THE IMPACT OF MANAGEMENT PRACTICES ON PRODUCTIVITY IN THE ERITREAN FISHING INDUSTRY

by

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DECLARATION

I, Kibrom Shumdehan Ghebrit declare that the study on "The impact of management practices on productivity in the Eritrean fisheries industry" was concluded by me. I also compiled this research report and all the sources used or cited are acknowledged by means of a complete reference:

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Kibrom Shumdehan Ghebrit

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ABSTRACT

In today's highly competitive business environment where survival of the fittest is considered the norm, business managers are increasingly striving to attain a position of competitive advantage in order to excel their competitors by effectively and efficiently utilising their resources. A better management practice at all levels of an organisation is a method that is increasingly accepted as a single best way to improve productivity. Improved productivity enables firms to meet all their business obligations to employees, suppliers, stakeholders and the government and to still remain competitive. To take advantage of the benefits to be realised from improved productivity, managers are expected to deal thoughtfully with their internal and external business environment. Thus, unless they understand the effects of their actions on their companies' performances, all their day to day actions might end up counterproductive.

The objective of this study was to determine the degree of application of certain management practices in the private companies of the Eritrean fisheries industry and to investigate whether a relationship exists between the management practices and total factor productivity. In doing so, six internal management practices were identified and examined in connection to their impacts on total factor productivity in the private companies operating in the Eritrean fisheries industry. The management practices identified are productivity measurement, employee training and participation, organisational communication, customer focus, product quality and leadership and competitive environment. In 2003, the industry consisted total of 12 companies of which eight were surveyed in this study. Through detailed examination of the primary and secondary empirical data collected, first, the companies were classified into two major groups as being the High and the Low - total factor productivity companies. Following the classification, whether the degree of application of the identified management practices by each company has an impact on the total factor productivity was examined. Data analysis was based on both descriptive and inferential statistics. The ITEMAN and

SAS computer software packages were used to analyse the survey responses of the 41 participating managers.

The hypotheses were tested through a mean difference method and the Mann-Whitney *U* test statistics was utilised to analyse the significance of the differences in mean management practices (μMPs).

The results of the study confirmed that each of the six - mean internal management practices (μMPs) for groups of companies classified as HTFP companies were significantly higher than for those groups of companies classified as LTFP companies. Thus, it was concluded that a direct and positive relationship exists between management practices and TFP in the surveyed companies. Besides, the results of percentage comparison of some external factors affecting productivity between the two groups of companies also confirmed a positive relationship to productivity. Generally, it was concluded that the companies in the Eritrean fisheries industry are low productive mainly because of the prevailing low level of management practices.

The managerial implication of these findings is that the managers of the companies in the industry should give special attention to improve the identified internal management practices as they have direct impact on their performance.

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1.1 Introduction

The role of productivity in increasing national welfare is now universally recognised. In every country, industry or organisation, the main source of economic growth is as a result of an increase in productivity. Inversely, slowing down in productivity improvement is accompanied by slackened growth, stagnation and decline. Thus, throughout history productivity is a subject that has been discussed for many years by politicians, economists, management and the media, though most of them having little understanding of its meaning or measurement.

Measuring and analysis of productivity related performance of an organisation is an ever-increasing issue for firms that are concerned with gaining a competitive edge. Given the fact that productivity is an essential ingredient for competitive advantage, understanding and implementing of an appropriate productivity measurement system is a required management tool in evaluating and monitoring the performance of a business operation. Productivity is, therefore, a major concern in today's business organisations, which enable them to survive and be profitable. Hence, in view of the growing need for the benefits to be realised from productivity improvement, managers should familiarise themselves with productivity and its measurement.

In their day to day activities, managers make many vital decisions related to capital, material, as well as human resources in an effort to achieve company objectives. However, the impact of each of their actions on productivity should be understood and taken into consideration when planning and implementing productivity programmes. Effective productivity management requires considerable time, energy, and commitment.
To sustain and be successful in today's highly competitive marketplace, the companies operating in the Eritrean fishing industry are expected to increase their productivity.

While this is an acceptable fact of business life, the means of doing so are far from easy. The means by which individual managers can achieve productivity through proper management practices are not obvious.

This study focuses on some selected management practices and their impact on total factor productivity. In this study, management practices that are considered to have significant influence on the productivity of the companies operating in the Eritrean fishing industry will be identified and analysed. These management practices include productivity measurement, employee training and participation, organisational communication, customer focus, product quality, and leadership and competitive environment.

It is imperative that one must always keep in mind, that productivity or an increase of productivity is not the final aim of a firm's operation. Rather, it is a way of striving for profitable action in a firm or an industry. Therefore, the researcher believes that aiming at improving productivity through the adoption of proper management practices is a strategic tool for achieving competitiveness and profitability. Thus, it is the belief of the researcher that acquiring the knowledge of how these managerial practices affect (if any) the total factor productivity (TFP) is vital for those managers in the Eritrean fishing industry to help them make informed-decisions.

To do so, both a literature and an empirical study were conducted. The literature study consists of the various productivity concepts and the relevant management practices laid-down by various productivity management professionals and general management practitioners. The resources from the literature review will be used as a base to analyse the current management practices on those companies. An empirical study will be conducted to analyse and determine the total factor productivity indexes for these firms. Furthermore, a statistical analysis will be conducted to analyse the relationship that might exist between the elements of management practices examined and the total factor productivity of those surveyed companies in the Eritrean fishing industry. Finally, the study will draw conclusions and recommendations.

1.2 Background to the study

It is understood that in today's highly competitive markets where survival of the fittest is considered the norm, business managers seek tools and new strategies, which allow them to stay one step ahead of their competitors. Thus, a number of industries in the global business, primarily manufacturing enterprises have introduced new methods and techniques to shift traditional paradigms in order to improve their performance. One of which is introducing a productivity measurement technique against which they monitor their productivity performance compared to the whole industry, within the various departments of the same company, and even individual productivities.

Van Loggerenberg and Cucchiaro (1982) state that the overall purpose of productivity analysis is to improve business operations and competitive position in order to serve the longer-term goals of improving profitability and, ultimately, shareholder's value in the firm. Yet many productivity improvement efforts are not supported by sound productivity measurement to track their bottom-line impacts.

Prokopenko (1987:6) explains the importance of productivity from both macro and micro point of views. At a macro level, growth in productivity have been recognised to be the major influence on many social and economic phenomena, including rapid economic growth, higher standard of living, improvement in a nation's balance of payments, inflation control, and even on the amount and quality of leisure. Similarly, at a micro level, improvement in productivity by each individual enterprise is necessary for it to remain competitive and to improve its profitability. Productivity is, therefore, one of the key factors affecting profitability and overall competitiveness of a firm. Improved productivity would result in higher wages to labour, more jobs and incremental gains in the standard of living; greater profits for management through greater output at reduced costs; and lower prices to consumers. Hence, improving productivity is not only vital for firms, but it is also vital to a whole nation.

Thus, the importance of productivity as a driver of competitive advantage in both local and global markets has forced firms all over the world to concentrate more than ever before on the improvement of their overall competitiveness.

Eritrea, a country of some 125,000 Km^2, is situated in the North - Eastern part of the African continent. Attributed to its strategic location in the Red Sea, the nation has passed through long chains of colonisation. After a protracted struggle extending over three decades, however, Eritrea gained its independence in May 1991. In the first seven years of independence Eritrea's economy was growing at an average rate of 7-8% annually. Unfortunately, the country went into a bloody border war with its neighbouring Ethiopia from 1998 – 2000. The recent war has affected the socio-economic situation of the country badly.

Considering that the Eritrean fishing industry, like other sectors of the economy, suffered immensely from population dislocations and loss of productive capacity during the period of war for independence and the mismanagement under the previous regime, it may even be the case that the fish stocks have grown. According to the studies conducted by the United Nations for food and agriculture organisation (FAO) (1992), the waters of the Red Sea are highly productive and they support substantial population of diverse marine species, with around 1,000 known species of fish and 220 species of coral. The FAO study further reveals that for a sustainable fishing industry, it estimates an annual fish harvest potential of 70,000-80,000 tonnes.

The Eritrean fishing industry is, therefore, potentially one of the major contributors to the Eritrean economy. Given the fact that the importance of productivity improvement as a source of competitive advantage in both local and global markets has increased, it is no surprise for the companies in the Eritrean fishing industry to strive for productivity improvement.

Although slowly, in an endeavour to invigorate the fishing sector as a whole the Eritrean Ministry of Fisheries (MoF) is working towards improving the fishing output. To do so,

some major actions have been taken over the past few years of independence. For instance, the privatisation process is underway, traditional fishermen have been organised in co-operatives and companies with modern fishing boats have been introduced. Besides, various companies whose activities are related to boat-building, Ice-making and fish processing have also been established. In spite of all the above-mentioned investment initiatives to enhance the fishing productivity, however, there are other obvious challenges (related to the human factors) that need to be overcome by the industry players. Among others, lack of appropriate management experience and skills, lack of employee involvement, low employee satisfaction levels, and low supply of fish to consumers (consumer dissatisfaction) are a few examples.

To the best knowledge of the researcher, no studies have been conducted as yet to investigate the impact of these soft-factors (i.e., management practices) on productivity in the Eritrean fishing industry. Thus, it triggered research interest in the area of management practices and productivity.

This analytical research aims to determine the degree to which the companies in the Eritrean fishing industry adopt appropriate management practices. It also aims to identify if a link exists between these management practices and the total factor productivity in these companies. In accomplishing these aims, this study attempts to:

1. Determine Total Factor Productivity (TFP) indicators (indexes) in these companies during the period (1998 – 2002).

2. Examine if any of the following selected management practices are employed properly in the companies operating in the Eritrean fishing industry:

    - Productivity measurement
    - Employee training and participation
    - Organisational communication
    - Customer focus

- Product quality
- Leadership and competitive environment

3. Determine the degree of association between the selected management practices (MPs) and TFP in these companies.

1.3 Statement of the problem

Cooper and Schindler (1998:91) state that problems too broadly defined cannot be addressed adequately in one study. Thus, the researcher has decided to specify and limit the statement of the problem to the following:

The productivity of the companies operating in the Eritrean fishing industry is negatively affected by their poor management practices.

Following from the broad research problem, this study aims to answer the following specific research questions and sub-questions:

1. Do the companies in the Eritrean fishing industry (EFI) adopt the selected managerial principles in their operations properly?

   1-1 Do these companies employ productivity measurement standards in evaluating their performance?

   1-2 Do these companies encourage the employees to participate in corporate decision-making?

   1-3 Do these companies provide employees with regular training programs and motivate them to reach their highest potential?

   1-4 Is there an active and proper organisational communication in these companies?

1-5 Do these companies focus on customer satisfaction?

1-6 Is there an organisational commitment to quality and its continuous improvement in these companies?

1-7 Is there appropriate leadership styles that enable these companies deal successfully in the competitive environment?

2. What are the performances in the total factor productivity (TFP) measures in these companies during the period (1998-2002)?

3. Is there a relationship between the selected management practices and TFP in these companies?

4. What are the possible benefits that these companies could generate from the strict implementation of the selected managerial practices outlined above?

1.4 Objectives of the study

As indicated above, no study has been conducted in the past to investigate the impact of the management practices on productivity in the companies operating in the Eritrean fishing industry. Therefore, the main objective of this study is to examine the management practices and to determine their links (if any) to the total factor productivity of the companies in the industry.

To achieve this objective, the study sub-objectives are outlined below under the categories: background study, empirical study, conclusions and recommendations.

1.4.1 Background Study

The background relevant to this study includes:

1. Providing a brief theoretical background on the state of the global fishing industry.

2. Providing a brief theoretical background for productivity and its importance, productivity measurement methodologies and productivity improvement.

3. Providing a brief theoretical background for the selected internal management practices and principles.

4. Providing a brief theoretical background on some selected external factors that affect productivity.

1.4.2 Empirical study

The empirical study aims to:

1. Calculate TFP indexes and determine the TFP measures in these companies during the period (1998 – 2002).

2. Determine the degree of application of the appropriate management practices in the companies of the Eritrean fishing industry.

3. Classify these companies into two groups. High–level total factor productivity (HTFP) and low-level total factor productivity (LTFP) companies based on their 2002 TFP indexes.

4. Investigate if a relationship between those selected (examined) managerial practices and total factor productivity exists in these companies.

1.4.3 Conclusions

The conclusion from the literature survey will lead to the development of certain research hypotheses which the study then has to test by way of personal interviews, questionnaires and financial analysis of the firms in the industry.
In conclusion, the objectives of this study are to determine how the theoretical background mentioned above in the background study can be applied to these companies. *(Answering all of the research questions and sub-questions listed in section 1.3).*

1.4.4 Recommendations

Implication of the study will be summarised by presenting recommendations and suggestions related to the adoption of the selected management practices and improvement of productivity in these companies, which in turn, contribute to support and develop the Eritrean fishing industry.

1.5 Research methodology

According to Cooper and Schindler (1998:130), the research design constitutes the blueprint for the collection, measurement, and analysis of data. This section contains the methodology that was followed in conducting the research and the rationale behind it.

This section covers the population of the study, variables investigated and how to measure them, survey measuring instrument, methods of data collection, and methods of data analysis. The purpose of this descriptive and analytical study is to determine the degree of application of the selected management practices in the Eritrean fishing industry. It also aims to examine the nature of the relationship (association) between the examined elements of management practices (the independent variables) and total factor productivity (the dependent variable).

1.5.1 Population of the study

The term population refers to the total number of people, objects, or events that are relevant to the research aspect being studied (Riley, *et al.* 2000:147).

The population of this study consists of all private companies operating under the Eritrean fishing industry. In 2003, the industry consisted of a total of 12 companies. However, only eight of these companies (i.e., two-thirds) were ready to participate in the study by completing the questionnaire and by allowing the researcher to access to the data/information requested in this study. In 2003, the eight surveyed companies provided jobs for over 80% (1,576) of the total employees (1,964) in the industry. The other four companies could not be included in the study because they could not supply the researcher with the necessary audited financial statements. Besides, the level and type of technology employed by the non-participating companies are more or less the same as the participating companies. Hence, the inclusion of the eight companies in this study is considered representative of the industry.

The researcher chose the Eritrean fishing industry because:

a) It is at the top of the development priorities of the government of Eritrea;
b) Its potential contribution to the national economy is significant;
c) It is the home country of the researcher and,
d) Its small size provides an excellent study coverage and outcome.

1.5.2 Variable measurement

A variable, according to Hussey and Hussey (1997:141) is an attribute of the entity, which you have chosen as your unit of analysis. In practice, the term variable is used as a synonym to the property being studied. In this context, a variable is a symbol to which numerals or values are assigned (Cooper and Schindler, 1998:40).

This study consists of two kinds of variables, independent and dependent variables. The independent variables are the selected management practices. While those core managerial policies that can make a difference are company-specific, it was attempted to

identify a generic set of management practices relevant to the Eritrean fishing industry. The investigated management practices include productivity measurement, employee training and participation, organisational communication, customer focus, product quality, leadership and competitive environment. In the questionnaire, respondents were asked to rank these variables in a priority scale according to their importance to their companies' productivity improvement. The dependent variable examined is the Total Factor Productivity index (TFP).

The following paragraphs illustrate how these variables were measured:

Independent Variables:

The independent variable is the variable that can be manipulated to predict the values of the dependent variable (Hussey and Hussey 1997:77). In this study, the independent variables are the management practices. The investigated elements of management practices were measured through a questionnaire as follows (*more details in sections 1.5.3.1 and 1.5.3.2)*:

1. **Productivity measurement (PM)**: This dimension was measured through the questions on: section performance identification, application and its relationship with company goals and mission and the type of standard implemented.

2. **Employee training and participation (EP):** This dimension was measured through the questions on: employee involvement and empowerment, training programs and decision – making participation.

3. **Organisational communication (OC)**: This dimension was measured through the questions on: instructions and procedures, communication media, and improving communication.

4. **Customer focus (CF)**: This dimension was measured through the questions on: market studies, customer satisfaction, customer expectations and customer relationships.

5. **Product quality (PQ)**: This dimension was measured through the questions on: continuous quality improvement, prevention efforts, effectiveness in resource utilisation, and development of improvement plans.

6. **Leadership and competitive environment (LC)**: This dimension was measured through the questions on industry competitiveness, impact of leadership changes and marketing strategies.

Dependent Variable*:*

The dependent variable is the variable whose values are predicted by the independent variable(s) (Hussey and Hussey, 1997:76) and (Cohen and Holliday, 1996:118). This was measured by the ratios shown below. The productivity model applied in this study is the value-added productivity, which is commonly known as the total factor productivity (TFP) (Grossman, 1993).

It is given by the following formula:

$$TFP = \frac{O}{L + C}$$

Where:

TFP = Total factor productivity

L = Labour input

C = Capital input

O = Value added output

OR

$$TFP = \frac{Gross \quad Output - (Material + Energy + Other \quad \exp enses)}{Labour + Capital}$$

Productivity is one of the variables that can only be measured indirectly. This requires measuring other variables and then calculating productivity from these other variables. TFP takes the ratio of output to labour and capital weighted by their respective prices (Grossman, 1993). To calculate TFP (value-added productivity), one needs measures of value-added output, labour input, capital input, and labour and capital prices.

The data required to calculate the total factor productivities for the companies were extracted from the annual financial statements of the participating companies for the period (1998 – 2002). In all the TFP calculations, real values (i.e., nominal values adjusted for inflation) were used. Although, there are many types of price indexes[1] used to remove the effect of inflation from productivity calculations, due to the unavailability of all the other price indexes the consumer price index (CPI) was used to change the nominal values of all inputs and outputs into their real values.

1.5.3 Measuring instrument

This research consisted of two sources of data:

1. **Secondary Data:**

   The secondary search for information and data concerning the topic are represented in the literature survey and annual financial statements of the companies in the Eritrean fishing industry. Total Factor Productivity (TFP) or the Value added productivity (Gross output minus materials and purchased services minus energy inputs) is calculated from the audited annual financial statements of the period (1998 – 2002).

2. **Primary Data:**

   Primary data was gathered through questionnaires and personal interviews. The questionnaire was developed, modified and then distributed to all personnel at the managerial levels (i.e., general managers, production managers, finance and administration heads, marketing managers, quality managers and unit supervisors) in

[1] See price index in chapter three of this study for detailed discussions on the importance and types of price indexes.

the eight companies operating in the Eritrean fishing industry. Using a five point Likert scale (i.e., 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree and 1 = strongly disagree) responding managers were asked to indicate their degree of agreement or disagreement with each statement. In addition, some dichotomy and priority rating questions were also utilised in formatting the questionnaire.

1.5.3.1 Questionnaires

A questionnaire is a list of carefully structured questions, chosen after considerable testing, with a view to eliciting reliable responses from a chosen sample. The aim is to find out what a selected group of participants do, think or feel (Hussey and Hussey, 1997:161).

A concerted effort was made throughout the design and layout of the questionnaire, in an effort to achieve the 'common-sense rules' in questionnaire design as laid down by Hussey and Hussey (1997:165) and Riley, *et al.* (2000:96).

They strongly suggest that one has to remember the following key points while designing a questionnaire:

- Use simple and concise language.
- Each question should ask about one ' thing' only.
- Be straightforward and guard against double meaning.
- Get the question order right.
- Make the layout easy to follow.
- Give clear instructions.
- Be polite.

Questions were ordered in such a manner as to draw to a maximum upon the knowledge and experience of each respondent. Sections of questions were grouped together in order to progress through a logical flow of information.

The final questionnaire consisted of three sections (*see Appendix 1*):

Section one: Provided information about the background of the managers participating in questionnaire completion. These include the managers' highest educational level, their positions in the companies, gender and experience in years (through questions 1-7).

***Section two*:** This section has eight parts. These parts provide information about factors which the company management has direct control over.

Part one:	Managers were asked to rank, in a priority scale, the management practices in relation to their section/ company priorities.	(Q. 8a - h).
***Part two*:**	Provided information on productivity measurement:	(Q. 9 - 14).
***Part three*:**	Provided information on productivity standards:	(Q. 15 - 17).
Part four:	Provided information on employee participation:	(Q. 18 - 27).
Part five:	Provided information on organisational communication:	(Q.28- 32).
Part six:	Provided information on customer focus:	(Q. 33 - 37).
Part seven:	Provided information on product quality:	(Q. 38 - 44).
Part eight:	Provided information on leadership and competitive environment:	(Q.45 - 50).

***Section three*:** Provided information about factors that are considered to be external to the management of the companies. These factors include government policies, geographical location, raw material supplies, local competition, and export markets (through questions 51-55).

1.5.3.1.1 Validity

The term "validity" denotes the scientific utility of a measuring instrument, broadly statable in terms of how well it purports to measure (Nunnally & Bernstein, 1994:83).

According to Saraph, *et al*. (1989) the validity of a measure refers to the extent to which it measures what is intended to be measured. The content validity of a measuring instrument is the extent to which it provides adequate coverage of the topic under study (Cooper and Schindler, 1998:167). In this study a concerted effort was made to make sure that the questionnaire contains a representative sample of the subject matter under study.
The validity of the questionnaire was ensured through continuous discussions with the researcher's study supervisor. Based on the study leader's comments and guidance, the format of the questionnaire was modified, some items were deleted, others expanded, and still others added.

Item analysis:

Although content validity primarily rests on rational rather than empirical grounds, an item analysis is extremely useful since it furnishes a variety of statistical data (i.e., proportions, percentages, item-total correlations, mean, standard deviation, reliability, median etc.) regarding how subjects responded to each item and how each item relates to overall performance (Nunnally and Bernstein, 1994:301). According to Saraph, *et al*. (1989) an item analysis considers the correlation of each item with each scale. Specifically, the item-score to item-score correlations are used to determine if an item belongs to the scale as assigned, belongs to some other scale, or if it should be eliminated.
An item analysis test using - ITEMAN Conventional Item Analysis Program Version 3.6- , a statistical computer software of the University of Pretoria was utilised to further refine the validity of the questionnaire statements. According to Riley, *et al*. (2000:123) a statement is valid if it is strongly related to all the other statements (the groupness principle). The relatedness between the statements is represented mathematically by the concept of correlation *r (Pearson product-moment correlation)*. If items do not reach a level of $r = +0.30$ they are normally rejected from the pool (Riley, *et al*., 2000:124). Accordingly, the final analysis of the questionnaire included only those items whose result was above the correlation $r = +0.30$. Pearsons correlation of the variables is attached in *Appendix 4*.
The final product (*Appendix 1*) was hand-delivered to 41 managers in the eight companies of the Eritrean fishing industry.

1.5.3.2 Personal interviews

Personal interviews were conducted to collect more insight information, about the practical application of the selected management practices and productivity measurement, from the top-level managers (mainly general managers) of the participating companies.

1.5.4 Methods of data collection

Here, both quantitative and qualitative data were collected and analysed in order to investigate the relationship between management practices (MPs) and total factor productivity (TFP).

In the following sections a brief discussion of the methodology utilised in undertaking the data collection phase will be presented.

1.5.4.1 Questionnaire distribution

The steps followed in distributing the questionnaires were:

1. Prior to the departure from South Africa, the researcher had contacted via e-mail the minister of ministry of fisheries of Eritrea and the head of the human resources development program (HRDP) of the University of Asmara, in Eritrea, in order to secure full co-operation from the respected companies during the data collection stage. After a positive reply from both parties, the researcher went to Eritrea to collect the needed information/data.

2. All department heads, section heads or supervisors (i.e., production, quality, marketing, finance, purchasing, technicians, and administration heads) in the twelve companies were initially phoned to seek their participation in the study. The four companies had some internal problems and showed their reluctance to participate in the study. The 41 managers of the eight companies agreed to participate in the completion of the questionnaire.

3. The questionnaires were prepared in the English language since the responding persons are medium and top level managers having appropriate qualifications, which enable them to understand questionnaires written in the English language. Explanation and interpretation of the questions was also given to some managers where necessary. About 70 % of the managers who have filled the questionnaires have obtained either a Bachelor degree or College diploma (41.46 % and 29.27 % respectively). This indicates that language was not a problem.

4. The questionnaires were distributed to the 41 (medium and top-level) managers of the eight participating companies (five questionnaires on the average for each company, but one). The questionnaires were delivered by hand, and left with the managers for a few days so that they could have enough days to fill them out. All of the distributed questionnaires were collected by hand. (41 questionnaires).

5. Immediate contacts were made with respondents where there were some incomplete questionnaires.

1.5.4.2 Personal interviews

All of the interview questions were asked in *Tigrigna* (local Eritrean language), with the answers mainly given in *Tigrigna*. The feedback from each interview was reviewed immediately on the completion of each interview.

1.5.4.3 Total factor productivity (TFP)

Total factor productivity (TFP) which is Gross output minus all outside purchases divided by labour and capital inputs for the eight participating companies were calculated from the audited annual financial statements for the years (1998 – 2002). To remove the effect of inflation, TFP measurements for the years (1998 – 2002) were adjusted by the consumer price index (CPI) (1998 = 100) which is provided by the National Bank of Eritrea (NBE) for these periods.

1.5.5 Methods of data analysis

A measure is reliable to the degree that it supplies consistent results. Reliability is concerned with estimates of the degree to which a measurement is free of random or unstable error (Cooper and Schindler 1998:171). At the heart of all 'methods' of calculating reliability lies the relationship between the number of items in the survey and the strength of the correlation between them (Riley, *et al*., 2000:126). If the item statements are poorly designed and the attitude in question not clearly defined in the mind of the researcher then the outcome will be an unreliable test. To the degree that items are independent measures of the same concepts, they will be correlated with one another.

The Kuder-Richardson Formula 20 (KR20) and Cronbach's Coefficient Alpha are the two frequently used inter-item consistency reliability measures (Cooper and Schindler, 1998:173). The internal consistency of a set of measurement items refers to the degree to which items in the set are homogeneous. Cronbach's alpha (α) is computed for a scale based on a given set of items (Saraph, *et al.,* 1989). Alpha Coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (i.e., 5 = strongly agree, 1 = strongly disagree). The higher the score, the more reliable the generated scale is (Reynaldo and Santos, 1999).
The reliability of the questionnaire was tested according to Cronbach's Coefficient Alpha measurements. Reliabilities less than 60% are generally considered to be poor, those in the 70% range, to be acceptable, and those over 80% to be good. The closer the reliability Coefficient gets to 100% the better.

The Reliability Coefficient Alpha (α) of each of the internal management practices is shown in *Table 1.1*.

Table 1.1-Reliability Coefficients.

Management Practices	Alpha (α)
Productivity measurement (PM)	87.70%
Employee training and participation (EP)	88.50%
Organisational communication (OC)	81.70%
Customer focus (CF)	84.60%
Product quality (PQ)	90.20%
Leadership and competitive environment (LC)	68.80%

The reliability coefficient alpha for the five management practices range between 81.70% to 90.20%, which is good, and 68.80% for one element which is still acceptable. These values indicate that the reliability of the questionnaire is high.

Based on careful calculations of the total factor productivity index (TFP), the eight participating companies were classified into two groups namely: those with high TFP and those with low TFP. A company with a productivity index number of ≥ 100 is considered high TFP company and those with a productivity index of < 100 are considered as low TFP companies. The total factor productivity (TFP) indexes of the companies for the period (1998 – 2002) was calculated based on the companies' audited annual financial statements. However, since the research was conducted in 2003, the TFP index for the year 2002 was considered as the most relevant index for the purpose of this study. Considering, the current unstable nature of the companies' management styles, it was decided that the responses from the managers can only be representative to the most recent years' productivity performance. Hence, the 2002 TFP index was used as the base for classifying the two groups.

Through systematic analysis of survey responses, using the SAS Statistical computer software, the means of the individual elements of management practices (μMPs) of the eight participating companies were calculated.

For example, the mean responses to customer focus (CF) for each company were calculated and investigated as follows:

1. Determine the mean values of the responses of each respondent to the five questions (V44 – V48) related to customer focus (CF).

2. Sum all the individual customer focus means and divide the sum total by the number of respondents in that particular company to determine an overall company CF mean.

3. To find the eight companies' CF mean, all the individual respondents' CF means were added and divided by 41(total respondents) to arrive at the participating companies CF mean.

4. To compare the means of the high and low total factor productivity companies, the average CF mean of the three HTFP companies was compared with the average CF mean of the five LTFP companies.

In the same way, the means of each of the management practices for every company were calculated. The overall internal management practices were calculated based on the internal management questions of the questionnaire attached as an *Appendix 1* at the end of this study. (See *Appendixes 5 and 6* for detailed calculations).

1.5.5.1 Descriptive and inferential statistics

Statistics texts commonly draw a distinction between descriptive statistics, which is used to summarise or display quantitative data and inferential statistics, which involves using quantitative data collected from a sample to draw conclusions about a complete population (Hussey and Hussey, 1997:187). The former involves the calculation of averages, frequencies, standard deviations, sum totals, minimum and maximum values.

On the other hand, the latter involves conducting t-tests, factor analysis and regression analysis (Cooper and Schindler, 1998:427).

In this study both methods are utilised. Data analysis was based on descriptive statistics (frequencies and means) and inferential statistics (Mann -Whitney and *U*-test). Hypotheses were tested using comparison of means ($\Delta\mu$) and significance of the *P*- value. A hypothesis is an idea or proposition which can be tested for association or causality by deducing logical consequences which can be tested against empirical evidence (Hussey and Hussey, 1997:10). The relationship between total factor productivity (TFP) and management practices (MPs) was tested by comparing the mean of management practices for companies with high TFP with the mean management practices of companies with low TFP indexes.

For example:

1-1. H_O**:** There is no statistically significant relationship between customer focus (CF) and company's total factor productivity (TFP) in the companies of the Eritrean fishing industry.

1-2. H_1**:** There is a statistically significant relationship between customer focus (CF) and company's total factor productivity (TFP) in the companies of the Eritrean fishing industry.

This hypothesis was tested by comparing the mean of management practices related to customer focus (μCF) for companies with high total factor productivity indexes (HTFP), with the mean of customer focus practices (μCF) for companies with low total factor productivity indexes (LTFP). Because of the nature of the above null hypothesis (i.e., no specific direction of relationship), a two-tailed test will be used.

Based on the significance of the difference in means, the results will be interpreted as one of the two possible answers, i.e., either:

a) The null hypothesis (H_O) will be rejected if the mean of customer focus practices (μCF) of companies with HTFP ***is not equal to*** the mean of customer focus practices (μCF) of companies with LTFP, which means there is a relationship between customer focus (CF) and TFP.

b) The relationship is ***positive*** if μCF for HTFP > μCF for LTFP or ***negative*** if μCF for HTFP < μCF for LTFP.

The results of a statistical test enable the researcher to state whether or not they believe the null hypothesis to be true and whether or not they believe a null hypothesis to be true with a given level of confidence or significance value (Riley, et al., 2000:200).
The significance of the *P* - value was used to determine the strength of the relationship between the selected elements of management practices (independent variables) and the TFP (which is the dependent variable). For example, there is a statistically significant relationship if the significance of *P*- value is ≤ 0.05 (Cooper and Schindler, 1998:475) and (Hussey and Hussey, 1997:223).

1.6 Scope of the study

In this study, the focus was on gathering information on how to measure the impact of key management practices on total factor productivity for the firms operating in the Eritrean fishing industry. Under this, an extensive literature survey on the background and relevance of the concept of productivity and management practices was undertaken.

In case of the literature review, the information contained is a summary of researches and books. The opinions, expressions and recommendations given are from the authors and researchers presented in the reference. Thus, the issue concerning productivity measurement and management practices is limited to the data sources listed in the reference sections.

1.7 Contribution of the study

This study contributes to the literature by attempting to satisfy the clear need for an analytical study that examines certain identified elements of management practices and then links them with total factor productivity using appropriate statistical methods.
The research adds to the literature by developing a framework, which shows the link between the selected management practices and TFP.

The information will be helpful to those companies in particular and the Eritrean fishing industry in general to create and design, and maintain appropriate productivity measures as a best means for tracking their progress. Once the system is put in place it will help the practitioners to identify, by means of indexes, those areas within the company that have potential improvement possibilities.

Interested investors who seek productivity indexes (in the form of a company, an industry, sector or even at national levels) as their major sources of decision-making can benefit from this study. Developing and maintaining productivity measurement system that considers the impact of managerial policies along with the financial performances could be used effectively as a tool for those bodies concerned.

Besides, it may be helpful as a base for developing the national fisheries industry productivity index so that progress could be compared against other sectors and the same sector of other nations. Other contributions include, giving ideas for further research suggested by that involved in this study.

1.8 Organisation of the study

This dissertation consists of six chapters. The main structure for each chapter is as follows:

Chapter - 1: Includes introduction and importance of the study, statement of the problem, objectives of the study, the research methodology pursuit in undertaking the research, including population of the study, variables and how to measure them, measuring instrument, methods of data collection, methods of data analysis, contribution of the study, the scope of the study and chapter summary.

Chapter – 2: Introduces brief theoretical background about the state of the global fishing industry in general and the case of the South African and Eritrean fishing management in particular.

Chapter – 3: Provides theoretical background of the study, which includes brief discussions of the importance of productivity and types of productivity measurement.

Chapter - 4: Provides a brief discussion on the examined management practices, including the examined internal management practices and some external factors that affect productivity. It also summarises some previous studies on management practices and performance.

Chapter – 5: Provides the analysis of the data collected through the questionnaire, determines the total factor productivity of the companies during the period (1998 – 2002) and examines the significance of the relationship using the Mann-Whitney *U*- test.

Chapter – 6: Presents the conclusions and recommendations of the study. This chapter also indicates the study's contribution to the knowledge, its scope, and some suggestions for future research.

1.9 Chapter summary

The aim of this chapter was to explain the importance of the study, the statement of the problem, and objectives of the study. Accordingly, problem statements and objectives were clearly stated. A considerable portion of the chapter was devoted to clarify the methodology of the research as well as to outline the logic and methodology in undertaking the study.

The population of the study consists of all the 12 private companies operating in the Eritrean fishing industry in 2003. Only eight of the private companies participated in the study by completing questionnaires. Total factor productivity, which is computed as value-added output divided by labour and capital inputs combined, is the dependent variable. The TFP for the participating companies, for the years (1998 – 2002), were calculated from their audited annual financial statements. The selected management practices, which are the independent variables, were measured using questionnaires.

The reliability of the questionnaire was tested according to Cronbach's Coefficient Alpha (α), which indicated the reliability of the questionnaire to be high. A concerted effort was made to make sure that the content validity of the questionnaire is achieved to a higher degree. The content validity of the questionnaire was ensured through an item analysis test (item correlation *r)* and the modifications resulted from the continued discussions between the researcher and his supervisor. The Mann - Whitney significance test was utilised to test the null hypotheses of the study. A significance value of $P \leq 0.05$ indicates that there is a significant relationship between the independent and dependent variables.

CHAPTER - 2

The Fishing industry and its challenges

2.1 Introduction

There is an increasing realisation among fisheries managers that the global fisheries are in a crisis, and so are the marine ecosystems upon which these fisheries depend. Thus, major policy and management changes are required to halt and reverse the trends that have brought about this situation (Pauly and Zeller, 2003).

Since the objective of this study is to determine the relationships that exist between management practices and productivity in the companies operating in Eritrean fishing industry, this chapter is devoted to provide an overall perspective of the current fishing industry. In this chapter issues concerning the importance of the global fishing industry, the global production and utilisation trends, the major challenges facing the global fishing industry and international treaties and agreements to overcome these challenges will be briefly discussed. The case of the South African fishing industry and its challenges will also be discussed with the aim of possible learning experiences from it. Finally, the Eritrean fishing industry and its current situation, which is the subject matter of this study, will be discussed briefly.

2.2 Importance and trend of the global fishing industry

Fishing has been one of the major economic activities of human beings since ancient times. Fish are important elements of the human food supply, and fishing is an important factor in global employment (World Resources, 1998-1999). In the human diet fish accounts for roughly one fifth of all animal protein, and an estimated 950 million people rely on fish as their primary source of protein (USAID, 2003; Sierra Club, 2003; FAO, 2002). Besides being used as food for human being, fish is also increasingly demanded for use as feed. Nearly one-third of the world's wild-caught fish are "reduced" to

fishmeal and fish oil, which are then used in feeds for livestock like poultry and pigs and in feeds for farmed carnivorous fish (Delgado, *et al.*, 2003).

As a source of employment, the fishing industry, which is composed of subsistence fishers, large scale mechanised fishing vessels and everything in-between, directly or indirectly employs some 200 million people world wide (Seirra Clubs, 2003 and World Resource, 1996-97). According to the food and agriculture organisation of the United Nations (FAO) 2002 annual report, in 2000, employment in the primary capture fishing and aquaculture production sector alone was estimated to be about 35 million people.

Production of fish products is far greater than global production of poultry, beef, or pork (World Resources, 1998-1999). Fisheries products are also the world's most widely traded foods. According to the USAID (2003) report, some 37% (by quantity) of all fish for human consumption are traded across international borders. For instance, the FAO, 2002 annual report, points out that in 2000 the foreign trade of fish had amounted to US$ 55.2 billion. Net export trade from developing countries increased from US$ 10 billion in 1990 to US$ 18 billion in 2000, corresponding to a real (corrected for inflation) growth of 45 per cent.

Despite all the above important roles that the fishing sector plays, however, in comparison of other sectors of the world food economy, the fishing sector are the most poorly managed, inadequately funded, and neglected by all levels of governments (USAID, 2003). Overexploitation of wild fish stocks has risen rapidly, over the past decades, because of the expanding fish fleets, enormous advances in fishing technologies, poor understanding of fish population dynamics, failure to introduce effective management systems and increased investments in the fishing sector. Irrespective of the increases in investment and fishing capacity, fish production from wild fishing has slowed or stagnated over the past years (Delgado, *et al.*, 2003 and Anonymous, 1997). Thus, the current harvest trends and fishery conditions put all of the above important roles of the industry at risk.

