ADDIS ABABA UNIVERSITY
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DEPARTEMENT OF MECHANICAL ENGINEERING
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PERFORMANCE MEASUREMENT AND IMPROVEMENT FOR ETHIOPIAN TANNERY INDUSTRIES: Case Study on Addis Ababa Tannery Share Company

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A thesis submitted to the School of Graduate Studies of Addis Ababa University in partial fulfillment of the requirements for the Degree of Masters of Science in Mechanical Engineering under Industrial Engineering Stream

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DECLARATION

I hereby declare that the work which is being presented in this thesis entitled "**Performance Measurement and Improvement for Ethiopian Tannery Industries:** Case Study on Addis Ababa Tannery Share Company" is original work of my own, has not been presented for a degree of any other university and all the resources of materials used for the thesis have been duly acknowledged.

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ABSTRACT

The industrial strategic development plan of Ethiopia gives great emphasis to improve export-led products to join the international market in a large scale. The strategy also promotes capital saving and labor-intensive industrial development policy using coordinated approach (joint forum) of supply chain management to encourage the production of value-added products. As a predominantly agricultural economy with the largest cattle population in Africa, Ethiopia has a strong base for semi-processed leather, finished leather and leather products. So Ethiopia's leather industry is in the forefront of the leather sector development within the Eastern and Southern African region. The recent export development strategy introduced by the government has give priority and incentive schemes for this sector. However, the challenge is how to make best use of the country's revealed comparative advantage to build a dynamic and competitive sector that contributes to Ethiopia's economic growth.

Since tanning sub-sector has a great potential for rapid development of Ethiopian leather sector and economic growth of the country, performance improvement of Ethiopian tannery industry needed. Therefore, the aim of this thesis is to assess performance measurement and improvement practices, determine key performance improvement areas, and make proper recommendation and formulate performance measurement and improvement model for Ethiopian tannery industries and case company.

This research paper reviews worldwide researches that related with performance measurement and improvement. It has been conducted in a sample of eleven Ethiopian tannery industries and case company by using a well structured survey questions, interviews, personal observation, and secondary data collection. The results from this research assure that the major performance problems of tannery industries are shortage of raw materials, low skill of workers, machinery breakage, poor resource planning, poor customer and supplier relations, and poor performance management. Depending upon the research findings, performance measurement and improvement model with its implementation steps is recommended as a solution.

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ABBREVIATIONS

AATSC	Addis Ababa Tannery Share Company
APO	Asian Productivity Organization
APO-BPN	Asian Productivity Organization-Best Practice Network
BPR	Business Process Re-engineering
BPI	Business Process Improvement
BSC	Balanced Scorecard
CSA	Central Statistical Agency
DFAS	Defense Accounting and Finance Service
EFQM	European Foundation for Quality Management
ERP	Enterprise Resource Planning
FTE	Full-Time Equivalent
GDP	Gross-Domestic Product
GVP	Gross-Value of Production
IIP	Investors in People
ISO	International Standardization for Organization
JIT	Just-In-Time
KPI	Key Performance Indicator
LIDI	Leather Industry Development Institute
MBNQA	Malcolm Baldridge National Quality Award
MLT	Manufacturing Lead Time
MSDS	Material Safety Data Sheet
NPOs	National Productivity Organization
NPR	National Partnership for Reinventing
PMI	Performance Measurement and Improvement
PMSs	Performance Measurement Systems
PPP	Performance, Productivity, and Profitability
PQASSO	Practical Quality Assurance System for Small Organizations
SMART	Specific, Measurable, Achievable, Relevant, and Timely
TPS	Toyota Production System

TQM	Total Quality Management
US	United States
USA	United States of America
USK	Swedish Quality Award
USPS	US Postal Service

CHAPTER ONE
INTRODUCTION

1.1. Background of the study

The industrial strategic development plan of Ethiopia gives great emphasis to improve export-led products such as coffee, livestock and livestock products, textiles, garments, pulses, oilseeds, horticulture, floriculture, and others to join the international market in a large scale.

Ethiopia has the largest livestock population in Africa. It is estimated that there are about 35 million heads of cattle, 11 million sheep, 10 million goats and 1 million camels. From these resources, Ethiopia has a capable of supplying 16-18 million pieces of hides and skins per year. Not only the volume but also the unique quality of Ethiopian leather, some of which are considered to be of prime quality in international markets, gives the country a competitive edge over other countries. As a result, Ethiopia has great potential for the rapid development of its leather sector [Ministry of Foreign Affairs, 2007]. In addition since leather industry is to a large extent labor intensive, use low skilled labor, and capital saving special attention has been accorded for its expansion [Theovander, 2003].

However, Ethiopian tannery industries depend greatly on the semi-finished hides/skins because the European market prefers semi-finished hides/skins and prices them higher than finished leathers. And also there are only a few factories with the capacity to process the finished leather and therefore, the low value-added semi-finished hides/skins account for the majority of exportation. However, it is unsustainable and vulnerable for the Ethiopian leather industry to depend on the low value-added semi-finished leather, which is normally less expensive than the finished leather. Therefore, the government is endorsing to shift the major export items from the low value-added hides/skins to high value-added leather products to ensure rapid and sustainable growth of the sector. Also the high-quality leather will find the domestic market growing in line with the increase in trade of leather footwear. Its short term strategy is on moving all leather production from the wet-blue stage to the crust and eventually finished stage. The strategy for the long-term is to gradually convert all available hides and skins to finished leather products: shoe uppers, shoes, jackets, bags, etc [Ministry of Foreign Affairs, 2007].

In addition based on the study of competitiveness in the Ethiopian leather sector by Berhanu and Kibre different main factors are affecting leather industries such as low productivity, low capacity utilization, low quality standards, limited supply of raw materials, outdated employed technology, poor economic infrastructure, lack of hard currency to purchase spare parts and inputs, and lack of export support or promotion services.

To withstand the challenges in global market, organizations all over the world have adopted new philosophies such as concurrent engineering, lean production, Just-In-Time (JIT), total quality management (TQM), benchmarking, business process re-engineering (BPR), etc in their manufacturing and service sectors. The main driver behind these philosophies is the optimization of organizations performance both internally and externally within its respective market target and also rethinking of performance management system through effective performance measurement [Rijkers et al., 2010, Chary, 2000]. It is to be noted that it is impossible to improve performance of an operation and company without measuring it. Performance measurement is vital in organizational management and operational system. The industries are characterized by poor performance measurement system mostly, characterized by implementing financial performance measurement including return on investment rather than quality measurement, employee performance measurement, customer satisfaction and flexibility measurement. In performance management process a company manages its performance with its corporate and functional strategies and objectives. Hence, research on performance measurement and improvement of tannery industry is very important in our country.

1.2. Problem statement

Leather sector is significant to economy of the country as major employment industry, foreign currency earning, appropriate to the context due to labor intensive methods of production and use of low skilled labor, and great potential available in large number of livestock. However, different factors affect its competitiveness in global market.

There are several problems constraining the proper functioning of the tanning sub-sector. These problems may arise from internal or external sources. The main factors affecting competitiveness in the tanning sub-sector are: low productivity, low capacity utilization, low quality standards, outdated technology and machinery, poor economic infrastructure which raises the transaction costs of firms, the relative lack of export support and promotion services, and shortage of raw material supply to tanneries [Berhanu and Kibre, 2002, John Sutton et al., 2010].

There is considerable wastage as well as quality deterioration between collection and processing which raises the costs of tanneries. For example, skins are mostly recovered by hand which usually causes damage to the skin, reducing its value. There is a 20–30% value difference between machine-flayed and hand-flayed skin. And also since there are no satisfactory ways of preserving the recovered skin until it reaches tanneries, its value deteriorates. The other quality problem is animal diseases (ekek)**.** It is reported that ekek affects almost 80% of the total sheepskins from highland Ethiopia, and the disease is only identified once the skins have passed through some level of processing. And also chemicals required for tanning contribute 30% of the total tanning cost; these are mainly imported from abroad, and tanneries usually hold a stock for a minimum of three months of operation. Therefore, the problems occur in logistics flow are slow processing in public offices and poor security in transportation [John Sutton et al., 2010].

From these previous researches it understood that there are many problems which affect performance of Ethiopian tannery industries. Hence, this thesis mainly focused on determining the key performance improvement areas, assessing the performance measurement and improvement practices and making relevant recommendations and proposing a performance measurement and improvement model for Ethiopian tannery industries and case company.

1.3. Objectives of the study

The general objective of the research is to develop performance measurement and improvement model for Ethiopian tannery industries and case company.

Specific objectives of the research include:

- To assess the current performance measurement and improvement practices of the enterprises
- To analyze the negative impact of traditional performance measurement systems of the enterprises
- To determine the key performance improvement areas
- To propose performance measurement and improvement model

1.4. Scope and limitation of the study

This research is on performance measurement and improvement of the tannery industries. The research shows how performance of tannery industry improved and be competitive in a sustainable manner. Even though the research aims on the general country level, the scope of this research is limited on tannery industries in Addis Ababa and Oromia region. The reason is that more than 50% of tannery industries are located in Addis Ababa and Oromia region. Therefore, the researcher believed that the selected sample size represent total tannery industries in the country.

This research work makes an assessment on performance related problems in selected Ethiopian tannery industries and studied in detail at Addis Ababa Tannery Share Company. It provides concrete and applicable performance measurement and improvement model so that the overall activities of the industries can be improved and can be competitive in the local as well as international market.

1.5. Significance of the study

The research paper provides performance measurement and improvement model for Ethiopian tannery industries. The aim of the research is to identify performance related problems that hinder the industries' competitiveness and develop a performance measurement and improvement model, which could be taken as a guide to improve the performance of the industries. In addition the research paper can be used as a reference for other researcher who wants to work on this area.

1.6. Organization of the study

The thesis is organized into seven chapters. Each chapter of the thesis illustrates different aspects of the research work. The first chapter covered introduction to the study. It introduces background of the problem, objectives, significance, scope, and limitation of the thesis. The second chapter covered review of literature on performance measurement and improvement from published and unpublished documents. It discussed the basic concepts of performance, productivity, and profitability; performance measurement and improvement concepts, models, and tools; and best practices on balanced scorecard. The third chapter covered research methodology and data collection method. The research processes, research approaches and research strategies are described in this chapter. The fourth chapter covered overview of tannery industries in Ethiopia based on secondary data collected from CSA. The fifth chapter covered survey and case result analysis. It analyzed performance and productivity awareness, performance measurement and improvement practices, and performance improvement problems in tannery industries and case company. The sixth chapter covered proposed solution with its implementation process. Finally, the study ended with conclusions and recommendations.

CHAPTER TWO
REVIEW OF LITERATURE

2.1. Introduction

As it has been aforementioned in the previous chapter, it is impossible to improve performance of an operation without measuring it. Therefore, in this thesis both performance measurement and improvement were studied. To understand the subject matter of performance measurement and improvement different journals, articles, and books are reviewed. Hence, this chapter gives brief discussion of the various concepts of performance measurement and improvement.

2.2. Manufacturing Performance

The terms performance, productivity and profitability (PPP) have similar or overlapping meanings. All can be described as ratios, and they are easy to confuse. The terms efficiency and effectiveness can be similarly confusing even though they are often distinguished as being doing things right and doing the right things. To ease the understanding and make the terms usable for improvement work, a presentation of the relations between the terms is made here [Stefan Tangen, 2005, Thomas Grunberg, 2007].

Performance is perhaps the widest term and covers overall economic and operational aspects. That means it is at the top, representing an overarching concept. But the simplest definition of productivity is an output per input ratio. It reflects a company's production ability. The measures of productivity are a subset of the performance measurements. These measures are more of a utilization character. The utilization of a production process is important in improvement work, since there are often losses to reduce. Also profitability can be defined as the ratio between revenue and cost. Profitability and productivity can be very similar if the output and input are translated into physical units. For improvement purposes, profitability does not have a direct impact since it is a result of, rather than a contributor to the actions and processes in operations. However, profitability is a useful complementary or countermeasure to performance and productivity since it helps to identify monetary effects like inflation, price changes, devaluation and currency effects and distinguish them from true performance and productivity changes. A company can increase its profit and at the same time decrease

productivity, because of these monetary effects. If both performance (productivity) and profitability are measured, the true reasons for increased profits can become clearer.

Therefore, in this research performance is defined as the broadest one which includes performance parameters such as quality, time, cost, and flexibility. In addition productivity is the major factor which affects performance improvement of an organization. It defined as output per input. Since profitability has no direct impact on performance improvement, it is not considered in this research.

2.3. Performance Measurement

Performance measurement is a topic often discussed but rarely defined. However, in this research the following definitions of performance measurement, performance measure and performance measurement system is used. These were [M. Bourne et al., 2003]:

- Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action.
- A performance measure can be defined as a metric used to quantify the efficiency and effectiveness of action. The set of this performance measure is called as performance measurement system.

2.3.1. Performance Measures

Performance measures tell something important about products, services, and processes. They are always tied to a goal or an objective of an organization. Performance measure is a tool which helps to understand, manage, and improve what organizations do. Therefore, effective performance measures can tell [Training Resources and Data Exchange (TRADE) Performance-Based Management Special Interest Group, 1995 & 2001**)]**:

- How well we are doing
- If we are meeting our goals
- If our customers are satisfied
- If our processes are in statistical control, and
- If and where improvements are necessary

There are various ways in which these performance measures can be categorized. Although there seems to be little agreement on precisely which non-financial measures of performance to use, many authors agree on the need to use more non-financial measures of performance that are relevant to the firm's own situation and adequately gauge manufacturing performance relative to a competitive strategy. Non-financial measures of performance give a better description of what goes on in the production of goods than financial measures do. Most literatures claim that the key dimensions of manufacturing performance can be defined in terms of quality, delivery speed, delivery reliability, price (cost), and flexibility. However, confusion still exists over what these generic terms actually mean. For example, Wheelwright (1984) uses flexibility in the context of varying production volumes while Tunalv (1992) uses it to refer to a firm's ability to introduce new products rapidly [Andy Neely et al., 2005, Proefschrift, 2001, Thomas Grunberg, 2004].

Therefore, different researchers pointed out that the generic terms of quality, time, cost, and flexibility encompass a variety of different dimensions. It would be impractical to review all the possible measures of manufacturing performance. Hence, only a selection of the most important measures relating to quality, time, cost and flexibility will be discussed as follows [Andy Neely et al., 2005, A. De Toni, 2001, Chang-Lin Yang et al., 2009, Ruth A. Kasul, 1995, Stefan Tangen, 2005]:

Performance measures relating to quality

Traditionally quality has been defined in terms of conformance to specification and hence quality-based measures of performance have focused on issues such as the number of defects produced and the cost of quality. Feigenbaum was the first to suggest that the true cost of quality is a function of the prevention, appraisal and failure costs. Crosby's assertion that "quality is free" is based on the assumption that for most firms an increase in prevention costs will be more than offset by a decrease in failure costs. Basically, the logic underlying the cost of quality literature is that for a given set of organizational conditions there is an optimal level of quality. The cost of quality is a measure of the extra cost incurred by the organization because it is either under- or over-performing.

