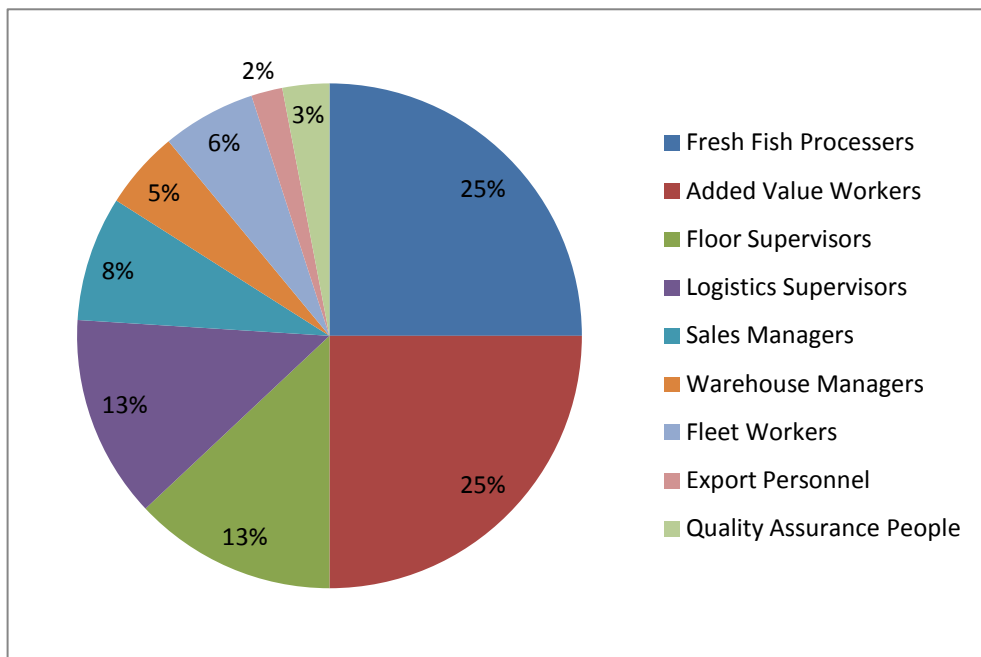
Management	Frequency	Percentage
Lower management	50	63%
Middle management	30	37%
Total	80	100%

The following table and figure indicate the respondents (in different capacities) who completed the questionnaire.

Figure 9: Frequency of different management levels: questionnaire**Table 4:** Different stakeholders completing the questionnaire

Management	Frequency	Percentage
Fresh fish processors	20	25%
Added value workers	20	25%
Floor supervisors	10	13%
Logistics supervisors	10	13%
Sales managers	6	8%
Warehouse managers	4	5%
Fleet workers	5	6%
Export personnel	2	2%
Quality assurance people	3	3%
Total	80	100%

Figure 10: Different stakeholders completing the questionnaire



All units in the company were targeted (table 4 and figure 10) except the Human Resource (HR) and Information and Technology (IT) Departments, because they are not directly affected by the IQMS. However, the fleet, factory, distribution and sales units were critical to this case study, because the IQMS has a direct effect on these units, right from when the fish are caught to when the products are sold on local or international markets.

All the units that were involved in the research project were found to understand the concept of QMS clearly and understood the importance of such an integrated system in each of their departments. They also understood that this study aimed to explore the effect that such an integrated system has had on their departments and on the company as a whole, be it positive or negative.

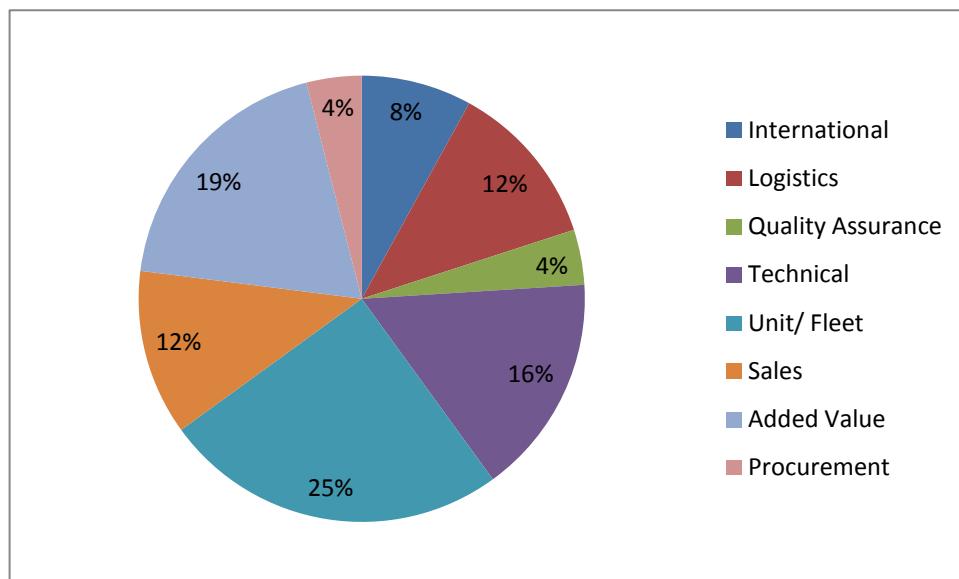
5.2.1 Participants in the questionnaire survey

The table and figure below show the number of questionnaires that were completed in the different departments to determine the effect of the quality management system on each. All departments that are involved with and affected by the IQMS were targeted, as indicated in table 5 and the corresponding pie chart.

Table 5: Different departments that participated in the questionnaire survey

Units	Frequency	Percentage
International	6	8%
Logistics	10	12%
Quality Assurance	3	4%
Technical	13	16%
Unit/fleet	20	25%
Sales	10	12%
Added value	15	19%
Procurement	3	4%
Total	80	100%

Figure 11: Different departments that participated in the questionnaire survey



5.2.2 Specific responses to each question

The following table shows the responses to the questions, together with a percentage analysis (table 6).

Table 6: Specific responses to the questions

Question	Yes	No	Don't know	Comments	Frequency	Frequency	Frequency
					Yes	No	Don't know
1	80	0	0		100.00%	0.00%	0.00%
2	80	0	0		100.00%	0.00%	0.00%
3	80	0	0		100.00%	0.00%	0.00%
4	80	0	0		100.00%	0.00%	0.00%
5	80	0	0		100.00%	0.00%	0.00%
6	80	0	0		100.00%	0.00%	0.00%
7	48	32	0	Extra admin	60.00%	40.00%	0.00%
8	80	0	0		100.00%	0.00%	0.00%

The responses in the question-by-question survey will be presented as they were found within the questionnaire. This will give a clearer picture of employees' understanding of an IQMS.

Question 1: Is there a QMS in place in your department?

The aim of this question was to determine whether all lower and middle management personnel were aware that the IQMS was in place in their own departments. With knowledge of an integrated system in place, personnel would have a better understanding of a QMS and how it operates in their department. Such a system has to be managed from top to bottom.

Response: The responses to this question were extremely positive. Every person from middle and lower management (100%), in all the departments, knew that the integrated system was in place. All of them interacted daily with this quality management system in their individual departments. Owing to their importance, the outputs of the systems are monitored every day, which ensures that the end product is suitable for trading on local and export markets.

Based on the above information, one may conclude that all the quality systems are interlinked to form the integrated system that supports the business as a whole.

Question 2: Does the integrated quality management system add value to the company – what benefits?

This question relates to question 1, and assesses the company as a whole, to determine whether the IQMS adds any value to the company and in what form in each department. It could reveal whether or not all departments have the same objective in relation to benefits for the company, that is, to have a quality business with quality products that achieves a sustainable margin.

Response: The IQMS does add value to the company, was the response of all the people who were targeted with the questionnaire. All the people involved said that the value that the integrated system had added was evident in the past four years in the company's results. The company had gone from strength to strength over this period, and its annual results were proof of that.

By managing the different management systems effectively, it is possible to see from the annual financial results that the company outperformed its competitors in the same industry in a few difficult years. Again there is a positive feeling about the system, which the people believe in, because it leads to better results year on year.

Question 3: Are there any QMS, that you know of, in place in other departments in the company?

The purpose of this question was to determine whether the different departments know that there are QMS in place in the other departments, because all the systems are interlinked to form the overall integrated system in order to achieve the company's objectives.

Response: As indicated earlier, all people seemed to know about the different management systems that are in place in the different departments, because all the systems play such a vital role in the production of the end product. Each department relies on the previous department in the supply chain to supply it with a product that complies with the QMS, and this enables it to be successful in its part of the value chain. Each department has measures in place that check whether or not the

previous department has supplied it with a product that complies with the quality standards that are in place.

Question 4: Did the IQMS that has been put in place over the past four years, have a direct impact on your department?

Here the aim was to determine the impact the QMS has had on the different units in the past four years and to see what positive and negative consequences there have been in each department.

Response: All departments agreed that the past four years had been excellent years for the company. They all agreed that the progress in the past four years was directly linked to the IQMS that is in place. The benefits started with fleet, where the changes that had been made had led to an end product that was of superior quality and this change gave the sales department an edge over the company's competitors in the market. This also seemed to have a direct influence on the margins that were made on products.

Question 5: Which department's QMS has the biggest impact on your departments KPAs?

By going through the whole value chain, it is possible to determine whether or not all the departments place the same importance on their contribution to the success of each department, and, if not, which department plays the main role in helping each of them to achieve their KPAs.

Response: All the respondents agreed that quality should start at the beginning, that is, with the vessels that catch the fish. The time period from when the net is lowered into the sea until the fresh fish are placed in the chillers where they are held at the right temperature awaiting the next stage of production, is one of the most critical parts of the supply chain. The more quickly the fish are taken from the water, are headed, gutted and transferred to the chillers, the better the quality of the final product will be. All the respondents agreed that this is the most important department with the most influence on their KPAs.

If the fish that the fleet catches is of good quality it will influence the whole value chain. Every department is linked to fleet, and if the boats catch no fish, then there is no work for the other departments, while poor quality fish affect the quality of the end product.

Question 6: Has the IQMS had a positive effect on the company over the past four years?

This question was asked to find out if the QMS has had a positive impact on the company as a whole, right from the catching of the fish to the end product, where consumers buy and use the product.

Response: All the respondents agreed that over the past four years the integrated quality management system has assisted the company in its success. Each department can see this result from its performance year on year. The fleet's catches are better in volume and quality, the production department's throughput and yield have increased, the sales department has increased sales, and are the market leaders in their field and the logistics department runs a profitable business that supports the sales department. This information is presented annually to the board of directors, and over the four years there were positive results reported for the majority of aspects of the company.

Question 7: Do you know of any negative effects that the IQMS has had on the company?

Systems do not always have only positive attributes. Sometimes they also have a few negative attributes, but these can be overshadowed by all the positive attributes. This question was asked to determine the various negative attributes, according to the different departments in the company.

Response: Of the departments, 60% did not have any problems with their systems, and agreed that they only see the positive results of the integrated system. However, according to 40% of the respondents said that the system had some negative

effects. The main one was the administration of the system. Everything has to be documented and checked and this creates a lot of paper work. Administrative work takes time and people see it as a burden, because they could have done other work which they see as more important.

Another negative effect mentioned by the respondents in the sales department, is that when there is a problem with a product in the supply chain, which is needed by the sales department, the QMS takes too long to clear the product for sale. The sales team are affected negatively in the sense that they can run the risk of losing a sale in a highly competitive market, because of all the different tests that have to be done on this product, and the protocols that have to be followed. Besides the loss of the sale, not delivering an order to a customer puts a strain on that particular supplier-customer relationship.

These were the only two negative factors that were mentioned in response to the questionnaire.

Question 8: The most important aspect of the fishing company is its focus on quality products. Does the IQMS support this?

All the KPAs of the different departments focus on the quality of the products that have been produced and will be sold at a margin. The integrated system should support the dual goals of producing high quality products and trading them at a premium.

Response: All the respondents involved in the questionnaire agreed that the whole focus of the IQMS is on producing quality products that can be sold at a premium margin, and that this assists the company in being a market leader in the local and international market. All systems are linked, from fleet all the way to merchandising of products in stores, in order to achieve the company's main objective, namely to be the market leader locally and abroad. By examining the results it is possible to see that there is a definite link between all the departments and their quality systems. Most of the objectives are supported and achieved by the IQMS.

The objectives that are not being achieved at present are a challenge for the future and for the upgrading the system, the aim of which is to achieve all the KPAs agreed on.

5.3 RESULTS OBTAINED FROM THE INTERVIEWS

5.3.1 Interviews

Interviews were held on a one-on-one basis with each of the top managers of each segment of the business supply chain in order to determine through their eyes the effect that the IQMS has had on their department as well as on the company as a whole (table 7). All of the top managers have vast experience in their particular fields of expertise and supplied critical information that would assist in the case study.

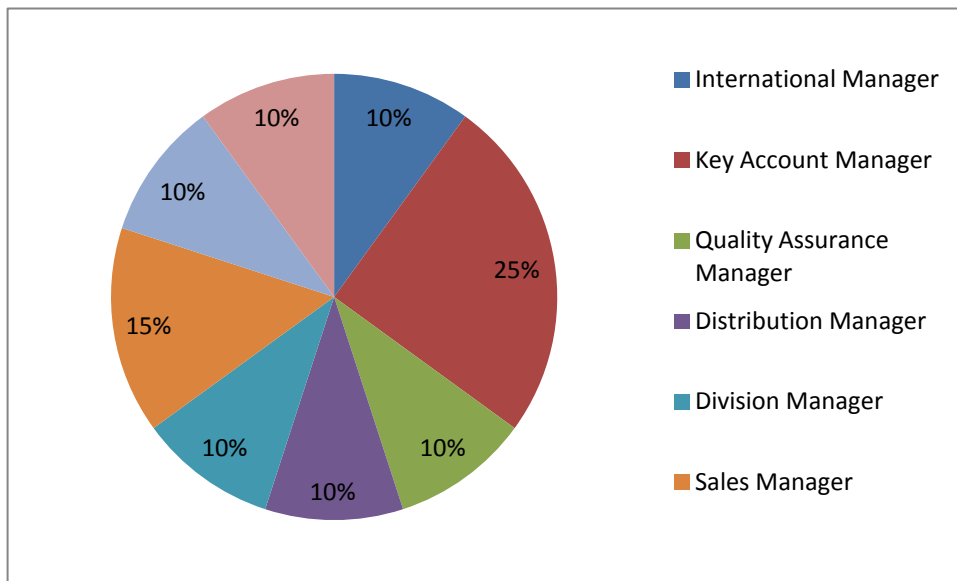
In the interviews, all bases relating to the QMS were covered in determining the full extent of the entire system in the company.

All the interviewees have a thorough knowledge of the business and its departments (table 7), which they manage, which enables them to comply with all the rules and regulations that have to be abided by, in relation to local and international markets.

Table 7: Frequency of managers interviewed

Manager	Frequency	Percentage
International manager	2	10%
Key account manager	5	25%
Quality assurance manager	2	10%
Distribution manager	2	10%
Division manager	2	10%
Sales manager	3	15%
Unit manager	2	10%
Procurement manager	2	10%
Total	20	100%

Figure 12: Frequency of managers interviewed



Departmental managers and members of their staff participated in the interview process. A total of 20 people were interviewed.

5.3.1.1 Quality assurance and technical department

This department has wide experience of all the different quality management systems currently in place in the company as an integrated system. Their focus is on monitoring various aspects of the IQMS to maximise the effects the system has on the company. They are in charge of implementing the different quality systems and also adherence to them by other departments, in order to achieve the different accreditations required to trade in local and international markets. The factory is audited annually on all the different QMS that have to be in place. This input is of critical value to this case study to determine the value of such a system in the fishing industry. If one of the QMS is not complied with, the company as a whole could lose a great deal of business.

During the past four years, many systems were implemented to assist in the success of the company. The following systems were implemented to help the company to be the market leader and preferred supplier of fish, both locally and abroad: the SAFSIS, BRC, HACCP, MSC and NRCS (see section 1.4).

A decision was made to focus more on this part of the business because of its importance to the company as a whole. More manpower was added in during this period to form a highly skilled quality assurance team that is in control of all systems that were in place as well as those which would be implemented in future.

The quality assurance team started to work on a strategy to improve the overall quality of the products that were produced. To achieve this they first had to find a way to improve the quality of the catch of fresh fish. When fish with less damage is delivered to the production department it is able to produce a better product, which the sales department can sell at a premium price.

According to the quality manager, the management team realised that to achieve this objective they had to start with the fleet that catches the fish, since that is the single most important part of the supply chain. The fleet delivers the raw material from which all the different products are produced. They knew that they had to implement a QMS at sea to achieve better quality fish with less damage, a better yield, an improved throughput for the factory and a better quality product. The quality team worked together with the fleet manager and unit managers to find a system that would integrate and align with the other departments, and achieve the targets that were specified. A great deal of research was conducted to find a system that was suitable for fleet and the rest of the units to form an integrated system.

After the quality team had finished with the fleet they started to look at upgrading the systems in the factory. This also had a positive result because of the better quality fish they received from the fleet. New technology and systems were put in place to help the unit in achieve its objectives. The systems helped them to produce better products with less damage and also better yields. This again led to the production of better quality products, which could be sold at a much higher price.

Better quality fish, has an improved life span, which helps in the long run with write-offs during storage and transportation. As mentioned earlier, quality is the fundamental of this business and everything starts with the fish that are caught. The quality assurance manager and his team still believe that the system can be

managed more effectively, and more systems will be put in place or upgraded as technology improves over the next few years, to allow the company to be even more successful.

