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Executing a process enhancement intervention on the processing lines at Seavuna Fishing Company.

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DECLARATION:
In accordance with Rule G4.6.3, I hereby declare that the above mentioned treatise is my own work and that it has not previously been submitted for assessment to another University or for another qualification.

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ABSTRACT

The fresh hake processing lines at Seavuna fishing company in Mossel Bay are not consistently achieving their volume output standards and this is resulting in higher processing costs and loss of processing opportunities. The company's senior management are concerned about this trend and require a complete review of the effectiveness of the resources deployed on the lines. This with the view of establishing the causes of poor process volume output.

In order to resolve the process inefficiency challenges mentioned, this study used both empirical and time studies to investigate the effectiveness of the company's resources directly deployed in the processing unit. The study focused on investigating the human factor, machinery and equipment, the environment and the current efficiency standards.

Relevant literature in the field of process efficiency improvement was consulted to assist in identifying factors that are known to cause process inefficiencies, and also to establish which improvement techniques would be relevant in correcting the situation. From the Literature reviewed, it was evident that a 'one size fits all' solution to resolving inefficiencies is almost non-existent and that a solution that is relevant to the problem is more effective. In addition, a benchmarking exercise was also done to establish how Seavuna's current volume output standards fair against its major rivals.

Once data from both studies were collected, the results were analysed using the some of the basic quality tools. Thereafter, lean manufacturing principles were used to attempt to resolve the current efficiency challenges. The study recommended that the company construct a business strategy and a corresponding organisational culture to direct its continuous improvement interventions. The use of strategic quality planning would go a long way in assisting the company to execute some of the interventions recommended.

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CHAPTER ONE

SCOPE OF THE STUDY

1.1 INTRODUCTION

The fresh hake processing facility at the Seavuna Fishing Company in Mossel Bay, is responsible for filleting various sizes of hake using semi-automated filleting machines and also manually. The facility consists of four fresh hake filleting lines, three semi-automated and one manual line. Each line is designated to fillet a specific size of hake at any given time and at a specified volume standard.

At present, the processing unit is reporting overall volume outputs of 80% on average, 20% short of the required standard. According to senior management, this current level of performance in unacceptable as it is negatively impacting on the sustainability and competitiveness of the company in the following ways-

- Elongated processing cycle times are driving processing costs upwards and also minimising profitability- Since the processing facility is processing less fish than expected, the company is unable to meet customer demand.
- A slow processing rate results in fish moving slowly through the process and as such negatively affecting fish quality. Fresh fish is highly perishable by nature and therefore any delays or prolonged processing times will affect the quality of fillets produced.

Oeij, Looze, Have, Rhijn and Kuijt-Evers (2011) are of the view that if process output consistently falls short of the standard, an intervention is required to restore output to standard or to modify the standard. Therefore, in order to address the process output challenges at Seavuna, it is incumbent upon the company to find ways to enhance its process efficiencies or alternatively modify its standards. This will enable the company to improve its process and in turn sustain and improve its

profitability, in the longer term. The underperformance of the processing unit can be attributed to poor or underutilisation of the resources of people, processes, machinery and equipment that are critical sources of process efficiencies.

Process and productivity improvement literature are of the view that the following are some of the inhibitors of process efficiencies-

- Poor process design.
- Ineffective leadership.
- High absenteeism.
- Ineffective performance metrics.
- Poor maintenance of machinery,
- Disengaged employees.
- Lack of a continuous improvement plan.
- Lack of creativity and innovation.
- Poor utilisation of resources.

The solution to enhance the poor process efficiencies on the hake filleting lines, would entail investigating and identifying possible causes of poor process efficiencies. Thereafter, executing relevant process improvement interventions to correct and improve the current situation.

In today's business environment the increase in global competition is the primary factor driving the need for process enhancements in manufacturing entities (Low, Kamaruddin & Azid, 2015; Grünberg, 2004). This factor requires businesses to seek new ways to conduct business, new ways to manage staff as well as new and invigorated processes to preserve and develop competitive advantage (Crouzet & Parker, 2014). Seavuna intends to develop its competitive advantage by focusing on improving its processing efficiencies continuously. Literature alludes to the view that enhanced and efficient manufacturing processes relate to competitiveness since they utilise less input, thereby giving them the competitive advantage to charge lower prices (Stevenson, 2009, p. 53).

A recent process benchmarking exercise done by the author has revealed that Seavuna fishing company's existing hake processing labour efficiency standards are superior to those of its major rivals. However, a quick glance at the current actual labour efficiencies indicates that the Seavuna processing unit is not consistently achieving these standards.

Three common efficiency measures exist in the South African hake processing industry, namely filleting efficiency (Input kilograms), output (yield) and the packing yield. However, for the purposes of this study only the input and out standards of the filleting process will be used. Since hake is sorted and graded into standard sizes based on specified weight range, each size has its own efficiency standard (Seavuna fishing, Quality Manager, 2016).

The primary contribution of this study is to identify the causes of poor process efficiencies on the hake filleting lines at Seavuna fishing company with the aim of finding ways to effectively eliminate or minimise them. In order to enhance process volume output, it is important to identify factors that inhibit productivity and deal with them, as they are a key to the success of the process (Grünberg, 2004).

1.2 PROBLEM STATEMENT

1.2.1 Restating the problem

The research problem is to investigate the causes of poor process efficiency on the hake filleting lines at Seavuna fishing company with a view of finding ways to correct them effectively.

If the sub-standard volume outputs on the hake processing lines are not resolved, Seavuna will be incapable of reducing waste, cost and processing time on the lines. This will deny the company the ability to be competitive as its input cost would remain high. In addition, its growth and existence will also be negatively affected (Crouzet & Parker, 2014). All in all, the company

will find it extremely difficult to compete locally and globally as consumers worldwide are demanding quality products at competitive prices.

A new trend in the global trade is emerging in which medium size organisations like Seavuna fishing company are actively becoming involved in international trade and competing with large multinationals (Hill, 2014, p. 19). In order for these companies to compete successfully for a global market share, they have to produce superior quality products at lower prices. For these organisations to produce quality goods at lower prices, they need to improve their innovative capabilities, which in turn would facilitate the enhancement of their process efficiencies as well as product offerings. Germany, the world's largest exporter of commodities is championing the concept of "hidden champions"; these are medium to small businesses that are making a huge impact on the global marketplace. (The White boarding, 2012)

In fact, the country's strong export performance is driven by the "hidden champions" who account for about 25% of the Germany's total annual exports. These businesses despite their size and also notwithstanding the fierce global competition exerted on them by the big multinationals continue to show significant growth (The White boarding, 2012). This is due to a number of key factors such as their ability to continuously innovate and improve their process efficiencies and product offerings as well as their attitude to focus on their core expertise as well as their ambitious goals of gaining competitive advantage through superior product quality (The White boarding, 2012).

The competitiveness and survival of Seavuna fishing company will also depend on its ability to continuously improve its productivity. To accomplish this, the company should implement effectual productivity and quality improvement interventions that are sustainable and equally relevant to fresh fish processing. Improved productivity will lower its input cost while high quality standards of its products will enable the company to export most of its quality products at a higher premium. "Continuous improvement

initiatives help enhance the organisation's ability to cohesive and quick process improvements" and therefore need to be implemented regardless of the size of the company (Kohlbacher & Gruenwald, 2010). Generally small and medium size organisations often lack the knowledge or capacity within their ranks to be able to implement process or productivity improvement projects (Mckee, 2003). Likewise, it seems Seavuna fishing company as a medium sized entity itself, has not implemented any productivity improvement program for some time now. Therefore, addressing this problem effectively will give other medium sized entities within the South African fishing industry and other industries the impetus to implement continuous improvement projects with confidence.

1.2.2 Background to the problem: Restating the problem

The primary drivers of poor process efficiencies identified at Seavuna fishing are not only confined to this company but are prevalent in other industries in South Africa and globally as well. Many manufacturing entities around the world suffer from low processing performances that result in financial losses. However, the techniques or tools used to resolve poor performance challenges differ from country to country, industry to industry and company to company due to the uniqueness of some of the problems, the availability or non-availability of technology and the culture of the employees. To assist in arriving at a resolution to Seavuna fishing company's efficiency challenges, this study will focus on finding ways to enhance the process efficiency of the hake processing lines. Improvement of processes is critical in improving business performance (Kohlbacher & Gruenwald, 2011). Therefore, by implementing process improvement initiatives, Seavuna fishing will be able to achieve improved product quality, reduction in waste and an increase in profitability (Low et al, 2015).

The hypothesis is that national culture does have a positive relationship with productivity as people's attitudes determine how they approach productivity. Most developed countries despite their lack of natural endowments like rich minerals, have still managed to become economically sound due to the

attitude of their inhabitants (Ostapenko, 2015). South Africa as a nation, however, suffers from a low labour productivity and its productivity levels continue to lurch. The latest statistics available from Productivity SA, published in its official publication, the Leader (2015) reports a 6.85% decrease in overall labour productivity. Out of the 20 manufacturing sub-sectors in South Africa researched by productivity SA, seven sub sectors mainly from food, leather and rubber reported a decline in their respective labour productivity (The Leader, 2015). Ironically, the fishing and agriculture sectors showed a 2.2% improvement in overall productivity however, this has not translated into any significant improvement in the actual labour efficiencies at plant level and in particular in the processing unit at Seavuna fishing Company (The leader, 2015).

1.2.3 Gaps of relevant literature

The various process enhancement techniques developed over time namely lean manufacturing, Kaizen, business process re-engineering, six sigma and lean six sigma provide structured ways of improving productivity but do not prescribe how one should implement them (Grünberg, 2004). In some cases, such techniques are problem specific and therefore cannot be applied across all industries (Grünberg, 2004). Most of the research done in this field cannot be generalised to other industries or countries and therefore this study will attempt to identify factors affecting process output in the South African hake processing industry, specifically at Seavuna fishing company. “Factors identified in the literature reviewed are generally connected to the separate local cases and purposes and are difficult to generalise for wider purposes” (Grünberg, 2004; Low et al, 2015). An indication that there is no ready-made and ‘one size fits all’ process improvement models that could be implemented across different countries, industries and organisations, have motivated this study. From the literature reviewed, there is no evidence that such research has been done in the hake processing industry in South Africa.

1.2.4 Conceptual statement

The hake processing lines at Seavuna fishing company utilise a line process system, in that high volumes of highly standardised fish products, flow through the process with dedicated resources to support this process (Verma & Boyer , 2010, p.111). The flow of fish products is organised around a few products. Therefore, most of the steps in the process are performed repetitively with minimal variation and as such all staff involved in the process are specialised in certain activities (Verma & Boyer, 2010, p111). The hake processing lines deploy a process layout, which entails grouping machines, equipment and people together that perform similar functions (Verma & Boyer, 2010, p.112).

According to Stevenson (2009, p. 251), the following are the disadvantages of the line process type-

- Due to the repetitive nature of the process, workers tend to get easily bored and this affects their motivation.
- Poor skilled staff may negatively affect process output.
- The process is not flexible to changes in volume or other products.
- The process is highly inclined to delays caused by machinery breakdowns, excessive absenteeism because workstations are highly interdependent.
- Incentive plans aligned to individual output are not possible as they would cause variations amongst the output of other staff members.

This study will attempt to minimise the effects of these disadvantages as well as those of process variations to enhance the performance of the process. There are four basic sources of variations in any business process that interfere with optimum output, namely the variety of goods produced, structural variation in demand, random variation and assignable variations (Stevenson, 2009. p 11). The minimisation of these variations should create a smoother process flow on the processing lines.

1.3 RESEARCH QUESTIONS

- What are the factors that are negatively influencing processing volume efficiencies on the hake processing lines at Seavuna fishing company?
- What is influencing the above mentioned factors?
- Are the factors conducive to high productivity as per literature present or absent within the processing unit at Seavuna fishing company?
- Is the process flow on the hake processing lines logical? Are there any steps missing or duplications?
- Are all the process steps adding value? Does any waste happen in any of the steps? Can some of them be shortened or eliminated? Can some steps be combined? Are additional steps required?
- Are the performance metrics used in the processing unit effective to measure all the critical variables?

1.4 RESEARCH OBJECTIVES

1.4.1 Primary objectives

The main objective of this study is to contribute in finding a resolution for the diminished process output on the hake processing lines at Seavuna fishing company by identifying and investigating the factors, which are negatively influencing the performance of the process. Using process and productivity improvement techniques to recommend and implement the interventions that would improve the efficiencies. Thereafter, measuring the new process and implementing revised process efficiency standards.

To achieve the mentioned primary objectives, the following secondary objectives are formulated-

- Conduct extensive literature review in the field of process productivity/efficiency improvement and establish which process improvement techniques would be relevant to improve efficiencies on the hake filleting lines.

- Conduct a time study observation on all the tasks making up the hake processing lines at Seavuna fishing to measure their actual cycle times and compare against existing standards. Thereafter identify process variations that are negatively impacting on process performance.
- Develop a questionnaire that will highlight empirical evidence that confirms or contradicts the hypothesis that the presence or absence of certain factors that positively influence productivity does have an influence on Seavuna fishing's processing performance.
- To draw a convenient sample of a minimum of 60 staff employed in the company's processing unit from a population of 85.
- Analyse data collected using Microsoft excel computer software program.
- To record and interpret the empirical results.
- Draw conclusions, provide managerial recommendations and indicate research gaps for future research.

1.5 DEMARCATION OF THE STUDY

In order to manage the research effectively, this study will be demarcated as follows-

1.5.1 The Organisation

This research will be carried out at Seavuna fishing company's fresh fish processing facility and specifically on the hake processing lines. An analysis of the filleting, washing, trimming and sorting task on the hake processing lines will be conducted using time studies. In addition, questionnaires will be sent to all the staff of the processing unit by hand.

1.6 ASSUMPTIONS OF THE STUDY

It is assumed that by correcting the factors that are negatively impacting on the hake processing lines' volume output, the company's performance will

be enhanced. This will, in turn have a positive effect on the company's overall competitiveness and profitability.

1.7 HYPOTHESIS

The following hypothesis is formulated to investigate the following:
Are the factors below which literature believes, positively influence process efficiencies/performance present or absent within the confines of the processing unit at Seavuna fishing-

- Effective leadership.
- Planned maintenance.
- Employee engagement.
- Effective training- has significant effects on the productivity of blue collar employees (Jagoda, Lonseth & Lonseth, 2012).
- Empowerment- involvement in decision making.
- Recognition.
- Visual efficiency graphs: displaying results visually motivates staff to do well and out-compete others (Jagoda et al, 2012).

This study will include a time study observation of each of the activities making up the hake processing lines, with the purpose of firstly obtaining the time necessary for an average qualified fish worker to accomplish them at a defined rate of performance. Secondly, time study will be used to identify those activities that are wasteful and non-value adding with the view of modifying or eliminating them completely.

1.8 DEFINITIONS OF CONCEPTS

1.8.1 Hake

Hake is a deep sea fish that is a member of the codfish family, found in both the shallow and deep waters of the Atlantic and Indian oceans. It is a mild fish with a more subtle flavour than cod and is considered one of the best

fish in the whiting family because of its firm, sweet, white meat and medium flake (Maritime stewardship council official website).

1.8.2 First and Second grade hake

Hake quality specifications are divided into three categories determined by the freshness, firm, colour, physical features of hake. The best grade is the first, followed by the second and then third grade. First and second grade hake is mainly exported while third grade hake is for the local market (Seavuna fishing, Quality department, 2016)**.**

1.8.3 Kaizen (Continuous improvement)

According to Verma and Boyer (2010, p. 454) this is a technique that was developed by Toyota and focuses on the elimination of waste by identifying and eliminating those activities that do not add non-value or quality to the process.

1.8.4 Lean manufacturing

Lean manufacturing is a system that uses minimal resources to produce high volumes of quality products (Stevenson, 2009, p. 28).

1.8.5 Line process

Line process is a manufacturing process utilised in the processing of high volumes of standardised products and with flow organised around a few products (Verma & Boyer, 2010, p. 111).

1.8.6 Process control

Process control entails the identification and removal of defects and also the reduction of process variation (Sanders & Linderman, 2014)

1.8.7 Process efficiency

Process efficiency is the ability of the process to produce products quickly and effectively with minimal disruptions. The products produced need to be consistent and in conformance with the required specifications (Sanders & Linderman, 2014)**.**

1.8.8 Six Sigma

Six sigma is a process improvement approach that seeks to identify and reduce defects and costs in a business process with the objective of improving quality and increasing customer satisfaction (Stevenson, 2009, p. 28: Jiju, Sarina & Lim, 2015)**.**

1.8.9 Time study

Time study is work measurement tool used to measure the time it takes to perform a specific job under specified conditions. The data collected through time study can be used to compile performance standards (Kanawaty, 1992, p. 265).

1.9 RESEARCH DESIGN

The broad research methodology that will be used in the study is elaborated below.

1.9.1 Research methodology

The following procedure was adopted to resolve the main and sub-problems:

Literature review

The following aspects of process and productivity improvement techniques were reviewed from literature-

- Factors that positively impact on process/productivity improvement.
- Productivity, performance and process improvement
- Lean manufacturing
- Kaizen (Continuous improvement)
- Six sigma
- Time studies

Time Study

All the tasks that make up the hake processing lines were measured through direct observation to determine the actual time it takes an average qualified worker to perform them.

Empirical study

Questionnaires designed to collect empirical data were directly handed to all employees of the processing facility at Seavuna fishing company. The objective was to collect empirical data pertaining to Seavuna that would confirm or contradict the hypothesis that poor productivity is caused by an absence of certain factors that positively influence productivity. The results of the literature review, time study and empirical research would be integrated with a view of analysing the factors that cause poor process productivity and finding a resolution to the main problem and sub-problems.

1.10 CHAPTER LAYOUT

Table 1.1

Chapters	Title	Brief Description
1	Introduction	Introduction to research problem

		Research objectives Research methodology
2	Hake Fishing Industry and Seavuna fishing company	Background to the fishing, the South African hake industry and Seavuna fishing company and its processing dynamics.
3	Theory of process and productivity improvement models/techniques	Literature review of various productivity improvement models, Lean manufacturing, six sigma and continuous improvement.
4	Research Methodology	Quantitative studies Questionnaires Work measurements tools:
5	Analysis and interpretation of empirical and time study results	
6	Fusion of findings of studies and literature review	Recommendations and conclusion.

(Source: Author's own work, 2016)

1.11 CONCLUSION

This chapter outlined the background to the research problem, which is improving process volume output on the filleting lines at Seavuna fishing company. Literature consulted on the probable causes of poor process efficiency highlighted poor process design, poor staff engagement and poor leadership as some of the inhibitors of process efficiency.

The next chapter will focus on the dynamics of the company being researched, Seavuna fishing and the industry in which it operates.

CHAPTER TWO

BACKGROUND OF FISHING AND THE SOUTH AFRICAN DEEP SEA INDUSTRY

2.1 INTRODUCTION

The objective of this chapter is to provide a background to fishing in general, the South African hake industry and Seavuna fishing company (Pty) limited, its processing dynamics and efficiency standards.

2.2 THE HISTORY OF FISHING

Fishing is one of the oldest professions in the world and dates back to at least the Paleolithic period about 40 000 years ago (National Geographic News article, 2001). Since then, fish has been man's primary source of animal protein and also a source of income for those fishermen who engaged in fishing for a living (World Fishing Report, 2013). According to the Food and Agriculture Organisation (FAO) statistics (2007), over 500 million people are employed directly and indirectly in fisheries around the world. This industry contributes about 16% of the world's gross domestic product. However, the evolution of fishing techniques has brought about a new set of challenges, which are now facing this industry, like the general depletion of fish stocks worldwide due to over-fishing (World fishing report, 2013). FAO (2007) estimates that about 85% of the world's fish stocks have been depleted through irresponsible or over-fishing. It is for so this reason that it is critical for governments and industry to work hand in glove continuously to seek better ways of managing and policing fish resources in an effort to curb illegal and over-fishing.

At the outset, fishing was carried out along the shores of the oceans and rivers using traditional throw nets and small fishing boats that did not venture into the deep waters of the ocean. However, modern day fishing has

become a sophisticated and capital intensive venture, with fishing companies deploying fishing vessels of over 400 gross tons with engines of more than 1000 kilowatts, equipped with supersized nets, modern fish finding equipment and venturing into waters of over 500 metres to catch fish (World fishing report, 2013).

2.3 THE SOUTH AFRICAN HAKE INDUSTRY

The South African government highly regulates the South African Hake fishing industry through a quota based system (Marine Stewardship Council report, 2013). The hake resource is scientifically assessed annually, and the Total Allowed Catch (TAC) of the species is adjusted accordingly, and this determines how much quota is allocated to each company or right holder within the industry (SADSTIA website).

The Fisheries Branch, a department within the South African Ministry of Agriculture, Food and Fisheries, manages fishing regulations and also conducts scientific research that assists in ensuring the sustainable utilisation of marine resources in South Africa (Department of Agriculture, Food and Fisheries (DAFF), official website 2016).

It is reported that the South African Commercial fishing industry as a whole, contributes around R6 billion per annum to the country's gross domestic product and directly employs about 43 000 people (DAFF website, 2016). South Africa has two main fishery sectors namely, Wild capture fishery sector, which includes commercial, recreational and subsistence fisheries and the aquaculture sector is primarily concerned with fish farming (DAFF website, 2016). With the wild fisheries stocks showing signs of decline, the government has prioritised the aquaculture sector as an area of intense focus and have directed resources towards the development of this sector (DAFF website, 2016).