More relevant for performance measurement system design, however, is the point made by Crosby. He says that many companies fail to integrate the cost of quality model with their management process. Although managers estimate the cost of quality, they fail to take appropriate actions to reduce it. With the advent of TQM the emphasis has shifted away from "conformance to specification" and towards customer satisfaction. As a result the use of customer opinion surveys and market research has become more widespread. Other common measures of quality which stated by Deming is statistical process control. These two measures of quality raise an important issue relevant to performance measurement system design because they focus on the measurement of the process rather than the output.

Performance measures relating to time

Time has been described as both a source of competitive advantage and the fundamental measure of manufacturing performance. Under JIT philosophy the production or delivery of goods just too early or just too late is seen as waste. Similarly, one of the objectives of optimized production technology is the minimization of throughput times. An interesting approach to the design of time-based performance measures which reviewed by Andy Neely et al. (2005) is indicated under table 2.1. Therefore, they suggest that companies that seek to employ time as a means of competitive advantage should use the generic set of measures.

Table 2.1: Measures for time-based competition

	Time-based performance measures
R&D	Number of changes in projects
Engineering time	Change in average time between subsequent innovations
Operations	Adherence to due dates
Throughput time	Incoming quality
	Distance travelled
	Value-added time (as a percentage of total time)
	Schedule attainment
Sales and marketing	Complexity of procedures
Order processing lead-time	Size of batches of information

Performance measures relating to cost

In the early 1900s direct labour made up the majority of the full product cost. It made sense to allocate overheads to products according to their direct labour content. Hence, even a relatively small change in a product's direct labour content can have a massive impact on its cost structure. Furthermore, the practice of allocating overheads according to direct labour hours encourages managers to concentrate on trying to minimize the number of direct labour hours attributed to their cost centre, while ignoring overhead. Johnson and Kaplan argue that these problems are likely to become more severe in the future as product life cycles become shorter and hence an ever increasing proportion of the full product cost will take the form of research and development overhead.

Performance measures relating to flexibility

Slack identifies range, cost and time as dimensions of flexibility, although he later modifies this model as range and response, where range refers to the issue of how far the manufacturing system can change and response focuses on the question of how rapidly and cheaply it can change. Following Gerwin suggests the following dimensions of flexibility:

- Mix flexibility can be measured by the number of components handled by the equipment. Where this figure is heavily influenced by short-term fluctuations in market demand, an average over a given time period can be used.
- Modification flexibility can be measured in terms of the number of design changes made in a component per time period.
- Volume flexibility needs to be considered at the aggregate level as well as at the level of individual components. Volumes changes depend upon how high capacity limits are set and how rigid are these limits. Flexibility can be measured in terms of the average volume fluctuations that occur over a given time period divided by the capacity limit.
- Material flexibility exists when there are adjustment mechanisms at one stage of a manufacturing process which identify and then correct or adapt to variations arising previously.
- Sequencing flexibility could be measured by the number of different sequences handled by the equipment with the lower limit being enviable sequence and the upper limit being random processing.

Generally the following performance measures are summarized in the review of Andy Neely et al., 2005. Therefore, any manufacturing industries can adapt their performance measures depending on the performance measures indicated on table 2.2.

Table 2.2: Summary of performance measures

S. No.	Performance characteristics	Performance measures
1	Quality	performance, features, reliability, conformance, technical durability, serviceability, aesthetics, perceived quality, humanity, and value
2	Time	rate of new product introduction, delivery lead-time, due-date performance, and frequency of delivery
3	Flexibility	material quality, output quality, new product, modify product, deliverability, volume, mix, and resource mix
4	Cost	manufacturing cost, value-added, selling price, running cost, and service cost

Depending on current situation of Ethiopian manufacturing industries and reviewed literatures, five major performance characteristics such as quality, time, flexibility, cost, and productivity are selected for this study. The reason for including productivity as major performance characteristics is that it has direct impact on performance improvement.

2.3.2.Benefits and Drawbacks of Performance Measurement

Performance measurement experts pointed out the following reasons for measuring performance. These are [Training Resources and Data Exchange (TRADE) Performance-Based Management Special Interest Group, 1995 & 2001**]**:

- It reduces emotionalism and encourages constructive problem solving. Because it provides concrete data on which to make sound business decisions.
- It increases one's influence. Measurement identifies areas needing attention and enables positive influence in that area.

- Improvement is impossible without measurement. If you don't know where you are, then you can't know where you're going and you certainly can't get to where you want to be. It's akin to traveling in unknown territory without a compass or a map.

Performance measurement yields many benefits for an organization. Some of the benefits of performance measurement are listed below. It can be used to:

- Set goals and standards
- Detect and correct problems
- Manage, describe, and improve processes
- Document accomplishments
- Gain insight into, and make judgments about the effectiveness and efficiency of programs, processes, and people
- Determine whether organizations are fulfilling their vision and meeting their customer-focused strategic goals
- Provide measurable results to demonstrate progress towards goals and objectives.
- Determine the effectiveness of the group/department/division/organization

Even though performance measurement yields many benefits for an organization, it won't tell about the following points:

- **The cause and effect of outcomes are not easily established:** outcomes can reveal the impact of the program, but without collaborating data, it is difficult to demonstrate that program was the cause of the outcomes. To determine the extent to which a program has affected the outcomes and to measure the impact, in-depth analysis needed. Special program evaluations provide estimates of program impacts and help to determine why some programs succeed and other do not.
- **Poor results do not necessarily point to poor execution:** if performance objectives are not being met, it is obvious that something is wrong, but performance information itself does not always provide the reason. Instead, it raises a flag requiring investigation. The organization should be able to explain performance results and to define and address the contributing factors.

- **Numerical quotas do not fix (repair) defective processes:** there is also a danger when performance objectives become numerical quotas. The setting of numerical goals and quotas does nothing to accomplish improvements in the process. Identify the challenges and changing the processes is what is needed to improve performance and achieve desired outcomes.
- **Measurements only approximate the actual system:** performance measurement provides a valuable tool for management and continuous improvement. However, people might try to "game" the system in a way that will make their programs look good. Additionally, accurate data may not be available. These are among the reasons why need to recognize the fact that the measured system is not the same as the actual system.

2.3.3. Historical Development of Performance Measurement

Performance measurement has its roots in early accounting systems. Johnson cites the Medici accounts as an excellent example of how a pre-industrial organization could maintain a good account of external transactions and stock without option to higher-level techniques such as cost accounting. As industrial organizations developed, Johnson provides a detailed account of how current management accounting developed in the USA between the 1850s and 1920s as industrial organizations moved from piece-work to wages, single to multiple operations, individual production plants to vertical integrated businesses, and individual businesses to multi-divisional firms.

As a result, following the First World War, companies such as DuPont, Sears Roebuck and General Motors were starting to use sophisticated budgeting and management accounting techniques, such as standard costing, variance analysis, flexible budgets, return on investment and other key management ratios. From these beginnings, the use of budgets spread. By 1941, 50% of well established US companies were using budgetary control in one form or another, and by 1958, budgets appeared to be used for overall control of company performance.

However, between 1925 and 1980s, there were no significant developments in management accounting and by the 1980s traditional accounting measures were being criticized as inappropriate for managing businesses of the day [M. Bourne et al., 2003]. For example, most researchers criticized traditional financial performance measures as [Andy Neely, 1999, Fentahun, 2007, J. Radnor et al., 2007]:

- They are historical in nature & provide little indications of future performance and strategic focus
- They are too aggregated and distorted for long-term decision-making process
- They encourage short-term decision making
- They do not report accurately the costs of processes, products, quality, and customers
- They are not applicable to new management techniques that give shop-floor operators responsibility and autonomy
- They do not have strategic focus and failure to provide data on quality, flexibility and responsiveness
- They do not penalize overproduction and often inhibit innovation
- They encourage managers to minimize variance from standard rather than seek to improve continuously
- They are internally rather than externally focused, with little regards for competitors or customers
- They are rarely integrated with one another or aligned to the business process, and
- Performance measures are often poorly defined

As a consequence, in the late 1980s and early 1990s there was a great interest in the development of more balanced performance measurement systems with the creation of frameworks such as supportive performance measures matrix, the SMART pyramid, the Results/Determinants Matrix and the Balanced Scorecard [M. Bourne et al., 2003]. These frameworks overcame many of the shortcomings of traditional financially based accounting systems but, despite criticisms, with the recent growth of the concept of measuring the satisfaction of all the stakeholders new frameworks are still emerging such as the performance prism.

2.3.4. Performance Measurement Systems

As explained in above sub-section, PMSs that are based on traditional cost-accounting systems do not capture the relevant performance issues for today's manufacturing environment. The rapid escalation in global competition has brought new doctrines such as JIT, TQM, and the flexible factory. This has necessitated new approaches to performance measurement including the expansion of traditional efficiency-focused manufacturing PMSs to embrace new manufacturing-performance measures [Jasmin Harvey, 2008].

There are a variety of integrated systems to overcome the limitations of the traditional PMSs. Some of internationally well-known multi-dimensional performance measurement models are Sink and Tuttle model, performance measurement matrix, SMART pyramid, Medori & Steeple integrated framework, performance prism, self-assessment frameworks such as MBNQA and EFQM business excellence model, and balanced scorecard [Fentahun, 2007].

In performance measurement the first step is to establish objective measurements, and the best measures are customer-focused and goal-oriented. This helps to learn how to improve their performance by pointing out where they are deficient and by establishing achievable timetables to reach desired levels. In this way, it can be used as a basis for improved performance. The following points should be used to develop effective performance measurement system. These were [Jasmin Harvey, 2008]:

- The performance measurement system must be integrated with the overall strategy of the business.
- There must be a system of regular feedback and review of actual results against the original plan and the performance measures themselves.
- The performance measurement system must be comprehensive. It needs to include the range of factors that contribute to the organization's success such as competitive performance, quality of service, and innovation. This requires a range of financial and non-financial indicators.
- The system must be owned and supported throughout the organization. The implementation must be top-down so that individuals setting strategy can determine the objectives and develop appropriate top-level measures. These should filter down to the

rest of the organization. Other levels throughout the organization should set their own measures in consultation with the level above and these must be consistent with the top-level measures.

- Measures need to be fair and achievable. Where performance measures are used to reward managers' performance, the evaluation should include only the elements they have direct control over.
- The system and results reporting need to be simple, clear and understandable, particularly to non-finance professionals. There is a need to prioritize and focus so that only the key performance indicators for the business in strategic terms are measured.

An effective PMS should include the traditional financial and cost-accounting criteria used by senior management and also the tactical-performance criteria that are used in assessing a firm's current level of competitiveness. Such tactical-performance measures vary according to the needs of the various management levels and functional areas within the organization. Each functional area should develop and utilize a set of performance criteria consistent with its particular operating characteristics and strategic objectives. An effective PMS should lead to the integration of operations, marketing, finance, engineering, and accounting to ensure that they act as a unified and coordinated value-adding system [Chee-Cheng Chen, 2008]. The system must have a long-term orientation such that continual improvement in both product and process leads to a sustainable competitive advantage. Generally, performance measurement systems have to fulfill the following characteristics to be an effective and efficient for performance improvement [Andy Neely et al., 2005, Fentahun, 2007]:

- **Link and align with strategic objectives:** it should be derived from the company's strategic objectives. Furthermore, it is important to remember that strategies usually change overtime and some performance measures must change too. Therefore, there is a need for flexibility in the performance measurement systems.
- **Have an appropriate balance between various measures:** it is vital that performance is not solely seen from a financial point of view. A PMS ought to consist of various types of performance indicators covering all important aspects agreed as representing the success of company's performance in a balanced way.

- **Have a limited number of performance measures:** a large number of performance measures increases the risk of information overload, becomes difficult to prioritize vital performance measures, and demands more analysis time & other resources.
- **Be easily accessible:** one of measurement system's goals is to give important information, at the right time, to the right person. Hence, it must be designed in such a way that information is easily retrieved, usefully presented and easily understood by those whose performance is being evaluated.
- **Consist of comprehensible specifications**: a performance measure should have a clear purpose & has to be defined in an unambiguous way along with details of who will use it. Furthermore, it is also necessary to specify a target for each performance measure and a timeframe within which that target should be reached.
- **Guard against sub-optimization:** it is not rare that an improvement in one area leads to a deterioration in another, even resulting in a decline in overall performance. Measurement systems must avoid sub-optimization, possibly by establishing a clear link from the top level to the bottom, to ensure that employees' behaviors are consistent with corporate goals.
- **Developed by users:** in order to ensure ownership of measures, they must be developed by the users. Measures dictated by a higher authority will usually not receive support from downstream units.
- **Consider Improvement:** although correcting non-conformance and making current decisions are essential, the focus should be on improvement, prevention, strategic long-term planning and goal setting. Measures have to be used to promote improvement, not to identify poor performance and penalize the low performers.
- **Indicate leading and lagging indicators:** financial and accounting data are often presented too late and aggregated to be actionable. This may require that measurements are taken hourly, daily, or weakly rather than monthly or quarterly as in traditional accounting systems. A significant portion of measurements needs to be operational rather than financial.
- **Motivate employees:** performance measures should indicate the role of evaluating and rewarding behaviors, and encouraging improvement and learning.

Organizations which fail to utilize performance measurement effectively tend to fall into two categories [Jasmin Harvey, 2008]. These were:

- Those who still continue to employ the traditional accounting performance measures rather than new approaches such as the BSC. They should widen their approach by including non-financial and multi-dimensional performance measures.
- Those who have failed to implement or revise their performance measurement system to include multi-dimensional and non-financial factors. They should be aware of the following issues when trying to use or implement a multi-dimensional performance measurement system:
  - Difficulty in measuring key success drivers, such as innovation or flexibility
  - Employees' behaviour not in line with strategic objectives. This can happen when the strategy, objective and target setting processes are not aligned
  - The system conflicts with the culture of the organization
  - Assuming the development process is too time consuming or difficult. A systematic and logical approach should be encouraged. Achieving a robust system will take time.

2.4. Manufacturing Performance Improvement

In performance improvement, it is important to connect the activities to performance measures and set targets which should be achieved based on the strategy of the company. It is important to support continuous improvement at a strategic level as well as to give the continuous improvement work strategic direction to maintain positive effects. If improvement goals are connected with strategy goals that could in turn fuel up the performance-objective results. In this way, it is possible for all participants involved in the improvement to work in the same direction. If the improvement work is well established at all company levels, all resources can more easily be focused on the same targets and objectives [Proefschrift, 2001].

Performance of a manufacturing firm has a joint impact of several factors such as efficiency of production, level of technology, and structure and composition of the firm. The following major performance factors which adapted from Thomas Grunberg (2007) were assessed by survey and case study in this research.