5.3.1.2 Fleet (vessels)

The fleet plays the most important role in the quality management value chain. Everything starts with the fleet, from the type of net that is used to when the catch is delivered to the factory. For the past four years, the attitude to fishing in the fleet has been changed to help the company to be more successful. All the quality systems that have been implemented on the vessels over the past few years had the following objectives:

- (1) to reduce the risk of people getting injured
- (2) to reduce the risk of harming the environment
- (3) to reduce by-catch
- (4) to increase the catch of hake
- (5) to improve the quality of the fish that is landed
- (6) to reduce the running costs of fleet
- (7) to run the fleet more profitably and effectively

A great deal of emphasis was put on these objectives, to assist fleet in being much more competitive in its sea-going operations. Quality systems were implemented on all the vessels to ensure that only the best quality fish were caught, and only the right fish were targeted.

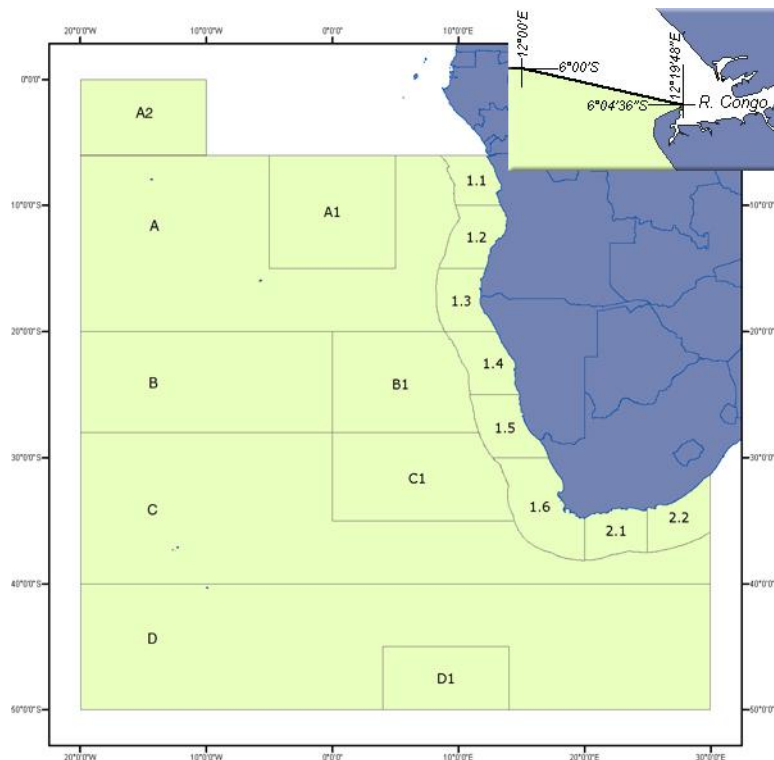
First the quality team looked at the by-catch that the fleet was catching. They had to implement systems to reduce the by-catch to a minimum. There is a growing acceptance by the fishing industry worldwide of the need to reduce the by-catch.

By reducing by-catch and specifically targeting hake, boats are able to carry more hake that is of higher value, rather than by-catch, which is of less value to the company.

When the by-catch, which is a hard fish, is mixed with hake, which is a soft fish, the hake is damaged. The by-catch has a negative effect not only because it damages other fish in the nets, but also because it reduces the fleet's performance. Over the past few years, the company has reduced the by-catch dramatically and has increased hake catches. To achieve this it had to improve communication between members of the fleet and use historical data on where the best hake spots were with the least by-catch mix. Improving communication was easy. The fishing vessels of the company communicated daily with one another to share information on the location of the best fishing spots. These fishing spots were then plotted, and recorded for future use.

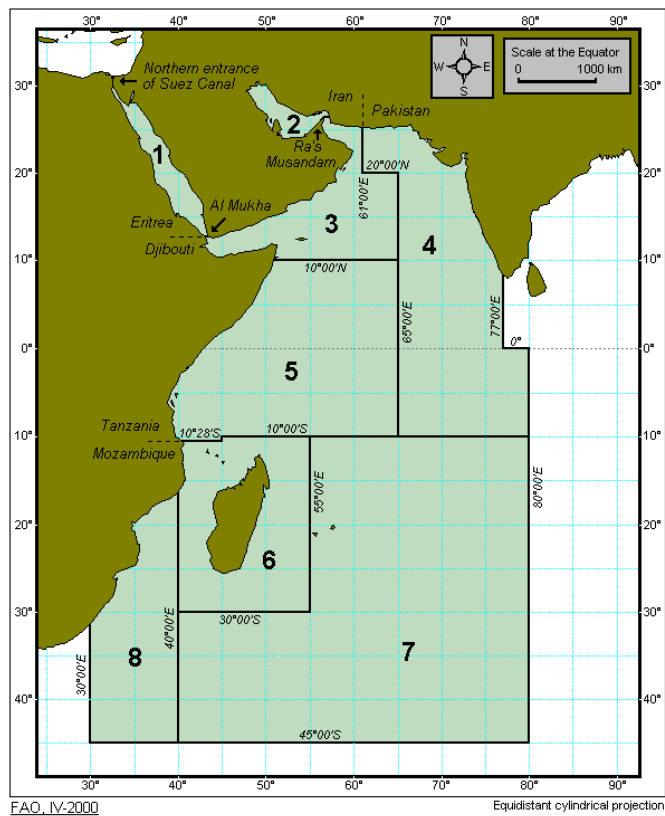
Firstly, demographic information from historical data was used by the fleet to determine where the best spots for trawling were. Nowadays these spots are marked using GPS. All vessels noted the locations of good fishing grounds and then shared this information with the rest of the fleet. These were also spots where less by-catch and more hake were caught. This helped to reduce the by-catch. Figures 13 and 14 are examples of the different fishing grids where fishing takes place on the west and east coasts of South Africa. As mentioned above, particular fishing grids have been marked where good hake catches have been recorded for future use.

Figure 13: West coast fishing grid



Source: DAFF (2011)

Figure 14: East coast fishing grid

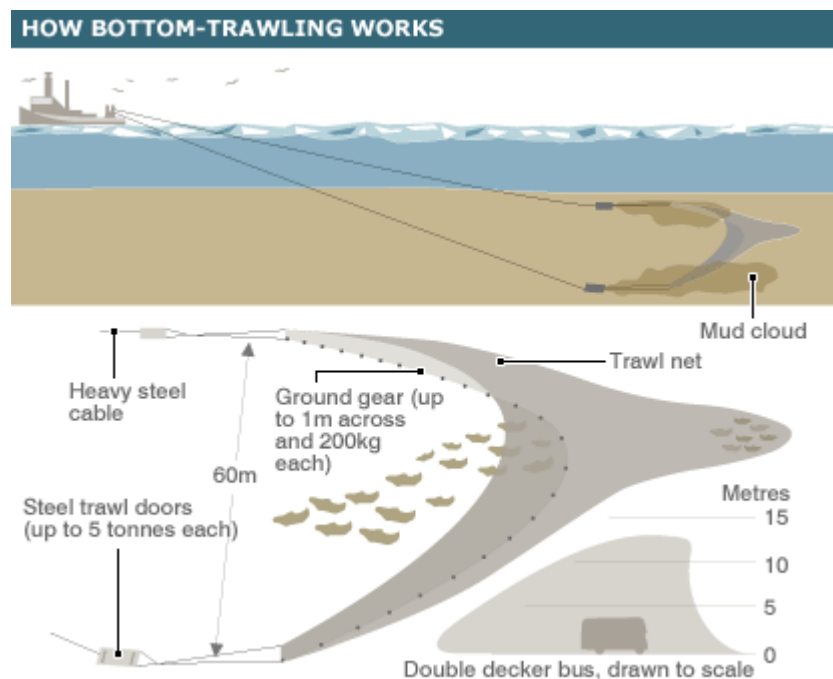


Source: DAFF (2011)

Secondly, it was decided to reduce drag time. This refers to reductions in net drag period. When dragging for long periods of time, many fish are bruised in the nets and also die, which has a negative impact on the quality and yield of the fish. As stated earlier, to increase quality, the quality assurance department had to start from the beginning to ensure that the best quality fish is caught and delivered to the factory. The only negative part was that the fleet had to let down the net more often, which demanded increased labour. The savings made from less damage outweighed the increase in labour costs.

Below is an example of a boat dragging a net on the sea bottom.

Figure 15: Bottom trawling for fish



Source: Bottom Trawling (2007)

Thirdly, a decision was made to reduce the bag (net) size, to ensure better catches, that is catches with fewer damaged fish. By changing to smaller nets, the fish were not damaged to the same extent as when big bags are used. In big bags, the fish are squashed and damaged, whereas in smaller bags they are not damaged as easily.

Fourthly, changes were made to the trawling mechanism used by the fleet. Many companies make use of two boats (figure 16) that are used to drag a large net (this is called pair trawling).

Figure 16: Example of pair trawling



Source: Pair trawling (2001)

Pair trawling (figure 16) was abandoned in favour of single boat trawling (figure 17) where a small net is used. Catches are smaller but much more frequent. This change led to catches of better quality fish, because by using a smaller net and a shorter drag time, the fish suffer less damage than previously when two boats were used to drag a big net. The use of smaller nets led to a reduction in the running cost of fleet. When pair trawling was used the big net created more damaged fish. The power needed by two boats to drag the big net was large, which meant that more diesel was used which increased running costs and increased the input cost of fish.

Figure 17: Example of single boat trawling



Source: Single trawling (2005)

Single boat trawling (figure 17) catches the same amount of fish as big boats but at half the running cost. The only significant difference and negative effect of single trawling is that you require to lower the net more frequent into the sea which led to be more labour intensive. In contrast to this the positive effect of single trawling, as stated earlier is that the operating cost is less, but the quality of the fish is much

more superior. As stated, these change made a big impact on the quality of fish, the yield and the input cost of the fish.

Changes to the fleet

Quality systems were installed on vessels to assist fleet to have better catches and less by-catch, but also to improve the quality of the fish, that were being caught. All these changes were mostly focused on catching better quality fish that would assist the company in producing products of superior quality that could be sold at a premium. These changes also helped to drive the costs down, because of better yield and less damage.

Quality systems were also implemented for the handling of fish at sea. Once fish has been caught, the quicker it reaches the chillers and its temperature is reduced to zero degrees Celsius, the better the quality. This is the single most important part of the value chain, because it is essential to maintain the quality of the catch so that a high quality product can be manufactured. A delay of two hours can have a huge impact on the quality of the fish. Bleeding of the fish is essential as soon as possible after the fish has been caught. Fish have to be kept at zero degrees Celsius before and after the cutting operation for the best results if blood discolouration is to be avoided and clotting of the blood is to be prevented.

Quality systems were implemented to reduce the time lapse between the fish being landed in the net, and being put into the chillers. Changes were also made in the ice that is used to bring the temperature of the fresh fish quickly down to zero degrees Celsius (see figure 18). To preserve quality and also to cause less damage two significant changes were made.

The first change was to move from the normal tub system to a bin system. According to the fleet manager, this change was designed to reduce damage, bruising and squashing of fish to a minimum, compared to what it normally was.

A tub normally takes 100kg of fish. This means that the fish at the bottom of the tub get bruised and damaged because of the weight of the other fish on top. This bruised

fish cannot be used for production and are used to produce fish mince to manufacture fish blocks that are later used for other products. This loss of good fish has a negative effect on the yield of the catch.

Tubs were changed to bins to reduce damage and bruising of fish to a minimum. Bins only take 25 kg of fish which reduces the weight on the other fish in the bin by 75%. This change had the immediate effect of reducing damage and bruising of fish, after they had been taken out of the nets.

The only negative effect of bins is that they need more manpower. Four bins now carry the same weight that one tub normally held, but the saving in damage and bruised fish justified the change.

The second change that was made, in order to increase the effectiveness of the fleet, was to change the ice that was used to store the fish in. To maintain the freshness of the fish, it is necessary to bring its temperature down as quickly as possible to zero degrees Celsius after being caught. The flake ice that was being used reduced the body temperature of the fish, but froze it after a while. When the bins were off-loaded at the factory, staff had to break the ice, to free the fish for production. During ice breaking, the fish were damaged, which had a negative effect on the yield of the production chain. The flake ice that was used also took a long time to reduce the fish to zero degrees Celsius. The company made a decision to change from flake ice to slurry ice, which is an icy liquid that, keeps fish in a better cold state than flake ice had done (figure 18). Slurry ice has three main advantages that help to maintain the quality of the fish.

The advantages of slurry ice are as follows:

- (1) The product is cooled faster because the smooth round shape of the small crystals ensures maximum surface area contact with the product and as a result, faster heat transfer.
- (2) There is better product protection because the smooth, round crystals do not damage the product, unlike other forms of sharp, jagged ice (flake, block, shell).
- (3) There is even cooling, unlike other irregular shaped ice, which mostly conducts heat through the air, the round shape of the slurry crystals enables them to flow

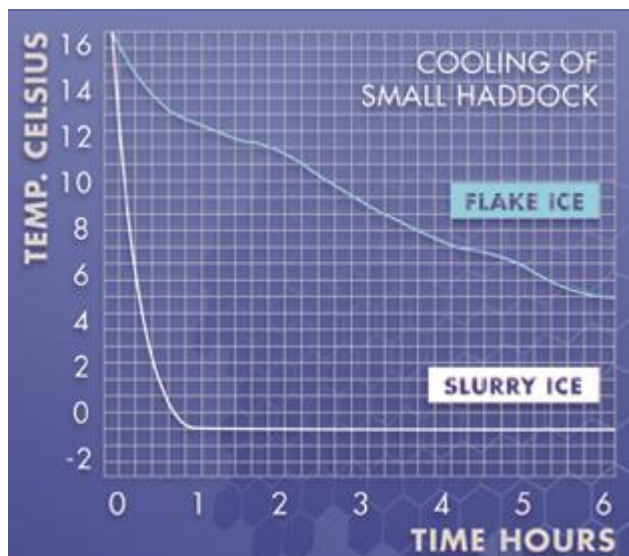
freely around the entire product, filling all the air pockets and uniformly maintaining direct contact and the desired low temperature (Pineiro, Borros-Velazquez & Santiago 2004).

As can be seen from the illustration below (Figure 18), slurry ice brings the core temperature of each fish down to zero degrees Celsius more quickly than flake ice.

The quicker the temperature can be reduced, the better the quality of the fish will be, because by bringing the core temperature down quickly to below zero degrees Celsius all its natural freshness and minerals are sealed in it.

The change to slurry ice made a drastic change to the quality of the catch and therefore to the end product. It ensured a better quality fresh fish that is used for export to countries abroad. This change helped the company to grow its market share abroad, in fresh as well as frozen products, and also in retail and bulk sales in the local market.

Figure 18: The difference between flake and slurry ice



Source: Davies (2005)

These two changes had a massive effect on the products and ensured that the quality of the fish that was being brought ashore was excellent. All the quality management changes that were implemented on fleet were used as a blueprint to

ensure better catch results and better quality for the fleet as a whole. After the implementation of these QMS, there was a drastic improvement in the fleet's results.

The IQMS works perfectly for the fleet and has not only benefited it, but also the company as a whole. Products are of better quality and justify a premium when sold. The unit and fleet manager is still looking at new ways to improve the current IQMS on an on-going basis.

5.3.1.3 Production department

All of the respondents in this department (100%) agreed that the integrated quality management system has had a positive effect on the company and on their department. There were different views on the positive effect it has had on their department, but with the same outcome, that it has had a positive effect on the company as a whole.

The respondents all agreed that the systems that had been implemented over the past four years had taken the company to new heights and that they had also transformed the company into the market leader in the local retail and international markets. Production management looks at the planning, implementation and control of all industrial production processes to ensure smooth and efficient running. The production management system looks at the transformation of raw materials into products that can be sold to the market at a premium.

One of the primary advantages of the system currently in place, is that it can do short runs on specific products. This is of great assistance when several products have to be produced for an order at short notice. The system is extremely flexible and can change quickly from producing one product to making another. This flexibility ensures that orders can easily be fulfilled and there is product availability at all times.

The system also helps on the financial side with fewer claims for unfulfilled orders. The ability to perform quick reruns means that there is seldom an order that is not fulfilled. A system is in place that makes provision for a substitute product for every original product, if and when there is no original product available.

The products that are produced comply with the necessary national and international standards.

5.3.1.4 Logistics

Logistics management systems are the governance of the supply chain function. The logistics department handles inbound and outbound transport management, fleet management, warehousing, material handling, storage and inventory management.

Quality management systems have been implemented in the logistics department to enable the company to be more competitive in the market, but also to reduce the costs of storing and distributing products. Logistics ensures that the product is stored correctly at the right temperature and then transported to the customer to reach its destination in perfect condition and on time. Products are distributed daily both locally and internationally. The value of the system is that it ensures the smooth running of the logistics department.

There are two challenging aspects of fish transportation by sea or by road: the first is the maintenance of the cold chain, for fresh, chilled and frozen products; and the second is the optimisation of packing and storage density.

In the previous pallet configuration, only 60% of the storage space slots were utilised (figure 19), which led to a wastage of 40% on each packing slot, and thus storage space was not fully optimised.

Figure 19: Old system: pallet configuration



Source: Coolbest (2011)

When the new system was implemented, the pallet configuration was changed by increasing the weight on the pallet, to occupy 100% of the storage slot (figure 20). By implementing this system, 100% of the storage space in each rack was used. In so doing, fewer pallets were used, which meant fewer pallets had to be hired which led to a massive cost saving.

With this 100% utilisation of storage space (figure 20) a massive cost savings was made, because less outside storage space was needed to store products. The cold store had 40% more storage space to store products. Stock management and truck loading became easier because everything was under the control of the staff at hand. This new storage system also made it easier for staff to pick products for distribution, because the pallet configuration was standardised so that everyone knew where the products were stored, and slots were allocated to each of the different selling divisions.

This system also controlled the stock at the outside storage facility. Because distributing, drawing and picking stock from the outside storage place has cost implications, a decision was made to load all the trucks at the company's own storage facility. By doing all the picking and drawing of stock from the company's cold store, costs were reduced. Only full pallets were loaded from outside storage, which were subject to a minimum fee.