The wild capture fishery sector consists of 22 commercial fishing sectors that include the hake trawl sector. This fishing sector is made up of the

inshore sector, targeting predominantly shallow water hake on South Africa's South Coast, and the deep sea or offshore sector, targeting mostly deep water hake, on fishing grounds extending from the Namibian border southwards along the Agulhas fringe (MSC website).

The South African Deep-sea trawling Industry association (SADSTIA) is an association of South African trawler owners and operators within the hake deep sea and inshore sectors (SADSTIA website). Two associations represent the hake trawling industry: the South African Deep Sea Trawling Industry Association (SADSTIA) representing all deep sea hake right holders and the South East Coast Inshore Fishing Association (SECIFA) represents the inshore hake trawl right holders. These two associations are recognised industry bodies that interact with government, non-governmental organisations and other interested parties on behalf of their respective member companies.

The South African hake sector is one of the largest within the South African commercial fisheries, accounting for more than 50% of the value of the nation's commercial fisheries (SADSTIA, website). This industry lands a total of about 160 000 tons of hake and related fish species annually, utilising a fleet of 52 deep sea trawlers (Sea harvest website). Of these vessels, 27 are 'wet fish trawlers' (they preserve fresh hake in ice and return it to shore to offload their catch frequently), 18 supply headed and gutted (H&G) hake to local and international markets in frozen form, and 7 supply sea-frozen hake fillets to the international market (SADSTIA, website).

The industry's annual sales are around R5.4 billion with total foreign exchange earnings of R3.5 billion. The sector has transformed significantly since 1994 (when South Africa ushered in a democratically elected government) and currently an average percentage of a black shareholding across all right holders is 62%. (Sea harvest website).

Despite fish stocks declining globally, the South African deep sea fish resources are relatively stable (WWF report, 2011; MSC report, 2013).

However, some of the most popular fish species in the country's inshore sector like Kabeljou and Geelbek are facing extinction at 70% depletion (WWF report, 2011).

Most of South Africa's hake is sold in Europe, where most supermarkets stock the fish only if the Marine Stewardship Council (MSC official website, 2015) certifies it. This provides peace of mind to the consumers who know that the fish comes from a sustainable fishery that is monitored and whose environmental impacts are alleviated by the government and the fishing companies themselves (MSC official website, 2015).

2.4 THE ORGANISATION: SEAVUNA FISHING COMPANY

2.4.1 Background

Seavuna fishing company (Pty) limited, the company being researched, is a medium sized, vertically integrated fishing company based in Mossel Bay, South Africa. The company is jointly owned by Vuna fishing company (Pty) Limited, a black empowerment company and Sea harvest Corporation (Pty) limited, one of the major hake processing companies in South Africa. The company's primary objective is the processing of fresh hake caught by its own fishing vessels, into hake products such as fillets, steaks and loins under the Sea Harvest and Seavuna brands, which is sold to both local and international markets (Seavuna fishing company literature, 2016).

Seavuna fishing owns two deep sea and four inshore hake fishing trawlers as well as a fresh fish processing facility. Its deep sea vessels catch fish in deep waters of about 500 metres deep and beyond 120 nautical miles from shore while inshore vessels catch within 20 nautical miles from the shore. Deep sea vessels are therefore bigger in size and carry bigger nets with large fishing crews.

2.4.2 Employment and Income

According to the economic and social impact assessment of Seavuna fishing company on the town of Mossel Bay (Van Zyl, Barbour and Kinghom, 2016), Seavuna employees around 240 permanent and over 240 contract employees, yielding between 518 to 605 jobs. This equates to about 2% of the total jobs in the Mossel Bay Municipal area.

The report further states that Seavuna contributes a total local income of between R49 million and R55 million to Mossel Bay households, about 1.3% of total household incomes of the Municipal area.

2.4.3 Operations

The company has the capacity to catch and process over 6,000 tons of hake per annum (Seavuna fishing company literature, 2016). Hake is caught throughout the year in South Africa and this allows the company to provide mostly, permanent jobs to the population of Mossel Bay. The company's core competencies lie in its capability to process variable amounts of hake available depending on catches, which are normally erratic.

Photo 2.1: Deep sea hake fishing trawler.

(Source: Author's own work, 2016)

The company's processing facility is based in the Mossel Bay harbour, making it easier for its fishing trawlers to offload their landing directly into the facility. The hake is cleaned (heads and guts removed) at sea, layered between dry ice in 50 litre bins, to ensure effective preservation. These fish bins are offloaded from the vessels using a crane and tipped into a piece of equipment known as the De-icer, which separates the ice from the fish. The fish then travels on a conveyor belt to the sorting and grading area.

It is imperative that the grading of fish is done correctly and accurately to ensure that the processing facility processes the correct size of hake at the filleting machine which is set to fillet a particular size range. Incorrect sizes of fish can lead to unnecessary damage to the filleting machines, causing costly and unnecessary downtime. Most importantly, the price of hake on the fish market is determined by fish sizes. Therefore, incorrect sizing will have an adverse effect on profit maximisation in the case of over sizing; while under sizing will negatively affect the company's credibility and ultimately, its profitability and market share (Seavuna literature, 2016).

Photo 2.2: Grading and sorting of hake at the grading line.

(Source: Author's own work, 2016)

Since the sorting and grading function supplies the processing unit with raw material, it has to be efficient enough to ensure a constant supply of

accurately graded hake to the unit to avoid unnecessary downtime at the processing lines.

2.4.4 Organisational Culture

Seavuna fishing company exhibits an organisational culture that is a combination of both mechanistic and organic. This hybrid organisational culture possess components of the two types of cultures in that though the company lacks change in its internal environment (mechanistic), it exhibits democratic and participative decision making processes in some departments (Organic). The company's organisational culture is analysed below using Hofstede's "four value behavioural difference dimensions" as illustrated by Werner et al (2010, p. 37).

Power distance

Indicates how power is distributed within an organisation. High power distance entails more levels of hierarchy and centralised decision making while low power distance has a flat structure and managers are normally called by their first names. Forster (2013, p. 399), alludes to the fact that organisations worldwide are flattening the hierarchies with the view of eliminating the bureaucratic layers of decision making. The thinking behind this phenomenon is that flat structures rely more on teams and as such increase creativity, initiative and make empowerment possible (Forster, 2013, p. 399).

- Seavuna is a low power distance organisation as it has a flat structure, decentralised decision making and managers are called by their first names and staff interact freely with their managers.

Uncertainty avoidance

"The extent to which uncertainty is found uncomfortable and predictability sought" (Welner et al, 2010, p.37). Organisations with high uncertainty avoidance use formal rigid rules to create security and avoid taking risks,

while those with low uncertainty avoidance are prepared to take risks, are innovative and encourage creativity.

- Seavuna exhibits high uncertainty avoidance as the company avoids taking risks and uses rigid rules to guard against uncertainty. The company is still using machinery and equipment that is over 30 years old and has not invested in any new technology as yet. Its processes are equally outdated and have not been upgraded for some time now.

Individualism/Collectivism

This entails the extent to which people within an organisation prefer to work as individuals or in teams.

- Seavuna fishing is more on the collectivism dimension as most of its processes require teamwork. Employees are therefore forced to operate in a team setting and management advocate teamwork.

Masculinity/Femininity

This dimension reflects the extent to which organisations prefer masculine values of assertiveness and competitiveness to feminine ones of caring and supportiveness (Welner et al, 2017, p.37).

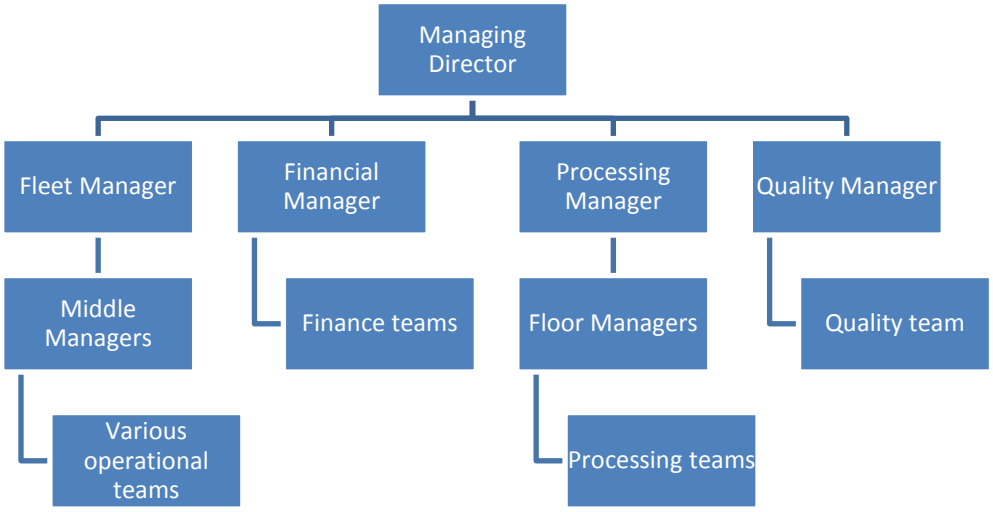
- Seavuna fishing is more masculinity as it encourages its staff to be decisive, assertive and competitive with small traces of collaboration.

Other components of Seavuna fishing's culture identified using the list of the components of a typical South African manufacturing organisation as illustrated by Pieterse et al (2015, p. 196)-

- The company utilises expensive machinery and equipment like fish trawlers and filleting machines to their fullest capacity in order to optimise their usage.

- Since the company is a vertically integrated one, it maximises the catches of fresh fish (raw material) on its fishing trawlers regardless of requirements.
- The company ensures that there is buffer inventory between machines and tasks to prevent unnecessary delays. In some instances, stacks of bins of fresh fish are waiting to be processed.
- The company inspects only a sample of its raw materials and finished products.
- In this organisation, knowledge lies with top management, who are responsible for process planning and lower ranking staff carry out these plans without significant input from them.

Figure 2.1 Seavuna fishing company's flat organisational structure, 2016



(Source: Seavuna fishing company literature, 2016).

2.4.5 The Processing unit

Since the company exports most of its products to Europe, its processing facility has to conform to the European Union (EU) and National Regulatory for Compulsory Specifications (NRCS) standards (Seavuna Quality

department, 2016). The facility is audited occasionally by the NRCS, who are the agents for the EU in South Africa to ensure that it continuously adheres to the stringent EU standards (Seavuna quality department, 2016). The EU visits various hake processing facilities in South Africa, which are accredited by itself and the NRCS every five years to ensure consistent compliance.

The processing unit at Seavuna fishing's primary function is to produce fresh hake fillets, which are sold in fresh or frozen form to various markets around the country and the world (Seavuna fishing quality management literature, 2016). To do so efficiently, it needs to have sufficient graded hake readily available for processing, sufficient skilled and semi skilled labour, automated filleting machines, weighing scales and plate freezing plant to mention but a few resources. Due to the high perishability of hake it has to be handled delicately throughout processing and also has to be processed speedily to avoid its quality from deteriorating (Seavuna fishing quality management literature, 2016). Most importantly, hake has to be processed in a temperature-controlled environment- specifically in a cool and not humid environment.

The hake processing unit at Seavuna utilises a line process, in that high volumes of hake and hake fillets flows through the process with dedicated resources to support it. The process is divided into series of standardised tasks, which allow for specialisation of both equipment and labour. In addition, a product layout, which entails dedicating equipment and labour to specific products on a linear route, is deployed (Verma & Boyer, 2010, p. 144). The primary objective of a process layout design as described by Verma & Boyer (2010, p. 145) is to necessitate the effective flow of product through the process with minimal unnecessary movements of workers and materials. It also allows for the effective use of labour and space while attempting to minimise bottlenecks (Stevenson, 2009, p. 217).

The Seavuna processing facility consists of three filleting lines, which are each designated to fillet and process a specified size of hake. The lines are

limited to processing only one size of hake at a time as the filleting machines are designed to handle one size range at a time. Filleting a larger size mix may damage the filleting machine as well as negatively affect the output yield. This is so because the blades would cut some of the hake meat off instead of just the centre bone. Similarly, a small size hake would equally not be filleted effectively resulting in damaged fillets which will have to be downgraded. This would mean that the fillets would have to be sold for much less than they would have fetched for had they been processed properly.

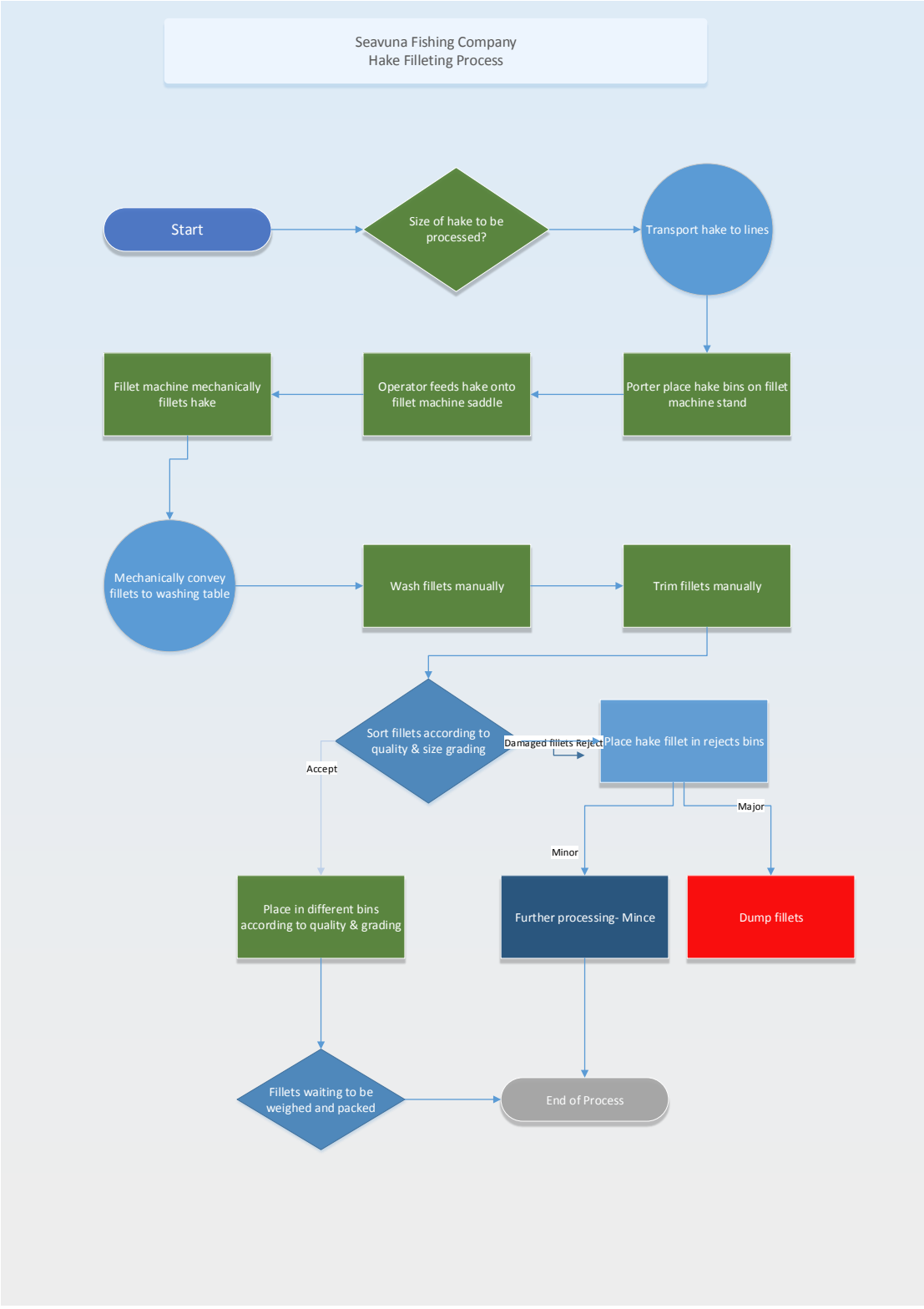
Photo 2.3 Hake processing on hake filleting lines.

(Source: Seavuna fishing company's quality department, 2016)

2.4.6 Flow chart of the hake filleting line

Flowcharting is a graphical portrayal of key elements and steps that make up a process (Verma & Boyer, 2010, p. 126). This technique is useful in identifying areas within the process that require improving or those that are not adding value.

Figure 2.2 Flow chart: Hake filleting process



(Source: Author's own work done by observing the filleting process, 2016).

2.4.7 Processing Efficiency Standards

Efficiency standards are output targets, which indicate the total time in which a job should be completed at standard performance (Kanawaty, 1999, p. 336). They form a basis on which the efficiency of a job or process can be measured against and therefore is a critical tool in assisting management to carry out their control function.

Within the hake industry, there are three primary process standards, namely Filleting efficiency, Yield and Packing standards. These standards are set according to the different sizes of hake as follows-

Table 2.1 Different hake sizes and their respective mass in grams

Hake Size	9s	6s	1s	2s	3s	4s
Range in grams	80-150	150-200	200-290	290-420	420-620	620-1200
Range average	115	175	245	355	520	910

(Source: Seavuna fishing literature, 2016).

The filleting efficiency is calculated using the total input kilograms of hake processed divided by the standard kilograms as follows-

- Filleting efficiency = $\frac{\text{Total kilograms of hake processed per hour}}{\text{Standard kilograms per hour}}$

- Yield efficiency = $\frac{\text{Total kilograms of hake fillets yielded [Output]}}{\text{Total kilograms of hake used [In put]}}$

- Packing weight Yield standard = 98%.

2.4.8 Benchmarking

Benchmarking entails measuring a business process performance against that of a company with a superior performance in any industry. This, with the objective of determining how the latter entity achieves their desired performance and using the information collected to enhance the organisations own targets and strategies (Kruger et al, 2006). Benchmarking gives an organisation the opportunity to gauge its own systems or processes' effectiveness and efficiency against those of world class entities (Forster, 2013, p.160). There are several types of benchmarking, however, this study will refine its self to process benchmarking, specifically focused on process volume output standards. Benchmarking information is difficult to get hold of, however it can be found on world class companies' websites or in their annual financial statements, if they are public companies (Forster, 2013, p.174).

For the purposes of this study, Seavuna fishing company's process output standards, which are key measures in the hake processing industry, were benchmarked against those of its major rivals in South Africa. The comparisons are tabulated below-

Table 2.2 Filleting hourly volume output standards

Hake Sizes Range in grams	**1s [200g -290g]**	**2s [290g -420g]**	**3s [420g- 620g]**	**4s [620g- 1200g]**
Average hake mass in grams	245g	355g	520g	910g
Industry (Kgs)	0.515	0.746	0.905	1.261
Seavuna Std (kgs)	0.544	0.852	1.030	1.802
Seavuna (actual)	0.495	0.730	0.850	1.120

(Source: Seavuna fishing and author's own work, 2016).

Table 2.3 Fillet Yield Standards

Hake Sizes Range (Kgs)	Hake 1s (Kgs) 200g -290g	Hake 2s (Kgs) 290g -420g	Hake 3s (Kgs) 420g- 620g	Hake 4s (Kgs) 620g- 1200g
Industry (std)	78%	78%	78%	84%
Seavuna	78%	78%	78%	82%
Seavuna (actual)	77%	77%	78%	79%

(Source: Seavuna fishing and author's own work, 2016).

PACKING YIELD

The industry packing yield standard of 98%, is the same as Seavuna and is based on a 2% provision for drip loss.

From the benchmarking results, it can be deduced that Seavuna fishing's filleting efficiency standards are higher than those of its major rivals are. However, the standards are not being achieved consistently.

CHAPTER THREE

LITERATURE REVIEW

3.1 INTRODUCTION

A production process can be enhanced to ensure that it meets the outcome desired by the process owner or the organisation. This can be achieved by improving the performance of each resource within the process, namely, human, machinery, equipment, set-up, raw materials and the environment (Pieterse, 2015, p.126). Therefore, process improvement is not only confined to the investigation and improvement of labour efficiencies but also includes all the other resources that support the process directly as indicated previously.

The cost of a business process output is a critical variable that has a direct impact on organisations pricing decisions and ultimately profitability (Stevenson, 2009, p. 40). It is therefore, incumbent upon entities that wish to be competitive to implement efforts continuously that firstly investigate the reasons for poor process efficiencies and then find ways to eliminate or reduce whatever factors are impeding productivity. It is no secret that organisations that have managed to get this right in the low cost strategy space, have gained a competitive advantage over their competitors.

3.2 PROCESS PERFORMANCE METRICS

Managers in all forms of organisations, whether profitable or non-profitable make use of performance metrics to manage and control operations (Stevenson, 2009, p.19). The most common performance metrics used in organisations include efficiency, yield, profits, cost, quality, productivity, assets, inventory to mention but a few (Nenadal, 2008). “A performance measurement system plays an important role in managing a business as it provides the information necessary for decision making actions and therefore, it is essential to measure the right things at the right time in a

supply chain" (Kazi & Zaman, 2013) The old adage "If you cannot measure something, you cannot manage it" is of significant relevance in the use of performance metrics. This is so because metrics enable managers to measure the performance of most operational or process activities. However, performance metrics have to be used systematically in order to derive real benefits from them. Even the best developed metrics will add insignificant value if they are not utilised effectively to drive improved performance (Kohlbacher & Gruenwald, 2011). For a metric to be effective, it must have an individual responsible for it, who is accountable to management (Kohlbacher & Gruenwald, 2011).

Furthermore, Nenadal (2008), suggests that metrics should possess the following key features to be effective-

- Validity- they must express key areas objectively and their results must be understood and accepted by the end users.
- Completeness- they must have the ability to reflect all key performance areas of the process.
- Sufficient- the metrics should be accurate and have sufficient detail but not too much or too less.
- Frequency of measurement- measurement of a process' performance must be done frequently to ensure that deviations if any are rectified without delay.
- Timeliness- Any stakeholder must have easy access to performance data.