Table 2.3: List of performance factors selected for the study

S.No	Performance parameters	Scope of the research	Performance factors assessed in this research
1	Quality	Raw material and product quality	Measurement and management systems, technology and machinery, material flow, layout, ergonomics, work method, skill of workers, rework, scrap, defects, and training and motivation of workers
2	Productivity	Labour, material, and machine productivity	
3	Flexibility	Product variety, time flexibility, and volume flexibility	
4	Time	Supply lead time, manufacturing lead time, and delivery lead time	
5	Cost	Direct cost such as labour cost, and material cost	

Source: Adapted from Thomas Grunberg, 2007

2.4.1.Performance Improvement Tools

The use of the various improvement models and tools has been variable with equally variable impact. The aim of the review under this sub-section is to raise awareness and understanding of some of the more popular performance improvement models and tools available. And also the abundance of approaches in the literature indicates that no single improvement programme appears to have comprehensively met the requirements of manufacturing performance improvement [Thomas Grunberg, 2007]. However, all aim to address one or more of the following objectives with the ultimate aim of improving performance [Amanda Whittaker Brown, 2006]:

- help understand what customers need
- help organizations and employees become more results oriented
- improve the quality of service to customers by improving processes or practices
- provide a structured approach to strategic management
- create links between individual, service and corporate objectives

- translate strategy into performance measures and targets, and in doing so rationalize performance information
- help to demonstrate individual staff contribution to organizational objectives and create ownership of performance by staff involvement in the improvement process
- identify strengths and areas for improvement
- aid internal and external communication

Some of most widely used performance improvement models/tools are [Amanda Whittaker Brown, 2006, Thomas Grunberg, 2007]:

1. Balanced Scorecard

Robert Kaplan and David Norton developed the balanced scorecard in the 1990s in the USA. Having begun as a performance measurement tool, the BSC was quickly being used as a multi-dimensional framework for managing strategy by linking objectives, initiatives, targets and measures across key corporate perspectives. They noticed that financial measures being used to gauge performance in many organizations were not necessarily related to achieving strategic objectives. The scorecard sought to remedy this by providing a more balanced suite of performance measures across a number of key perspectives. Typically these look at customers, finances, internal processes, and learning and innovation. However, they can be adapted depending on what factors are considered important for the success of the particular organization.

Since 1992, Kaplan and Norton have studied the success of various applications of the BSC in different types of organizations. Companies have used as few as four measures and as many as several hundred measures when designing a BSC performance measurement system. Based on this research, it has been found that a BSC framework using about 20–25 measures is the usual recommended best practice. Smaller organizations might use fewer measures, but it is generally not advisable to go beyond a total of 25 measures for any single organization, holding company, or conglomerate group of holding companies.

As a result of continued research and innovations, the BSC has gone through an evolutionary process of improvement, from performance measurement (1990–1996) to performance management (1996–2000), to becoming a globally recognized best practice for strategic management (2001– present). The benefits a firm can obtain from properly implementing the BSC include [C. Johnson et al., 2007]:

- Translating strategy into more easily understood operational metrics and goals
- Aligning organizations around a single coherent strategy
- Making strategy everyone's everyday job
- Making strategic improvement a continual process, and
- Mobilizing change through strong effective leadership.

To be "balanced" does not mean to be equal in all dimensions. A balanced scorecard is one that contains:

- multiple perspectives of performance
- leading and lagging measures
- internally focused and externally focused measures
- short-term and long-term measures
- quantitative and qualitative measures

2. Business Process Reengineering

BPR was introduced by Hammer and Champy in the early 1990s and has an approach of breakthrough changes. It concentrates on radical change to improve operations. The radical change allows new revolutionary ideas to evolve which can help to improve operations more than a Kaizen approach. They state that small changes give small effects and small earnings whilst the radical change gives radical increases in earnings. Its main idea is that operations should be organized around the process instead of around functions. It aims to review and redesign organizational processes in order to achieve improved performance in terms of cost, quality of service and timeliness. It has the potential to bring about considerable change in systems and in the people who operate them. BPR is often considered to be primarily about cost saving; however, it can also have a marked effect on customer and employee satisfaction. The

approach combines the hard case for reengineering with the softer people aspects ensuring the solution can be implemented with minimum problems.

Business Process Improvement (BPI) is related with BPR but puts its emphasis on continuous improvement, and not only on breakthrough change. The need for BPI evolves from the fact that the change's positive effects decline some time after the implementation. To resolve this, further attention should be focused on the change.

3. Total Quality Management

TQM focuses on control of business processes and customer satisfaction. Activities such as improvement, statistical control, supply control and quality engineering are ingredients of TQM. TQM as a concept emanates from the academic field and has contributors such as Feigenbaum, Juran and Deming. It has kaizen as a tool for continuous work. This is visualized by the Deming's wheel. To use this method, the improvement is first planned. The second step is implementation of the improvement. During the third step observation is made of the effects and the last action is to learn from the change imposed. After these four steps of improvement, it is time to find a new problem. Statistical control is a powerful tool to gain control of manufacturing defects and it correlates to measurement.

4. Kaizen Blitz

Kaizen means continuous improvement which is a Japanese business philosophy of making continuous improvements and enhancements in business processes. Blitz refers to the concentrated assault on inefficiency. Kaizen techniques are based on the principles of focused continuous improvement, commitment of leadership, empowerment of staff, hands on doing not proposing, and elimination of waste and low budget incremental improvements with occasional breakthroughs. Kaizen principles and techniques can be used on a continuing basis.

Kaizen Blitz is a short-term project-based approach to improving business processes which can achieve rapid results. It is an intensive facilitated week of assessment and review of processes designed to identify and take out anything that does not add value or hinders the process under examination.

Overall organizational improvement is achieved via many small increments and entails relatively little expense. However, functional changes can be dramatic and bring about improvement results in a relatively short time.

5. Six Sigma

The name Six Sigma is derived from a statistical concept of minimizing variation. In statistics the sigma symbol is used to denote variation from the norm, measured in units of standard deviation. A process that is 'six sigma' means that there are just six standard deviations between the average and the minimum or maximum acceptable standard. In practice this means that very few outcomes deviate from the ideal. The idea is that if you can measure the number of defects in a process, you can then systematically eliminate them and optimize the process.

Six Sigma is a disciplined methodology for process improvement. It brings together a wide set of proven tools which are based on rigorous data analysis to identify sources of variation in performance and ways of reducing them. It promotes a management by fact philosophy of using powerful data to make decisions. The approach is applied to an organization's key business processes. It focuses on making improvements in three main areas:

- customer satisfaction
- reducing errors and defects, and
- reducing cycle time

6. Performance Prism

Performance prism is a stakeholder-centric framework for performance measurement and management. It evolved from the BSC, but unlike the scorecard, it acknowledges the full range of stakeholders an organization has. Principally these are investors, customers & intermediaries, employees, suppliers, regulators and communities. It does this in two ways; by considering what the current and future wants and needs of those stakeholders, and more uniquely what the organization wants and needs from its stakeholders. In this way the reciprocal relationship with each stakeholder is examined in the context of improvement.

The three dimensional framework comprising strategies, processes and capabilities are considered in the light of the organizational relationships with its stakeholders. Strategy maps are drawn up to enable the organization to understand the essential elements of the framework that need to be in place in order to satisfy the wants and needs of both the organization and the stakeholders. The maps can also illuminate the often complex relationship between organization and stakeholders.

7. Investors in People

IIP is the national standard for improving organizational performance by training and developing people to achieve business goals. It was developed in 1990 by the national training taskforce in partnership with various private sector, personnel and trade organizations, including the confederation of British industry, trade unions congress, and institute of personnel development. The standard is based on four key principles that link together people development with business planning:

- Commitment: to invest in people to achieve business goals
- Planning: how skills, individuals and teams are to be developed to achieve these goals
- Action: to develop and use necessary skills in a well defined and continuing programme directly tied to business objectives
- Evaluating: outcomes of training and development for individuals' progress towards goals, the value achieved and future needs

These four principles are translated into twelve indicators of performance. Evidence is collected against each of the twelve. This evidence may include corporate strategies and action plans, staff feedback and examples of processes or approaches. External assessment takes place against this framework. An organization will have to demonstrate that it meets all twelve of the indicators of the standard in order to gain IIP status. In addition to the generic principles above, IIP aims to bring business planning and people planning together to provide business benefits; a framework for workforce development; improved motivation, morale, job satisfaction and retention; and higher skills levels of staff.

Since impossible to review all performance improvement models/tools, some of well-known improvement models/tools with their some description are summarized in table 2.4. Therefore, it gives some concepts about those models/tools [Amanda Whittaker Brown, 2006].

Table 2.4: Summary of performance improvement models and tools

Performance improvement model/tool	**Summary description**
Balanced Scorecard	A multi-dimensional framework for managing strategy by linking objectives, initiatives, targets and performance measures across key corporate perspectives
The Big Picture	Organizational development framework and toolbox designed to make an organization think about every aspect of its work
Business Process Reengineering	An approach to review and redesign organizational processes in order to achieve improved performance in terms of cost, quality of service and timeliness
Charter Mark	The government's national standard and quality improvement scheme for customer service in the public sector
EFQM Excellence Model®	Organizational improvement framework for assessing strengths and areas for improvement across the spectrum of an organization's activities
Investors in People	National standard for improving organizational performance by training and developing people to achieve organizational goals
ISO9001 Quality System	Global standard and approach for quality management systems. The standard focuses on the management of processes and documentation in order to meet customer needs and expectations
Kaizen Blitz	Short term and intensive performance improvement approach to improving business processes
Performance Prism	A stakeholder centric, three dimensional framework for performance measurement and management
PQASSO	Practical Quality Assurance System for Small Organizations, or projects within larger organizations based on a self assessment
Public Service Excellence Model	Organizational improvement framework and diagnostic tool for identifying strengths and weaknesses within an organization
Six Sigma	A disciplined methodology for process improvement that deploys a wide set of tools based on rigorous data analysis to identify sources of variation in performance and ways of reducing them
Statistical Process Control	A technique used to reduce waste and improve consistency through a reduction in variation
Value management	Organizational improvement framework incorporating a toolbox of proven methods that aim to raise productivity and optimize customer outcomes within the resources available

2.4.2.Selection of an appropriate model or tool

At first glance, it cannot be said that one concept or tool is better than another. The reason for this is that all concepts and tools have both positive and negative components and the situation and where it is used affects the applicability. Another aspect is that not all concepts and tools are applicable in all businesses. It is important to see what that needs to be accomplished with a specific method, so that an adoption to dominant conditions can be made [Thomas Grunberg, 2007].

Therefore, since it is unlikely that a single approach would address all the organization needs, the organization need to be clear what they are trying to achieve and why, before selecting a particular performance management model, improvement tool or approach. This will involve asking a series of questions, including:

- What are you aiming to change and improve?
- What outcome are you looking for?
- Does the improvement need to be holistic covering all the organizations activities or designed for a specific task, service or area of activity?
- What is the key driver for change i.e. inspection or review, change of staff, etc
- What is the timescale for the change?
- What resources are available?
- To what extent do you want to involve staff in the changes?

Individual authorities and organizations will need to undertake research to decide on the approach or balance of approaches that would best suit their organization and circumstances. The following review does not aim to provide definitive information on each approach but is provided to help informed decisions [Amanda Whittaker Brown, 2006].

Table 2.5: Criteria for selecting an appropriate model or tool

PM Models	Scope	Time	Resource	Staff involvement
Balanced Scorecard	Holistic model that can be used at various levels across the organization, service, team or group.	Four to six months to implement depending on level of measurement in place	Low resource investment – often just facilitation costs and staff time	Inclusive if scorecards are cascaded and widely deployed
Business Process Reengineering	Improvement tool used to bring about change in systems and people who operate them	Improvements anticipated in 6-12 months from the start of the project for general processes	Investment of resources can be high due to the intensive nature of the approach.	Inclusive of staff in the areas of activity being improved
EFQM Excellence Model®	Holistic self assessment model	Approximately 35 staff days over six weeks	Can be resource intensive. Costs are estimated to be at least £4000-£5000 for external support per assessment	Fully inclusive. Involvement usually through facilitated staff workshops.
Investors in People (IIP)	Processes supporting employee development	Six months to three years from commitment to achieving IIP	Assessors cost approx. £550/day. Organizations of 50-100 people need three to four assessor days	Fully inclusive
ISO9001:2000 quality system	Processes and documentation	Implementation to assessment takes approx six to nine months	Organizations of 60-70 would pay approx £3000 for the assessment and £1600 a year for audits	inclusive of staff in the areas of activity being improved
Kaizen Blitz	Processes or functions	Usually two to three months from conception to bedding in of new processes	Consultant costs within the region of £7000-10,000 per blitz event	Fully inclusive of staff in the areas of activity being blitzed
Performance Prism	Stakeholder centric-model	Up to approx 6 months to implement depending on strategies and performance measures in place	Relatively low resource investment. Independent facilitation may be required to maximize the effectiveness of workshop sessions.	Inclusive of organizational managers and stakeholders.
Six Sigma	Processes, functions or services	Black belt projects will normally take three to nine months	Costs vary depending on methods adopted and consultancy requirement	Inclusive of staff in areas of activity being improved
Statistical Process Control	Processes or functions	Less than 6 months to implement improvements to processes or functions	Moderately resource intensive. External support often required	Inclusive of staff in areas of activity being improved

2.5.Best practices

Organizations with the intent of enhancing their performance have various improvement approaches to choose from. Benchmarking is one of the effective management tools that can be used to create incremental changes as well as strategic reforms for the organization. As defined by benchmarking partnerships in Australia, a best practice (also referred to as leading or outstanding practice) is something that demonstrably contributes to excellent business outcomes or results. It is something unique or different that others don't do. A best practice is not only a plan or intent, but also something that is well deployed or utilized throughout the organization and is continually being improved [Asian Productivity Organization, 2004].

The Asian Productivity Organization-Best Practice Network or APO-BPN is a network of organizations in Asia with a common purpose of achieving competitiveness through sharing of best practices. The best practice network aims to generate knowledge on global best practices that will be useful for NPOs in helping the organizations in their country achieve best practice performance standards. It also seeks to support the transfer of best practice knowledge among organizations in the APO member countries and position the NPOs as leaders in the area of knowledge transfer. Even though APO-BPN selected different key topic areas in consultation with the customers and stakeholders of the NPOs in the learning and sharing of best practices, only best practices on BSC is discussed in this sub-section.

BSC is the most widely used organizational system in the world for measurement and management of enterprise business performance. It is being used by non-profit government and state-owned companies to improve performance and achieve strategic alignment and focus. For example, it is used by more than 70% of 500 companies in developed countries. Dubai, PRC, Thailand, Malaysia, and Fiji are among the transitional governments using the BSC to monitor and improve performance. The BSC is also a popular management tool for public sector enterprises in the United States, Australia, United Kingdom and Scandinavia. Numerous studies on BSC have proven the following BSC effectiveness [Asian Development Bank, 2007].

- Mobil Oil (North America) increased cash flow by $1.2 billion and return on investment from 6% to 16% between years 2 and 5 after implementing the BSC. Within 2 years of implementing the BSC, Mobil moved from last place in industry profitability to first place.