Figure 20: New system: pallet configuration



Source: Fisby business (2011)

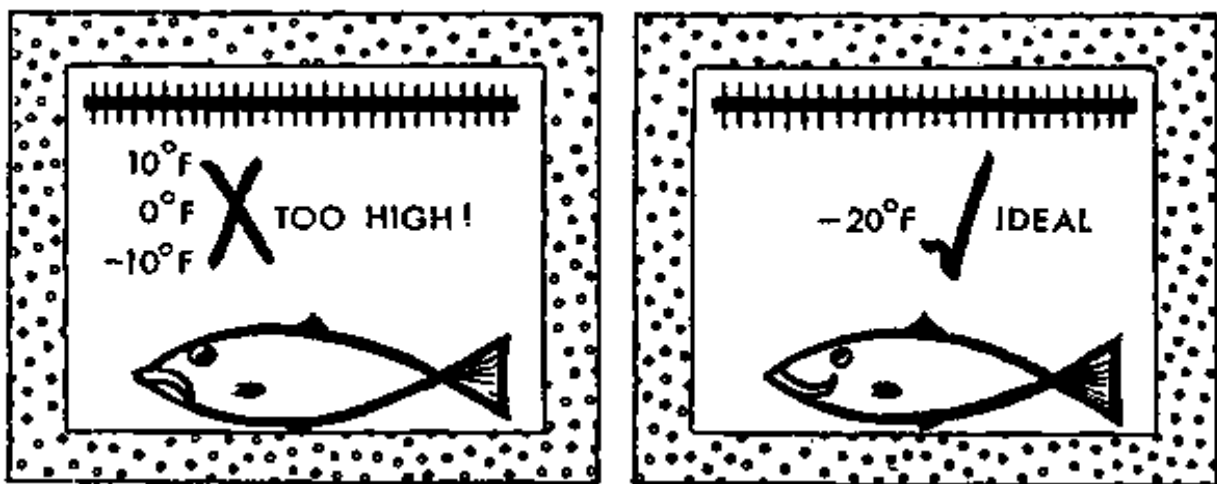
Standardising the pallet configuration and allocating specific space to each sales division saved time in allocating and loading stock. Pickers knew exactly where the stock was kept in the freezer. Because of this quality management system, pickers could load trucks faster. By loading the trucks more quickly, more trucks could be loaded daily and this improved the on-time delivery of products. The system not only ensured better utilisation of people and trucks, but also provided large cost savings in overtime payments. This saving of time meant that people did not need to work late every day, which had previously led to overtime payments.

Systems were implemented to ensure that the products remained at the required temperature (figure 21) and to eliminate temperature abuse. Maintaining the cold chain requires the use of insulated containers or transport vehicles that are equipped with adequate quantities of coolers or mechanical refrigeration.

Temperature monitors have been installed and are used continuously to provide evidence that the cold chain has not been broken during transportation. By using these monitors, stock damage by temperature abuse during transportation has been eliminated. The same monitoring system has also been implemented at the outside cold store that is used to store some of the company's products.

When the truck carrying pallets of stock from the factory arrives at the outside cold store, the temperature of the product in the back of the truck is monitored to see if it is in good condition, as is the temperature of the cold store. When both the truck driver and the cold store manager are satisfied, the product is offloaded into the cold rooms in the cold store. By following these procedures, the responsibility for products is moved to the cold store manager and any damages thereafter are on the account of the cold store. When a product is issued by the cold store, the same rules apply to eliminate the transfer of damaged stock or stock that has been temperature abused.

Figure 21: The ideal fish storage temperature



Source: FOA 1995; FOA 2010

The logistics department has also looked at how to use trucks more efficiently. Orders are clustered to use the trucks to their full capacity. Trucks are scheduled for certain routes on a weekly basis. The salespeople have to cluster their customers into different regions to make weekly deliveries more viable. By doing this the logistics department has started to reduce the cost per kilometre.

The department has implemented systems that link, in some cases, the distribution of retail products with bulk products. In so doing, the capacity of the trucks is utilised to its fullest for areas to which, in the past, half truck loads would have been dispatched.

Haulage companies have been sourced, according to the reliability and service they provide. In this way, the company has committed to one or two distributors, which

deliver most of the weekly loads. This makes it possible to negotiate a reduction in the tariff that is charged by the transporter. These QMS that monitor transporters, have led to a reduction in distribution costs and also a better relationship between the distributor and the company.

This system has secured a win-win situation, because the transporter is ensured of the business and the company knows that it will have good service at a competitive rate from the transporter.

The integrated system in the logistics department has had a huge impact on cost savings for the company. This system is linked to the other departments, to assist the business in being more competitive and profitable. The only element that is beyond the control of logistics is the fuel price which has fluctuated on a monthly basis.

5.3.1.5 International market

To sell products to the international market, the company has to comply with all the rules and regulations of all the countries it supplies. In the company, the split between international and local trade is 60/40. Owing to the high standards that the international market demands, local trade has also benefited, because all the quality management systems that are in place were implemented for both markets.

Quality assurance and traceability are the main focus of all regulations that have to be complied with. Quality assurance is a critical aspect of international trade and is supported by all the quality management systems that have been implemented by the quality assurance team. It is thus essential to have the input of the international trade division because all the QMS that have been implemented are there to support this department, and to assure that the whole company's products comply with the standards demanded by the international market.

The international team work closely with the quality assurance team on all products that have to be produced for the international market. The production team is also obliged to produce products that comply with the quality systems of all the different

countries. To achieve this, an integrated system has been implemented that uses all the different quality standards and practices to formulate one integrated system. All these systems are checked and monitored daily to ensure they comply with the rules and regulations.

The international team has clear guidelines to comply with, which run in line with the integrated management system.

5.3.1.6 Local trade

Local trade also has to comply with NRCS rules and regulations. Products that are traded in the local market also have to comply with international specifications, and because of these rules and regulations there are certain QMS that have been implemented to assist in this matter. These quality management systems have been integrated with the international quality management systems.

In the local market, traceability of products is starting to play a large role. All major chain stores, and local supply companies have to comply with the new Customer Protection Act that was implemented by government, in order to have their products on the shop shelf.

With the current QMS in place the company already has all bases covered on traceability and can pinpoint, for any of its products, when the fish was caught by which boat, in which area of the sea and at what time.

This system was developed by integrating the international trade system with the local trade system and has given the local trading division a huge advantage over its competitors. Owing to these quality systems, the product can sustain a premium and is of world-class quality.

5.3.1.7 Procurement

The procurement department monitors and decides which stock of raw material is needed for production and trading. When products are manufactured, or sourced locally, or abroad, the factory has to comply with certain quality assurance rules and regulations. In the interview with the local trade manager and the international trade team, it was clear that traceability plays a massive role when procuring products locally and internationally.

The procurement division has to use the integrated quality management system that has been designed to comply with all the different regulations. The procurement division only provides a service to the sales and manufacturing side of the business.

It buys the raw material for the manufacturing department to produce products for the sales division. The quality management system was implemented to assist the department in being successful in procuring stock. This system has had a positive effect and it has given the procurement department better control over the products it buys in.

All actions performed by the procurement department are aimed at reducing cost, while still adhering to the same quality product. The same process is followed with the purchase of raw materials. With the integrated quality systems the procurement department can manage the purchase cost of these raw materials effectively, which leads to a cheaper end product with the same quality. With an effective quality management system, the procurement department ensures that the sales department has a competitive price which will assist it to gain greater market share.

As can be seen from the summary, the integrated system has meant many benefits for the company and enabled it to be a market leader in the local and overseas markets.

5.4 RESULTS OBTAINED THROUGH OBSERVATION

The IQMS has a positive effect on all aspects of the supply chain regarding all the specific observations made. Each of the different units in the company was observed and information was gathered that would assist in this case study. Field notes were made on the different units where observations took place. These field notes were analysed and the data set out below were extracted.

5.4.1 The fleet

Observations were done on fleet while fishing at sea. The researcher was stationed on a fleet vessel to observe the whole process from where the nets were dropped into the sea until the fish were caught, processed and frozen. By observing the fleet, it was possible to see that everyone knows the tasks that he/she has to perform and is responsible for. It was recorded that the workers operated like a unit and knew what the job at hand was.

Based on these field notes, it can be concluded that the IQMS that has been implemented on the fleet is followed meticulously and all aspects of the fish that are caught and stored are monitored on an hourly basis. All the personnel on the fleet are seen to understand the concepts of the system that is in place and the impact it has on the vessel and the business as a whole. Checks are done with each catch to see that the employees follow the systems that are in place.

Quality managers on the vessels, constantly do checks to see that all the systems are followed and adhered to. People who work on the vessels also see the benefits of this IQMS, because the catches are of a better quality. When supplied to the factory, these catches can produce better products, which at the end of the value chain, assist the company to supply a quality product to the South African and international markets

5.4.2 Production

All the production staff understand the integrated system that is in place and also the reason for its use. Here, the IQMS plays a vital role in ensuring that the end product adheres to all the regulations both locally and abroad.

All production lines are monitored and checks are carried out to see that all the different protocols are followed. The cooperation between the different workstations in the production department is outstanding and everyone understands the part that they play in the value chain and its importance. The production people constantly give their input on the quality of the fish they receive and raise their voices when there are problems that affect their output. Women make up 80% of the production staff working on the production lines.

The employees in this department are also involved in giving input on how to improve the business and the performance of the production unit. Each innovation is considered with reference to the saving or improvement it will provide. If it is deemed appropriate, it is implemented.

The effect of this IQMS can be seen in the production department. This department is the custodian of the brand and all protocols are followed and monitored to the tightest specification. Staff constantly check the quality of the product that is produced and give feedback to one another. The employees are a tight family unit who have worked together for years and over time have built up excellent relationships.

5.4.3 Logistics

The logistics department follows a strict set of rules and measures on all aspects of the product's transport, the cold store and distributors. The working environment and culture are pleasant and the team works together as a unit. The older more experienced managers train new employees who are brought into the team. In so doing, new employees receive the correct training right from the start. They are

introduced and taught about all the different systems in the different subunits of the logistics department.

Hourly checks are conducted on the temperature of the products in the cold store to see that there is no temperature variation. This is a crucial function because any temperature fluctuation can lead to spoiled products, which can cost the company thousands of rands.

All employees are trained to do the hourly checks and each one knows what to look for when going through his/her check sheet. Check sheets are submitted on a daily basis to see that all aspects of the storage and distribution of products are followed. Where there is a problem, the maintenance crew are quick to respond. A detailed report on the problem is then given to the logistics department, which is required to put systems in place to eliminate future occurrences of such a problem.

Full utilisation of the storage space is also checked on a daily basis to see that it is adhered to. Stock is transferred between the outsourced cold store and the company's cold store on a weekly basis to ensure that the cold store utilisation is in line with operational requirements. The logistics department is cost driven and monitors its costs daily to see that they are within the prescribed parameters, against which they are benchmarked. All logistics personnel understand the integrated quality system and the effect it has had on their department over the past four years. Some factors that they do not have control over, like the price of fuel and electricity, are also measured on a daily basis, and the effect of an increase or decrease is noted.

5.4.4 Sales department

Sales of fish are driven by market prices. The sales department is dependent on the input costs, which are the product prices set by the production department. If input costs were not market related, the sales department would have to sell the product at a loss, which is the last thing the company can afford. The sales department is linked to the quality system, in the sense that it needs the product to adhere to the

different QMS for it to sell on the local and international market, but price is still the deciding factor in the transaction.

The sales department is a well-run unit. All the objectives are clear in the different sales units and everyone is committed to his/her role. This department has a pleasant environment and has extremely supportive structures in place.

The staff in this department understand the effect and effort put in through the IQMS in producing products, and although price has a vital influence in the market based on supply and demand, they understand that they can afford to ask a premium price for their products, because the quality system that is in place enables them to deliver a world-class product.

The various sales units also need to work together. They look at all the objectives of each of their departments and make decisions based on what is the best for the company. Price does have an effect on the outputs of their sales teams, but the premium price they achieve for their products is as a result of the IQMSs that are in place in the business.

5.4.5 Summary of observations

The culture in the business is a healthy and people enjoy their work. There is a major drive to improve their achievements on an ongoing basis. The people in all the different management positions have a lot of pride in their work and this is shown daily in their commitment to achieve the best results.

Everyone understands their job and what is expected of them. Because of the importance of quality, every aspect of the supply chain is monitored and documented. Traceability is a key factor, and the documents of the supply chain support this.

Training is of paramount importance, and all employees go through an induction programme that covers all aspects of the business to give them a better understanding of the business and its culture.

Overall, this fish manufacturer seems to be a well-run company that has world-class people and systems in place.

5.5 HISTORICAL DATA

Historical data were also given by each manager to assist with the case study. All historical data were analysed to give a broad overview of the effect the IQMS has had over the past four years on the individual departments and on the business as a whole. Employees in every department had a different view of what the IQMS has meant for them.

When considering historical data, all the different units in the company concentrated on their department's performance and compared each year's results against the previous year's results. They also knew that they were part of the value chain, and therefore that their performance could have a massive impact on the end results for the business. Managers are aware that each department contributes to the success of the company, which is to produce quality products and make the company more sustainability for years to come.

The historical data for the past four years gave an excellent indication of the company's performance and how it reacted to the changes that took place in the economy, locally and abroad. By analysing the information, a better understanding was gained of the effect of the IQMS in the company.

The following historical data were collected from each of the departments in the company that were part of this case study.

5.5.1 Fishing and the vessels

The historical data that were gathered over the past four years through the different research methods helped the researcher to draw conclusions about the impact that

the QMS (integrated system) that were implemented on the vessels have had on the company and on the quality of products the vessels offload.

According to Merritt (1969), the quality and storage life of fish depends on how good the handling process on-board is, which includes the use of clean plastic boxes with clean ice. Merritt (1969) also maintains that blood discolouration on fresh white fish can be avoided by early gutting, and that storage in melting ice (slurry ice) bleeds the fish effectively.

5.5.2 Fishing quota

For the past four years (2007–2010) there was either a decline or no increase in the fishing quotas for fishing companies in South Africa (table 8 and figure 22), compared with the 2006 quota. This puts considerable pressure on all fishing companies. It is difficult to remain profitable when fish catches have to be reduced but overheads stay the same. In 2011, the government increased the fishing quotas by 5% on hake, which was a welcome relief for the industry.

Figure 22: Fishing quota variance in South Africa

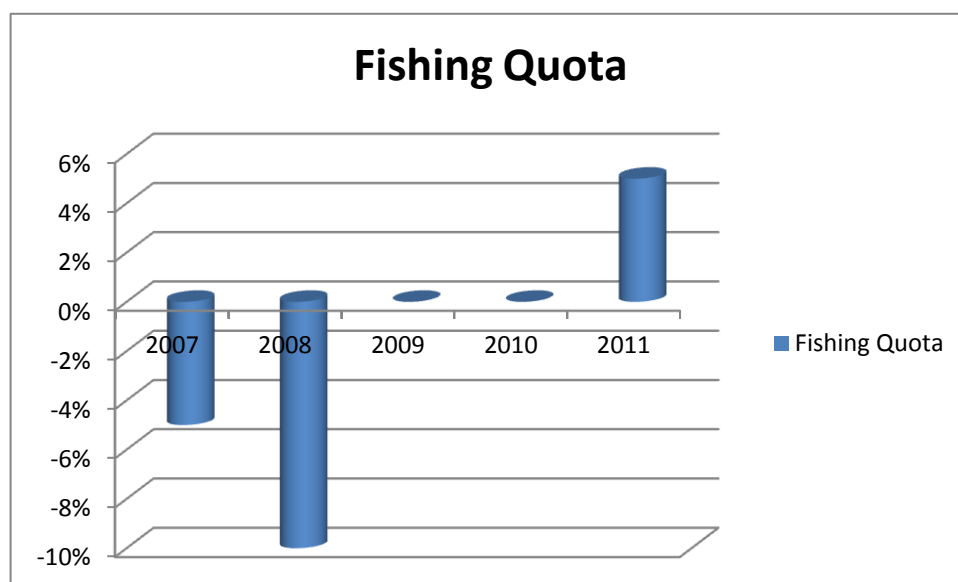


Table 8: Fishing quota variance in South Africa

	2007	2008	2009	2010	2011
Fishing Quota	-5%	-10%	0%	0%	+5%

This increase happened, not only because of the sound management of South African fishing resources, but also because South African fishing companies complied with the reductions in the 2007 and 2008 quotas. Reductions in these years actually caused South African fishing companies in general to implement quality management systems on their vessels, in order to maintain the viability of fishing. All the systems that were implemented in the company under study here over the four years assisted in this matter, from changing the drag time to the use of slurry ice. With the increase in quota for 2011, companies can now look forward to better fish conversion rates, because the size of catches can be increased.

5.5.3 Efficiency of hake landings

There has been a constant increase in the daily catch rate of fleet in the past four years (figure 23 and table 9). This was achieved as a result of the historical data and better communication between the vessels. These better fishing results assisted the company in growing in the international and retail markets, although there was a decrease in quotas in the previous four years. Owing to better fishing, the vessels were more profitable when at sea which also led to longer production runs in the factory, thus reducing factory operating costs.