3.3 PROCESS INEFFICIENCIES

When a process is not conforming to its volume and quality metrics, then it is not meeting its set standards. This should be a warning signal to management that something is wrong in the process and an investigation into the reasons for non-conformance need to be instituted. For management to implement an effective process improvement plan, it is imperative that they gather facts that reveal the factors that are inhibiting performance.

There are numerous factors that are responsible for negatively driving process performance, which are well documented in process improvement literature and include, process variation, Ineffective leadership, disengaged employees, poor training of staff, ineffective utilisation of resources, high absenteeism, unreliable machinery and equipment, lack of a continuous improvement culture, minimal usage of technology, to mention but a few.
Some of the factors that negatively influence process performance are discussed in detail below:

3.3.1 Process variation

Process variation is prevalent in any business process and is due to process design and process variability (Foster, 2013, p 302). Process variations are disruptive to a process as they result in additional costs, delays, poor quality and inefficient work systems (Stevenson, 2009, p.11).

Both Foster (2013, p.302-303) and Stevenson (2009, p.12) are in agreement that two common types of process variations are exhibited in any process, namely, random and non-random variations. Random variations are natural variations within the process, which cannot be controlled and are due to the design of the process. Small amounts of variations would have an insignificant effect on the specifications of the process while large ones would have the opposite effect. Non-random variations, sometimes referred to as special variations are influenced by an event that is external to the process itself, such as untrained staff, sub-standard raw materials and lack of motivation.

3.3.2 Ineffective leadership

Literature is clear as regards the critical importance of leadership in driving productivity in the workplace. However, effective leadership is a ‘rare quality’ in that leaders with right skills sets are difficult to come by (DuBrin, 2010, p. 3). Effective leaders are strong visionaries who promote good values, empowerment, openness, participation, trust, integrity and recognition

(Werner et al, 2011, p. 356). Therefore, effective leadership entails creating an environment in which employees are actively involved in making decisions that affect their work areas. Pieterse et al (2015, p. 89) define employee involvement as “the regular participation of employees in deciding how their work should be carried out, making suggestions for improvement, goal setting and monitoring their own performance”.

According to Pieterse et al (2015, p. 89) the thinking behind the philosophy of employee involvement is that it inspires employee motivation and commitment towards the improvement of their work performance.

Leadership is not only critical at the top echelons of the organisation but equally at the factory floor levels. It is indeed at the lower levels that execution of the strategy crafted by the top leadership takes place.

DuBrin (2010, p.3), highlights the following representative definitions of leadership-

- A process whereby an individual influences other people to achieve a common goal.
- “The influential increment over and above mechanical compliance with directions and orders”.
- The act that affects others to respond in a shared direction.
- The act of positively influencing people by persuasion to follow.
- The effort and ability to control and exercise power over others.
- The willingness to be accountable and to make others accountable as well.
- Motivating staff to accomplish organisational goals.

The above list relates directly to influencing productivity and as such confirms the notion that leadership has a direct influence on productivity. Not all leaders and leadership styles are effective in successfully directing people’s efforts towards achieving company goals, though.

DuBrin (2010, p.11), further illustrates that leadership effectiveness entails the attainment of a desirable outcome such as productivity and quality in an organisational setting. He is of the view that the following four variables-determine leadership effectiveness:

Leadership characteristics and traits

These are the qualities such as self confidence and problems solving capabilities, which are critical in ensuring that a leader functions effectively. Self confidence is said to be one of the “major contributors to leadership effectiveness”. It would almost be impossible for a leader who lacks problem solving abilities to resolve complex issues that negatively affect the performance of his area. This implies that this leader would find it difficult to attain the desired outcome of his area of responsibility and as such would be ineffective.

Leadership behaviour and style

The leader’s behaviour and style determine how effectively they lead. A leader who coaches and motivates his staff will most likely choose to use a leadership style like transformational and charismatic. While a leader who believes in putting the needs of their subordinates before theirs will most likely use the servant leadership style.

Transformational leadership: according to Werner et al (2009, p. 365) this leadership paradigm emerged as a result of the tough economic environment in which modern organisations operate. It was pioneered with the objective of giving organisations a kind of leadership style that would enable them to survive and remain competitive. This is managed through inspiring and changing followers’ attitudes with the aid of a compelling vision (Werner et al, 2009, p.365).

The following are the attributes of transformational leadership as listed by DuBrin (2010, p. 128):

- The empowerment of staff by involving them in decision making: Research by Sun, Hui, Tam and Frick (2000) demonstrated that people closest to a problem are in the best position to make decisions for improvement if they have some control of the process. They further state that Chief executive officers of most successful companies in the USA acknowledge that the best way to organisational success is by empowering and involving staff at all levels of the organisation.
- Encouraging personal development of their staff.
- Giving support to staff through positive feedback.
- Recognising and rewarding good individual and team performances.
- Creating and harnessing environment for innovative ideas.
- Leading by example.
- Giving staff challenging assignments.

Charismatic leadership: is a component of transformational leadership (DuBrin, 2010, p. 130) that entails positivity. Charismatic leaders are visionaries who are good at communicating, motivating, leading and connecting with their followers (DuBrin, 2010, p. 107).

Servant leadership: involves valuing, nurturing and caring for followers as well as putting their interests, first. Servant leadership focuses on guiding followers to achieve their own goals while realising those of the organisation as well. It also encourages the participation and creativity of staff (Werner et al 2009, p. 365).

Positive organisational scholarship (POS) Leadership: is a fresh leadership paradigm that breeds positive energy in the emotions of followers by advocating high integrity, ethical and moral behaviours. It has the added advantage of integrating the qualities of other positive leadership paradigms namely transformational, authentic and servant leadership (Jung, Yammarino & Lee, 2009; Searle & Barbuto, 2011).

POS leadership emphasises positive relationships between stakeholders that benefit all parties. Its primary focus is on building a positive organisation and indeed positive members (Searle and Barbuto, 2011). Everyone in a POS organisation is responsible and accountable for their performance and share in the success and failures of the organisation (Cameron, 2008). A positive climate that is conducive to the positive nourishment of followers that encourages them to engage in value added elements that benefit both themselves and the organisation at large is also a proponent of POS leadership (Cameron, 2008). This leadership style demands transparency, open and frequent communication, which fosters teamwork amongst staff and responsibility on the part of external stakeholders.

Group member characteristic

The qualities and abilities of the group members will affect a leader's effectiveness. Group members who are supportive of the leader's decisions and plans will make the leader look effective while the opposite is also true.

Internal and external environment

Will always have an impact on how effective a leader is. A hostile environment will spell serious challenges for a leader in meeting his objectives. For example, a leader in the South African mining industry would in one way or the other be negatively affected by the spate of industrial unrest.

3.3.3 Disengaged employees

Disengaged staff negatively affect productivity as they lack the commitment towards their jobs. There are various causes of disengagement of staff and they include lack of effective leadership, recognition, transparent and fair treatment of employees. Engaged employees contribute to increased productivity (Shahidul Islam & Shazali, 2011).

3.3.4 Poor training of staff

Training contributes to the skill of staff and skill is a dominant input of a manufacturing process. The productivity of a manufacturing process is dependent on the skill of its staff (Shahidul Islam & Shazali, 2011) and quality of skills sets is recognised as a positive driving force for enhancing manufacturing performance (Shahidul & Anwar, 2007). Literature states that the highly-productive manufacturing organisations tend to have a highly skilled workforce than the least productive" (Shandul Islam & Shazali, 2011). Haskel and Hawkes (2003) found that educated and skilled staff, support innovation and advanced production processes, which are positive drivers of higher productivity.

3.3.5 Poor utilisation of resources

Poor utilisation of resources results in unnecessary negative labour variances. The cause of poor utilisation can be high absenteeism, poor planning and lack of a contingency planning on the part of management (Stevenson, 2009. p 58). Poor utilisation negatively affects the overall performance of productive units in that expensive resources are not optimally utilised. This in itself, defeats the objective of productivity, which entails the optimal utilisation of resources.

3.3.6 Labour turnover or absenteeism

Absenteeism impacts negatively on process efficiencies by minimising the utilisation of the productive process capacity (Stevenson, 2009, p. 59). Moreover, training new staff to replace absent employees takes time and is costly.

According to the Forbes Magazine (2013) Absenteeism in the United States of America costs the economy billions of dollars each year as a result of diminished productivity, poor product quality and excess management time

spent on resolving absenteeism issues. These reports further highlight the following as causes of absenteeism in the USA-

- Burnout, stress and low morale due to heavy workloads or schedules, social pressures.
- Employee disengagement- lack of employee commitment towards their jobs.
- Illnesses and Injury.
- Depression.

In South Africa, the economy loses in the region of R16 billion as a result of absenteeism, negatively impacting on the country's total productivity. It is estimated that an average of 15% of staff are absent from work daily in South Africa and of these only 5% are physically ill. Therefore 67% of absenteeism in this country is as a result of other issues other than illness (Mail & Guardian, 2014).

3.3.7 Defective products and rework

Sometimes referred to as quality waste, are products that are not conforming to the product specifications (Stevenson, 2009, p.13). Such products have to be either reworked or scrapped, adversely affecting productivity and impacting on profitability.

3.3.8 Lack of incentives

Incentives are said to have the ability to motivate staff to increase their work output while the absence of incentives can have negative effects on productivity (Stevenson, 2009, p. 324). Incentives are usually paid to employees based on their attainment of a desired volume or quality output and therefore linking incentives directly to performances (Stevenson, 2009, p. 324).

3.3.9 Lack of innovation

Innovation is a complex and dynamic process that entails collaborative learning and knowledge collection within an organisation. It is argued that innovation is the most knowledge intensive activity, which involves the collective knowledge within and sometimes outside the organisation (Alsaaty, 2011). Overall (2013) alludes to the fact that the collective knowledge of an organisation's internal and external networks is critical to its creativity success. This means that innovative organisations must not only develop their internal innovative processes and activities but also strengthen their abilities to collaborate with external consultants, other companies as well as customers in seeking innovative ideas. Organisations like Procter and Gamble and McDonald's rely on outside inventors and consultants to provide them with innovative ideas. In the case of Procter and Gamble, outsiders have provided 35% of its ideas (Hult, Pride & Ferrell, 2012, p. 36) Therefore, in order to successfully innovate; organisations need to create an environment that is conducive to harnessing both internal and external sources of innovative pools of knowledge.

"For innovation to be sustainable, a satisfying organisational culture that is inclusive of employees is vital", (Lyons, Chatham & Joyce, 2007; Sarros, Cooper & Santora, 2008). It is therefore, logical for organisations to implement an organisational culture that encourages and rewards innovation (Overall, 2013). Huang and Li (2009) accede to this fact in their case study of Toyota, in which they demonstrated that organisations that have the ability to foster an innovative culture throughout their hierarchies are capable of developing new products and services quickly and as such take advantage of opportunities. An organisational culture that promotes trust, commitment and satisfaction amongst its employees, which creates an environment in which staff are allowed to try out new things and make mistakes, that measures and remunerates innovation is vital in igniting innovative ideas (Overall, 2013).

3.3.10 Poor communication of goals

Literature is of the view that if the company's goals are fully explained to employees, there is a likelihood that the employees will buy into these goals. This notion advocates the fact that effective communication increases the employees' motivation and has a positive effect on employee productivity.

3.3.11 Unfavourable working environment

The regulation of climatic conditions in the work area is important to staff health and comfort and to the sustainability of higher labour efficiencies. Excessive hot or cold temperatures negatively affect efficiencies as they create discomfort to employees (Kanawaty, 1992, p. 55).

According to Kanawaty (1992, p. 45) good visibility of the work area is an essential factor in accelerating productivity, reducing the number of defective products, minimising waste and preventing visual fatigue. He further states that lighting is one of the more important factors and that it is easy to correct.

3.3.12 Defective machinery and equipment

Have a negative impact on the volume and quality output of a process. Kruger et al (2006, p. 515) argue that defective machinery and equipment have the following consequences for a manufacturing unit-

- **Lowers the quality of products**- poorly maintained machinery and equipment perform outside their specifications and therefore will not be able to produce the products according to the required specifications. This will lead to the production of defective products that have to either be reworked or scrapped creating unnecessary wastage for the organisation.

- **Reduced production capacity**- Defective machinery and equipment are highly susceptible to breaking down, causing downtime that results in poor productivity. Downtime has a direct negative impact on the productive capacity.

- **Higher production costs**: Faulty machinery reduces volume and quality outputs of the productive unit and therefore increases the cost of production due to rework, an increase in scrap and prolonged production time.

- **Poor safety environment**: Defective machinery and equipment can cause unnecessary injury to operators. This has a negative impact on productivity as the work has to be stopped for the incident to be investigated and the piece of machinery repaired. If the operator is seriously injured, then even worse as he or she would not be able to continue working and a replacement operator has to be sought. This resulting unnecessary downtime.

- **Poor customer satisfaction**: Since faulty machinery and equipment causes unnecessary downtime and affect the quality of products produced, they are more likely to create stock shortages and product quality problems. This will force customers to switch over to other similar products or brands on the market.

3.3.13 Unsafe work area

The unsafe work area is accident-prone and accidents cause downtime, which in turn negatively affects productivity. According to Stevenson (2009, p. 323) workers will not “be effectively motivated if they feel that they are in physical danger. Accidents are undesirable and costly and therefore must be prevented at all times. It is management’s responsibility to ensure that the work area is safe.

3.4 PROCESS EFFICIENCY IMPROVEMENT

A process is defined as a sequence of activities, which utilises resources such as knowledge, skill, tools, machines, materials and labour to transform inputs into outputs (Kruger, de Wit & Ramdass, 2006, p. 174). Usually, the output of one process forms the input to the next one (Kruger, 2006).

According to Stevenson (2009) process improvement is a systematic approach that entails using documentation, measurement and analysis to improve the operating of a process. Pieterse et al (2015, p. 139) are of the view that process improvement is an integral part of the lean philosophy and that numerous organisations will initially focus lean implementation on their operations function which is made up of a number of processes. He further states that between these processes there is always a prevalence of waste, which negatively affects the efficiency of the process. Stevenson (2009, p.11) agrees with Pieterse et al (2015) that every process by its nature will have waste, either due to natural process variation or as a result of inefficiencies. Variations result in additional costs, delays, poor quality and inefficient work systems (Stevenson, 2009, p.11)**.**

Process efficiency can be enhanced by either increasing output or decreasing input. This can be done through the improvement of three basic factors, namely, the process method, the performance and the utilisation (Almstrom & Kinnander, 2011). The method factor entails the ideal method performed at the specified or normal rate without any stoppages. The performance factor relates to the current speed in relation to the set standard speed. The utilisation factor is the actual amount of time utilised in relation to the time available for the specific task (Almstrom & Kinnander, 2011).

Initiatives aimed at improving a process, if implemented effectively can allow a company to compete successfully and sustain growth (Low et al, 2015). Therefore, manufacturing entities need to continuously evaluate their

operational processes, with the view of improving them. By implementing process improvement solutions on the processing floor, an organisation will be able to reduce processing waste, cycle times and in the long-run increase customer satisfaction (Low et al, 2015; Stevenson, 2009, p. 434; Pieterse et al, 2015, p.139).

Stevenson (2009) and Pieterse et al (2015) both provide the following approach or steps to process improvement-

Select the process

When selecting a process to improve, it is imperative to consider a process or an operation that has several bottlenecks, involves long changeovers, has high rejects of scrap value, entails excessive movements of staff, products or equipment and has a significant impact on the overall value chain. The use of value stream mapping is essential in identifying such a process.

Map the process

- Collect information relating to the process and identify all steps in the process. A process flowchart and a String or spaghetti diagram would be essential tools to use in mapping out the process.
- For each step determine- inputs and outputs, workers involved and the decisions they have to make.
- Record measures such as time, cost, waste, employee engagement, employee turnover, working conditions, quality etc.

Analyse the process

- Is the flow of the process logical?
- Are there any steps or tasks missing?
- Are there any duplications?

- Are all the steps necessary, which ones add value and which produce waste, can the cycle times of some step be shortened?

Pieterse (2015, p. 146), developed the diagram below to be used in analysing a process effectively. The diagram consists of five main questions, whose prospective answers would lead to the development of alternative methods for improving the process.

Table 3.1 Process analysis tool

QUESTION	WHAT	WHY	WHAT ELSE	WHAT SHOULD
Purpose	What is done?	Why is it done?	What else could be done?	What should be done?
Means	How is it done?	Why this way?	How else could it be done?	How should it be done?
Place	Where is it done?	Why there?	Where else could it be done?	Where should it be done?
Sequence	When is it done?	Why then?	When else can be done?	When should it be done?
Person	Who does it?	Why them?	Who else can do it?	Who should do it?

(Source: Pieterse et al, 2015).

The use of work measurement tools in analysing a process is also critical. Work measurement tools include time and motion and work studies, which are conducted by physically observing a process and recording the cycle times.

Redesign the process

This is the stage where the improved method is implemented. It is important to obtain management and employees buy-in before implementing an

improved process. A good place to start is to communicate the reasons why change is imminent in the process to employees at the very outset of the process and to involve them throughout the process.

3.5 PROCESS IMPROVEMENT TOOL AND TECHNIQUES

Kruger et al (2006, p.217) define tools and techniques as “practical methods, skills, means, or mechanisms that can be applied to particular tasks to facilitate positive change and improvements”. A tool is a device that has a clear use, is narrow in focus and used on its own usually. A technique, on the other hand, has a wider usage and as such demands relevant training and skills to be used effectively (Kruger, 2006, p 217). There are several tools and techniques that an organisation can use to improve its processes, however, the “usability of these tools and techniques needs to be investigated” to ascertain whether they are relevant to the situation or process being targeted (Low et al, 2015).

Techniques and tools play a critical role in process improvement initiatives within organisations by facilitating the following-

- The monitoring and evaluation of processes.
- The involvement of all stakeholders in the improvement process.
- The development and sustainability of as attitude of continuous improvement.
- The “reinforcement of teamwork through problem solving”.
- People or employees to take ownership of the process challenges in their area of responsibility and finding own ways of resolving them. (Kruger et al, 2006, p. 217).

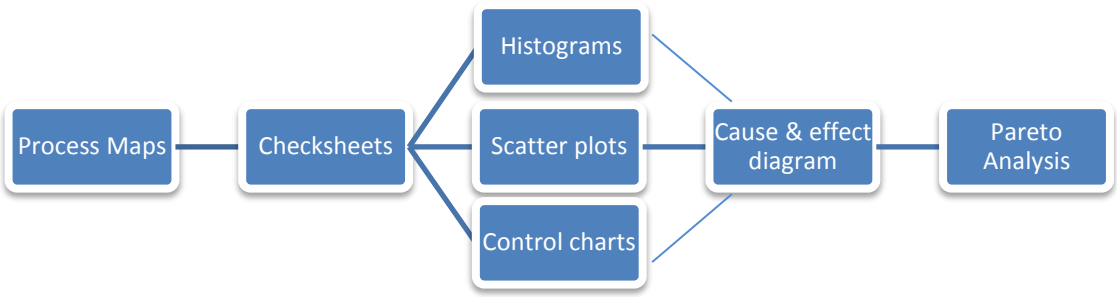
3.6 BASIC QUALITY TOOLS

Quality tools assist in the collection of useful data that is critical in identifying activities in a process that are not conforming to the process’ quality and quantity output (Stevenson, 2009, p. 290). ‘Ishikawa’s basic seven quality

tools' as the quality tools are sometimes referred to are simple tools that are used in continuous improvement efforts (Foster, 2013, p. 263).

According to Foster (2013, p. 263), the seven quality basic quality tools can be used in logical order, as illustrated in the diagram below.

Figure 3.1 Illustrates logical order of basic quality tools



(Source: M. Brassard, The Memory Jogger II, published by GOAL/QPC, 2004).

The seven quality tools, which this study will utilise as follows-

- **Process flowchart**- will provide the big picture of the process to be analysed and improved.
- **Check sheets**- will be used to collect process data.
- **Histogram**, **Scatter plots** and **Control charts**- will be used to analyse and represent the process data collected.
- **Cause and effect diagram**- will be used to identify root causes of the process problems identified.
- **Pareto analysis**- The root causes will be prioritised using the Pareto analysis.

3.6.1 Process Flowchart

A process flow chart is a graphical representation, which shows the sequential flow of steps within a process (Verma & Boyer, 2010, p. 112).

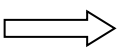
Pieterse (2015, p. 30) defines a process flowchart as a picture that depicts what happens in the various steps within a process. It assists in the identification of possible steps in a process that are not adding value or are duplications. A flowchart records the flow and the various activities and steps making up a process by utilising symbols to specifically identify the different activities (Pieterse, 2007, p. 30). It allows for a detailed analysis and evaluation of a process, enabling management to identify activities on the line that are wasteful.

Flowcharts help in making staff understand how they fit into the bigger process and in identifying who their suppliers are customers are. This leads to improved communication amongst all the members involved, which in turn results in an effective coordination of the processes (Kruger et al, 2009, p. 217). Flowcharting is critical in highlighting steps or activities within a process where quality related measurements or inspections should be positioned (Kruger et al, 2006, p. 217).

Pieterse (2015, p. 142) further adds that a flow process chart is a process mapping tool that has the ability to focus on the operator, equipment and material. Therefore, it assists in providing management with a full picture of human and machine activities in the process and their interactions with raw materials for producing effective output. It is for this reason that a flow chart is best suited to identify those activities or steps in the process whether performed by humans or machinery that are not benefiting the process and ultimately the company. Since flowcharting pinpoints non-value adding activities in a process, it is linked to lean manufacturing, which advocates the removal of waste from a process.