- UPS (United Parcel Service) increased revenues by 9% and net income by 33% within two years after BSC implementation.
- Three years after implementing the BSC, Wells Fargo Bank increased its customer base by 450% and was rated the best online bank. As a result of the BSC implementation, the company also added 750,000 online customers over a 2 year period and decreased its costs per customer by 22%.
- Chemical Bank increased its group company profits 20- fold over a 4-year period after implementing the BSC. The Chemical Bank vice-chairman, Michael Hegarty, (of what is now Chase Manhattan Bank) stated: *"The balanced scorecard has become an integral part of our change management process, enabling us to look beyond financial measures and concentrate on factors that create economic value: quality, organizational learning, and focusing on customers. The scorecard has delivered on our major goals in communication, teamwork, learning, and commitment."*
- The world famous advertising firm, Saatchi achieved a five-fold increase in market capitalization to $2.5 billion within 3 years of implementing the BSC. William H. Cochrane, chief financial officer, stated: *"The balanced scorecard has not only helped us manage our human capital, it has transformed our agencies into being action-oriented and client-focused. And it has put everyone in the same ballpark with a consistent definition of what we call 'permanently infatuated clients' and consistency in measures."*
- Siemens IC Mobile increased sales by 76% to €9 billion within one year of BSC implementation. Rudi Lamprecht, member of the managing board at Siemens AG and President of Siemens IC Mobile, stated: *"We've always had strategies, but through the balanced scorecard we bring them to life*."
- The US Postal Service (USPS) first implemented the BSC in 1996. Since then, USPS has been able to increase on-time delivery of mail by 20%, increase productivity by almost 3% per year while decreasing overall employment by full-time equivalent (FTE) of 60,000, increase employee and customer satisfaction, and deliver mail at rates about a half of those of Germany or Japan.
- The Defense Accounting and Finance Service (DFAS) of the US department of defense first implemented the BSC in 2001. Since then, DFAS has been able to increase customer satisfaction by an average of 2% per year; increase employee satisfaction by 14%; reduce

overall employment by 30%; cut its federal budget allocation by half; and most importantly align and clarify its mission to its customers, employees, and managers.

- The UK ministry of defense implemented the BSC in April 2000. The ministry is one of the largest government departments in the United Kingdom with a budget of £25 billion or 2.5% of GDP. It employs more than 300,000 military and civilian personnel and has fixed assets of £87 billion. As a part of the UK government's wider modernizing agenda, in April 2000, the ministry released its first BSC that established clear strategic goals, targets, measures, and initiatives. The results have been clear and visible: simplified strategic objectives, better communication of strategic intent, improved resource allocation, greater accountability, better decision making, and enhanced military capability and readiness.

CHAPTER THREE

RESEARCH METHODOLOGY AND DATA COLLECTION

In previous chapter a related literature review on performance measurement & improvement has been presented. Since proper research method is important to start scientific research, this chapter describes research process, research approach, and research strategies of the thesis.

3.1. Research process

Although there are different methods to conduct the research, all these methods are involved in a sequence of activities that form research process with high dependency together. All activities in research process do not always follow the same order nevertheless the relevant generic pattern is presented in figure 3.1.

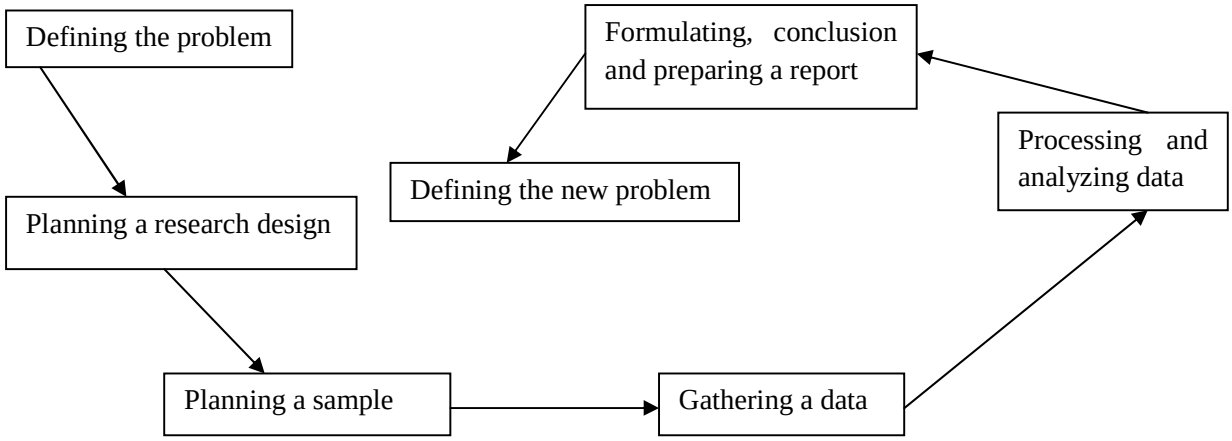


Figure 3. 1: Research process

The conclusion of studies usually generates new ideas for future research. So, it makes research process cyclical.

3.2. Quantitative and Qualitative Research Approaches

Quantitative research is an inquiry into an identified problem, based on testing a theory, measured with numbers, and analyzed using statistical techniques to prove or disprove predetermined hypotheses regarding the relationships between specific variables. Qualitative research is described as the non -numerical examination and interpretation of observations, for

the purpose of discovering underlying meanings and patterns of relationships. It is carried out by using open-ended observations and interviews.

According to the above explanation, this study is conducted using the combination of both qualitative and quantitative research approaches.

The research strategy should be chosen according to the research questions in the particular situation. A number of research strategies are available for conducting a research such as literature survey, experiments, questionnaire surveys, histories, case studies, and analysis of archival information. According to the research objectives, preferable research strategies like literature survey, questionnaire survey, case studies, interviews, and archival records and documentations were selected for this research.

Survey of literatures

Complete literature surveys have been conducted regarding the concept of performance, performance measurement systems, performance improvement factors, and performance improvement models. These concepts were obtained from various books, international research journals, masters & doctoral thesis, and internet websites.

Data collection methods

Following literature survey, in order to assess the performance measurement and improvement of Ethiopian tannery industries, data collection has been carried out. Both primary and secondary data were collected by using a well structured questionnaire for survey study; and face to face interviews, personal observations, and secondary data collection for case study.

- **Survey study**

This research is conducted through survey study and case study. The researcher has designed the survey questionnaires for assessing the performance improvement and measurement practices of the selected tannery industries. This questionnaire was distributed to research co-advisor, colleagues, and production manager of case company for comments and suggestions before

finalizing it. The questionnaire was finalized taking into account the suggestions under the guidance of the advisor.

The questionnaire is developed in order to gain vital information regarding the performance measurement and improvement practices of the Ethiopian tannery industries. It is developed aiming for responders' of educational level of Diploma and above.

In general the objectives of conducting the questionnaires are to determine whether performance improvement and measurement is practiced in Ethiopian tannery industries and to assess attitudes, tendency and commitment of workers towards performance improvement. The survey questionnaires contain 79 questions requiring types of answers including; some brief answer for subjective questions, yes or no nominal scales, and other scales. Furthermore, it is categorized as:

- Preliminary information
- Performance interpretation
- Performance measurement and improvement practices
- Financial and non-financial performance factors
- Performance improvement problems and causes of poor performance

The sample size and the specific tannery industries are chosen considering required acceptance sampling number, industries profile regarding the year of establishment, type of products and market performance. Due to geographical distribution of the tannery industries and survey cost, tannery industries from Addis Ababa and Oromia region are selected for this survey. The reason is that more than 50% of tannery industries are located in Addis Ababa and Oromia region. However, it distributed through e-mail for the rest of tannery industries. Eighteen questionnaires were distributed for 14 tannery industries by face-to-face contact and for 7 tannery industries it distributed through e-mail. Only 13 questionnaires are responded by 11 tannery industries from eighteen distributed questionnaires and the list of surveyed companies are indicated in table 3.1. And also there is no response for distributed questionnaires through e-mail. As indicated in table 3.1, the respondents' position in the company is above department head and their experience in the company is more than two years. Therefore, the researcher is confidential in the understanding of the questioner by respondents.

Table 3.1: List of surveyed tannery industries

S.No	Company Name	Respondents' position	Respondents' experience
1	Kolba Tannery	Production and technical manager	Above 10 years
2	Addis Ababa Tannery	Production manager, Benchmark expert	Above 10 years and 2-5 years
3	Hafde Tannery	General manager	
4	Walia Tannery	Department head	2-5 years
5	Gellan Tannery	Production and technical manager	Above 10 years
6	Modjo Tannery	Production manager	Above 10 years
7	Dire Tannery	Production and technical manager	Above 10 years
8	Hora Tannery	Marketing manager	5-10 years
9	Mesako Tannery	Department head	2-5 years
10	Blue Nile Tannery	Deputy general manager	Above 10 years
11	Crystal Tannery	General manager	
12	Ethio-Leather Industry PLC (ELICO)	No response	
13	Batu Tannery	No response	
14	Shoa Tannery	No response	

- **Case study**

During case study different data collection methods such as interview, observation, and secondary data collection were used.

The designed interview questions were based on the research objectives. Its aim is to get general information about the firm's management system and selected key performance indicators such as quality, productivity, time, flexibility, and cost.

Most of the interview questions conducted in this research are regarding competitive strategy, performance criteria used, performance measurement and improvement practices, performance factors of each key performance indicators, and culture and working environment of the company. About 36 interview questions are developed by dividing it for top management, quality control section, research and development section, administration and finance management, commercial services, and production and technical services. The interviewees were administrative and human resource manager, production manager, supply and store section head, supervisors, and accountant of AATSC.

Observational evidence is often useful in providing additional information about the topic being studied. Therefore, the researcher has also used this method for collecting the required data and information from the respective industry. It is used as a means to assess the techniques used in documentation and production processes as well as the existing facilities of the company. Important documents such as annual reports, company profile, and inspection data have been used to perform quantitative analysis. Infrastructure and facilities of the survey industries and case company have also been observed.

3.3. Data analysis

The collected data through the means of interviews, questionnaires, direct observation and secondary data are analyzed by using tables & figures, and theoretically interpreted. The results are presented in chapter four, five, and appendices.

Generally from about a total of 22 tannery industries in the country designed questionnaires were distributed for 21 tannery industries by face to face contact and through e-mail. However, only eleven tannery industries responded it. The reasons for non-responsiveness were tight working schedule, and unwillingness and poor understanding of the research. The researcher believed that the current situation of the tannery industries towards performance measurement and improvement has exactly reflected in these survey questionnaires, interview questions, observations, and archival records.

CHAPTER FOUR

OVERVIEW OF ETHIOPIAN TANNERY INDUSTRIES

4.1. Introduction

Ethiopia possesses the largest livestock population in Africa, and the tenth largest in the world. Ethiopia's livestock population is estimated at 44.3 million cattle, 23.6 million sheep, 23.3 million goats and 2.3 million camels. The skin removal rate is 7% for cattle, 33% for sheep and 37% for goats. The country produces 2.7 million hides, 8.1 million sheepskins and 7.5 million goatskins annually. As a predominantly agricultural economy with the largest cattle population in Africa, it has a strong base for semi-processed leather, finished leather and leather products. As a result, Ethiopia's leather industry is in the forefront of the leather sector development within the eastern and southern African region. It is no surprise that the recent export development strategy introduced by the government recently has singled out this sector as a priority area and incentive schemes have been designed accordingly. However, the challenge is how to make best use of the country's revealed comparative advantage to build a dynamic and competitive sector that contributes to Ethiopia's economic growth. Since the rapid development of any sector depends on similar growth in all related sub-sectors, tanning sub-sector has a great potential for rapid development of Ethiopian leather sector [Embassy of Japan in Ethiopia, 2008, John Sutton et al., 2010, United Nations, 2002].

4.2. Tannery Industries Sub-sector

Leather tanning is the process of converting raw hides or skins into leather. Hides and skins have the ability to absorb tannic acid and other chemical substances that prevent them from decaying, make them resistant to wetting, and keep them supple and durable. The surface of hides and skins contain the hair and oil gland is known as the grain side. The flesh side of the hide or skin is much thicker and softer.

Tanning is essentially the reaction of collagen fibers in the hide/skin with tannins, chromium, alum, or other chemical agents. The most common tanning agents used in most tanneries is trivalent chromium and vegetable tanning extracted from specific tree barks. Alum, syntans (man-made chemicals), formaldehyde, glutaraldehyde, and heavy oils are other tanning agents.

The tanning industry in Ethiopia was started by an Armenian entrepreneur in 1925 which is the case company of this research (that is Addis Ababa Tannery Share Company). For approximately 60 years, there were just six tanneries. After nationalizing of existing private tanneries in 1975 expansion took place, although at the same time the export of raw hides and skins was banned. This led to the processing of hides and skins to get pickle and wet blue products for export purpose, followed by inevitably processing to crust. Currently about 22 tannery industries are operational in Ethiopia, most producing crust and finished leather from sheepskin; wet blue, crust and finished leather from goatskin; and crust & finished leather from hides [John Sutton et al., 2010, United Nations, 2002].

In leather supply chain, hides and skins are regarded as a secondary by-product of meat production. As shown in figure 4.1 below, raw skins are collected from peasants and households by skin collectors (roamers) in a traditional way. The collected skin is stored in temporary preserving stores where the tanneries can access it. Leather is exported to more than 60 countries. The major destinations are: Italy, United Kingdom and China. Leather products such as shoe uppers, leather garments, stitched upholstery, school bags, handbags, industrial gloves, and finished leather are also exported to Europe, United States, Canada, Japan and the Far East. There are also some export sales to countries in Africa, in particular to Nigeria and Uganda as well as to the Middle East, especially Yemen [Embassy of Japan in Ethiopia, 2008, John Sutton et al., 2010].

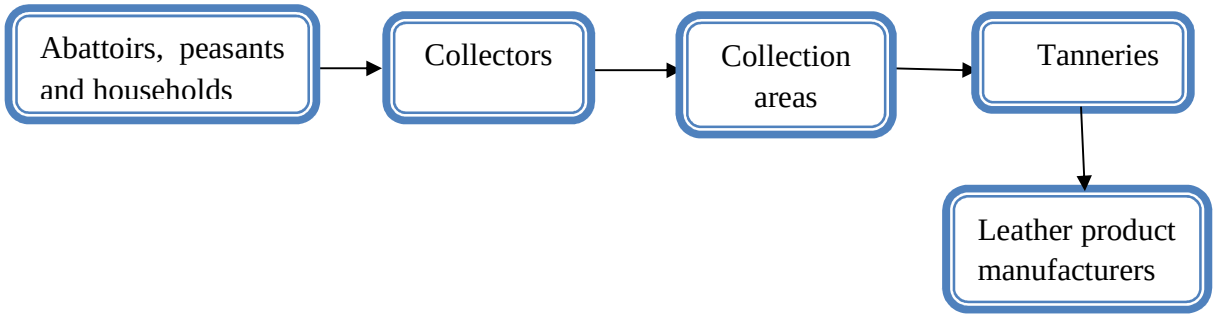


Figure 4.1: Supplier-manufacturing-customer value chain of tannery industries

4.2.1. Performance analysis of Tannery industry sub-sector

Depending on CSA report (1996, 2001), performance trends of tannery industries in the country are analyzed. This analysis will cover distribution of large and medium scale leather industries by regional states, gross value of production (GVP), ratio of value – added to GVP, ratio of labor cost to GVP, ratio of imported raw material cost to total raw material cost, and ratio of energy cost to total industrial cost.