New projections suggest that the contribution of fish to the global fish supply is likely to decrease in the next two decades as demand for fish increases and production decreases (World Resources, 1998-1999). As revealed by Delgaldo, *et al.* (2003), as a consequence of the rising demand and slower growing production, the real prices of most fresh and frozen fish have risen since World War II. Delgaldo, *et al.* (2003) further point out that this is in contrast to prices of most animal-origin foods, which have declined steeply over the past several decades.

This fishing threat has led to urgent calls for reforming national and international fisheries management (World Resources, 1996-97). In recent years governments have shown concerns on how to overcome these challenges. In the World Summit on Sustainable Development held in Johannesburg (2002), for instance, world leaders have acknowledged the vital role of marine fishing to economic and food security and to biodiversity in general. Leaders established a number of fisheries commitments for the world community, including a call "to maintain or restore stocks to levels that can produce maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015" (Turner, 2003).

2.3 Global fishing production

The world fish production comes from three sources (Sierra Club Fact Sheet, 2003 and World Resources, 1996-97):

1. Marine catch - Consisting of all species harvested in coastal waters or on the seas;
2. Inland catch - Consisting of all species harvested from lakes and rivers; and
3. Aquaculture - Consisting of all fish species harvested artificially from both freshwater and marine.

According to the World Resources Institute (1996-97) report, of the total global fish harvest of 101 million metric tons in 1993, for instance, 78% was caught by marine fishing fleet, 6.8% was caught inland, and 15.5% was raised artificially through Aquaculture.

The discussion below focuses on the marine catch, which is by far the most important component of the world fish harvest.

According to the United Nations Food and Agriculture Organisation (FAO) (2002) annual report, the total capture fisheries production (marine catch) in 2000 reached 94.8 million tones (*Table 2.1* below), the highest level ever. The estimated first sale value of this production amounted to some US$ 81 billion, a marginal increase over the value in 1998. Catch reports for 2001 from major fishing countries indicated that there was a marked decrease in global capture production, to about 92 million tons. The report further revealed that in 2001, there were some 99 million metric tons of fish available for direct human consumption. FAO expects demand to increase to 110 to 120 million metric tons in 2010 as world population grows (World Resources 1998-99).

Total world fishing production (which includes both marine catch and Aquaculture) has fluctuated upwardly over the 1990s and into the new millennium. Global fishing production sources (in millions metric tons) and its utilisation is presented below.

Table 2.1-World fishing production and utilisation (in millions of metric tons).

Production Category	**1996**	**1997**	**1998**	**1999**	**2000**	**2001***
Inland						
Capture	7.4	7.5	8.0	8.5	8.8	8.8
Aquaculture	15.9	17.5	18.5	20.1	21.4	22.4
Total inland	**23.3**	**25.0**	**26.5**	**28.6**	**30.2**	**31.2**
Marine						
Capture	***86.1***	***86.4***	***79.3***	***84.7***	***86.0***	***82.5***
Aquaculture	10.8	11.1	12.0	13.3	14.2	15.1
Total marine	**96.9**	**97.5**	**91.3**	**98.0**	**100.2**	**97.6**
Total capture	93.5	93.9	87.3	93.2	94.8	91.3
Total aquaculture	26.7	28.6	30.5	33.4	35.6	37.5
Total World Fisheries	**120.2**	**122.5**	**117.8**	**126.6**	**130.4**	**128.8**
Capture production as a % of tot. world production	***71.6***	***70.5***	***67.3***	***66.9***	***66.0***	***64.0***
Utilisation						
Human consumption	**88.0**	**90.8**	**92.7**	**94.4**	**96.7**	**99.4**
Non-food uses	32.2	31.7	25.1	32.2	33.7	29.4
Population (*billions*)	5.7	5.8	5.9	6.0	6.1	6.1
Per capita food fish supply (kg)	15.3	15.6	15.7	15.8	16.0	16.2

***Source**:* FAO report (2002). * Data for 2001 are provisional.

The above *Table 2.1* reveals that the level of marine capture fishing as a proportion of total world fishing production has declined since 1996. *Table 2.1* further confirms that with the harvest in the capture fishing stagnating, more and more total production increases come from Aquaculture.

In the following paragraph a brief description of each of the major Oceans in terms of their contribution to the global production of capture fish will be presented.

Table 2.2-World marine capture fishing production by Ocean *(in millions of metric tons*).

Ocean	1995 tons	1999 tons	2000 tons	Per cent
Pacific Ocean	53.3	52.9	53.8	63%
Atlantic Ocean	23.5	23.2	23.5	27%
Indian Ocean	7.8	8.5	8.6	10%
Southern Ocean	0.1	0.1	0.1	-
Total marine capture fishing production	84.7	84.7	86.0	100%

***Source*:** FAO report (2002)

As presented in the above *Table 2.2*, the Pacific Ocean ranks clearly as the most important area of capture fish production, followed by the Atlantic and Indian Oceans. The Southern Ocean, in global production terms, is insignificant. According to the FAO (2002) assessments, no likely dramatic change in the ranking of capture fishery production by Ocean over the next decade is indicated.

As indicated in *Table 2.3*, the top 10-world marine capture fishing producers have largely maintained their rankings since 1995.

From *Table 2.3*, it can be said that:

- China is ranked first, followed by Peru.
- Production by the eight other leading world producers has generally remained static or trended downwards.
- The 10 major producers account for about two thirds (64%) of total marine fishing production.

Table 2.3-The top 10-world marine capture fishing producers.

Country	1995 tons	1999 tons	2000 tons	Ranking
China	11.0	15.0	14.8	1
Peru	8.9	8.4	10.6	2
Japan	5.9	5.1	4.9	3
U.S.A.	5.2	4.7	4.7	4
Chile	7.4	5.0	4.3	5
Indonesia	2.7	3.7	3.8	6
Russian Federation	4.1	3.8	3.7	7
India	2.7	2.8	2.8	8
Thailand	2.8	2.7	2.7	9
Norway	2.5	2.6	2.7	10
Sub-total	**53.2**	**53.8**	**55.0**	-
Other countries	31.5	30.9	31.0	-
Total world marine capture	**84.7**	**84.7**	**86.0**	-
Major 10 producers as a percentage of total marine capture fishing production	**63**	**64**	**64**	-

Source: FAO report (2002)

2.3.1 Growth in the fishing industry

In the Post-World War II period, the global marine catch grew 6% per year during 1950-88, which is three times the rate of the population growth. During the period 1988-92 the global fish catch growth was 8% per year. The greatest growth came from high-volume-low-priced species lower on the aquatic food chain. Then, as these stocks started reaching their limits in the late 1980s, total marine catch began to fluctuate with the highly variable output of these and other high-volume, low-value fisheries. The global supply of fish would have stagnated with the marine catch if not for aquaculture production accelerating during this period. Aquaculture increases have averaged 2 million tons per year since 1992 (Anonymous, 2002).

2.4 The challenges of world fisheries

As expounded by the researchers of the International Food Policy Research Institute (IFPRI) Delgaldo, *et al.*(2003), a healthy natural environment is essential to maintaining fish harvest levels in the face of increasing demand. Unfortunately, fishing activities often cause large-scale damage to the aquatic environment.

As clearly indicated in the World Resources, 1998-1999 report, irrespective of the increasing attention of policy makers and industry representatives, progress towards better management of fish harvests has been slow, and the government policies and market forces behind the trend toward global overfishing remain largely in place.

The Sierra Club Fact Sheet (2003) has also revealed the fact that global fishery is experiencing a decline in the productivity of many important fish and shellfish species. It further points out that overfishing is a prime cause, though not the only cause, of decline in marine fisheries.

As revealed by the FAO report (2002) the global situation of the main marine fish stocks still follows the general decline trend observed in previous years. In general terms, as fishing pressure continuous to increase, the number of underexploited and moderately exploited fisheries resources continues to decline slightly, the number of fully exploited stocks remains relatively stable and the number of overexploited, depleted and recovering stocks is increasing slightly. According to the FAO (2002) and Doulman (2003) reports:

- An estimated 25% of the major marine fish stocks or species groups are underexploited or moderately exploited. Stocks or species groups in this category represent the main source for the potential expansion of total marine catches.

- About 47% of the main stocks or species groups are fully exploited and are therefore producing catches that have reached, or are very close to, their maximum sustainable limits. Thus, nearly half of world marine stocks offer no reasonable expectations for further expansion.

- Another 18% of stocks or species groups are reported as overexploited. Prospects for expansion or increased production from these stocks are negligible, and there is an increasing likelihood that stocks will decline further and catches will decrease, unless remedial management action is taken to reduce overfishing conditions.

- The remaining 10% stocks have become significantly depleted, or are recovering from depletion and are far less productive than they used to be.

Despite such warnings, the trend towards more overfishing observed since the early 1970s has not yet reversed (Environmental News Service, 2001).

In the following sections brief discussions of the underlying causes of the overfishing (mismanagement) of the global fishing industry will be presented.

2.4.1 Underlying causes of decline in the fishing industry

The basic problem facing to fishing at a global level is an increased ability to catch fish combined with insufficient legislation and regulation on the part of governments.
As advocated by most United Nations organisations and environmental scientists, the following seven factors are the most common factors contributing to the current decline in fishing productivity. (The first six factors are the underlying causes for overfishing whereas the last factor is the cause for the low aquatic productivity). These include:

- Open access.
- Economics.
- Fishing fleets and Overcapacity.
- Technology.
- Waste (discards).
- Subsidies for fishing industries.
- Environmental degradation.

Open access:

In most parts of the world, fish stocks have generally been considered common property open to exploitation by anyone with a boat and gear. As long as enough fish are caught to cover operating costs, there is little economic incentive to stop fishing once a vessel is built. As more fishers enter the system, greater effort is required to catch a dwindling

supply and revenues will fall. By this time fish stocks will probably be severely depleted (Sierra Club Fact Sheet, 2003).

Economics:

As discussed by Nixon (1997) and Anonymous (2003), the industrial, highly mechanised approach to fishing provides both the means and the incentive to overfish. The large capital investment in boats and gear requires a payback, which in turn creates an incentive to maximise fishing effort, leading to a "race to fish". The skipper who is first to the fishing ground with the most efficient boat and gear stands to have the best catches and the highest profit margin. As others improve their boats and gear, staying competitive requires further investment in still faster, more powerful boats, still more efficient gear and so on in a vicious cycle. Those who fish need to catch more fish to pay off their investment but as fish stocks reach their maximum yield they have to fish harder and longer to maintain even the same catch; as a result, operating costs increase and profit margins decline. Ultimately, the fishing is no longer for profit but for survival.

The expansion of world fishing fleets and Overcapacity:

Modern fishing vessels, many much larger than their older counterparts, can cross the world to distant fishing grounds, fish in deep and dangerous waters, stay at sea for months at a time, and process their catch on board. Over the past decades, the size of the industrial fleet has expanded twice as fast as the rise in catch (Sierra Club Fact Sheet, 2003). According to the FAO (2002) estimates, the world's fishing fleets have at least 30% more capacity than it needs. Overcapacity combined with powerful new technologies (discussed in the next section), results in rampant exploitation.

The world's fishing fleet is undergoing rapid change from small boats that discard a relatively small fraction of their catch to huge factory trawlers that discard a far larger portion (about 40%) of their haul (Anonymous, 1998). According to the Ocean Update report (June 1998), the global fishing fleet is continuing to increase with more vessels of larger size and greater efficiency increasing the global fleets overall capacity.

Between 1970 and 1992, for instance, the size of the world's industrial fishing fleet doubled in both total tonnage and number of vessels. By 1992, there were 3.5 million

fishing vessels (Nixon, 1997). According to the most recent FAO (2002) estimates, however, in 1998 the total world fleet engaged in fishing has reached to a high of 4.1 million vessels.

The harvesting capacity of fishing gear has also been vastly amplified by mechanical power. A trawl net hauled by a hydraulic winch can scoop up many tonnes of fish in a single set. The capacity of more traditional gear like long-lines can be greatly increased by hydraulic winches and automatic hook baiters. The scale of some modern fishing gear is hard to comprehend; for example, 80-mile long lines with thousands of hooks, the "Gloria" super trawl net (whose maw of 110 by 170 metres is large enough to engulf 12 Boeing 747s), and 40-mile drift nets (Nixon, 1997).

Technology:

Environmental News Service (2001), Anonymous (1998) and Nixon (1997) discuss the important role played by new electronic technology in the fishing industry. Sonar allows the skippers of fishing boats to locate schools of fish and track them down more efficiently. Satellite and aerial surveillance also help fishing boats to locate their prey. Navigational aids such as Global Positioning System (GPS) and radar allow fishing vessels not only to reposition themselves on prime fishing grounds (such as spawning grounds) with great accuracy but to go to sea in relative safety in conditions that would have kept traditional fishing boats in port.

In addition to the above advancement, technology has also played a major role in expanding the market base for fish. As fresh fish is a highly perishable commodity, its traditional markets were usually limited to coastal regions and their hinterlands. And fish from distant fishing grounds was traditionally dried or salted. But the combination of modern transportation and cold storage technology means that “fresh” fish can be available across the world in virtually any season. Thus, encourages overfishing.

Waste (Bycatch):

In order to satisfy market demands and maximise profits, commercial fishing fleets target the most highly valued species and sizes of fish. As defined by Anonymous (1998), bycatch are unwanted fish species caught incidentally and dumped at sea usually dead. The "bycatch" of lower-valued species, consisting of species for which the vessel does not have a licence or quota but that are caught along with the target species, is simply dumped (Nixon, 1997). Indiscriminate fishing practices mean that one third of the entire world fish catch, amounting to a staggering 27 million tonnes, is dumped back into the ocean yearly (World Resources, 1996-1997). However, this figure of discard (bycatch) could run as high as 39.5 million tons according to the recent estimates of the FAO (2002). Quota systems intended to limit catches to sustainable levels encourage the practice of "high-grading", that is the dumping of the smaller or otherwise less marketable portion of the catch in order to maximise profits.

Subsidies for fishing industries:

Global fishery management has generally failed to protect resources from being over - exploited, and fishing from being economically inefficient. The main reason for the failure is the lack of political will to make changes necessary to increase fish supplies, the persistence of direct and indirect subsidies, lack of control of fishing fleets, and rigidity of industrial lobbies are major issues that need to be addressed (Anonymous, 1998).

According to the FAO (2002) estimates, globally $124 billion per year is spent catching $70-billion worth of fish. Government subsidies apparently make up the $54-billion per year shortfall by various forms of subsidies to the fishing industry; intended to stimulate economic activity and create employment, these subsidies are ultimately counterproductive as they undermine the sustainability of the resource.

Sierra Club Fact Sheet (2003) reveals that national governments have traditionally heavily subsidised the industrial fishing sector because it is an important source of employment, food, and export earnings. Unfortunately, these subsidies have historically been used with little consideration of the long-term damage to the resource they encourage. Subsidies encourage fishers to remain in a depleted fishery even when it is not

profitable. Without subsidies, the costs of going after that last fish would become prohibitive and this would limit the amount of overfishing.

Nixon (1997) provides the following main reasons for governments' subsidies from a social and political point of view:

a) When stocks are on the increase, there is a tendency for the industry to expand to take advantage of the boom.
b) On the down phase, there is often strong social and political pressure on governments to provide financial assistance to help the industry survive the lean times in order to protect investment and jobs. The result is that the fishing industry grows beyond the sustainable yield of the resource.

Environmental degradation:

As discussed previously, overfishing is not the only factor contributing to the current decline in fisheries. According to World Resources (1996-1997) environmental degradation of coastal areas that is caused by pollution, from industrial, municipal, and agricultural sources perhaps represents an even greater long-term threat to aquatic productivity. Thus, industrial and agricultural effluents and municipal sewage may pollute waters to the point where they cannot support fish populations or they may simply contaminate the fish so that these are not suitable for consumption.

Besides to the overfishing effect of the fishing methods carried out by the modern fishing fleets, they are also responsible for environmental damage. For instance, heavy trawl nets have caused significant alteration to the sea bed by levelling out the bottom, cutting off coral heads in some areas, and turning over sediments, thereby disturbing and often killing the bottom-living fauna. The vast majority of shallow continental shelves have already been scarred by fishing (Nixon, 1997).

In the following paragraphs some of the recent principal remedial actions that have been taken at the international level to halt the declining fishing trend will be presented briefly.

2.4.2 Global treaties dealing with over-fishing

Although most of the burden of fishing management must be shouldered by the individual coastal nations acting in their own territorial waters, there is also a significant role to be played by the international community (World Resources, 1996-1997). Thus, threats posed by excess fishing capacity to the world's fish stocks have been acknowledged in major international agreements. Fortunately, there appears to be a growing international consensus supporting conservation and management of fisheries resources (Nixon, 1997).

In this section brief review of some important recent international agreements will be discussed. These include:

- UN agreement on Straddling Stocks and Highly Migratory Species;
- FAO Code of Conduct for responsible Fisheries;
- FAO Compliance Agreement; and
- Kyoto Declaration
- Johannesburg World Summit on Sustainable Development

1. UN Agreement on Straddling Stocks and Highly Migratory Species

This agreement was reached in New York in December 1995 and was signed by 26 member States. This United Nations sponsored convention resulted in a binding international agreement on the joint management of fish stocks that cross national boundaries or that migrate in the open Oceans. The Straddling Stocks Agreement is intended as a framework for management regimes governing straddling stocks and highly migratory species that span Exclusive Economic Zones (EEZs) and the high seas (open Oceans that extend beyond 200 miles).

The United Nations Agreement on Straddling and Highly Migratory Fish Stocks provides:

- means whereby members of regional fishing organisations can take enforcement action against vessels fishing the high seas whose flag states are unable or unwilling to exercise control;
- compatible conservation measures inside and outside the 200-mile limit;
- a precautionary approach to fishing; and
- a compulsory and binding dispute settlement mechanism to resolve disputes concerning high seas fishing (FAO, 2002).

2. FAO Code of Conduct for responsible Fisheries

The FAO Code of Conduct for Responsible Fisheries, approved in Rome in November 1995, is another important step. The code, described as a "comprehensive moral umbrella," applies to marine and fisheries and deals in depth with fishing management, fishing operations, aquaculture development, conservation measures, post-harvest practices, trade, and research (FAO, 2002). The Code is voluntary rather than mandatory, and aimed at everyone working in, and involved with, fishing and aquaculture, irrespective of whether they are located in inland areas or in the oceans. Because the Code is voluntary, it is necessary to ensure that all people working in fishing and aquaculture commit themselves to its principles and goals and take practical measures to implement them.

Further the Code calls upon States to reduce the use of indiscriminate and destructive technologies such as trawls and drift nets, and to eliminate entirely the use of poisons and explosives. It calls upon States instead to use responsible technologies and methods, and urges developed countries to share technologies and knowledge with developing nations, with the aim of maintaining biodiversity and conserving population structures, aquatic ecosystem and fish quality.

Under the Code, States are required to provide educational and technical assistance to encourage those fishers to shift to more sustainable methods, where such a shift is necessary.

The Code calls on member States to reduce overcapitalisation by ensuring that investments in fishing are in proportion to the value of fishery yield (Waltemath, 2002).

3. FAO Compliance Agreement

The FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the high Seas, was adopted by FAO Council in Rome in November 1993. Accordingly, parties to the FAO Agreement must control fishing on the high seas by vessels flying their flags, in order to ensure that these vessels do not undermine the conservation decisions of international or regional fishing organisations, even if the parties are not members of those organisations.

4. Kyoto Declaration

The International Conference on the Sustainable Contribution of Fisheries to Food Security, held in Kyoto (Japan) in 1995, with the participation of 95 States came up with the so-called Kyoto Declaration.

The principle of the Kyoto Declaration, if fully implemented, would bring the world's fisheries much closer to their full potential. These principles include:

- recognition of the importance of fishing in food security and their social and economic role;
- steps for the responsible management of fisheries;
- improvement to food supply through optimum use of harvests and reduction of post-harvest losses;
- promotion of sustainable and environmentally sound aquaculture;
- responsible post-harvest use of fish; and
- ensuring that trade in fish and fishery products does not result in environmental degradation or adversely affect the needs of people for whose health and well-being fish and fishery products are crucial.

5. Johannesburg World Summit on Sustainable Development (2002)

During the World Summit on Sustainable Development, it was recognised that the depletion of fisheries poses a major threat to the food supply of millions of people. Participating governments agreed to:

- Establish a UN inter-agency co-ordination mechanism on ocean and coastal issues.

- Encourage the application of the ecosystem approach.
- Promote integrated coastal and ocean management at national level.
- Strengthen regional co-operation.
- Assist developing countries in fishing and integrated coastal area management.
- Maintain or restore fish stocks to levels that can produce maximum sustainable yield (by 2015).
- Establish a network of marine protected areas that are consistent with international law and based on scientific information by 2012.
- Eliminate subsidies that contribute to overcapacities and illegal, unregulated and unreported (IUU) fishing.
- Support sustainable aquaculture.
- Maintain productivity and bio-diversity of coastal areas.

In addition it was agreed that previous treaties be implemented (World Bank, 2003 and Waltmath, 2002).

The world's fisheries have reached, or in many cases even exceeded, the limits of sustainability. At the same time, the world, population continues to increase by approximately 100 million a year and is expected to surpass 7 billion by the year 2010.
Given all the social, economic and political pressures to keep fishing, together with the environmental effects of fishing and numerous other human activities, this is a daunting challenge. Without a fundamental global shift in outlook at all levels to the one that seriously places the conservation of fish stocks, it will continue to decline to a much greater extent than has already happened.

Despite these initiatives to protect over-fishing and depletion, however, the international treaties on fishing have yielded less-than-satisfactory results. According to the UN data, 1997:

- The 12/31/92 international moratorium on drift nets larger than 2.5 km. is still ignored by some nations;

- Developing nations cannot afford to protect their fishing industry from illegal invasions by foreign ships;
- Many countries under-report their fishing harvest,
- There are many ongoing disputes, globally, related to depleting fisheries (1997 UN data).

2.5 The South African fishing industry

The South African coastline stretches for about 3,000 km between the international border with Namibia in the West and the Mozambique border in the East (Paul, 2000; White Paper, 1997). The Oceanic waters of South Africa are one of the most dynamic ecosystems in the world. Hosting 16% of the world's species of fish, these waters are both abundant in marine life and rich in biodiversity (Paul, 2000).

South Africa's fishing industry plays an integral role in many of its coastal regions' local economies, and are the lifeblood of many communities (Life Sciences, 2003). The fishing industry is an important sector of the South African economy, employing 25,000 people in the commercial sector, 60,000 people in related sectors, and grossing around 2.5 billion Rand a year (Paul, 2000). South Africa has a large commercial fishing industry. More than 4,500 commercial fishing vessels are licensed by the Department of Environment Affairs and Tourism (DEAT) to work in the industry.

As fishing efforts intensify around the world, as discussed in the previous sections, fish stocks are being depleted. Perhaps because of its geographical remoteness from the countries of the First World or because of the authoritarian policies of the apartheid-era government, the fishing industry of South Africa is still, on the whole, relatively healthy and productive. But those with long-time experience fishing in South Africa's waters have noticed dramatic changes in the last 50 years (Friedel, 2000).

According to Paul (2000) the South African fishing industry is generally divided into five categories. These include demersal, pelagic, rock lobster, line fishery, and "other" including the abalone and squid fisheries. A brief description of each of the categories will follow in the next paragraphs.

Demersal fishery:

The demersal fishery is the most valuable sector of the South African fishing industry, in terms of income generated, bringing in over 500 million Rand per year. The deep-sea trawler dominates this sector specifically targeting the hake species. This industry reached its peak harvest in the early 1970s at 300,000 tons. Soon thereafter, the stock suffered a sharp decline as a result of overexploitation by foreign fleets and mismanagement of the resources. After several regulatory measures in 1983, however, there were signs of a gradual recovery of the hake stock and the total allowable catch (TAC) was set at 120,000 tons. In 2000, the total allowable catch has moved to 150,000 tons.

Pelagic fishery:

The pelagic fishery is the largest by mass of fish landed in South Africa. Which means it is the largest sector in terms of volume (Booth and Hecht, 2000). Despite the considerable mass landed, the unit value of the catch is low, bringing the economic value of the fishery below that of the demersal trawl fishery (Booth and Hecht, 2000).

It is dominated by purse-seine sector, which harvests the small fish near the surface (primarily anchovy, sardine, and round herring). There have been fluctuations in the pelagic catch, oscillating between 350,000 and 450,000 tons between 1975 and 1990, then dropped to 214,000 tons in 1992.

Rock lobster fishery:

The rock lobster fishery is an important sector of the industry, bringing in around 90 million Rand a year. However, the rock lobster fishery is facing difficulty at the moment. Fishermen on the West Coast operate in rocky inshore areas, using hoop nets or rectangular traps to catch the lobster. Large vessels and baited plastic traps are used to

catch the deep-water lobsters of the South Coast of the country. Due to the lucrative nature of the species, poaching is high in this sector. Thus, the statistics received are often unreliable. It is estimated, however, that the average growth has declined, and the catch has decreased from 10,000 tons in the 1960s, to just 2,300 tons in 1998. This decline is due to mismanagement and decrease in mussels, the primary source of food for the lobster.

The West Coast commercial fishery is controlled by company quotas, which are allocated for a subdivided geographical area. The entire industry is regulated through total allowable catches (TACs), closed season, and minimum size requirements.

Line fishery:

This sector focuses primarily on harvesting tuna, snoek, kob, and yellowtail. This industry, like the others, has experienced a dramatic decline in catch over the years. Despite management measures like closed season, minimum size limits, TACs, and legal protection, the number of long-line fishermen is rising annually and the stock is increasingly being threatened.

Squid fishery:

The squid –jigging fishery is a very important sector in the Eastern Cape bringing in 50 million Rand a year. Initiated in 1983, squid-jigging use lights and bait at night to attract and hook (jig) the squid. Regulations in the squid fishery include a TAC, a closed season of three to five weeks, and a limited number of licenses issued.

Abalone fishery:

Abalone is the most lucrative species in the South African fishing industry. The abalone are caught by divers in the shallow sub-tidal kelp beds; commercial divers use small dinghies and scuba gear while recreational and subsistence fishermen are only allowed to use a snorkel. The TAC has been set at around 600 tons since the 1990s, bringing in over 25 million Rand a year. Much of the catch is frozen and exported to the Far East, where abalone is considered a delicacy and commands a very high price.

2.5.1 The industry's problem areas

1. Bad practice fishing and lack of compliance.

South Africa's fishing industry is replete with bad fishing practice and lack of compliance with the governing laws and regulations. Friedel (2000) identifies some of common bad fishing practices and lack of compliance:

1. Illegal selling of recreational catches;
2. Disregarding bag limits
3. Illegal harvesting
    a. Poaching of abalone and rock lobster
    b. Fishing without a permit
    c. Night-time trawling in inshore areas
4. Supplying of false information
    a. Underreporting of catches
    b. Dishonest quota applications
5. Holding multiple quotas, leading to effort subsidisation
6. "Paper" quotas and "cardboard" quotas (dishonest joint ventures) and
7. Targeting of bycatch.

Friedel (2000) suggests that some of these practices can be addressed through better management.

2. Lack of capacity or managerial competence in DEAT

According to Friedel (2000) there is a tendency within the industry to blame current problems on the incompetence of the regulatory body which is the Department of Environment Affairs and Tourism (DEAT). The main problem seems to be a severe lack of capacity with which to complete their multiple objectives.

2.6 The Eritrean fishing industry

While most of the highly valuable stocks of fish in the world are actively fished, there are still unutilised resources and resources that have very low exploitation rates. The main reason for this is that, most fishermen in these countries operate under small-scale or artisanal fishing activities (Anderson, 1986 cited in Michael and Scrimgeour, 2003). Specifically, under-exploitation of fishing resources is prevalent in some developing countries. The Eritrean fishing industry is a typical example of unexploited fishing industry (Michael and Scrimgeour, 2003).

Eritrea possesses a mainland coastline of 1,216 kms along the Red Sea. In addition, it has a total length of 1,258 kms on the 356 offshore islands mainly located in the *Dahlak Archipelagos*. The continental shelf in the 0-200 metre depth is estimated to be 52,000 km^2. These shallow waters are rich in corals, which is home for a variety of marine animals and plants (Marcos *et al.*, 1995 cited in Michael and Scrimgeour, 2003).

During the Eritrean armed struggle for independence (1961-1991) all the fishing infrastructures were destroyed and the fishing ground were almost completely abandoned as most of the coastal population migrated to neighbouring countries (MoF, 2000). After independence, however, the Ministry of fisheries has been working tirelessly to revive the industry (MoI, March 2004). As an agency of the government of Eritrea, the Ministry of fisheries (MoF), is entrusted with the functions and authority to develop and manage the sustainable exploitation of the country's marine living resources, protect and preserve the marine habitat and work towards integrated coastal zone management, including the island area (MoF, 2001).
Some of the objectives of the MoF include:

- Provide employment opportunities by encouraging local and foreign investment in the fishing sector.

- Provide the necessary fishing infrastructure and help create fishing co-operatives, credit and loan system through which fishing co-operatives could benefit from banking services.
- Protect the marine habitat from over-exploitation, excessive tourism and pollution and preserve it for the Eritrean posterity.
- Develop step by step the national capacity able to develop and manage the fishing industry (MoF, 2001).

The Eritrean fishery is composed of two complementary sectors. These include the artisanal fishery and the industrial fishery.

Artisanal fishery:

The Artisanal fishery, which is the most active sector in the industry, has more than 650 fishing licenses and is delivered in the region of *Massawa, Tio* and *Assab*. Within this sector, fishermen are organised in co-operative associations all along the coast. In 2000, more than 1,174 fishermen have been recorded in the artisanal sectors. Fishing gears commonly used are gillnets and simple hand-line (MoF, 2000). The main commercially valuable fish species caught by this sector are reef fishes such as snapper, groupers and emperors. In addition, pelagic fishes of the families trevallies, makerels and tunas are common catches. Bararacudas and shrimps are also caught in smaller proportions (Gebremichael, 2000).

Artisanal fishing in Eritrea is mainly carried out using three types of fishing boats:

- *Houries*. These are traditional wooden boats with small outboard engines. They are 4-11 meters long and have an average 40-hp engine. The average crew size for houries ranges from 4-6 people.
- *Samboucks*. These boats are bigger than the *Houries*. They are 12-17 meters long and are traditional Red Sea vessels. These are generally decked and equipped with inboard diesel engine. The average crew size reaches 10 people.

- *Fibreglass boats*. These are the newly introduced boats to the industry. These modern fishing boats are manufactured by a private company called Sea Chrome Marine Eritrea. However, traditionally some of these boats were imported from Yemen and Japan. The boats are 11-18 meters long and are shrimp trawlers and long-liners.

In 2000, 188 *Houries*, 49 *Sambaucks* and 30 Fibreglass fishing boats were licensed to fish in the Eritrean Red Sea area (Gebremichael, 2000).
Comparatively speaking, back in 1970s, the Eritrean artisanal fishing fleet strength was estimated at some 500 *Houries* and 300 *Sambaucks* (FAO survey, 1992).

Industrial fishery:
The industrial fishery of Eritrea has been under reconstruction since 1994. The number of licensed trawlers has decreased from seven in 1994 to just three in 1997. The government is actually elaborating the development policy outline for this sector, which has the largest potential in terms of landings with an estimate of several thousands tons per year. The number of trawlers is expected to increase in the near future according to the Ministry of Fisheries sources (MoF, 2000).

In contrast to the near none-existent state of the current industrial fishery, the industrial fishing fleet strength in the sixties involved up to four inshore trawlers (50-120 hp), nine offshore trawlers (150-400 hp) and about three hand-liners (FAO survey, 1992). The survey further points out that the fishing fleet were mostly commanded by expatriates and crewed by local deck hands. Their financial productivity was satisfactory for the well-operated units.

According to the article published by the Ministry of Information of Eritrea (MoI) (March 2004), despite the country's abundant sea resources, the Eritrean fishing resources are not fully utilised due to some constraints impeding the development of the industry. Further, the article points out that, the current overall chain from production to marketing is hindering the successful utilisation of the nation's sea resources.

According to the publication, the underlying constraints for effective utilisation of these resources are:

- Lack of skilled manpower in the industry: this includes both managerial and technical skills.
- Inadequate Infrastructure: which includes landing facilities, storage facilities, Ice making, processing and canning industry, boat building and repairing facilities, transportation facilities etc.

Despite the above drawbacks, however, according to MoI (March 2004), the Ministry of fisheries is exerting persistent efforts towards overcoming infrastructure bottlenecks to the development of the fishing sector. In the past few years (since 1993), besides its endeavours to upgrade infrastructure facilities, consistent with the objective listed above, the government has been encouraging fishing investment in the coastal areas. Seizing the opportunity provided by the government some companies have been established. These companies are operating in fishing and fish related businesses. The major operations of these companies include, fishing activities, fish processing, ice manufacturing, boat building and repairing. The contribution of these companies in filling up the existing infrastructure gaps is very crucial.

As indicated in chapter one, the focus of this study is on the impact of the management practices of these new companies, operating in the fishing and fish-related activities, on their company productivities.

Production:

According to the FAO surveys of 1992, the Eritrean marine artisanal and industrial fishing that were flourishing some three to four decades back produced on the order of 20,000-26,000 tons per year principally comprising sardine and anchovy (80%), demersal fish (15%), and shark (5%). The fishing industry of the past can generally be characterised as very active. For instance, catches of well over 25,000 tons per year were reported in 1954 (FAO survey, 1992). Results of the 1992 marine frame survey and field observations confirm that the 1992 situation of the Eritrean Red Sea fishery has

drastically deteriorated from what it was some decades back owing to events of warfare and disintegration of the national fishing workforce and fleet.

The 2000 annual report of the Ministry of Fisheries in Eritrea shows that, there is a big gap between the actual production and the potential for harvesting. The maximum sustainable yield of fish for the country was estimated to be around 70,000 – 80,000 tons, but the actual production for that particular year was only about 13,000 tons. Out of this production the artisanal sector contributed only 10% while the remaining was harvested by the industrial sector using modern fishing mechanism (MoF, 2000).

2.7 Chapter summary

The objective of this chapter was to give a general outlook of the fishing industry. Emphasis was given to the current challenges facing the industry. In this chapter, the status of the global fishing, the case of the South African and the Eritrean fishing industries were briefly described.

Fish has been one of the major economic activities of human beings since ancient times. It plays an important role as a source of food, employment and as a source of income (trade). The fishing industry, which is composed of subsistence fishers, large-scale mechanised vessels and everything in between directly or indirectly, employs about 200 million people worldwide.

Despite these important roles, however, the fishing industry is the most endangered and poorly managed industry in the world. Today, in the world, an estimated 25 per cent of the major marine stocks are under-exploited, about 47 per cent are fully exploited, 18 per cent are overexploited and the remaining 10 per cent stocks are depleted. Some of the underlying causes of the declining fish stocks include unrestricted access, economic motives, growing fishing fleets and overcapacity, improved technology, too much by-catches and discards, government subsidies and environmental degradation.

To protect and conserve these natural resources, a number of international agreements on sustainable use and management have been signed over the past years. According to the UN data despite these initiatives to protect overfishing, however, the international treaties on fishing have yielded less-than-satisfactory results.

South Africa has a coastline of about 3,000 kms and the fishing industry of South Africa employs some 85,000 people in the commercial and related sectors and is grossing around 2.5 billion Rand a year. Perhaps attributed to its remoteness from the First World countries or because of the authoritarian policies of the apartheid-era government the fishing industry in general is relatively healthy and productive.
The industry is classified into five sectors. These include demerasal fishery, pelagic fishery, rock lobster fishery, line-fishery and "others". Like in most other fishing countries, the South African fishing industry is also suffering from bad fishing practices, non-compliance, and lack of managerial competence.

Owing to the war for independence, which destroyed the entire fisheries infrastructure and forced the coastal population to migrate, the Eritrean fishing industry can be regarded as one of the few unexploited fishing industries of the world. Consequently, the challenges faced by the industry at present are lack of skilled manpower and inadequate fishing infrastructure. Because of these bottlenecks, for example in 2000, the industry as a whole has managed to produce only 13,000 tons of fish out of the 70,000 + tons of sustainable fishing potential of the industry. Seizing the opportunity provided by the government of Eritrea, few companies have been established and started to operate in the fishing industry. The activities of these companies are related to fishing, fish processing, boat-building and repairing, and Ice-making. Their role in filling up the gaps is crucially important.

CHAPTER - 3

Productivity and its measurement

3.1 Introduction

Nowadays it is widely accepted that productivity is a key performance benchmark for firms involved in the manufacturing sectors. This is because improvement in productivity is related to increased profitability, lower costs and sustainable competitiveness.
Thus, in this world of intense competition and dynamic business environment it is important that business managers consider productivity as a performance measure for their firm's production activities. Managers must understand what exactly is meant by productivity, the importance of productivity, the various types of productivity measures and the techniques available to improve it. It is also important to know how to manage productivity and to understand what exactly are the critical factors affecting productivity.

Once the concepts and techniques of productivity improvement are well grasped by those responsible managers, then productivity as a performance measure can be utilised to transform firms from where they are now to where they should really be. It is only when managers know the impact of their actions on productivity that they work smarter (and not only harder) to maintain their present companies' competitive positions and/or to gain a new market share.

This chapter aims to provide a brief theoretical background about productivity in general, productivity definitions, measurement and measure approaches, types and elements of productivity measures, and techniques to improve productivity.

3.2 Productivity in general

In this era of technological explosion, any organisation regardless of its size faces three major problems. Firstly, there is a limited supply of resources for any project. Capital, materials, energy, and labour are usually in short supply. Secondly, competitive environments demand a better quality product or service at the existing price or at a lower price. Thirdly, survival through acceptable profit levels requires maintaining the current market share or improving it as much as possible. Problems arise when allocating scarce resources to the variety of alternative purposes competing for their use. Matching objectives with resources to achieve end results is not an easy task. Only those organisations that manage productivity as an ongoing activity will be able to deal with these problems successfully (Edosomwan, 1995:1).