Figure 3.2 Process chart symbols

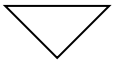
Indicate operation or primary steps of a process.



Transport: movement of resources within the process.

Delay:

Inspection: inspection for quantity or quality



Storage

3.6.2 Check sheets

A check sheet is a tool that is used to record data showing the patterns that may assist with further analysis (Pieterse et al, 2015, p. 125). It is a structured document that is used to collect and analyse data with a view of identifying problems in a process or operation. There are numerous formats of marking on the check sheet but the most frequently used are simple checkmarks (Kruger et al, 2006, p. 226). The recording of data using checkmarks is done in such a way that patterns are easily visible (Pieterse et al, 2015, p. 125). This allows the data collected on the check sheet to be interpreted directly from the document without further processing (Stevenson, 2009, p. 435). Such readings are simple and easy and can be interpreted by shop floor staff.

Pieterse et al (2015, p. 125), further states that a check sheet highlights the frequency of the occurrence of the data being presented.

3.6.3 Histograms

A histogram is a commonly used graph, which shows the frequency distribution of data collected (Verma & Boyer, 2010, p. 421). It is a simple graphical representation of data in bar format with the following rules for developing it-

- The width of the histogram bar must be equal where each bar contains a single class.
- The classes must be mutually exclusive (Foster, 2013, p. 271).

3.6.4 Scatter diagram

Also known as the scatter plot diagram, it is an exploratory technique that seeks to identify a potential relationship between two variables (Verma & Boyer, 2010, p. 422). It examines two sets of plotted data to establish whether a relationship or correlation exists between the two variables (Foster, 2013, p.273). If the two sets of data are closely related, their data points will be confined to the same areas on the scatter diagram.

3.6.5 Control charts

A control chart looks more like a run chart except that it has two horizontal lines known as the upper and lower control limits (Kruger et al, 2006, p. 227). A control chart is a tool that is used to monitor process variation (Foster, 2013, p. 305).

3.6.6 Cause and Effect Diagrams (Fish-bone diagram)

A fish-bone is a structured problem solving tool that assists in the search of possible causes of problems. Also known as, the Ishikawa or fish-bone diagram, this tool categorises factors that might be causing problems in a business process or work area. This tool is normally used during brainstorming sessions to record and organise the ideas generated in a structured format (Stevenson, 2009, p. 439).

3.6.7 Pareto charts

Developed by Vilfredo Pareto, the Pareto analysis is a technique used to identify and categorise data based on frequency and percentage of occurrences (Verma & Boyer, 2010, p.421). It organises errors or defects in such a way that 20% causes of 80% of the process' challenges are identified and prioritised for resolution (Pieterse, 2015, p. 127). The concept maintains that a high percentage (80%) of problems in a process or on the production floor are caused by few problems (20%).Therefore, focusing on

resolving the few problems, which are causing the rest of the problems is important for companies. This will enable organisations to resolve almost all their challenges much quicker and with much fewer resources.

3.7 OTHER PROCESS IMPROVEMENT TOOLS AND TECHNIQUES

3.7.1 Value stream mapping

Value stream mapping is a lean tool that is used to identify and assist in eliminating waste, inherent in a business process (Pieterse et al, 2015, p. 153). It provides the basis for establishing the current process map and highlights the starting point for improvement and subsequent improvement areas. The main objective of the value stream map is to “improve flow, create pull and eliminate waste on an ongoing basis” (Pieterse et al, 2015, p.153).

Pieterse et al (2015, p.154), states that the mapping procedure has become standardised and that it follows internationally recognised steps as follows-

- Select a process or processes
- Map the current state
- Analyse the flow and apply lean techniques
- Map the future process
- Repeat the procedure

3.7.2 Run charts

A Run chart is a line graph that is used to plot changes in the performance data of a process and also demonstrates long term stability or instability of process performance (Verma & Boyer, 2010, p.424). It is a vital tool in tracking performance metrics such as production, volume, cost and customer satisfaction outputs (Kruger et al, 2006, p.226). A Run chart is easy to comprehend and clearly highlights process variations and trends graphically (Kruger et al, 2006, p.226).

3.7.3 Line balancing

Line balancing entails assigning the various activities in a process with approximately equal times of accomplishing the task to enable an undisrupted flow of products through the process (Vermer & Boyer, 2009, p. 412; Stevenson, 2009, p.262). A process that is perfectly balanced will allow a smooth flow of work as activities along the line are synchronised to achieve maximum utilisation of labour and equipment (Stevenson, 2009, p. 262).

To implement line balancing it is important to first measure the cycle time of the tasks on the line. A cycle time is the maximum time allowed to complete a task.

3.8 OTHER PROCESS IMPROVEMENT TOOLS AND TECHNIQUES

3.8.1 Continuous Improvement (Kaizen)

Continuous improvement, commonly known as Kaizen, a Japanese word for continuous improvement, is regarded as one of the most important techniques that may enable organisations to become competitive (Kruger et al, 2006, p. 27). With the ever changing needs of the customer having become the order of the day, organisations have little or no choice but to seek smart and innovative ways of satisfying these renewed customer needs. Continuous improvement has the ability, if implemented effectively to guide organisations to achieving competitiveness (Kruger et al, 2006, p. 27).

Kaizen is a companywide philosophy, in that in advocates from continuous improvement to take place in all areas of a business

3.8.2 Six Sigma

Six sigma was first implemented at Motorola in 1986, with the objective of improving product quality. It had involved every member of the organisation,

who were trained in the basic methods of six sigma quality (Pieterse, 2015, p. 118). Six sigma is a program developed to reduce the occurrence of defects in a process to reduce cost and improve customer satisfaction (Stevenson, 2009, p. 429). It is based on the principle that prioritises the reduction of process variation with a view of improving quality and resolving process inefficiencies.

Six sigma utilises the DMAIC methodology to improve volume and quality outputs on processes. DMAIC stands for Define, Measure, Analyse, Improve, Control and outlines the process that this model uses to improve processes (Foster, 2013, p. 367).

3.8.3 Lean Six Sigma

Lean six sigma is an integration of two process improvement principles of lean and six sigma, which are combined to generate a dual effect of reducing process variation (Stevenson, 2009, p. 430). The thinking behind this combination is that lean and six sigma cannot singularly achieve process improvement (Stevenson, 2009, p. 430). This process improvement model utilises the DMAIC process related to six sigma to reduce wasteful activities in a process and also the value stream map and SIPOC diagrams (lean) to identify and eliminate activities that do not add value (Foster, 2013, p. 365).

3.8.4 Lean Manufacturing

Lean manufacturing was developed by the Toyota company in the 1950's with a view of manufacturing faster and cheaper than its competitors (Pieterse et al, 2015, p. 1). The Lean philosophy is one of the many process improvement initiatives that a number of major businesses globally have been attempting to implement this in order to streamline their production processes and achieve effective use of their resources (Womack et al, 1991). According to Verma and Boyer (2010, p. 449), lean production is a "sociotechnical production system whose main objective is to eliminate

waste by concurrently reducing supplier, customer and internal variability". Its objective is to utilise less human effort, less inventory, less cycle time and less space to become highly responsive to customer demand while producing top quality products (Kazi & Zaman, 2013; Pieterse et al, 2015).

Lean production system, sometimes referred to as the "Toyota Production System", was originally developed, specifically for the motor vehicle manufacturing industry by Toyota, however, of late this system has been implemented in across a spectrum of industries with a view of benefiting from its advantages (Pieterse et al, 2015, p. 3).

Lean enterprise utilises a pull system, which is a system that "promotes conditions necessary to manufacture high quality products to meet market demand with relatively small levels of inventory." Storage costs are reduced because materials only arrive when they are needed to produce the immediate forecasted demand. This significantly reduces lead times, raw materials, work-in-process and finished goods inventories (Näslund, 2008).

According to Pieterse et al (2015, p. 2) Lean does not only entail a collection of tools to eliminate waste and create a seamless flow but also empowers and encourages employees to participate and take ownership of process improvement initiatives. In order to effectively implement lean, organisations need to ensure that all their staff members are on board by involving them in the entire process. It is one of Lean's principles to have staff resolve their own challenges in their own little spaces. Verma and Boyer (2010, p. 449) allude to the fact that lean is a "mindset for all employees and managers that focus on the elimination of waste" and process variability minimisation.

Lean thinking maintains that value should be measured from a customer's point of view (Verma & Boyer, 2010, p.449; Pieterse et al, 2015, p.2). In other words, customers determine value through what they are willing to pay for and whatever they are not willing to pay for must be eliminated.

Verma and Boyer (2010, p.449), highlights five core components of lean production namely-

- The value in the production system should be derived from the customer's point of view and not from what the company thinks defines value.
- Each activity on the production line should be weighed up on its contribution to customer value creation. Therefore, only those activities on the production lines that add value in the eyes of the customer should be utilised. On the other hand, the activities that do not provide value should be eliminated.
- The value adding activities should be arranged in an orderly sequence to create a seamless flow of product through to the customer.
- Production should be geared on the concept of a pull production system. This means producing those products and features of a product that the customer is demanding.
- The involvement and participation of all staff in continuous improvement are critical.

Waste elimination

The lean philosophy is based on the premise that only those production activities that provide value to the customer should be prioritised in the production of products, while non-value adding activities should be candidates for reduction or even elimination (Verma & Boyer, 2010, p. 449).

To make waste elimination systematic, the three types of waste found in a lean process are categorised by Pieterse et al (2015, p.5) as follows-

- Muda - is a Japanese word that means wasteful production activities that do not add any value to the customer. The value in this sense is what the customer is willing to pay for.
- Mura - Refers to the unevenness of a process. The uneven process is wasteful as it inhibits a seamless flow and as such creates unnecessary process variations.

- Muri - Is waste resulting from the overburdening of equipment or operators. It is a physical strain placed on the human factor or on pieces of equipment. This can be easily minimised by better standardisation of the process or improving the ergonomics of the tasks within the process (Verma & Boyer, 2010, p.449).

Seven types of waste

The person responsible for the development of the Toyota Production System, the precursor to the lean philosophy, Taichi Ohno identified seven types of wastes present in production processes (Pieterse et al, 2015, p.2). These wastes are a result of the following-

- Over production - occurs when organisations maximise the utilisation of their production capacity in the production of products. This means that they will produce even those products that are not immediately required by the customer. The lean philosophy maintains that only products that are required by the customer must be produced. It further purports that any product that requires storage before further work can be done on it is a source of waste. Therefore, it is "better to produce products in smaller quantities that are closer to market demand than to produce excess products that will occupy unnecessary space. Over production results in excess products being stored in designated storage area yielding the following unnecessary costs- storage space, electricity for lighting or chilling for perishable products, insurance, security, transport, stock-taking and also the risk of obsolescence and theft.
- Waiting - in a process is as a result of raw materials not arriving on time due to poor planning or to the use of unreliable suppliers. The other source of waiting is the unevenness of a process. In such cases, if the step or activity before is slower than the one after it, then the latter activity will wait for work. This will result in a longer production lead time that means additional labour and equipment cost. A prolonged waiting time is a source of quality problems, as the

raw materials may become obsolete, especially perishable raw materials like fresh fish (Verma & Boyer, 2010, p.454).

- Transport - the lean philosophy advocates that unnecessary transportation of materials and products between factories and warehouses be minimised. This can be made possible by locating these facilities in close proximity to each other. Pieterse et al (2015, p.3) mention that excessive moving of materials or machines around from one section to another within a factory does not add value. He further states that in order to minimise these changes to the factory layout bring the sections closer to each other and improvement to transport methods like the use of automated transportation equipment may reduce waste.
- Set-up times - are necessary for any production process to enable the change over from the production of one product to another. However, set-up times can be a source of wastage, if they take longer to implement. It is for this reason that the lean philosophy calls for set-up times to be minimised to reduce process downtime, which adds cost to the process.
- Movement or motion - “simplification of the work is a rich source of reduction in waste of motion” Pieterse et al (2015, p. 3). A factory layout such as a U-shaped layout is crucial in minimising motion on a production floor.
- Inventory - the lean philosophy states that all inventory should become a candidate for elimination. This will only be done with just in time inventory management system is implemented. Excess inventory is wasteful as it means money being held in unnecessary stock, deterioration of stock and spoilage due to prolonged storage.
- Defective products - Products that are not produced according to the required specifications have to be reworked or scrapped. Defective products cost the organisation money in the form of labour, wastage of raw materials and unnecessary storage.

Barriers to the implementation of the lean enterprise systems

Implementing lean is not easy as it involves changing the organisational culture as well as the strategy. Changing their cultures in a short period of time is extremely difficult for organisations. This is so because cultures are normally embedded in the mindset of an organisation's employees over a long period of time and become second nature (Stevenson, 2009, p 718).

Despite the challenges of implementation, switching over to lean can be achieved successfully as most organisations that have done have proven.

Stevenson (2009, p.718) highlight the following barriers to lean implementation-

- Management's unwillingness to commit the required resources to switching over to a lean enterprise.
- An organisation's lack of resources to convert to lean.
- Management and staff's resistance to change due to fear of the impending changes affecting them negatively.
- Suppliers may lack the commitment and resources to implement lean processes.
- The organisation's rigid culture might make it difficult for staff to accept changes after having been used to operating traditionally.

Pieterse et al (2015, p 198) list the following barriers-

- Fear of the unknown- People generally become comfortable with the normal way of doing things and therefore are not prepared to venture into a new unknown territory. This will cause them to resist change.
- Security- change does have an effect on the job security of staff, as they fear the possibility of job cuts.
- Economic factors- employees might have concerns that they will not be able to perform the new duties and therefore end up losing their job.
- Limited focus of change- change in one department does not normally filter through to other departments who might detest this

change and therefore ensure they block it. Changes were recently made in one of the departments at Seavuna fishing Company in terms of introducing a transparent system of management, which involves staff in decision making however, the other departments have failed to emulate this despite the visible successes displayed in the department in question.

- Group Inertia- If the union disagrees with the proposed change; most of its followers will side with it and will not accept the change. This is prevalent at Seavuna where employees are reliant on the union for most major decisions.
- The threat to established power relationships- Management might feel that empowering employees to make decisions minimises their authority to manage.

3.8.5 Work Measurement

Kanawaty (1992, p. 243) defines work measurement as a technique used to establish the time it takes a qualified operator or worker to perform a given task at a defined working rate. It is concerned with the measurement of the length of time it takes to complete a task or activity. The length of time a job takes to accomplish is an important input in capacity planning, workforce planning, scheduling, forecasting labour costs as well as budgeting (Stevenson, 2009, p. 339). Work measurement's primary objective is the investigation, reduction and elimination of time in which no effective work is being carried out by workers (Kanatawy, 1992, p.244).

Therefore, it is a technique specifically used to measure the time taken to perform a task in such a way that ineffective time or idle time is revealed and thereafter eliminated to improve the efficiency of a process. This technique is indeed critical in divulging factors on a process that are impeding the effective utilisation of time and thus negatively affecting efficiencies. Once these factors have been uncovered, management would be in a better position to implement steps to eliminate them. According to Kanawaty (1992, p.244) if an organisation is seeking to improve its process

performance, “work measurement if properly carried out would be the best means of achieving this”. Work measurement technique also plays an important role in setting standard times for completing tasks or jobs. Standard times enable management to monitor and track the performance of their processes against the set standards.

The following is a list of uses of work measurement as highlighted by Kanawaty (1992, p. 246) -

During the process of setting standards

- Comparing the efficiency of various methods used to carry out a specific task with the view of selecting the method that uses the least time.
- Balancing the work of team members in liaison with multiple activity charts, to ensure each member has a task taking an equal time to complete.
- To establish, “in association with worker and machine multiple activity charts, the number of machines an operator can operate.

After time standards have been set

- To provide important data that can be used to estimate selling prices and delivery dates for tenders.
- Setting time standards of machine utilisation and labour performances, which can be used to implement incentive schemes.
- To provide data “for labour-cost control and to enable standard costs to be fixed and maintained”.

Work measurement techniques

A number of techniques used to measure work make up work measurement, namely Work sampling, Analytical estimating, Time study and Predetermined time standards (Kanawaty, 1992, p. 248).

Work sampling

Work sampling is a direct observation technique used to find the percentage occurrence of a given activity by statistical sampling and random observations. It entails observing a large number of activities.

Analytical sampling

Analytical sampling involves finding the “percentage occurrence of a certain activity by statistical sampling and random observation” (Kanawaty, 1992, p. 249).

Time study

Stevenson (2009, p. 344) defines time study as a work measurement technique that is used to observe and measure the cycle times of jobs, rate worker performance and compute standard times.

Predetermined time studies

Uses published data on basic standard elemental times to compute time standards of similar jobs (Stevenson, 2009, p. 345). This technique is quicker and can be used to develop standards of jobs beforehand.

3.9. QUALITY AND PROCESS IMPROVEMENT EXECUTION

Most quality and process improvement interventions do not succeed due to poor execution strategies. In order to implement these interventions successfully, it is critical to ensure a systematic approach to implementation.

3.9.1. Strategic Quality Planning

Strategic quality planning is a companywide, customer focused approach used for effective planning and execution of business improvements

(Rakich, 2000). It is a long term management activity that defines an organisation's direction as regards quality improvement plans and the provision of resources to achieve this plan. Its primary objective is to link quality improvement interventions to the organisations' strategic process (Rakich, 2000). Sometimes referred to as 'Hoshin planning' strategic quality planning flows from the company's strategic vision, through the mission and to the lower level quality strategies of an entity (Foster, 2013, p. 123). It entails the allocation of resources and aligns the multi level strategies to the entire organisation (Rakich, 2000; Foster, 2013, p.123).

According to Forster (2013, p 110) Strategic quality planning is made up of two aspects namely, content and process. Content variables are key inputs into the development of strategic plans and include the following variables-

Time- is a critical variable in the implementation of business goals as is it used to measure the time it will take to accomplish a task. It is actually used as a performance metric. Strategies are differentiated based on their time lines- long term, medium term and short term plans.

Leadership- is a key input in the achievement of organisational goals or plans. Leadership is responsible for influencing followers to achieve goals.

Quality costs- quality interventions cost money to implement, however in the longer term they benefit the business more.

Generic strategies- (cost, differentiation and focus)

Strategy process outlines the steps necessary to construct the strategy as outlined by Juran (1986) as follows:

- Identification of both internal and external customers
- Determination of the needs of the customers
- Development of product or service features that respond to the needs of the customers
- Establishment of quality objectives that meet the needs of customers
- Development of processes that are able to produce the product features that required by customers

- Proving process capability - has the process the ability to meet the quality objectives under normal operating conditions?

Strategic quality planning is an effective approach to use when implementing quality and process improvement initiatives as it links the intervention to the necessary resources within the company that would make implementation possible. This will minimise the failure rate of process interventions.

3.10. CONCLUSION

From the literature review conducted, it was clear that in order to improve process volume output, it is imperative to investigate all the inputs into a process, namely, human, machinery, equipment, set-up, raw materials and the environment. This is so are these variables all have an impact on process efficiencies, therefore improving them all will have a multi-factor effect on total process efficiency. This study will attempt to resolve the process efficiencies at Seavuna by investigating the mentioned variables using empirical and time studies.

In order to improve process efficiencies, it is important to decide on the best process improvement technique that is somehow relevant to the organisational culture and also the environment in which the company operates. Lean manufacturing and lean six sigma principles would suit the hake processing factory as they focus on the elimination of wasteful and non-value adding activities. The results of time study observations on the processing lines have highlighted activities that were creating waste, which will be outlined in chapter five of this study.

CHAPTER FOUR

METHODOLOGY OF THE STUDY

4.1 INTRODUCTION

This chapter outlines the research process that has been followed to collect and interpret data for this study. It highlights the research design, research paradigm or approach as well as the research methodology utilised.

4.2 RESEARCH DESIGN

Hedrick, Bickman and Rog (1993, p.3), define research design as an "architectural blueprint" around which the research project is built. It provides the structure for data collection and analysis methodologies that the researcher applies in conducting the research study (Hedrick et al, 1993, p.3). Research design also highlights the objective of the study developed at the outset to ensure that data collected is adequate to resolve the research problem.

According to Hedrick et al (1993, p.3), the selection of a research design affects the credibility, usefulness and feasibility of the study, which are explained in detail below:

- Credibility refers to the validity of a study and how effective the design is, in providing sustainability for definite conclusions and recommendations.
- Usefulness refers to whether the design is directed adequately to answer the specific questions of interest that provide the basis of the study.
- Feasibility refers to whether the research design and plan are reasonable given the requisite time and other resource constraints.

4.2.1 Reliability

A reliable research design provides a clear explanation of the phenomenon being studied and regulates the possible biases that might distort the research findings. Blumberg, Copper and Schindler (2008, p. 455) state that "reliability is a degree to which a measurement is free of random or unstable error". In other words, reliability has to do with consistency and the credibility of the results obtained. Collis and Hussey (2003, p. 58) on the other hand, are of the view that if a research can be repeated and the same results obtained, then it is reliable. They further state that repeating a study to test reliability is of great importance in positivistic studies where reliability is considered in high esteem.

4.2.2 Validity

Collis and Hussey (2003, p. 58), define validity as the extent to which the research findings accurately represent what is being measured. Blumberg et al (2008, p. 447), believe it is the extent to which a test measures what it actually intends to measure. Validity therefore, is the genuineness and authenticity of the measure in relation to what needs to be measured.