- **Distribution of large and medium scale leather industries by regional states**

The distribution of large and medium scale leather industries (including all sub-sector such as tannery industries, footwear industries, and leather garment industries) by regional states is shown in table 4.1. The values in table 4.1 indicate the total number of large and medium scale leather industries in our country in 2001 Ethiopian fiscal year. More than half of leather industries which were operating in the reference year were located in Addis Ababa. Following Addis Ababa, Oromia, Amhara, Tigray and Harari regions covered 26, 6, 3 and 1, respectively in total establishments of leather industries. And also the share of leather industries was only 4.04 percent of the total number of manufacturing industries which indicates that the Ethiopian large and medium scale manufacturing industry is characterized by a high concentration of a limited range of manufacturing activities.

Table 4.1: Regional distribution of large and medium leather industries

Regional states	Number of Tanning and dressing of leather, manufacture of footwear, luggage and handbags
Tigray	3
Amhara	6
Oromia	26
Harari	1
Addis Ababa	53
Others	-
Total	89
Total percentages	4.04

- **GVP performance of tannery industries**

According to CSA report (1996), GVP includes the sales value of all products of the establishment. It is the net change of stocks between the beginning and end of the reference period in the value of finished goods and the value of semi-finished goods, the value of industrial services rendered to others, the value of goods bought and resold without any transformation or processing, and other receipts. The valuation of GVP is in terms of producers' values where indirect taxes are included in the value of sales of the establishment and the value of subsidies received is excluded. The researcher idea on this definition is that impossible to understand the reason for increment/decrement of true performance due to seasonal monetary effects like inflation, price changes, devaluation, and currency effects. So if both productivity and GVP are measured, the true reasons for GVP increment/decrement can become clearer. Therefore, even though the reason for increment/decrement is unknown, GVP of Ethiopian tannery industry has been increased up to 2000 E.C, and then slightly decreased as shown in figure 4.2.

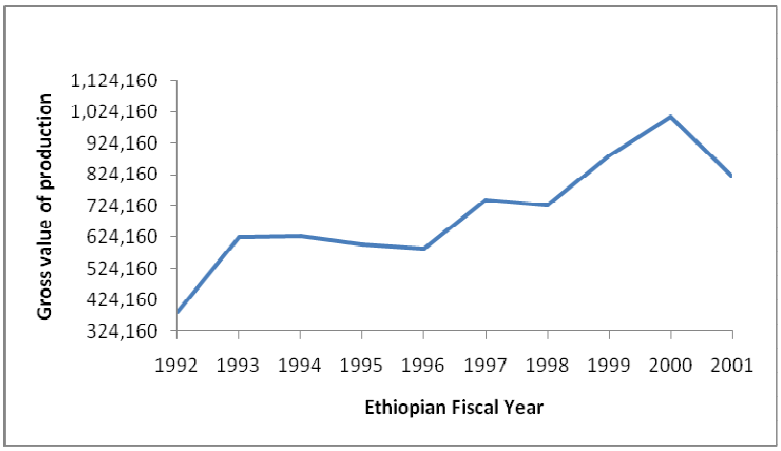


Figure 4.2: Gross-value of production (in '000Birr)

- **Ratio of value – added to GVP of tannery industries**

Value added in the national account concept at market price is defined as the difference between the gross value of production and industrial & non-industrial costs. Industrial cost includes the cost of raw materials, fuels, and other supplies consumed; cost of industrial services rendered by others; cost of goods bought and resold without any transformation or processing; and cost of electricity consumed. Non-industrial cost includes payments like professional fees, postage,

telephone, insurance, advertising, hired transport, rental payments, etc. Interest, amortization and depreciation are excluded. It indicates profitability of the sub-sector. As shown on figure 4.2 above, GVP of the sub-sector has been increasing up to 2000 E.C. However, ratio of value added to GVP of sub-sector increased one year and then decreased in the next year as shown in figure 4.3. From this it understood that there is production cost management problems which affect working capital problems in sub-sector. Therefore, the researcher recommends that CSA should develop proper performance measurement framework for performance management by using financial and non-financial measures in a balanced way. The most common mistake many organizations make is measuring too many variables, and the next most common mistake is measuring too few.

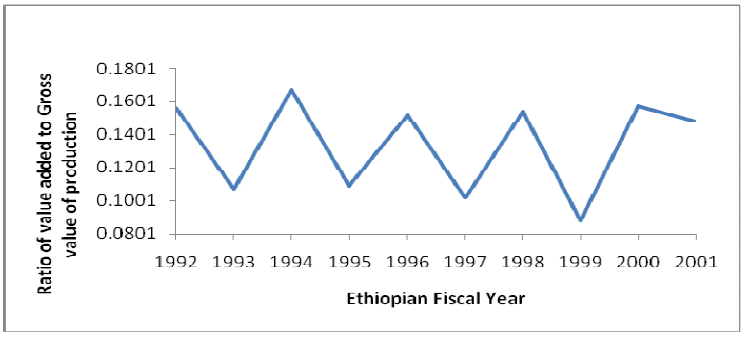


Figure 4.3: Ratio of value-added to GVP

- **Ratio of labor cost to GVP**

The general trend of the cost of labor to gross value of production of sub-sector is shown in figure 4.4, which shows that it has been increasing after 1999 E.C. From this it understood that labour productivity of Ethiopian tannery industry has been decreasing after 1999 Ethiopian fiscal year. Various factors like workers skill, motivation, and satisfaction; ergonomics and work methods; and machine failures due to its oldness affect labour productivity. However, the organization didn't identify the reasons for decrement/increment of labour productivity. Therefore, integrated performance measurement framework should be developed to overcome drawbacks of traditional measures of performance.

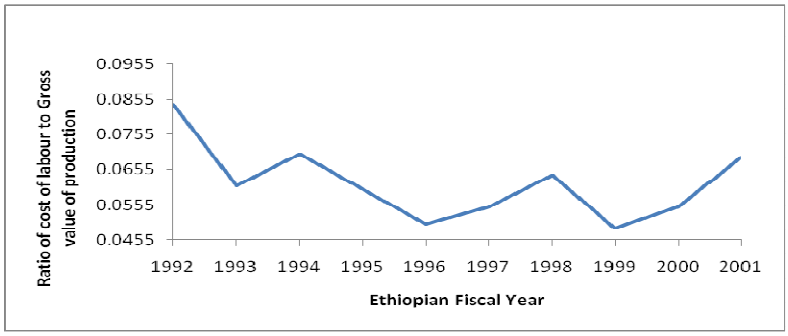


Figure 4.4: Ratio of labour cost to GVP

- **Raw Materials**

According to CSA report (1996), raw materials include all raw and auxiliary materials, parts and containers which are consumed during the reference year. The value of local raw materials is the value of locally produced raw materials and is the cost at the factory which includes the purchase price, transport charges, taxes and other incidental costs. The value of imported raw materials is the value of raw materials produced in other countries and obtained directly or from local source and is the cost at the factory which includes the purchase price, transport charges, taxes and other incidental costs.

i. Ratio of imported raw material cost to total raw material cost

The ratio of imported items to total consumed raw material costs of tannery industries are indicated in figure 4.5. Even though the ratio has been increasing from 1996 E.C up to 2000 E.C, then imported raw material usage has been decreased. The increment of this ratio indicates that either increment of imported raw material cost or decrement of total consumed raw material cost which is unclear to take an action. Therefore, development of proper performance management system is important to measure key performance indicators, and then take improvement actions.

Figure 4.5: Ratio of imported items to total consumed raw material costs

ii. Ratio of cost of energy consumed to total industrial cost

The ratio of cost of energy consumed to total industrial cost is also shown in figure 4.6, which shows that it has been increasing after 1995 E.C. Therefore, energy utilization of the sector has been decreasing after 1995 Ethiopian fiscal year.

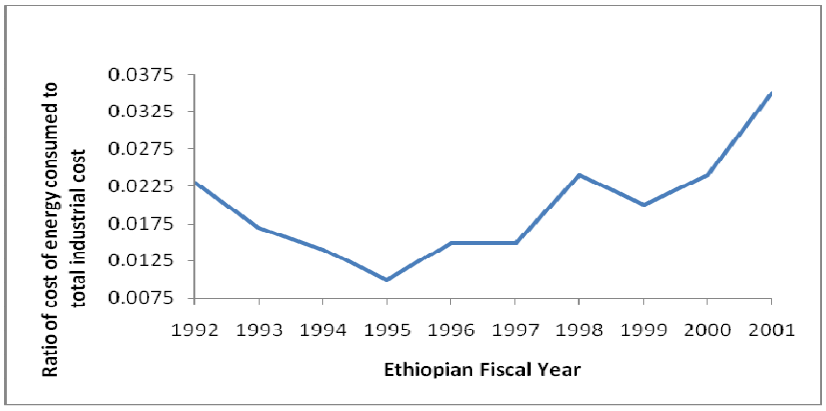
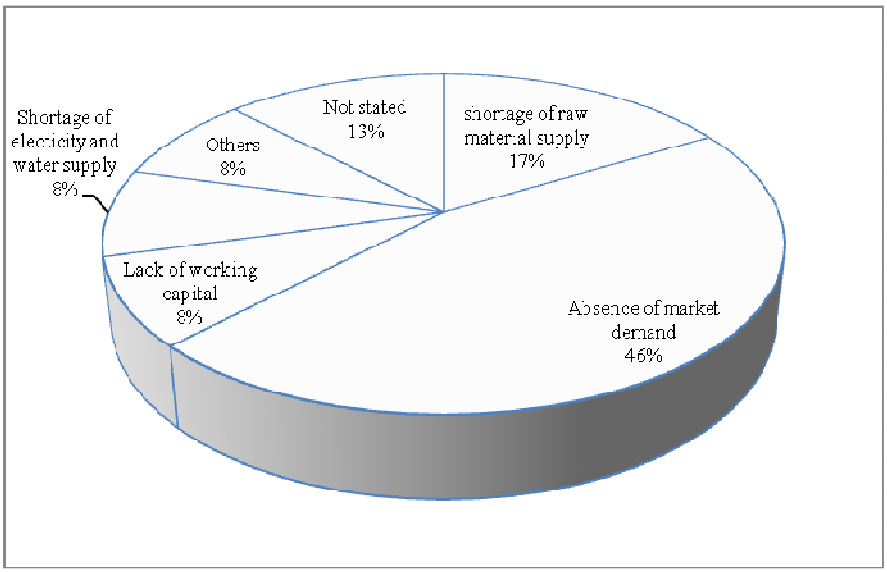


Figure 4.6: Ratio of cost of energy consumed to total industrial cost

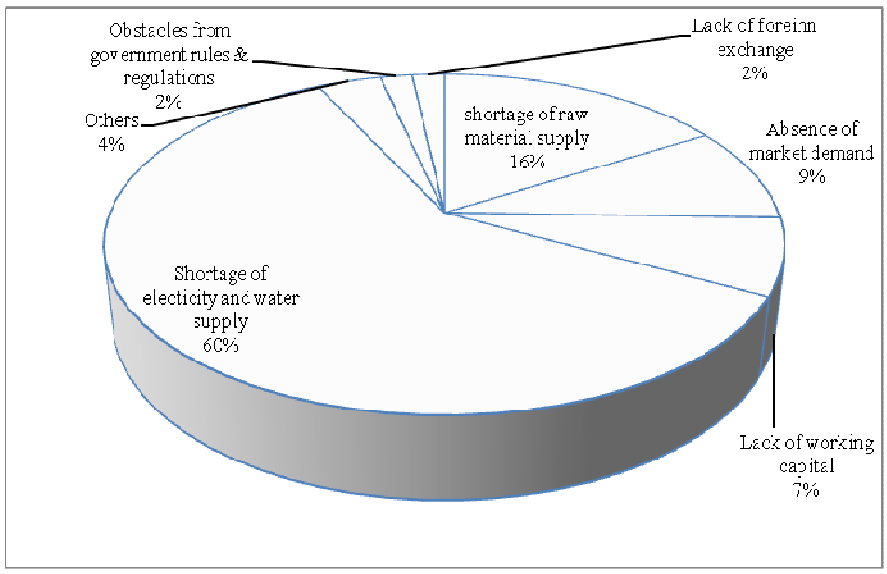
4.2.2. Reported performance problems in tannery industries

For manufacturing industries there are different factors which are the major reason for not being fully operational. Figure 4.7 shows the percentage distribution of tannery industries by first major reason for not being fully operational. This shows that 46% of the problem is due to absence of market demand and 17% is due to shortage of supply of raw materials when related to general manufacturing problems. And also their percentage is 11% and 4%, respectively when

related to general problem of the sector. However, the major problem in 2001 Ethiopian fiscal year is that shortage of electricity and water supply which accounts 60% of general manufacturing problems. Since it is seasonal problem, it is not important to give more attention on it.



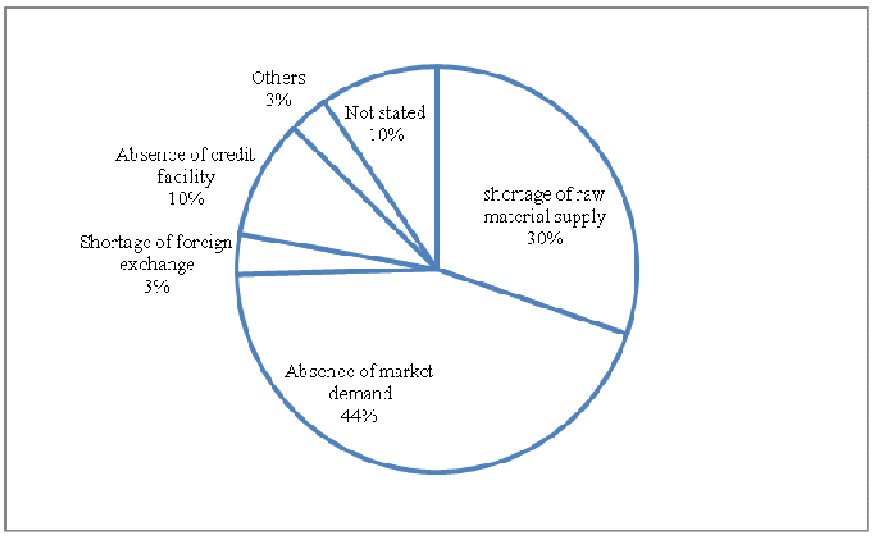
1996 E.C



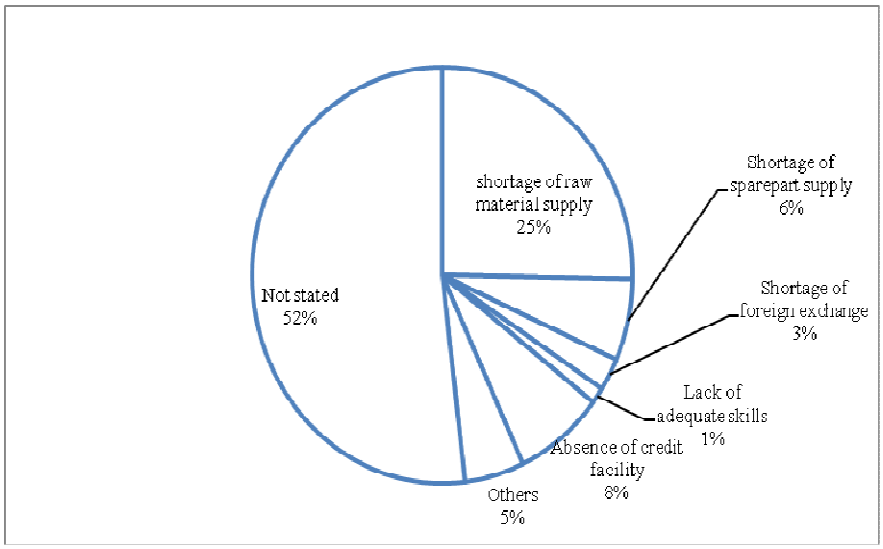
2001 E.C

Figure 4.7: Percentages distribution of the first major reason for not being fully operational of the firm

There are various problems why most of Ethiopian manufacturing industries are not working at full capacity. Figure 4.8 shows percentage distribution of Ethiopian tannery industries by first major reason for not working at full capacity. It indicates that 44% of the problem is due to absence of market demand, 30% is due to shortage of supply of raw materials, and 10% is due to absence of credit facility; which are the major problems in the sector.