In every country, developed or developing, with a market economy or centrally planned economy, the main source of economic growth is an increase in productivity (Prokopenko, 1987:1). Thus, it would not be wrong to state that productivity is the only important worldwide source of real economic growth, social progress and improved standard of living. Theoretically, productivity improvement results in a direct increase in the standard of living under conditions of distribution of productivity gains according to contribution (Prokopenko, 1987:6).

In their studies Jurison and Gray (1995) and Soniat and Raaum (1993) point out that productivity growth at the firm level is the source of firms competitive advantage. According to Singh, *et al.* (2000) productivity is one of the basic variables governing economic production activities, perhaps the most important one. In the study by Singh, *et al.* (2000) it was investigated, however, that productivity as a source for competitive advantage has had a renaissance of late. The study further confirms that productivity has too often been relegated well behind quality and neglected or ignored by those who influence production process. Although, in recent years, the pressures of an increasingly global economy have compelled firms to focus on strategies for productivity

improvements, issues related to the measurement of productivity have still not received adequate attention.

Baines (1997) explains about the need for ultimate productivity improvement strategy by most organisations. It was discussed, in the study, the fact that most organisations would like to find the recipe for the ultimate productivity improvement strategy. However, those same organisations that are searching for this Holy Grail are likely to have found themselves unable to take full advantage of the methodologies and techniques so far tried. Part of this is because many of them do not understand what productivity really means.

Sauian (2002) highlights the importance of higher productivity in relation to the continuous globalisation. Sauian states that the globalisation agenda of the WTO (World Trade Organisation) together with the liberalisation movement of goods and services among countries have created a strong competitive spirit within the globe. Various business strategies had to be applied in generating wealth in most organisations. Thus, in such circumstances, competitive advantage can be maintained through high productivity and efficiency. Although the service sector plays a major role in this IT-era, according to this study, manufacturing still plays a dominant part in creating value added in most countries. Its contribution to the aggregate economy is still significant to affect growth. Thus, production processes in manufacturing should be the most productive as well as efficient in order to maintain the highest standard of quality.

McKee (2003) criticised managers in that, in the past, organisations and individuals were all urged to pay attention only to customer needs and desires - indeed to go beyond mere satisfaction towards customer delight and joy. According to Bolton and Heap (2002) “this is symptomatic of the ‘management guru mentality’- too many managers are looking for the one real solution, the one great big ‘fix’ that will solve all their problems. They buy the latest books, read up on the latest technique and expect their organisation to be transformed”. Bolton and Heap (2002) witness the reality, in relation to their experience in the field as “ those of us in the productivity profession know it is not (and never was) that easy. The result can be that the organisation is subjected to a long stream of

improvement programs and serial initiatives. The organisation then starts to suffer from 'initiative fatigue', to exhibit signs of stress and exhaustion".

In his book entitled '*Productivity decoding of financial signals*', the famous South African productivity analyst, Van Loggerenberg (1990:2) states the importance of productivity growth to various interest groups. He emphasises the growing importance of productivity in the unpredictable, turbulent economic environment in which we live in, by saying that "it is increasingly recognised that the productivity performance of private and public sector undertakings is the principal determinant of cost – effectiveness and hence viability". Furthermore, leading undertakings and government policy-makers in the First, Second and Third Worlds are to varying degrees articulating a commitment to productivity improvement because of the rewards it brings. According to this author, the purpose of raising productivity is to increase the profitability of the private sector, the cost-effectiveness of the public sector and the real living standards of customers.

The productivity commission of Australia, *Productivity Primer*, (April 2003) advocates that productivity growth is a crucial source of growth in living standards. Productivity growth means more value is added in production and this means more income is available to be distributed. In a similar field, Maynard and Galarneau (Spring 1995) studied the productivity of Canadian industries from 1961 to 1991. Their long-study proved that, despite temporary disruptions, the long - term effect of improved productivity is always an increase in the standard of living. According to the authors, a general increase in productivity implies the same output at a lower cost (or higher output at the same cost). This translates into lower consumer prices and/or increased returns to the factors of production (including wages and salaries). Furthermore, their study reveals that productivity increase in industries has made substantial contributions to the growth of GDP[2] and the overall wealth of the country. Among other things, this has translated into a major increase in real per capita income along with a decrease in the hours of work.

[2] GDP = Gross Domestic Product.

At a firm or industry level, according to *Productivity Primer* (2003), the benefits of productivity growth can be distributed in a number of different ways:

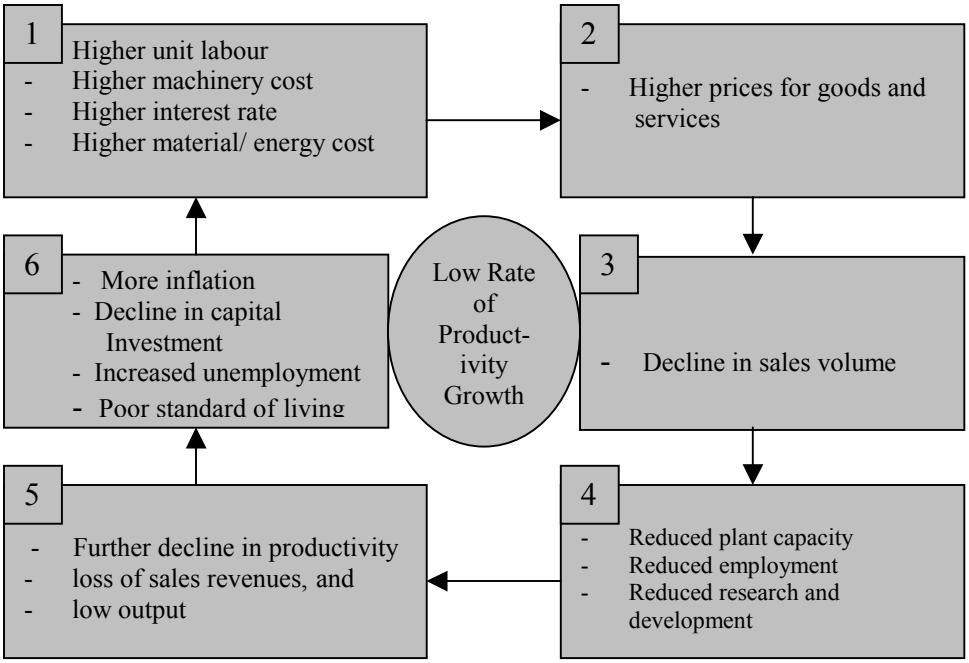
- To the workforce through better wages and conditions;
- To shareholders through increased profits and dividend distribution;
- To customers through lower prices;
- To the environment through more stringent environmental protection; and
- To governments through increases in tax payments (which can be used to fund social and environmental programmes).

In other words productivity growth is important to the firm because it means that it can meet its obligations to workers, shareholders, and governments (taxes and regulation), and still remain competitive or even improve its competitiveness in the market place.

In addition to the improvement of living standards and GDP, inflation controlling and economic stability roles in a country, productivity determines how competitive a country's products are internationally. For instance, if labour productivity in one country declines in relation to productivity in other countries producing the same goods, a competitive imbalance is created. If the higher costs of production are passed on, the country's industries will lose sales as customers turn to the lower cost suppliers. But if the higher costs are absorbed by industries, their profits will decrease. Some countries that fail to keep pace with the productivity levels of competitors try to solve their problems by devaluing their national currencies. But this lowers real income in such countries by making imported goods more expensive and by increasing domestic inflation. Thus, low productivity results in inflation, an adverse balance of trade, poor growth rate and unemployment (Prokopenko, 1987:7).

The cyclic effects of low productivity growth rate on the national economy are shown schematically in *figure* 3.1.

Figure 3.1 - Cyclic effects of low productivity.



Source: Edosomwan, (1995).

Prokopenko (1987:7) suggests that the above circle of poverty, unemployment and the resulting low productivity level can only be broken by increasing productivity. Increased national productivity not only means optimal use of resources, but also helps to create a better balance between economic, social and political structures in the society.

3.3 Productivity defined

A large body of literature has been produced, which addresses the context and content of productivity as well as the various approaches and strategies that may be used to improve it. In this section some of them will be discussed.

Productivity was mentioned for the first time in an article by Quesnay in 1776, and since then most authors have defined it in different ways (Edosomwan, 1995:2). However, the modern productivity movement has been around for just over 50 years. During this period a number of techniques, methodologies and productivity strategies have been developed.

Despite the efforts, however, the pursuit of improved productivity still seems an imperfect science: even the term itself seems to be interpreted differently by different organisations and in different countries (Baines, 1997). The issues surrounding the definition and measurement of productivity have been the topic of research for a variety of disciplines, including accountancy, economics, engineering and operations research. At a basic level, the concept of productivity is relatively easy to define. It is the ratio of output to input for a specific production situation. Rising productivity implies either more output is produced with same amount input, or that less inputs are required to produce the same level of output (Rogers, 1998).

Consistent with the above argument, the report compiled by Thomas and Baron (1994) states that the concept of productivity is often vaguely defined and poorly understood, although it is a widely discussed topic. Different meanings, definitions, interpretations and concepts have emerged as experts working in various areas of operations have looked at it from their own perspectives.

The Oxford Advanced Learner's Dictionary defines Productivity as " the rate at which a worker, a company or a country produces goods, and the amount produced, compared with how much time, work and money is needed to produce them".

Helms (1996) defines productivity as "a measurement that tells you how well you are doing as a producer or how well a machine, an acre of land or the country as a whole is doing". On its simplest form Sink (1984) confines the definition of productivity to Output/Input ratio. He states, "Productivity, as mentioned, is strictly a relationship between resources that come into an organisational system over a given period of time and outputs generated with those resources over the same period of time". It is most simply output divided by input. He also states that managers create confusion about productivity because they do not distinguish between productivity's definitions, measurement, and improvement on the one hand, and performance's concepts,

measurement, and improvement, on the other. This failure to distinguish between productivity and performance[3] can make communicating about productivity difficult.

Similarly, Schermerhorn (1993: 8) defines productivity in respect to its relationship with quality as " a summary measure of the quantity and quality of work performance with resource utilisation considered. It can be measured at the level of the individual, group, or organisation". From a manager's perspective in all cases reflects success or failure in producing goods and services in quantity, of quality, and with a good use of resources.

In the Journal entitled "*Productivity South Africa*" by Du Plooy and Jackson (1995), the concept of productivity was defined more comprehensively. The authors point out the fact that productivity means different things to different people. Some of the more commonly accepted definitions Du Plooy and Jackson (1995) mentioned include:

- Doing the right thing the first time.
- Working smarter not harder.
- Units sold divided by units bought, or
- Outputs divided by inputs.

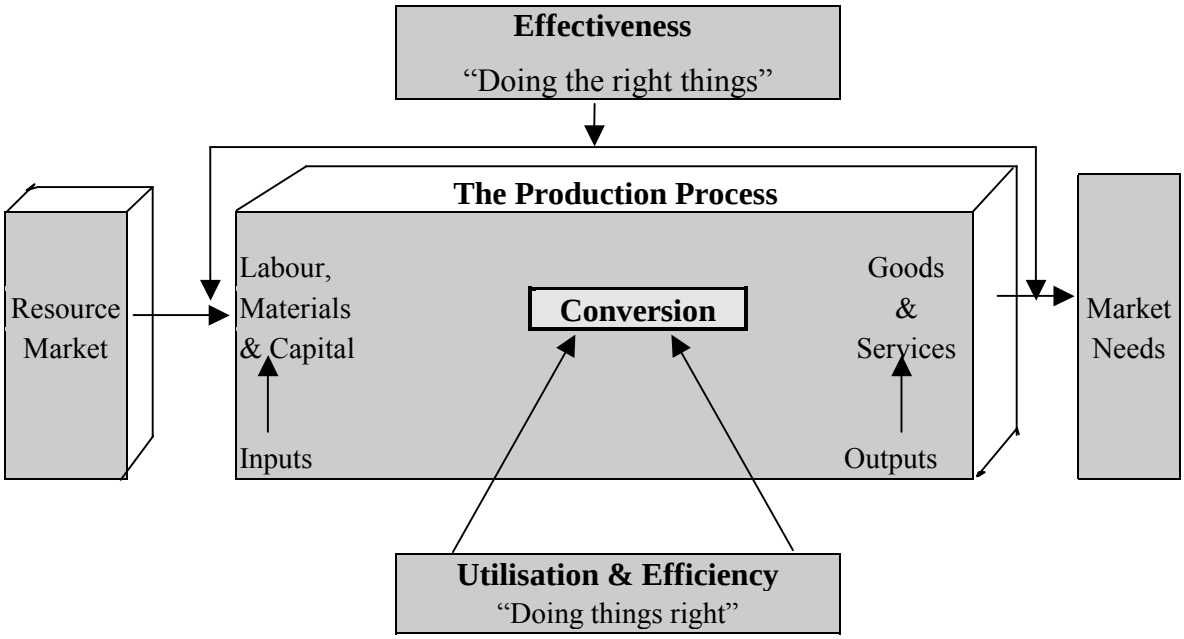
Broadly, Du Plooy and Jackson (1995), define productivity as the ability that a system (be it the economy, a business, a department, or even an individual) has to use all the resources at its disposal in a collective sense to produce products or services which are useful to the end user or customer. It is about synergy, in the sense that different types of resources, albeit materials, capital, people, or energy should be working optimally together to produce results. The picture becomes rapidly more complex when one considers that the outputs of one process may be the inputs of another.

[3] "Performance" is a broader term than "productivity". It includes factors that are not easily quantified, such as quality, customer satisfaction, and worker morale.

As illustrated in the diagram below, productivity has, among other things, three major components:

- Utilisation
- Efficiency, and
- Effectiveness.

Figure 3.2- Components of productivity.



Source: Productivity SA, March/April 1995.

a) Utilisation: In order to function, a business must make use of resources. In this context utilisation is "the extent to which we use the resources". The concept of utilisation can be explained using the following classical example of a printing machine. A printing machine that has the capacity to print 10,000 pages per 24 hours day is operating at only 80 percent utilisation if it is only used for 19.2 hours a day.

b) Efficiency is defined as "the rate of conversion while resources are being used". Efficiency is measured in terms of maintaining a satisfactory relationship between costs and benefits. The more efficiently the company controls its raw materials the better the benefits. Riggs and Felix (1983) explain efficiency in terms of how well do we use our

resources of labour, energy, capital, and materials. For instance, while the plant is being used, if it can produce 200 units per hour it is more efficient than similar equipment producing 150 units per hour.

c) Effectiveness is measured in terms of "doing the right things". A good example could be satisfying customer needs. Riggs and Felix (1983) explain effectiveness in terms of how well do our results accomplish their stated purpose in an accurate and timely manner. In other words somebody must want to buy the goods and services produced by the company- it must satisfy the needs of customers within the realms of affordability.
In general terms, what this all means is that the better a system is at acquiring and converting selected resources into marketable goods or services, the more productive it becomes.

In conclusion, the researcher prefers the definition by Du Plooy and Jackson as discussed above.

3.3.1 Performance effectiveness and Performance efficiency

Schermerhorn (1993:8) used two criteria - "Performance effectiveness" and "Performance efficiency"- to indicate a manager's success in the quest for productivity.

Performance effectiveness: is defined as "a measurement of task output or goal accomplishment". To explain this concept a Rubbermaid production supervisor was considered. If you are a Rubbermaid production supervisor, performance effectiveness means having your work unit meet daily targets of both production quantity and production quality. True productivity, however, requires more than this. After all, you might meet the targets, but waste resources during the process.

Performance efficiency: is defined as "a measure of the resource cost associated with goal accomplishment – that is, outputs realised compared to inputs consumed". Cost of labour is a common efficiency measure. Others include equipment utilisation, facilities maintenance, and returns on capital investment. The same production supervisor, as above, can be considered to explain the concept of performance efficiency.

The most efficient manager is one who meets the daily production targets at minimum cost of materials and labour. As highlighted in the figure below, the managerial success entails not only performance effectiveness in goal attainment, but also performance efficiency in resource utilisation.

Table 3.1 – Productivity effectiveness and efficiency.

Goal Attainment			
	High	Effective but not efficient; some resources wasted	*Effective and efficient; goals achieved and resources well* ***utilised; area of high productivity.***
	Low	Neither effective nor efficient; Goals not achieved ; resources wasted in the process	Efficient but not effective; no wasted resources, but goals not achieved
		Poor	**Good**
		Resource utilisation	

Source: Schermerhorn (1993).

Chen and McGarrah (1982:4) define productivity from a financial performance perspective. They state productivity to measure a firm's performance in terms of financial or economic significance. For example, the dollar value of a unit of product or service delivered divided by the dollar value of labour, material, or capital utilised by the firm's work process. With due allowances for temporary currency value fluctuations or changes in commodity or product prices there is a strong, positive correlation among time series data measuring productivity, profitability, and efficiency.

Generally speaking, productivity could be considered as a comprehensive measure of how organisations satisfy the following criteria:

- Objectives: the degree to which they are achieved.
- Efficiency: how efficiently resources are used to generate useful output.
- Effectiveness: what is achieved compared with what is possible.
- Comparability: how productivity performance is recorded over time.

Although there are many different definitions of productivity, the commonest approach (not a definition) is to design a productivity model to identify the right output and input components in accordance with the long, middle and short-term development goals of the enterprise, sector or country (Prokopenko, 1987: 6).

3.4 Productivity measurement

"The first requirement for performance improvement is measurement. With measures we can set goals. With measures we can track performance toward those goals. With measures we can involve everyone in improving performance. Our productivity measures become a starting point for achieving and maintaining world-class performance. For many years Peter Drucker has been telling us that productivity improvement is the first job of management" (Christopher and Thor, 1993).

A number of literature bodies have indicated the importance of implementing well-designed productivity measurement tools in achieving organisational goals.

Bridges (1992) for instance, gives one fundamental reason for measuring productivity. He questions that, "How can you be sure of how much is being saved if you do not have a baseline?" and argues that, "some type of benchmark (standard, average, mean) should be determined, if none exist". The famous management writer, Drucker (1974:113) clearly indicated the importance and relevance of measurement in the improvement process when he said:

"Productivity is a difficult concept, but it is central. Without productivity objectives, a business does not have direction. Without productivity measurement, it does not have control."

It is understood that all organisations have goals. Achievement of these specific goals is the driving force behind any organisational activity. Success is measured by the achievement of the goals. An organisation that has no goals cannot succeed; and an organisation that has no means of measuring achievement of goals is unlikely to. Therefore, not only do we need to know when a goal has been achieved; we also need to measure our progress towards goals. If productivity is included among our goals, productivity measurement becomes an important part of the management process (Heap, 1992). Thus, productivity measurement is a required management tool in evaluating and monitoring the performance of a business operation (Aboganda, 1994).

The most important thing for businessmen to remember about productivity measurement is that it is not an end in itself but rather a means to an end. As discussed above it is a tool by itself to track how well a company is performing. For businesses the prime objective of productivity measurement is to gain competitive advantage. The notion of productivity measurement is first to establish the prevailing productivity levels and then to improve those ratings by systematic organisational or technological steps so that the business performs better than its competitors. By doing so the business will grow and ideally, all those that contributed to the company's new competition edge should share the profits from growth. If those people who contributed to the growth are not rewarded, there will not be continuity. As mentioned previously, productivity can be measured at all levels i.e., on a national or industry bases, or for a company, for divisions, selected groups within a company, or for just one individual. But it is important to note that whatever the parameters used it should encompass the entire system (Du Plooy and Jackson, 1995).

Du Plooy and Jackson (1995) went on to say that the main objective of a good measurement system should be to provide simple and unambiguous information as a basic managerial control aid. It should be clear to and understood by all employees, managers and stakeholders of the organisation. Brinkerhoff and Dressler (1990: 45) list four criteria that make successful measures. They argue that measurement should go beyond accuracy. According to their argument " it is possible to produce highly accurate and sensitive measures, but if these same measures are not useful in helping people in

organisations make effective changes that result in productivity improvement, then the measures have not been successful".

To help practitioners keep measurement development efforts focussed on critical success factors, the four central criteria are defined below. They further suggest that these criteria should be considered by anyone whose goal is to help organisations to produce higher quality goods and services more productively. However, since the topic is beyond the scope of this study, details are not included.

Criterion one: Quality – The measure must define and reflect the quality of production or services as well as quantity. Any productivity measure that assesses only quantity of outputs can lead to reduced productivity.

Criterion two: Mission and goals – The measure must define and assess only outputs and services that are integrated with organisational mission and strategic goals. Measures directed to products and services that are not consistent with mission and goals threaten productivity.

Criterion three: Rewards and incentives - Measures must be integrated with performance incentives, reward systems and practices. Measures that have no important contingencies will not work to improve productivity. There must be some consequence for achieving positive results on productivity measures. That is measures must make a difference in the welfare of the person or unit being measured, or the measures will have virtually no attention paid to them.

Criterion four: Employee involvement – There must be involvement of organisation employees and other direct stakeholders in the definition and construction of productivity measures. When lack of involvement has not resulted in commitment, results from the measures are not likely to be received favourably or to have any impact on future productivity. Detailed discussions about employee involvement are provided in chapter four of this study.

The notion is that, if top management is doing its proper job of delegating authority, then the people most knowledgeable about how jobs really work are the job performers themselves. To not involve these very people (i.e., the job holders) in measurement planning is to ignore the greatest experts.

Du Plooy and Jackson (1995) list a number of requirements for sound productivity measurement, and argue that the more of them that can be satisfied the greater will be the acceptability of the measurement. They include:

- The measurement should be understood or at least trusted by those being measured.
- All the resources and operations with in the business must be included.
- Ideally the results should indicate who or what is being measured.
- The results must give clear signals to management for action to improve profit.

This fourth point is extremely important if the notion that productivity has relevance to business is to be fostered. Productivity is rarely, if ever, a primary objective of the firm, and unless the role of productivity in achieving corporate goals can be identified, productivity measurement and improvement will not be achieved.

3.4.1 Purposes of productivity measurement

It explained in the previous discussions that productivity could be commonly defined as a ratio of a volume measure of output to a volume measure of input used. While there is no disagreement on this general notion, a look at the productivity literature and its various applications reveals very quickly that there is neither a unique purpose for nor a single measurement of productivity. However, the Manual of the Organisation for Economic Co-operation and Development (OECD) (2001), lists five objectives of any productivity measurement:

Technology: A frequently stated objective of measuring productivity growth is to trace technical change. Technology has been described as "the currently known ways of converting resources into outputs desired by the economy". Productivity appears either in its disembodied form (such as new blueprints, scientific results, and new organisational techniques) or embodied in new products (advances in the design and quality of new vintages of capital goods and intermediate inputs). In spite of the frequent explicit or implicit association of productivity measures with technical change, the link is not straightforward.

Efficiency: The quest for identifying changes in efficiency is conceptually different from identifying technical change. Full efficiency in an engineering sense means that a production process has achieved the maximum amount of output that is physically achievable with current technology, and given a fixed amount of inputs.

Technical efficiency gains are thus a movement towards 'best practice', or the elimination of technical and organisational inefficiencies. Not every form of technical efficiency makes, however, economic sense, and this is captured by the notion of allocative efficiency, which implies profit maximising behaviour on the side of the firm. One notes that when productivity measurement concerns the industry level, efficiency gains can either be due to improved efficiency in individual establishments that make up the industry or to a shift of production towards more efficient establishments.

Real cost savings: Real cost saving is a rational way to describe the essence of measured productivity change. Although it is conceptually possible to isolate different types of efficiency changes, technical change and economies of scale, this remains a difficult task in practice. Productivity is typically measured residually and this residual captures not only the above-mentioned factors but also changes in capacity utilisation, learning by doing and measurement errors of all kinds. In this sense, productivity measurement in practice could be seen as a quest to identify real cost savings in production.

Benchmarking production processes: In the field of business economics, comparisons of productivity measures for specific production processes can help to identify inefficiencies. Typically, the relevant productivity measures are expressed in physical units (e.g., cars per day, passenger-miles per person) and highly specific. This fulfils the purpose of factory-to-factory comparisons, but has the disadvantage that the resulting productivity measures are difficult to combine or to aggregate.

Living standards: Measurement of productivity is a key element towards assessing standards of living. A simple example is per capita income, probably the most common measure of living standards: income per person in an economy varies directly with one measure of labour productivity, value-added per hour worked. In this sense, measuring labour productivity helps understanding the development of living standards. Another example is the long-term trend in multifactor productivity. This indicator is useful in assessing an economy's underlying productive capacity ('potential output'), itself an important measure of the growth possibilities of economies and of inflationary pressures.

3.4.2 General and special difficulties with measures

In defining productivity measures, Parsons (2000) identifies five decisions that may have to be taken. These decisions include:

- Deflator decisions- quantities and prices;
- Resource variability decision ;
- Attribution decision – systems and centres;
- Contrast decision – actuals, budgets, and
- Series decisions- time periods.

Deflator decision: Since productivity measures address, by definition, the products, services and resources in physical quantities or "real" terms, the deflator decision is designed to partition monetary values into their quantity and price components. This is necessary to determine the extent to which changes in the financial position are a function

of productivity or price effects. This is the essence of productivity accounting methodologies.

Variability decision: Resource variability defines how resources behave relative to changes in product or service volumes in the absence of managerial intervention. Variability usually ranges from 1 (completely variable) to 0 (completely fixed). Although this decision has no effect on the productivity change per se, it does allow insights into the nature of the productivity change.

Attribute decision: An attribute represents the area within the organisation where resources can be directly attributed to products or services. It defines the system boundaries within which performance is determined. It can be represented by the whole organisation (corporate system) or, alternatively, by a division, department, regional office, or line of business. Clearly, the more partitioning of the larger system into more closely defined attributes, the more precision and insights the results may yield.

Contrast decision: As indicated earlier, all measurement is by contrast. In this context, the contrast decision means defining the reference and review periods in terms of actuals, budgets, peer organisations, standards or norms.

Series decision: Time series decisions involve defining the length of the periods to be contrasted. This could mean (say) a contrast of two sets of quarterly results or a contrast of the year 2003 annual results with the 2004 budget. These decisions are relatively straightforward, but it is important to remember that, although the length is unimportant per se, the periods being contrasted must be of comparable length.

3.4.3 Benefits of productivity measurement in companies and organisations

Edosomwan (1995:79) and Jurison and Gray (1995) summarise the benefits that can be realised by companies from introducing formal productivity measurement system. They state that in order for companies to effectively compete in the global market and

contribute to the national growth rate of productivity in both the short run and the long run, it is necessary for them to institute a formal productivity measurement system. Such a system can have at least the following five important benefits:

1. Productivity measurement is an important motivation for better performance, since it helps to identify on what bases the individual task, project or customer is to be measured. It provides the basis for planning the profit level in a company.

2. Productivity measurement highlights by means of indices those areas within the company that have potential improvement possibilities. Productivity values and indices also provide a way of detecting deviations from established standards on a timely basis that something is done about such deviations.

3. Productivity measurement creates a basis for the effective supervision of necessary actions to be taken and improves decision making through better understanding of the effect of actions already taken to address a given problem.

4. Productivity measurement can be used to compare the performance levels of individuals, work groups, tasks, projects, departments, and firms as a whole.

5. Productivity measurement facilitates better resource planning and projections in both the short and the long run. It also simplifies communication by providing common measures, language, and concepts with which to think, talk, and evaluate the business in quantitative terms.

3.4.4 Elements of productivity measures

As was noted in the preceding sections, a productivity measure is a ratio that compares output (production of some desired result) with input (consumption of some defined resources). The first step in productivity measurement is to establish the output of the business, division, or person being measured. The second step, which is often more

difficult, is to identify and measure the various inputs to that system. The third step is to remove the impact of inflation so that the measures are on a real or physical basis. Finally, the output per collective use of resources adjusted for inflation is then calculated.

In the subsequent sections a brief explanation of the elements and terms involved in the productivity measurement will be presented. These include outputs (i.e., in terms of value-added, sales and gross output), inputs and price indexes.

3.4.4.1 Outputs

Outputs, in their simplest form, are " goods and services produced" by any individual, unit, or organisation (Riggs and Felix, 1983). Brinkerhoff and Dressler (1990: 55), however, define output in light of the increased worldwide competition and a consistent emphasis on quality as " the number of goods and services produced that are usable, saleable and of acceptable quality". At the plant level, output can be a single product, varying models of a single product, or varying models of a number of individual products (Sadler, 1993).

Outputs must quantify the physical outputs of the business. From a total business perspective the output must be what the customer receives and is willing to pay for the business. That is to say, a company should not produce goods and services for which there is no demand. The customer can be an internal or external customer (Cooper, 1999). Although there are many but conflicting approaches in calculating the output of an organisation, Cooper (1999) argues that an output must quantify what the customer takes. According to Cooper, from a total business perspective the output is not what is manufactured or produced but what is sold. This is where the importance of marketing to productivity performance comes in. To make his argument more understandable let's have a look at the example provided by Cooper. "A business could manufacture 1,000,000 widgets in an extremely efficient manner. However, if the market requires only 600,000, and the remaining 400,000 sit in the warehouse and are not used, it is not good

productivity. So in measuring productivity, the output for the period under review must be 600,000 widgets sold and not the 1,000,000 manufactured" (Cooper, 1999).

In contrary to the above argument by Cooper, (1999), however, Edosomwan (1995:89), and Craig and Harris (1973) suggest that in calculating outputs the number of units produced be used and not the units sold. Their justification is that since productivity is concerned with the efficiency of converting inputs to outputs, only those units sold cannot be used in output calculations. The reason is that some of the units sold could be from a reduction in finished inventory and such a condition would yield an overstated output. Conversely, units produced but not sold would not be counted, giving an understated output. In-process inventory must be included in the output calculation as well. In effect, in-process inventory is partial units produced. Adjustment of output will generally take the form of multiplying the in-process units by their selling price and their percentage completion as measured in cost terms. Roger (1998) also emphasises the importance of defining output as the real output produced in a set time period. The sales or revenue figure normally reported in accounts will not coincide with this if inventory levels have risen or fallen over the period. Hence, adjustments for the level of inventories should be made and also, if possible, the impact of any output given away for promotions etc.

Various authors including Stainer (1997), Du Plooy and Jackson (1995), Chen and McGarrah (1982:4), and Craig and Harris (1973) also explained difficulties that arise in connection to measuring diverse outputs. According to these authors, even in a relatively simple situation of a furniture factory there are complications associated with measuring output. The outputs of this factory (i.e., tables and chairs) are not immediately measurable because the quantity units are not uniform. They argue that a common unit must be devised and used to express the total output, and the period during which the output was produced must be specified. This is where prices and other weightings become important in productivity measurement.

Therefore, instead of specifying the factory's output as 1000 chairs and 400 tables per week, they suggest that a monetary value be placed on each item so that a total aggregate

output per week can be established. Giving a monetary value to output has the advantage of compatibility with accounting systems and if expressed in real terms, can be used to compare output volume. As discussed earlier, however, there are other factors to be considered. This is because the sales of a business unit usually represent only a part of total output. Some of the merchandise produced is kept as inventory, and other production work could be still "in progress" at the end of the period. Some of the products could have been produced from raw materials and others from semi-processed components. Sales also include customer services such as after sale repairs. Another complication is that price fluctuate which, together with inflationary pressures, means that the monetary value of output will fluctuate independently of the physical output of a production unit (Du Plooy and Jackson, 1995; Craig and Harris, 1973).

Although the basic concept of productivity is straight forward, difficulties are soon encountered when one confronts various measurement problems, the presence of multiple inputs and outputs, and uncertainty over how to model the production process (Roger 1998). Edosomwan (1995:80), Du Plooy and Jackson (1995) and Craig and Harris (1973), summarise the most common difficulties involved in measuring productivity into three basic points. Kendrick (1984:18) also points out that " the operational concept of productivity involves many detailed definitions and statistical problems"

These three difficulties in measuring productivity include:

1. Measuring outputs whose characteristics may change over time.
2. Defining and measuring real capital stocks and inputs as well as labour inputs when the characteristics of both factors are diverse and changing.
3. Aggregating heterogeneous units of output and input.

Kendrick (1984:18) further points out that these problems would exist even if data were perfect and suggests using prices or unit costs for aggregation purposes.

3.4.4.1.1 Measures of output

In most instances, total output is defined in physical terms. An exception is in organisations where, because the great variety of output precludes physical aggregation, the measurement can be based on adjusted sales (Stainer, 1997).

Output may be expressed in one of the following three ways Rogers (1998) and Grossman (1993):

1. **Gross output**: Gross output is a measure of total production, including materials and energy inputs. At the firm level the proper measure of output is gross output, as firms must also attempt to use material and energy inputs efficiently. At the more aggregate level economists have traditionally used value-added to avoid double counting, as the output of one industry may by the input into the other. (Grossman, 1993).

2. **Value-added**: To account for the capital – labour substitution effect, economists developed the capital – labour multifactor or total factor productivity. Value-added measure of output is defined as the production due to the efforts of labour and capital. The costs of materials and energy inputs are excluded (Grossman, 1993).
   According to Du Plooy and Jackson (1995) a popular method of measuring productivity is the concept of value added per unit of resource. Because value added (gross output less material and/or service costs) – is an existing financial entity in many companies and it requires little additional computation to establish it. Straightforward ratios exist for the computation of value added productivity measurement.

   Despite their shortcomings value-added productivity measurements are at the very least, convenient for managers because in any reasonable set of management accounts the information needed is readily available (Du Plooy and Jackson, 1995).

3. **Sales**: This measure of output excludes any addition to (subtraction from) inventory. It is not a proper measure of production because it may exclude large additions to inventory, which represents part of current production, and thereby understates output.

   Grossman (1993) summarises the above three points just discussed as follows:

   Net Sales – inventory change = Gross Output – materials and purchased service – energy = value-added.

   Therefore, for the purpose of this study the value-added measure of output will be applied due to the above mentioned reasons (i.e., it can easily be computed from company financial statements).

3.4.4.2 Inputs

Cooper (1999), Edosomwan (1995:89), Brinkerhoff and Dressler (1990:73), and Craig and Harris (1973) approach to input is that inputs must include every thing the business physically uses in the manufacture of the output. This includes people, materials, and assets such as, machines, vehicles, computers, and even buildings. It is, therefore, necessary to include all the inputs as the impact of resource substitution, replacing one type of resource with another, needs to be identified. Examples of resource substitutions could be:

- Replacing capital with labour;
- Replacing labour with capital;
- Outsourcing versus using own resources; and
- Changing the mixture of labour skills.

In the next sections, a brief discussion about the two important inputs namely labour and capital inputs will follow.

Labour input:

Labour is usually the most important single factor of production, but capital, raw materials, energy and services such as transport are also important, and are therefore crucial to the determination of productivity. Because human resource costs are easily identified in management accounts, measuring labour productivity is arguably the simplest of productivity measures, but on its own it does not reflect the trade-offs between other resources or the collective ability of the business as a whole.

In calculating labour input, units such as number of employees, hours worked or constant dollar of labour is used (Grossman, 1993). There are, however, several technical problems in measuring labour input that should be mentioned:

- *Type of labour:* an hour worked by a production worker is not necessarily the same as that of a non-production worker.
- *Hours worked:* companies are faced with the problem that hours tracked by their accounting systems are likely to include hours paid but not worked.
- *Number of employees:* care must be taken not to add full-time and part-time employees on-a one to one- basis. Some type of full time equivalent basis should be calculated.
- *Constant dollar measure:* an appropriate and easy way to measure labour input is to take labour compensation and divide it by the wage rate for a base year (Grossman, 1993).

As expounded by Du Plooy and Jackson (1995) many managers suffer under the misguided notion that productivity is measured solely in terms of output per man-hour. The narrowness of this view is evident when one considers that labour productivity constitutes only one aspect albeit an important one, of the many components of productivity.

Capital input:

Capital is made up of many inputs - they include land and buildings, plant and equipment, and inventories. Capital productivity can be expressed in terms of the relationship between the output and capital inputs. It indicates how much is generated for the amount invested in capital equipment (Du Plooy and Jackson, 1995). As Grossman (1993) emphasised, trying properly to measure capital input is the most difficult and intractable problem in calculating productivity. Capital inputs must be measured in terms of services, which is a flow concept, whereas capital is, by definition, a stock. After acknowledging the challenges that face in measuring capital inputs, Stainer (1997) provides many options to calculate capital value.

According to Stainer, if historic cost is considered inadequate, current value yardsticks must be focused on:

- *historic cost* adjusted for inflation which takes into account changes in the general purchasing power of money, rather than the specific rate of price change for the various assets;
- *economic value* which is based on forecast, capitalised cash flows from the assets which reflect the strengths and weaknesses of discounted cash flow techniques;
- *replacement cost* which is the cost of replacing the service potential of the existing asset in the cheapest possible way;
- *net realisable value* which is the amount received from selling an asset in its existing condition, less any disposable costs incurred;
- *deprival value* where, if the organisation was deprived of an asset, it is the sum of money required to make it whole again, given that it has time to take any necessary action to minimise its loss or
- *leasing charge* which is an opportunity cost or tilting annuity relating to the presumed cost of leasing an asset.

3.4.4.2.1 Measures of inputs

The only practical way that inputs can be aggregated is in money terms. When comparison is made over time, the measurements should be taken in real terms. This means that all economic indicators must be kept at base-year prices to allow meaningful comparison as well as isolate inflation. For this purpose, it is important to select, where possible, a relatively stable base-year as this will aid sound analysis (Stainer, 1997).

3.4.5 Measure expressions

According to the article by the productivity commission of Australia, *productivity primer* (2003), productivity measures can be expressed as one of the following three approaches. These include:

1. *Physical measure*. For example, number of cars produced per employee,
2. *Monetary measure*. For example, thousands of dollars of output per hour worked or
3. *An Index measures*. For example output per unit of labour say 100.

Since price indexes are important tools in calculating productivity indexes, in the next paragraphs, brief discussions on what indexes are used for and how they are computed will be presented.