According to Blumberg et al (2008, p.449), three primary forms of validity have to be considered when designing research-

Construct validity: entails the usage of certain terms and whether these terms actually measure what they are purported to measure (Forster, 2013, p. 150). It is the ability of the research instrument to reflect the phenomena that the study is attempting to investigate (Collis & Hussey, 2003, p. 59).

Content validity: Is the extent to which a measuring instrument provides sufficient coverage of the questions regulating the study (Blumberg et al, 2008, p.449). The measuring instrument should contain a representative sample of the population of the subject being researched constructs in the

conceptual frame work are measured in the research study (Blumberg et al, 2008, p.449).

Content validity can be determined judgmentally or by using a panel to judge how well the instrument reflects the required content (Blumberg et al, 2008, p.449).

Criterion-related validity: is the ability of an instrument to predict or estimate an outcome.

4.2.3 Research design versus research methodology

Table 4.1: The differences between research design and research methodology are summarised by Mouton (2006, p. 56)

Research design	Research methodology
Focuses on the **end product**: What kind of study is being planned and what kind of results are aimed at. E.g. Historical - comparative study, interpretive approach OR exploratory study, inductive and deductive etc.	Focuses on the **research process** and the kind of tools and procedures to be used. E.g. Document analysis, survey methods, analysis of existing (secondary) data/statistics etc)
Point of departure (driven by) = Research problem or question.	Point of departure (driven by) = Specific tasks (data collection or sampling) at hand.
Focuses on the logic of research: What evidence is required to address the question adequately?	Focuses on the individual (not linear) steps in the research process and the most 'objective' (unbiased) procedures to be employed.

(Source: Mouton, 2006, p.56).

4.2.4 Independent and dependent variables

According to Hedrick et al (1993, p.3), independent variables are the "purported causes of change in dependent variables". Therefore, independent variables influence the change or outcome in the dependent variables. In case of this study, the independent variables are all the factors that influence process output and process output is the dependent variable.

The research design for this study was divided into the primary problem/questions and subsequent sub- problems as follows:

Main problem/question:

What are the factors that are negatively influencing the process output on the hake processing lines at Seavuna fishing company?

- To answer this question a time study was conducted by the author on the processing lines to establish the factors within the process, which were inhibiting process output.
- Questionnaires were handed to all employees of the processing facility, to establish whether certain factors that positively drive process efficiencies were present or not on the processing lines.

Sub-problems/questions

What does literature say are the primary factors that are responsible for driving process output?

- A literature review was conducted to address this problem/question.

Is the process flow on the hake processing lines logical? Are there any steps missing or any duplications?

- A time study observation was conducted to investigate the above and a value stream mapping techniques was used to highlight process efficiencies

Are all the process steps adding value? Does any waste happen in any of the steps? Can some of them be shortened or eliminated? Can some steps be combined? Are additional steps required?

- As above.

Are the performance metrics used in the processing unit effective to measure all the critical variables?

- Literature review used to answer the above question.

4.3 RESEARCH PARADIGM

Research can be conducted using two distinct methodologies, namely positivistic or phenomenological paradigms. Positivistic paradigm utilises quantitative methods to test a hypothesis or deductive generalisations while phenomenological paradigm uses qualitative methodologies to develop ideas through the induction of data collected (Amaratunga, Baldry, Sarshar & Newton, 2002).

4.3.1 Positivistic paradigm

The Positivistic paradigm assumes that human behaviour can be explained by “social facts” which can be scrutinized by methodologies that use deductive logic to reach a conclusion (Amaratunga et al, 2002). The paradigm is a confirmatory study that verifies observed phenomena in relationship to specific theories of reference (Gelo, Braakmann and Bentka, 2008).

Quantitative research measures phenomena using objective methods and as such does not infer subjectively through sensation or reflection. Moreover, the reliability and validity of data collected through quantitative research can be determined scientifically and objectively (Amaratunga et al, 2002).

According to Collins and Hussey (2003), the following are some of the major criticisms of positivistic paradigm-

“It is impossible to treat people as being separate from their social contexts and they cannot be understood without examining the perceptions they have of their own activities”.

Due to its highly structured nature, quantitative research induces certain constraints on the result and may ignore more relevant and important findings. In addition, capturing complex phenomena in a single numerical measure is impossible.

4.3.2 Phenomenological paradigm

This paradigm is exploratory in nature as it seeks to use data collected or phenomena observed to construct theories about those phenomena (Gelo et al, 2008).

Qualitative data is subjective and susceptible to bias in data collection and interpretation and such research provides an unstable basis for costly and critical business decisions (Collis & Hussey, 2003, p. 67). The results or findings generated from qualitative research cannot be generalised to a larger population as is the case with quantitative research results (Collis & Hussey, 2003).

The [henomenological study uses small sample sizes and its findings can be used to generate theories. Therefore, there is no need for a large sample to conduct a qualitative study. However, the analysis and interpretation of data collected through this paradigm are more difficult than that collected through quantitative research (Collis & Hussey, 2003, p. 67). Moreover, due to the subjectivity of the data collected, this paradigm’s findings tend to have low credibility amongst policy makers (Collis & Hussey, 2003; Amarutunga et al, 2002).

Yin (1994), states that a research methodology choice should be relevant to the research situation. If the research situation entails testing the hypothesis, using a positivistic paradigm would be most appropriate. This study's primary objective is to enhance the process volume output of the filleting lines in the processing plant at Seavuna Fishing Company in Mossel Bay. The study will entail testing the hypothesis to ascertain whether certain variables that literature purports to positively impact on process improvement and productivity are prevalent within the processing environment at Seavuna fishing company. If these variables are not present in the processing area, then the area will have to be modified to become to create their presence (Amaratunga et al, 2002). In light of the above arguments, a positivistic paradigm was chosen for this research study.

4.3.3 The sampling design

Sampling entails selecting a subset of a population in order to infer conclusions about the entire population. A sample must be representative of the entire population being researched (Collis and Hussey, 2003, p.232).

The sample for this study is selected using the simple random sampling method. In that, each individual amongst the people targeted for the study has known and equal chance of selection (Collis and Hussey, 2003, p.232). The sample will be selected from the population of about 100 employees working in the processing facility at Seavuna fishing in Mossel Bay. The definition of 'employees working in the processing facility' according to this study implies all staff employed in the processing division with the following ranks-

- Supervisors
- Fish workers
- Packers
- Quality controllers
- Operators

The study was conducted at Seavuna in Mossel Bay. Structured questionnaire hard copies were handed to all employees directly at their places of work. The training department of the company agreed to assist with the distribution of questionnaires and the collection of the completed ones from the respondents.

4.3.4 Measuring instruments

Since this study will be conducted using positivistic paradigm, Likert rating scales (interval data) that use bipolar adjectives will be used in the survey questions to measure respondents' preferences and perceptions. Interval data possesses sufficient numerical properties to be used as numerical data for the purpose of statistical analysis. However, the ratio of interval scaled values cannot be compared with one another, as the difference between them is not the same (Wegner, 2002, p.11).

The questionnaire statements will be anchored on 5 Likert scales ranging from strongly disagree to strongly agree. The questionnaires are self constructed using the following sources (Grobler, Bothman, Brewster, Carey, Holland and Warnish, 2014). The six main statements of the questionnaires are communication and goal alignment, Leadership style aspects, Compensation (Incentives), productivity Improvement, training and development and machinery and equipment maintenance.

4.4 ROLE OF DATA IN RESEARCH

Data is critical in research as it provides researchers the basis of statistical analysis with a view of deriving findings with can aid decision making (Wegner, 2002, p. 11). Data can be sourced from both internal and external sources. Internal sources are indigenous documents of an organisation that are generated in the normal course of doing business, like sales invoices, credit notes, stock sheets and time sheets to mention but a few. While external sources are found outside of the organisation and consist of

government agencies, research and university institutions (Wegner, 2002, p. 13).

4.4.1 Primary versus secondary data

Primary data is data collected for the first time and for a specific objective. It may be sourced within the organisation (internally) or outside the organisation (externally).
Secondary data is data that already exists and was collected for other purposes. It is both sourced internally and externally (Wegner, 2012, p. 14).

4.4.2 Data collection methods

The primary data collection methods are observation, surveys and experiments as detailed below by Wegner (2012, p. 14):
Observations- entail the observation of a respondent, a task or a process in action. An example of an observation is time study observation, which is used in this study to collect data pertaining to the hake processing lines. Data collected from observations can be recorded manually or electronically.

The advantages of collecting data through observations are that respondents would be unaware of that they are being observed and therefore would behave naturally. This increases the accuracy of the data and as such minimises bias.

4.5 CONCLUSION

Since this study will focus on testing the hypothesis to ascertain whether certain variables that literature believes to positively influence process efficiencies are present at processing unit at Seavuna fishing company, positivistic or quantitative research will be carried out to obtain the required data.

CHAPTER FIVE

ANALYSIS AND INTERPRETATION OF THE EMPIRICAL AND TIME STUDY RESULTS

5.1 INTRODUCTION

This chapter is divided into two parts. This first part covers the findings derived from the survey undertaken by the author of the staff members of the Seavuna fishing processing facility. The second part deals with the findings of the time study done on the filleting lines.

5.2 ANALYSIS OF EMPIRICAL STUDY

The results of the different sections of the questionnaire were analysed and interpreted below.

5.3 RESPONSE RATE

Survey questionnaires were physically handed to all processing staff and 57 out of the total of 83 responded: yielding a response rate of 69% of total processing staff. The following is the breakdown of the responses by the different categories in which the respondents were segmented.

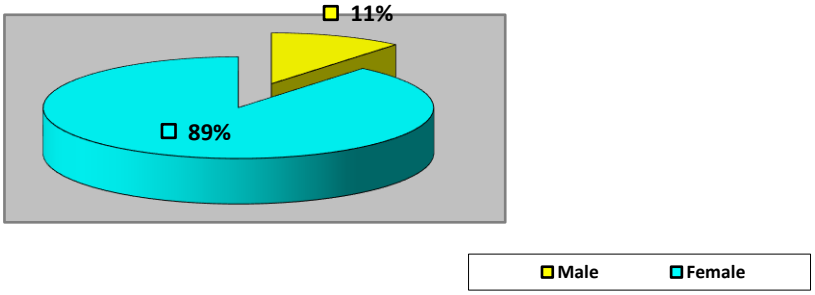
5.3.1 Respondents according to gender

Table 5.1

Gender	Number of respondents	% of respondents
Male	6	11%
Female	51	89%

(Source: Quantitative study done by author, 2016).

Chart 5.1: Response according to gender



(Source: Quantitative study done by author, 2016).

89% of the respondents were female and 11% male. This is a true reflection of the composition of the population of processing unit at Seavuna fishing company (Seavuna literature, 2016).

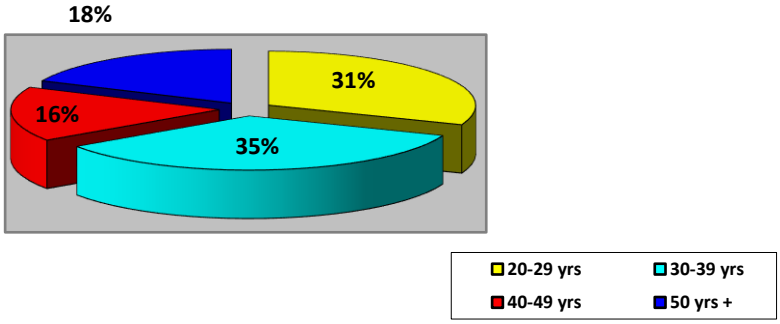
5.3.2 Respondents according to age groupings

Table 5.2

Age groupings	Number of respondents	% of respondents
20-29 years	17	31%
30-39 years	19	35%
40-49 years	9	16%
50 years and over	10	18%

(Source: Quantitative study done by author, 2016).

Chart 5.2: Respondents by age groupings



. (Source: Quantitative study done by author, 2016).

According to talent management literature, people of the same generation may share common values and may experience the world in similar ways

(Martin, 2005). This is what makes the different generations to believe in different things and also why their societal values are shaped differently. It is critical to analyse age groupings within a department or an organisation to ensure that relevant strategies that appeal to such groupings are implemented. In the case of this study, the majority of respondents as demonstrated in chart 5.2 above were between the ages of 30 and 39 years old (35%), followed by the 20 to 29 years groupings at 31%.

Generation Y

According to literature, the 20 to 29 years old belong to the generational cohort know as generation Y. Martin (2005) mentions that this generational cohort's advanced technological savvy lifestyle continues to customise their ability to gather and share information, creating an enormous source of knowledge at their fingertips. Weyland (2011) describes how they use instant text messaging to discuss work problems, arrange meetings and gain consensus on decisions. Martin (2005), says that while they require clear direction and managerial support, they despise being micro managed. Instead, they wish for the freedom to complete tasks in their own way and own pace. Moreover, they lack loyalty and therefore do not stay longer in one position.

Generation X

The 30 to 39 and 40 to 49 years old combined form what is known as generation X. This grouping has a strong need for independence and autonomy in the workplace. Therefore, mechanistic, inflexible management styles or micro-management tactics frustrate them and would deter them from performing well (Augusta, Sandra and Dinah, 2005). It seems therefore that most of the people in this cohort have an individualistic approach to work and prefer to be left alone to achieve their work objectives.

Baby boomers

The 50 years and above belong to the baby boomers generational cohort. Baby boomers are hard working and spend longer hours at work. They will arrive early for work and will leave late. They are fond of working in teams and in making a personal contribution (Brazeel, 2009). Baby boomers are highly competitive in nature and always work efficiently while seeking recognition for their contribution (Brazeel, 2009).

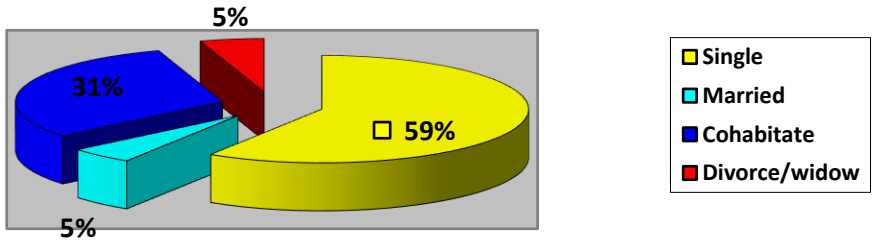
5.3.3 Respondents by marital status

Table 5.3

Marital status	Number of respondents	% of respondents
Single	33	59%
Married	3	5%
Cohabitate	17	31%
Divorced/Widowed	3	5%

(Source: Quantitative study done by author, 2016).

Chart 5.3 Respondents by marital status



(Source: Quantitative study done by author, 2016).

59% of the respondents were single while the minority were either married or divorced/widowed. The fact that 59% are single brings about a host of challenges like, if their child or children fall sick there is no one at home to take their children to the doctor and as such, they have to do it themselves. This would negatively affect their availability for work/attendance.

5.3.4 Respondents according to ethnicity

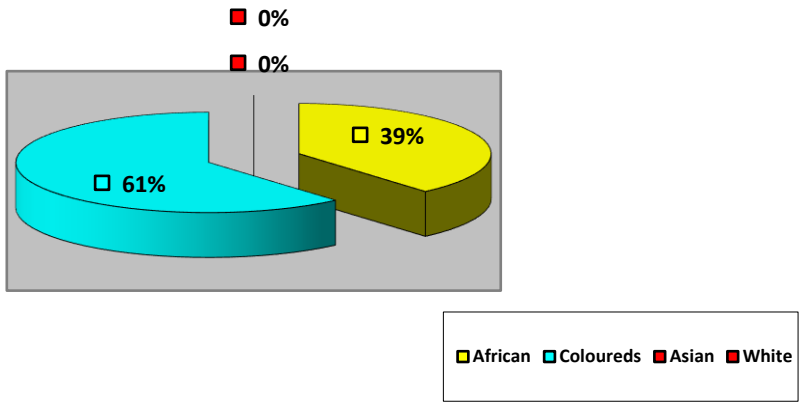
The demographics of the respondents were dominated by coloured staff at 61% and 39% black Africans. This represents the demographics of the processing units' entire population as per the company's records (Seavuna employment documents, 2016). See table and chart below.

Table 5.4

Ethnicity	Number of respondents	% of respondents
African	22	39%
Coloureds	35	61%
Asian	0	0%
White	0	0%

(Source: Quantitative study done by author, 2016).

Chart 5.4: Respondents by ethnicity



(Source: Quantitative study done by author, 2016).

5.3.5 Respondents by work areas within the processing facility

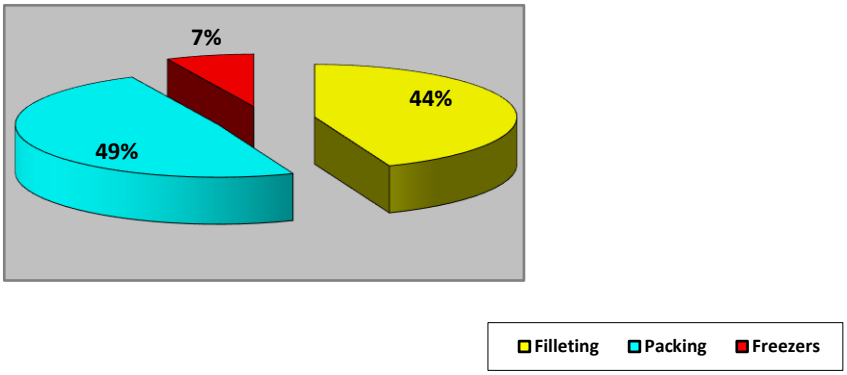
Table 5.5

Ethnicity	Number of respondents	% of respondents
Filleting lines	25	44%
Packing lines	28	49%

Freezing section	4	7%

(Source: Quantitative study done by author, 2016).

Chart 5.5: Response by different Sections



(Source: Quantitative study done by author, 2016).

The majority of the respondents work on the packing lines, followed by 44% who are engaged on the filleting lines.

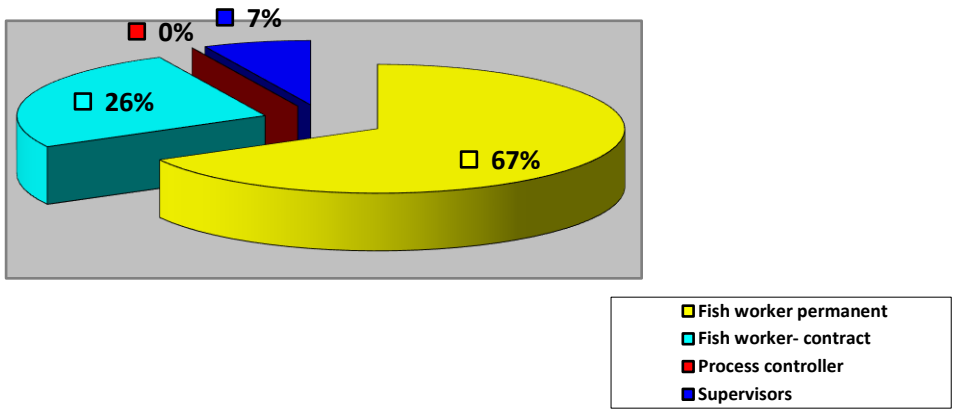
5.3.6 Respondents by job positions

Table 5.6

Job positions	Number of respondents	% of respondents
Fish workers- permanent staff	38	67%
Fish workers- casuals	15	26%
Process controllers	0	0%
Supervisors	4	7%

(Source: Quantitative study done by author, 2016).

Chart 5.6: Respondents by job positions



(Source: Quantitative study done by author, 2016).

Most of the respondents were permanently employed, at 67%, with 36% being contract employees.

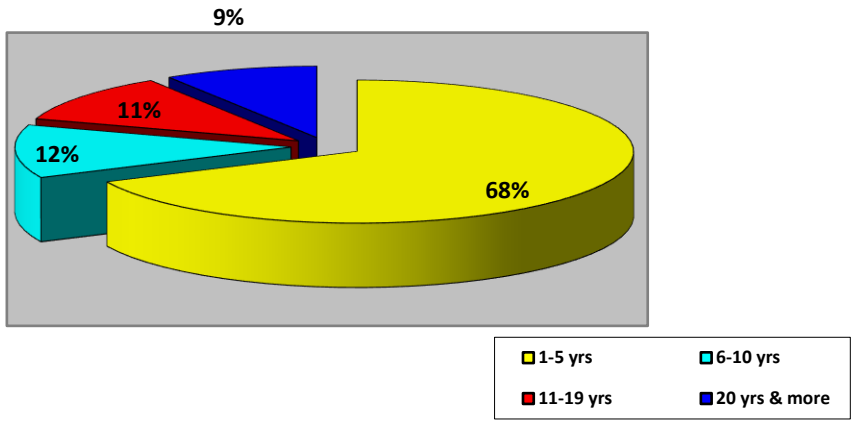
5.3.7 Respondents by years of service

Table 5.7

Years of service	Number of respondents	% of respondents
1-5 years	39	68%
6-10 years	7	12%
11-19 years	6	11%
20 years & more	5	9%

(Source: Quantitative study done by author, 2016).

Chart 5.7: Respondents by years of service



(Source: Quantitative study done by author, 2016).

As can be deduced from the chart 5.7 above, the majority of the respondents, 68% have worked for the company for the least number of years. An indication that the rate of labour turn over within the unit might be high. 12% of respondents have served the company for 6 and 10 years, 11% over 10 years while 9% have been loyal to the organisation for more than 20 year of service.