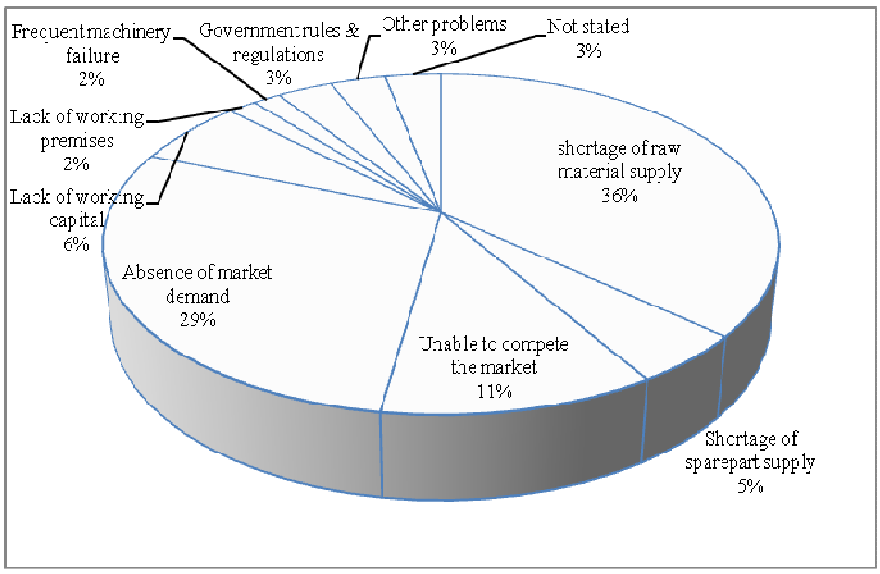
1996 E.C



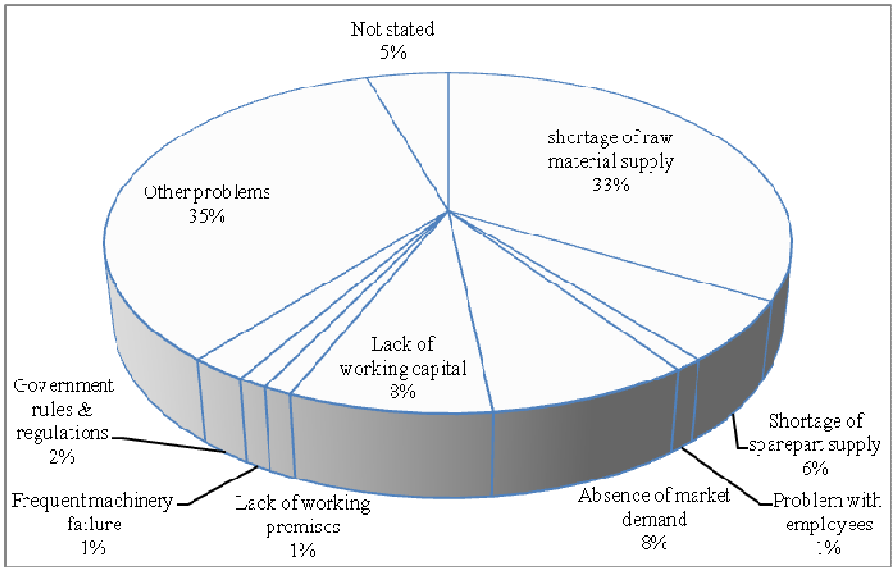
2001 E.C

Figure 4.8: Percentage distribution of the first major reason for not working at full capacity of the firm

During operation different problems may faced manufacturing industries. Figure 4.9 shows percentage distribution of tannery industries operational problem. Shortage of raw materials supply and absence of market demand are the first and the second operational problems of tannery industries in our country.



1996 E.C



2001 E.C

Figure 4.9: Percentage distribution of the first major operational problem faced

4.3. Historical background of Addis Ababa Tannery S.C.

The research has survey and case study. Its case study was done on Addis Ababa Tannery Share Company. Addis Ababa Tannery S.C was established in 1925 (1918 E.C), and is Ethiopia's oldest tannery. It located in the Gulele area, approximately 10 kilometers from Addis Ababa town center on the Ambo road. The factory was established under the share of two Armenians, called by Muse Savajian and Avadis Savajian. Still now there is no accurate evidence that could tell about the initial capital of the factory, but some said initially the factory was operating with the help of knives so it is not difficult to guess how small the initial capital was. It has an attainable processing capacity of approximately 6000kg per day, and is currently producing at the level of approximately 5500kg per day. The tannery's principal products are shoe uppers and lining, sole leather, bag leather, upholstery leather, crust and finished leather.

4.4. Process description of Addis Ababa Tannery S.C

The hides and skins of animals are the source of leather. The skins of large animals such as cattle and horses are referred to as hides. Those of smaller animals such as sheep, goats and calves are called skins. After the hide has been removed it is fleshed (removing any remaining meat tissue or fat). Freshly fleshed hides are shipped to a tannery for immediate processing into leather. If this is not possible, the fleshed hides are cured or preserved by immersion in agitated salty water or brine for 12 hours. After curing, the hides can be stored for several months without rotting and can be shipped to tanneries. Therefore, the production processes in Addis Ababa Tannery S.C. can be split into four main categories: hide and skin storage and beam house, tanning, post-tanning, and finishing operations.

A. Storage and Beam house operation

- **Reception**: Salted hides are temporarily stored. The application of salt (NaCl) is done outside the factory to preserve the hides from decay. All hides are weighed for calculating the amount of needed chemicals.
- **Re–hydration (soaking)**: It is carried out to allow salted hides to re-absorb any water, which may have been lost after flaying, to clean the hides and skins (removal of dung, blood, salt, air, etc), and to remove interfibrillery material. The soaking methods depend on the state of the hides. The process is mostly carried out in two steps. A dirt soak, to

remove the salt and dirt, and a main soak. The process is carried out in processing vessels, such as mixers, drums, paddles, and pits. Depending on the type of raw materials used soaking additives can be used.

- **Liming/De-hairing**: It is removal of hair and some unwanted proteins which are water soluble. Soaked hides undergo the de-hairing/ liming process lead through in a rotating, wooden drum.
- **Fleshing**: This step is conducted to remove the residual flesh from the hides by mechanical means (fleshing machine). The removed flesh sludge containing a high amount of fat is discharged into the nearby river.
- **Trimming**: It is the removal of loose, rag end of hides and skins usually by hand knife.

B. Tanning operation

- **De–liming**: After a manual treatment de-liming also takes place in rotating drums. The fleshed hides are still in a limed condition and contain alkali reactive agents. To make the hides suitable for tanning, the pH value is brought back first from 12 to (3.8–4) with a solution of $(NH_4)_2SO_4$ and $NaHSO_3$.
- **Bating**: removal of scud for development of bacteria in the skin/hide.
- **Pickling**: For further pH adjustment to 3.5, fresh water, formic acid, sulfuric acid and sodium chloride are added and mixed with the skin in rotating drums. This step is important for the penetration of tanning agents into the hides. The solution is not changed before the pre-tanning/tanning steps. It used as preservation process by concentration difference for buffering act (to control swelling).
- **Pre-tanning/Tanning**: Before tanning the leather, a pre-tanning step with pre-tanning agent is carried out for 1 hr. In the tanning process the collagen fiber is established by the tanning agents such that the hide is no longer susceptible to putrefaction or rotting. In this process the collagen fibers are stabilized by the cross-linking action of the tanning agents. The tanning is worked out with the addition of $Cr_2(SO_4)_3$ at a pH of 3.8 in a rotating drum. There are two types of tanning process: mineral (chrome) tanning and vegetable (organic) tanning. Even though based on customer order vegetable tanning sometimes used in the factory, most of the time chrome tanning is carried out due to the following advantages of chrome tanning:

- It is heat resistance in the process (that means it resists high temperature).
- Its availability
- In the process it is easily converted from chrome tanning process to other tanning process (vegetable tanning), and
- It stays for a long period of time

- **Draining, Summing, and Setting:** After tanning, the leathers are drained, rinsed and either horsed up to age, or unloaded in boxes and subsequently summed to reduce the moisture content prior to further mechanical action, such as splitting and shaving. The setting out operation can be carried out to stretch out the leather. After summing and setting, hides and skins can be sorted out into different grades after which they are processed further or sold in the market.
- **Splitting**: The function of the splitting operation is to cut through skins or hides at a set thickness. If the hide/skin is thick enough, splitting can yield a grain split and a flesh split, which could both, be processed into finished leather.
- **Shaving**: The shaving process is carried out to achieve an even thickness throughout the skin/hide, and it can be carried out on tanned or crusted leather. Shaving is carried out where splitting is not possible or where minor adjustments to the thickness are required.

C. Post-tanning/crust operation

Crust is hides/skins which finished its process till the end of re-tanning process. Post- tanning involves neutralization and washing followed by re-tanning, dyeing and fat liquoring, mostly done in a single processing vessel. At this stage of the process, special operations may also be carried out to add certain properties to the leather such as water repellence, oleophobing, air permeability, flame retarding, abrasions and anti-electrostatics.

- Wetting–back and Re–chroming (if necessary): adjusting the chrome content of all the batches. At this stage it has around 4pH.
- Neutralization: to make the solution to (5 -5.5) pH.
- Re–tanning: it is material re–tanning to fill the substance of the hide/skin for the purpose of tightness and fullness.

- Finally, fat liquoring (adding artificial fat for the purpose of softness); dyeing (coloration of the product); fixation and drying (addition of acids or cationic materials to the product, then drying); and staking & trimming carried out.

D. Finishing operation

The overall objective of finishing is to enhance the appearance of the leather and to provide the performance characteristics expected from finished leather with respect to: color, gloss, handle, flex, adhesion, rub fastness, as well as other properties including extensibility, break, light and perspiration fastness, water vapor permeability and water resistance as required for the end use. The process carried out for finishing purpose are dyeing (coating), fixation, and ironing.

The summary of flow process chart of the company has been shown in figure 4.10.

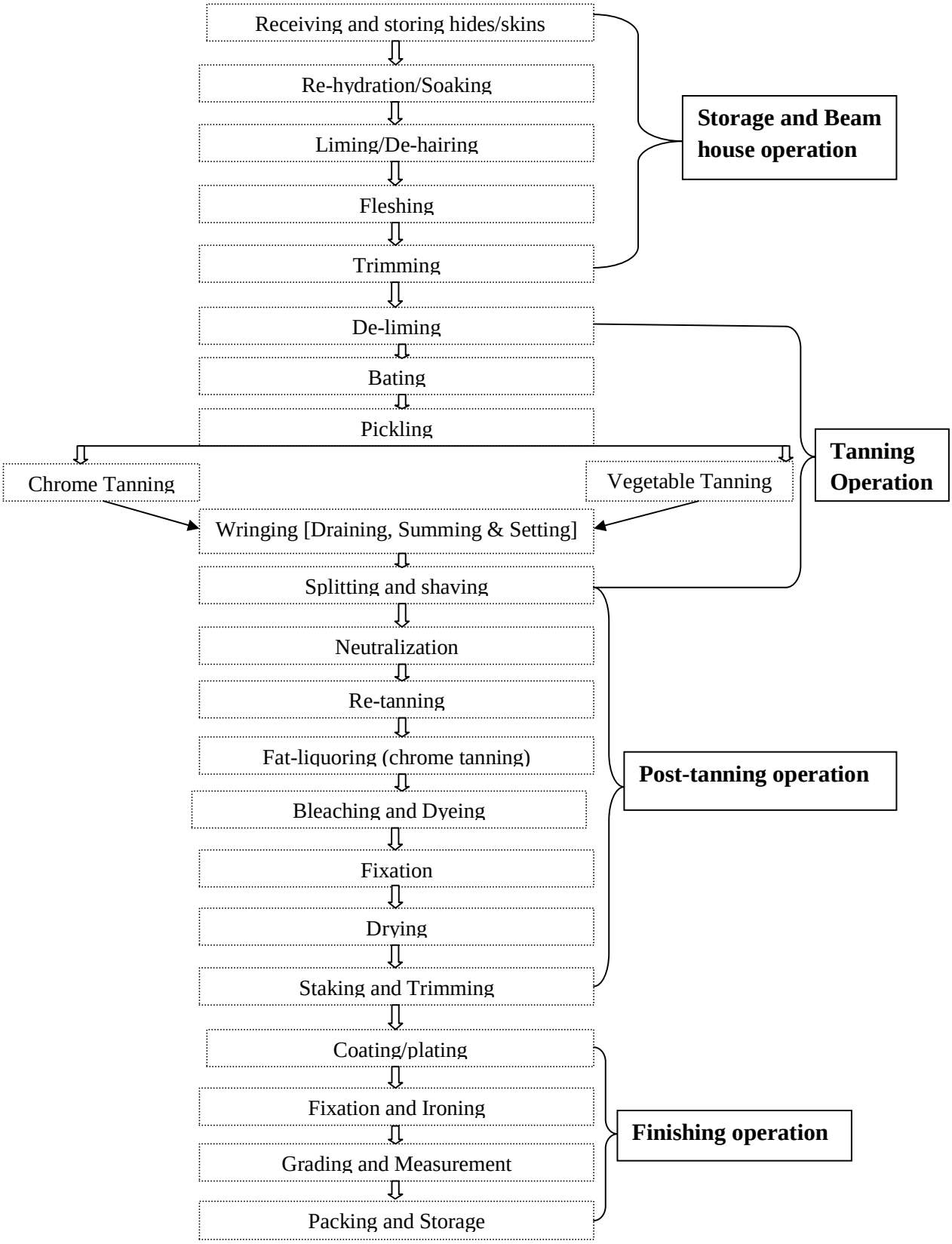


Figure 4.10: General process flow diagram of AATSC

4.5. Summary of the chapter

The data collected from CSA report (1996, 2001) have been synthesized to identify the performance and performance problems of the sub-sector. From this analysis the following weakness in performance measurement practice of the organization and performance problems of tannery industries were summarized.

In case of performance measurement and analysis practice of Ethiopian central statistical agency, they not concentrate on most important performance measures for performance improvement. In the rule of performance measurement, measuring and collecting too much data or too little data is not important.

In this chapter performance problems of tannery industries also discussed. The major performance problems are shortage of raw materials, frequent machinery breakage, maintenance problems, absence of market demand, and lack of working capital.