3.4.5.1 Price indexes

A major task in developing productivity measures is to develop measures of output and inputs in real or physical terms. For a given business, it is usually possible to determine changes in the quantities of inputs used and goods and services produced. For a chair manufacturer, for example, a chair is a unit of production. At the national level, however, variations in quantities are more difficult to determine because of the many types of inputs used and goods and services produced, as well as the difficulties in finding a common unit of measurement. This is why inputs and outputs are expressed in dollars. However, because of inflation, dollar values generally increase more quickly than

quantities. Price deflator[4] makes it possible to convert the measures in quantities and still retain a common unit of measurement (Mayrand and Galarneau, 1995).

According to Grossman (1993) and FRB Dallas (Federal Reserve Bank of Dallas) (2003) to transform a series into real[5] terms, two things are needed: the nominal[6] data and an appropriate price index. In order to deflate nominal measures we require some measures of prices. The most common sources of price indexes are:

- In-house developed product price or cost indexes.
- Producer price indexes (PPI).
- Consumer price indexes (CPI).
- Gross national product price deflators (GNPPD) and
- Price deflators for private structures by type, published in some detail by the Bureau of Economic Analysis.

Common price indexes measure the value of a basket of goods in a certain time period, relative to the value of the same basket in a base period. They are calculated by dividing the value of the basket of goods in the year of interest by the value in the base year. By convention, the value is then multiplied by 100.
Generally speaking, statisticians set price indexes equal to 100 in a given base year for convenience and reference. To use a price index to deflate a nominal series, the index must be divided by 100 (decimal form). The formula for obtaining a real series is given by dividing nominal values by the price index (decimal form) for that same time period:

$$\textit{Real value} = \frac{\textit{Nominal value}}{\textit{Price index (decimal form)}}$$

[4] A numeric pricing measure used to change nominal values into real values.
[5] The value of an economic variable adjusted for price movements. Real values are money values corrected for inflation. Real values measure purchasing power.
[6] The value of an economic variable in terms of the price level at the time of its movement; or unadjusted for price movements. Nominal values are money values. Consequently, nominal values rise with inflation (i.e., the average increase in money prices.)

Soniat and Raaum (1993) state the advantages of using indexes in measuring productivity. They explain that indexes make it possible to show the input, output, and productivity rates on the same graph. Readers can then readily see whether changes in productivity are attributable to either the input or output dimension. The steps in computing productivity indexes are:

1. Compute an output index.
2. Compute an input index and
3. Divide the output index by input index to calculate the productivity index.

The corresponding formulas follow in which the " base year" is the first year being measured.

1. Measured year input / base year input x 100 = input index
2. Measured year output / base year output x 100 = output index
3. Output index / Input index x 100 = Productivity index.

In this study, the total factor productivity (TFP) indexes of the companies were computed according to the above formulas.

3.5 Time series, benchmarking & norms

Now it is clear that productivity measurement is only a tool. The objective of measuring productivity in a firm is to use the productivity indices or indicators to highlight how the various factors are performing and then to see what improvements can be made.

The basic comparative nature of productivity measures was emphasised by Du Plooy and Jackson (1995). In explaining this feature of productivity measures, the authors say that productivity levels must be established, by whatever method, and then compared either to the reading for the previous period or another division or section within the company. This all important comparative element is illustrated when one considers that while the

actual level of productivity for one function over a given period might be unchanged, real productivity gains have in fact been achieved if the productivity level of competitors has declined over the period.

Similarly, Cooper (1999) argues that once the relationship between input and output is defined, it is still necessary to benchmark it against something or it becomes meaningless. That is to say that there is a need for some kind of baseline against which the results are compared. In agreement with the above argument, Parsons (2000) points out that all measurement is by contrast of one sort or another. According to Parsons, to state that productivity is 16 or 73 is senseless unless the figure can be compared with something. The point is that for instance, say the ratio between output and input is three, what does it mean? There is no way of identifying whether the ratio of three means that the business is improving or deteriorating and how it is performing against other organisations.

Parsons (2000) and Cooper (1999) propose the need to compare the ratio with a previous period to determine the magnitude and direction of the change or, with other organisation to establish how the business is performing relative to the market. It is necessary to note that this is where the often-confusing connection between productivity and competitiveness comes in. Thus, any company should compare its performance to other similar organisations.

There are essentially three options from which to choose in order to make such a comparison (Parsons, 2000). These are:

1. *Past (or future) performance* - time series/time lines - temporal or longitudinal; comparisons.
2. *Performance of another operation* - benchmarking, inter-firm comparisons (IFCs) and spatial or cross sectional comparisons.
3. *Standard performance* - budgets, engineered standards (time study), standard costing - *normative* comparisons.

An important distinction that should be made within the broad context of the above three different types of contrast is that between *levels* and *trends*. For example, according to Parsons (2000), "the average American worker produces roughly 1.5 times the output of his Japanese counterpart yet, until recently, the rate of increase in output per worker has been significantly faster in Japan compared to America. Who is more productive? Clearly, the productivity of Japanese workers has been growing faster than that of American workers but that does not negate the fact that the *level* of productivity is higher in America than it is in Japan".

In the succeeding sections, a brief discussion of each one of the three selected options of productivity comparison tools will be followed.

3.5.1 Time series

Performance in this case is contrasted across two time periods. Often these are contiguous periods - that is, periods that follow or are next to one another. Examples would include this month's performance versus last month's performance. Alternatively, comparisons are made of this month's performance versus the same month last year or the year before. A series of such results will enable a time series to be constructed that will indicate the change or in trend performance. As such, the results become amenable to statistical manipulation to gain further insights. Generally speaking this type of contrast will indicate whether an organisation is getting better or worse (Parsons, 2000).

3.5.2 Benchmarking

Productivity benchmarks are defined as instruments that allow an organisation to compare its productivity to those of other similar organisations or projects (Briand, *et al.,* 1998).

Cross-sectional comparisons embrace a range of measurement techniques that enable a single entity (organisation, division) to compare its performance with that of other, often but not necessarily, similar entities. The measures are usually ratios so that the

differences in size are normalised. Benchmarking brought a new dimension to cross-sectional comparisons. It is defined operationally by Kearnes of Xerox as "the continuous process of measuring products, services, and practices against the toughest competitors or those companies recognised as industry leaders". It is possible to make comparisons of one aspect of business operations with someone who is an industry leader in that area and compare another aspect with a different organisation which happens to be the very best in that area. The focus is usually on practices and sometimes the best practitioner is found in another industry. For instance, if an insurance company wished to compare its debt collection processes with the 'best in class' these would probably be found in institutions such as credit card companies rather than in another insurance company.

Generally, cross-sectional comparisons will indicate whether the organisation is better or worse than the best currently operating organisation (Parsons, 2000).

Objectives of benchmarking:

The objective of benchmarking is derived primarily from the need to establish more credible goals. It is first a direction setting process, but more important, it is a means by which the practices needed to reach new goals are discovered and understood (Camp, 1993). As discussed above, it also legitimises goals and direction by basing them on external orientation (for example, competitors). It is an alternative to the traditional way of establishing targets, namely by extrapolation of past practices and trends. Camp (1993) argues that conventional goal setting often fail because the external environment changes at a pace significantly faster than projected.

The ultimate benefit is that end user requirements are more adequately met because benchmarking forces a continual focus on the external environment.

Benefits of benchmarking:

There are five important benefits of successful benchmarking as listed by Camp (1993):

1. End-user requirements are more adequately met.
2. Goals based on a concerted view of external conditions are established.
3. True measures of productivity are determined.

4. A competitive position is attained.
5. Industry best practices are brought into awareness and sought.

Therefore, it can be concluded that the bottom-line benefit of benchmarking is competitiveness. In addition to the external orientation, however, benchmarking can also derive consensus internally. If performance levels are aligned with the best in the industry, then all the energy within the organisation can be turned to accomplishing the results, not arguing over what should be done. The result is true productivity, which is derived from workers at all levels, solving real problems of the business revealed by the benchmarking findings (Camp, 1993).

3.5.3 Norms

When performance is compared to a norm or standard – for examples, this month's actual versus this month's target results - variances are produced which can be favourable, unfavourable or zero. The nature of norms is usually very varied. They can be hard engineered standards such as might be derived from industrial engineering or work study, or they might be softer norms based on previous experience and management insights such as budgets and sales targets. For the first time, normative measures directly address the question of whether performance is good or bad (Parsons, 2000).

3.6 Productivity measurement approaches

Many literature bodies on productivity measurement confirmed that, physical measures are better than dollar measures. For a plant level productivity measurement, physical measures, properly weighted, remain significantly more accurate than dollar-value measures (Sadler, 1993).

According to Sadler (1993), the very first steps for any plant productivity measurement are to verify the following conditions:

1. ***Functional integration***. Relevant departments or sections of an organisation, i.e., the product design, product engineering, and production supervisory officials are in full current co-operation regarding each item being produced.

2. ***Customer driven***. The firm's current production and its future plans are based on the results of the advance evaluation and feedback of customer requirements and/or desires for both domestic and overseas markets. (*This will be discussed in detail in section 4.2.3 of chapter four*).

3. ***Participation***. The company's management – employee relations and work patterns have been fully shaped – or are presently being shaped – in the direction of full employee participation in all aspects of work. (*This will be discussed in detail in section 4.2.1 of chapter four*).

4. ***Motivation***. Review with appropriate factory management representatives the system and procedures that assure that employees, managers, supervisors, engineers, and indirect workers are effectively motivated. These stakeholders should benefit appropriately from whatever awards and payment systems are established.

5. ***Flexibility***. Assure that the firm's top management personnel are effectively world class – oriented on product quality and sales/distribution follow-up and service capability.

As a measurement of efficiency with which a production activity converts inputs into outputs, productivity at the company level could be measured in different ways known as total versus partial approaches (Mady, 1992). The OECD (Organisation for Economic Co-operation and Development) Productivity Manual (2001), the Australian Bureau of Statistics (2000), Maynard and Galarneau (1995), and Anderson (1992) used two general classifications of productivity measures. These are:

1. Partial productivity measures, and
2. Multi-factor productivity measures.

Other prominent productivity professionals including Stainer (1997), Grossman, (1993) and Edosomwan (1995:81) however, classified the productivity measures into three major groups as:

1. Partial productivity measures,
2. Total factor productivity, and
3. Total productivity measures.

Each group has its own strengths and weaknesses and therefore, no one measure or group is considered best (Grossman, 1993). It is important to note that there is no single universal measure of productivity for all organisations. As revealed by McKee (2003) and Jurison and Gray (1995), no single productivity tool is the "right one", what works for one organisation at one point in time may be inappropriate for another organisation – even the same industry sector at the same point in time. Therefore, different measures are needed in different organisations. None of the productivity measures are perfect. They all have some shortcomings and limitations. By understanding the strengths and weaknesses of different measures, however, managers can choose the appropriate measures and use them to improve organisational performance.

To rectify the shortcomings and limitations of productivity measures, Anderson *et al.* (1992) offer two general recommendations for the methods by which productivity measures can be used more effectively.

1. The first recommendation is for managers to use both partial and total productivity measures together. When managers use both measures together, they are able to determine the patterns of interaction between various types of inputs and total productivity. Use of partial and total productivity measures together will enable managers to identify and understand such situations as the occurrence of quality

changes in inputs or outputs or the distortion of productivity measures by capacity utilisation or other large fixed expenses. In addition, partial measures help in determining if some types of inputs are not showing productivity improvement overtime, and if these inputs eventually dominate the productivity measure for a product or organisational unit.

2. The second recommendation is, whenever possible, to use both currency-based and physical measures of productivity and to compare them. Physical measures that are unadjusted for currency fluctuations may serve as good indicators of process performance.

   The comparison of physical productivity measures with currency-based measures should provide insight to managers regarding quality improvements in inputs and outputs. Also, the comparison of physical measures with currency-based measures aids in determining the usefulness of productivity measures. If currency based and physical measures tend to correspond closely to each other, a stable environment is indicated and currency based productivity measures would appear to be quite appropriate. If the two types of measures do not correspond closely to each other, such as in the case of new, high technology products, which enjoy increased physical productivity concurrent with decreasing prices, then productivity is probably a less important performance measure than other measures of competitiveness. In such a situation a multitude of performance measures that consider both productivity within organisation and comparison of products with those of competitors is warranted.

The OECD Productivity Manual (2001) reveals that there are many different productivity measures and the choice between the different productivity measures available, however, depends on:

a) The purpose of the productivity measurement, and
b) In many instances on the availability of data.

As explained above the OECD (2001) and other authors have broadly classified productivity measures as:

a) Single factor productivity measures (relating a measure of output to a single measure of input) or
b) Multifactor productivity measures (relating a measure of output to a bundle of inputs).

Another distinction, of particular relevance at the industry or firm level is between productivity measures that relate some measure of:

a) Gross output to one or several inputs, and those which use a
b) Value-added concept to capture movements of output.

Table 3.2 uses the above criteria (proposed by the OECD) to enumerate the main productivity measures. The list is incomplete insofar as single productivity measures can also be defined over intermediate inputs and labour-capital multifactor productivity can, in principle, be evaluated on the basis of gross output. However, in the interest of simplicity, *Table 3.2* was restricted to the most frequently used productivity measures (OECD, 2001).

These are measures of labour and capital productivity, and multifactor productivity measures (MFP), either in the form of capital-labour MFP, based on a value-added concept of output, or in the form of capital-labour-energy-materials MFP (KLEMS), based on a concept of gross output.

Table 3.2 - Types of productivity measures.

Types of Output Measures:	***Types of input measures***			
	Labour	Capital	Capital and Labour	Capital, labour &intermediate inputs(energy, materials, services)
Gross output	Labour productivity (based on gross output)	Capital productivity (based on gross output)	Capital - labour MFP(based on gross output)	KLEMS multi-factor productivity
Value-added	Labour productivity (based on value added)	Capital productivity (based on value added)	Capital - labour MFP(based on value added)	-
	Single factor productivity measures		**Multi-factor productivity (MFP) measures**	

***Source*:** OECD report, 2001.

In the following sections a brief discussion of each of the measures listed above (i.e., partial productivity measures, total factor productivity and total productivity measures) will be presented.

3.6.1 Partial productivity (single factor)

Partial productivity measurement is probably the most commonly used technique. Partial measures relate output to one class of input (Parsons, 2000). Output per labour hour is the best example of partial productivity measure and is the one most commonly used.

Riggs and Felix (1983) present a classical example of partial productivity (labour productivity) measurement as:

$$Labour\ Productivity = \frac{Output}{Labour\ Input}$$

This is a fraction or ratio. In case of the productivity ratio, the objective is to regularly increase the quotient or index number, the value that we get when we divide the numerator by the denominator.

As an example, if in July we produced 200 bookshelves and used 50 labour hours to do so, our productivity ratio of 200/50 would yield a productivity index number of 4.

$$Productivity = \frac{Output}{Labour\ hours} = \frac{200}{50} = 4$$

Our goal in August and beyond is to achieve ever-higher index numbers. This will indicate improvements in productivity. As revealed by Jurison and Gray (1995), Anderson *et al.* (1992), Gregerman (1984:5), and Felix and Riggs (1983), any productivity effort can be improved in either of the following five ways:

A) Output increases faster than input – " managed growth"

$$\frac{Increased\ \ output}{Increased\ \ input}$$

(But the increase in input is proportionately less than the increase in output).

B) More outputs from the same input – " working smarter"

$$\frac{Increase\ \ output}{Ma\,\text{int}\,ain\ \ input}$$

C) More outputs with a reduction in inputs – " the ideal"

$$\frac{Increase\ \ output}{Decrease\ \ input}$$

D) Same output with fewer inputs – " greater efficiency"

$$\frac{Maintain \quad output}{Decrease \quad input}$$

E) Output decreases, but input decreases more – " managed decline"

$$\frac{Decrease \quad output}{Decrease \quad input}$$

(But the decrease in output is proportionately greater than the decrease in input).

Returning back to the above labour productivity example if, in all the above cases, our index number went from 4 to about 4.2, then this resulted in a productivity improvement from July to August of 5%.

$$Percent \quad productivity \quad improvement = \frac{4.2 - 4.0}{4.0} \times 100\% = \frac{0.2}{4.0} \times 100\% = 5\%$$

Hence, our objective in our organisation is to increase index numbers as a reflection of increasing productivity. First, however, we have to devise index numbers to increase.

There is a danger, however, in using partial measures according to studies by various writers. Edosomwan (1995:81), Grossman (1993), Seigel (1976), and Craig and Harris (1973) argue that a partial measure of productivity could be misleading when viewed alone. For example, a high material productivity could project that a company is doing well although indeed, capital productivity, energy productivity, labour productivity, and other indices may be low. The actual danger of partial measure is that it over-emphasises one input and others are neglected.

Parsons (2000) and Grossman (1993) outline the major problems and advantages with using partial productivity measures.

Major disadvantages of partial productivity measures:

- They tend to overstate the increase in productivity. The reason for this is that partial productivities ignore the contribution of other inputs in their calculation.
- Since resources are looked in isolation, the effects of resource substitution on productivity and performance may easily be ignored.
- Inability to reflect the financial impacts of productivity on bottom line results.

Major advantages of using partial productivity measures:

- They are much easier to understand and to measure.
- They can be used in the measure and evaluation of unit factor costs.

Other common examples of partial productivity measures include capital productivity, energy productivity and materials productivity.

3.6.2 Total factor productivity (TFP) measures

As was discussed on the foregoing section, the most obvious limitation of partial productivity measures is that they attribute to one factor of production – (labour, capital, material or energy) – while changes in efficiency attributable to all factors of production. However, in practice it is not possible to attribute the changes in output directly to specific factor inputs. This limitation has given rise to the development of a more comprehensive measure, multifactor productivity. One of the more commonly used measures of multifactor productivities is that of total factor productivity.

Total factor productivity measures are usually based on net output (value added) rather than gross output (production or sales) as explained by many authors including Parsons (2000), Grossman (1993), and Graig and Harris (1973). Output is measured on a value-added basis, i.e., the value added by the company or industry to a product. Total factor productivity (TFP) takes the ratio of output to labour and capital services weighted by their respective prices.

A total factor productivity index (TFP) is expressed as:

$$TFP = \frac{O}{L + C}$$

Where:

TFP = Total factor productivity

L = Labour input

C = Capital input

O = Value added output

Or

$$TFP = \frac{Gross\ output - (Materials + Energy + Others)}{Labour + Capital}$$

As can be seen from the formula, to calculate TFP, one needs measures of value-added output, labour input, capital input, and labour and capital prices. While output and labour input are fairly easy to come by, it is difficult to measure capital. Book-value measures of capital (fixed) must be converted into constant dollar terms.

Materials, energy and other expenses are subtracted from the output and are also excluded from the resources. Thus, those expense items purchased from outside suppliers are excluded so that the "value added" by the organisation is considered. The productivity of the resources excluded – materials, energy, etc. – is measured indirectly through measurement of labour and capital. The advantage of TFP is that it accounts for capital-labour substitution. The main disadvantage is that it is a more difficult measure to understand and measure.

Since the data required to calculate the total factor productivity are readily available in the financial statements of the companies in the Eritrean fishing industry, this method was utilised to compute the TFP indexes.

3.6.3 Total productivity (TP) measures

The other end of the spectrum of the productivity measures is the total productivity measure. As the name suggests, total productivity measures relate total output from the organisational system to all the inputs or resources used to generate that output.

Stainer (1997) describes total productivity as the overall measure of economic effectiveness on the basis of output per unit of all resource(s). Stainer (1997) further argues that "total productivity measures form a decision-making tool and, therefore, the most relevant costs should be utilised".

Total productivity is calculated from the formula as:

$$TP = \frac{O}{L + M + C + E + Q}$$

Where:

TP = Total Productivity

O = Total Output (gross output)

L = Labour Input

M = Materials Input

C = Capital Input

E = Energy Input

Q = Other Inputs

Unlike the total factor productivity (TFP), total productivity (TP) includes intermediate goods in the measure of output as well as their inclusion in adding up inputs. Intermediate goods include purchased materials and energy. Conceptually total productivity is the more correct measure to use at the company level than total factor productivity. However, in practice, TFP is as acceptable as TP. At the industry and higher levels of aggregation, TFP is the correct measure, to prevent double counting (Grossman, 1993).

A well-designed total productivity measurement system will enable all the partials to be measured and then combined. This means that resources not ordinarily considered in constructing traditional partial measures are taken into account (Parsons, 2000).

The total productivity measure, which considers total output in relation to total inputs has been proposed by most authors. For the most part there have been significant variations in the definition of the input and output elements. Various authors have also proposed different allocation criteria for specifying the proportional contributions of each input element to the final output.

Many authors including, Parsons (2000), Jurison and Gray (1995), Grossman (1993), and Hayes and Clark (1986) mentioned the general advantages of TP measures. These include:

- Trade-offs due to resource substitution can be tracked and analysed.
- Because of total productivity's system-wide focus, it becomes possible to reconcile the results of productivity measurement with the financial position of the organisation.

However, the main disadvantage is that:

- It is the most difficult to understand and measure.

In the next sections brief discussions of three selected models of productivity measures for the multifactor inputs will follow. These include:

1. The task – oriented total productivity measurement (TOTP)
2. Productivity measurement by objective matrix (OMAX)
3. Productivity accounting model (REALST)

1. The Task – Oriented Total Productivity Measurement (T.O.T.P) Model

The task – oriented total productivity model developed and recommended by Edosomwan (1995:86) is based on all possible measurable output and input components. An incremental analysis is somewhat implicit in the model. The measures derived from this model are in the form of an index that intuitively has the following properties and advantages.

a. The indices derived use the broadest possible input (labour, materials, energy, robotics, computers, capital, data processing, and other administrative expenses) and output (finished units, processed, partial units produced, and other output associated with units produced).

b. The productivity indices derived vary with changes in task parameters, resource utilised, and output obtained from the transformation of resources.

c. The productivity indices derived are comparable over time and can objectively be used to measure the productivity of tasks, customs, products, projects, work groups, departments, divisions, and company.

d. They provide a means of focusing on key problem areas for productivity improvement. The indices identify which particular input resources are utilised inefficiently so that an improvement action plan can be implemented.

e. The indices can be used in productivity planning and improvement phases. They also offer a basis for companies in planning every phase of a product or technology development cycle.

In utilising Edosomwan's (1995:86) T.O.T.P measurement model, the following key definitions associated with the model are used.

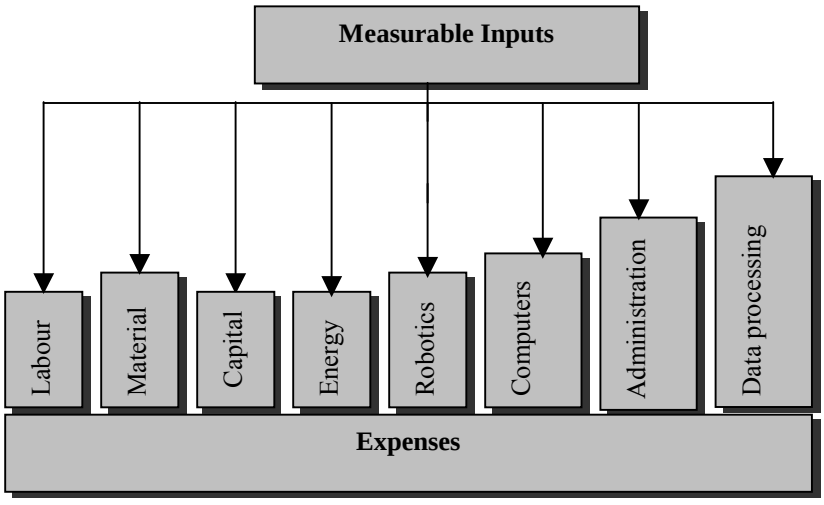
Task - At the basic level, task is a unit of work accomplished primarily at a single location (site), by a single agent, during a single time period, producing useful output from some resources available.

Total Productivity - is the ratio of total measurable output (total finished units produced, partial units produced, and other outputs associated with units produced) to the sum of all the measurable inputs (labour material, capital, energy, robotics, computers, data processing, and other administrative expenses) utilised for production.

Total Factor Productivity – is the ratio of total measurable output minus expenses to the sum of labour and capital inputs.

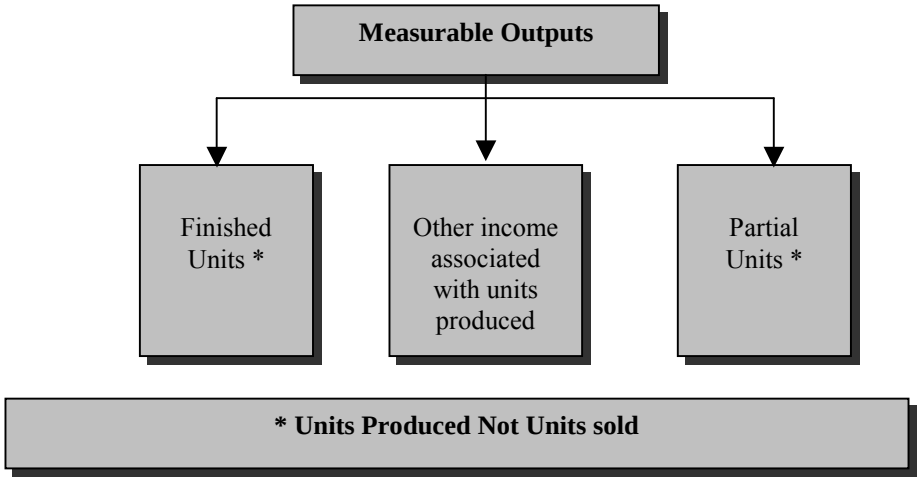
Partial Productivity – is the ratio of total measurable output to one class of measurable input (for example, labour hours utilised for production or service).
Input and output components of the task-oriented total productivity measurement model is shown schematically in the following *Figures 3.3 and 3.4* respectively.

Figure 3.3 - Input components considered in the task – oriented total productivity model



Source: After Edosomwan, 1995.

Figure 3.4 - Output components considered in the task-oriented total productivity model



Source: After Edosomwan, 1995.

2. Productivity Measurement by Objectives Matrix (OMAX)

This measure is developed by Jim Riggs at the Oregon Productivity Centre. It has been eminently successful and has found application in a very wide range of situations in many countries around the world.

According to Riggs and Felix (1983), an Objective Matrix enables management to combine all important productivity criteria into one easily communicated format. As argued by Thor (1993), most organisations are not willing to stop with the calculation of five or six separate measures but they want a single answer "bottom line". The objective matrix technique offers a convenient way of doing this.

The Objective Matrix establishes a common numerical scoring system. Management can select any combination of criteria considered important for its particular productivity mission and combine the scores of all these selected criteria to obtain a single, overall productivity index. Moreover, since all criteria are not likely to be of equal importance, in the matrix format, management distributes 100 points among the criteria to give each one a weighted numerical value that reflects its importance in relation to the others.

The Matrix therefore indicates where improvement is needed and when performance falls below the set norm.

Steps in constructing an Objectives Matrix (OMAX):

Thor (1993) and Riggs and Felix (1983) outline the following 10 steps in developing the objectives matrix:

a. Major criteria impacting productivity in a given area are identified and appropriate measures determined for each criterion as shown in *Table 3.5* (*Step 1*).

b. The current level of performance in the area is calculated for each criterion and the ensuing numerical results entered at a level corresponding to a score of 3 (Note the scores listed vertically from 0 – 10 at the right of the Matrix). While level 3 is where we are at, level 10 is where we want to go (*Step 2*).

c. Based on broad organisational goals, productivity objectives are established for all criteria. For example, the organisation targets increasing production from 590 to 800 units per labour hour, which is a 35% rise. These quantitative targets (i.e., 800) are entered at a level corresponding to a score of 10 (*Step 3*).

d. Using linear scale, step-wise goals or mini-objectives are then determined and the squares from score levels 3 to 10 are filled in with these successive " hurdles" (*Step 4*).

e. At the same time, flexibility to account for trade-offs or occasional slack periods is recognised, and figures are inserted in the squares below score level 3. Quotients associated with anything less than minimum likely performance corresponds to a score of 0. For example, 500 units are considered the minimum production (*Step 5*).

f. Since some criteria are more important than others, *weightings* are assigned to each. The sum of these weights equals 100, and can be distributed in any informative fashion. The step defines the *productivity mission* of the area in question. For example, the productivity criteria "production" and "quality" in *Figure 3.5* Objective Matrix are given weights of 30 and 20 respectively (*Step 6*).

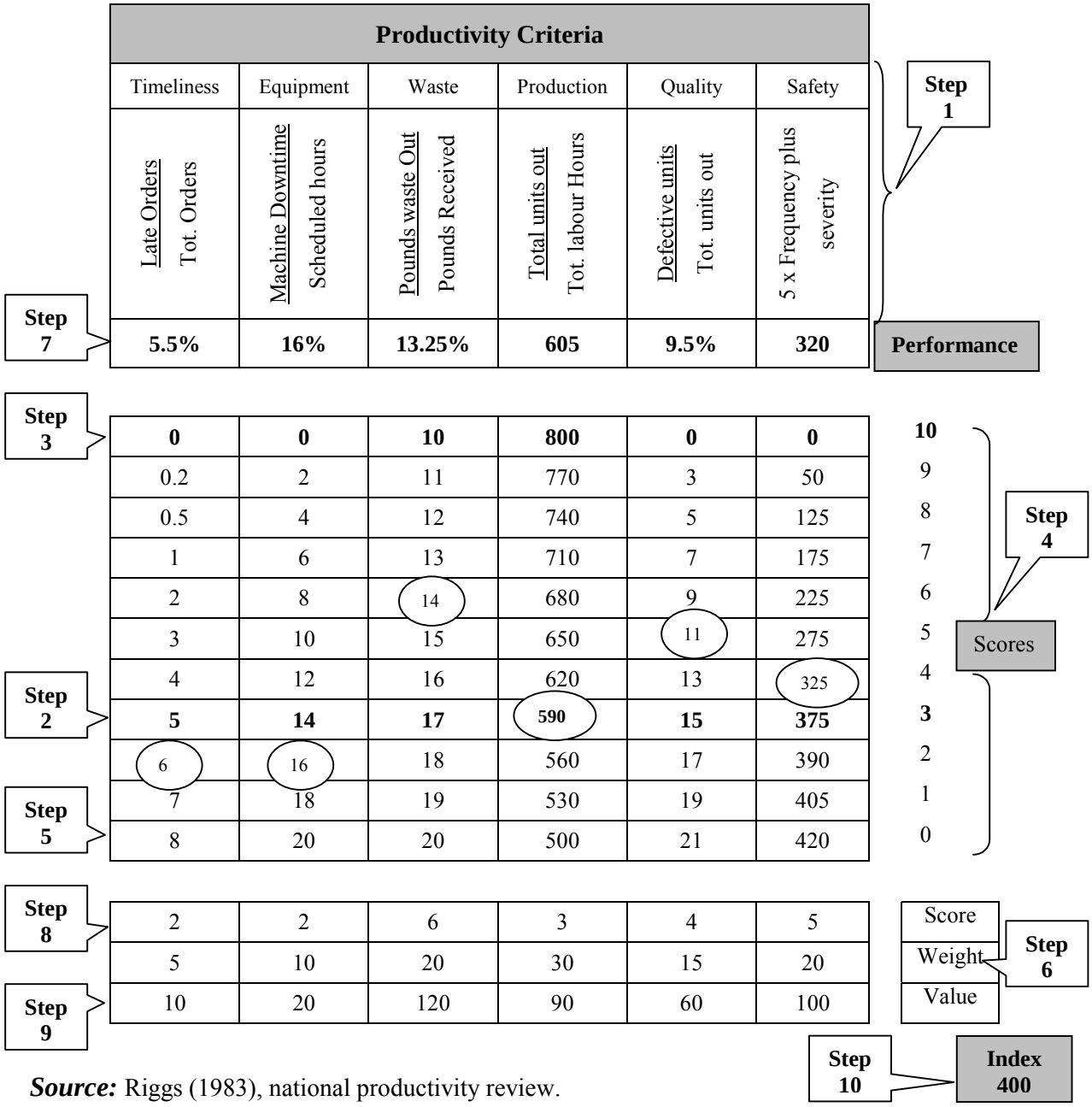
g. At the conclusion of every monitoring period, which could be once a month, quarter or a year, the *actual measure* for each criterion is calculated and placed in the "Performance" row. (Quality improved from 15% - 9.5% defect rate) (*Step 7*).

h. As shown in *figure 3.5*, the level that these achievements represent is then circled in the body of the Matrix and associated with a score of from 0-10. Scores are entered in the "Score" row of the Matrix (*Step 8*). For example, the measured current 13.25% waste rate (≈14 %) (i.e., circled) corresponds to a score of 6 in the vertically listed scores.

i. Each score is then multiplied by the weight for that same criterion, to obtain a value, listed on the bottom row (For example, 6 x 20= 120) (*step 9*).

j. The sum of all values yields a productivity index for the period (400). Over time the movement of this single index track the net results of productivity efforts in the area of interest (*step 10*).

Figure 3.5 - Objective Matrix – OMAX



Source: Riggs (1983), national productivity review.

According to the report on Productivity measurement in the service sector by Parson (2000), the rationale for, and value of, the objective matrix rests on its:

- Ability to normalise the units of the different measures specified;
- Flexibility in accommodating measures of quality, timeliness, safety, employee attitudes, productivity , and yields;
- Results/outcome orientation as against simply measuring activities; and
- Ability to measure trade-offs and produce a single, overall, measure of performance.

3. Productivity Accounting Model (Profitability – Productivity Relations)

The relations that exist among profitability, productivity and price recovery were originally developed and discussed in detail by the works of Van Loggerenberg and Cucchiaro (1981-82). Other authors including Stainer (1997), Jurison and Gray (1995) and Miller (1984) have also demonstrated the importance of this model of productivity in a price-constrained environment.

Unlike the objective matrix (as explained in *Figure 3.5*) that uses a family of measures approach, productivity accounting uses accounting figures and systems to measure productivity.

Although highly productive firms tend to be profitable, high productivity does not guarantee high profit performance. The reason why this being the situation was explained by Jurison and Gray (1995). According to these authors, profitability is defined, at the simplest level, as the ratio of sales to costs (Profitability = sales /costs). But sales are equal to output units times output prices while costs are equal to input units multiplied by their respective prices. Profitability can therefore be described as:

$$Profitability = \frac{Output\ quantities \times Output\ prices}{Input\ quantities \times Input\ prices}$$

The above equation can be rewritten as a product of two ratios:

$$Profitability = \frac{Output\ quantities}{Input\ quantities} \times \frac{Output\ prices}{Input\ prices}$$

The first part of the equation is *productivity*. The second part of the equation, (output prices to the price paid for inputs), is defined as *price recovery*. The above equation again can be rewritten to describe the fundamental relationship:

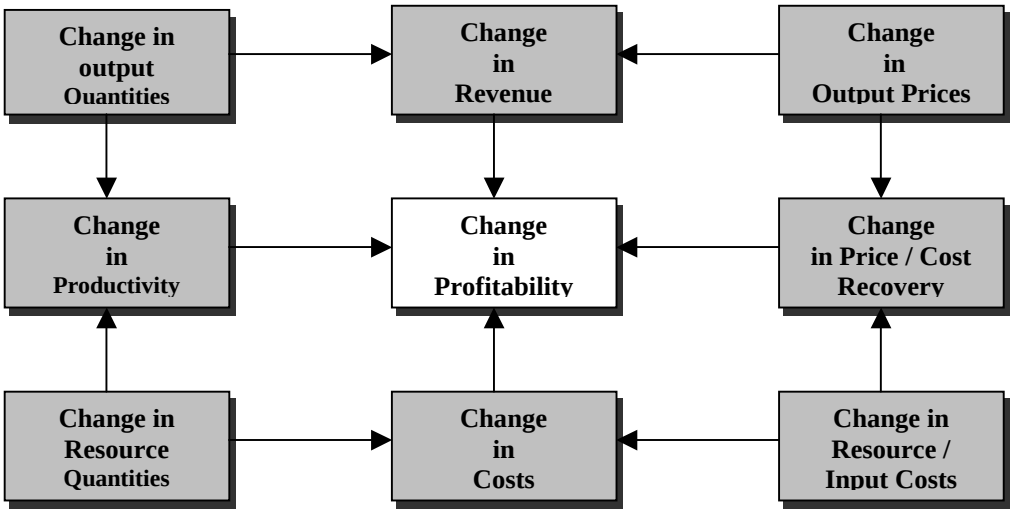
$$Profitability = Productivity \times Price\ recovery$$

This relation states that profitability comes from two sources:

1. Productivity and efficient use of resources.
2. Price recovery – which is the ability to maintain a favourable relation between prices paid for inputs and prices charged to customers.

Productivity accounting defines a clear relationship between profits, productivity and prices. The following nine-box diagram demonstrates the dynamic relations among the variables in the above equation:

Figure 3.6 - Relations among, Productivity, Price recovery, and Profitability.



Source: Van Loggerenberg (1990)

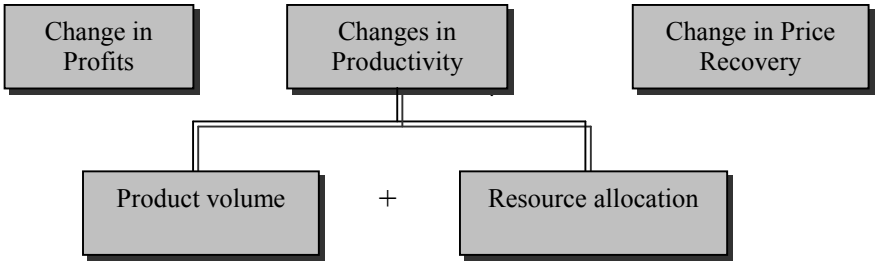
In the model, the variables that can be controlled are in the corners (output quantity, output price, resource /input cost, resource / input quantity). The business measures (revenues, productivity, profits, price /cost recovery, cost changes) are in the middle.