Figure 23: Efficiency of hake landings

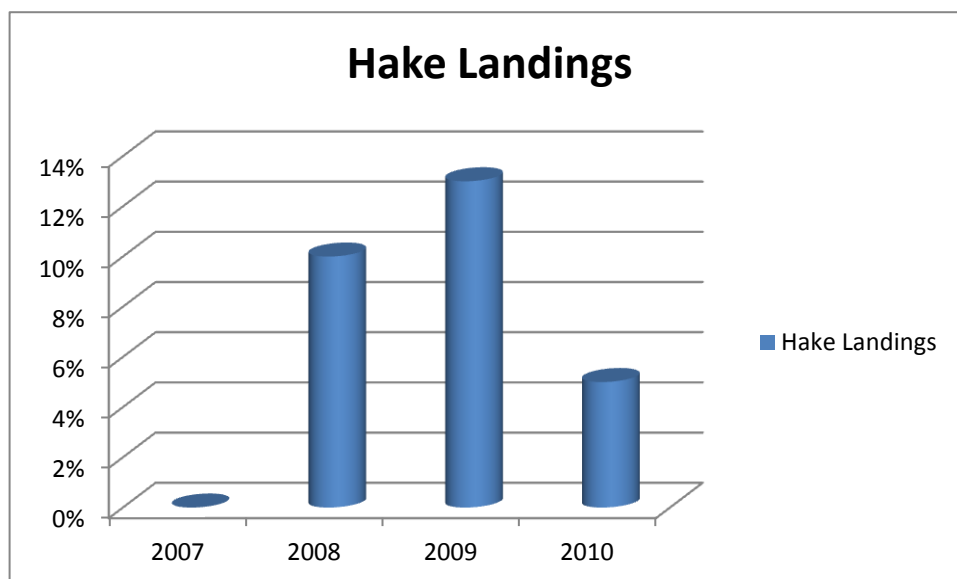
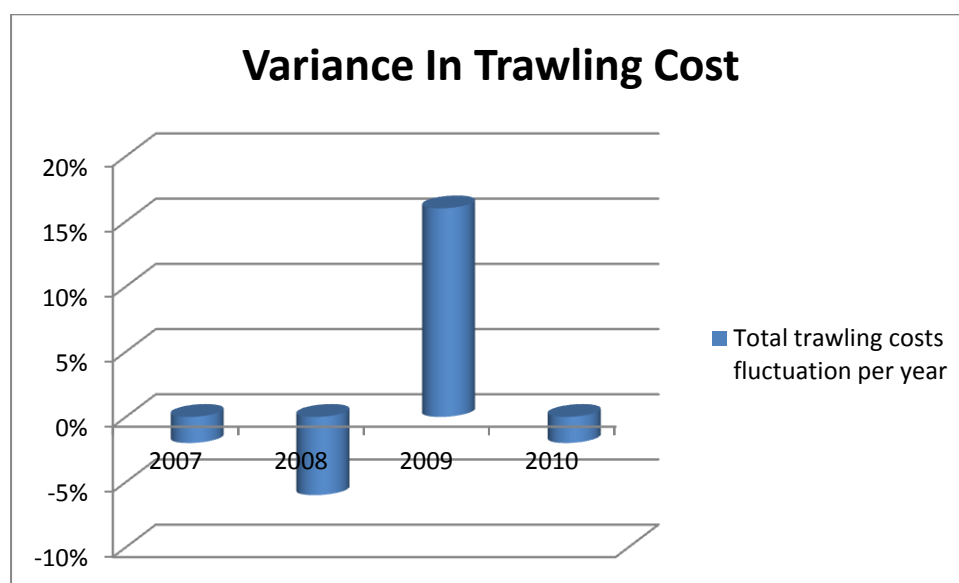


Table 9: Efficiency of hake landings

	2007	2008	2009	2010
Increases in hake landings	0%	10%	13%	5%

5.5.4 Trawling cost

Trawling costs are managed on an ongoing basis. With the management systems that were implemented (single boat trawling), trawling costs were reduced by 8% in the first two years (2007/2008). In 2009 there was a massive spike in trawling costs due to the high fuel prices at that time. Fuel prices rose by 36% for the year, whereas the trawling costs only increased by 16%, as indicated in figure 24 and table 10. This demonstrates the effect that the IQMS has had on managing the cost of the fleet.

Figure 24: Variance in trawling cost**Table 10:** Variance in trawling cost

	2007	2008	2009	2010
Total trawling cost fluctuation per year	-2%	-6%	+16%	-2%

In 2010, trawling costs declined by 2%, again a reflection of reduced fuel costs and improved operating efficiencies (table 10). From the information that was gathered through the different research instruments, most savings were made by using new management approaches and initiatives that were implemented throughout the year.

From 2003 to 2007, there was a major drive to reduce fixed operating costs. By putting the systems in place that were mentioned above in chapter 5, fixed operating costs were decreased by 19% in this period, which achieved huge savings for the company and also led to improved efficiencies.

Fuel savings were achieved because of the quality systems that were put in place on vessels, and discussed earlier in chapter 5. Historical data that were collected over the years show that better planning and communication between vessels on where to fish assisted the company to reduce fuel consumption and also to run the fleet with much improved effectiveness and profitability. Vessels knew where to fish and where the best fishing grounds were. This meant no more aimless searches for fish, which had led, in the past, to extra fuel and operational costs. In 2008, the company also switched to a new fuel to power its vessels, which gave it a 1% decrease in vessel fuel costs. Only in 2009 were there significant increases in trawling costs of about 16%, but these were driven by the 36% fuel price increase that year (table 5.8).

There were also much better catches than five years ago, because the fleet being able to go deeper to catch fish, because of better and upgraded fishing vessels. The new technology that was put into place to improve vessels, now meant that they had the instruments and power to fish further offshore. Improved communications and the use of historical data on where to fish, assisted vessels in becoming more productive than in the past.

Better hake catches and reduced by-catch led to better realisation per kilogram for vessels when offloading fish for production. The old and new fleets' catch rates both increased over the past four years. The new vessels with better technology caught more large fish than older vessels. Owing to technology and newly implemented systems on the boats, the reduction in by-catch was closely linked to improved hake

catches. Reduced by-catches and increased hake catches helped to improve the utilisation of the vessels.

The quality of fish was also much improved as a result of the systems implemented on vessels. This was discussed earlier in this chapter, in the section dealing with the handling of the fish from the time it is caught until it has been transferred to the production facility on hand.

The catch mix of hake, considering size, over the past four years, was also much better than during previous years. The size mix that was caught was a good spread of different sizes, suitable for the range of product offerings to the end consumer. The full effect of better quality was seen in the growth in sales, during the same period, abroad and in the local market. The company became the market leader in the local market with its excellent product offering to the end consumer. Its main focus, as previously stated, is on the quality of the products it produces.

Vessel utilisation increased over the past four years by 10%. This was mostly because of improved hake catches and reduced by-catches. These improvements were achieved by means of the following:

- The use of historical data and improved communication between the vessels assisted the fleet to find the best places to fish for hake. These locations were also recorded for future catches.
- By implementing the different management system, namely (1) shorter drag time, (2) smaller nets, (3) using bins, and (4) changing to slurry ice, all assisted the vessels to achieve better yield which led to better vessel utilisation.
- All these quality management systems helped to reduce trawling costs, improved catch mixes and increased vessel utilisation.

Because of better planning, fishing days showed a noticeable improvement over the four-year span. Better planning and the use of historical and present data on where to fish and when, enabled vessels to fish on more days than in the past.

The only negative impact, besides the reduction of the hake quota that occurred over the four years, was the increase in the fuel price, owing to its vulnerability, not only to supply and demand, but also to currency fluctuations. This was a factor that no one had control over and made it extremely difficult for companies to plan for the future.

As can be seen from the results, the IQMS that was implemented on the vessels over the past few years had a positive effect, by assisting them to be more competitive, reliable and profitable with their catches and the quality of the end product.

All these changes, as explained in chapter 4, came at an additional cost, which is the negative effect the QMS had on the vessels. The cost of implementing the IQMS will be fully recovered in the next five years, because of the results that are being delivered on the fishing vessels at the moment. Better catches and quality lead to better sales and a larger market share. For the future, these systems will be fine-tuned to be much more competitive, and some new innovations will have to be implemented to make the vessels even more productive.

5.5.5 Factory and processing of the fish

Owing to the better catch mix and quality that was supplied by the vessels, the factory could produce better quality products and had much less damage and yield loss. Product utilisation increased year on year which resulted in less product waste, which had a positive effect on the factory's contribution to profits. Because of the improved catch mix and reduced by-catch, there was more hake to be processed, which resulted in a better throughput on the fish processing plant. This led to better realisation per kilogram in the factory.

Cold store expenses were also reduced dramatically over the past four years. This was all because of the optimal usage of the full capacity of the cold store. In one year there was a cost reduction of 17%. As indicated in section 5.4.1, the simple act of utilising the full space of cold store racking had a marked influence on space utilisation, which in turn provided a massive saving for the company. This is also an ongoing process, and on a yearly basis, new challenges are put forward to improve the previous year's savings.

5.5.6 Sales

Owing to better catches and better quality fish that was supplied by the vessels, the production department could produce better products at a much reduced input cost, as a result of all the quality management systems they implemented. In addition to better freezer utilisation, there was also a reduction in costs from the use of a new pallet configuration, which meant that more stock could be loaded into the trucks or containers on each delivery, thus saving time. All these savings reduced the input costs of products, which meant that the sales department could sell much more competitively and still reach its targets.

The only negative effect of the past four years was the reduction in the total allowed quota (TAC) of the company. Because of that, fish had to be shifted to departments where the contribution was better for the company. That market is normally the international and retail market where premium prices are paid for fish. In such scenarios where the TAC has been reduced, the local market receives less fish owing to reduced margins the company yields from its products, and in so doing, they assist the other markets with fish, which leads to better revenue for the company. Normally when demand is more than supply or when TAC has been reduced, the local division will source products from abroad to supply demand for the local market.

As indicated in tables 11 and 12 below, there were extremely positive sales volumes on retail and international sales during the past four years. The local bulk market did not perform that well in terms of volumes, but this was more the effect of shifting volumes to the other two more lucrative markets, the international and local retail markets.

5.5.7 International market

The international market did extremely well during the past four years and exhibited huge growth over this period. There was a growth of 47% (table 11) in volume, and that on a total catch reduction of 5% (table 8) over the four years on TAC. What makes these figures even more significant is that in the international sales department, sales realisation went up by 73%. Over the past four years, some price increases were put through, which assisted the upward curve in the sales realisation of the international market. The dollar/rand ratio was also beneficial. However, the main reason for the continued increase in volumes and realisation was because of the effectiveness of all the departments in the supply chain that supplied the international sales team with a product mix that it could sell well in a highly competitive market. The vessels and factory gave the international sales team products of excellent quality at a competitive price. Over the past four years, all these efficiencies have been driven by the implementation of the different quality management systems.

These efficiencies assist the company in being one of the preferred brands overseas. The international sales team used this advantage to assist them, not only to expand their existing markets but also to open up new lucrative opportunities in other countries. Because of the massive demand overseas, the international team also developed new products for the overseas market that assisted in expanding the product range of the brand. As can be seen from tables 11 and 12, the implementation in 2007 of quality management systems through the supply chain had a positive effect on the international sales department in terms of both volume and revenue.

Figure 25: Variance in sales volume

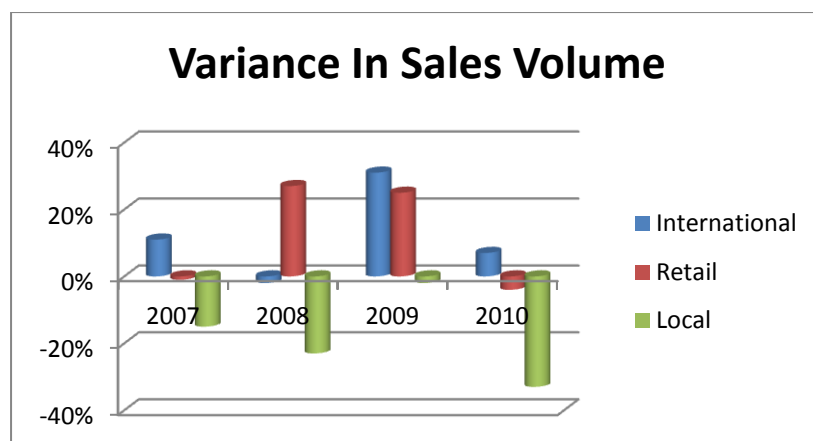


Table 11: Variance in sales volume

Sales volume	2007	2008	2009	2010
International	11%	-2%	31%	7%
Retail	-1%	27%	25%	-4%
Local	-15%	-23%	-2%	-33%

5.5.8 Retail market

The retail market also showed tremendous growth during the past four years. Not only did it grow in volume and realisation, but also in terms of market share. Market share has grown to such an extent, that the company is now the leading fish brand in South Africa. In the past four years, the retail market grew by 47% (table 11) in volume and 35% (table 12) in realisation. The market share also grew by 12% nationally (table 13).

The reason for all this growth is the same as that which has already been mentioned above in relation to the international market. The products supplied to the sales department are of excellent quality and the low input costs allowed the sales team to be competitive. Even though less fish was available over the past few years because of the quota reduction, the retail team still managed to increase their volumes and market share. This was due to a reduction in the fish that was supplied to the local bulk market. Because of the opportunity for better realisation, additional

fish was channelled through to the retail and international departments and away from the local bulk market. Ongoing marketing campaigns also assisted the team to grow market share and become the market leader today.

Quality systems that were implemented to assist in sourcing raw materials, also helped the retail department to be more competitive. Raw materials for certain products that have large support in the retail market, were sourced from other suppliers to assist in the procurement and manufacturing of these products. Because these raw materials were bought in large quantities, the input cost could be reduced because of bulk discounts. These products were introduced because of the high demand for them and the limited supply of fish that the current vessels could deliver on account of the yearly decline in TAC. Supply management systems were implemented to ensure that raw materials and fish were available at all times, so that the sales team could fulfil the demand of its customers and would sit without off stocks. This management system also played a vital role in the growth of the company's market share due to product availability at all times, at the best quality and price.

Product innovation also led to a larger product range, to the opening up of new markets and to increased market share. All these new innovations were the result of systems that were put in place to assist the sales team to create products that were competitive in the market and of superior quality. The products that were developed were in direct competition to other products in the market, but because of the strong brand, which is built on the pillars of quality and reliability, the competition could not compete. These quality management systems assisted the company to be innovative and the leader in the seafood category in the local market.

The company's market share increased by 12% (table 13) over the past four years, and as stated earlier, its brand is now the market leader in the local market in the fish category. This is a huge accomplishment for any company in such a competitive market.

Figure 26: Variance in sales realisation

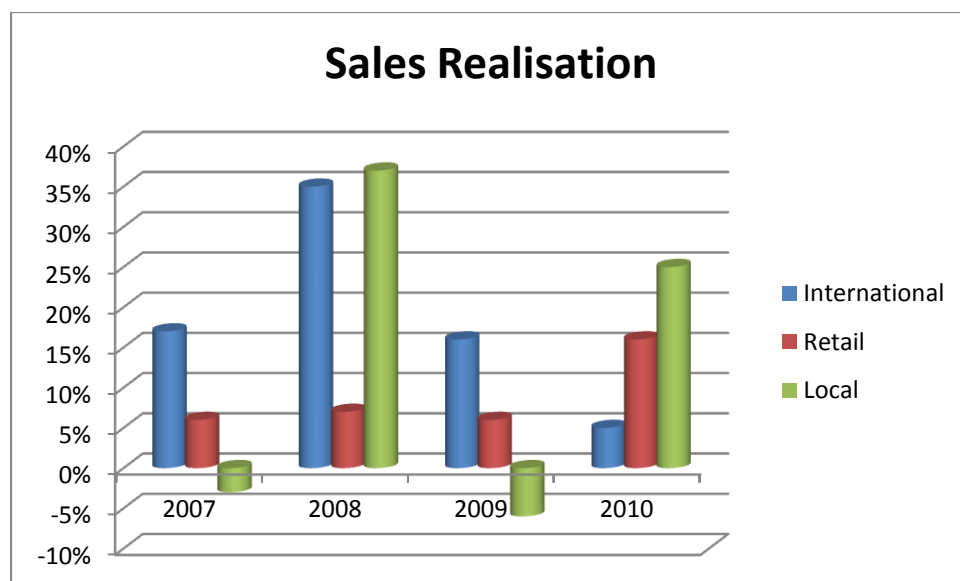


Table 12: Variance in sales realisation

Sales Realisation	2007	2008	2009	2010
International	17%	35%	16%	5%
Retail	6%	7%	6%	16%
Local	-3%	37%	-6%	25%

Figure 27: Market share increase

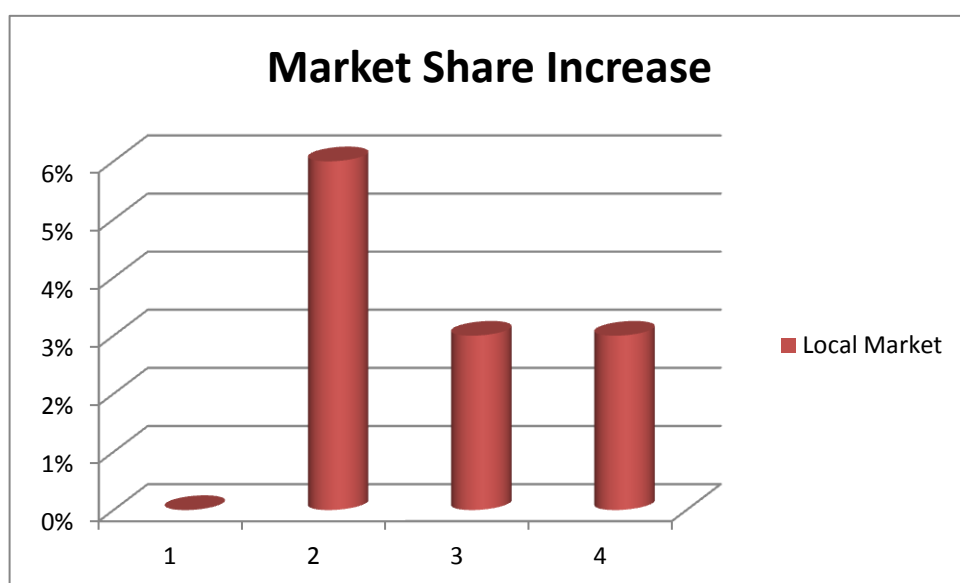


Table 13: Growth in market share (local)

Market share	2007	2008	2009	2010
Local market	0%	6%	3%	3%

5.5.9 Seafood service sales (bulk sales)

The seafood service department is the sales department that only sells in bulk to the local market. The problem for this department was that when the TAC was reduced, their yearly allocation of fish was reduced. The reason for this was that the company first looked at the picture in total to see where the most lucrative markets were to sell its products. As usual these were the overseas and retail markets, which meant that most of the fish quota was used for these markets.