Therefore, performance measurement and improvement of tannery industries were studied through survey and case study by taking these issues as an input of the research.

CHAPTER FIVE
RESULTS AND DISCUSSIONS

5.1. Introduction

In the above section, it has been discussed that performance of tannery industries in our country and their main problems by using central statistical agency data. This chapter practically discussed the following key points by using data & information gathered from sampled enterprises and case company:

- Performance interpretation
- Performance measurement and improvement practices
- Performance improvement problems
- Major performance factors by using cause-and-effect diagram

5.2. Survey result analysis

Various data collection methods were used in the success of this research. Questionnaire survey is one of the data collection method carried out in this research. The aim of the survey is to get general information on performance awareness, performance measurement and improvement practices, and performance factors. Hence, the result of the survey has been discussed in this sub-section.

5.2.1. Performance Interpretation in Tannery Industries

In this research performance and productivity interpretation studied through survey questionnaires. As indicated under appendix B, 67% of the respondents agreed on performance include efficiency and effectiveness, and the rest agreed on its definition is not decided. And also 42% agreed on performance is wider in scope than productivity. Productivity is defined as output per input. The inputs include labor, material, capital, energy, and other auxiliary inputs. But most of the time productivity only defined with respect to labor productivity. When we come to tannery industries in Ethiopia, most of the respondents agreed productivity as labor productivity. And also more than 66% of the respondents agreed on total productivity (output per inputs of material, labor, capital, and other inputs). But most of the respondents are not agreed on partial productivity like material productivity, capital productivity, and productivity with respect to sales. In addition productivity is the major KPI in most of Ethiopian tannery industries.

Therefore, awareness creation is very important before implementation of performance measurement and improvement system.

5.2.2. Performance Measurement and Improvement Practices in Tannery Industries

The following results which derived from the survey expose that utilization of financial and non-financial measures in tannery industries. This result indicates that financial measures have more utilization value than the rest performance parameters to evaluate their strategic performance. But numerous researchers argued organizations have to use financial and non-financial performance measures in a balanced way to enhance their business performances and to be competitive in global market.

Table 5.1: Financial and non-financial performance measurement utilization

S.No.	**Performance parameters**	Performance measurement practice scores
1	Financial Measures	2.61
2	Customer and Market Measures	2.29
3	Internal Process/Operation Measures	2.42
4	Employee Satisfaction Measures	2
5	Training & Development Measures	2.34
6	Social and Environmental Measures	2.32
7	Supplier Partnership Measures	2.45

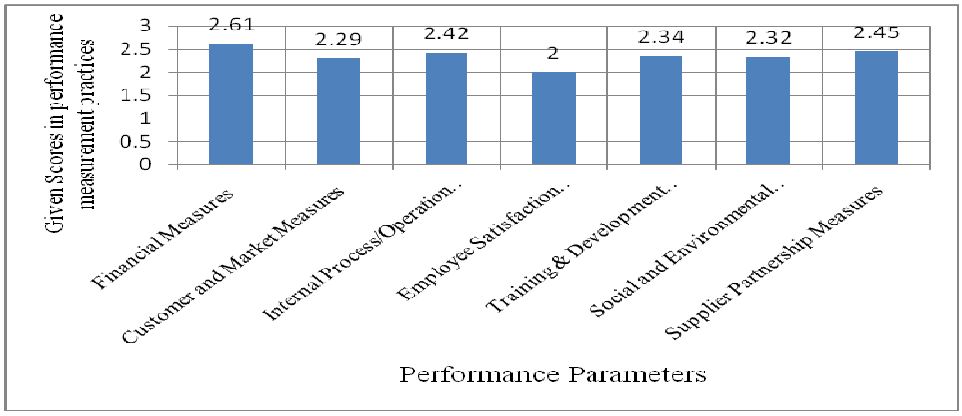


Figure 5.1: Enterprises performance measurement utilization

Source: Survey results

Performance improvement practices of Ethiopian tannery industries also studied through survey study. The result indicates the key performance driver of tannery industries are planned utilization of raw materials, education and training of employees, investment in machinery and equipment, government spending & security, and innovation, respectively. Moreover, they have the following strategy to improve their performance in future:

- By expanding total production capacity and investing in advanced production technology;
- By improving the networks with input suppliers;
- By diversifying local sales into exports; and
- By computerizing design department, manufacturing department, input sourcing and marketing management, and advertising the product; respectively.

In addition obstacles in performance improvement practices also studied by classifying as major obstacle, moderate obstacle, and low obstacle. The major obstacles for performance improvement of tannery industries are shortage of working capital, high production cost, and poor quality & shortage of raw materials. Following rated factors as moderate obstacle include high lead times, less diversified production, poor inventory control and management, and poor working conditions. Lastly, the factors which considered as no obstacle are low demand for products, poor layout of the facilities, labor problems, wastage of times, old technology, and low resource utilization. However, the factors which categorized under no obstacle affect the first and second categorization (high and moderate obstacle). Therefore, all factors should be considered during performance improvements.

Moreover, general information about performance improvement factors such as financial status, quality, productivity, ergonomics (quality of work life), management system, and new product development also studied. The results were:

A. Financial Status of Tannery industries

The response of surveyed industries indicate that finance source of 45.5% of tannery industries is own fund from sales, the other 36.4% is from both own fund and local loan, and the remaining 18.2% is from own fund, local loan, and advanced payment. Profit and market share are the

major financial and customer focus measures. However, profits of 25% and market share of 22% of tannery industries haven't increased in the last three years.

B. Productivity

The data collected indicates that all of tannery industries have productivity improvement program, where 81.8% of the employees are aware about their productivity programs and 90.9% of these industries have identified and recognized productivity problems in day to day activities. And also 61.5% of them determine their resource utilization.

The major reasons for not being fully operational also studied and indicated under appendix B. These reasons are divided as low effect, medium effect and high effect. The reasons which have high effect on productivity of the tannery industries are raw material shortage, shortage of spare parts, shortage of working capital, lack of market, government rules & regulations, and frequent machinery breakage, respectively. The respondents have also indicated reasons for machine failure which include 45% of tannery industries responded as due to lack of preventive maintenance, 23% due to improper handling of machines, and 32% due to aging of machines and equipments.

C. Quality

The survey results indicate that 90% of Ethiopian tannery industries calculate cost of quality, and 84.6% recognize and solve quality related problems. All of them identify customer requirements where 81.8% of the respondents believe that their company objectives are linked to customer needs and expectation. And also 61.5% responded that the quality awareness of their employees is moderate where 92.3% of them believe that employee participation in quality activities also moderate. Moreover, from the research it understood that only half of these industries have a procedure for evaluating their subcontractors or suppliers where 91.7% of these industries use inspection & tests for incoming, in-process and final products; and 81.8% of them do not have quality management system. In raw material quality management 84.6% of the industries ensured through inspection, 7.7% ensured through ISO certification, and the remaining 7.7% through performance measurement practices.

D. Quality of work life

The survey results indicate that 75% of the industries have right materials handling equipments. Accident preventive methods applied in tannery industries include implementing occupational safety and health procedures by giving trainings, using protective apparatuses such as masks and by covering machines that need protection. And also 83.3% of the respondents responded that there is suitable physical working environment in tannery industries.

E. Management Systems

Training and motivational system, raw material supply system, and inventory control system of tannery industries also studied. As indicated under appendix B, 75% of tannery industries have training program and implement for workers. Regarding the amount of expenditure for training, 66.6% spend less than 6%, 22.2% spend 6-8%, and the remaining 11.1% spend more than 8% of their total expenditure. It also indicates that about 45.6% of these industries provide incentive and motivational system for their workers, and from direct interview it clear that incentive and motivational system is neither efficient nor sufficient in most of the industries due to the fact that it is not applied systematically but randomly, when the profit of the company allows, besides the industries tend to strictly implement penalty system than motivational system.

Regarding access to raw materials 50% of them responded that they use locally purchased and the rest of the respondent use both locally purchased and imported raw materials. In all cases locally purchased raw materials are skins and hides while imported raw materials are tanning chemicals. And on the topic of trade 90% have a cost effective delivery system considering time, cost, reliability and safety. The problems encountered by tannery industries during purchase of raw materials locally or partially importing is shown in the following pie-chart. The major problems in local raw material supply are shortage of raw materials, inferior quality of raw materials, reliability problems, and high cost of raw materials relative to imported raw materials, respectively. And also the major problems in raw material import are delay in clearing goods through customs, high cost of inputs, minimum order size, and non-recognized duty exemption, respectively.

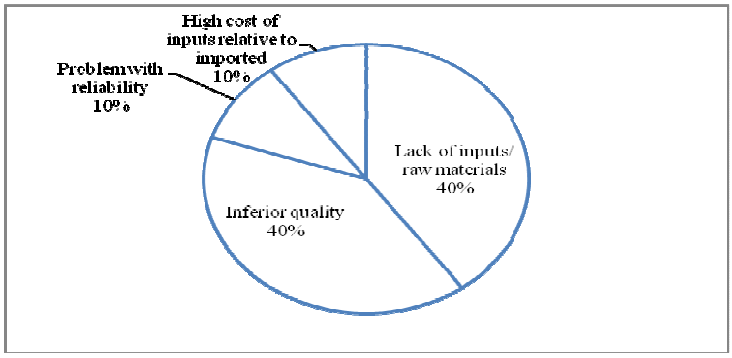


Figure 5.2: Major problems in local raw material supply

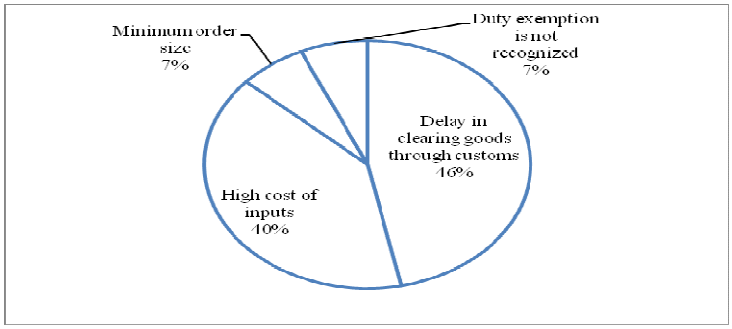


Figure 5.3: Major problems in raw material importing

On the subject of inventory, 91.7% have an inventory control system to ensure ideal stock levels (no overstock or out of stock) and 83.3% of responders have a systems to track the number and cost of stock on hand, purchased and sold, and in addition to check records against physical stock regularly.

F. New Product Development

From the survey result, it is understood that 81.8% of tannery industries including case company have product design and development department, but from observation it is clear that the design and product development department is neither sufficient nor efficient. All of the responders responded that the company's production system is flexible in handling different volume of product and delivery time. However, 75% of them responded that trained staff member on effective design change is moderate. And also 83.3% responded that the degree of computerization of the organization production and distribution functions is moderate in their company.

Flexibility of manufacturing system can be undertaken by developing new product, introducing a new joint venture, upgrading an existing product line, outsourcing a major production activity, introducing a new technology, and brought in-house of a major production activity that was previously outsourced. Figure 5.4 indicates the result of questionnaire survey in flexibility improvement practices of tannery industries which undertaken in the previous three years. From the result it is understood that the major activities which undertaken in tannery industries are developing a new product line, introducing new technology, upgrading an existing product line, discontinuing not produced (outdated) product line, introducing a new joint venture, outsourcing a major production activity that was previously conducted in-house, and brought in-house of a major production activity that was previously outsourced, respectively.

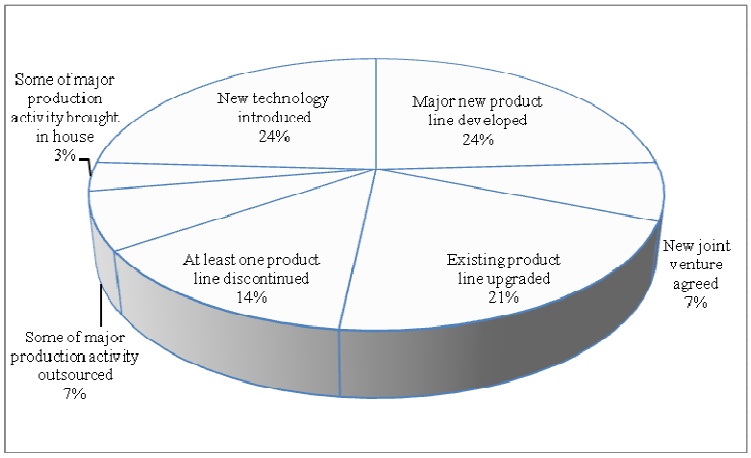


Figure 5.4: Major production activities undertaken in flexibility improvement

In performance management cause-and-effect diagram is very important. Therefore, causes of poor performance in tannery industries are prioritized in this study. As indicated in figure 5.5, the major causes of poor performance is poor quality products, high production cost, low flexibility, high lead time, and low productivity as their order of importance. And also the causes of each performance perspectives are prioritized in this research (appendix B). The major causes of poor quality products are defective raw materials, low management commitment, low quality awareness and quality tool application, and low skill of workers, respectively. And also the major causes of high production cost are low capacity utilization, poor resource utilization, and poor inventory control, respectively.

In addition the major causes of low flexibility are low flexibility on machinery and facility layout, low skill of workers in product design and development, low flexibility on time to market, and low flexibility on product capacity, respectively. The major causes of high lead times are machinery breakage; poor logistics, supply and delivery management; poor machinery and facility layout; poor ergonomics and work methods; and rework; respectively. Finally, the major causes of low productivity are machinery breakage; low material utilization due to scrap, rework and defects; poor layout; poor ergonomics and work method; and low workers skills, motivation, and satisfaction; respectively.

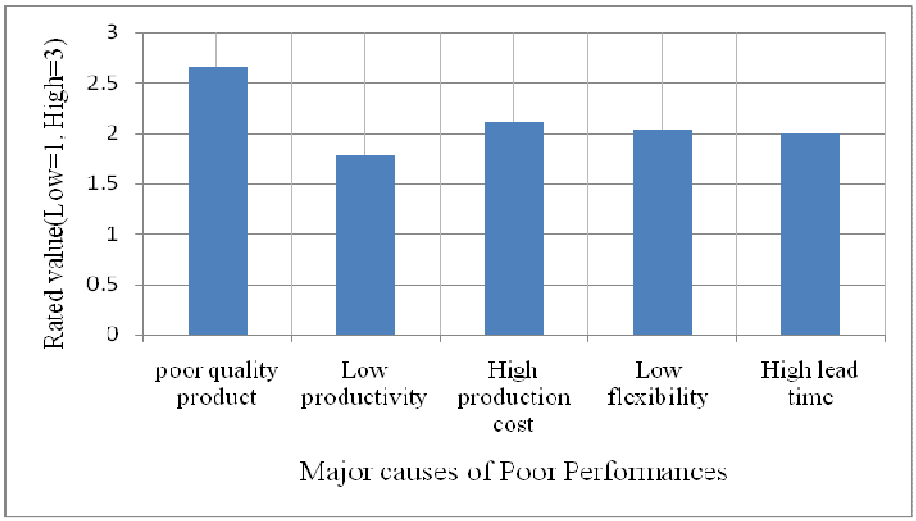


Figure 5.5: Enterprises major performance factors

Source: Survey result

5.3.Case result analysis

At case company performance of the firm and gap analysis on specific performance factors studied through secondary data collection, observation, and discussion with supervisors, production manager, and benchmark experts. Hence, the results were analyzed under this sub-section.