5.4 RESPONSES DERIVED FROM THE QUESTIONNAIRES

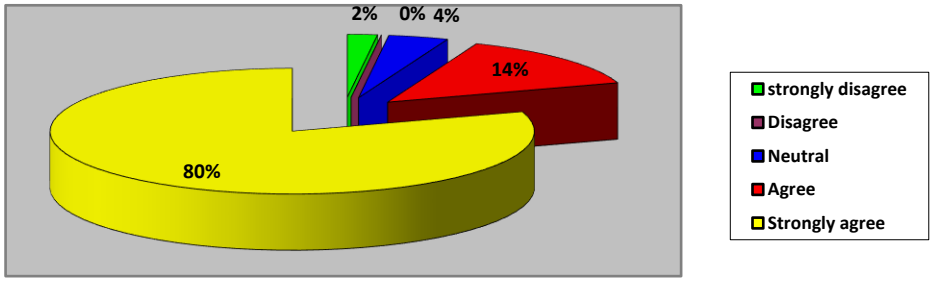
Table 5.8: Communication and goal alignment

	Communication and Goal alignment		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No response	Total
1	The contribution of my department in the organisation is clear and well understood	**Number of Responses**	4	1	3	14	34	1	57
		%	7%	2%	5%	**25%**	**60%**	2%	100%
2	Expectations of my contribution to the department are clear and understood		1	0	2	8	46	0	57
		%	2%	0%	4%	**14%**	**80%**	0%	100
3	Goals and performance indicators are well defined and communicated.		2	0	4	12	39	0	57
		%	4%	0%	7%	21%	68%	0%	100%
4	Management communicates my performance regularly with me.		1	5	5	16	30	0	57
		%	2%	9%	9%	**28%**	**52%**	0%	100%
5	My supervisor informs me about the plan for the day at the start of my shift.		8	9	7	12	21	0	57
		%	14%	16%	12%	21%	37%	0%	100%
6	My supervisor informs me of any changes to the plan during the shift.		7	5	4	15	25	1	57
		%	12%	9%	7%	**26%**	**44%**	2%	100%
7	Roles and responsibilities are clearly explained		1	0	6	12	36	1	57
		%	2%	0%	11%	21%	64%	2%	100
8	Quality standards of my area of work are clear and well understood.		3	0	2	14	35	2	57
		%	5%	0%	4%	**25%**	**62%**	4%	100%
9	The company's vision and mission are explained to us.		8	3	3	15	28	0	57
		%	14%	5%	5%	27%	49%	0%	100%
10	A team meeting is held every morning with our supervisor to discuss issues pertaining to the team's performance and other burning issues.		27	13	3	5	9	0	57
		%	**47%**	**23%**	5%	9%	16%	0%	100%

(Source: Quantitative study done by author, 2016).

The majority of respondents were aware of the contribution that the company and department expected from them. They had knowledge of their departments' goals and their key performance areas, including quality standards. This implies that management has done well in effectively communicating the company's goals and staff's key performance areas. However, 70% of the respondents disagreed that meetings were held between them and their supervisors daily to discuss the previous day's performance and plan for the day. This indicates a lack of employee involvement in decision making.

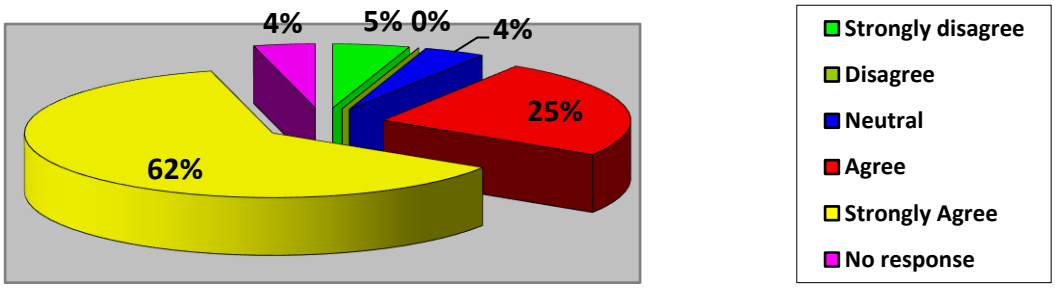
Chart 5.8: Expections of my contribution well understand



(Source: Quantitative study done by author, 2016).

Chart 5.8 above illustrates that about 85 per cent of the respondents strong agree/agree that they understood how their department and themselves contribute to the larger organisation. This is important to ensure all staff are aligned to the goals of the company.

Chart 5.9: Quality standards are explained and well understood



(Source: Quantitative study done by author, 2016).

Chart 5.9 above, demonstrates that about 87 per cent of the respondents strongly agree/agree that they comprehend the department's quality standards, which have being explained to them well.

Table 5.9: Leadership style aspects

	Leadership style aspects		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No responses	Total
	My Supervisor:								
1	Respects me and my team mates.	**Number of Responses**	6	5	10	8	28	0	57
		%	10%	9%	18%	14%	49%	0%	100%
2	Consults with staff before making a decision.		13	9	10	9	15	1	57
		%	23%	16%	17%	16%	26%	2%	100%
3	Treats staff as individuals.		10	6	11	14	14	2	57
		%	18%	10%	19%	25%	24%	4%	100%
4	Recognises staff's accomplishments.		7	5	14	9	20	2	57
		%	12%	9%	25%	16%	35%	4%	100%
5	Listens to staff and treats them equally /fairly.		10	10	5	7	25	0	57
		%	18%	17%	9%	12%	44%	0%	100%
6	Involves staff in decision making and encourages participation.		15	9	6	10	17	0	57
		%	26%	16%	10%	18%	30%	0%	100%
7	Asks for my inputs or suggestions.		21	7	10	5	12	2	57
		%	37%	12%	18%	9%	21%	3%	100%
8	Creates a fun environment at work.		14	9	8	10	16	0	57
		%	25%	16%	14%	17%	28%	0%	100%
9	Is my role model.		22	9	6	2	18	0	57
		%	39%	16%	11%	3%	31%	0%	100%

10	Motivates me to achieve higher goals.		14	4	8	12	19	0	57
		%	25%	7%	14%	**21%**	**33%**	0%	100%

(Source: Quantitative study done by author, 2016).

Some aspects of transformational and charismatic leadership were lacking in the leadership style exhibited by the Supervisors and Managers on the processing floor, according to the respondents. Only 30% of the respondents felt that staff inputs or suggestions were encouraged or valued and 48% agreed/strongly agreed that staff were involved in decision making.

56% of the respondents felt that supervisors listened to them and treated them fairly and 54% were of the opinion that their supervisors motivated them to achieve higher goals.

Table 5.10: MOTIVATION

	Motivation aspects		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**No Responses**	**Total**
1	My supervisor keeps me motivated and encourages me to accomplish my tasks within target.	**Number of Responses**	7	7	8	10	25	0	57
		%	12%	12%	14%	18%	44%	0%	100%
2	My jobs gives me satisfaction		2	2	4	9	39	1	57
		%	3%	3%	7%	16%	68%	2%	100%
3	Would gladly accept a higher position in the company.		5	7	9	9	26	1	57
		%	9%	12%	15%	16%	46%	2%	100
4	Would be prepared to learn new tasks.		3	2	3	8	40	1	57
		%	5%	4%	5%	14%	70%	2%	100%
5	My Supervisor recognises my good performance.		4	4	15	8	26	0	57
		%	7%	7%	26%	14%	46%	0%	100%
6	Competition amongst team members serves as good motivation.		9	3	5	18	22	0	57
		%	16%	5%	9%	31%	39%	0%	100%
7	Visual display of my hourly performance		5	1	8	15	28	0	57

	serves as motivation.								
		%	9%	2%	14%	26%	49%	0%	100%
8	My hourly performance is important.		4	1	6	13	32	1	57
		%	7%	2%	10%	23%	56%	2%	100%
9	A small token of appreciation from my supervisor would act as motivation.		7	6	5	9	29	1	57
		%	12%	10%	9%	**16%**	**51%**	2%	100%
10	Would be prepared to go the extra mile.		3	1	4	8	41	0	57
		%	5%	2%	7%	**14%**	**72%**	0%	100%

(Source: Quantitative study done by author, 2016).

A notable 84% of the respondents agreed/strongly agreed that their current position offered them satisfaction and also that they would be prepared to learn new tasks. 86% were prepared to walk the extra mile while 7% were not prepared to do so. 67% of the respondents felt that a small token of appreciation from their supervisors would go a long way in motivating them and 60% were of the view that their supervisors do recognise their performances.

56% of the respondents strongly agreed and 23% agreed that their hourly performance measures were important to them- in total 79% of the respondents were in agreement with this statement. 75% agreed that visual display of their hourly performances was important to them.

Table 5.11: Training and development

	Training and experience aspects		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**No responses**	**Total**
1	Fully competent in my job.	**Number of Responses**	2	1	2	7	45	0	57
		%	3%	2%	3%	12%	79%	0%	100%
2	Able to perform more than three tasks effectively on the processing line.		1	1	5	14	36	0	57
		%	2%	2%	9%	**24%**	**63%**	0%	100%
3	Would appreciate further to perform my work differently and better.		1	0	3	16	37	0	57

		%	2%	0%	5%	28%	65%	0%	100%
4	Prepared to learn news tasks.		1	0	1	8	45	2	57
		%	2%	0%	2%	**14%**	**79%**	3%	100%
5	My supervisor gives me challenging work from time to time.		5	10	3	16	23	0	57
		%	9%	18%	5%	28%	40%	0%	100%
6	Training provided by the company is sufficient.		8	5	7	17	20	0	57
		%	14%	9%	12%	30%	35%	0%	`100%
7	Appreciate change if it is fully explained to me.		2	0	6	14	35	0	57
		%	3%	0%	11%	**25%**	**61%**	0%	100%
8	My job is cumbersome.		6	1	11	15	21	3	57
		%	11%	2%	19%	26%	37%	5%	100%
9	Would perform better if my job is redesigned.		2	4	7	15	27	2	57
		%	4%	7%	12%	26%	47%	4%	100%
10	Would prefer to work for a learning organisation.		5	4	4	16	27	1	57
		%	9%	7%	7%	28%	47%	2%	100%

(Source: Quantitative study done by author, 2016).

A significant percentage (91%) of the respondents believed that they were fully competent in performing their respective functions, while 87% agreed/strongly agreed that they had the ability to perform more than three tasks on the processing lines.

Of the respondents, 75% preferred to work for a learning organisation and 93% were prepared to learn new tasks. 86% were willing to embrace change but only if it was fully explained to them.

65% agreed/strongly agreed that the current training interventions provided by the company were effective while 23% thought otherwise- disagreed.

Table 5.12: Performance assessment

	Performance assessments aspects		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**No Responses**	**Total**
1	Supervisor involves me when setting my Key Performance Areas (KPA's) and targets.	**Number of Responses**	10	10	6	14	15	2	57
		%	17%	17%	11%	25%	26%	4%	100%
2	KPA's and targets are clear and measurable.		5	7	7	17	20	1	57
		%	9%	12%	12%	30%	35%	2%	100%

3	My KPA's and targets are clearly explained to me.		3	5	7	12	26	4	57
		%	5%	9%	12%	21%	46%	7%	100%
4	Performance Assessments are objectively done amongst employees.		4	5	12	17	17	2	57
		%	7%	9%	21%	30%	30%	3%	100%
5	High performers are paid more.		33	10	8	2	3	1	57
		%	**58%**	**17%**	14%	4%	5%	2%	100%
6	High performers are rewarded.		32	10	5	5	4	1	57
		%	56%	17%	9%	9%	7%	2%	100%
7	Good performance is acknowledged by supervisors and senior management.		16	6	7	6	20	2	57
		%	28%	11%	12%	11%	35%	3%	100%
8	Promotions are based on good performance.		21	5	5	11	15	0	57
		%	**37%**	**9%**	9%	19%	26%	0%	100%
9	Poor performers are reprimanded /disciplined.		10	5	7	14	19	2	57
		%	18%	9%	12%	25%	33%	3%	100%
10	Further training and assistance is provided to poor performers.		21	4	6	10	16	0	57
		%	37%	7%	11%	18%	28%	0%	100%

(Source: Quantitative study done by author, 2016).

65% of the respondents were of the view that performance targets were clearly stated and explained by their superiors and that they understood them. However, only 46% felt that good performances were acknowledged by supervisors and senior management. Moreover, 73% of the respondents stated that high performing staff, were not rewarded by management and only 26% agreed that poor performers were reprimanded.

Table 5.13: Productivity improvement interventions

	Productivity aspects		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**No Responses**	**Total**
1	Understand what productivity means.	**Number of Responses**	2	2	6	13	34	0	57
		%	4%	4%	10%	23%	59%	0%	100%
2	Productivity is important to me.		1	1	1	16	36	2	57
		%	2%	2%	2%	28%	63%	4%	100%
3	Have been exposed to a productivity improvement project before.		6	11	10	15	15	0	57
		%	11%	19%	18%	26%	26%	0%	100%
4	Our processing line is performing very well.		1	2	5	19	29	1	57
		%	2%	3%	9%	33%	51%	2%	100%
5	Would be interested in productivity improvement.		1	2	5	18	29	2	57
		%	2%	3%	9%	32%	51%	3%	100%
6	Would prefer to work for a processing line that consistently meets its productivity targets.		0	5	5	14	32	1	57

		%	0%	9%	9%	25%	56%	2%	100%
7	We are always trying to eliminate waste on our line.		2	1	7	20	25	2	57
		%	3%	2%	12%	36%	44%	3%	100
8	A productivity bonus for good performance will entice me to perform better.		6	1	6	14	30	0	57
		%	10%	2%	10%	25%	53%	0%	100%
9	Good leadership would entice me to perform better.		2	1	5	8	40	1	57
		%	35%	2%	9%	14%	70%	2%	100%
10	Senior management involvement is important to me.		6	7	9	14	20	1	57
		%	10%	11%	16%	25%	36%	2%	100%

(Source: Quantitative study done by author, 2016).

53% of the respondents strongly agreed and 23% agreed with the fact that they were aware of what productivity entailed.
84% (70% strongly agreed and 14% agreed) agreed that good and effective leadership would entice them to perform even better. 78% indicated that a productivity incentive bonus would encourage them to perform more or better.

Table 5.14: Machinery, equipment and tools performance

	Machinery and equipment performance aspects		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**No Responses**	**Total**
1	The filleting machines are always running at standard speed.	**Number of Responses**	6	3	9	21	18	0	57
		%	11%	5%	16%	37%	32%	0%	100%
2	The filleting machines are reliable [very few breakdowns and stoppages].		11	8	7	21	9	1	57
		%	19%	14%	13%	37%	16%	2%	100
3	The filleting machines cut good quality fillets always.		14	9	9	13	11	1	57
		%	25%	16%	16%	23%	19%	2%	00%
4	The maintenance team responds quickly to mechanical breakdowns as they arise.		5	9	2	19	21	1	57
		%	9%	16%	3%	33%	37%	2%	100%
5	The maintenance team is competent in resolving filleting machine problems.		9	5	5	19	18	1	56
		%	16%	9%	9%	33%	32%	2%	100%
6	The poor quality of the machines is negatively affecting our productivity.		15	3	8	13	18	0	57
		%	26%	5%	14%	23%	32%	0%	100%
7	The knives we use to trim the fish are of poor standard/quality.		8	6	15	10	18	0	57
		%	14%	11%	26%	18%	32%	0%	100%
8	Poor quality fish affects our performance.		8	4	2	17	26	0	57
		%	14%	7%	3%	30%	46%	0%	100%
9	An effective planned maintenance system		5	4	14	15	17	2	57

	for filleting machines does exist.								
		%	9%	7%	25%	26%	30%	3%	100
10	Filleting machine utilisation is effective.		4	4	15	14	17	3	57
		%	7%	7%	26%	25%	30%	5%	100%

(Source: Quantitative study done by author, 2016).

According to 53% of the respondents, the fillet machines are reliable, while 33% thought that they were unreliable. 70% agreed/strongly agreed that the maintenance or technical team responded quickly to breakdowns. 40% agreed that the filleting knives used on the processing floor are of good quality, 25% disagreed, while 26% were undecided.

Table 5.15: My work environment

	Aspects of my current work environment		**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**	**NO Response**	**Total**
1	There is sufficient light in my work environment.	**Number of Responses**	3	5	2	8	30	9	57
		%	5%	9%	3%	14%	53%	16%	100 %
2	There is sufficient ventilation.		3	5	9	6	25	9	57
		%	5%	9%	16%	11%	44%	6%	100 %
3	My work entire environment is satisfactory		5	4	9	10	21	8	57
		%	9%	7%	16%	17%	37%	14%	100 %
4	Have to walk far to collect work materials.		11	10	7	7	13	9	57
		%	19%	18%	12%	12%	23%	16%	100 %
5	Protective clothing is of good standard.		12	6	4	9	17	9	57
		%	21%	10%	7%	16%	30%	16%	100 %
6	The tools we use are effective.		6	8	8	8	17	10	57
		%	10%	14%	14%	14%	30%	18%	100 %
7	There is too much wastage of water.		6	7	8	9	17	10	57
		%	10%	12%	14%	16%	30%	18%	100 %
8	The equipment we use is outdated.		4	7	9	11	18	8	57
		%	7%	12%	16%	19%	31%	14%	100 %
9	Comfort breaks are sufficient		11	7	8	10	13	8	57
		%	9%	12%	14%	18%	23%	14%	100 %
10	Standing for too long is exhausting		7	4	3	5	31	7	57
		%	12%	7%	5%	9%	54%	12%	100 %

(Source: Quantitative study done by author, 2016).

67% of the respondents were satisfied with lighting in the processing facility and 66% were also happy with air ventilation. 54% were generally satisfied with the entire work environment.

5.5 ANALYSIS OF TIME STUDY RESULTS

5.5.1 Introduction

The primary purpose of the time study was as follows-

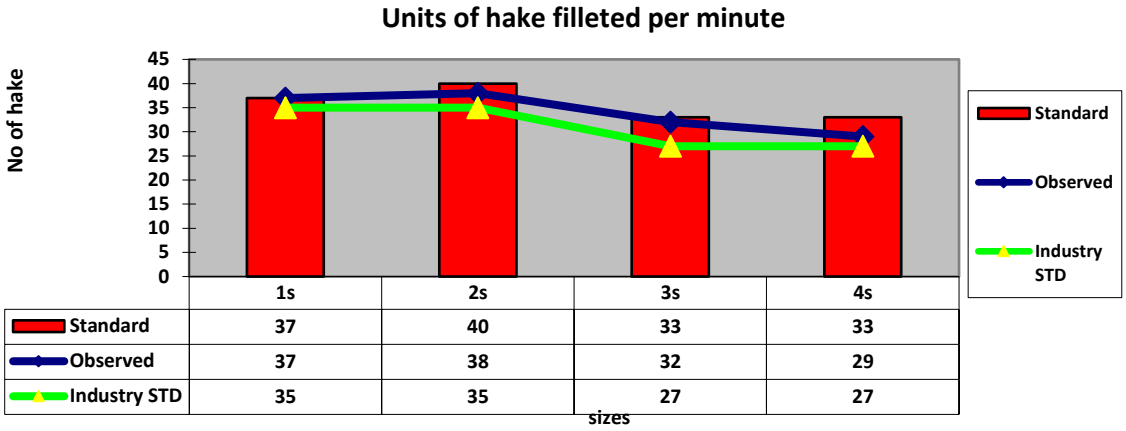
- To measure the cycle times of the various tasks on the filleting lines.
- To establish whether the existing standards were achievable.
- To identify sources of a waste of the lines.
- To balance the lines in order to achieve seamless flow.

The time study procedure and documents were designed and coordinated by the author, while the observations were done with the assistance of Seavuna work study department. The observations covered the three automated processing lines. The cycle times of all the activities and sub-activities that make up each processing line were measured. According to Grunberg (2004), it is important to measure the cycle times of activities and sub-activities, in order to 'pinpoint losses and problems that might constitute a rationale for improvement interventions'. He further states that when measuring process lead times, it is critical to comprehend the proportion of the lead times that constitutes value adding activities and that of ineffective time.

Therefore, for the purposes of this study, the activities of the hake processing lines were measured and are represented graphically below:

5.5.2 Time study results

Chart 5.10: Units of hake filleted per minute



	1s	2s	3s	4s
Standard	37	40	33	33
Observed	37	38	32	29
Industry STD	35	35	27	27

(Source: Time study conducted by author on the filleting lines, 2016)

General findings

Line 1- Hake size 1**:** The actual number of fillets produced per minute as per observation was on par with the current Seavuna hake filleting standards. However, the industry standard was 2 units lower than the existing one.

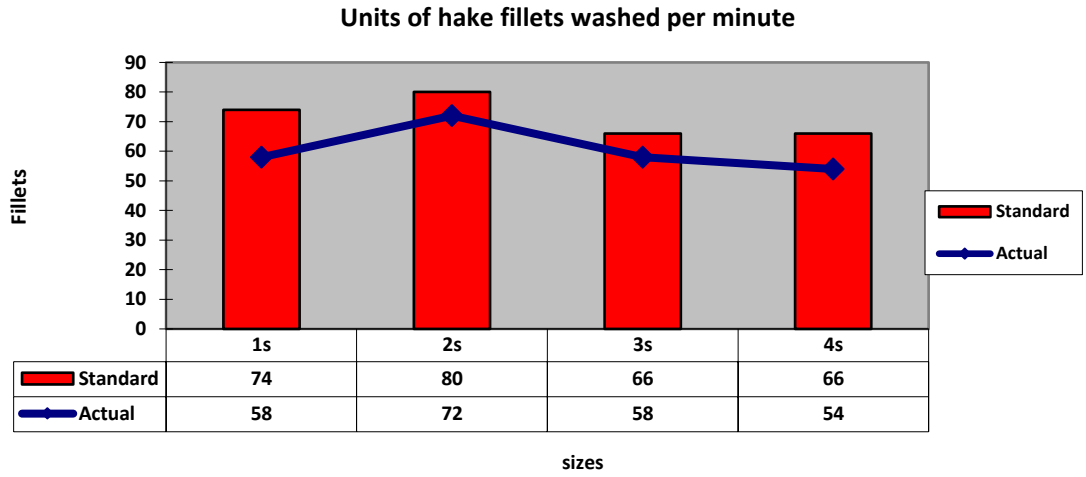
Line 2- Hake size 2: The actual hake units filleted was 38 units per minute against the standard of 40 units per minute. The industry standard was lower than both the observed and the existing standards at 35 units per minute [12.5% lower].