In the past four years local bulk market sales volumes have been reduced by 73% (table 11). This is considerably more than the past four years' 15% (table 8) drop in quota.

Because of this problem, quality systems were put in place to help source products from other suppliers. Because of the short supply of the company's branded products, prices could be increased.

Everything works on supply and demand in the fishing industry. When there is plenty of fish, prices are low, and when fish volumes decrease, prices rise. With this in mind and the reduction in the availability of branded products, prices were gradually increased over the past four years. At the same time buying products from other suppliers at lower prices reduced input costs. These raw materials were then used to assist in manufacturing products to sell to the local bulk market. This led to the local bulk department being able to increase its sales realisation by 53% (table 12) over the past four years.

Although their sales quota was reduced, realisation increased. This shows the strength of this fish product manufacturer's brands. The management systems that were implemented over the years have focused on a quality product offering, and

this has assisted the company in increasing the prices of its products owing to the strong brand.

5.5.10 Overall conclusion regarding the sales departments

The existence of three sales departments also helped to achieve the successes of the past four years. By having a department for each of the different sectors of the business, the company was able to give the attention to each sector that it deserved. In this way focus and expertise are brought into each sector of the business. The international and retail departments are the flagships of the company and drive the brand locally and abroad, whereas the local bulk sales department has established a footprint for the company in the more informal trading environments. The sales management system covers all LSM groups in the local market, and the top groups in the international market.

In table 5.12 below, the company's quota reduction is compared with its sales in kilograms and the realisation, for each year. In 2007 and 2008 there were quota reductions of 15% but still there was an increase in the company's sales, in kilograms of 3%. Owing to the reduction in quotas, less fish was for sale in the market and this led to the increase in prices, which can be seen in the 40% increase in realisation (figure 28 and table 14). The company capitalised on this reduction of fish availability by using it to its advantage. It increased prices to maximise its profits on the smaller quota.

In 2009, when world markets reached an all-time low because of the worldwide economic collapse, the company lost sales in kilograms but owing to its IQMS, the company's realisation reduction was less than the 12% reduction in kilogram sales. The realisation reduction was only 6.9%. This shows the benefits that the QMS has brought to the company by producing products of quality that could be sold at a premium.

In 2010, as in 2009, there was again no quota increase, and the company felt the full brunt of the depression. There was an increase in sales of 1% but because of unstable overseas markets, price reductions were necessary, which led to the 4.73%

(figure 28 and table 14) reduction in realisation. Price reductions were implemented to protect the overseas and local markets. Other companies overseas felt the threat of bankruptcy and most of them lost more than 60% of their business. In some instances, the companies had to close. The 4.73% realisation lost in 2009, was nothing compared with what happened to other companies overseas and locally.

These figures show the strength of the brand and the positive effect a quality management system can have on a company.

Figure 28: Relative changes in quota, kilograms and realisation

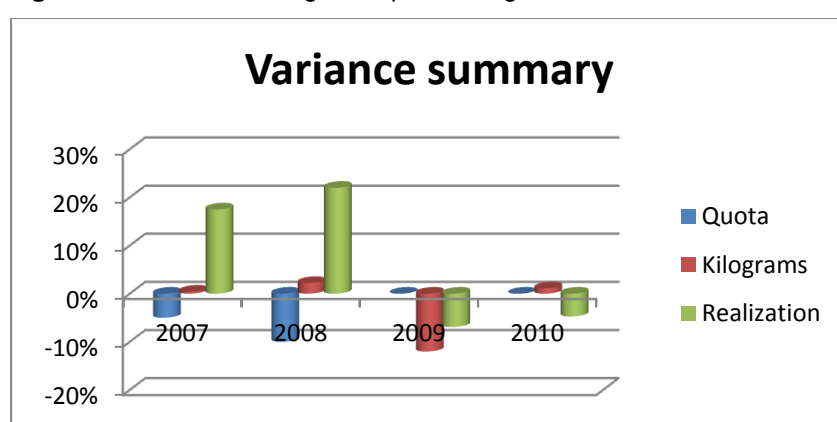


Table 14: Relative changes in quota, kilograms and realisation

	2007	2008	2009	2010
Quota	-5%	-10%	0%	0%
Kilograms	0.42%	2.22%	-	-
Realisation	17.50%	22.00%	6.90%	4.73%

5.6 OVERALL OUTCOMES AND BENEFITS OF THE INTEGRATED MANAGEMENT SYSTEM

The overall outcomes and benefits of the IQMS are summarised in the table on the following page.

Table 15: Benefits and disadvantages of the integrated quality management system

Supply chain	Better	Worse	Comment
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A. Fleet

1. Drag time	#		Shorter drag time, increased quality and fewer damaged fish
2. Handling of fish	#		Decreased handling – use bins and not tubs
3. Throughput on vessel	#		Better catches and less by-catch and increased throughput
4. Yield on vessel	#		Better yield due to better quality – reduced drag time and fish handling
5. Quality of fish	#		Better due to shorter time and less handling
6. By-catch	#		Less by-catch due to communication and historical data
7. Hake catches	#		Use of historical data and communication between the fleet
8. Damages	#		Fewer damages owing to reduced drag time, handling and the use of slurry ice

B. Factory

1. Yield	#		Better quality fish from vessels
2. Throughput	#		Better quality fish from vessels
3. Damages	#		Fewer because of better quality fish from vessels
4. Quality	#		Better due to improved quality systems on the vessels
5. Admin		#	More administration work to comply with

C. Logistics

1. Space Utilisation	#		Owing to changes in the cold storage room
2. Savings	#		Less use of outside cold storage and less picking due to pallet configuration
3. Damages	#		Fewer because of less handling and

			standardised pallet configuration
4. Transport	#		Better utilisation on account of pallet configuration and management system
5. On-time delivery	#		Better because of quicker loading due to standardised pallet configuration

D. Sales

1. Quality	#		Better because of fleet and production quality management systems
2. Margins	#		Better because better quality products are manufactured
3. Market share	#		Improved quality and on-time delivery increased market share
4. Competitiveness	#		Better quality and service increased competitiveness

5.7 CHAPTER SUMMARY

This chapter indicated the IQMS that was implemented increased the performance of the company in all departments. All the different departments were positively affected by the IQMS, and the effect led to an increase in quality and in sales, both locally and abroad.

The only negative effect of the QMS was the increased administrative work. This negativity was seen in all departments. The increased administrative work was because of the need for better record keeping and improved methods of tracking. This administrative work forms a crucial part of the supply chain. All the processes had to be measured and monitored more frequently to ensure that all the departments complied with the rules and regulations of the integrated system.

The fleet saw an improvement in its catches, which led to better quality fish being delivered to the factory. This better quality fish enabled the production department to produce better quality products for the market. The international trade department

played a key role in this function, owing to the impact of its QMS, which had to be adhered to by the rest of the company. The consequence was that all the products that were produced were benchmarked against international standards.

Because the company had to comply with all the international standards, these systems were used as the backbone of all the quality management systems that were implemented. These systems enabled the local trade department to be more competitive and profitable.

The quality system in the logistics department reduced the cost of delivering products and optimised the utilisation of the cold store. These changes helped to reduce costs and made the company more successful. All the outcomes from the different units were analysed in this chapter to draw conclusions on the effects that the integrated QMS has had on the fishing company. The results with reference to the research objective clearly indicate that the IQMS had a positive effect on the fishing company and is fully compatible with the industry. This IQMS works hand in hand with the company to achieve the results it is looking for in all aspects of business, these being efficiency, quality and flexibility.

In chapter 6 all the information that was gathered will be used to enable the researcher to draw conclusions on the value of an IQMS for a company. The answer to the question will rely heavily on the financial figures as well as the sales results over the past four years to see the effect that the integrated system has had on the bottom line of the company. Because the IQMS has a direct effect on the quality of the product that is caught and processed, the effect should be seen, not only in the company's financial reports, but also in its sales and market share.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter provides an in-depth discussion of the research findings set out in chapter 5 as well as those of the literature review explored in chapter 2. In this chapter it will be decided if the IQMS in the case study provides benefits to the company and if it has a rightful place in the fish manufacturing industry. The discussion is based on the objectives that were set out in chapter 1.

The study as a whole focused on all the effects that an IQMS had, on all departments of the business. The research examined all the processes in the company from the beginning, where the vessels catch the fish, and continued to the point where the products are bought by the end consumer in retail outlets. When the research was conducted, all the different quality systems that the company has to comply with, were already in place. The aim was to determine the value that the system contributes to the company by analysing the effect it has had on each of the different departments in the company since its implementation, and whether or not it is compatible with the rest of the fishing industry.

The question was whether the IQMS does in fact have a positive effect on the fishing company as a whole?

All the available data were used to determine the value that the system contributed to the company by analysing the effect it had on each of its departments. By understanding the effect in each department, conclusions could then be drawn concerning the effect that the system has had on entire business. The financial records of the past four years were analysed, to examine the effect the different departmental systems have had.

Chapter 1 provided an overview of the history of fishing with an indication of the time spans involved and its origins. The fishing industry in a global perspective as well as in the local market was examined. This provided a global picture of the situation, and

comparisons with the local market were drawn to see similarities, differences and market trends.

As a leading fish product manufacturer, the company was analysed in terms of its history, where it is situated and all the accreditations with which it has to comply, to enable it to be a significant role player in South African and international markets. The company has built its brand on a quality product offering, which is recognised by its customers and consumers.

The problem statement given in chapter 1 provides a better understanding of the problems the industry faces and its need for QMS. The objectives of this research study were also set out. The ultimate aim of the objectives was to determine the viability and the value that the QMS contributes to the company and its effect on the industry.

Chapter 2 focused on a literature review of the fishing industry. It gave an indication of the history of the fishing industry, as well as the current state of the oceans and the impact that fishing practices are having on them. The views that researchers and people in the industry have expressed on the current state of fishing in the world were also examined. As emphasised in chapter 2, there are huge concerns about the consequences of overfishing. If overfishing continues unchecked, it is possible that most of the fish species that are currently being caught will not be there in a decade from now. This situation will create job losses and food shortages, which will have a disastrous economic impact. The state of world fishing, which is driven by an increasing demand for fish and by money, means that fish colonies do not have enough time to restore their numbers to healthy totals.

People have voiced their concerns and it is now up to governments to put management systems in place to assist in managing the world's fish resources for the future. It was also mentioned that there are certain institution like the MSC, which use their QMS to assist companies in complying with regulations that aim to support sustainable fishing. People and researchers agree that the future of the fishing industry will rely heavily on the implementation of QMS. As stated in chapter 2, the

future of the fishing industry worldwide looks bleak because of overfishing, and systems need to be implemented to drive the process of sustainable fishing.

In chapter 3 all the information on the different QMSs was analysed, together with their benefits and shortcomings as assessed over the years by other researchers. The specific focus was on what other researchers had to say about QMSs and how they are managed. QMSs became more important over the years and nowadays many different QMSs can be used. Only the most important ones in the fishing industry were examined along with their effects on business.

In chapter 4 the research approaches and methods used to determine the impact of QMSs on the fishing manufacturer were discussed. The research problem and the research objectives were chosen to reflect the effect that the quality management system has on the fish manufacturer.

Findings from previous studies on QMSs were examined in the context of the current organisation. Their approaches, as well as their results, were considered. A comparison of the findings of previous researchers provided a clearer picture of the present situation in terms of QMS. The findings of this study should be similar to the findings of other researchers. A qualitative approach was adopted in this research.

The people targeted for this case study, were selected from all LMS groups in the company. The sample came from lower, middle and top management. In chapter 4, a detailed description of the different methods that were used to extract information was given. Each of the different research methods was discussed in terms of how it would be applied to the research. All the positive and negative factors of each approach were weighed up, in order to decide on the best way to obtain the most viable and reliable information for the case study. Interviews, questionnaires, observations and historical data were the approaches used to collect the information from the people sampled.

Most of the information that was needed to determine whether or not an IQMS added value to the fishing product manufacturer, lay within the historical data. The other approaches that were used assisted with additional information to determine the

value of the QMS. All these methods are used daily and people are comfortable with them. As stated earlier, chapter 4 gave an indication of the information that was sought and of how it would be gathered for the case study.

All the results were presented in chapter 5, from the information that was gathered in chapter 4, by means of the different research methods. The results obtained using each of the different research methods were discussed in detail, in order to draw conclusions. All the information that was gathered and researched throughout all the chapters was summarised in chapter 5 and from there conclusions will now be drawn and presented in this chapter.

All the information that was gathered in chapter 5 examined the potential benefits that the company may or may not have enjoyed because of the IQMS. The conclusions on the benefits the company has enjoyed over the past four years are set out below.

6.1.1 Vessels

The information gathered from fleet shows the positive effect of the IQMS. All aspects of this system assisted fleet to be more successful when fishing and supplying the production department with quality fish. The fleet were far more effective when going to sea, according to historical data that were collected during the past four years. Improvements we gained by using catch data and improved communication between vessels (table 9). Better quality fish the result of the changes made with dragging times and net sizes. Better catches meant that there was more product to sell, which led to increases in sales for retail and international trade, as indicated in table 11. In general, total sales increased over the past four years by 21%. These increases were driven by retail and international trade.

Vessels were also much more cost effective because of the single trawling policy that was adopted. Table 10 indicates that trawling costs came down three out of the four years, which had a significant impact on the company's annual figures. Trawling cost is the single most expensive part of any fishing operation and any savings on this can have a huge impact on the company's bottom line. All these savings were

linked to the IQMS, which promoted better fish landings which assisted in reducing production costs. Only in 2009 were there major increases in fuel costs which led to a 16% increase in trawling costs.

Research was also done to help preserve the quality of the fish on vessels. By reducing the core temperature to below 0 degrees as quickly as possible, the quality of the fish was improved. The strategy made use of slurry ice instead of flake ice. Flake ice damages the product, which has an impact on the product yield on each vessel. The use of slurry ice increased the yield for vessels, which could now provide better-quality, undamaged product to the production department. The effect of this is shown in table 11: where there was a 21% increase in general sales in the preceding four years. Just on retail and international trade which are driven by price and quality, there was a 94% increase in sales volume (table 11) which led to a 108% increase in sales realisation (table 12).

Administration work increased because of the monitoring of the system. This was the only negative aspect of the study that came through from the fleet.

The positive effects of the IQMS on the vessels were as follows:

- better catches (due to better information and communication)
- decreased trawling costs (single trawling)
- better quality fish (drag time and size of nets)
- slurry ice (assisted in having better quality fish)
- less by-catch (historical data)
- more high value product on vessels (less by-catch)

The only negative effect of IQMS on vessels was more administration work (systems checks).

6.1.2 Production department

The production department is linked to the supply of fish from vessels. The better the quality of the product it receives, the better the yield and product produced. Over the past four years there has been a defined increase in the yield and throughput from the factory. Better hake catches resulted in increased through-put, which led to a better net realisation per kilogram for the factory.

Better throughput and quality assisted the sales department with better quality products at a lower input cost. As stated earlier, these factors enabled the factory to become a profit centre rather than a cost centre, by producing product at a lower input cost and selling it on to the sales department at a profit. As can be seen, owing to better input costs there was an overall increase in market share growth in the past four years of 12%, in the local market (table 12). This was only achieved because of the lower input cost, which helped the sales department to sell the product at highly competitive market-related prices. This assisted the local trade department to increase sales realisation by 53% (table 12), although it had a reduction of 73% in volume (table 11).

Administrative work was also seen as a serious problem because of all the protocols that had to be followed. People all agreed that although this is a problem, in the long-run they have seen results from the IQMS.

The benefits of the IQMS in the production department were as follows:

- better yield
- better throughput
- decreased input cost
- changing from a cost centre to a profit centre
- overall product to assist sales department to be more competitive
- assisting in increasing market share

The negative results of the IQMS in the production department were as follows:

- more administrative work (more controls)
- more in-house training

6.1.3 Logistics department

The logistics department is a cost centre and its focus is to supply the sales department with cost-effective transport. Its main function is to reduce the cost on transport and storage. A sub-function of logistics is to see that products arrive on time at customers, both locally and abroad. Systems were implemented in the past four years to assist the transport department in bringing down distribution and storage costs. The main problem with logistics is the fluctuation in fuel costs and the annual increase in electricity tariffs.

The logistics department reduced costs by implementing systems which, in the long run, will help them to change from a cost to a profit centre. Savings occurred on storage and transport costs in the past four years.

In the cold store, pallet configurations were changed which assisted in carrying more stock on the premises, and less use of outside cold storage (see figures 19 and 20). This reduction in outside cold storage use meant a massive saving for the distribution department. The better utilisation of storage space in the company's cold store reduced the storage cost per kilogram and helped to absorb the ongoing electricity increases. Better planning in the cold store resulted in pallets being numbered and tracked. By tracking pallets, workers found them quicker, reducing overtime cost for casual labour. The system assisted managers on duty to know exactly where pallets are for loading, thus bringing down the standing time cost of delivery vehicles.

Transport costs will remain a challenge because of the ongoing fluctuation in the fuel price. Owing to the better utilisation of pallets, more products can be packed into delivery vehicles. This initiative reduced the cost per kilometre on delivery vehicles and assured that there was a saving during a difficult four-year period in the transport business. Because of better input costs from the production department, the sales team increased sales in the retail and international markets, which meant an increase in total sales volumes. This increase in volumes assisted the transport department with better utilisation of trucks and also to negotiate better rates with

outsourced transport companies because of larger volumes being transported (table 10).