Suppose a raw material goes up in price (a change in resource/ input costs). This results in an increase in cost and hence a reduction of profit. *Figure 3.6* portrays that to keep profits at the same level, a firm either has to increase revenues or increase productivity. When competition does not allow passing the cost on to the customer, the only solution for the firm is to increase productivity. Thus, the model demonstrates the importance of productivity in price constrained environment (Jurison and Gray, 1995; Van Loggerenberg, 1990: 6).

Moreover, *Figure 3.6* shows that profits (financial performance) can only change through changes in productivity and price recovery. Thus, under conditions of constant productivity and price recovery no changes in profits would occur. Parson (2000) argues that productivity will be constant only when the quantity change ratio for the products equals the quantity change ratio for the resources. Similarly, constant price recovery assumes that product price changes will equal those for resources. Productivity accounting uses these basic principles to explain changes in profits and profitability in terms of the contributions of productivity and price recovery change.

Figure 3.7 below, illustrates the measurable sources of profit change in a business unit. As business profits change from year to year, management can measure to what degree earnings growth has been generated from changes in capacity utilisation, efficiency, and price recovery. In this manner, according to Loggerenberg and Cucchiaro (1981-82) a business can isolate the controllable factors, which affect profits and then measure their contribution to productivity growth.

Figure 3.7 - Productivity Accounting – Performance Variances



From a management response perspective, productivity changes are generally a function of what is happening inside the organisation. One way or another, management is responsible for:

- The technology being employed,
- The manner in which the value-adding processes are executed , and
- The markets in which the organisation operates.

On the other hand, price recovery changes are more a function of market forces. No single organisation can consistently determine the prices it gets for its products or services nor can it determine the price it is going to pay for its raw materials, energy, labour, or outside services. Therefore, management's response to a profit decline flowing from productivity loss should be quite different to its response to a profit decline resulting from an inability to recover resource prices in the market (Parsons, 2000). According to Stainer (1997), however, the weaknesses of this approach are twofold:

1. The productivity measure is over-simplified and partial.
2. Capital is invariably based on historic cost.

3.7 Productivity raising techniques

Based on the Japanese success stories in the fields of quality and productivity, Stainer (1995) summarised eight success ingredients in the long-range planning of productivity. These include:

- Commitment of top management and unions;
- Understanding of the productivity needs of the organisation;
- Creation of productivity culture towards continuous improvements (*Kaizen*);
- Creating a communication mechanism;
- Modernising technology;
- Counselling and development of human resources;

- Gain-sharing and
- Productivity integrated into corporate planning.

There are a variety of techniques we can use to increase productivity (Prokopenko, 1987:121).

1. **Work-study.** This is one of the main productivity increasing techniques designed to help management to make better use of all resources available. It pays close detailed attention to actual productive operations. Work study is normally used in an attempt to increase output from a given quantity of resources with little or no further capital investment. In many organisations the discipline is called " management services' or " organisation and methods'

2. **Capital investment.** Productivity can be increased by the injection of capital to purchase new equipment and modernise old. To be effective, capital is often required on the large scale and the results are long term.

3. **Simplification and standardisation.** These processes are often a matter of basic design in the work area, coupled by a determination by management to reduce the number and variety of products and equipment which can lead to improved productivity. Specification and design can often be simplified. The philosophy is that people know best how to do their jobs and therefore should be involved in the job improvement. Besides, they should be trusted by management and should be trained.

4. **Pareto analysis.** This principle is often called the 80/20 rule, that means 80 per cent of the results come from 20 per cent of the effort. It is a useful tool for productivity analysis since it concentrates attention on the most important few issues or problems and it helps establish priorities. Pareto analysis is used in many production and management areas such as marketing, quality control, stock analysis, purchasing, sales analysis, waste reduction processes and so on.

5. **Quality standards.** Sometimes quality standards are unrealistic, with designers and engineers demanding a quality, which is far higher than the work requires. The specification of an appropriate quality standard can reduce unnecessarily high costs.

6. **Material utilisation.** Productivity can be raised by improved control of materials, with regard to purchasing, storage, usage, issuing and transportation, simplification of product design can also affect material costs.

7. **Use of plant and equipment.** Careful and detailed planning by management is essential to ensure maximum utilisation of expensive plant and equipment. The design and implementation of effective maintenance systems are a particular help in raising productivity.

8. **Research and development.** This is essentially a long-term way of raising productivity. Existing techniques of production are improved and new processes developed, often at considerable capital cost. The results are frequently long-term.

9. **Use of manpower.** In many situations manpower represents a substantial element of cost. Effective use of manpower is only achievable through good planning based on accurate data, and adequate supervisory control. Many of the above techniques will also have implications for the use of manpower.

3.8 Chapter summary

The term productivity was mentioned for the first time in an article in 1776, and since then most authors have defined it in different ways. However, there is a general agreement that productivity refers to the ratio of outputs (products or services) to the inputs (Labour, capital, energy, materials, and other inputs). Most definitions of productivity incorporate terms like efficiency, effectiveness, resource utilisation, profitability, quality, quantity, and standard of living.

In most cases productivity growth is the major source of competitive advantage. At a national level productivity growth determines how competitive a country's products are internationally. Productivity growth is also important to the firm because it means that it can meet its obligations to workers, shareholders, and governments (taxes and regulation), and still remain competitive or even improve its competitiveness in the market place.

Productivity measures can be broadly classified into three major groups. These are partial productivity measures, total factor productivity measures and total productivity measures. Each measure group has its own strengths and weaknesses and therefore, no one measure or group is considered the best. In this study the total factor productivity (TFP) measurement approach was used to calculate productivity indexes. The reason for this that the data required to calculate TFP is readily available in the financial statements of companies. In computing productivity, the first step is to establish the output of the business, division or person being studied. The next step is to identify and measure the various inputs to that system. Finally, the output per collective use of resources is then calculated. In all the computations it is important that we adjust the figures for inflation using various price indexes.

Since the objective of measuring productivity in a firm is to use the productivity indices to indicate how the various factors are performing and then to see what improvements can be made, it is important that we compare it using either time series, benchmarking or previously set standards.

The chapter also discussed briefly some commonly used models of productivity measures including the task oriented total productivity measurement (TOTP), productivity measurement by objective matrix (OMAX) and productivity accounting model (REALST). Besides, techniques used to raise productivity were also discussed very briefly.

CHAPTER - 4

Management practices and productivity

4.1 Introduction

A better management practice at all levels of an organisation is a method that is increasingly accepted as the single best way to improve productivity. Getting better results through improved productivity is the most important task of all managers, regardless of their hierarchies (Ross, 1977:2).

This chapter aims at providing a brief theoretical background about the selected elements of management practices investigated in this study (internal and external factors) and their relationships with productivity. The internal elements of management practices discussed in this chapter include, employee training and participation, organisational communication, customer focus, product quality and leadership and competitive environment. It also summarises some previous studies related to management practices and company performance.

4.2 The working environment

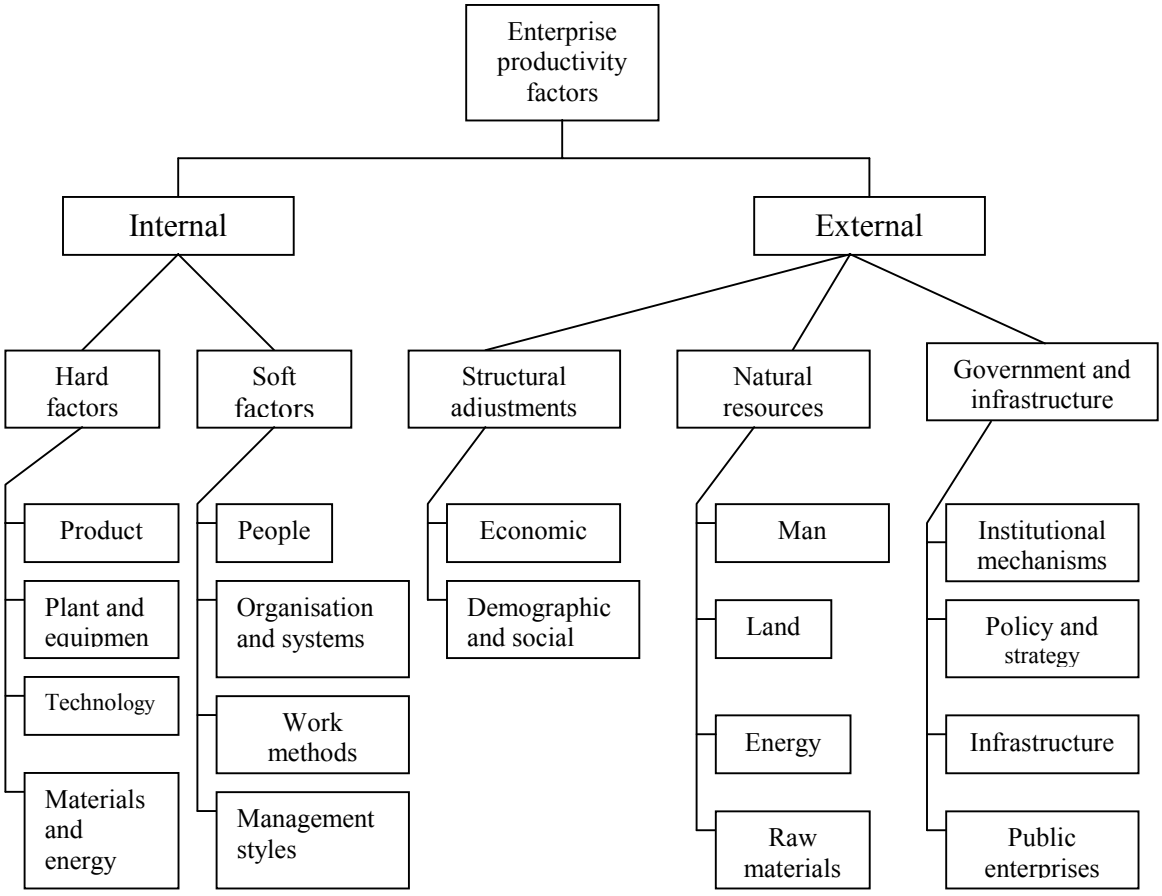
The environment in which business organisations operate is surrounded and to a greater extent influenced by the continuous interaction of a multitude of controllable and uncontrollable factors. And those prudent managers who keep the balance of these environmental interactions usually succeed in achieving the objective to make profit.
As explained by Van Loggerenberg and Cucchiaro (1982), within a business environment dictated by many uncontrollable factors, a manager seeks to improve the corporation's profit performance by judiciously allocating and utilising those corporate resources under his/her control. Prokopenko (1987:9) presents two major categories of productivity factors: namely

- External (not controllable) and
- Internal (controllable).

The external factors refer to those factors, which are beyond the control of the individual enterprise, and the internal factors are those within its control. Both the controllable and uncontrollable factors can impose significant positive or negative impacts on corporation's productivity.

Mukherjee and Singh (1975:93) have suggested the following integrated scheme of factors constituting a major source of productivity improvement.

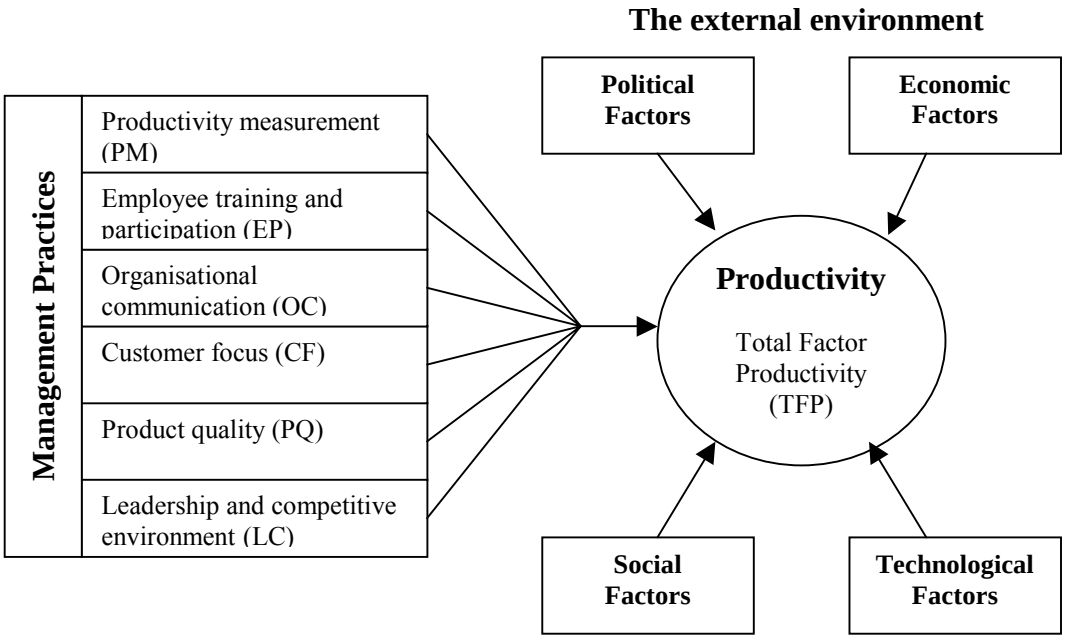
Figure 4.1 - An integrated model of enterprise productivity factors.



***Source*:** Adopted from S.K. Mukherjee and D. Singh, 1975.

Although the core management practices (both internal and external) that affect productivity are company-specific, considering the limited scope of this study and the researcher's experience in the Eritrean fishing industry, it was attempted to identify only a generic set of management practices. The selected set of management practices is believed to have a direct effect on the productivity of the companies operating in the Eritrean fishing industry. Thus, the emphasis of this chapter will be on the selected managerial practices, which are the internal management practices (related to human aspect of organisations), and some external management practices and their impact on productivity. Therefore, the objective of the integrated model presented in *Figure 4.1* above is just to give a broad perspective of the factors of productivity and the discussions will be limited to the management practices identified. For the purpose of this study the following framework was developed.

Figure 4.2 - The study framework.



In the next sections, brief discussions of the management practices (the left part of the study framework) will follow. However, since the productivity measurement and standards (PM) element of the management practices was discussed in detail in chapter three (*sections 3.5 & 3.6*), here no further discussions will be presented on this subject.

4.2.1 Employee training and participation

Input to a manufacturing system can be grouped into two categories: i.e., the human part and the material part. The material part consists of such items like raw materials, equipment, energy, capital, machinery, etc., which are generally fixed in nature, while the human part basically consists of the people, workers or employees in the organisation. The issue of generating better productivity is actually people – oriented, the human resource factor (Sauian, 2002).

Involving employees in decisions made relating to their work is a fundamental principle of good management. According to Cotton (1993:25) the notion of employee participation is that through employees participation in decision making, by making the workplace more democratic, and by empowering employees, certain outcomes like productivity of an organisation may improve.
As purported by Stainer (1995), the Japanese Productivity Centre has three guiding principles based on the conviction that productivity improvement could not be achieved without positive labour participation as well as sound and constructive labour management relations:

- *Increase of employment*: in the long run the improvement in productivity will increase rather than reduce employment;
- *Labour-management co-operation*: in order to increase productivity, labour and management must work together; and
- *Fair distribution of productivity gains*: the fruits of improved productivity should be distributed fairly among management, labour and customers.

Stainer (1995) reveals that the Japanese consider that productivity is not merely an output/input ratio but that it involves, in a substantial way, the human element.
As affirmed by their study Cotton *et al.* (1988) employee participation in work decisions has relatively consistent and positive effects on productivity.

When we say employee participation (Raiborn and Payne, 1996) firstly, employees are involved not only in decision-making but also in the creative thought processes that precede decision-making. Secondly, not only are employees involved, they are empowered. Employees can only be truly empowered if the following three factors are present: the employees are involved in organisational planning; have the abilities and tools to perform tasks well; and can trust and be trusted by management. Given these factors, employees will be able to commit themselves to pursue the organisational goals and objectives.

At a minimum, involvement in organisational planning would require that employees have been told of the basic business strategy. However, to truly empower employees, involvement means that the company has pushed decision-making authority down to the lowest reasonable level of organisational positions. Employees need to receive feedback about their new level of involvement; measures of performance and reward structures must be developed that recognise the employees' new participation activities (Raiborn and Payne, 1996).

The "right" management system to support employee self-growth will be one, which encourages employees to "stretch" beyond their traditional job-description boundaries. That is to say, an employee's role will not be defined by a traditional piece of paper, which can limit opportunities, but instead will be inspired to climb over these artificial walls. With the right management system, leaders at all levels in the organisation do not feel threatened or concerned that others will surpass their own level, but instead they encourage employees to take risks and expand their thinking (Beach, 1996). Stainer (1995) puts forward the Japanese productivity experience in relation to employee attitudes as " productivity is seen as a way of life, where the employee becomes a 'source' of improvement rather than a mere 'resource'. Overall, organisational productivity is emphasised in long-term gains and synergy".

An environment that encourages employee identification with the firm and co-workers may enhance corporate performance (Blasi *et al.,* 1996). Furthermore, participation may

raise productivity if workers are better equipped to motivate and monitor each other than management (Brown *et al*., 1999).

Enhancing productivity through human resource management is the objective of management lead involvement techniques. According to Ichinowski *et al.* (1996) focus can either be on effort and motivation of workers and work groups (how to work harder) or on improved efficiency through changes in the structure of the organisation (how to work smarter). Involvement schemes will induce employees to higher efforts because work is experienced as less tiring and more interesting due to higher degree of feed-backs and rewards. Furthermore, employees generally have more complete knowledge and information about their work tasks and processes than do managers and are in a better position than managers to plan and schedule work, to organise work tasks and work flow, and to otherwise identify and resolve obstacles to achieve optimal performance. Occasionally, employees can provide technical information to management that would otherwise be costly or time-consuming to obtain.

Training:

Human resource planning is the most powerful tool of any organisation's success and the training of employees is regarded as one of the most important functions of effective resources management. In order to obtain a competitive edge in providing the best services to the customer, training which will develop a well-trained workforce is vital to improve productivity. New professionals may require it to enable them to obtain their professional qualification. Others may need it for a specific purpose such as the development of a new service. In a situation of less development, people need training even more because if a job becomes drudgery, it cannot be performed effectively (Jain, 1999).

As advocated by Cosh *et al*. (1998), an educated and well-trained workforce is considered to be essential to the maintenance of a business firm’s competitive advantage in a global economy. It is also believed that training can and should be a powerful agent to facilitate a firm’s expansion and development of its capabilities, thus enhancing profitability.

According to Rowley (1995) "Training and development is important for the maintenance of the human resource base of the organisation and must be viewed as an integral part of the core organisational strategy, rather than an ad hoc operation issue". The idea is that a lack of training results in a lack of skill to use the knowledge existing in a person, which causes ineffective services, a lack of self-satisfaction, customer dissatisfaction and ensuing lower productivity. The provision of training will foster an increase in professionalism and further exploitation of management methods, whereas a lack of training can cause frustration and lack of job satisfaction. Well-trained individuals know the scope, expectations and depth of their jobs and will be able to add building blocks to their professionalism as they progress through their careers. Training is therefore critical for human resource planning and development (Pugh, 1984).

As employees learn more, they are then better able to perform their current tasks, analyse those tasks and suggest methods of improvement, acquire new skills, and participate at greater levels of organisational planning (Railborn and Payne, 1996). In addition Railborn and Payne (1996) argue that the organisation must provide employees with the appropriate tools (equipment, information, and authority) to perform their jobs in a manner consistent with the organisational objectives.

Training consists of organised learning activities capable of improving individual performance through changes in knowledge, skills, or attitudes. The training process includes such activities as identifying employee training needs, designing annual training plans, advising training objectives, choosing delivery methods, implementing training programmes, evaluating training results, and documenting records. As an organisational subsystem, training must be closely co-ordinated with overall business strategy and the activities of line departments. Therefore, setting up a specific department within a firm to organise and implement employee training and development may result in more effective training (Huang, 2001).

Compensation and recognition:

When organisations ask employees to assume new challenge and responsibilities, the question "what's in it for me?" ultimately gets asked. Compensation and recognition refer to all aspects of pay and reward, including promotions, bonuses, and recognition, either monetary and non-monetary (Evans and Lindsay, 1999:303).

According to Sabo (1993) recognition is one of the most effective incentives for improved performance. Recognising the self-motivated, self-managing, and highly productive individual encourages the continuing development of that person's abilities, while also allowing the individual to set a good example for others. Many incentives are more important than money; recognition is a very effective motivator. Sabo (1993) identifies two key methods of recognising employees:

- *Promotion from within.* As the most effective means of recognising every employee's potential for development.
- *Employee of the year awards.* Every employee is considered potentially eligible for these annual awards regardless of the capacity in which that individual serves the company.

Similarly, Evan and Lindsay (1999:305) list six key practices that lead to effective employee recognition and rewards:

- Giving both individual and team awards;
- Involving everyone. Recognition programmes involve both front-line employees and senior management;
- Tying rewards on measurable objectives. Recognise and reward behaviour, not just results;
- Allowing peers and customers to nominate and recognise superior performance;
- Publicising extensively. Many companies recognise employees through newsletters, certificates, special breakfasts ...etc; and
- Making recognition fun.

Thurow (1993) suggests that, if productivity is to grow rapidly, it must be made visible and individual incentives must be aligned with communal incentives. No one works to improve an invisible variable and few will work to improve a variable that raises the average incomes but lowers their own personal income. Piercy (1995) reveals that in some instances the best companies reward and value those who break the rules to do a better job for the customer.

Productivity and quality of work life (QWL):

Schermerhorn (1993: 9-10) discusses the importance and influence of the quality of work life in productivity. The productivity issue of resource utilisation includes a significant concern in today's world of strong social values - the way people are treated as human resources in the workplace. Ideally, productivity is achieved through high performance with a sense of satisfaction by the people doing the work.

The term quality of work life (QWL) is frequently used as an indicator of the overall quality of human experiences in the workplace. Managers are increasingly expected, and rightfully so, to facilitate productivity for the organisation while maintaining the quality of work life for its members. The QWL concept expresses an important respect for people in their work environments. Schermerhorn (1993:10) lists the major attributes of a high quality of work life. According to the author, a high quality of work life offers the individual such things as:

- Adequate and fair pay for a job well done;
- Safe and healthy working conditions;
- Opportunity to learn and use new skills;
- Room to grow and progress in a career;
- Social integration into the organisation;
- Protection of individual rights;
- A balance of work and non-work demands; and
- Pride in the work itself and the organisation.

A report by Parsons (August 2000) on *Productivity Measurement* shows a clear relationship between job satisfaction and productivity. According to Parsons this was evidenced by the findings of researchers from the United States who discovered, in almost all cases, that job satisfaction is associated with productive behaviour whilst stress and dissatisfaction are associated with non-productive behaviours. The study further revealed that low morale and motivation levels would lower productivity levels. As discussed in chapter three, productivity is not only affected by the technical factors but it is also a function of social processes and the quality of work life is an indicator of how well the social aspects are being managed.

4.2.2 Organisational communication

Organisations today are information rich. They are also increasingly " high-tech". But we always need to remember that people still drive the system. And if people are to work together well and commit their mutual talents and energies to create high performance organisations, they must excel at interpersonal communication (Schermerhorn *et al*., 2000:337). The word communication is derived from the Latin word "communis," meaning commonness, and it is this commonness of meaning in the message that the sender and receiver are trying to achieve through the communication process. However, commonness in meaning is a difficult task to achieve (Ross, 1977:47).

Dessler (1985:333) defined organisational communication as " the subject that deals with the exchange of information and transmission of meaning throughout the organisational hierarchy". Similarly, Daft (1997:560) has defined organisational communication as " the process by which information is exchanged and understood by two or more people, usually with the intent to motivate or influence behaviour".

Ross (1977:47) discusses the role of effective communication systems on organisational productivity. Ross argues that productivity is directly affected by the way people communicate in organisations. "A breakdown in communication is as costly as the breakdown of machines, the loss of sales, a poor engineering design, or material stock

outs". It is important to remember that the operation of all other subsystems of a business and the integration between subsystems depends on good communication. The author further wrote "if we can draw an analogy between a company and the human body, organisation structure is the anatomy and communication is the nervous system". That is to say both are required to make the system work.

As pointed out by Owusu (1999), communication is an essential function because it is the foundation for transmitting management objectives and provides means for understanding those objectives. Communication can have one or more of several purposes:

- To furnish information or transmit data.
- To persuade people.
- To give directives or direction.
- To gather information or receive input.

Owusu (1999) argues that in order for the people, who receive a communication, to take the desired action or retain the desired knowledge they must accept and understand the message.

The process of communication is at once simple and complicated. It revolves around three basic factors: a sender, a receiver, and a message. The sender and the receiver can be either individuals or groups since the process works irrespective of the numbers involved (Gray and Smeltzer, 1989:548; Schermerhorn, 1989:333; and Dessler, 1985:323). The communication cycle is not complete until the sender receives some sort of feedback regarding the receipt of the message by the receiver. The sender must evaluate the impact of the message by some action or response that is appropriate to the message and the receiver. A lack of feedback seems to be the central problem throughout history (Ross, 1977:47).

Organisations by their very nature tend to create barriers to communication. Information systems, organisation structures, authority arrangements, policies, controls, and other

"trappings" of formal organisational complexity make communication difficult (Ross, 1977:48). Other organisational barriers include physical distraction, information overload; time pressure; technical and in-group language; status differences, and absence of formal communication channels (Kelly, 2000). However, Ross (1977:48) argues that the challenge is to communicate despite these complexities.

According to Schermerhorn *et al.* (2000:342) information flows in organisations through both formal and informal channels of communication. Formal channels follow the chain of command established by an organisation's hierarchy of authority. For example, an organisation chart indicates the proper routing for official messages passing from one level or part of hierarchy to another. Because formal channels are recognised as authoritative, it is typical for communication of policies, procedures, and other official announcements to adhere to them. On the other hand, "much net working" takes place through the use of informal channels that do not adhere to the organisation's hierarchy of authority. They coexist with the formal channels but frequently diverge from them by skipping levels in the hierarchy or cutting across vertical chains of command. Informal channels help to create open communications in organisations and ensure that the right people are in contact with one another.

In too many organisations, communication moves only one way, from the top down. Incentive management, with its respect for each individual, demands two-way communication. When employees know what is expected of them, they have the opportunity to do their best. One critically important job of management is to be clear about its expectations. This means consistently communicating those expectations, and also setting a good personal example for employees to follow. This way, effective communication becomes part of the daily life of the organisation (Sabo, 1993).

The direction of organisational communication flow is divided into three directions: downwards, laterally, and upward (Schermerhorn *et al*., 2000:343-344 and Dessler, 1985:335). Downward communications are transmitted from superior to subordinate and consist of messages regarding things like what the job entails, procedures and practices to

be followed, and feedback on performance. Lateral or horizontal communications involve communications between departments, for instance, between a salesperson and a production supervisor. Upward communication (from subordinates to superiors) can provide management with valuable information concerning how the organisation and its employees are functioning. Upward communication can take many forms, including budget reports, morale surveys, and grievance procedures through which employees are permitted to appeal disciplinary action to top management.
Barry (1991) argues that the power of internal communication both vertical and horizontal, is central to employee involvement thus, regular and meaningful communication at all levels must occur.

Communication and trust between management and workers are prerequisites to making a company a world-class organisation. Many managers of different organisations have realised the danger of solely considering people (workers) as a mere extension of production machines or an expendable commodity (Owusu, 1999). They have, also, realised that respecting people (i.e. considering their capability to think and not just to perform physical work) is the foundation of any durable improvement of the company's performance and management style. Owusu, (1999), warns that any view short of this denies the worker the right to be human because it does not recognise the worker's ability to think and suggest some improvements toward a better and safer working environment and better ways to produce goods and services.

The government body, which is in charge of the Eritrean fishing industry is the ministry of fisheries of Eritrea (MoF). Rules, regulations and policy issues related to the entire industry's operation are communicated through written procedures. Once the messages are communicated, it is then the obligation of management of the private to inform their employees through appropriate mediums of communication. However, the degree of effectiveness in communicating the right message at right time throughout an organisation depends on how well these companies have established their communication systems. It is therefore, attempted in this study, to find out the degree of effectiveness of each of the companies' communication system as perceived by the participating managers.

4.2.3 Customer focus

Defining a business in terms of making profits is too a narrow definition because, in a broader sense, the first valid business purpose is to create a customer. Thus, every business must satisfy its customers or it will fail (Drucker, 1974:61). The commonest use of the word 'customer' is perhaps in the context of a typical retail transaction. In this situation, a customer comes in, decides what he/she wants, pays the money and receives the goods or services. Here there are three important activities, these are deciding what to have, paying the money, and using, consuming or benefiting from the goods or services. The activities correspond to three roles of a customer: as a decision-maker, as provider of money and as consumer/user (Wood, 1997). Therefore, the concept of effective customer focus in organisations is simply a way of trying to ensure that what is produced is likely to correspond to what potential purchasers want to buy (Wood, 1997).

The Eritrean fishing industry has both local and foreign customers for its products. These customers include wholesalers, retailers and in some instances the government. As mentioned in chapter two of this study, its products to the market include fishing boats, tourist boats, various species of fish (processed and semi-processed), frozen and fresh fish, ice-making plants for the fishermen...etc. It is expected that particularly the customers of the their export markets are very sensitive to the quality and price of its products due to the high level of competition. The way these customers are handled by the private companies would definitely affect their production and productivity. Therefore, it is important that they give a special attention to the customer. Thus, the objective of this section is to lay a general concept about the subject matter of customer focus.

The ever-changing tastes of customers and pressure from competitors induce firms to adopt proactive strategies to retain and /or gain market share. Hence, continuous improvement of the products or services that a company offers to its customers is essential for the very survival of a company. Productivity can be enhanced through both incremental and breakthrough improvements by decreasing costs and/or improving performance. Performance is enhanced through greater responsiveness, shorter cycle time

for new products, better products, shorter throughput time and unique marketing, engineering or production strategies. Costs decline by reducing errors, defects or wastage (Khan, 2003).

Despite the ever-changing tastes of customers, however, meeting customer expectations is often considered the minimum requirement for a company to stay in business. To be truly competitive, companies must surprise and delight customers by going beyond the expected (Evans and Lindsay, 1999: 183). The customer may be both from within or outside the organisation. Outputs that meet the expectations of the customers are normally considered as achieving the minimum quality level (Sauian, 2002).

According to Stainer (1995) the most prominent approach for the Japanese long-term productivity thinking is in the field of continuous improvement (*Kaizen*). In the Japanese philosophy, productivity is seen as comprehensive holistic phenomenon, encompassing all elements required to improve products and services. This includes the satisfaction of customers as well as the optimisation of resources and inputs. The "pull" approach has been developed so that the organisational effort is linked to, and driven by, customer needs rather than being a "push" by management.

It is obvious that delighted customers are the prime determinant of sustainable competitive advantage for any organisation. In an effort to retain current customers and entice new once a company needs to focus on providing value to the customer and should be in a manner that is more effective than that of its competitors. Customer satisfaction transforms into customer delight when goods or services exceed customers' expectations. Thus, understanding what the customer wants is crucial. When a company directs all its efforts towards this goal, it automatically produces only what is required by its customers. This leads to higher sales and operating profits for the company as customers pay more and buy more when it comes to quality products that they want. It also curbs inventory pile-up of both unsold and returned/rejected inventory as well as recall costs, warranty claims and product liability costs. As discussed above company customers are not only external but also internal (employees). When care is taken to satisfy the requirements of internal customers, items are produced according to specifications thereby minimising

defective items, the cost of rework and subsequently throughput time. Hence, customer focus enhances effective productivity by reducing internal and external failure costs along with ensuring that only those goods are produced that are in demand (Khan, 2003).

Despite all efforts to satisfy customers, every business experiences unhappy customers. Complaints can adversely affect business if not dealt with effectively (Evans and Lindsay, 1999: 196). If we truly believe that customer satisfaction and loyalty is critical to the success of our business, then we should measure and evaluate that satisfaction level (Piercy, 1995). To do so, it is important to have measures in place to assess how well the products and services meet the customer requirements and to identify their future needs.

Effective resolution of complaints increases customer loyalty and retention. Many customers do not complain because they feel it wouldn't do any good or they are uncomfortable with the process. World-class organisations make it easy for customers to complain. Complaints provide a source of product and process improvement ideas. To improve products and process effectively, companies must do more than simply fix the immediate problem. They need a systematic process for collecting and analysing complaint data and then using that information for improvements (Evans and Lindsay, 1999:196). Retaining customers means dealing effectively and speedily with any complaints. Again, this is easier if we have access to appropriate information about them and their past record of dealing with the organisation (Limehouse, 1999).

A variety of methods are used by companies to collect information about customer needs and expectations. Some of the key approaches to gathering customer information include: comment cards and formal surveys, focus groups, direct customer contact, field intelligence, study complaints, and Internet monitoring (Evans and Lindsay, 1999: 186).

According to Evans and Lindsay (1999:197) through feedback, a company learns how satisfied its customers are with its products and services and sometimes about competitors' products and services. Measures of customer satisfaction allow a business to:

- Discover customer perceptions of how well the business is doing in meeting customer needs both in terms of its product quality and price affordability.
- Compare the company's performance relative to competitors. How well is the fishing industry performing comparing to other similar industries.
- Discover areas for improvement, both in the design and delivery of products and services. This is, in fact, the objective of any productivity programme initiative.
- Track trend to determine if changes actually result in improvements. The fisheries industry taken as a one or separately can make use of the feedback from their customers to track if they are showing any improvement.

4.2.4 Product quality

Quality should not be overlooked by management and, therefore, the measure of output must be integrated with the quality level required to satisfy customer needs. According to Thor (1994: 95) the most profound statement used to connect productivity to quality is that whereas productivity is what ultimately makes organisations competitive, quality is the best way to achieve that productivity.

Quality is a difficult concept to define, since it may be tied up to individual perceptions of value for money, as well as expectations of performance and appearance. There have been a number of attempts to express a simple definition of quality. One common definition of quality that is shared by most authors is "conformance to specification or standards" (Mohanty and Yadav, 1994). An alternative based on the teachings of Juran is "fitness for purpose". More recent definitions feature the customer's complete satisfaction, excitement, or delight with the final product or service (Mohanty and Yadav, 1994).

Organisations have traditionally tried to ensure quality through error detection. They focus on the final product, inspecting it after it has been made. The objective of this strategy is to sort conforming from non-conforming product. More recently, some organisations have tried to ensure quality through prevention. They focus on inspecting

products in stages as they are being made. Like detection, the objective of this strategy is to sort conforming from non-conforming product, only further upstream. Detection and prevention strategies misinterpret and underestimate what is needed to reduce the high percentages of waste generated by organisations. Instead of dealing with defects once they are partially or completely made, organisations should focus on not making them in the first place. Organisations can avoid making defects by improving the whole process that makes the output (Hertz *et. al*., 1997).

Continuous improvement and learning should be an integral part of the management of all systems and processes. Improvement may take any one of several forms (Evans and Lindsay, 1999:122):

- Enhancing value to the customer through new and improved products and services.
- Reducing errors, defects, waste, and related costs.
- Improving productivity and effectiveness in the use of all resources.
- Improving responsiveness and cycle time performance.

The productivity-quality connection:

It was discussed by the work of Edosomwan (1995: 65) that productivity and quality are connected, interrelated, and inseparable. His studies assert that productivity increases as quality improves. Danforth (1984) points out the wrong perception shared by too many people who think that high quality always costs organisations more. However, according to him producing more- inefficiently – at the expense of quality is no way to increase productivity.

Similarly, Helms (1996) suggests that productivity stems from fully implementing the philosophy of avoiding waste and respecting people. This includes not wasting materials, human efforts or machine time. It is also a policy of no mistakes as organisations continually strive to achieve perfection in all stages of their operations. The idea is to strive towards:

- Minimising inventory investments;
- Shortening the production lead times;
- Reacting faster to demand changes with time-based competitiveness strategies; and
- Uncovering and correcting quality problems.

As advocated by Howard (1994), quality programmes can directly improve productivity in a company of any size, regardless of whether it is a start-up, a struggling young firm, or an older family firm looking for an added age against the competition.

To build quality into the total operational flow, all personnel must take individual and group responsibility for maintaining and improving quality. The ability to balance productivity and quality goals, objectives, resources and expected results at all levels throughout an organisation can make a difference in achieving total customer satisfaction and improved organisational performance (Edosomwan, 1995:66).

As suggested by Edosomwan (1995:66) one approach for balancing productivity and quality results is to apply the Productivity and Quality Assessment Matrix (PAQAM) shown in *Figure 4.3*. The steps when implementing PAQAM are listed below.

Step one: Perform a thorough current environment analysis with focus on organisational strengths and weakness, sources of quality and productivity problems; classify all work processes by product mix, procedures, and specific operational units goals and objectives.

Step two: Develop a continuous improvement system for managing the input and output components of work cells.

Step three: Train everyone on productivity and quality management concepts and techniques.

Step four: Develop measurement methods for productivity and quality at the individual task and organisational levels. (Quality can be measured by percent defective, internal failure costs, external failure costs, appraisal costs and prevention costs).

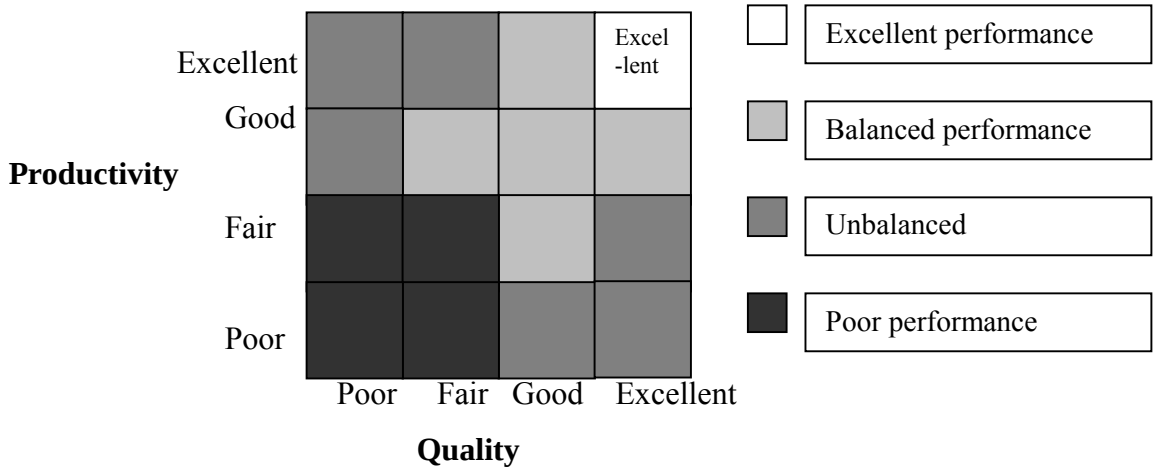
Step five: Classify the productivity and quality measures obtained in step four in major categories: poor, fair, good, and excellent. Plot the values obtained in the PAQAM assessment matrix.