Line 3- Hake size 3: The observed rate of hake filleted was 32 units per minute versus the standard of 33 units per minute, while the industry benchmark was 27 units per minute. The current speed of the filleting machine, therefore, was 18% faster that the industry norm at 33 units per minute.

Line 3- Hake size 4: The Seavuna standard of 33 units per minute and was not being achieved by the operators, who were only able to put through an

average of 29 units per minute. This is however, better than the industry benchmark of 27 units.

Chart 5.11: Manual washing of hake fillets per minute



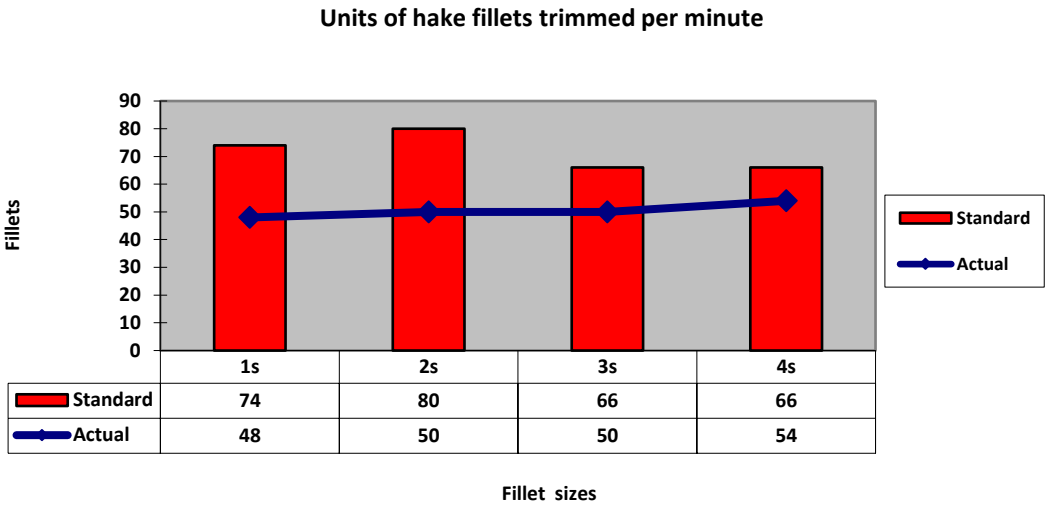
(Source: Time study observations conducted by author, 2016)

General findings

Across all the hake sizes, the number of actual fillets washed per minute was lower than the number of fillets produced. For every minute of production, the wash workstation had a backlog of fillets, which still had to be washed. This created idle times for the workstations before and after the washing activity. This is evidence that the processing lines are out of balance and consequently are not flowing smoothly.

On Line-1, the observed washing cycle time was 2.07 minutes per fillet, which equates to 58 fillets washed per minute against the standard output of 74 fillets per minute produced.

Chart 5.12: Hake fillets trimmed per minute



(Source: Time study observations conducted by author, 2016)

Findings per size:

Line 1: Fillets- size 1

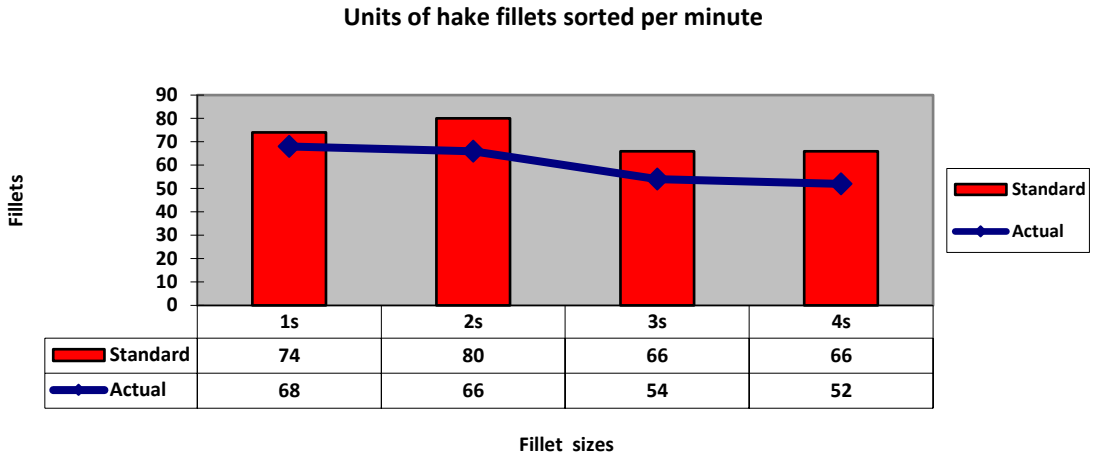
The 4 trimmers on this line trimmed an average of 12 fillets per person per minute- total of 48 fillets per minute against the 74 fillets produced per minute. This created a backlog of about 26 fillets per minute. This points to firstly, the excessive speed of the filleting machine and secondly the poor performance of the trimmers.

Line 2 & 3: Fillets size 2, 3 and 4

The trimming volume performance on size 2 fillets was 10 fillets per person per minute. A total of 5 trimmers were used, yielding a total 50 fillets per minute against the standard of 80 fillets, 27% below standard.

On size 3 fillets, the total actual trimmed per minute was 50 fillets while size 4 fillets were trimmed at 54 fillets per minute. Both were lower than the required standard of 66 fillets per minute respectively. In conclusion, the filleting machines are set at a very fast rate or the trimmers trim at a lower rate.

Chart 5.13: Hake fillets sorted per minute



(Source: Time study observations conducted by author, 2016)

Findings

Line 1: Hake fillets size 1

The observed sorting efficiency at 68 fillets per minute was 6 fillets short of the standard. This implies that in every minute of production there was a build up of 6 fillets that still had to be sorted.

Line 2: Hake fillets size 2

The rate of filleting on this size hake produced 80 fillets per minute, while the sorters could only sort 66 fillets per minute, resulting in a backlog of 14 fillets every minute. The sorters were not coping with high speed of the filleting machine and therefore held back the efficiency of the entire line.

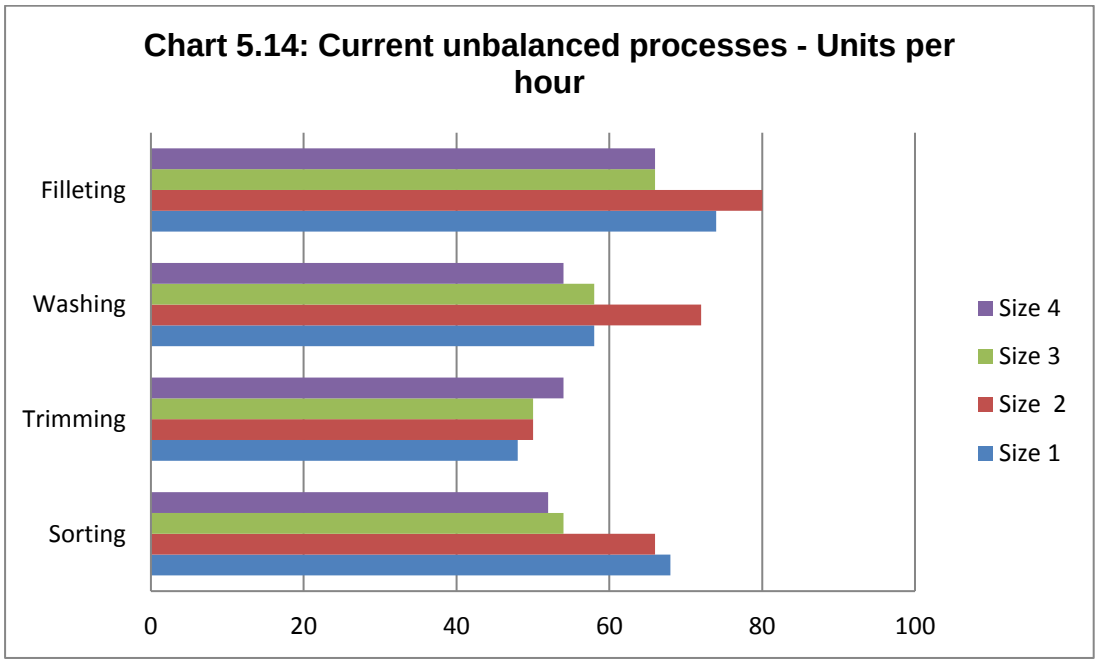
Line 3: Hake fillets size 3

Sorters only sorted 78% of the total fillets produced per minute, leaving 22% of the fillets waiting to be sorted.

Line 4: Hake fillets size 4

The sorters did not cope with the high rate of fillets production- sorting 52 fillets of the 66 produced per minute.

5.6 LINE BALANCING



(Source: Time study observations conducted by author, 2016)

From the above diagram, it is clear that all the processing lines are unbalanced. In all instances the trimming activity is the bottleneck.

Volume output of each line based on the unbalanced process

NB: The bottleneck efficiency is used to calculate the volume output as this is the maximum that each line can process per minute.

Calculation of current volume output based on bottleneck task output:

Line # 1:

- Bottleneck (Trimming task) = 48 fillets= 24 units/minute x 0.245kgs x 60 minutes x 8.25 hours= **2,911kgs.**

Line # 2:

- Bottleneck (Trimming task) = 50 fillets= 25 units/minute x 0.355kgs x 60 minutes x 8.25 hours= **4,393kgs.**

Line # 3:

- Bottleneck (Trimming task) = 50 fillets= 25 units/minute x 0.520kgs x 60 minutes x 8.25 hours= **6,435kgs.**

Total volume output of the 3 lines per shift= **13,739kgs**

5.6.1. Conclusion

The following wasteful practices as described by lean principles were observed on the lines as follows-

- **Muri**- Filleting machines were set at higher speeds than the norm and as such overburden the equipment and operators.
- **Mura**- It was evident that the lines experienced unnecessary stoppages due to the unevenness of the process.
- **Overproduction**- The filleting machines produced more fillets than could be handled by the activities that followed. This resulted in a continuous accumulation of product at the washing, trimming and sorting workstations.

This is an indication that the filleting standards were incorrectly applied and implemented. As W. Edward Deming pointed out in his 14 points for management, point 11 as quoted by Foster (2013, p.56): “If quantity standards become the overriding concern for management, then quality suffers”. Fresh fish is highly perishable and therefore any stoppages of the line results in the loss of moisture from the fillets which yields
poor quality fillets (**Defective goods**).

5.7 OTHER OBSERVATIONS

5.7.1 Ineffective leadership elements

- Production managers were frequently observed directly supervising staff as opposed to managing supervisors. They were doing the supervisors work instead of coaching and mentoring the supervisors.

- Poor time keeping- processing staff arrived late on the floor at the start of the shift and from tea and lunch breaks. Staff left the lines frequently during processing, apparently to attend to the call of nature.
- Lines waiting for raw material supplies.
- Supervisors were not visible on the lines.

5.7.2 Factory utilisation

The processing unit was underutilised, as one of the three processing lines was not operational for most days in the week due to absenteeism. The unit did not have sufficient trained people to operate all the lines due to about 15 of the total 100 staff members being absent daily- an average absenteeism rate of 15% per day. This negatively affected the unit's utilisation, which was at 67% with one line not operational. This is **inappropriate processing** as described in the seven wastes of lean principles.

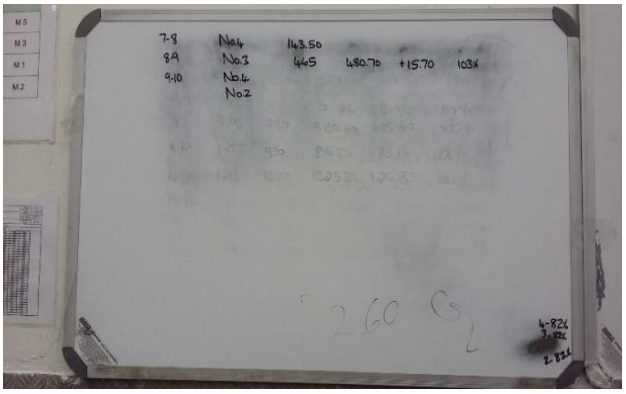
5.7.3 Non-value adding work

The line supervisors and the floor management were observed, spending a lot of time at the administrative table, adding up the fish input tickets in order to work out their hourly efficiencies. In the process, they left their respective lines unattended and unsupervised. This meant that they negated the very critical and primary function of supervision, which is actively monitoring the performance of their subordinates. This waste is known as **Muda** in lean as a resource was being used without it adding any value.

5.7.4 Lack of Visual performance displays

The visual performance display of the white boards were not regularly updated and looked unattractive. See photographs below

Photo 5.1



(Source: author's own work, 2016

CHAPTER SIX

FUSION OF LITERATURE REVIEW AND FINDINGS OF EMPIRICAL AND TIME STUDIES, RECOMMENDATIONS AND CONCLUSIONS

6.1 INTRODUCTION

The objective of this chapter is to summarise the deductions and viewpoint that have been derived from the research conducted to resolve the main and sub-problems of the study using lean principles.

The study's limitations and recommendations for future research will be highlighted as well.

6.2 RECOMMENDATIONS

Relevant literature reviewed in chapter three of this study is of the view that in order to improve process efficiency, the performance of each resource within a process, namely, human, machinery and equipment, set-up, raw materials, the environment and the process itself need to be enhanced (Pieterse, 2015, p.126). Therefore, the recommendations in resolving the main problem 'sub-standard process efficiencies on the hake processing lines' will be broken down into the process resources mentioned.

It is strongly recommended that Seavuna fishing should consider using lean principles to improve its process efficiencies and strategic quality planning in implementing the recommendations below.

6.2.1 Human Resource (Men)

The empirical study undertaken for the purposes of this study provides a source of the recommendations for this critical resource as follows-

Communication and goal alignment

The company needs to develop a clear business strategy with a supporting mission and core values. The mission will provide management and staff with a clear purpose and direction of the company while the core values will provide the relevant operating principles (Forster, 2013, p. 35). The strategy, mission and core values have to be fully communicated to all staff and reinforced to ensure they strongly influence a corresponding organisational culture (Forster, 2013, p. 35). The organisational culture needs to support the strategy chosen to ensure alignment. Failure to have the two aligned will result in “Organisational culture eating strategy for breakfast” Therefore, the organisational culture should be one that embraces lean principles. Literature is of the view that an organic type of culture is conducive to continuous improvement initiatives like lean, as it supports creativity and innovation, which are the cornerstones of continuous improvement.

Leadership aspects

The company needs to train its supervisors in effective management of staff. As can be deduced from the survey, 84% of the respondents were of the view that effective leadership would motivate them to perform better. From the various leadership styles available, out there the following encompass the elements of lean- Transformational, Charismatic POS leadership and Servant leader. It is recommended that the company trains all its leaders in these leadership styles. If possible, the company should develop and implement a leadership brand for the facility.

Staff engagement

Literature is of the view that in order to install a system of continuous improvement in an organisation successfully, employees must be encouraged to participate in such initiatives directly by including them in decision making processes from the outset (Sun, Hui, Tam & Frick, 2000).

The majority of the respondents also indicated that incentives would motivate them to do perform better. A group incentive scheme as opposed to an individual incentive scheme is recommended. This is so, as the company would benefit more from the entire line performing well. Incentive plans aligned to individual output are not effective in rewarding staff that work on a line, as they would cause variations amongst the output of other staff members who are chasing the incentive (Stevenson, 2010, p. 251).

Visual display of performances

- Install electronic performance display board on processing floor that will update line performances hourly.
- Appoint Visual display board champion to collect tickets from lines, add them up and update board hourly.
- The electronic board can be used to communicate other important staff issues.

Performance assessment

The company should develop key performance indicators for the processing leadership, which support the larger company strategy. The Balanced scorecard system as described by Hough (2013, p. 13) is an effective tool in achieving goal alignment and 'line- of- sight, in the organisation. The line of sight simply means each employee can see how their contribution fits with the company's objectives (Hough et al, 2013, p.13).

Productivity improvement

83% of the respondents to the survey agreed that they would welcome new productivity improvement initiatives brought about by the company. 84% said productivity was important to them while 84% were prepared to learn new tasks. Therefore there is a high probability that implementing lean principles would be welcome if such an intervention is fully explained to staff and they are involved in the process from the outset. The company

therefore, should consider implementing lean manufacturing, which primarily focuses on waste elimination and process improvement. Lean is easily adaptable to a situation as there are various approaches to its implementation (Pieterse, 2015, p. 193). Therefore Seavuna can choose the cheapest and the most effective approach depending on management's priorities.

Cultivating innovation

Lean entails using innovation where possible to resolve process efficiency challenges. According to DuBrin (2013), organisations can enhance innovation internally by-

- Systematically collecting fresh ideas: Solicit fresh ideas from employees and place them in the company database. Reward employees for good ideas.
- Equipping a Kitchen for the mind: create a special place on the company premises equipped with computers, flipcharts, pencils, toys, etc to help stimulate innovative thinking.

Absenteeism

From literature consulted and also from Seavuna's own experience positive staff engagement alone is incapable of resolving absenteeism. This study therefore, recommends that the company employees a surplus contract staff complement to be used to offset staff shortages when required. The contract staff must be trained in most aspects of fresh fish processing before being included in the company's database. This intervention will ensure that the processing unit is utilised optimally at most times.

6.2.2 Machinery and equipment

Reliability

- Develop and implement a planned maintenance system for the all filleting machines (Total productive maintenance).

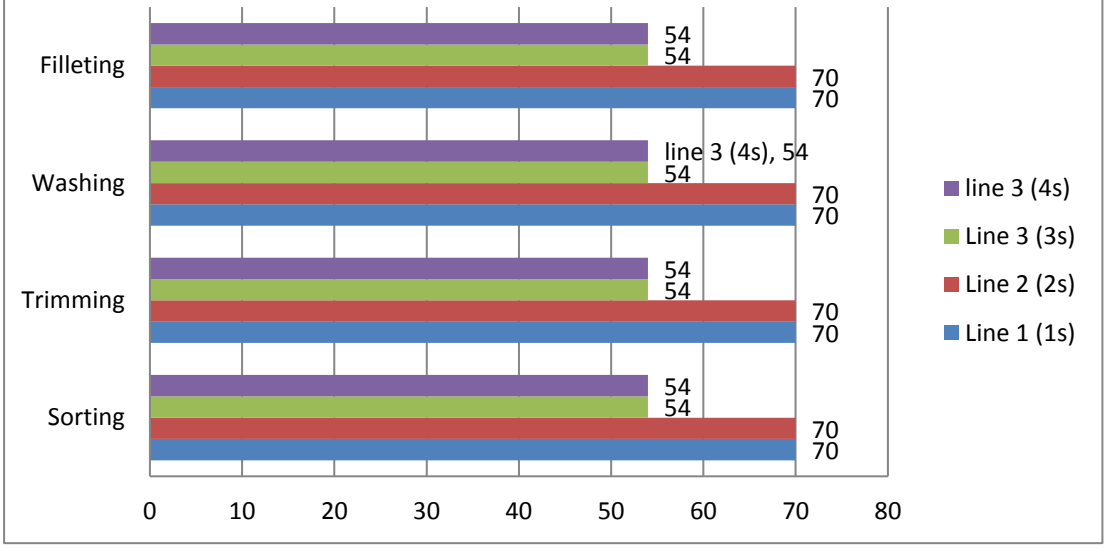
- Employee a qualified and experienced filleting machine technician to repair and service the machines regularly.
- Investigate purchasing good second hand or new fillet machines to replace the old ones gradually.

Flexibility

- Modify/adapt all filleting machines to provide capability of filleting any size fish if and when required **(Flexible resources in lean).**
- Investigate and implement quick set- up times on all machines when changing sizes. **(Quick setups in lean)**

6.2.3 Process

Chart 6.1: Proposed balanced lines



(Author's own work, 2016)

Calculation of volume output based on proposed process as follows-

See detailed illustrations in Annexure C.

- Line 1: 70 fillets= 35 units/minute x 0.245kgs x 60 minutes x 8.25 hours= **4,245kgs**

- Line 2: 70 fillets= 35 units/minute x 0.355kgs x 60 minutes x 8.25 hours= **6,150kgs**

- Line 3: 54 fillets= 27 units/minute x 0.520kgs x 60 minutes x 8.25 hours= **6,950kgs**

Total volume output of the 3 lines: proposed process = **17,345kgs**

Total volume output of the 3 lines: existing process = **13, 739kgs**

Difference= 3,606kgs = 26% improvement.

6.3 CONCLUSIONS

Process efficiency improvement literature emphasises the importance of continuous improvement and its direct influence on sustainability and competitiveness. It is said that for organisations to withstand current global competition they have to enhance their processes and product features. Seavuna is no exemption to global competition and therefore must implement process improvement techniques that are relevant to its environment. Based on Seavuna's current process output challenges as revealed by both the empirical and time studies, it is recommended that the company implements lean to correct the situation and also to move the company towards a continuous improvement mode. Lean can be implemented without a huge financial commitment from the company and is easier to implement. A lean expert should be contracted to lay the foundation and a lean champion appointed from within the organisation, preferably a senior manager who has the ear of the Chief executive officer and is trusted by staff and their union.