The positive results of the IQMS in the logistics department were as follows:

- better utilisation of pallets (increased product weight)
- better utilisation of cold storage (increased volume in cold store)
- better utilisation of trucks (more stock loaded in trucks)
- better kg/km on transport costs
- better rate on transport cost due to more volume being transported
- fewer overhead costs (less overtime)
- lower costs on outside cold storage

The negative results of the IQMS in the logistical department were as follows:

- increased administrative work
- more planning to assist in daily operations

6.1.4 Sales department

The sales department is at the end of the whole supply chain and all the aspects of the IQMS assisted the various departments in supplying the sales department with quality products at a competitive selling price. The sales department has three sub departments: international; retail; and local trade.

For the past four years most of the product sales have been directed away from local trade to international and retail trade (table 10). This was also because of the decrease in the fishing quota over the four years. By directing more sales to these two departments, better margins were achieved which led to better profits (table 11). Due to the lower volume that the local trade department had to work with, selling prices increased, because of the supply-demand model.

As stated earlier, the total sales department grew by 21% (table 10) in the past four years, despite this being a time of world depression. Owing to better input costs, products were sold at a far more competitive price and better margins were recorded for the past four years in all three units. Sales realisation increased in international

trade by 73%, retail trade by 35% and local trade by 53%. All these increases assisted the company to grow its market share by 12% in the local market and it is now the market leader according to the AC Nielsen report.

As can be seen from results in the past four year, the company has grown during an extremely difficult period. All factors in the market were against companies that sell products abroad and locally, but despite all the negative factors, the company still managed to be successful in all aspects of its business. Reductions in quotas, lower sales to the local market and the recession did not affect overall results.

All the interventions implemented, from where the vessels go to sea, to where final products are sold, led to the success of the sales department in its operations.

The positive effects in the sales department were as follows:

- increases in retail and international sales
- increases in realisation (all three sales departments)
- increases in market share (locally)
- more competitive pricing

The negative effects on the sales department were as follows:

- decreases in local sales
- quota decreases for four years

The research findings resulting from information that was collected over the past six months are discussed below.

6.2 RESEARCH RESULTS

In the case study all the objectives were achieved and all the expected outcomes were achieved.

The case study objectives were as follows:

(1) To determine whether the IQMS, which is based on different international standards, is valid and applicable to a fish manufacturing unit

- An IQMS is valid to the fishing manufacturer studied. It is evident from the company's results and its growth over the past four years that the IQMS does work and is valid and adds value. The growth shown in realisation and market share in tables 12 and 13 gives a clear indication of the benefits such a system has brought although volumes have decreased.

(2) To determine whether this IQMS is ideal for quality assurance in the fishing product manufacturing industry

- The system as it currently stands, is ideal for the company, even though management are still trying to improve its component parts on an ongoing basis. As indicated in the results, from the point at which fish are caught by vessels all the way through to the selling of the actual product, the company is going from strength to strength. Sales realisation increased (table 12) and the reduction in trawling costs (table 10) clearly indicate that the integrated quality management system works extremely well for the fishing company.

(3) To determine the collective qualitative and quantitative values of the IQMS as a whole (for the enterprise/manufacturer) and for internal and external customers

- The main focus of the company is to supply its customers locally and abroad with a quality product. All quality systems that have been implemented, assist in this matter and attempt to supply customers with the best product at the best possible price. As can be seen from market share growth (table 13) over the past four years, the company is clearly the market leader according to the AC Nielsen report. Internally workers understand the importance of the IQMS and work toward one goal, to improve the quality of the product they produce on an ongoing basis. This can also be seen out of the company's performance the past four years.

(4) To determine other unique subsystem benefits/values of the IQMS

- The systems that were implemented run hand in hand with one another. The vessels' systems assist the production departments' system because the fleet catches better quality fish. The production department produces better products which are in turn sold at premium prices. This assists the company to be more successful owing to the premium price that is justified by the quality product.

(5) To determine the potential value of the IQMS for employees at different management levels

- With the sales growth that has occurred over the past four years, and all the changes introduced by the various systems, absenteeism has been reduced and the company has moved to a level 2 BEE contributor company. This indicates that there has been a great deal of development over the past four years where people from lower levels have risen to higher management roles. The integrated quality management systems that have been implemented have assisted people to develop much quicker and also to take ownership and pride in their work.

(6) To determine specific value relating to cost of quality (COQ) statistics regarding defects, rejects, rework and so on

- As indicated in the results of the company over the past four years, sales and revenue have increased, and damages and rejected stock have decreased. Because of better hake catches, fishing costs have been reduced and the factory has had less damaged fish which requires reworking. The costs of by-catch, damages and waste have been reduced drastically. Vessels did not catch as much by-catch as they used to, and the fact that the quality of fish is much better, has reduced the loss on damaged goods and has increased sales, both locally and internationally.

6.3 CONCLUSIONS AND RECOMMENDATIONS

As can be seen from the overall study of this fish product manufacturer, the IQMS do add value to the business. For the past four years, the company has performed impressively and although a recession affected world markets in 2009 and 2010, the company still performed remarkably well. In these two difficult years the company's market share grew by 6%, while all other roll players in this market suffered from a decrease in market share.

Quality systems were implemented throughout the supply chain. All these systems worked together to ensure that the end product is of world standard, but at a highly competitive price. Improvements were seen in all departments of the business. Catches were better, production improved on throughput, quality of products was world class, distribution costs decreased, margins on sales improved and there was an increase in market share. From the fleet to the end product positive increases were evident. These initiatives assisted the company to become the market leader in the fishing industry in South Africa. The conclusion can be drawn and it has been proven that an IQMS did add value to this fish manufacturer.

The company studied here has built its brand and increased its market share on the quality products that it produces. The following recommendations per sector of the business may assist the company to ensure future growth and development.

6.3.1 Vessels

The company has to look at modifying or upgrading its whole fleet systematically to fish further out in the ocean in the future. This is a costly exercise and should be done over a period of time. The deeper the vessels can go into the ocean, the colder the water and the better the quality of the fish caught will be. To achieve this, vessels need stronger engines to go deeper into the ocean and better equipment for tracking fish. New improved sonar systems help vessels to identify the species of fish detected, which can assist the fleet in catching the correct fish species with lower or no by-catch. Stronger engines also mean higher fuel costs. These costs are linked to new technology which costs money, and have to be justified by improved catches

and quality fish. As stated earlier, this is a systematic process of upgrading fleet and the first vessel will show if such an upgrade justifies the money spent.

6.3.2 Production department

The company needs to invest money in its production plant on an ongoing basis to keep up with technology and EU standards. Skilling its people should be high on the fish manufacturer's list for the future. By uplifting and training its workforce, it will ensure that quality products of world standards are produced to ensure market growth locally and abroad.

Longer production runs will also help bring down costs. This saving will again assist the sales department to sell products at a much more competitive price than its competitors.

6.3.3 Logistics department

Cold store capacity will have to be increased in the future. This will cost money, which will be absorbed within five years due to the savings made on stock currently being stored in outside cold storage. Uplifting and educating staff will also assist the logistical department to step up a level and be even more successful.

In terms of logistics, the company has to look at more direct drops to customers which are more cost effective and assist in quicker turnaround times for trucks. Doing so will ensure on-time delivery and better utilisation of trucks. In the future, the company has to look at trading one level down, and for that smaller trucks will be needed to do smaller drops direct to end customers. This will be a sales focus, but transport will play a decisive role in making this a success by assisting the sales department with on-time deliveries.

6.3.4 Sales department

The sales department has to keep its focus on selling quality product at a competitive price locally and abroad. The huge opportunity for the future lies in the local market. The increase in the TAC quota (2011) will assist, in that there will be

more product available to sell, which will enable the local sales department to grow its market share. Adopting a strategy of buying products in bulk from other producers and then selling those on in the local market will help to increase the sales department's footprint in the local market.

The small by-catch that is being caught can also be boxed and resold in the local market. Where by-catch is presently sold to hawkers on the pier when the vessels dock, this product can be reworked and then sold on into local trade. This will generate money from by-catch and will help to increase the company's local market share by increasing product offering.

The retail and international sales departments should continue to focus on their current markets and try to increase their market share. For them this will be much more difficult owing to their growth over the past four years. They will have to keep focusing on their quality product offering, and penetrate new emerging markets.

All these suggestions for the future may assist the company in being successful in all aspects of its business. This will ensure the future of the fish company in an extremely unstable world economy, where there is a fine line between quality and price.

6.4 FINAL CONCLUSION

In conclusion, the IQMS does have a positive effect on the fish product manufacturing company and the IQMS is compatible with the fish product manufacturing industry as indicated in this case study.

REFERENCES

- Adam, E.E., Corbett, L.M., Flores, B.E., Harrison, N.J., Lee, T.S., Rho, B., Ribera, J., Samson, D. & Westbrook, R. 1997. An international study of quality improvement approach and firm performance. *International Journal of Operations and Production Management* 17(9):842–873.
- Adams, G., McQueen, G. & Seawright, K. 1999. Revisiting the price of quality awards. *Omega* 27:180–191.
- Agnew, D., Grieve, C., Orr, D., Parker, G. & Barker, N. 2006. Environmental benefit resulting from certification against MSCs. *Principles and Criteria of Sustainable Fishing*:1–134.
- Aranda, M. & Christensen, A. 2009. Comparative evaluations of innovative fishing management. *New Zealand's quota systems (QMS) and its complementary mechanisation*:19–41
- Arauz, R. & Suzuki, H. 2004. ISO 9000 performance in Japanese Industry. *Total Quality Management and Business Excellence* 15(1):3–33.
- Attwood, C. 2011. We just do fish. *Fishing Industry News* 12 (2):17-21.
- Azuma Foods. 2012. HACCP. [Online]. Available at: <http://www.azumafoods.com> (accessed on 18 April 2012).
- Baena Lopez, R. 1998. ISO 9000: Un buen comienzo hacia la calidad total. *Alta Direccion* 197:49–56.
- Bangert, M. 2007. Quality management. *The Importance of ISO 46*(1):60.
- Barcellos, L.J.P., Peres, M.B., Wahlich, R. & Barison, M.B. 1991. *Relatorio sobre a otimizacao bioeconomica dos recursos pesqueiros marinhos do Rio Grande do Sul*. Fundacao Universidade do: Rio Grande Press:59.

Batchelor, C.1992. Badge of quality. *Financial Times*, 1 September. London.

Beattie, K.R. & Sohal, A.M. 1999. Implementing ISO 9000: a study of its benefits among Australian organizations. *Total Quality Management and Business Excellence* 10(1):95–106.

Beatty, J.R. 2006. The quality journal: Historical and workforce perspective and the assessment of commitment to quality. *International Journal of Productivity and Reliability Management* 1:139–167.

Berry, H.T.(1991). *Managing the quality transformation*. New York: McGraw Hill.

Biazzo, S. & Bernardi, G. 2003. Process management practises and quality system standards: risk and opportunities of the new ISO 9001 certification. *Business Process Management Journal* 9(2):149–169.

Bogdan, R.C., Biklen, S.K. 1998. *Qualitative research in education: an introduction to theory and methods*. 3rd edition. Needham Heights. MA: Allyn and Bacon

Botsford, L.W., Castilla, J.C. & Peterson, C.H. 1997. The management of fisheries and marine ecosystems. *Science* 277:509–512.

Bottom Trawling. 2007. *South Pacific to stop bottom trawling*. [Online] Available at: <http://www.news.bbc.co.uk> [assessed on 15 July 2011].

Breka, J. 1994. Study finds gains with ISO 9000 registration increase over time. *Quality Progress*, May:18–200.

Brewer, D., Nash, M. & List, W. 2005. Exploiting an integrated management system. *Gama Secure Systems Limited*:1–6.

Briscoe, J.A., Fawoette, S.E. & Todd, R.H. 2005. The implementation and impact of ISO 9000 among small manufacturing enterprises. *Journal of Small Business Management* 43(3):309–330.

Brown, A., Van der Wiele, T. & Loughton, K. 1998. Smaller enterprises' experiences with ISO 9000. *International Journal of Quality and Reliability Management* 15(3):273–285.

Burns, N. & Grove, S. 2011. *Understanding nursing research*. Texas: Elsevier Saunders.

Buttle, 1997. F. An investigation of the willingness of UK certificated firms to recommend ISO 9000. *International Journal of Quality Science* 1(2):40–51.

Buzby, J.C., Roberts, T., Lin, C.T.J. & MacDonald, J.M. 1996. Bacterial food borne disease: medical costs and productivity losses. Agriculture Economic Report No. 741. Economic Research Service, US Department of Agriculture.

Buzzel, R.D. & Wiersema, F.D. 1981. Modelling changes in market share: a cross-sectional analysis. *Strategic Management Journal*:27–42.

Carlingo, L.M.R., Leong, Y.M., Chia, M.P. & Mohamed, H. 1995. Achieving total quality management through ISO 9000: a research note. *Accounting and Business Review* 2(1):173–186.

Casadesus, M. & Jimenez, G. 2000. The benefits of the implementation of the ISO 9000 Standard: empirical research in 288 Spanish companies. *The TQM Magazine* 12(6):432–441.

Casadesus, M. & Karapetrovics, S. 2005. Has ISO 9000 lost some of its lustre: a longitudinal impact study. *International Journal of Operations and Production Management* 25(6):580–596.

Castka, P. & Balzarova, M. A. 2010. Geographies, motivation and benefits from ISO 9000 standard: a comparison of manufacturing and service operations. *International Journal of Productivity and Quality Management* 5 (4):370–383.

Castro, P.M.G. 2000. Estrutura e dinamica da frota de parelhas do Estado de Sao Paulo e aspectos biologicos dos principais recursos pesqueros demersais costeios da regioao Sudeste/Sul d Brazil. *Instituto Oceanografico da Universidade de Sao Paulo*:122.

Caswell, J.A. & Hooker, N.H. 1996. HACCP as an international trade standard. *American Journal of Agricultural Economics* 78:775–779.

Chapman, R.L., Murray, P.C. & Mellor, R. 1997. Strategic quality management and financial performance indicators. *International Journal of Quality and Reliability Management* 14(4):432–448.

Chernatony, L., McDonald, M. & Wallace, E. 2011. *Creating powerful brands*. London: Oxford.

Chittenden, F., Poutziouris, P. & Muhktar, S.M. 1998. Small firms and the ISO 9000 approach to quality management. *International Small Business Journal* 17(1):73–88.

Choi, T.Y. & Eboch, K. 1998. The TQM paradox: relations among TQM practices, plant performance, and satisfaction. *Journal of Operations Management* 17:59–75.

Chow-Chau, C., Goh, M., & Wan, T.B. 2003. Does ISO 9000 certification improve business performance. *International Journal of Quality and Reliability Management* 20(8):936–953.

Christensen, V., Guenette, S., Heymans, J.J., Walters, C.J., Watson, R., Zeller, D. & Pauly, D. 2003. Hundred year decline of North Atlantic predatory fishes. *Fish* 4:1–23.

Christensen, V. 1998. Fishery-induced change in the marine ecosystem: insight from models of the Gulf of Thailand. *Fish Biology* 53:128–142.

Craig, C.S. & Douglas, S.P. 1982. Strategic factors associated with market share and financial performance. *Quality Review of Economic and Business*:101–111.

Conti, G.C., Benjamin, D.M., Drawbridge, M.A. & Demer, D.A. 2007. Measurement of table scattering spectra from bocaccio. *Fish Bulletin* 105:153–157.

Conti, T. 2006. Quality thinking and systems. *The TQM Magazine* 18(3):297–308.

Conti, T. Kondo, Y. & Watson, G. 2003. Quality into the 21st century. *International Academy for Quality*.

Coolbest. 2011. Cold store manufacturer [Online]. Available at: <http://www.tjskl.org.cn> [assessed on 20 August 2011].

Corbett, C.J., Montes-Sancho, M.T. & Kirch, D.A. 2005. The financial impact of ISO 9000 certification in the United States: an empirical analysis *Management Science* 51(7):1046–1059.

Corrie, C. 2009. ISO 9001: 2008, ISO 9004 and beyond. Paper presented at the IPQ and Cedintec Conference.

Cottee, D., Kuhn, D., Lan, L., Lottering, L. & Schrieffer, G. 2004. The study of the implementation of ISO 9000 quality management system. BTech Business Administration Assignment. Cape Peninsula University of Technology, Cape Town. [Online]. Available at: <http://www.cput.ac.za> [accessed on 7 July 2010]

Creech, B. 1994. The five pillars of TQM. *How to Make Total Quality Management Work for you*:234–295.

Cronje, G.de J., J. Hugo, W.M.J., Neuland, E.W. & van Reenen, M.J. 1993. *Inleiding tot die bestuurswese*. 2nd edition. Kaapstad: Southern.

Crosby, P.B. 1997. *Quality is free*. New York. New American Library.

DAFF. 2011. *West Coast fishing grid*. [Online]. Available at: <http://www.nda.agric.za> [assessed on 13 April 2011].

DAFF. 2011. *East Coast fishing grid*. [Online]. Available at: <http://www.nda.zgric.za> [assessed on 13 April 2011].

Dahlgaard, J.J., Kristensen, K. & Kanji, G.K. 2005. *Fundamentals of total quality management*. 1st edition. London: Taylor & Francis.

Dale, B.G. 2003. *Managing quality*. 4th edition. New York. Wiley.

David, L.G. & Stanley, B.D. 2006. *Quality management: introduction to total quality management for production, processing, and services*. 5th edition. Upper Saddle River, NJ: Pearson.

Davies, T.W. 2005. Slurry ice as a heat transfer fluid with a large number of application domain. *International Journal of Refrigeration* 28:108-114.

Dean, K.H. 1990. HACCP and food safety in Canada. *Food Technology*, May:172.