Step six: Perform a root cause analysis to determine why a particular performance appears on each region. Implement improvement actions to correct and move a poorly performing individual or task to the region of productivity and quality excellence. Recommended strategies in correcting performance include:

- Provide on-going counselling and feedback on performance level. Let a poorly performing individual know how well he or she is doing on the job.
- Provide the required classroom training to correct deficiency in skill level.
- Provide the required on-the-job training (coaching) to correct deficiency in skill level.
- Match skills to the right job.
- Use experience personnel who perform highly to train poorly performing individuals.
- Let the poorly performing individuals accept ownership on gradual improvement steps to correct a low performance level.
- Reward improvement promptly by appropriate feedback.

Step Seven: Follow-up periodically on open issues and base productivity and quality rewards in balanced accomplishments (Edosomwan, 1995:68).

Figure 4.3 - Productivity and quality Assessment Matrix (PAQAM).



4.2.5 Leadership and competitive environment

In the final analysis managerial skill is responsible for the efficient use of all the resources under its control. The degree, the orientation, or absence, of management skill will greatly affect productivity of an enterprise through its output. In addition, the leadership's response to the ever-changing competitive environment (i.e., using various mechanisms including marketing strategies, new product development etc) is very decisive in influencing the level of productivity.

In some countries there is a view that management is responsible for about 75 per cent of productivity gains. The reason is that management is the one responsible for the effective utilisation of all resources under an organisation. As revealed by one productivity expert and consultant to many Japanese companies, as much as 85 per cent of the quality and productivity problems in United States industry are common problems of the system that lies within the area of management, and not the individual worker (Harold, 1985).

A study by Tjosvold, *et al*. (2002) shows that leaders can be distinguished according to their orientation and values as: productivity orientation and people maintenance orientation leaders.

a) A productivity orientation shows that the leader wants employees to follow procedures and instructions so that they work productively.
b) A people maintenance orientation demonstrates that the leader is supportive and concerned about employees as people.

These two dimensions can be independent so that leaders can be high or low on both orientations. Overall, their research shows that a people's maintenance orientation may be particularly useful for such outcomes as satisfaction and productivity for task accomplishment. Their study further suggests that, leaders should strive to be high on both people and production values to maximise constructive outcomes.

Ross (1977:64) lists the following general requirements that help managers to be effective leaders. These are:

- Conflicts should be resolved in due course, before it is too late for it to damage co-operation, organisational integration, and achievement of results.
- Managers should allow employee participation in decisions.
- Management should encourage creativity and innovation in work methods to improve results.
- Based on upward communication (i.e., from subordinate to superior) and goals established by subordinates, managers should manage by results.
- Provision for control and feedback should be provided to fulfil the requirements of:
    a) a clear understanding of expected results;
    b) information on progress; and
    c) information for self-monitoring and control.
- Morale should be maintained to support good performance.
- Negotiate and maintain commitment to goals that are established in the superior subordinate relationship.
- Set stretch objectives that require employees to "reach out" for productivity and satisfaction. Employees should not be confined to the traditional job description.
- Develop employees by providing opportunities for growth including training.
- Focus should be on opportunities and not problems.
- Utilise appraisal as an opportunity for setting future objectives rather than focusing on reward or punishment based on past performance that is judged on traits.
- Managers' style and behaviour should have a positive impact on organisational longevity and growth.

According to Evans and Lindsay (1999: 230) an effective leadership system creates clear values that reflect the requirements of company stakeholders, and sets high expectations for performance and performance improvements. It builds loyalties and teamwork based upon these shared values, encourages initiative and risk taking, and subordinates organisation to purpose and function. It also includes mechanisms for leaders' self-examination and improvement

Effects of marketing orientation on company performance:

A study conducted by Avlonitis and Gounaris (1997) provide a solid ground that supports the existence of a relationship between marketing orientation adoption and company performance. As to the direction of this relationship (i.e., whether marketing orientation leads to better performance or vice versa) it demonstrates that the development of marketing orientation contributes to the company's performance and not the other way round.

4.2.6 External factors affecting productivity

The performance of a firm is highly related to the fit between the environment and its organisation. Morgan (1999) suggests that in order for decision-makers to be successful in their work roles, they are required to be vigilant in their assessment of environmental conditions and evaluate whether the existing fit with the firm is desirable or whether some form of strategic intervention is necessary.

External factors include government policies and institutional mechanisms; political, social, and economic conditions; the business climate; the availability of finance, power, water, transport, communications and raw materials. They affect individual enterprise productivity, but the organisation concerned cannot actively control them. However, these factors should be understood and taken into account by management when planning and implementing productivity programmes (Prokopenko, 1987:15).

In the next paragraphs a brief discussion of some of the external factors will follow. The categories presented by Prokopenko (1987:15-21) and Van Loggerenberg (1990:2) are summarised as follows:

***Physical/ geographical factors*:** the physical component is given by the natural endowment and is subject to little intervention by man. Geographical factors affect the availability of indigenous sources of raw materials or fuel. For example, the discovery of exploitable ores at shallower depths in mining or the availability of plenty of fish stocks could raise productivity.

***National culture**:* the national culture of a society can change and thereby raise productivity. The acceptance of a work ethic and a profit motive by a society whose value system previously devalued such notions will improve motivation, production and productivity.

Government and infrastructure: which play an important part in establishing the conditions under which firms operate. Financial policies affect interest rates and therefore the cost of capital and its availability. Tariffs and import quotas are factors, which have to be considered prior to investment decisions being taken.
Government policies, strategies and programmes greatly affect productivity through:

- Practices of government agencies.
- Regulations (such as price control, income and wage policies).
- Transport and communications.
- Power.
- Fiscal measures and incentives (interest rates, tariffs, and taxes).

Many structural changes that affect productivity result from laws, regulations or institutional practices. In addition, the whole area of government productivity itself is extremely important because it enables governments to render more services with the same resources or to provide the same services at lower cost.

d) Market: conducive market conditions may favourably affect productivity. This can be explained by the demand and supply conditions of fish. For instance, when the supply of a highly demanded fish species in the market is in a limited quantity, it is expected that prices for that particular fish will rise up. Fishermen (suppliers) will work hard to satisfy the demand by supplying more quantities of fish at better prices and hence affect their productivity favourably.

4.3 Integrating various management practices and performance

This section discusses and evaluates previous studies related to management practices and firm performance.

Tan *et al*. (1999) carried out a survey to determine whether a particular firm's competitive environment (CE); total quality management (TQM), supply base management (SBM), and customer relations (CR) practices can impact corporate performance in some US firms. They proposed the following four hypotheses:

H1: A firm's competitive environment and management's responsiveness to it affects its performance.
H2: The use of TQM tools and practices positively affects performance.
H3: Effective management of the supply base positively affects performance.
H4: A customer relations focus is positively related to high levels of performance.

To test the above propositions, a survey instrument was developed based on the constructs described above. Questions were designed using a seven point Likert scale. Respondents were asked to indicate the performance of their firm compared to that of major industry competitors, the level of competition in their firm's primary industry, the extent to which they used the quality and supply base management practices of interest, and their ability to monitor customer relationships. The survey was sent to 1,469 individuals identified from an American Society of Quality Control list of 3,000 quality directors and vice-presidents. The firms represented by these individuals operated in a broad range of industries including the automotive, chemical, computer, construction, consumer products, defence, electronics, industrial products, medical device, packaging, pharmaceutical, paperboard, semiconductor, and telecommunications industries.
In all the cases, the results of their study revealed that the factors examined above (i.e., CE, TQM, SBM, and CR) were directly and positively correlated with overall firm's performance.

Similarly, Sohal and Anderson (1999) attepted to determine the link between quality management practices and company performance in 62 small and medium-sized companies in Melbourne, Australia. The questionnaire used for the study was based around the Australian Quality Awards framework.

In doing do, they identified six independent variables and one dependent variable. The independent variables considered in their study were "Leadership", "Strategy, Policy and Planning ", "Information and Analysis", "People", "Customer focus", and "Quality of Process, Product and Services". The dependent variable in this instance was "business performance".
Their research found a number of significant relationships between TQM (total quality management) practices and organisational performance.

Their study concluded that:

a) For organisations concerned with quality rather than flexibility in delivery, the research determined that leadership practices were particularly important. As expected, a strong customer focus, quality system or good information management, provided greatest positive influence on the quality of output.

b) The research also determined that strategic planning, information and human resource management practices had a beneficial impact on organisational performance.

In another study, Hayes and Clark (1986) conducted research on three major US companies to find out "the reason why some factories are more productive than others". The issue led them to embark on a continuing, multiyear study of 12 factories in the three major companies. The companies included in the study were a Process Company, Fab (fabrication-assembly) and a Hi-Tech Company. In order to identify the effects of management actions and policies on factory level productivity, they used three approaches. 1) Longitudinal analysis, which looks at a single factory over a long time,

2) Cross-sectional analysis, which compares the performances of two or more factories that, apply similar manufacturing processes, and 3) A combination of the above two approaches. They developed their central performance measure, the total productivity (TP), by first calculating each factory's monthly partial factor productivities (i.e. labour, capital, material, and energy) and then by combining these partial measures into an index of overall total productivity (TP).

Then they had to identify and measure those managerial policies that might have an impact on TP. The managerial policies identified included: Plant equipment, Quality, Inventory, Workforce, and policies affecting confusion.

The outcome of the study revealed that:

- Traditional measures of factory performance, such as profit and loss statements and cost systems, often obscure performance details and provide a blurry picture of what is really going on.
- Measure of efficiency such as total productivity (TP) - help to clarify distortions brought about by periods of high inflation, and to integrate the contributions of all the factors of production into a single measure of total input.
- TP approach also clarifies the difference between the data that managers see and what those data actually measure.

The multi-year study further concluded that, once poor measurement systems are cleared away, it is possible to identify the real levers for improving factory performance.
Apart from some structural factors such as plant location or size, which lie outside the control of managers, there are clearly certain managerial actions, which make a difference. Their work asserted that capital investment in new equipment is essential to sustaining growth in TP over a long period of time. Correctly managed, new equipment supports long-term productivity improvement and process understanding (learning). The real boost in TP, however, comes not just from the equipment itself, but also from the opportunities it provides to seek out and apply new knowledge to the overall production process. The downsize of such investment is that managers often underestimate the

massive indirect costs associated with introducing new equipment, especially the ripple effects on inventory levels, equipment utilisation, reject rates, downtime, and material waste. Consequently, they concluded that, while capital investment is essential to long-term productivity, if poorly managed, it could destroy the benefits of TP.

4.4 Chapter summary

The environment in which organisations operate is surrounded and influenced, to a greater extent, by the interaction of internal and external factors. In this chapter a brief discussion of these two groups of factors was presented. The study has also scientifically developed a framework, which shows the interaction among the internal management practices, the external environment and productivity performance.

Although the impact of the core management practices on productivity is company specific, in this study a generic set of management practices were identified as critical success factors based on the researcher's experience in the Eritrean fishing industry and the limited scope of study. Hence, six elements of internal management practices are identified. These are employee training and participation, organisational communication, customer focus, commitment to product quality, productivity measurement and standards, and competition and leadership. Discussions on each of the elements identified were presented in light of their impact to company performance. Since the emphasis of this research is more on the above internal management practices only a brief discussion of some external factors was presented. These include geographical factors, national culture, government and infrastructure and market conditions.

The chapter concluded by presenting some similar previous studies, which attempted to integrate the various management practices and company performance. In the studies for example, Tan *et al*. (1999), Sohal and Anderson (1999), and Hayes and Clark (1986) found that proper management practices were directly and positively correlated with good productivity performance and vice versa.

CHAPTER - 5

Discussion of the research results

5.1 Introduction

The objective of this chapter of the study is to discuss the research results and establish the basis for the final conclusions and recommendations for future research. This chapter introduces the statistical testing for the main hypotheses (and their minor hypotheses) which examines the differences in means of each element of management practices (μMPs) between companies with high level of total factor productivity (HTFP) and those companies with low level of total factor productivity (LTFP). Item analysis was used for evaluating an item based on how well it discriminates between those companies whose total scores is high and whose total score is low. Productivity indexes were used to classify the two groups of companies.

This chapter is structured in three parts.

Part 1: Descriptive analyses of the responses to all the questions in section one (Background information), section two (internal factors, which the company has direct control over) and section three (external factors) of the questionnaire.

Part 2: Classifying the eight participating companies into high and low total factor productivity based on the 2002 audited financial statements. Comparative analysis of management practices for companies with high and low total factor productivity is also included.

Part 3: Statistical hypotheses testing (the mean difference) and significance testing (*P*-values) using the Mann-Whitney *U* - values will be presented.

5.2 Questionnaire analysis

Data collected through the questionnaire consisted of some background information about the participating managers (section one of the questionnaire) and more information about the selected management practices (in sections two and three of the questionnaire).

5.2.1 Background information

In section one of the questionnaire the background information was obtained on the position of managers at different levels, their gender, highest educational level, number of employees reporting to them and their experience.
The background information section of the questionnaire consisted of the following:

1. **Position**

The distribution of the managers according to their current positions is shown in *Table* 5.1 below. (Question 1).

Table 5.1-Distribution of the managers according to their positions

Position	Managers (numbers)	Percent (%)
General managers	5	12.2
Department heads	20	48.8
Section heads	8	19.5
Supervisors	1	2.4
Others	7	17.1
Total	**41**	**100**

Approximately two-thirds of the responding managers were either department or section heads (68.3%) and 12.2 per cent were general managers. All the responding persons were managers who had responsibilities for strategic decision-making in their areas. It was also found (from respondents answers for questions four and five in the questionnaire) that the majority of the managers' duties were in connection to decisions related to quality, production, personnel, marketing, and financial matters of their respected sections/

departments. This indicates that the responding managers are likely to understand how their sections/departments/companies are performing.

2. **Gender**

The distribution of the managers according to their gender is shown in *Table* 5.2 below. (Question 2).

Table 5.2-Distribution of managers according to their gender

Gender	Managers (numbers)	Percent (%)
Male	36	87.8
Female	5	12.2
Total	**41**	**100.0**

Almost 90 % of the responding managers were male managers. In the Eritrean fishing industry, male managers predominantly occupy medium to top-level management positions. However, it is not the purpose of this study to determine the effect of gender related issues and the impact on perception of managers due to gender issues, and therefore the huge difference (88%: 12%) in the size of the two gender groups, is seen as inconsequential.

3. **Highest educational level**

The distribution of the managers according to their highest educational levels is shown in *Table* 5.3 below. (Question 3).

Table 5.3-Distribution of the managers according to their highest educational levels.

Highest educational level	Managers (numbers)	Percent (%)
Primary education	0	0
Secondary education	9	21.9
College diploma	12	29.3
Bachelor degree	17	41.5
Masters degree	1	2.4
Other	2	4.9
Total	**41**	**100.0**

The majority of the participating managers have a minimum educational qualification of a bachelor degree or college diploma (70.8%). In Eritrea, English is the medium of instruction starting from junior schools. This indicates that the responding persons have the qualifications and knowledge, to enable them to understand and participate in the completion of a questionnaire written in the English language.

4. **Number of employees reporting**

The distribution of the managers according to the number of employees directly reporting to them is shown in *Table* 5.4 below. (Question 6).

Table 5.4-Distribution of the managers according to the number of employees directly reporting to them.

Number of employees	Managers (numbers)	Percent (%)
1-5 employees	20	48.8
6-10 employees	5	12.2
11-15 employees	4	9.8
16-20 employees	3	7.3
21-25 employees	0	0
26 and more employees	9	21.9
Total	**41**	**100.0**

Approximately half of the total responding managers have at most five employees directly reporting to them (48.8%). Considering the small number of employees reporting to an individual manager the probability that the managers are in full control of their departments' or sections' activities is very high. This indicates that the possibility of implementing and controlling productivity programs is also high.

5. **Experience in the company**

The distribution of the managers according to their experiences in the current companies is shown in *Table* 5.5 below. (Question 7).

Table 5.5-Distribution of the managers according to their experiences in the company

Experience in the company	Managers (numbers)	Percent (%)
Less than 2 years	11	26.8
2 - 5 years	19	46.4
More than 5 years	11	26.8
Total	**41**	**100.0**

About three-quarters of the participating managers had been with these companies for at least two years (73.2%). This indicates that most of the responding managers have appropriate experiences enabling them to provide the researcher with sufficient and accurate information. Although not all details of work experience is known, the researcher is satisfied that the number of experience in years is sufficient to get the needed information.

5.2.2 Internal factors

In section two of the questionnaire data related to internal management factors for participating companies were recorded. These are the factors that management has direct control over and therefore have a direct influence on performance. In the interest of manageability and logical flow of discussions, the internal management factors were presented in eight parts. In the first part, respondents were asked to rate the management practices, which are believed to have an impact on productivity growth, according to their importance. Each of the management practice constitutes a part in the questionnaire. Therefore, discussions related to productivity measurement, productivity standards, employee training and participation, organisational communication, customer focus, product quality and leadership and competitive environment will follow from part two to eight.

5.2.2.1 Ranking variables

In part one of the questionnaire, eight variables were listed for the managers to rank them according to their importance for their sections/departments productivity growth.
Table 5.6 shows the ranked variables according to their response means as rated by the respondents.

Table 5.6-Ranking of certain management practices according to their response means.

Variable	Question	Rank	Mean	Standard Deviation	Minimum	Maximum
Training of employees	8 (b)	1	5.853659	1.824294	2.000	8.000
Investing in technology	8 (a)	2	5.780488	2.464875	1.000	8.000
Employee satisfaction	8 (f)	3	4.585366	1.829967	1.000	8.000
Product quality	8 (h)	4	4.487805	1.938065	1.000	8.000
Customer satisfaction	8 (e)	5	4.439024	2.086250	1.000	8.000
Efficient communication	8 (c)	6	4.195122	2.100232	1.000	8.000
Marketing effectiveness	8 (g)	7	4.097561	2.289158	1.000	8.000
Resource availability.	8 (d)	8	2.560976	2.202825	1.000	8.000

The 41 managers of the eight companies that participated in the study were asked to rank eight management practices in a priority rating scale. This means that the priority ranking (which ranges from 8 = most important to 1 = least important) was determined by taking the sums of all the ratings for each management practice (variable) and dividing it by the total number of respondents (i.e., 41).

As shown in the above *Table 5.6*, of the eight variables listed for respondents to rate, respondents considered training of employees (mean value of 5.85) as the most important factor for improving company/department/section productivity growth followed by investment in new technologies (mean value of 5.78). These findings are also supported by the theories discussed in the literature review part (chapters three and four). An educated and well-trained workforce is considered to be essential to the maintenance of a business firm's competitive advantage in a global economy and likewise capital investment makes workers more productive. Thus, productivity is affected by these two variables significantly. From the responses collected, it seems that the employees in the companies operating in the Eritrean fishing industry lack proper training programmes. This could probably be the reason behind for rating employee training as the most important variable. This finding is in agreement with the current conditions of the Eritrean fishing industry discussed in chapter two of this study, which discussed the prevailing lack of skilled manpower in the industry.

Respondents also rated employee satisfaction (mean = 4.59), product quality (mean = 4.49), and customer satisfaction (mean = 4.44) according to their importance for company/department/section productivity growth as third, fourth and fifth respectively. According to the priority rating scale, resource availability (mean = 2.56) was rated as the least important variable for company productivity growth by participating respondents followed by marketing effectiveness (mean = 4.10) and effective organisational communication (mean = 4.20).

Although natural resources availability is very important for productivity growth, it appears given the fact that the Eritrean fishing industry is in its infancy stage, hence unexploited, the resources availability (in this case fish stocks) could not be considered as major productivity growth problems at this moment. As discussed in chapter two, however, the resources have to be utilised properly by deploying environmental friendly technologies and by training employees so that they can be more productive. The resource availability variable (which is an external factor) was included in the priority rating scale to test whether or not it is an immediate constraint to productivity improvement initiatives in the Eritrean fishing industry at this stage compared to those internal management variables identified as critical.

Surprisingly, however, the respondents perceived marketing effectiveness as the second least important variable for their sections or departments productivity growth. In today's competitive business environment effective marketing strategy is among the critical success factors of a business operation.

5.2.2.2 Management practices relating to productivity measurement

The productivity measurement element of the management practices was measured through questions (9-14) in the questionnaire, covering topics whether productivity measures are related to company goals and mission, identification of section performance results, and issues related to the design and importance of productivity measures. A distribution of the respondents' answers is shown in *Table 5.7* below.

Table 5.7-Distribution of the respondents answers about their productivity measurement actions.

Question	Response in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
9	26.8	51.2	4.9	4.9	12.2	100
10	9.8	39.0	19.5	17.1	14.6	100
11	7.3	29.3	24.4	24.4	14.6	100
12	12.2	43.9	14.6	17.1	12.2	100
13	12.2	46.3	14.6	17.1	9.8	100
14	4.9	19.5	21.9	36.6	17.1	100

1. **Productivity measures form part of the goals and mission**. (Question 9).

As shown in *Table 5.7*, about 51% of all managers responded "Agree". It is encouraging to note that the majority (78%) have productivity measures as part of their company goals and mission.

This finding is in agreement with the theories discussed in chapter three, of this study, which point out the importance of setting productivity measurement as part of company goals and mission.

2. **Identification of performance measures**. (Question 10).

To be able to measure productivity, key performances of the various sections or departments of a company have to be identified.

Approximately half of the respondents agreed that their sections/departments had identified key performance measures (48.8%).

Although about a third of the respondents had disagreed (31.7%), this finding indicates that some of the companies had already identified their basic performance measures in their companies. Hence, some of the sections/departments in the industry are in a position to implement productivity improvement programmes.

3. **Involvement in design and development of productivity measures**. (Question 11).

To develop a successful productivity measurement tool, there must be the involvement of key organisation employees and other direct stakeholders in the definition and construction of productivity measures. The participation of those individuals who know the job very well in the design and development of the productivity makes a difference.

Despite the above fact, however, just over one third (36.6%) of the responding managers are in agreement with the opinion that those key functional personnel are involved in the development of productivity measures for their sections/departments. However, The majority (39%) of the respondents believe that no key functional personnel are involved in designing productivity measures and one fourth (24.4%) are unsure about the involvement.

The above findings assert the answers given, in an interview, by one manager of a low total factor productivity company who said, " the finance personnel are responsible for measuring and monitoring productivity".

This finding indicates that the measures of productivity of those companies in the Eritrean fishing industry are probably designed and developed only by those top-level managers.

4. **Section performance results as sources of improvement plans**. (Question 12).

Performance measures should start right from the lower levels of an organisation. These lower level performance measures should be used as sources of improvement plans. This is because the overall performance of an organisation is the sum total of all individual sections.

As presented in *Table 5.7*, a majority (56.1%) of the respondents had agreed that section performance results are used as sources of productivity improvement plans.

This indicates that some of the companies are using section performance results as a source for productivity improvement plans, although close to a third (29.3%) of the respondents had disagreed.

5. **Communicating performance results**. (Question 13).

Performance results need to be communicated throughout the organisation, so that all the sections and individuals can see how their performances are going compared to the last period and/or other sections or individual performances.

According to *Table 5.7*, over one half (58.5%) of the respondents had responded positively to the statement put in number 13 of the questionnaire by selecting either of the two agreement alternatives (i.e., strongly agree 12.2% and agree 46.3% respectively).

This indicates that the majority of the stakeholders of the companies surveyed are aware of the importance of communicating performance results as a motivating factor.

6. **Comparing performance measures against competitors**. (Question 14).

One of the characteristics of productivity measures is their relative nature. In other words, we need to compare them against some kind of reference. Benchmarking is one of the many methods used to compare company performances.

As shown in *Table 5.7*, a small proportion (4.9%) of the respondents strongly agreed with the statement put forward in question 14 of the questionnaire, followed by another (19.5%) "agree" responses. The majority (53.7%) of the responding managers, however, had disagreed with the statement that company performance is benchmarked against industry leaders.

This indicates that the majority of the companies in the fishing industry are not considering the benefits of comparing their performance against their competitors.

5.2.2.3 Productivity standards

These management practices related to productivity standards were measured in the questionnaire through questions (15-17). The topics covered under this section include in-house built and third-party productivity standards, benchmarking, level of involvement, actions taken by individual managers and productivity improvement responsibilities.

A distribution of the respondents answers to productivity standards is shown in *Table 5.8*.

Table 5.8-Distribution of the respondents according to their responses to productivity standard questions.

Question	Response in percentage			Total
	Implemented	Planned for	Not planned for	
15-a	17.0	41.5	41.5	100
15-b	9.8	39.0	51.2	100
15-c	2.4	36.6	61.0	100

1. **In-house built productivity standards**. (Question 15-a)

Of all the managers participated by completing a questionnaire, only 17% have implemented an in-house developed productivity standard to measure their section/ departments productivity levels. Whereas the overwhelming majority responses (83%) were equally split into "planned for" (41.5%) answers and "not planned for at all" answers (41.5%) to the question in 15-a.

This indicates that most sections and departments have not yet implemented in-house built productivity standards.

2. **Third party productivity standards**. (Question 15-b)

When asked to indicate if their sections/departments are adopting third party productivity standards, about one half (51.2%) of all the responding managers indicated that their sections or departments have "not planned for" any third party productivity standards against which they could compare their performances. But a considerable number of respondents (39%) are aware of and have "planned for" implementing a third party developed standard. A small proportion (9.8%) of the responding managers, however, have "implemented" a third party productivity standard in their sections/departments.

Relatively speaking, this shows that the managers are more interested in adopting in-house productivity standards than third party developed standards.

3. **Benchmarking**. (Question 15-c)

The responding managers were also asked to give their responses on whether their sections or departments are using benchmarking as a productivity measurement standard. Almost insignificant number of sections/departments (2.4%) have adopted benchmarking. However, a considerable majority of the respondents have indicated as "not planned for" (61%) or "planned for" (36.6%).

From *Table 5.8* it appears that the tendency of most respondents is to implement the in-house productivity standards. Probably the reason for this tendency could be the simplicity of implementing in-house designed productivity standards. These responses are also in agreement with the previous answers given in question 14 above.

Table 5.9-Distribution of the respondents answers according to their responses to productivity improvement programs.

Question	Responses in percentage		Total
	Yes	No	
16	65.9	34.1	100
16-a	37.0	63.0	100
16-b	37.0	63.0	100
16-c	29.6	70.4	100
17	48.8	51.2	100

4. **Availability of productivity improvement program**. (Question 16)

Respondents were asked if their sections or departments have productivity improvement programmes in place. Approximately two thirds (65.9%) of all the responding managers answered positively to question 16 in the questionnaire. The other one third (34.1 %), on the other hand, of all the managers don't have a section or department for productivity programmes.

These findings indicate that the majority of the sections/departments in the fishing industry have productivity improvement programmes.

5. **Whether someone is in charge**. (Question 16-a).

Those respondents who responded "yes"(65.9%) to the previous question number 16 in the questionnaire, were further asked if they have assigned a person in charge of the productivity programme set by their respective sections or departments. While only 37 percent of which have assigned a person in charge, the majority (63%) didn't.

This seems a definite warning sign that the majority of the respondents (63%) whose sections/departments have already productivity programmes have not assigned someone to monitor the programmes. Productivity literature on the other hand, argue that assigning the responsibility to someone is imperative.

6. **Formal structure.** (Question 16-b).

Those respondents whose sections/departments have already initiated a productivity improvement programme (65.9%) were asked if they have a formal organisational

structure. (Question 16-b of the questionnaire). The majority (63%) of the respondents indicated that they have no formal structure relating to productivity programmes.

From the responses in *Table 5.9*, there appears that the productivity initiatives in the companies operating in the Eritrean fishing industry are not well founded.

7. **Degree of involvement**. (Question 16-c).

The responding managers were also requested to indicate whether all managers at all levels are involved in the productivity improvement programmes set in their respective companies. Irrespective of the productivity improvement theories which advocate for a full involvement of all managers at all levels in the organisational hierarchy, an overwhelming majority of the respondents (70.4%) response was "no" to question 16-c in the questionnaire.

This low participation (involvement) by managers indicates that the productivity improvement programmes initiated by those companies are at high risk of failure. For a successful productivity improvement programme, commitment and full involvement of all parties in an organisation is sought.

8. **Actions taken to improve productivity**. (Question 17)

In this question, respondents were requested if they individually, as managers, had taken any productivity improvement related actions in their respective sections or departments. Just below one half of the participating managers responded "yes" (48.8%). Those respondents who responded "yes" to this question, were requested to expand their response by writing down briefly those actions taken individually to motivate their subordinates.

Most respondents' answers were related to reward and incentive schemes. These include overtime payments, and some other fringe benefits to employees. The reason for this is that, according to their responses, the majority of the employees in those companies of the Eritrean fishing industry are working as national service workers. (In the Eritrean case, a national service worker is a worker who has the duty to work for a minimum

amount of money for a period of 18 months. During those months the company at which he/she works for, is obliged to pay the salary of its employees to the government). Therefore, the majority of the managers believe that money incentives are the best tools to motivate employees to become more productive. However, the theories in chapter four discuss more about the importance and effectiveness of non-money incentives.

5.2.2.4 Management practices relating to employees.

Managers make many vital human resource decisions in areas which impact productivity such as employee training, employee empowerment and employee participation in decision making.

In part four of the questionnaire this element of the management practices was measured through questions 18 to 27. Under this section, the factors that were considered included employee involvement, training needs and budget, empowerment, reward systems, employee satisfaction, payment fairness and working conditions.
The distribution of the respondents' responses to these questions is shown in *Table 5.10* below.

Table 5.10-Distribution of the respondents' responses to employee related questions.

Question	Responses in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
18	12.2	39.0	22.0	19.5	7.3	100
19	7.3	31.7	17.1	29.3	14.6	100
20	2.5	14.6	26.8	48.8	7.3	100
21	9.8	39.0	17.1	34.1	0	100
22	7.3	34.1	24.4	24.4	9.8	100
23	7.3	41.5	21.9	17.1	12.2	100
24	4.9	17.1	29.3	34.1	14.6	100
25	2.4	17.1	19.5	31.7	29.3	100
26	19.5	56.1	14.6	9.8	0	100
27	7.5	42.5	30.0	20.0	0	100

1. **Full involvement of employee in the business.** (Question 18).

Responding managers were asked to give their views on the statement put forward by question number 18 in the questionnaire. About one half (51.2%) of the total respondents indicated their agreement by choosing either "agree" (39%) or "strongly agree"(12.2%). About one fifth (22%) of the respondents were unsure about the extent of employee involvement in the business and whether their companies are encouraging them to reach their full potential.

These results indicate that employee participation in the companies is encouraged, although over a quarter of the responding managers (26.8%) response were one of disagreement.

2. **Periodic training needs assessment.** (Question 19).

In order to obtain a competitive edge in providing the best services to the customer, continuous training-need assessment is vital to improve productivity. The training will help to develop a well-trained work force.

About 44 per cent of the managers responded either "disagree" (29.3%) or "strongly disagree" (14.6%). However, 39 per cent of the managers agreed (31.7% and 7.3% for "agree" and "strongly agree" responses respectively) to the statement that periodic training needs were assessed.

This indicates that training-need assessment, as a prerequisite for improving company productivity probably is not given a priority in most of those companies studied in this research.

3. **Budget allocation for employee training.** (Question 20).

Responding managers were also asked to give their opinion by agreeing or disagreeing to the statement that "a budget is allocated by the company for employee training purposes". As shown in *Table 5.10*, this question, of the questions on employee related practices, was the one that managers had most frequently responded to as "disagree". About half of the managers responded "disagree" (48.7%). Whereas as a minority proportion of 2.5 per cent strongly agreed on the statement that there is a budget for training purposes.

This finding was also in agreement with the answers given by the majority of the managers (both from high and low productivity companies') who had been interviewed. The majority of the interviewee said that, " there is no known budget for training purposes in their organisations".

This indicates that training costs in those companies are low and employees are either not well trained or the low competition level in the industry does not demand much training.

4. **Responsibility of improving productivity**. (Question 21).

The respondents were requested to give their views on whether employees believe that increasing productivity is their responsibility. As shown in *Table 5.10*, approximately one half (48.8%) of the respondents agreed with this statement by either selecting one of the two agreement alternatives.

Although, a considerable proportion (34%) of the respondents had disagreed with the statement put forward on question 21, it is encouraging to note that the majority believes increasing productivity is their responsibility.

5. **Employee empowerment**. (Question 22).

As noted by one of the productivity authors in chapter four of this study, if top management is doing its proper job of delegating authority, then the people most knowledgeable about how jobs really work, are the job performers themselves.

By not involving jobholders in measurement planning, is to ignore the greatest experts. Thus, empowering employees is one of the actions that should be taken by management to boost productivity.

As shown in *Table 5.10*, approximately 41.5 per cent of the respondents agreed with the statement that the employees are empowered. Although this might signal that employees in those surveyed companies are empowered, about 34 per cent of the respondents had disagreed and about 24.5 per cent of them were unsure about it.

From the responses above, it appears that in some sections employees are empowered, whilst in many others are not.

6. **Reward systems.** (Question 23).

Measures must be integrated with performance incentives, reward systems and recognition. Measures that have no important contingencies will not work to improve productivity.

As shown in *Table 5.10*, almost half of the respondents had agreed with the statement in question 23 (48.8%). Irrespective of these findings, however, the answers recorded during an interview with a few managers from low total factor productivity companies, revealed that the reward and recognition systems in place are not encouraging to support productivity growth plans.

7. **Employee satisfaction**. (Question 24).

Various studies in the theoretical chapters confirmed that "a satisfied worker is a productive worker". Productivity should be achieved through high performance with a sense of satisfaction by the people doing the work. Therefore, employees should be treated as internal customers and their satisfaction should be measured regularly.

It appears from *Table 5.10* that very little efforts, by the involved companies, to measure employee satisfaction had been taken.

Approximately, half of the respondents disagreed with the statement that employee satisfaction is regularly measured (48.8%). In addition, a considerable proportion of the respondents (29.3%) were unsure about the statement put forward in question 24.

From the findings it seems that, at least, some companies/sections/departments are ignoring the contributions that satisfied employees could bring to their productivity growth.

8. **Payment scheme**. (Question 25).

Of all the statements on employee related issues, this statement was the one respondents had most frequently disagreed (61%) to. In addition to this 19.5 per cent of the respondents were unsure about the fairness of the payment scheme. From the employee-related questions, it was also in this particular question that the highest "strongly disagree" responses had been recorded (29.3%) followed by a considerable "disagree" (31.7%) responses.

It is to be expected, given the fact that most employees are working as national service workers in those companies of the Eritrean fishing industry. Having said that, it is sensible to consider and add even the 19.5% "undecided" answers on top of the "disagreement" answers to reach into an overwhelming majority (80.5%) disagreement responses to the statement that "there is fair payment scheme for a job well done". This would obviously affect productivity of these companies. In an interview with one HTFP company manager, he said that "since the government policy concerning to a national service worker is counterproductive, our company tries to motivate its employees by paying an extra amount of money (by allocating an additional budget) and encouraging them to work overtime".

This indicates that a poor payment scheme is being practised in the majority of the companies operating in the Eritrean fishing industry.

9. **Working conditions**. (Question 26).

Managers are increasingly expected to facilitate productivity for the organisation while maintaining the quality of work life (QWL) for its members. The QWL concept expresses an important respect for people in their work environments.

Of all the statements on employee related issues, this statement was the one most respondents had agreed to. As shown in *Table 5.10*, about three-quarters (75.6%) of the respondents agreed that the working conditions are safe and healthy to work in. Besides, in this particular question no "strongly disagree" response had been recorded.

From the above findings it is important to note that the safe and healthy working conditions in the Eritrean fishing industry are conducive to improve productivity.

10. **Job and organisational pride**. (Question 27).

When respondents were probed to give their opinion on whether employees have the pride in their work itself and the organisation they work for, a majority (50.0%) of the respondents reacted positively to this statement. In this question, no " strongly disagree"

answer had been recorded. However, a worrying number of respondents had "neither agreed nor disagreed" (30%) with same statement and the rest (20%) disagreed.

Despite the encouraging response that employees have pride in their work and the organisation to which they work for, the fact that an equivalent proportion of sections/departments had "disagreed" or "neither agreed nor disagreed" with the same statement indicates that many employees are unsatisfied in their jobs and have no pride in the organisations they work for.

5.2.2.5 Management practices relating to organisational communication

In part five of the questionnaire management practice about organisational communication was covered through questions 28 to 32. Smooth organisational communication is vital for company productivity. According to one author in the literature (chapter four) "a breakdown in communication is as costly as the breakdown of machines, the loss of sales, a poor engineering design, or material stock outs".
The topics examined under this section include issues such as company instructions and procedures, written purposes and directions, communication directions, reports and models, and the timing of information. The distribution of the responses is shown in *Table 5.11*.

Table 5.11-Distribution of the respondents' response on organisational communication.

Question	Responses in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
28	12.5	47.5	17.5	22.5	0	100
29	10.0	37.5	22.5	30.0	0	100
30	15.0	52.5	20.0	10.0	2.5	100
31	12.5	25.0	20.0	35.0	7.5	100
32	7.5	30.0	37.5	25.0	0	100

1. **Importance of clear and easy procedures.** (Question 28).