Most productivity improvement interventions fail due to poor implementation. It is for this reason that this study recommends the use of strategic quality planning. This approach ensures that resources required to successfully implement an intervention are made available and that realistic deadlines

are set. However strategic quality planning requires a clear business strategy to be in place before it can be used to link process and quality improvement interventions. Therefore, Seavuna fishing needs to craft a business strategy and relevant organisational culture and mission to support the strategy. Senior management will need to ensure that the strategy filters to the lower levels of the organisation and that employees are actively involved in the entire process at their relevant levels. Staff will have to be trained and retrained and rewards need to be aligned to lean implementation and success. Effective performance metrics should be developed and implemented while monitoring of performance metrics needs to be consistent and continuous and the results used to correct and reward staff accordingly.

According to Deming, process and quality improvements take time to realise real benefits and require the necessary supporting resources to flourish. Therefore, Seavuna should ensure that sufficient and appropriate resources are made available to support Lean and equally that realistic completion time lines are set.

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6.4 RECOMMENDATIONS FOR FURTHER RESEARCH

This study only focused on the filleting lines and not the entire fresh fish processing unit at Seavuna, though it was evident through quick observations that the other areas equally required efficiency improvement. The packing lines as well as the freezing area will require a full investigation to ascertain the effectiveness of the processes currently employed.

It is also advisable that a study is done to ascertain a specific process improvement approach that would be effective in improving the manufacturing processes at Seavuna fishing company.

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LIST OF TABLES

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ANNEXURE A: QUESTIONNAIRE

TITLE OF STUDY

Executing a process enhancement intervention on the hake filleting lines at SeaVuna Fishing Company.

A: DEMOGRAPHICAL INFORMATION

Please mark the appropriate box with an "X"

Gender	Male	Female

Age	20-29 years	30-39 years	40-49 years	50 yrs & above

Marital status	Single	Cohabitate	Married	Divorce/widow

Ethnicity	African	Coloured	Asian	White

Section	Filleting	Packing	Freezers

Position	Fish worker-permanent	Fish worker-casual	Process controller	Supervisor

Years of Service	1-5 years	6-10 years	11- 19 years	20 yrs & more

B: COMMUNICATION

Please give your response for each item below by marking/circling the most appropriate option on the scale ranging from 1 - Strongly disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly agree.

	Communication and Goal alignment	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	The contribution of my department in the organisation is clear and well understood	1	2	3	4	5
2	Expectations of my contribution to the department are clear and understood	1	2	3	4	5

3	Goals and performance indicators are well defined and communicated.	1	2	3	4	5
4	Management communicates my performance regularly with me.	1	2	3	4	5
5	My supervisor informs me about the plan for the day at the start of my shift.	1	2	3	4	5
6	My supervisor informs me of any changes to the plan during the shift.	1	2	3	4	5
7	Roles and responsibilities are clearly explained	1	2	3	4	5
8	Quality standards of my area of work are clear and well understood.	1	2	3	4	5
9	The company's vision and mission are explained to us.	1	2	3	4	5
10	A team meeting is held every morning with our supervisor to discuss issues pertaining to the team's performance and other burning issues.	1	2	3	4	5

C: LEADERSHIP AND MANAGEMENT STYLE PREFERENCES

Please indicate the management style of your Supervisor/Manager using the scale 1 to 5.

	Leadership style aspects	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
	My Supervisor:					
1	Respects me and my team mates.	1	2	3	4	5
2	Consults with staff before making a decision.	1	2	3	4	5
3	Treats staff as individuals.	1	2	3	4	5
4	Recognises staff's accomplishments.	1	2	3	4	5
5	Listens to staff and treats them equally /fairly.	1	2	3	4	5
6	Involves staff in decision making and encourages participation.	1	2	3	4	5
7	Asks for my inputs or suggestions.	1	2	3	4	5

8	Creates a fun environment at work.	1	2	3	4	5
9	Is my role model.	1	2	3	4	5
10	Motivates me to achieve higher goals.	1	2	3	4	5

D. MOTIVATION

Please indicate to what extent you agree with each of the statements below using the scale 1 to 5.

	Motivation aspects	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	My supervisor keeps me motivated and encourages me to accomplish my tasks within target.	1	2	3	4	5
2	My jobs gives me satisfaction	1	2	3	4	5
3	Would gladly accept a higher position in the company.	1	2	3	4	5
4	Would be prepared to learn new tasks.	1	2	3	4	5
5	My Supervisor recognises my good performance.	1	2	3	4	5
6	Competition amongst team members serves as good motivation.	1	2	3	4	5
7	Visual display of my hourly performance serves as motivation.	1	2	3	4	5
8	My hourly performance is important.	1	2	3	4	5
9	A small token of appreciation from my supervisor would act as motivation.	1	2	3	4	5
10	Would be prepared to go the extra mile.	1	2	3	4	5

E: TRAINING AND DEVELOPMENT

Please indicate your level of competency using the scale 1 to 5.

	Training and experience aspects	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

1	Fully competent in my job.	1	2	3	4	5
2	Able to perform more than three tasks effectively on the processing line.	1	2	3	4	5
3	Would appreciate further to perform my work differently and better.	1	2	3	4	5
4	Prepared to learn news tasks.	1	2	3	4	5
5	My supervisor gives me challenging work from time to time.	1	2	3	4	5
6	Training provided by the company is sufficient.	1	2	3	4	5
7	Appreciate change if it is fully explained to me.	1	2	3	4	5
8	My job is cumbersome.	1	2	3	4	5
9	Would perform better if my job is redesigned.	1	2	3	4	5
10	Would prefer to work for a learning organisation.	1	2	3	4	5

F: PERFORMANCE ASSESSMENT

Indicate if the following Performance Assessments are prevalent in your current work area using the scale 1 to 5.

	Performance assessments aspects	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Supervisor involves me when setting my Key Performance Areas (KPA's) and targets.	1	2	3	4	5
2	KPA's and targets are clear and measurable.	1	2	3	4	5
3	My KPA's and targets are clearly explained to me.	1	2	3	4	5
4	Performance Assessments are objectively done amongst employees.	1	2	3	4	5
5	High performers are paid more.	1	2	3	4	5
6	High performers are rewarded.	1	2	3	4	5
7	Good performance is acknowledged by supervisors and senior management.	1	2	3	4	5
8	Promotions are based on good performance.	1	2	3	4	5

9	Poor performers are reprimanded /disciplined.	1	2	3	4	5
10	Further training and assistance is provided to poor performers.	1	2	3	4	5

G. PRODUCTIVITY IMPROVEMENT

Please indicate to what extent you agree with each of the statements below using the scale 1 to 5.

	Productivity aspects	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	Understand what productivity means.	1	2	3	4	5
2	Productivity is important to me.	1	2	3	4	5
3	Have been exposed to a productivity improvement project before.	1	2	3	4	5
4	Our processing line is performing very well.	1	2	3	4	5
5	Would be interested in productivity improvement.	1	2	3	4	5
6	Would prefer to work for a processing line that consistently meets its productivity targets.	1	2	3	4	5
7	We are always trying to eliminate waste on our line.	1	2	3	4	5
8	A productivity bonus for good performance will entice me to perform better.	1	2	3	4	5
9	Good leadership would entice me to perform better.	1	2	3	4	5
10	Senior management involvement is important to me.	1	2	3	4	5

H. MACHINERY, EQUIPMENT AND TOOLS PERFORMANCE

Please indicate to what extent you agree with each of the statements below using the scale 1 to 5.

	Machinery and equipment performance aspects	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	The filleting machines are always running at standard speed.	1	2	3	4	5
2	The filleting machines are reliable [very few breakdowns and stoppages].	1	2	3	4	5
3	The filleting machines cut good quality fillets always.	1	2	3	4	5
4	The maintenance team responds quickly to mechanical breakdowns as they arise.	1	2	3	4	5
5	The maintenance team is competent in resolving filleting machine problems.	1	2	3	4	5
6	The poor quality of the machines is negatively affecting our productivity.	1	2	3	4	5
7	The knives we use to trim the fish are of poor standard/quality.	1	2	3	4	5
8	Poor quality fish affects our performance.	1	2	3	4	5
9	An effective planned maintenance system for filleting machines does exist.	1	2	3	4	5
10	Filleting machine utilisation is effective.	1	2	3	4	5

I. MY WORK ENVIRONMENT

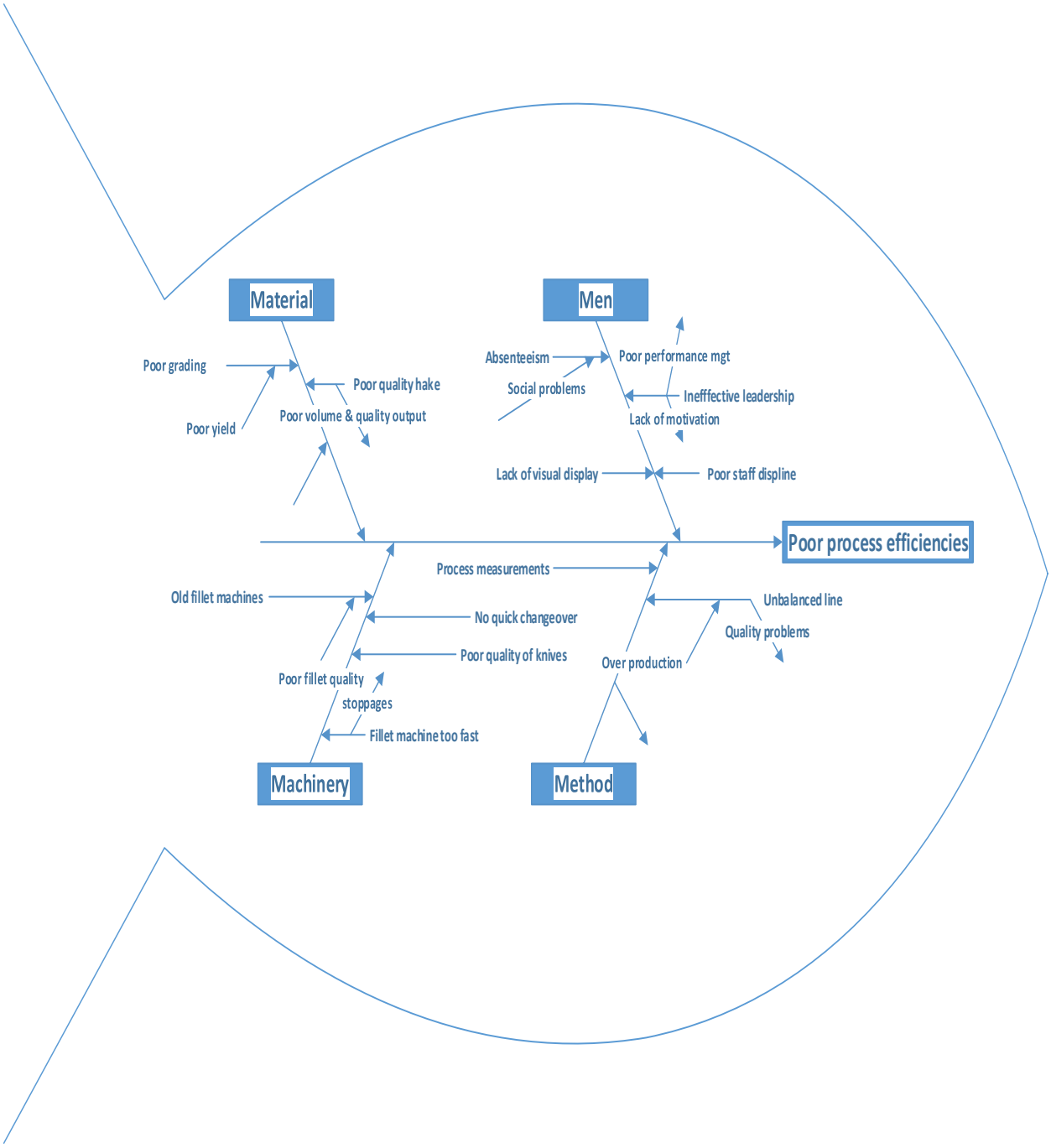
Please indicate to what extent you agree with each of the statements below using the scale 1 to 5.

	Aspects of my current work environment	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1	There is sufficient light in my work	1	2	3	4	5

	environment.					
2	There is sufficient ventilation.	1	2	3	4	5
3	My work entire environment is satisfactory	1	2	3	4	5
4	Have to walk far to collect work materials.	1	2	3	4	5
5	Protective clothing is of good standard.	1	2	3	4	5
6	The tools we use are effective.	1	2	3	4	5
7	There is too much wastage of water.	1	2	3	4	5
8	The equipment we use is outdated.	1	2	3	4	5
9	Comfort breaks are sufficient	1	2	3	4	5
10	Standing for too long is exhausting	1	2	3	4	5

(Source: Question design adapted from Stevenson, 2009; Kruger et al, 2006; Kanawaty, 1992 and Werner et al, 2013).

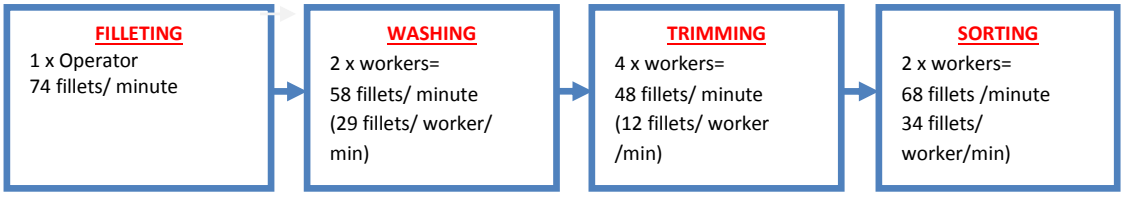
ANNEXURE B: CAUSE AND EFFECT ANALYSIS



(Source: Authors own work, adopted from fish diagram developed by Ishikawa)

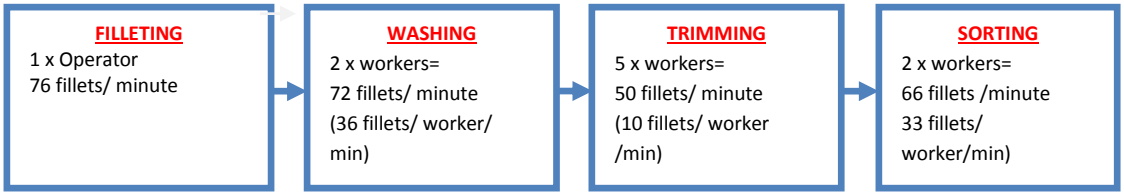
ANNEXURE C: Volume output of the current and proposed processes

Line 1: Current flow & volume output of existing unbalanced process



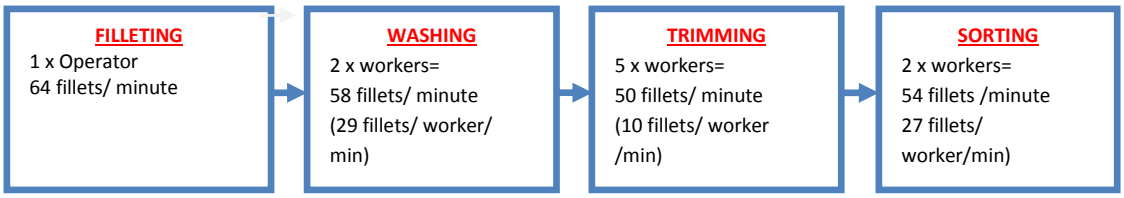
74 fillets produced per min. 58 fillets washed per min. 48 fillets trimmed per min. 68 fillets sorted per min.

Line 2: Current flow & volume output of existing unbalanced process



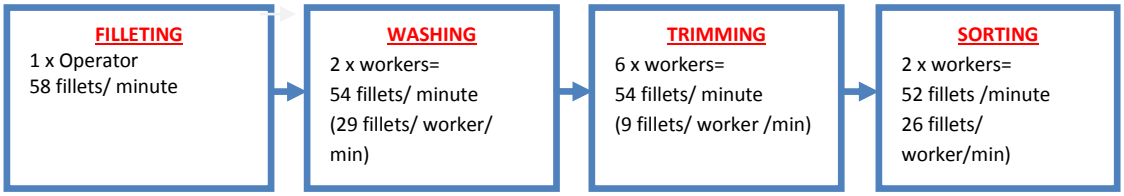
76 fillets produced per min. 72 fillets washed per min. 50 fillets trimmed per min. 66 fillets sorted per min.

Line 3: Current flow & volume output of existing unbalanced process



64 fillets produced per min. 58 fillets washed per min. 50 fillets trimmed per min. 54 fillets sorted per min.

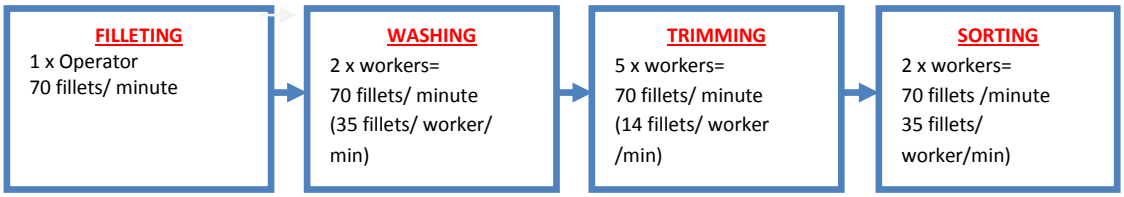
Line 4: Current flow & volume output of existing unbalanced process



58 fillets produced per min. 54 fillets washed per min. 54 fillets trimmed per min. 52 fillets sorted per min.

Volume output of each operator based on the proposed balanced process

Line 1: proposed flow & volume output



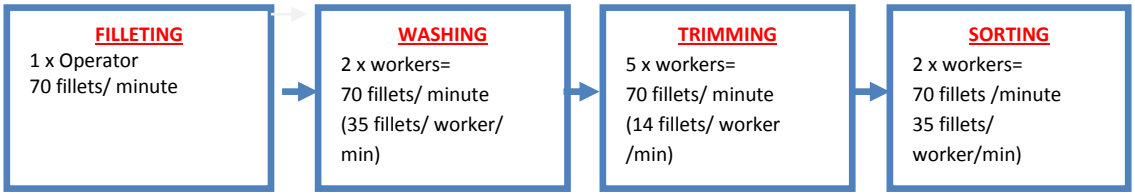
Reduce to 70 fillets produced per min.

70 fillets washed per min. **[Increase output of each Worker by 6 fillets /min]**

70 fillets trimmed per min. **[Increase by 1worker & each worker output by 2 fillets per minute]**

70 fillets sorted per min. **[Increase output of each worker by 1 fillet/ min]**

Line 2: proposed flow & volume output



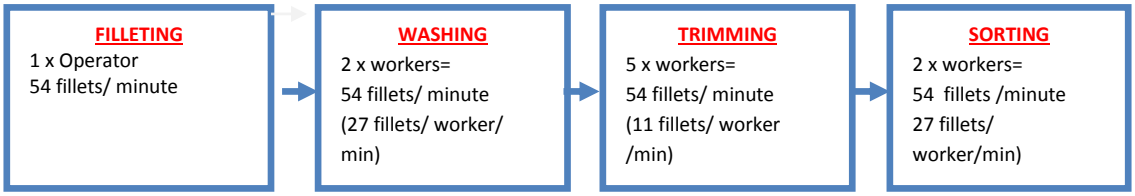
70 fillets produced per min.

70 fillets washed per min. **[current output in line] with proposed standard]**

70 fillets trimmed per min. **[Increase output of each worker by 4 fillets per minute]**

70 fillets sorted per min. **[Increase output of each worker by 2 fillets per minute]**

Line 3: proposed flow & volume output



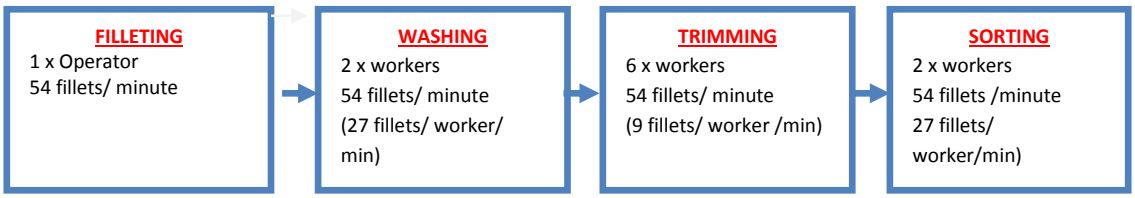
Reduce to 54 fillets produced per min.

54 fillets washed per min. **[Current output in line with proposed standard]**

54 fillets trimmed per min. **[Increase output of each worker by 1 fillet per minute]**

54 fillets sorted per min. **[Current output in line] with proposed standard]**

Line 4: proposed flow & volume output



54 fillets produced per min.	54 fillets washed per min. **[Current output in line with proposed standard]**	54 fillets trimmed per min. **[Current output in line] with proposed standard]**	54 fillets sorted per min. **[Increase output each worker by 1 fillet per minute]**

NB: Increasing individual efficiencies on the lines requires effective supervision of staff, which must include monitoring/measuring how well they are achieving the standards. This should happen during processing and not after. Supervisors should be issued with stop watches to enable them measure individual performances frequently to ensure adherence to output standards.