De Chematony, L., McDonald, M. & Wallace, E. 2011. *Creating powerful brands*. 4th edition. Oxford: Butterworth-Heinemann.

Deming, W.E. 1986. *Out of the crisis*. New York: New American Library.

Deming Institute. 2005. *Deming prince: definition of TQM*. [Online]. Available at: <http://www.deming.org/demingprice/demingapplication02.html> [accessed on 18 February 2012].

Dick, G.P.M. 2000. ISO 9000 certification benefits, reality or myth? *The TQM Magazine* 12 (6):365–371.

Dick, G., Gallimore, K. & Brown, J.C. 2001. Does ISO 9000 give a quality emphasis advantage? A comparison of large service and manufacturing organizations, *OMJ* 8 (1):52–57.

Dick, P.M.D., Heras, I. & Casadesus, M. 2008. Shedding light on causation between ISO 9001 and improved business performance. *International Journal of Operations and Production Management* 28(7):687–708.

Drucker, P.F. 1974. *Management: task, responsibility, practices*. New York: Harper & Row.

Dryden, D., Oryan, C., Theunissen, J., Richards, M. & Wang, G. 2004. Value added by ISO 9001 quality management system. BTech Business Administration Assignment. Cape Peninsula University of Technology, Cape Town. [Online]. Available at: <http://www.cput.ac.za> [accessed on 7 July 2010].

Edward, A. & Talbot, R. 1999. *The hard-press research*. London: Longmans.

Efthalia, K. & Skuras, D. 2002. Adoption of a quality assurance scheme and its effect on firm performance: a study of Greek firms implementing ISO 9000. *Total Quality Management* 13(6):827–841.

Ehrenfeld, R. 2003. Globalization: effect on biodiversity, environment and society. *Conservation and Society* 1(1):99–11.

Elmunti, D. 1996. World class standards for global competitiveness: an overview of ISO 9000. *Industrial Management* 38:5-9.

Elmunti, D. & Aldiab, T.F. 1995. Improving quality and organizational effectiveness go hand in hand through Deming management system. *Journal of Business Strategies* 12(1):86–98.

Elmunti, D. & Kathawala, Y. 1997. An investigation into the effect of ISO 9000 on participants "attitudes and job performance". *Production and Inventory Management Journal* 38:52–55.

Elmunti, D. & Kathawala, Y. 1994. Benchmarking for quality management and Technology. *Benchmarking for Quality Management and Technology* 4(4):229–243.

Enberg, K., Jorgenson, C., Dunlop, E.S., Heino, M. & Dieckmann, U. 2009. Implications of fisheries induced evolution for stock rebuilding and recovery. *Evolutionary Applications* 2 (3):394–414.

Escanciano, E., Esteban, F. & Vazquez, C. 2001. ISO 9000 certification and quality management in Spain: results of national survey. *The TQM Magazine* 13(3):192–200.

Escanciano, C., Fernandez, E. & Vazques, C. 2001. Influence of ISO 9000 certification on the progress of Spanish industry towards TQM. *International Journal of Quality and Reliability Management* 18(5):481–494.

FAO, *vide* Food and Agriculture Organisation.

Flick, U. 2009. *An introduction to qualitative research*. 4th edition. London: Sage.

Flynn, B.B., Schroeder, R.G. & Sakakibara, S. 1994. A framework for quality management research and an associated measurement instrument. *Journal of Operational Management* 11:339–366.

Filipovic, I., Njari, B., Cvrtila Fleck, Z., Miokovic, B., Zdolec, N. & Dobranic., N. 2008. Conference Paper. *Quality Management Systems in the Food Industry* X:465–467.

Fish for the future. 2010. [Online]. Available at: <http://www.fishforfuture.eu> [accessed on 21 October 2010]

Fisby Business. 2011. [Online]. Available at: <http://www.redirack.co.uk> [accessed on 15 August 2011].

Food Safety Management. 2008. *Development of ISO 22000 and PAS 220 food safety certification scheme*. [Online]. Available at: <http://www.foodsafetymanagement.info> [accessed on 10 March 2011].

Food and Agriculture Organisation. 1995. Code of Conduct for Responsible Fisheries. Food and Agriculture Organisation of the United Nations. Rome:41.

Food and Agriculture Organisation. 2010. Code of Conduct for Responsible Fisheries. The state of World Fisheries and Aquaculture. Food and Agriculture Organisation of the United Nations. Rome:24.

Food Safety. 2005. The seven principles of HACCP. Institute of Agriculture and Natural Recourses. Nebraska: 402-472

Forker, L.B., Mendez, D. & Hershauer, J.C. 1997. Total quality management in the supply chain: What is its impact on performance? *International Journal of Production Research* 35(6):1681–1701.

Foster, S.T. 2008. Towards an understanding of supply chain quality management. *Journal of Operations Management* 26(4):461–467.

Fuller, G.K. & Vertinsky, I. 2006. Market response to ISO 9000 certification of software engineering process. *International Journal of IT Standards and Standardization Research* 4(2):43–54.

Gawron, J. & Theuvsen, L. 2009. Certification schemes in the European Agrifood Sector: overview and opportunities for Central and Eastern Europe. *Outlook on Agriculture*.

Gawron, J. & Theuvsen, L. 2007. *Die Bewertung des International food standard durch Unternehmen der Ernaehrung*. Good Governance in der Agrar-und Ernaehrungswirtschaft. Landwirtschaftsverlag. Muenster-Hiltrup:359–368.

Giusti, A.M., Bignetti, E. & Cannella, C. 2003. Exploring new frontiers in total food quality definition and assessment: from chemical to neurochemical properties. *Food and Bioprocess Technology* 1(2):130–142.

Goetsch, L. & Davis, S. 2006. *Understanding and Implementing ISO 9000: 2000*. London. Prentice Hall.

Gotzamani, K.D. & Tsiotras, G.D. 2001. An empirical study of the ISO 9000 standards contribution towards quality management. *International Journal of Quality and Reliability Management* 21(10):1326–1342.

Gray, C.F. & Larson, E.W. 2008. *Project management: the managerial process*. 4th edition. New York: McGraw-Hill

Green Peace. [S.a.]. *Victory! John West changes its tuna*. [Online]. Available at: <http://www.greenpeace.org> [accessed on 26 July 2011].

HACCP. 2010. [Online]. Available at: www.fda.gov/food/foodsafety/hazardanalysiscriticalcontrolpointshaccp [accessed on 12 January 2011].

Haedrich, R.L. & Hamilton, L.C. 2000. The fall and future of newfound lands cod fishery. *Society and Natural Resources* 13:359–372.

Haimovici, M., Brunetti, N.E., Rodhouse, P.G., Csirke, J. & Leta, R.H. 1998. Squid recruitment dynamics: the genus *Illex* as a model, the commercial *Illex* species and influences on variability. *FOA Fish Tech* 376:27–58.

- Haimovici, M.J., Castello, P. & Vooren, C.M. 1997. Fisheries, in *Subtropical convergence environments: the coast and sea in the Southwestern Atlantic*. Springer-Verlag:183–196.
- Harrison. G. 2011. Interview with the researcher on 10 May. Woodstock, Cape Town.
- Hasan, M., Ali, M.M. & Lam, T.H.K. 2007. ISO and TQM for business excellence. *Quality Standards: ISO 9000* 2(3):1–6.
- Hatanaka, M., Bain, C. & Busch, L. 2005. Third party certification in the Global Agrifood System. *Food Policy* 30:354–369.
- Hayes, H.M. 1994. ISO 9000: the new strategies consideration. *Business Horizon* 7(3), May–June:52–59.
- Heilbronn, L.K. & Ravussin, E (2003). Calorie restriction an aging: review of the literature and implications of studies in humans. *Am J Clin Nutr* 79:361–369.
- Henderson, S., Holt, G. & Northen, J. 1998. Cost and benefits of implementing HACCP in the UK dairy processing sector. Conference on Economics of HACCP, 15-16 June, Washington, DC.
- Henning, E. Van Rensburg, W. & Smit, B. 2004. *Finding your way in qualitative research*. Pretoria. Van Schaik.
- Hentrich, S. & Salomon, M. 2006. Flexible management of fishing rights and a sustainable fisheries industry in Europe. *Marine Policy* 30(6):712–720.
- Heras, I., Casadesus, M. & Dick, G.P.M. 2002. ISO 9000 certification and the bottom line: a comparative study of the profitability of Basque region companies. *Managerial Auditing Journal* 17(2):72–78.

Heras, I. Dick, G.P.M. & Casadesus, M. 2002. ISO 9000 registration's impact on sales and profitability, *International Journal of Quality & Reliable Management* 19(6):774–791.

Hillborn, R., Quinn, T.P., Schindler, D.E. & Rogers, D.E. 2003. Bio complexity of fisheries sustainability. School of Aquatic and Fishery Science and Department of Biology, University of Washington 100(11):6564–6568.

Hillborn, R., Orensanz, J.M. & Parma, A. 2005. Institutions, incentives and future of fishing. *Philosophical Transactions of the Royal Society* 360:47–57.

History of Fishing. 2011. *Fishing: history of fishing*. [Online]. Available at: www.oldmaster85.com/history_of_fishing.htm [accessed on 10 May 2011].

Ho, S.K.M. 1999. Change for the better via ISO 9000 and TQM. *Management Decision* 37(4):381–385.

Huang, F., Hong, C. & Chen, C. 1999. A study of ISO 9000 process, motivation and performance, *Total Quality Management*, 10(7):1009–1025.

Institute of Quality Assurance. 1993. *Survey on the use and implementation of BS5750*. United Kingdom: IQA.

International Organisation of Standardisation. [S.a.]. *The ISO system*. [Online]. Available at: <http://www.iso.org/iso/home.html> [accessed on 8 September 2011].

ISO, *vide* International Organisation of Standardisation.

Jackson, E., Fink, R.L. & Gillett, J.W. 2001. Understanding and implementing the year 2000 changes to ISO 9001. *Ohio CPA Journal* 60:52–55.

Jacobson, R. & Aaker, D. 1987. The strategic role of product quality. *Journal of Marketing* 51:31–44.

- James, P.T.J. 1996. *Total quality management*. Hertfordshire: Prentice Hall.
- Jens, J.D. Kristensen, K. & Kanji, G.K. 2005. *Fundamentals of total quality Management*. London. Taylor & Francis.
- Jones, R., Arndt, G. & Kustin, R. 1997. ISO 9000 among Australian companies: impact of time and reason for seeking certification on perceptions of benefits received. *International Journal of Quality and Reliability Management* 14(7):650–660.
- Josh Levy-Kramer. 2005. *HACCP seven principles*. [Online]. Available at: <http://www.autologyworld.co.uk> [accessed on 10 August 2011].
- Kanji, G.K. 1995. *Total quality management: proceedings of the first world congress*. 1st edition. London: Prentice Hall.
- Kanji, G.K. 2001. Forces of excellence in Kanji's business excellence model. *Total Quality Management* 12(2):259–272.
- Kanji, G.P. & Moura, P. 2003. Sustaining healthcare excellence through performance measurement. *Total Quality Management and Business Excellence* 14(3):269–289.
- Kanter, R. 2000. *The ISO 9000 answer book*. 2nd edition. Wiley.
- Kapripidis, P., Athanassiadis, K., Aggelopoulos, S. & Giompliakis, G. 2008. Factors affecting the adoption of quality assurance systems in small food enterprises. *Food Contribution* [in press].
- Kayne, P.J. 2000. ISO 9000: should your company seek certification? *Pennsylvania CPA Journal* 70(4)7–8.
- Keefer, D.K., De France, S.D., Richardson, J.B. & Alvanez, M. 1998. *Late Pales–Coastal foragers: specialized extractive behaviour at Quebrada Tacahuay, Peru*. *Latin American Antiquity* 12(4):413–420.

Keep America Fishing. 2010. Fishing: history of fishing. [Online]. Available at: www.keepamericafishing.org/the-history-of-fishing.php [accessed on 21 October 2010].

Kimberlin, C.L. & Winterstein, A.G. 2008. Research fundamentals. *Validity and Research Instruments Used in Research* 65(12):2276–2284.

Knaflewska, J. & Pospiech, E. 2007. Quality assurance systems in the food industry and health security food. *Food Policy* 6(2):75–85.

Kruger, L.P. & Steenkamp, R.J. 2008. *Basic OPQ-M principles for operations, project and quality management*. 1st edition. Menlo Park: Red Pepper Books.

Lamprecht, J.L. 1992. *ISO 9000 preparing for registration*. Milwaukee, WI: ASQC Quality Press.

Laurian, J.U. & Helen, H.J. 1999. The economic implications of using HACCP as a food safety regulatory standard. *Food Policy* 24:625–635.

Lawrence, S., Duffield, R., Bishop, D. & Spencer, M. 1997. The validity of a repeated sprint ability test. *Journal of Science and Medicine in Sport* 4:19–29.

Lee, T.Y. 1998. The development of ISO 9000 certification and the future of quality management: a survey of certified firms in Hong Kong. *International Journal of Quality and Reliability Management* 15(2):162–177.

Lee, T.Y., Hareton, K.N., Leung, K. & Chan, C.C. 1999. Improving quality management on the basis of ISO 9000. *The TQM Magazine* 11(2):88–94.

Lipovatz, D., Stenos, F. & Vaka, A. 1999. Implementation of ISO 9000 quality systems in Greek enterprises,. *International Journal of Quality and Reliability Management* 16(6):534–555.

Llopis, J. & Jaun Jose, T. 2005. The importance of internal aspects in quality improvement. *Department of Business Management*. University of Alicante. Spain 1-30.

Lloyd's Register Quality Assurance (1993), *Setting Standards for Better Business*, Report of Survey Findings, Lloyd's Register Quality Assurance, UK.

Maani, K.E., Putterill, M.S. & Sluti, D.G. 1994. Empirical analysis of quality improvement in manufacturing. *International Journal of Quality and Reliability management* 11(7):19–37.

Magh, H.A.E. 2006. An investigation of ISO 9000 adaption in Saudi Arabia. *Managerial Auditing Journal* 21(2):132–147.

Mann, R. & Kehoe, D. 1994. An evaluation of the effects of quality improvement activity on business performance. *International Journal of Quality and Reliability Management* 11(4):29–44.

Marine Steward Council. [S.a.]. *Certified fisheries*. [Online]. Available at: <http://www.msc.org/track-a-fishery/certified> [accessed on 8 September 2010].

Merrit, J.H. 1969. *Refrigeration of fish vessels*. Oxford: Fishing News Book.

Martinez-Costa, M., Martinez-Lorente, A.R. & Choi, T.Y. 2008. Simultaneous consideration of TQM and ISO 9000 on performance and motivation: an empirical study of Spanish companies. *International Journal of Production Economic* 113:23–39.

Martinez-Lorente, A.R., Dewhurst, F.W. & Dale, B.D. 1998. Total quality management: origins and evolution of the term. *The TQM Magazine* 10:378–386.

Mason, J. 1996. *Qualitative research*. Thousand Oaks, CA. Sage.

- Mazzocco, M. 1996. HACCP as a business management tool. *American Journal of Food Protection* 59:1133–1137.
- McAdam, R. & McKeown, M. 1999. Life after ISO: an analysis of the impact of ISO 9000 and total quality management on small business in North Ireland. *Total Quality Management* 10: 229–241.
- McNiel, D.W. & Rainwater, A.J. 1998. Development of the fear of Questionnaire III. *Journal of Behaviour Medicine* 21(4):389–410.
- Meuwissen, M.P.M., Velthuis, A.G.T., Hogeveen, H. & Huirne, R.B.M. 2003. Traceability and certification in meat supply chains. *Journal of Agribusiness* 21:167–181.
- Mensah, L.D. & Julien, D. 2011. Implementation of food safety management in the UK. *Food Control* 22 (8):1216–1225.
- Merican, Z. 1996. Dealing with an expanding global food supply. *Journal of Food Protection* 59:1133–1137.
- Merli, G. 1990. *Total manufacturing management: production organization of the 1990s*. London. Productivity Press.
- Monterey Bay Aquarium. [S.a.]. *Fishing methods*. [Online]. Available at: <http://www.montereybayaquarium.org> [accessed on 21 October 2011].
- Morris, C.E. 1997. HACCP update. *Food Engineering*, July-August:51–56.
- Motarjemi, Y., Kaferstein, F., Moy, G., Miyagawa, S. & Miyagishima, K. 1996. Importance of HACCP for public health and development: the role of the World Health Organization. *Food Control* 7:77–85.
- Moy, G. Hazzard, A. & Kaferstein, F. 1997. Improving the safety of street vended food. *World Health Statistics Quarterly* 50:124–131.

Myers, R.A. & Worm, B. 2003. Rapid worldwide depletion of predatory fish communities. *Nature* 423:280–283.

Naagarazan, R.S. & Arivalagar, A. 2005. *Total quality management*. 1st edition. New Delhi: New Age International.

Nash, R.D.M. & Geffen, A.J. 2012. Mortality through the early life-history of fish: what can we learn from European plaice. *Journal of Marine Systems* 93:58–68.

Nasser, K., Karbhari, Y. & Mokhtar, M.Z. 2004. Impact of ISO 9000 registration on company performance: evidence from Malaysia. *Managerial Auditing Journal* 19(4):509–516.

Naveh, E. & Marcus, A. 2005. Achieving complete advantage through implementing a replicable management standard: installing and using ISO 9000. *Journal of Operations Management*:1–26.

Newman, I. & Benz, C.R. 1997. *Qualitative-quantitative research methodology: exploring the interactive continuum*. New York: ANSI.

North East Integrated System. 2011. [Online]. Available at: www.imsnorthern.co.uk. [accessed on 12 September 2011].

Oakland, S.J. 2003. *TQM: text with cases*. 3rd edition. Oxford: Butterworth-Heinemann.