It appears from *Table 5.11*, that the procedure followed in performing jobs in the organisations are clear and easy. Just less than two-thirds of the respondents had agreed

(60%) as opposed to 22.5 percent that disagreed to the statement that procedures are clear to be followed by subordinates.

This is a good indication that the occurrence of confusions as a result of unclear communications such as messages, orders or directions are minimal.

2. **Availability of formal written purpose and direction.** (Question 29).

Respondents were requested to agree or disagree, on a five-point Likert scale, with the statement given to them in question 29. Just under half of the respondents agreed that written company directions are used and are understood by all managers and employees (47.5%). Literature suggests that company purposes and directions, which include, policies, procedures and other official announcement be formally written and all the parties must adhere to them. This is because when employees know what is expected of them, they have the opportunity to do their best. In spite of this, however, about a third of the respondents (30%) have disagreed with the statement.

Although the findings indicate that the tendency of the companies is towards using written procedures and directions, there are still many sections and departments within those companies which are either not using written procedures or directions and procedures are not understood by both employees and managers.

3. **Availability of continuous communication in all directions**. (Question 30).

The objective of effective organisational communication is to make sure that communication flows freely within the organisation and that "commonness" in meaning is secured. To do so information should flow in all directions continuously.

It appears from *Table 5.11* that information flows in all directions, i.e., up, down, and lateral. It can be seen that, just over two-thirds of the respondents believed that communication is available in their companies in all directions (67.5%). This question on organisational communication was the one that respondents had least frequently responded to the two disagreement alternatives (12.5%).

The findings indicate that the companies encourage communication flow in all directions.

4. **Utilisation of reports and models**. (Question 31).

Respondents were requested, on a five-point Likert scale question, to agree or disagree with the statement that reports and models are designed to increase effectiveness of communication.

This question, of the organisational communication questions, was the one that respondents had most frequently either "disagreed" (35%) or "strongly disagreed"(7.5%) to. Besides, the least "agree" response was also recorded in this statement (25%).

This indicates that, at least, some of the companies/sections/departments are not using efficiently models and designs to analyse data or not using them at all.

5. **Importance of timely information**. (Question 32).

Information should be communicated to the right people at the right time. This helps to avoid any possible confusion that might arise from late information.

It appears from *Table 5.11*, that the majority of the respondents (37.5%) are not sure whether both management and employees receive timely information.

This probably indicates that either the information is confined to the managers only or the employees are receiving information after it has become too late to bring about change.

5.2.2.6 Management practices relating to customer focus.

For a company to stay and prosper in competitive market situations it is important that management devise measures to assess how well a company's products and services meet the customer requirements and to identify their future needs.

This practice of management was measured in part six of the questionnaire through questions 33 to 37. The distribution of the respondents according to their responses referring to these aspects is shown in *Table 5.12* below.

Table 5.12- Distribution of the respondents' responses to their customer practices.

Questions	Responses in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
33	7.50	35.0	22.5	30.0	5.0	100
34	5.0	50.0	30.0	10.0	5.0	100
35	12.2	46.4	24.4	14.6	2.4	100
36	2.4	44.0	29.2	22.0	2.4	100
37	7.3	22.0	39.0	26.8	4.9	100

1. **Measures of customer satisfaction.** (Question 33).

Respondents' responses regarding the regularity of measures of customer satisfaction by the surveyed companies, revealed no much difference between the percentage responses of those sections/departments who regularly measure customer satisfaction and those who don't.

According to *Table 5.12*, although the majority response was one of agreement (42.5%), just over a third of the respondents (35%) had disagreed with the statement that the companies regularly measure customer satisfaction. And just under one-quarter of the respondents had neither agreed nor disagreed (22.5%).

The findings indicate that measuring customer satisfaction regularly doesn't seem to be part of the organisational culture of the surveyed companies. There is no convincing majority of sections/departments that measure customer satisfaction regularly.

2. **Customer needs and expectations**. (Question 34).

Management is expected to know its customers' present needs and future expectations. The key to establishing a customer focus is to put employees in touch with customers so that customer needs are known and understood.

Exactly 50 per cent of the respondents perceived that they know the present and future needs of their products' customers.

This finding is encouraging since it was pointed out in the theoretical part of this study (chapter four) that meeting or exceeding customer requirements offers the best path to corporate success.

3. **Complaints resolving efficiency.** (Question 35).

Achieving high level of customer satisfaction is perhaps the most important goals of any business regarding its competitiveness. Despite all efforts to satisfy customers, every business experiences unhappy customers. Complaints can adversely affect business if not dealt with effectively. Management needs to promptly and efficiently resolve customer complaints.

As can be seen from *Table 5.12*, a majority of the respondents reacted positively to the statement that management resolves complaints of customers immediately (58.5%). Only 17 per cent disagreed and the rest were unsure.

This finding indicates that the tendency of the majority of the sections/departments surveyed is towards immediate complaints resolving.

4. **Employees as customers**. (Question 36).

Successful companies treat their employees as internal customers, and by doing so they reduce rework costs, time and defective items since the products are produced according to specifications.

When responding managers were requested to agree or disagree with the statement that employees are considered as internal customers in question 36 of the questionnaire, just under half (46.4%) of the managers had agreed and 24.4 per cent had disagreed. A considerable proportion of the respondents, however, were indifferent to the same statement (29.2%).

While the low level of disagreement responses seem encouraging, the fact that over a quarter (29.2%) of the respondents responded as "undecided" indicates that the majority of the companies don't consider their employees as their customers.

5. **Customer relationship**. (Question 37).

Continual communication with customers is essential in a competitive market place. Therefore, management should continuously evaluate the relationship with its customers.

In question 37 of the questionnaire respondents were probed to give their opinions to the statement that was put forward.

As shown in *Table 5.12*, this question was the one where respondents had most frequently "neither agreed nor disagreed" (39%) to. Approximately 32 per cent of the respondents disagreed with the statement.

This finding indicates that customer relationships are not evaluated periodically and probably actions are not taken accordingly.

5.2.2.7 Management practices relating to product quality.

Producing more and more products inefficiently at the expense of quality is no way to increase productivity. Productivity can be improved by producing good quality products or services, which can satisfy customers.

In part seven of the questionnaire, data relating to quality were collected through questions 38 to 44. The management practices that were considered there were quality objectives, quality improvement, defective products, the productivity quality connection, and resource use efficiency. Some of the findings are presented in the following paragraphs. The distribution of the respondents' responses to these questions is shown in *Table 5.13*.

Table 5.13-Distribution of respondents' responses to product quality.

Question	Responses in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
38	48.8	43.9	4.9	0	2.4	100
39	31.7	46.3	4.9	12.2	4.9	100
40	34.2	31.7	26.8	7.3	0	100
41	17.1	39.0	19.5	12.2	12.2	100
42	12.2	46.3	19.5	12.2	9.8	100
43	19.5	56.1	9.8	7.3	7.3	100
44	21.9	48.8	9.8	14.6	4.9	100

1. **Quality as company objective**. (Question 38).

Companies striving to achieve higher productivity cannot accomplish their objectives without considering quality objectives. Studies have proved that productivity increases as quality improves.

In *Table 5.13* it is shown that the overwhelming response (92.7%) is one of agreement on the statement put forward by question 38. This question is also the one that no " disagree" response was recorded to.

This finding is encouraging because, according to theory, the first criterion in designing productivity measures is to clearly define company quality objectives.

2. **Quality improvement efforts.** (Question 39).

As can be seen from *Table 5.13*, an overwhelming majority of the response is one of agreement with the statement put forward by question 39. Respondents had agreed overwhelmingly to the statement that management promotes quality improvement efforts (78%).

This finding indicates that quality improvement efforts are getting attention by the majority of the various sections of the companies surveyed.

3. **Efforts for defect free production.** (Question 40).

Management should ensure quality of its products or services. The focus should be on producing/providing the right product the first time. The advantages that can be realised are like less rework time, improved customer services, low cost and increased market share.

As can be seen from *Table 5.13*, two-thirds of the respondents (65.9%) agreed with the opinion that their companies strive to produce their products without any defects.

This finding indicates that wastage rate in some of the companies/sections/departments of the Eritrean fishing industry is low. By doing so probably they are saving a lot of money.

4. **Availability of methods to maintain and improve quality**. (Question 41).

Management is expected to maintain and continuously to improve its products and services quality. Over half of the respondents had agreed with the statement that management has established methods to maintain and improve the quality of the products (56.1%).

Although about a quarter of the respondents of the surveyed companies had disagreed (24.4%) with the statement, the findings indicate that, at least, some of the companies have established methods to maintain and improve quality.

5. **Importance of prevention mechanism**. (Question 42).

As discussed previously, focusing on prevention of problems before they happen has the advantage of saving a lot of time and money for the companies.

It was found that 58.5 per cent of the respondents' responses were in agreement with the statement in connection to prevention.

This finding indicates that the trend is going to affect positively the productivity of the sections that are currently practising "prevention of problem" as a mechanism.

6. **Linkage between quality and productivity**. (Question 43).

It is important that management understands the strong linkage that exists between productivity and quality. In fact, the two are interconnected and inseparable.

Table 5.13 shows an overwhelming three-quarter of the respondents (75.6%) seem to understand the strong connection between product quality and productivity.

It is interesting to find such a result, which indicates that the companies in the Eritrean fishing industry could be potentially globally competitive.

7. **Resource utilisation**. (Question 44).

Continuous commitment to quality improvement is a policy of no mistakes as organisations continually strive to achieve perfection in all stages of their operations. Thus, efficient resource utilisation is at the heart of the concept of increasing productivity.

As shown in *Table 5.13*, approximately 70 per cent of the respondents had agreed with the notion that management concentrates on improving productivity through efficient utilisation of resources.

This finding is again encouraging because it is consistent with the theories discussed in chapter four of this study.

Comparatively speaking, the overall response to questions related to quality was one of agreement. It is a good indication of the companies' commitment to continuously improve the quality of their products.

5.2.2.8 Management practices on Leadership and competitive environment.

It is obvious that in today's market environment, which is characterised by strong competition, the availability of effective leadership is imperative for the business to survive and prosper.

In part eight of the questionnaire, data relating to leadership and competitive environment were collected through questions 45 to 50. The management practices that were considered in here were aggressiveness of competitors, the extent of competition, time spent to analyse competitors, the impact of leadership and marketing strategies of the companies. The distribution of the responses of the respondents to these questions is shown in *Table 5.14*.

Table 5.14-Distribution of the responses of the respondents on their views to leadership and competitive environment.

Question	Responses in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
45	4.9	29.3	39.0	24.4	2.4	100
46	2.5	14.6	43.9	26.8	12.2	100
47	2.4	4.9	36.6	39.0	17.1	100
48	17.1	41.5	26.8	9.7	4.9	100
49	12.20	39.0	21.9	21.9	5.0	100
50	24.5	39.0	9.7	17.1	9.7	100

1. **Aggresiveness of competitors**. (Question 45).

From the responses collected on question 45, the respondents don't appear to have exact knowledge of how aggressive their major competitors are. Only about a third of the respondents (34.2%) agreed that their respective sections/departments/companies know the aggressiveness of their competitors. A majority (39%) of the respondents, however, neither agreed nor disagreed with the statement.

This finding indicates that either the companies are not giving so much attention to competition or that the competition is not tough enough to be concerned about.

2. **Level of competition**. (Question 46)

Respondents were requested to agree or disagree on the overall level of competition in the Eritrean fishing industry. As shown in *Table 5.14* the majority (39%) of the respondents perceived that the overall competition level in the industry to be low. It was in this particular question that the highest "neither agree nor disagree" answer had been recorded (43.9%).

This finding is to be expected considering the small number of companies operating in the fishing industry. The low level of competition in the industry is characterised by a small number of companies and low experience levels.

3. **Time for analysing competitors**. (Question 47)

Despite a small proportion of the respondents who had perceived that their sections/departments were spending a considerable amount of time (7.3%) on analysing their major competitors, a significant number (56.1%) of the respondents had disagreed with this statement.

This is an interesting finding probably because the companies are not in a position, at this stage, to afford a considerable amount of time due to the insignificant competition level in the industry.

4. **Leadership effectiveness on productivity**. (Question 48)

Over half of the respondents (58.6%) perceived that the leadership of their respective companies was effective in affecting productivity positively.

Given the fact that only 14.6 percent of the respondents disagreed with the statement, this finding is a good indication that the leaders of some sections are affecting productivity positively.

5. **Marketing strategies**. (Question 49)

Just over half of the respondents (51.2%) agreed that the marketing strategies of their companies focus on opening up overseas markets. An interview with a high productivity company manager revealed: "the local market is so small to depend on and to allow our company to grow. Thus, we continually look for an export market which is the most rewarding and lucrative market for our products ". Some managers from low productivity companies, however, have indicated their satisfaction by saying that "at this stage, the local market is not fully supplied and we should concentrate on the local market".

It is interesting to note that the two groups of companies have different marketing strategies at this stage.

6. **Company international marketing strategies**. (Question 50)

As shown in *Table 5.14* the majority of the respondents (63.5%) are of the opinion that their companies marketing strategies are focussed on international marketing and global competition. Just over a quarter (26.8%) of the respondents, however, disagreed to the statement.

This finding is in line with the answers given to question 49, which indicates the companies' plans for export oriented strategies.

5.2.3 External factors

Management has no direct control over its external environment in the short and medium run. They are nonetheless affected by what occurs in the external environment. The factors that were considered during this study were government policies, geographical location, raw materials suppliers and local and foreign competition.

In section three of the questionnaire data about certain external factors related to the Eritrean fishing industry were recorded. Some of the findings are presented in the following paragraphs.

Table 5.15-Distribution of the companies (%) according to the responses to company external productivity factors questions.

Question	Response in percentage					Total
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	
51	41.5	43.9	7.3	7.3	0	100
52	43.9	46.4	2.4	7.3	0	100
53	7.3	24.4	24.4	31.7	12.2	100
54	0	17.1	14.6	48.8	19.5	100
55	7.3	12.2	9.7	41.5	29.3	100

1. **Conduciveness of government's policy.** (Question 51)

Regarding the condusiveness of government policy on the productivity growth of the surveyed companies, it was found that the response was an overwhelming 85.4 per cent for the two agree alternatives. According to *Table 5.15*, about 41.5 per cent of all managers responded " strongly agree" and 43.9 per cent responded as " agree" to.

It was also witnessed from the interviews conducted with the top managers of both groups of companies, that the government policies in place concerning businesses operating in the fishing industry are encouraging.

This finding is encouraging since it was pointed out in the literature study of this research that a positive policy regarding productivity is necessary for companies to grow.

2. **Suitability of geographical location**. (Question 52)

Of the five questions on company external factors, this question was the one that managers had most frequently responded as either "agree" or " strongly agree" to. Just over 90 per cent of all the managers responded either " agree" or "strongly Agree". As for the previous question, in this particular question no " strongly disagree" response had been recorded.

This shows that the geographical locations where these companies are set up are conducive to work in. This is of course, to be expected, as the companies' operations are related to the sea and all these companies are located in the Red Sea coastal areas.

3. **Availability of suppliers** (Question 53)

Availability of sufficient suppliers of raw materials at competitive prices are conducive to productivity improvement. The input cost of a company can be reduced if the services of a more efficient supplier is used.

Table 5.15 shows that almost 32 per cent of the managers disagreed with this statement. This shows that there are no enough raw materials suppliers in the industry. According to the interview conducted with one top manager of a low-level total factor productivity company, the inadequate and irregular supply of raw materials is contributing to the low productivity of his company. He said that "one of our major problems is the irregular supply of raw materials to our operations. In fact, we run out of raw materials for weeks even some times for over a month".

Although the majority response was disagreeing (32%) there is also a large response that agrees that there are enough suppliers of raw materials at competitive prices. If the response category " neither agree nor disagree" (24.4%) are added to the "agree" (24.4%) it amounts to 48.8%. It might be the case that some companies don't experience a problem in this regard while the majority do.

4. **Local competition**. (Question 54)

When an industry experiences a high level of local competition it is probably also true that productivity is on a higher level compared to a situation where enterprises are allowed to manage without external pressure.

About one half of the managers responded "disagree" (48.8%). In *Table 5.15* it is shown that the overwhelming response (68.3%) is one of disagreement on the statement put forward in question 54. This question of the external factors is also the one that no " strongly agree" response was recorded to.

Considering the small number of companies and the low experience levels in those companies, the Eritrean fishing industry is in its infancy stage. Thus, the level of competition is very low and productivity standards incomparable with companies in First World companies.

5. **Sufficient local market**. (Question 55).

Of the five questions on company external factors, this question was the one that managers most frequently responded either "disagree" or " strongly disagree" to. As shown in *Table 5.15,* over 70% of all the managers responded either disagreed (41.5%) or strongly disagreed (29.3%).

This indicates that most managers are interested in getting new markets for their products. These results are in agreement with the responses given by one top-level manager from a high productivity company who said, " although the local market is not yet satisfied, the export market is more rewarding and therefore export is very important for our company's growth".

5.3 Classifying companies into high & low total factor productivity

In this study, the companies were classified into two groups namely companies with high total factor productivity (HTFP) and companies with low total factor productivity (LTFP).

As discusses in chapter three of this study, the total factor productivity measures (i.e., value-added outputs divided by capital and labour inputs combined) for the eight participating companies were calculated for the period (1998 – 2002) using a similar model developed by Grossman (1993) and Craig and Harris (1973).

The formula for calculating total factor productivity is given by:

$$TFP = \frac{VA}{L+K} \qquad Or \qquad TFP = \frac{VA}{TFI}$$

$$LP = \frac{VA}{L}$$

$$KP = \frac{VA}{K}$$

Where:

TFP = Total factor productivity

VA = Value added output

L = Labour input

K = Capital input

TFI = Total factor input (the sum of weighted labour and capital indexes)

LP = Labour productivity

KP = Capital productivity

At the end of this dissertation the format (procedure) that shows the detailed total factor productivity calculations is attached as an *Appendix 2***.** The accompanying assumptions and definitions (for each of the variables) used in calculating the total factor productivity

indexes are also presented. *Table 5.16* shows the total factor productivity indexes for the eight companies.

Table 5.16 - Total factor productivity indexes for the eight companies during the period (1998 – 2002).

Companies	**Total Factor Productivity Indexes**				
	1998 Base year[7]	*1999*	*2000*	*2001*	*2002*[8]
Company 1	100.0	41.9	145.6	16.4	**129.3***
Company 2	100.0	100.0	81.1	23.6	-27.8
Company 3	100.0	99.6	65.3	76.2	**162.0***
Company 4	100.0	84.5	104.6	101.6	81.8
Company 5	100.0	99.4	144.9	98.2	96.2
Company 6	100.0	101.4	126.1	135.4	**113.8***
Company 7	100.0	96.3	100	104.2	95.8
Company 8	100.0	75.0	91.6	31.9	-16.3

* Indicates the total factor productivity indexes for HTFP companies (TFP > 100) in 2002.

Based on the resulted total factor productivity indexes of each company in 2002, the companies were classified into two groups. The two groups were, as discussed above, those companies with high total factor productivity (HTFP) and those companies with low total factor productivity (LTFP). The criterion used to classify the two groups of companies was the 2002 productivity index of each company. Companies with a productivity index number of 100 and above ($\geq$ 100) were classified as High Total Factor Productivity companies (HTFP) and those companies with a productivity index number of less than 100 (< 100) were classified as Low Total Factor Productivity companies (LTFP).

[7] This is the year against which we compare the productivity growth of all other years. A base year has a 100 index number. For the purpose of this study the year 1998 was taken as a base year.

[8] Companies with TFP index $\geq$100 in the year 2002 were categorised as HTFP companies (1, 3, & 6) and those companies with a TFP index <100 in the year 2002 were categorised as LTFP companies (2,4,5,7 & 8).

Mean total factor productivity measurements for three productivity categories (i.e., for all companies, HTFP companies, and LTFP companies) during the period 1998 – 2002 is shown in *Table 5.17*. In calculating these three productivity categories, the mean total factor productivity (μTFP) for each group was computed. For example, to calculate the "all companies" TFP index in the year 2002, the overall mean (μ) of the TFP indexes for the eight participating companies (presented in *Table 5.16*) was computed and the quotient was 79.4 (i.e., mean TFP index for the year 2002). In a similar manner, the mean total factor productivities (μTFP) for the three "HTFP companies" and the five "LTFP companies" were calculated and the quotients were 135 and 45.9 respectively for that particular year. (*See Appendix 7*)

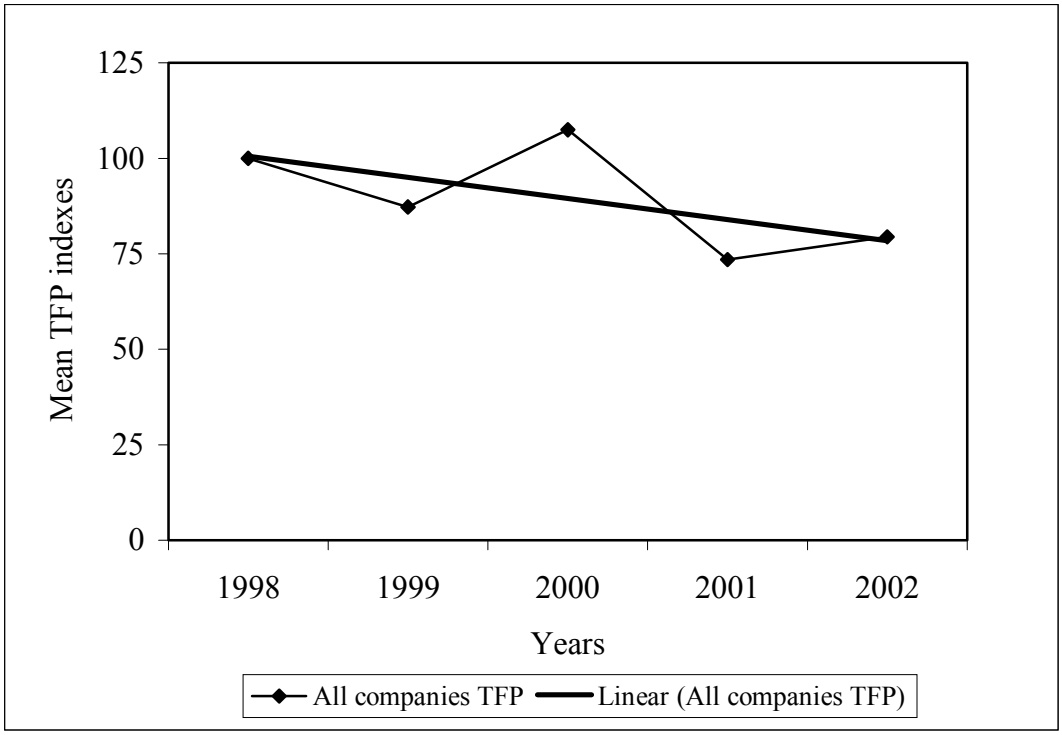
Table 5.17-Mean total factor productivity indexes for three categories of companies during the period (1998 – 2002)

Company groups	**Mean TFP indexes during the period of (1998- 2002)**				
	1998	*1999*	*2000*	*2001*	*2002*
All companies	100	87.3	107.4	73.4	79.4
HTFP companies	100	81.0	112.3	76.0	135.0
LTFP companies	100	91.0	104.4	71.9	45.9

Mean total factor productivity index measures for all the companies during the period (1998 – 2002) are shown in *Figure 5.1*. In general, as shown in *Figure 5.1*, the mean total factor productivity for the companies in the Eritrean fishing industry had decreased over the years 1998 to 2002. A linear line was added to the "all companies TFP line" to show that the overall productivity trend for all the companies that participated in this study. From the trend line, it appears that the companies in the Eritrean fishing industry are suffering from low productivity experiences.

This finding partially answers the broad research problem of this study as specified in chapter one, *section 1.3*, which postulates that "the productivity of the companies operating in the Eritrean fishing industry is negatively affected by their poor management practices".

Figure 5.1- Mean total factor productivities line for all companies during the period (1998 – 2002).



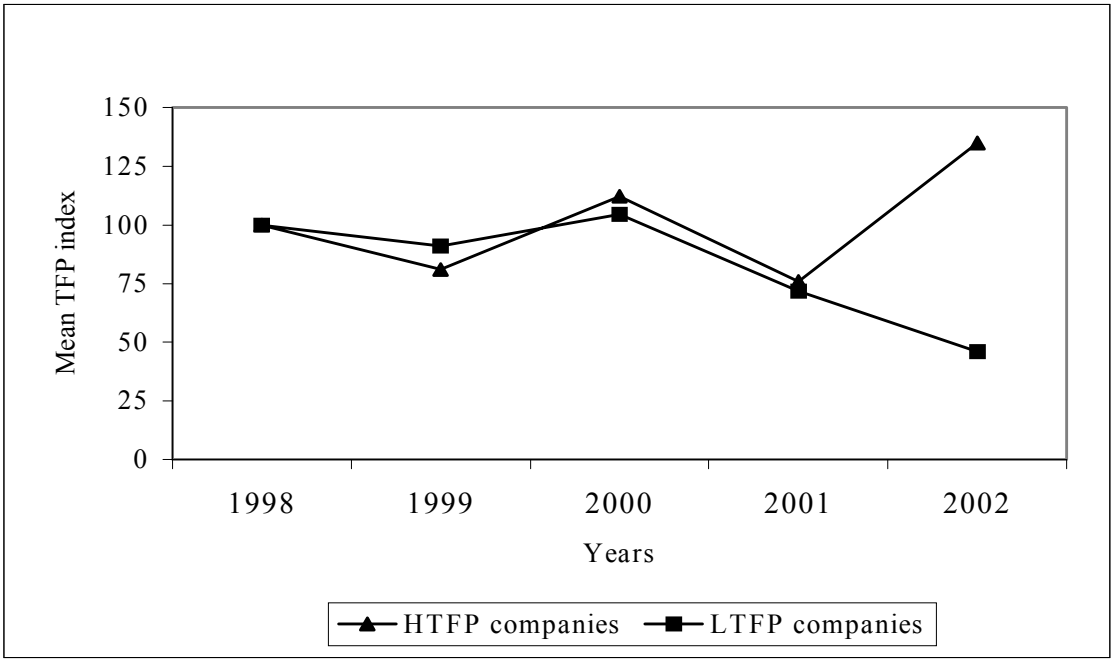
In *Figure 5.2* the productivity index for the HTFP and LTFP companies is shown in a line graph. Generally, as compared to HTFP companies, as portrayed in *Figure 5.2*, the mean total factor productivity index (μTFP) for the LTFP companies had decreased steadily especially over the years 2000 to 2002. During same years, i.e., 2000 to 2002, on the other hand, HTFP companies had experienced a slightly higher productivity indexes and a sudden increase in μTFP after the year 2001.

Although, the differences in the mean productivity indexes (μTFP) for the two groups of companies during the period 1998 to 2001 are small, the criterion for classifying these two groups of companies was based solely on their productivities of the year 2002, which is significantly higher. As noted in chapter one *(section 1.5.5)* of this study, the reason for choosing the 2002 productivity index as a base for classifying the two groups of companies was the fact that the research was conducted in 2003. The questionnaire was completed by the managers who might only be responsible for the performance of the recent one or two years of their respective sections/departments. Therefore, the most

recent information of all the available data, that is the mean TFP for the year 2002, was taken in order to maintain the reliability and validity of this study. For this reason, only a brief discussion of the productivity trend analysis was conducted.

It is important to note that the Eritrean fishing industry have experienced highly unstable productivity fluctuations over the years. One of the major causes for these fluctuations in productivity, as discussed in chapter one, could be the repercussion of the border war between Eritrea and Ethiopia during the period under study. However, it is not the objective of this study to address the reasons behind these huge fluctuations and their significance in affecting performance.

Figure 5.2 Mean TFP index measures for the HTFP and LTFP companies during the period (1998 – 2002).



The next section will deal with the extent to which management practices affect productivity performance of these companies.

5.4 Analysing the link between TFP & management practices (MPs)

In this section the relationships that exist between total factor productivity and selected management practices will be analysed. The analysis is presented in the following subsections:

5.4.1 Descriptive statistics of data

The six examined elements of management practices, which were used to test the hypotheses, are briefly described in *Table* 5.18 of the next page. These management practices are productivity measurement, employee participation, organisational communication, customer focus, top management's commitment to product quality and competitive environment and leadership.

Table 5.18 - The six management practices examined in testing the hypotheses and their brief description.

Management Practices (MPs)	Abbreviation	Brief Description
Productivity measurement	PM	Productivity measures are used as key tools to monitor company performance.
Employee training and participation	EP	Encouraging employees to participate in strategic decision-making through employee involvement, training and empowerment.
Organisational communication	OC	Communication is open and continuous in all directions in the organisation.
Customer focus	CF	Customer's satisfaction is the highest priority in the organisation.
Product quality	PQ	Long-term commitment to change and improving products, services and process continuously.
Leadership and competitive environment	LC	Leadership strategies to cope with the ever-changing business environment.

Since the data was collected using a questionnaire survey, questions were structured so as to fit in with the computer software (i.e., ITEMAN) which was utilised during the response analysis stage (*see the questionnaire*). Based on all available item responses (i.e., the responses of the 41 managers' to each item (question) related to each of the above six scales), some descriptive statistics for the six elements of management practices (scales) examined in this study are summarised in *Table 5.19*. The item analysis was processed using the ITEMAN Conventional Item and Test Analysis Program, Version 3.6 of the University of Pretoria.

Table 5.19-Descriptive statistics for the six management practices.

Management practices[9]	Mean	Standard deviation	Minimum	Maximum	Skewness (*sk*)[10]	Kurtosis (*ku*)[11]
PM	3.163	0.95705	1.000	5.000	-0.521	-0.193
EP	3.033	0.75121	1.600	5.000	0.388	-0.039
OC	3.330	0.77201	2.000	5.000	0.007	-0.629
CF	3.234	0.77881	1.600	5.000	-0.139	-0.522
PQ	3.763	0.86284	1.714	5.000	-0.775	-0.112
LC	3.089	0.65733	1.833	4.167	-0.429	-0.842

Some detailed results of the ITEMAN- Item analysis are attached at the end of the research (*See Appendix 3 and 4; 220-221*).

As shown in *Table* 5.19, the average responses for the management elements of all companies vary from 3.033 for employee participation (EP) to 3.763 for product quality commitment (PQ). The highest standard deviation was observed for productivity measurement (PM), which is 0.95705.

Generally, the distribution of the responses is flatter in the tails. The value of *Ku* for a normal distribution is 0. Flat distributions with scores more evenly distributed and tails

[9] See previous page of this chapter for the explanation of the acronym used for the management practices.
[10] Skewness is a measure of a distribution's deviation from symmetry.
[11] Kurtosis is a measure of a distribution's peakedness (or flatness).

fatter than a normal distribution have negative values of *Ku*. The larger the absolute value of the index, the more extreme is the characteristic (Cooper and Schindler, 1998: 430). Four of the elements are negatively skewed while two are positively skewed. When the tail streches to the left, to smaller values, it is negatively skewed. With negative skew, *SK* will be negative (Cooper and Schindler, 1998:430).

5.4.2 Hypotheses testing – differences in means (Δμ)

The mean responses on questions to the HTFP group and LTFP groups of companies were calculated for each of the six internal management practices on a five-point Likert scale. The procedure followed to calculate the mean internal management practices (μMPs) for all the companies is discussed in chapter one (*section 1.5.5*) of this study.

Table 5.20 – Internal management practices for companies with high and low levels of TFP in 2002 [μMPs and Std. dev.].

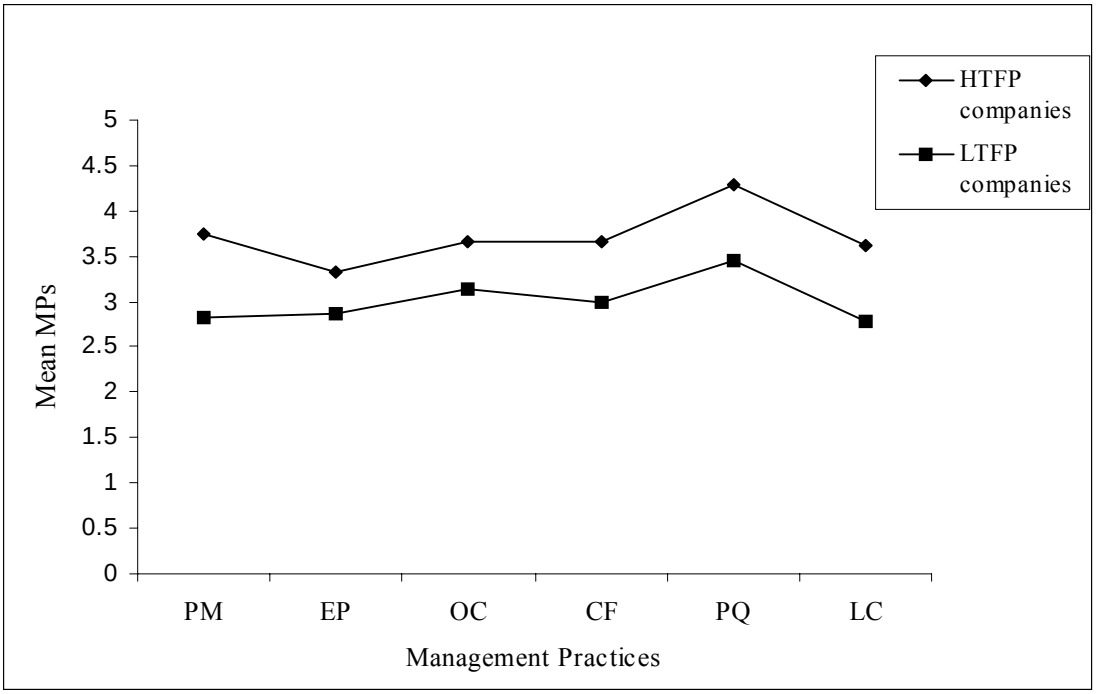
Management practices	HTFP companies		LTFP companies	
	Mean	Standard deviation	Mean	Standard deviation
PM	3.7444	0.5303	2.8269	0.9938
EP	3.3267	0.5599	2.8637	0.8036
OC	3.6533	0.5317	3.1360	0.8361
CF	3.6667	0.3677	2.9846	0.8370
PQ	4.2952	0.4199	3.4560	0.9080
LC	3.6222	0.3361	2.7820	0.5996

As can be observed from the analysis (*Table* 5.20 above and *Figure* 5.3 on the next page), the research hypotheses were tested by comparing the means of each element of management practices (μMPs) for high total factor productivity companies (HTFP) with the means of each element of management practices (μMPs) for low total factor productivity companies (LTFP).

In all instances, the results of the above table clearly show that the average (mean) responses of the participating managers of the HTFP companies, to the statements presented in a five-point Likert scale related to each of the six management elements, is much greater than for the LTFP companies. Besides, the standard deviations of the LTFP companies are greater than the standard deviations of the HTFP companies.

Based on the techniques described in chapter one, *section 1.5*, of this study the relationship between TFP and the elements of management practices (MPs) was examined using the Mann – Whitney *U*-test (a rank sum test). To calculate the Mann Whitney U- test, the BMDP Statistical computer software was utilised. Besides the extent to which the differences in means between the MPs of the two groups of companies are statistically significant were examined.

Figure 5.3 – Mean (μ) MPs for HTFP and LTFP companies in 2002.



The following hypotheses were tested here:

H_o: There is no statistically significant difference between the means of each of the management practices (μMPs) for companies with high level of total factor productivity and for companies with low level of total factor productivity.

H_1: There is statistically significant difference between the means of each of the management practices (μMPs) for companies with high level of total factor productivity and for companies with low level of total factor productivity.

In this study, the above null and alternative hypotheses were customised to test for each of the six selected management practices as discussed in chapter one.

As shown in *Figure* 5.3, the mean of each element of management practice for companies with high total factor productivity (HTFP) is higher than those with low level total factor productivity companies (LTFP).

Results of the significance tests using Mann-Whitney *U* – test and Z-values for the examined elements of management practices are presented in *Table 5.21* below.

Table 5.21 – Some statistical measurements for certain management practices (MPs).

MPs[12]	*U-statistic value	Mean of the U-statistic (μU)	Std. error of the U-statistic (σU)	Z-Values**	P-value One tail	P-value Two tail
PM	310.5	195	36.9459	3.13	0.0009	0.0017
EP	275.5	195	36.9459	2.18	0.0146	0.0292
***OC	256.0	187.5	35.7945	1.92	0.0274	0.0545
CF	304.5	195	36.9459	2.96	0.0015	0.0029
PQ	311.5	195	36.9459	3.15	0.0008	0.0016
LC	345.0	195	36.9459	4.06	0.0000	0.0000

Note:

* U statistic values are calculated for the highest sum ranks. However, the Z-values are always the same for both higher and smaller sum ranks.

** Z –values were calculated using the formula $Z = \frac{U - U\mu}{U\sigma}$, the result is rounded to two decimal place.

*** While only OC is significant at 0.1 confidence level, the other five elements of management practices are significant at P- value of 0.05 and lower (two tail).

[12] Management practices.

In assessing the difference between two independent samples the Mann-Whitney *U*-test provides a useful non-parametric alternative to the *t*-test for uncorrelated data when the assumptions of the *t*-test are not met (Cohhen and Holliday, 1996:202).
The Mann-Whitney *U*- statistic is a measurement of the difference between the ranked observations of two samples (Levin and Rubin, 1983). In this study the significance of the mean differences of the two groups of companies was analysed using the Mann – Whitney *U*-statistic. In doing so, the mean responses of 15 respondents represented the three HTFP companies' management practices whereas the mean response of the 26 responding managers' has represented the five LTFP companies.

However, when one or both of the sample sizes are larger than 20, we convert our obtained *U*-values into a *Z*-score in order to interpret the significance (Cohhen and Holliday, 1996:206). In this study, since one of the sample sizes is 26 (i.e., > 20), the calculated *U*-values have been converted into *Z*-scores. Having obtained the *Z*-value, the *Z*- value table was used to find the probability *P* of its occurrence under the normal curve.

As shown in *Table 5.21*, the difference of means between high and low – total factor productivity companies for the five selected elements of management practices have produced *P*- values of < 0.05 (two-tailed). However, one of the management practices, i.e., organisational communication, has produced a *P*- value of 0.0545. Therefore, OC is significant at *P*- value of 0.1.

These results confirm that there is a statistically significant difference between each of the mean management practices (μMPs) analysed for groups of companies classified as high total factor productivity (HTFP) and for those groups of companies classified as low total factor productivity (LTFP). Therefore, there is a positive relationship between all the examined elements of internal management practices and total factor productivity.

5.4.3 Analysing the relationships between the external factors and TFP

In this section the tendencies of the high and low total factor productivity companies with respect to some external factors to productivity will be analysed. In analysing the relationship between TFP and the external factors, the emphasis will be on the tendency of the frequencies rather than the significance levels[13].

The procedure followed is the percentage difference. The percentage difference consists of comparing percentages in different columns of the same row, or conversely, in different rows of the same column (Cooper and Schindler, 1999:442; Holiday and Louis, 1996:163).

In analysing the tendencies, the responses of the participating managers to the five-point Likert scale questions related to external factors to productivity growth were contracted (collapsed) into three groups. The "Strongly agree" and "Agree" (5 and 4 response categories respectively) were grouped together to indicate the agreement responses. The "Strongly disagree" and "Disagree" (1 and 2 response categories respectively) were grouped together to indicate the disagreement responses. The third option was the "Neither agree nor disagree" to indicate the neutral responses (option 3). The two groups of companies used were the HTFP and LTFP companies.

In the following paragraphs, the selected external factors to productivity will be examined to see if there is a relationship between company productivity performance (TFP) and the responding managers' responses.

[13] Statistics results showed that the Chi - Square significance test may not be a valid test for analysing the relationship between TFP and external management practices for the two groups of companies. In this analysis the tendency of the percentages of the two groups will be examined.

Table 5.22-Percentage comparison of responses for HTFP and LTFP companies.

Question	HTFP companies			Total	LTFP companies			Total
	Agree	Neutral	Disagree		Agree	Neutral	Disagree	
51	**86.6**	6.7	6.7	100	**84.6**	7.7	7.7	100
52	**100.0**	0.0	0.0	100	**84.6**	3.9	11.5	100
53	**60.0**	20.0	20.0	100	**15.4**	26.9	57.7	100
54	**33.3**	26.7	40.0	100	**7.7**	7.7	84.6	100
55	**20.0**	6.7	73.3	100	**19.3**	11.5	69.2	100

1. **Government policies**. (Question 51).

As shown in *Table 5.22* both groups of companies (HTFP and LTFP), perceived that the prevailing government policies are favourable for the companies to improve their productivities (86.6% and 84.6% for the HTFP and LTFP companies respectively). However, the tendency is that the HTFP companies are slightly more satisfied with the current government policies.

2. **Geographical location.** (Question 52).

As indicated in *Table 5.22* both groups had perceived the geographical locations, where these companies are operating, to be favourable for the kind of business they are in.

It is interesting, however, to see that the HTFP companies were 100 per cent satisfied with the geographical locations. Although, the LTFP companies had showed 84.6 per cent satisfaction, the 15 per cent difference shows that the tendency is that there is a direct relationship between geographical location and company performance.

3. **Raw materials suppliers**. (Question 53).

Respondents in the HTFP companies had agreed with the statement that there are enough suppliers of raw materials at a competitive price for their operation (60%), while only 15.4 per cent of the LTFP companies had agreed with the statement.

The results of the percentage difference procedure in *Table 5.22* show that companies with many raw materials suppliers at competitive prices tend to be more productive than those companies without reliable suppliers. Hence they are positively related.

4. **Level of competition**. (Question 54).

A third (33.3 per cent) of the HTFP respondents had considered the competition level in their industry as high, whereas only 7.7 per cent of the LTFP respondents had considered the competition to be high.

It appears from the results of the percentage difference analysis that both groups of companies had perceived the level of competition in the Eritrean fishing industry to be low. Besides, it seems that those companies that are operating in a relatively higher competition are more productive than those companies that are operating in lower competition markets.

5. **Opening up new markets**. (Question 55).

Just below three-quarter (73.3 per cent) of the HTFP companies' respondents had disagreed with the statement that there is no need to look for new markets. On the other hand, 69.2 per cent of the LTFP companies' respondents had disagreed with the same statement.

From the results of *Table 5.22*, although the results are close, it appears that export oriented companies are more productive than those who are less export oriented.

5.5 Chapter summary

Respondents were asked to rate eight variables (management practices) according to their importance to productivity growth in their respective sections/departments. Overall, responding managers considered training of employees, investment in new technology and employee satisfaction as the first, second, and third most important factors respectively to improve their productivities. Respondents' responses to a five point Likert scale questions related to the management practices (MPs) investigated in this study were also analysed in detail individually.

Based on the 2002 productivity indexes calculated by using the value added total factor productivity method, as proposed by Graig and Harris (1973) and Grossman (1993), the eight surveyed companies were classified into two groups namely high total factor productivity companies (HTFP) and low total factor productivity companies (LTFP).

The results of data analysis indicate that there is a positive relationship between the examined management practices and the total factor productivity of companies. This study has shown that those companies with better internal management practices have better total factor productivity performances as compared to those companies with relatively poor management practices. Results of descriptive analysis indicate that the means of each of the management practices (μMPs) for HTFP companies are significantly higher than the means of each of the management practices (μMPs) for LTFP companies. The difference of means ($\Delta\mu$) of management practices between HTFP and LTFP companies produced *P*-values < 0.05. This proves that there is a statistically significant deference between the means of each element of management practices examined in this study (μMPs) for groups of companies classified as high total factor productivity (HTFP) and those groups of companies classified as low total factor productivity (LTFP). Therefore, it could be concluded that in the companies operating in the Eritrean fishing industry, there is a positive relationship between all the examined internal management practices and their total factor productivity performance.

The findings also indicate that there is a direct relationship between productivity and the external factors examined. In all cases, the tendency is that, those companies with high productivity performance to be more satisfied about their external environment compared to the low performing companies. This confirms that there is a positive relationship between the investigated external factors to productivity and total factor productivity.

CHAPTER - 6

Conclusions and recommendations

6.1 Introduction

In the previous chapter discussions of the research results were presented. In this final chapter the findings of the research, based on the original objectives will be summarised in an attempt to highlight the main areas of focus on the resulting benefits of the study. Therefore, conclusions and recommendations for management will be drawn. This chapter will also present some recommendations for the future research by anyone interested in this field.

6.2 Conclusion

For the purpose of convenience, this study can be clearly divided into two broader sections with each section having different objectives to be achieved. The first section, which is the literature review, comprises of three chapters. The objective of these three chapters was to establish concepts and constructs that would be used as basis for the research analysis. This objective was accomplished to a greater level through the development of relevant theoretical backgrounds on the current status of the global fishing industry, the concept of productivity and some selected management practices.

The second section, which is the empirical study, has dealt with the analysis of both data collected through the questionnaires distributed to and completed by the participating managers and the financial statements collected from the companies surveyed in this study. The objectives of this important section, as clearly specified in chapter one of this study, were achieved to a higher degree through the application of descriptive and inferential statistics in analysing the data and presenting the research findings in a scientific manner.

In the next paragraphs, the conclusions and recommendations for management will be provided according to the objectives set in chapter one of this study.

6.2.1 Total factor productivity (TFP)

Generally productivity can be defined as a ratio of a system's outputs to a system's inputs. In the literature part, three broad categories of productivity measurement approaches were discussed. These are the single factor productivity measures, total factor productivity measures and the total productivity measures. Although, each of these approaches has its own advantages and disadvantages, in this study the total factor productivity measurement approach (TFP) was found to be most suitable because of its data availability (i.e., the data required to calculate TFP are readily available in the financial reports of the companies). Total factor productivity measures are usually based on net output (value added) rather than gross output and they take the ratio of output to labour and capital services weighted by their respective prices.

In this study, based on the resulting total factor productivity indexes of each company in the year 2002, the eight participating companies were classified into two groups. Companies with a TFP index number of 100 and above ($\geq$100) were categorised as having high total factor productivity and those companies with a TFP index number of less than 100 (<100) were categorised as having low total factor productivity.

Of all the participating companies 37.5 per cent were categorised as high total factor productivity companies (HTFP) and 62.5 per cent were categorised as low total factor productivity companies (LTFP). Although, the total factor productivity trend analysis was not the central objective of this study, the mean total factor productivity index (μTFP) measures for all the companies in the Eritrean fishing industry had decreased significantly over the period 2000 to 2002. During the same period, however, measures of mean total factor productivity indexes (μTFP) for companies with high total factor productivity had been greater than those companies with low total factor productivity

measures. The difference in mean total factor productivity between the HTFP companies and the LTFP companies particularly in the year 2002 was significantly high.

6.2.2 Management practices (MPs)

Previous studies have suggested that the adoption of appropriate management practices such as: employee training and participation (Cotton, 1993; Stainer, 1995; Raiborn and Payne, 1996; Brown, 1999), productivity measurement (Drucker, 1974; Bridges, 1992; Christopher and Thor, 1993 and Aboganda, 1994), organisational communication (Ross, 1977; Owusu, 1999; Schermerhorn, *et al*., 2000), customer focus (Drucker, 1977; Evans and Lindsay, 1999; Limehouse, 1999; Khan, 2003;), commitment to product quality (Edosomwan, 1995; Helms, 1996; Hertz, *et al*., 1997) and leadership and competitive environment (Ross, 1977; Prokopenko, 1987; Evans and Lindsay, 1999) are positively related with company productivity (performance).

The factors that affect productivity were categorised as internal and external factors. As indicated above, the internal management practices identified from the literature and examined in this study are: productivity measures and standards, employee training and participation, organisational communication, customer focus, commitment to product quality, and competitiveness and leadership. Although this study concentrated more on the above internal management practices, some external factors including geographical location, government policies, raw materials suppliers availability, level of local competition and natural resources availability were also briefly discussed in connection to their relationship with company performance.

The degree of application of each of the identified management practices by the eight surveyed companies was measured through descriptive analysis of the responses of the 41 managers who had participated by completing the questionnaire. From the results of the findings it is concluded that:

Overall, the employees in the Eritrean fishing industry lack proper training programs and the industry in general is not investing in new technology to improve the existing level of productivity. According to the results of the priority rating scale, training of employees was considered as the most important factor for improving company/ department/ section productivity growth followed by investment in new technology by all the participating managers of the companies operating in the Eritrean fishing industry.

Companies classified as HTFP have the culture of encouraging their employees to participate in important company decisions, delegating authority, have better working conditions, and have better reward systems. On the other hand, the LTFP companies are characterised by low levels of employee participation and authority delegation, and poor reward systems. Both high and low TFP company managers, however, responded most frequently as having unfair and poor payment schemes due to the national service duty program of the government. The HTFP companies have allocated an extra budget to motivate their employees and they usually encourage their employees to work overtimes. The managers of those LTFP companies, however, didn't mention any kind of monetary incentives to motivate their employees.

In the high total factor productivity companies, key measures of (section/department) performance have been identified by those personnel who directly involve in the design and development of their section/department productivity measures and their employees consider productivity improvement as part of their companies' goals and mission. The interviews conducted with some managers from the low total factor productivity companies, however, revealed that only finance managers are responsible for productivity measures and therefore, most employees know little about the productivity objectives of their companies.

Overall, most sections and departments of the companies operating in the Eritrean fishing industry hardly implement the possible productivity standards namely in-house developed, benchmarking and third party standards. Relatively speaking, however, high total factor productivity companies have either implemented or planned for an in-house

developed productivity standards. Benchmarking is not considered as an important tool in monitoring their productivity growth against the best performer of the industry.

In the high productivity companies communication is open and continuous between the various departments and hierarchies in all directions. The procedures in place that one has to follow are clear and easy. Further, to avoid confusions, high productivity companies use written directions. Low productivity companies, on the other hand, have indicated some difficulties that arise out of some communication inefficiency through their low response rates to questions related to communication.

High productivity companies know better about their customers' needs, expectations and level of satisfaction than the low productivity companies. Besides, complaints are more quickly dealt with in the high productivity companies than are in the low productivity companies. However, managers from both groups of companies have indicated frequently as having low customer relationship efforts.

The "commitment to product quality" element of the management practice is the one which all managers in all companies have responded more positively. This indicates that all the companies seem to have good product quality practices. The high productivity companies, however, are far better committed in the implementation of quality standards. They try to produce their products without any defects, and they understand the inseparable connection that exists between quality and productivity.

Because of the current low level of competition in the industry, both groups of companies are not considering any immediate threat from the industry players. Thus, the time spent to analyse rivals is insignificant. However, the high productivity companies' marketing strategies are more export oriented whereas the low productivity companies are interested in satisfying domestic markets.

6.2.3 The relationship between total factor productivity and management practices

The results of descriptive analysis indicate that mean responses for the management practices (μMPs) for companies with high total factor productivity (HTFP) is significantly higher than for those companies with low total factor productivity (LTFP). The significance of the mean differences of each of the management practices between the two groups of companies was analysed using the Mann-Whitney *U*-statistics.

The differences in means between the two groups of companies for the five elements of management practices (i.e., employee training and participation, customer focus, commitment to product quality and leadership and competitive environment) have produced (two-tail) *P*-values of <0.03 and 0.0545 for one element of the management practices (organisational communication). This confirms that there is a statistically significant difference between the means of each element of the management practices for groups of companies classified as high total factor productivity and those groups of companies classified as low total factor productivity. Hence, the null hypotheses formulated in chapter one are rejected and it is, therefore, concluded that there are direct and positive relationships between each of the examined elements of internal management practices and the total factor productivity in the private companies operating in the Eritrean fishing industry. Furthermore, the findings of the tendency analysis for the examined external factors to productivity growth confirm that there exists a direct relation between total factor productivity and the factors examined. In all the cases, those companies with high productivity performance had better influence on their external environment than the low performing companies.

6.3 Recommendations

The findings of this study have significant implications for the management of the surveyed companies operating in the Eritrean fishing industry and other related

companies. Based on the study findings, the following general recommendations can be offered.

Firstly, management should understand and adopt appropriately all the management concepts, discussed in this study, at all levels of management hierarchies (i.e., units, sections and departments), in order to improve their companies' performance, which in turn would, create a competitive advantage for the companies. The following specific recommendations, however, need immediate actions:

- The management of the surveyed companies should consider implementing appropriate employee training programmes, at all hierarchies in the organisation, immediately by allocating appropriate budgets so that they can impact productivity favourably.

- Given the government policy of "national service programme", which is often referred as "counterproductive" by most managers, companies should consider introducing a flexible incentive schemes so that they could motivate the workers who are on their national service duty.

- To be competitive in the domestic as well as foreign markets, the management of these companies should use market analysis, customer satisfaction studies, customer feedback methods, and be responsive to resolving customer problems and complaints.

Secondly, as it is empirically evidenced, the management of the surveyed companies should be aware of the direct relationships that exist between each of the management practices examined and company productivity performances. Thus, managers are recommended to adopt good management practices, as they are associated with improved productivity performances.

Thirdly, productivity as a performance measurement tool is not being practised the way it should be in the companies. It is therefore, suggested that they should consider designing and implementing an appropriate productivity measurement model that suits to their unique company situations.

Fourthly, the Eritrean fishing industry has to use modern technology that will expand their production and productivity. As revealed from the findings of this study, overall technology was considered as the second most important factor in raising productivity (following training of employees) by the responding managers. It is therefore recommended that the companies operating in the Eritrean fishing industry to consider investing in modern technology so that they can expand their productivity and be competitive internationally.

6.4 Recommendations for further research

In this section of the study, based on the literature review and the findings, the researcher would like to recommend some areas for further research.

- In order to normalise the effect of investment variation on productivity among companies, in this study the index approach was utilised. However, it is possible that the amount of investment could have a direct effect on productivity. Thus, further study aiming at the level of investment by each company may be needed to address the effect of investment variations on plant productivity.

- In this study, only six internal management practices of the companies were identified as critical and examined based on the researcher's experience in the Eritrean fishing industry. For a more complete study, however, the effect of other management practices such as, the level of technology application by each company, the work methods employed, and the work ethics of employees on the productivity of these companies' needs further investigation.

- This study was carried out amid unstable political situation in Eritrea. It could be of interest to investigate the impact of the border war (between Eritrea and Ethiopia 1998-2000) on the productivity of the companies surveyed.

- The productivity method utilised in this study to measure the productivity indexes of the surveyed companies was the total factor productivity (TFP) designed by Grossman's (1993). The only sources of data utilised to compute the TFP indexes were the audited annual financial statements of the participating companies. It is, however, recommended that the total productivity (TP) measurement method, which considers all outputs to all inputs of a system, should be utilised for a better and accurate result.

- Detailed productivity trend analysis and its implications to the management of the surveyed companies was not included in this study. However, it is believed that further examination on this area (i.e., a study focusing on a comprehensive and detailed trend analysis that shows the movement of labour productivity, capital productivity and the total factor productivity in one figure) could enrich the content of this study.

- It is recommended that further research be conducted on this research topic, utilising the hypotheses formulated in this study, focusing on other industries in Eritrea or in the same industry of other nations. This would help to identify any differences that might occur due to the unique nature of the environment of the industry or country in which the study is conducted.

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Appendix 1

QUESTIONNAIRE

Dear respondent,

The research is conducted for the purpose of completing my masters degree at the University of Pretoria. I am studying the management practices of the companies operating in the Eritrean fisheries industry and its relationship with total factor productivity (TFP). I would greatly appreciate your participation in this project, by completing the attached questionnaire and allow a follow-up interview to explore issues in more depth. All information obtained from this questionnaire will be treated ***confidential*** and participant's identity will remain anonymous. The results will be used for academic purposes only, and might be included in an academic publication.

This questionnaire seeks information about the degree of implementation of certain selected management practices in your company. The selected management practices to be considered are the following: measuring productivity, productivity standards, management of the customer and the employee, organisational communication, product quality, leadership and the competitive environment. You will be asked to consider how these various elements are managed in your company.

In answering each question, please be as ***objective*** as possible remembering that biases sometimes ***"cloud"*** the real answer. You should not tick a box for example because the answer sounds more like what you ***" want"*** to hear but rather, indicate an answer which in your opinion ***accurately depicts the present situation in the company***. Your responses should reflect the situation in your section/company. The validity of this research largely depends on the accuracy of your answers.

Thank you in advance for your participation in the completion of this questionnaire.

Kibrom Shumdehan	Prof. E F de V Maasdorp
Researcher	Supervisor

SECTION ONE: Background Information

Office use

Respondent Number V1☐☐ 1-2

1. What is your position in the company? V2☐ 3

☐ General manager (C.E.O.)
☐ Department head
☐ Section head
☐ Supervisor
☐ Other, please specify: _____

2. Gender ☐ Female ☐ Male V3☐ 4

3. Your highest educational level V4☐ 5

☐ Primary Education
☐ Secondary Education
☐ College diploma
☐ Bachelor Degree
☐ Master Degree
☐ Other, please specify: _____

4. Name the section, division or department of which you are in charge_____

_____

5. Describe your main duties. _____

_____

_____

6. How many employees directly report to you? V5☐ 6

☐ 1 – 5
☐ 6 – 10
☐ 11 – 15
☐ 16 - 20
☐ 21 - 25
☐ 26 and more

7. How many years have you been with this company? V6☐ 7

☐ Less than 2 years ☐ 2 – 5 years ☐ More than 5 years

SECTION TWO: Factors which the company management has direct control over

In this section you are asked to consider a number of statements in relation to your view of your section/company. Please answer ***all*** questions by ticking (√) the appropriate box, which ***best*** describes the current situation in your section or company.

Part One: Ranking of certain management practices

8. Which of the following factors do you think *contributes most to productivity growth* in your company? Rank them in order of importance where 8= most important and 1= least important.

Office use

a) Investing in new machinery/ technology	☐	V7 ☐ 8
b) Training of employees	☐	V8 ☐ 9
c) Effective organisational communication	☐	V9 ☐ 10
d) Resource availability	☐	V10 ☐ 11
e) Customer satisfaction	☐	V11 ☐ 12
f) Employee satisfaction	☐	V12 ☐ 13
g) Marketing effectiveness	☐	V13 ☐ 14
h) Product quality	☐	V14 ☐ 15

Part Two: Management practices relating to productivity measurement

9. Productivity measures are part of the company goals and mission. V15 ☐ 16

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

10. Key measures of section/department performance have been identified. V16 ☐ 17

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

11. Key functional personnel are involved in the design and development of productivity measures. V17 ☐ 18

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

12. Section performance results are used to plan improvement. V18 ☐ 19

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

13. Company performance results are communicated throughout the company. V19 ☐ 20

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

14. Overall company performance is measured against our competitors. V20 ☐ 21

5	4	3	2	1
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree

Part Three: Management practices relating to productivity standards

15. Please mark one	Implemented	Planned for	Not planned for	
a) In-house productivity standards	☐	☐	☐	V21 ☐ 22
b) Third party productivity standards	☐	☐	☐	V22 ☐ 23
c) Benchmarking	☐	☐	☐	V23 ☐ 24

16. Does your company have a productivity improvement program?	***Yes***	***No***	
	☐	☐	V24 ☐ 25
If yes, then			
a) is someone in charge ?	☐	☐	V25 ☐ 26
b) is there a formal structure?	☐	☐	V26 ☐ 27
c) Are managers at all levels involved?	☐	☐	V27 ☐ 28

17. Do you as an individual manager taken any specific action to improve productivity?
☐ Yes ☐ No. If yes, briefly what were they? _____ V28 ☐ 29

Part Four: Management practices relating to employees

18. Employees are encouraged to be fully involved in the business and they reach their full potential. V29 ☐ 30

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

19. Training needs are assessed periodically. V30 ☐ 31

5	4	3	2	1
☐	☐	☐	☐	☐

Strongly agree *Agree* *Neither agree nor disagree* *Disagree* *Strongly Disagree*

20. There is a budget allocated by the company for employee training purpose. V31 ☐ 32

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

21. All employees believe that increasing productivity is their responsibility. V32 ☐ 33

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

22. Employees are empowered by delegating authority to make decisions regarding process improvement within individual areas of responsibility. V33 ☐ 34

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

23. Reward and recognition systems support the company's productivity objectives. V34 ☐ 35

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

24. Employee satisfaction is regularly measured. V35 ☐ 36

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

25. There is adequate and fair pay for a job well done. V36 ☐ 37

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

26. There are safe and healthy working conditions. V37 ☐ 38

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

27. Employees have pride in the work itself and the organisation. V38 ☐ 39

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

Part Five: Organisational communication

28. Instructions and procedures are clear and easy to follow by subordinates. V39 ☐ 40

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

29. The company has a formal written purpose and direction. It is broadly communicated and understood by all managers and employees. V40 ☐ 41

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

30. Communication is open and continuous in three directions: up, down and across. V41 ☐ 42

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

31. Reports and models are designed to increase effectiveness in displaying and analysing of data. V42 ☐ 43

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

32. Both management and employees receive timely information. V43 ☐ 44

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

Part Six: Management practices on customer.

33. The company regularly measures customer satisfaction. V44 ☐ 45

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

34. The present needs and expectations of customers for the future are known. V45 ☐ 46

5	4	3	2	1
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

35. Complaints and problems are resolved promptly and efficiently by management. V46 ☐ 47

5	4	3	2	1

Strongly agree *Agree* *Neither agree nor disagree* *Disagree* *Strongly Disagree*

36. Employees are considered as internal customers in your company. V47 ☐ 48

5 ☐ Strongly agree | 4 ☐ Agree | 3 ☐ Neither agree nor disagree | 2 ☐ Disagree | 1 ☐ Strongly Disagree

37. Customer relationships are evaluated and improved. V48 ☐ 49

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

Part Seven: Management practices relating to quality

38. Quality improvement is your company's objective. V49 ☐ 50

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

39. Management promotes quality improvement efforts. V50 ☐ 51

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

40. Your company always strives to produce existing products without any defects. V51 ☐ 52

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

41. Management has established methods to maintain and improve the quality of products. V52 ☐ 53

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

42. Management focuses on prevention of problems before they happen. V53 ☐ 54

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

43. Management understands the strong connection between quality and productivity. V54 ☐ 55

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

44. Top management concentrates on improving productivity and increasing effectiveness in utilising its resources. V55 ☐ 56

5 ☐ *Strongly agree* | 4 ☐ *Agree* | 3 ☐ *Neither agree nor disagree* | 2 ☐ *Disagree* | 1 ☐ *Strongly Disagree*

Part Eight: Practices on leadership and competitive environment

45. Management knows exactly how aggressive your major competitors are. V56 ☐ 57

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

46. Overall competitiveness in your industry is very high. V57 ☐ 58

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

47. The amount of time spent analysing your major competitors is very high. V58 ☐ 59

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

48. The management style (leadership style) in your company encourages productivity. V59 ☐ 60

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree

49. Strategies of the company include opening up overseas markets and finding new ways to compete. V60 ☐ 61

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

50. Marketing strategies of the company focus on international marketing and global competition. V61 ☐ 62

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree

SECTION THREE: Factors which the company management has minimal influence or no control over.

In this section you are required to give your opinion on the various statements by ticking (√) the appropriate box from the scale provided.

51. The government policies regarding the fisheries industry in Eritrea are conducive to your company's productivity growth objectives. V62 ☐ 63

5	4	3	2	1
☐	☐	☐	☐	☐
Strongly agree	*Agree*	*Neither agree nor disagree*	*Disagree*	*Strongly Disagree*

52. The geographical location of your company is ideal for the kind of business you are running. V63 ☐ 64

5	4	3	2	1
☐	☐	☐	☐	☐

Strongly agree *Agree* *Neither agree nor disagree* *Disagree* *Strongly Disagree*

53. There are many raw materials suppliers for your company at a competitive price. V64 ☐ 65

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

54. The level of local competition in the industry is very high. V65 ☐ 66

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

55. There is no need to look for new market, because the local market is not yet satisfied. V66 ☐ 67

5 ☐ *Strongly agree* *4* ☐ *Agree* *3* ☐ *Neither agree nor disagree* *2* ☐ *Disagree* *1* ☐ *Strongly Disagree*

Thank you for your valuable time.

Appendix 3

Results of descriptive statistics using the ITEMAN Conventional Item Analysis Program Version 3.6.

Scale Statistics

Scale:	PM	EP	OC	CF	PQ	LC
N of items	6	10	5	5	7	6
N of examinees	41	41	40	41	41	41
Mean	3.163	3.033	3.330	3.234	3.763	3.089
Variance	0.894	0.551	0.581	0.581	0.726	0.422
Std. Dev.	0.945	0.742	0.762	0.762	0.852	0.649
Skew	-0.521	0.388	0.007	-0.139	-0.775	-0.429
Kurtosis	-0.193	-0.039	-0.629	-0.522	-0.112	-0.842
Minimum	1.000	1.600	2.000	1.600	1.714	1.833
Maximum	5.000	5.000	5.000	5.000	5.000	4.167
Median	3.167	2.900	3.400	3.200	4.000	3.167
Alpha	0.877	0.885	0.817	0.846	0.902	0.688
SEM	0.331	0.252	0.326	0.299	0.267	0.362
Mean P	N/A	N/A	N/A	N/A	N/A	N/A
Mean Item-Tot.	0.787	0.696	0.764	0.783	0.785	0.622
Mean Biserial	N/A	N/A	N/A	N/A	N/A	N/A

Legend:

PM = Productivity measurement

EP = Employee training and participation
OC = Organisational communication
CF = Customer focus
PQ = Product quality
LC = Leadership and competitive environment

Appendix 4

Results of descriptive statistics using the ITEMAN Conventional Item Analysis Program Version 3.6.

Pearson Product-moment correlations among the examinee scores on the individual scales.

Scale Intercorrelations.

	PM	EP	OC	CF	PQ	LC
PM	1.000	0.775	0.754	0.824	0.799	0.668
EP	0.775	1.000	0.826	0.803	0.673	0.593
OC	0.754	0.826	1.000	0.794	0.728	0.562
CR	0.824	0.803	0.794	1.000	0.778	0.574
PQ	0.799	0.673	0.728	0.778	1.000	0.687
LC	0.668	0.593	0.562	0.574	0.687	1.000

Legend:

PM = Productivity measurement
EP = Employee training and participation
OC = Organisational communication
CF = Customer focus
PQ = Product Quality
LC = Leadership and competitive environment

Appendix 2

Total factor productivity (TFP) calculations (Company 7)

	1998		1999		2000		2001		2002	
OUTPUT:	**USD**	**INDEX**	**USD**	**INDEX**	**USD**	**INDEX**	**USD**	**INDEX**	**USD**	**INDEX**
Total sales revenue	8671808		9871502		10231000		12167253		11666724	
Inventory Change (+)	3228843		2336892		2021990		1404659		-650000	
Adjusted Production Output	11900651		12208394		12252990		13571912		11016724	
Less: - Material expenses	-2322137		-2043161		-2080620		-2404590		-1524703	
Energy expenses	-484640		-490164		-521955		-598141		-406206	
Other Expenses	-1479534		-1442131		-1274641		-1279686		-1090758	
Value added Output	7614340	100.0	8232938	108.0	8375774	110.0	9289495	122.0	7995057	105.0
CPI	1.00		1.052		1.084		1.126		1.225	
Adjusted Value added output	**7614340**	**100.0**	**7825987**	**102.8**	**7726729**	**101.5**	**8249996**	**108.3**	**6526577**	**85.7**
INPUT:-										
Labour (share of labour 20.8%)	1579887	100	1991922	126	1674680	106	1711018	108.3	1565668	99.1
CPI	1.00		1.052		1.084		1.126		1.225	
	1579887	**100**	**1893462**	**119.8**	**1544908**	**97.8**	**1519554**	**96.2**	**1278096**	**80.9**
Capital (share of capital 79.2%)	17156785	100	18656266	108.7	19046651	111.0	20464363	119.2	19293210	112.5
CPI	1.00		1.052		1.084		1.126		1.225	
	17156785	**100**	**17734093**	**103.4**	**17570711**	**102.4**	**18174390**	**105.9**	**15749559**	**91.8**
Total Factor Input (TFI)		**100**		**106.8**		**101.4**		**103.9**		**89.5**
PRODUCTIVITY MEASURES										
Labour Productivity		100		85.8		103.8		112.6		106
Capital Productivity		100		99.4		99.1		102.3		93.3
****TFP Productivity**		***100***		***96.3***		***100***		***104.2***		***95.8***

** this indexes are the final measures of the Total Factor Productivity of company 7 during the years from 1998 - 2002.

Important notes and definitions in the TFP calculation:

1. ***Total sales revenue.*** This is the sales revenue received from outputs (goods and services) sold. Because complete records of units were not available, output was calculated from the annual sales revenue.

2. ± ***Inventory.*** This includes finished goods and work in progress items. Inventory (calculated in sales value) stands for the difference between the year ending value and year beginning value of inventory. In the calculations of inventory balances, the FIFO method was applied. The balance is then added to or subtracted from the total sales. In this manner, in our calculations, an inventory adjustment was made to convert the sales output to a production output. In 1998 there was an inventory valued at $3,228,843, which was produced in the same year but not sold.

3. ***Value added (VA).*** This is the difference between adjusted production output and other external purchases. In this case, materials, energy and other expenses were subtracted from the production output to arrive at the "value added output". It refers to the "value added" to materials by each company as a result of applying labour and capital to convert the inputs into salable (marketable) outputs. In 1998 ($ 7,614,340)

4. ***CPI*** (consumer price index). This is a price index number as sourced from the Commercial Bank of Eritrea (CBE). It is used to transform (i.e., to either inflate or deflate) the nominal value into real value. Because of the shortage of time and the lack of appropriate price indexes for each category of costs in the industry, the researcher has used the CPI to transform all the nominal values into real values. Had there been enough time, it could have been possible to develop company specific indexes, such as PPI (producer price index), in order to get a more accurate result.

5. ***The base year***. In all the calculations, the year 1998 was chosen as the base year and hence an index number of 100 was allocated. By using an index, each year's figure represents the relative change in the measure from this year (1998).

6. ***Labour input (L).*** Labour input is the total wage and salary costs paid for producing the value-added output, including all other benefits to employees in a particular financial year (i.e., $1,579,887 in the base year). The assumption is that these costs represent the economic cost of the human talent that created the value-added output.

7. ***Capital input (K).*** Capital input is the cost of capital utilised in the production of the value-added output. There are many methods used in calculating capital inputs. In this study the method used to calculate capital input was the indexed historic cost approach adjusted for inflation. Capital assets include machinery, building, furniture, equipment and land. The real purchase values of capital were the only data available in the financial statements of the companies, which were written off overtime to account for depreciation. (In 1998, it was $17,156,785).

8. ***Total factor input (TFI).*** This is the weighted sum of labour and capital input indexes. Labour and capital input indexes must be added to derive total factor input. To do so, their respective shares of total income in the base year (i.e., 1998) must be calculated. For instance, in this case labour input accounted for 20.8% percent of value added output (1,579,887/7,614,340 = 20.8%). The remaining share was attributed to capital 79.2%(100% - 20.8%). These fixed weighting factors were then used throughout the years to sum the labour and capital inputs so that to arrive at the total factor inputs. For example, in 2002:

   TFI was calculated as [80.9 (0.208) + 91.8 (79.2) = 89.5].

9. Total factor productivity (TFP). This is the ratio of value added output to total factor input.

$$\text{In 1999, TFP} = \frac{\text{VA}}{\text{TFI}} = \frac{85.7}{89.5} = 95.8,$$

Relative to the base year (1998) in 2002 this company showed a 4.2% decline in total factor productivity.

Appendix 5

Mean calculations of one company's respondents responses to the questions. SAS Statistical software was used.

Respondent	v15	v16	v17	v18	v19	v20	v29	v30	v31	v32	v33	v34	v35	v36	v37	v38	v39	v40	v41	v42	v43	**v44**	**v45**	**v46**	**v47**	**v48**
1	4	4	2	4	1	3	3	3	3	4	4	4	3	4	4	3	4	4	4	3	3	**3**	**4**	**4**	**3**	**3**
2	4	3	3	3	4	3	4	3	3	3	3	4	3	3	4	3	3	3	3	3	3	**3**	**3**	**4**	**4**	**3**
3	4	4	3	3	3	2	3	3	2	3	3	3	3	3	3	3	3	4	3	3	3	**2**	**3**	**3**	**3**	**3**
4	4	4	3	4	4	4	3	2	2	3	4	2	2	2	4	4	4	4	4	2	3	**4**	**4**	**4**	**3**	**4**
5	3	2	3	4	3	2	3	2	2	4	3	2	5	2	4	4	4	3	4	2	2	**5**	**4**	**4**	**3**	**2**

Continues....

Obs	v49	v50	v51	v52	v53	v54	v55	v56	v57	v58	v59	v60	v61	PM	EP	OC	**CF**	PQ	CE
1	5	4	3	3	3	5	4	4	3	3	4	4	5	3.00000	3.5	3.6	**3.4**	3.85714	3.83333
2	4	4	4	4	4	4	4	3	3	3	4	4	4	3.33333	3.3	3.0	**3.4**	4.00000	3.50000
3	4	4	4	4	3	4	4	3	4	2	5	4	4	3.16667	2.9	3.2	**2.8**	3.85714	3.66667
4	4	4	5	4	4	4	4	3	3	3	2	3	5	3.83333	2.8	3.4	**3.8**	4.14286	3.16667
5	3	4	4	3	4	4	3	4	4	2	4	4	4	2.83333	3.1	3.0	**3.6**	3.57143	3.66667
											Mean			3.23332	3.12	3.24	**3.4**	3.88571	3.56667

Appendix 6

ITEMAN (tm) for 32 – bit Windows, Version 3.6

Conventional Item and Test Analysis Program

Item Statistics for CF

Seq. No.	Scale -Item	Item Mean	Item Var.	Item-Scale Correlation	N per Item
33	6-1	3.100	1.140	.88	41
34	6-2	3.400	0.840	.82	41
35	6-3	3.451	0.933	.70	41
36	6-4	3.220	0.805	.84	41
37	6-5	3.000	0.976	.67	41
		3.234			

The Means for each of the six scales were calculated as above using ITEMAN software.

Appendix 7

Mean TFP calculations for the high total factor productivity (HTFP) companies.

Company	Years				
	Base year 1998	1999	2000	2001	2002
Company 1	100.0	41.9	145.6	16.4	129.3
Company 3	100.0	99.6	65.3	76.2	162.0
Company 6	100.0	101.4	126.1	135.4	113.8
Mean TFP	**100.0**	**81.0**	**123.3**	**76.0**	**135.0**

Mean TFP calculations for the low total factor productivity (LTFP) companies.

Company	Years				
	Base year 1998	1999	2000	2001	2002
Company 2	100.0	100.0	81.1	23.6	-27.8
Company 4	100.0	84.5	104.6	101.6	81.8
Company 5	100.0	99.4	144.9	98.2	96.2
Company 7	100.0	96.3	100.0	104.2	95.8
Company 8	100.0	75.0	91.6	31.9	-16.3
Mean TFP	**100.0**	**91.0**	**101.4**	**71.9**	**45.9**

Mean TFP calculations for all companies.

Company	Years				
	Base year 1998	1999	2000	2001	2002
Company 1	100.0	41.9	145.6	16.4	**129.3**
Company 2	100.0	100.0	81.1	23.6	-27.8
Company 3	100.0	99.6	65.3	76.2	**162.0**
Company 4	100.0	84.5	104.6	101.6	81.8
Company 5	100.0	99.4	144.9	98.2	96.2
Company 6	100.0	101.4	126.1	135.4	**113.8**
Company 7	100.0	96.3	100.0	104.2	95.8
Company 8	100.0	75.0	91.6	31.9	-16.3
Mean TFP	**100.0**	**87.3**	**107.4**	**73.4**	**79.4**