Oakland, S.J. & Morris, P. 1997. *TQM: a pictorial guide for managers*. 1st edition. Oxford: Butterworth-Heinemann

Ofori, G., Gang, G. & Briffett, C. 2002. Implementing environmental management systems in construction: lesson of quality systems. *Building and Environment* 37(12):1397–1407.

Orris, G.D. & Whitehead, G.D. 2000. Hazard analysis and critical control points (HACCP) as part of an overall quality assurance system in international food trade. *Food Contribution* 11:345–351.

Oschaman, J.J., Stroh, E.C. & Auriacombe, C.J. 2005. In search of excellence in public service delivery. *Primary and supportive dimensions of total quality management* 24(2):176–196.

Pair trawling. 2001. *European cetacean by-catch campaign*. [Online] Available at: www.eurocbc.org [assessed on 15 July 2011].

Pauly, D., Watson, R. & Alder, J. 2005. Global trends in world fisheries: impact on marine ecosystems and food security. *Philosophical Transactions of the Royal Society* 29(360):5–12.

Pauly, D., Alder, J., Bennet, E., Christensen, V., Tyedmery, P. & Watson, R. 2003. The future for fishing *Science* 302(5649):1359–1361.

Pauly, D., Christensen, V., Dalsgaard, J., Froese, R. & Torres, F. 1998. Fishing down marine food webs. *Science* 279(5352):860–863.

Pauly, D., Christensen, V., Guenette, S., Tony, J.P., Sumaila, U.R., Walters, C.J., Watson, R. & Zeller, D. 2002. Towards sustainability in world fisheries. *Nature* 418:689–695.

Patton, M. 1990. *Qualitative evaluation and research methods*. Beverly Hills, CA: Sage.

Payne, D., Miao, T., Miller, D.H. & Modesitt, M. 2005. First measurement of the rate of the inclusive radiative penguin decay. *The American Physical Society* 74(15):2885–2889.

Peres, M.B. & Haimovici, M. 1998. A pesca dirigida ao cherne poveiro. *Polyprion americanus* no sul do Brazil. *Atlantica, Rio Grande* 20:141–161.

Perez, J.A.A., Wahrlich, R., Pezzuto, P.R., Schwigel, P.R., Lopes, F.R.A. & Rodrigues-Ribeiro, M. 2003, Deep-sea fishery off Southern Brazil: recent trends of the Brazilian Fishing Industry, *J. Northw. Atl. Fish Sci* 31:1–18.

Peters, R.E. 1997. The broader application of HACCP concepts to food Australia. *Food Australia* 49(6):270–274.

Pfeifer, T, 2002. *Quality management*. Toronto: Hanser Gardner.

Pfeifer, T. 2002 *Quality management: strategies, methods, techniques*. Munchen: Carl Hanser Verlag.

Phillips, L.W., Chang, D.R. & Buzzel, R.D. 1983. Product quality, cost position, and business performance: a test of key hypotheses. *Journal of Marketing* 37:26–43.

Prince, E.K. & Myers, T.L. 2008. Effect of harmful algal blooms an competitors: allepathic mechanism of red tide dinoflagellate. *Kanenia brevi Limnol* 53(2):531–541.

Pierson, M.D., Corlett, D.A. Jr. (Eds.) 1992. *HACCP: Principles and Applications*. New York: Van Nostrand Reinhold.

Pikitch, E.K., Santora, C., Babcock, E.A., Bakun, A., Bonfil, A., Conover, D.O., Dayton, P., Doukakis, P., Fluharty, D., Heneman, B., Houde, E.D., Link, J., Livingston, P.A., Mangel, M., McAllister, M.K., Pope, J. & Sainsbury, K.J. 2004. Ecosystem base fishery management *Science* 305(5862):346–347.

Pineiro, C., Borros-Velazquez, J. & Sandiago, P.A. 2004. Effect of newer slurry ice system on the quality of aquatic food product: a comparative review versus flake-ice chilling methods. *Trends in Food Science and Technology* 15(12):575–582.

Pivka, M. 2004. ISO 9000 value-added auditing. *Total Quality Management and Business Excellence* 15(3):345–353.

Polit, D.E. & Talano-Beck, C. 2008. *Nursing research: generating and assessing evidence of nursing practices*. Philadelphia: Lippincott.

Popper, K. 2004. *The advantages and disadvantages of questioners*. The Logic of Scientific Discovery. Routledge: Taylor & Francis.

Prajogo, D., Baofeng, H. & Han, Z. 2012. The effect of different aspects of ISO 9000 implementation on key supply chain management practices and operational performance. *Supply Chain Management: An International Journal* 17(3):306–322.

Pun, K.F., Chin, K.S. & Lau, K. 1999. A self assessed quality management system based on integration of MBNQA/ ISO 9000/ ISO 1400. *International Journal of Quality and Reliability Management* 16(6):602–629.

Pycraft, M., Singh, H., Phihlela, K., Slack, N., Chambers, S., Harland, C., Harrison, A. & Johnston, R. 2001. *Operational management*. 4th edition. Cape Town: Pearson.

Quazi, H.A. & Padibjo, S.R. 1997. A journey towards total quality management through ISO 9000 certification. *A Singapore experience* 9(5):364–371.

Quazi, H.A. & Padibjo, S.R. 1998. A journey towards total quality management through ISO 9000 certification: a study on small and medium-sized enterprises in Singapore. *International Journal of Quality and Reliability Management* 15(5):489–508.

Quazi, H.A., Hong, W.H. & Meng, C.T. 2002. Impact of ISO 900 certification on quality management practices: a comparative study. *Total Quality Management* 13(1):53–67.

Ramasamy, S. 2005. *Total quality management*. New Delhi: Tata McGraw-Hill.

Rawlins, R.A. 2008. *Total quality management (TQM)*. 1st edition. London: Author House.

Reardon, T. & Farina, E. 2002. The rise of private food quality and safety standards: illustrations from Brazil. *International Food and Agribusiness Management Review* 4:413–421.

Renuksa, S.D. & Venkateshwara, B.A. 2006. A comparative study of human resource management practices and advanced technology adoption of SMEs with and without ISO certification. *Singapore Management Review* 28(1):41–61.

Roa, S.S., Raghu-Natham, T.S. & Solis, L.E. 1997. Does ISO 9000 have an effect on quality management practices? An international empirical study. *Total Quality Management* 8(6):335–346.

Romano, P. 2000. ISO 9000: What is its impact on performance? *Quality Management Journal* 7(3):38–56.

Santos, L. & Escanciano, C. 2002. Benefits of the ISO 9000: 1994 system. *International Journal of Quality and Reliability Management* 19(3):321–344.

Sandweiss, D.H., Richardson III, J.B., Reitz, E.J., Hsu, J.T. & Fieldman, R.A. 1998. Quebrada Jaguay: early maritime adaptations in South America. *Science* 281:1830–1832.

Sandweiss, D. 2008. Early fishing societies in Western South America. *The Handbook of South America Archaeology* 3:145–156.

Sarantakos, S. 1998. *Social Research*. 2nd edition. China: Macmillan Publishers.

SASSI. [S.a.]. *The state of our ocean*. [Online]. Available at: <http://www.wfwsassi.co.za> [accessed on 1 November 2011].

Scheele, N. 2003. Scheele promotes China. *Ward's Auto World* 39(7):15

Schiefer, G. & Rickert, U. 2004. *Quality assurance, risk management and environmental control in agriculture and food supply networks*. Bonn: ILB-Press.

Schoefler, S., Buzzel, R.D., & Heany, D.F. 1974. Impact of strategic planning on profit performance. *Harvard Business Review*, March-April:137–145.

Sea Harvest. [S.a.]. *History*. [Online]. Available at <http://www.seaharvest.co.za> [accessed on 7 January 2011].

Seddon, J. 1997. *In pursuit of quality: the case against ISO 9000*. London: Oak Tree Press.

Seddon, J. 1996. BS 5750 – history shooting quality in the foot. *Managing Service Quality*, 4:9–12.

Shank, G.D. 2002. *Quality research: a personal skills approach*. Upper Saddle River, NJ: Pearson.

Sharma, D.S. 2005. The association between ISO 9000 and financial performance. *The International Journal of Accounting* 40(2):151–172.

Sherman, R., Webb, R. 2001. *Qualitative Research in Education: Focus and Methods*. London: Routledge Falmer.

Single Trawling. 2005. *Pelagic Single Trawling*. [Online] Available at: <http://www.seafoodscotland.org> [Assessed on 18 October 2011].

Skrabec, O.R. 1999. Quality assurance revisited. *International Management*, November-December:6–9.

Singels, J., Ruel, G. & Van der Water, H. 2001. ISO 9000 series: certification and performance. *International Journal of Quality and Reliability Management* 18(1): 62–75.

Sissel, K. 1996. Survey rates ISO 9000. *Chemical Week* 158:33.

South African Department of Sea Fisheries. [S.a.]. *Information on fisheries management in the Republic of South Africa*. [Online]. Available at: <http://www.fao.org> [accessed on 25 January 2011].

South African Fishing. [S.a.]. [Online]. Available at: http://www.South_african_economy_fishing.html [accessed on 21 January 2011].

Stevenson, T.H. & Barnes, F.C. 2001. Fourteen years of ISO 9000: impact, criticisms, cost, and benefits. *Business Horizon* 44:45–51.

Struebing, L. 1996a. TQM makes a difference with food distributors. *Quality Progress* 29:17–18.

Struebing, L. 1996b. 9000 standards? *Quality Progress* 29:23–28.

Stuedel, H.J. 1996. New consortium focus on quality assurance: ISO 9000. *Perspective*, 17 November.

Sun, H. 2000. Total quality management, ISO 9000 certification and performance improvement. *International Journal of Quality and Reliability Management* 17(4):40–57.

Suwanrangsi, S. 2000. Experiences in the application of HACCP for exports and local markets: the Case of Thai Fishing. *Food Safety Management in Developing Countries*:1–12.

Suwanrangsi, S. 2000. HACCP implementation in Thai fishery industry. *Food Control* 11:377–382.

Surak, J.G. 2003. HACCP and ISO development of a food safety management standard, *Department of Science and Human Nutrition*.

Surak, J.G. 2007. A recipe for safe food: ISO 22000 and HACCP. *Food Safety*.

Tari, J., Molina, C.E. & Claver, E. 2002. Areas of improvement in certified firms advancing towards TQM. *Emerald Group Publishing Limited* 19(8):1014–1036.

Taylor, W.A. 1995. Senior executives and ISO 9000: attitudes, behaviour and commitment. *International Journal of Quality and Reliability Management* 12(4):40–57.

Terziovski, G., Samson, M. & Dow, D. 1997. The business value of quality management system certification: evidence from Australia and New Zealand. *Journal of Operations Management* 13(4):64–76.

The Ecological Footprint. 2012. [Online]. Available at: www.footprintnetwork.org [accessed on 7 January 2012].

The Living Planet Report. 2012. *Biodiversity, bio capacity and better choices*. [Online]. Available at: www.donellameadows.org/living-planet-report-2012-released [accessed on 8 February 2012].

Theuvsen, L., Plumeyer, C.H. & Gawron, J.C. 2007. *Quality in food chains*. Wageningen: Wageningen Academic.

Textile Today. 2010. Implementing of ISO 9000. [Online]. Available at: <http://textiletoday.co..bd> [accessed on 21 October 2010]

Total Quality Management and Business Excellence. 2009. *Maximizing the benefits of ISO 9000 implementation*. [Online]. Available at: <http://www.tandfonline.com> [accessed on 18 September 2010].

Tsekouras, K., Dimara, E. & Skuras, D. 2002. Adopting of quality assurance scheme and its effect on firm's performance: a study of Greek firms implementing ISO 9000. *Total Quality Management and Business Excellence*, 13(6):827–841.

Tummala, V.M.R. & Tang, C.L. 1996. Strategic quality management, Malcolm Baldrige and European quality awards and ISO 9000 certification: core concepts and comparative analysis. *International Journal of Quality and Reliability Management* 13(4):8–38.

Tzelepis, D., Tsekouras, K., Skuras, D. & Dimara, E. 2006. The effect of ISO 9001 on firms' productive efficiency. *International Journal of Operational and Production Management* 26(10):1146–1170.

Unnevehr, L.J. & Jensen, H.H. 1999. The economic implications of using HACCP as a food safety regulatory standard. *Food Policy* 24:625–635.

Valentini, H., D'incao, F., Rodrigues, L.F., Rebelo Neto, J.E. & Rahn, E. 1991. Analise da pesca do camarao-rosa nas regioes sudeste e sul do Brazil. *Atlantica Rio Grande* 13:143–158.

Wackernagel, M & Rees, R. 1996. *Our ecological footprint*. Gabriola Island: New Society.

Walsh, B. 2011. The end of the line. *Time*, June, 18:5.

Watling, L. & Norse, E.A. 2008. Disturbance of the seabed by mobile fishing gear: a comparison to forest clear cutting. *Fish and Fisheries* 10:1523–1539.

Watkins, D. 2006. Reflections of future quality. *Quality Progress*, January:23–28.

Watson, R., Kitchingman, A., Gelchu, A. & Pauly, D. 2004. Mapping global fishing: sharpening our focus. *Fishing and Fisheries* 5:168–177.

Watson, R. & Pauly, D. 2001. Systematic distortions in the world fisheries catch trends. *Nature* 414:534–536.

Webb, S.A. 2001. Some considerations on the validity of evidence-based, practice in social work. *British Journal of Social Work* 31:57–79.

Webster, S.E. 1997. ISO 9000 certification: a success story at Nu Visions Manufacturing. *IIE Solutions* 29:19–21.

Welman, C. Kruger., F. & Mitchell, B. 2003. *Research Methodology*. 3rd Ed. Cape Town: Oxford University Press.

West, J.E. 2002. ISO 9001:2000's Process Approach. *Quality Progress* 6:35-55.

Wild, S. 2008. Sustainability reporting in the fishing industry: regulation versus voluntarism. *Australasian Accounting Business and Finance Journal* 2(3):57–80.

Wisniewski, M. 2001. Using Servqual to assess customer satisfaction with the public sector service. *Managing Service Quality* 11(6):360–388.

World fishing industry. *World fishing industry: by catch*. [Online]. Available at: <http://pangaea-yep.com/blogs/entry/World-fishing-Industry> [accessed on 8 May 2010].

World of Fishing. 2010. *World of fishing*. [Online]. Available at: www.bassing.co.za/bassingforum/58798-past3.html [accessed on 18 November 2010].

World Wildlife Foundation [S.a.]. *Fisheries challenges requires all hands on deck*. [Online]. Available at: <http://www.wwf.org.za> [accessed on 10 November 2011].

Worm, B. 2009. Rebuilding global fisheries. *Science* 325:578–585.

Yahya, S., Goh, W.K. 2001. The implementation of an ISO 9000 quality system. *International Journal of Quality & Reliability Management* 18(9):941-966.

Yeung, A.C.L., Lee, T.S. & Chan, L.Y. 1999. Senior management perspectives and ISO 9000 effectiveness: empirical research. *International Journal of Production Research* 41(3):545–569.

Yin, R.K. 1984. *Case study research: design and methods*. Beverly Hills, CA: Sage.

Yin, R.K. 1994. *Case study research: design and methods*. 2nd edition. Beverley Hills, CA: Sage.

Yin, R.K. 2003. *Case study research: design and methods*. 3rd edition. London: Sage.

Yin, R.K. 2009. Case study research design methods. *The Weekly Qualitative Report* 2(27):162–165.

Zairi, M., Letza, S.R. & Oakland, J.S. 1993. *TQM: its impact on bottom line results*. London: Technical Communications.

Zhu, Z. & Scheuermann, L 1999. A comparison of quality programs: total quality management and ISO 9000. *Total Quality Management and Business Excellence* 10(2):291–297.

Zucker, L.G. 1987. Institutional theories of organization. *Annual Review of Sociology* 13:443–464.

Additional internet sources

<http://www.businessballs.com> [accessed on 1 November 2011].

<http://www.brcglobalstandards.com> [accessed on 22 January 2011].

<http://www.bsigroup.com> [accessed on 8 July 2011].

<http://www.btaplus.ca> [accessed on 30 April 2011].

<http://www.efsa.europa.eu> [accessed on 10 may 2011].

<http://.greenpeace.org/international/en/campaign/oceans/bycatch> [accessed on 30 September 2011].

<http://www.msc.org> [accessed on 20 September 2011].

<http://www.nasa.gov> [accessed on 21 July 2011].

<http://www.nrcc.org.za> [accessed on 25 January 2011].

<http://www.stats.oecd.org/glossary/detail.asp> [accessed on 12 February 2011].

<http://www.saarf.co.za/LMS/lms.htm> [accessed on 12 November 2011].

<http://searchsoftwarequality.techtarget.com> [accessed on 21 September 2011].

<http://www.socialresearchmethods.net/kb/sampprob.php> [accessed on 10 May 2011].

<http://www.thefoodsafetynetwork.co.za> [accessed on 8 September 2011].

<http://www.woolworths.co.za> [accessed on 12 March 2011].

<http://www.wowlink.com.au/wps/portal> [accessed on 12 May 2011].

<http://www.wwf.org.za> [accessed on 21 June 2011].

APPENDIX A: QUESTIONNAIRE

Name :.....

Department :.....

Years of service :.....

Gender :.....

Questionnaire on the integrated quality management system in the fishing company

- 1 Is there an IQMS implemented in your department?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 2 Does the company's IQMS add value to the company?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 3 Are there any QMSs being implemented, that you know of, in the other departments of the company?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 4 Did the IQMS implemented over the past four years, have a direct impact on your department?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 5 Which department's QMS has the biggest impact on your departments KPAs?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 6 Did the IQMS have a positive impact on the company over the past four years?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 7 Do you know of any negative effect that the IQMS has had on the company?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

- 8 The most important aspect of the fishing company is its focus on quality products.
Does the IQMS support this?

YES	NO	DON'T KNOW
-----	----	------------

Remarks

This questionnaire is available in Afrikaans and English.