5.3.1. Firm performance

For this research five performance parameters such as quality, productivity, flexibility, time, and cost were selected in addition to financial performance. Financial performance, machine productivity, and quality performance of the firm were analyzed under this sub-section. Regarding the rest of performance parameters, data collected through interview were explained under firm's performance improvement factors.

A. Financial performance

From collected secondary data, the financial performance of AATSC was analyzed. The results were indicated in figures 5.6 & 5.7. Financial indicators for this analysis are total annual sales, and annual local & foreign sales. The analysis indicates that the sales performance of the company increased in respective five years. But its foreign sales performance has been decreased. This is due to tax increments on export of semi-finished leather products. The government gives incentive to export finished leather products.

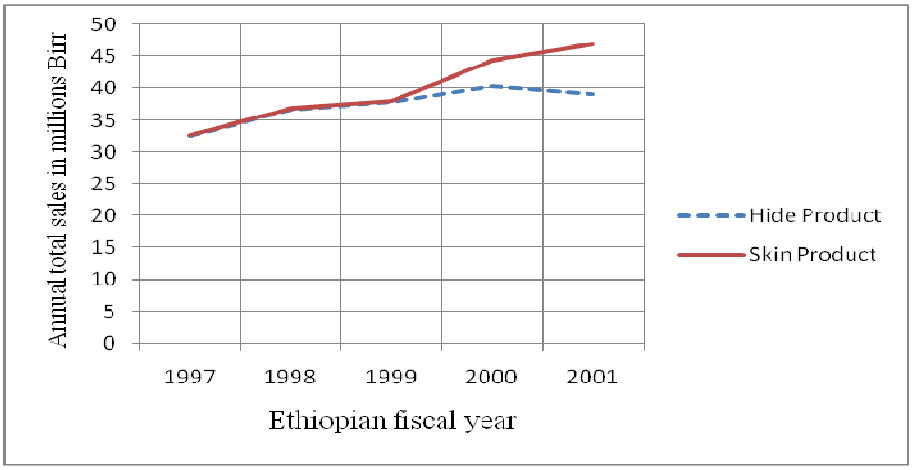


Figure 5.6: Sales performance of the company

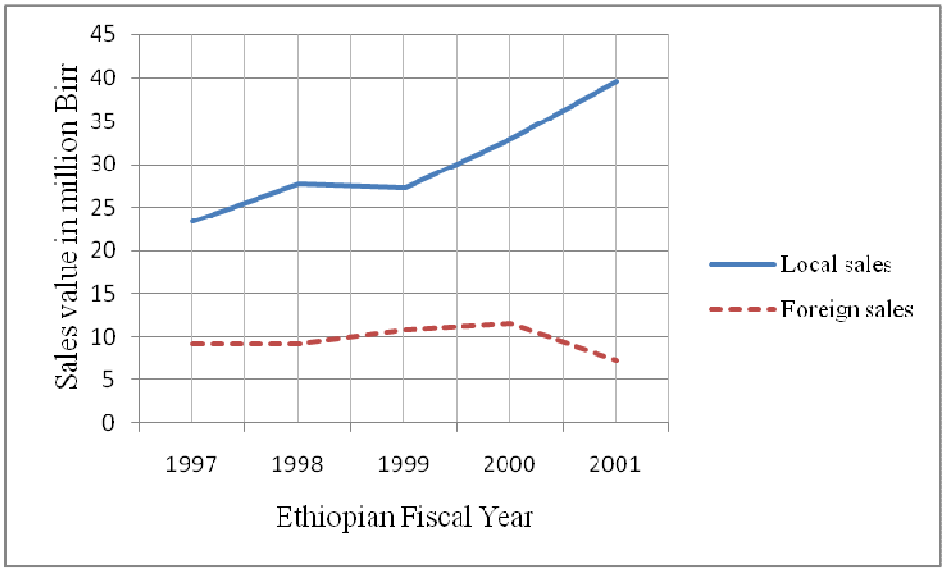


*Figure 5.7: Local and foreign sales performance of the company (for **skin product** only)*

B. Productivity performance

The research also indicates that the average capacity utilization and actual output of the case company in table 5.2 and figure 5.8, respectively. As indicated in the table the three years average capacity utilization of the company is less than 69.7% and also its actual output has been decreasing in the consecutive five years. When this actual output is compared with company's annual sales performance, sales performance increased while actual output decreased which indicates profitability does not represent productivity of the company. Due to this proper performance measurement framework is essential for a company to measure its performance.

Table 5.2: Capacity utilization of the company

	2000 E.C	2001 E.C	2002 E.C
Planned capacity (in Square feet)	5,523,329	4,585,393	4,788,060
Actual capacity (in Square feet)	3,702,466	3,198,037	2,594,016
Capacity utilization (in %)	67%	69.7%	54.2%

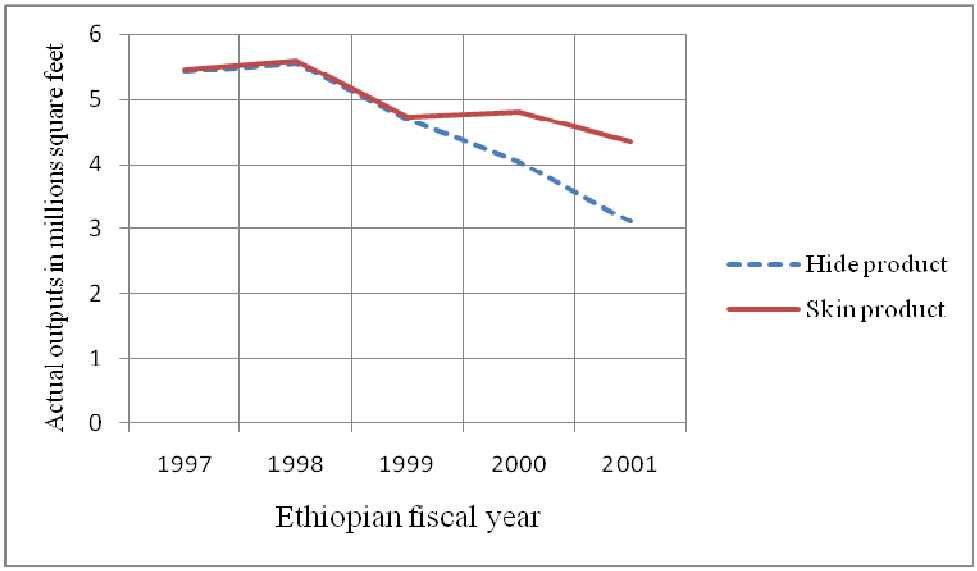


Figure 5.8: Annual output of the company

Machine productivity of AATSC also analyzed based on collected secondary data. The result only indicates daily production of major machine in the company. As indicated in figure 5.9 machine productivity of the company is lowered as compared with international benchmarks. The major reasons are machinery failures due to its oldness, and poor maintenance management system.

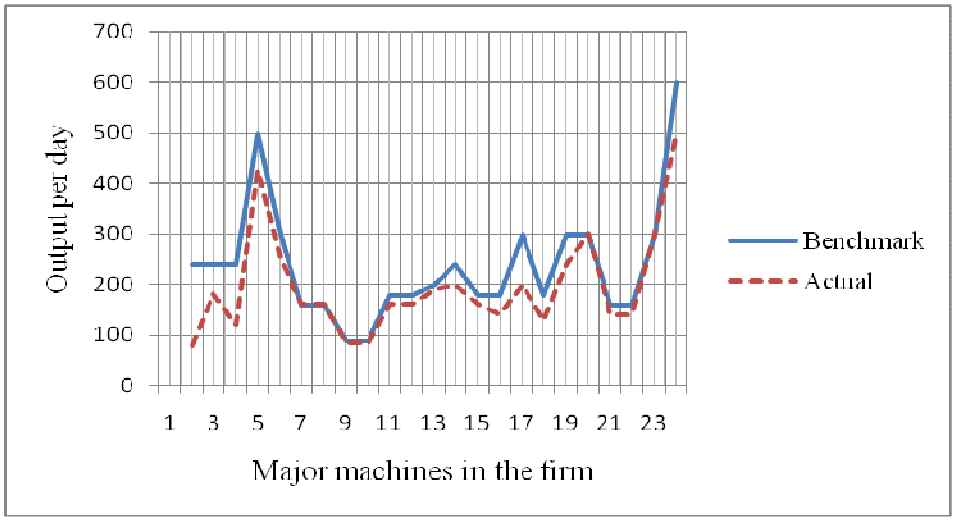


Figure 5.9: Performance gap on machine productivity of the company

Source: Benchmark report, 2009

C. Quality performance

End product quality of the company also studied in this research based on collected secondary data. The result summarized in table 5.3 indicates average quality performance of year 2009/2010 fiscal year. As indicated in the table, the rejected percentage of the product is very high when compared with grade 1-3 products. The major reason is that poor quality of skin/hide which identified after further processing.

Table 5.3: Product quality percentages of the company

Grade	Pickle (goat) %		Pickle (sheep) %	Wet blue (goat) %		Wet blue (hides) %	
	First quarter report	Second quarter report	Average of nine months report	First quarter report	Second quarter report	Average of nine months report	Second quarter report
1-3	**1.7**	**-**	**0.8**	**-**	**1.1**		**-**
4	16.7	5.1	10.3	19.4	17.8	**1.2**	-
5	40	33	36.9	41.7	37.6	17.7	18.2
6	34.5	43.7	38.8	31.4	33.8	17.2	22.1
Reject	**7.1**	**18.2**	**13.2**	**7.5**	**9.7**	**63.9**	**59.7**

5.3.2. Performance improvement factors in the firm

Performance parameters such as quality, productivity, time, flexibility, and cost were selected for this research. The performance factors which affect these major performance indicators were studied in detail at case company and analyzed as follows:

A. Management systems

Through interview the general information about the firm's organization and critical KPI of the company were studied. In addition performance measurement and improvement practices, and culture & working environment of the company also studied.

Regarding the organizational information of the company, there is a good integration of vision, objectives, and strategy of the firm with performance measures. The responsible person on the working area is responsible for his respective performance measures and performance improvement. However, data organization and analysis problems were observed in the company.

In case of performance measurement and improvement practices in the company, the company uses some financial and non-financial performance measures such as sales performance, quality performance, and product mix. However, overall performance of the company concluded by depending on financial performance which has major effects in global competition.

In addition use of key performance indicators for respective business areas or departments are important in today's competition and performance improvement. Many key performance indicators were indirectly or directly used in respective department. For example, output per employee, rejected percentages, variety of products, annual sales, absentee rate, market share, throughput time, and others were used in the company. However, they are not directly linked to the strategy of the company and data required for analysis are not collected or arranged periodically.

A performance improvement practice of the company is the integration of improvement practice of all departments. For example, marketing and sales department of the company works to increase market share of the products, research and development department works to expand product variety, and production department of the company works to improve productivity and quality of the products. Therefore, the integration of those improvement practices makes total performance improvement of the company.

Regarding employee satisfaction and training & development, the company is investing on training, motivation, and education of the workers. Bonus and promotion are the type of motivational system applied in the company. Moreover, the company gives insurance for the workers two hours before starting the work up to two hours after the end of the work. It also covers 75% and 100% of payment due to sickness for operational and administrative workers, respectively. Regarding training and education there is training section in the company and in addition to that some of the workers attended training given by LIDI. And also the company covers 75% of educational payment for workers who didn't complete grade ten. However, most of the experts proposed that the skill and motivation of the workers are not enough for performance improvement of the company.

B. Quality

From interview results it understood that quality definition in the company is “conformance to specification” which is not appropriate for continuous improvement. Rejected percentage is used as key performance indicator for quality section. Regarding service quality of the company, delivery on-schedule is used as key performance indicator. The various major raw material quality problems in tannery industries are flay cuts, putrefaction, dirt, dung and animal diseases (ekek). Flay cuts and putrefactions are the major raw material quality problems in the company. As a result, there is considerable wastage as well as quality deterioration between collection and processing which raises the costs of tanneries.

From observation and discussion with supervisor and benchmark experts, there are various quality control problems in the company. The company is processing heavy, medium and light weight raw material together, because there is no assortment of raw material which leads to inconsistency in the quality of processing. In the same drum the expert team had seen completion of deliming for light material while for heavy material the deliming was incomplete. And also poor raw material quality observed due to putrefaction, flay cuts, and improper preservation.

In addition there is no quality control system followed in beamhouse. As a result, there is improper weighing, no pH check in soaking, and no analysis of sulphide during liming. And also assortment of leathers into different grades especially for hides has been carried out after sammying and shaving. The stocking of lower grade material after shaving which has low moisture content could result in drying of leather which is undesirable.

Moreover, there is no application of international & local standards because their standards are only based on customer specification. Input chemicals used for processing are also not analyzed periodically. Insufficient lab facility is also another observed problem in the company. For example, no weight balance with precision of 1mg, inadequate chemicals for analysis and apparatus for chemical testing, and there is no shrinkage tester and machines for testing tensile and tear strength.

C. Productivity

Regarding the key performance indicators of productivity, output per employee for employee productivity; output per working time of machine for machine productivity; and rework, scrap, and defect percentages for material productivity are used in the company. From survey results, it understood that the average percentages of rework, scrap, and defect in total production processes are 5-10% for rework, and 3-5% for scrap and defect individually, which is more as compared to international benchmark (up to 5% in total). The average actual labour productivity of the company is also 120ft^2 per production worker which is very less when compared with international benchmark set by LIDI (270ft^2/day/production worker).

Moreover, productivity problems such as lack of awareness of the workers, poor layout, inaccessibility of technology and automated machines, non-value added activities, and insufficient maintenance management system also found from interview results. There is lack of skilled man power, well organized work shop, schedule for preventive and routine maintenance, and planned maintenance implementation regarding maintenance management. Some of the major specific problems of productivity in the company were:

- **No trimming of raw material before starting a process:** Shanks, tail, holes due to horns, and nailed region are not of value for leather making and hence they need to be removed before further processing. Therefore, trimming needs to be carried out in raw in the case of wet salted and fresh material, and after soaking in case of dry hides. The experts of leather sector estimate its benefits as 3-5% savings in chemicals offered in beam house processes, and 3-5% increase in capacity utilization of drums.
- **Improper order of activities:** assortment of leathers into different grades especially for hides has been carried out after sammying and shaving. The stocking of lower grade material after shaving which has low moisture content could result in drying of leather which is undesirable.
- **Poor layout Management**: improper machinery layout and it lacks machineries which are essential for the manufacture of high quality finished leather and sustained product development. The existing layout of the company was studied by benchmark experts and another layout was recommended to improve flow and handling of materials.

- **Too much time for washing and draining:** during the wetting-back process washing and draining process takes too much time which increases manufacturing lead time.
- **Problem on optimization of cost**: there is no work carried out to optimize the use of the chemicals and leather auxiliaries used, and processing conditions of the company.

D. Flexibility

There is research and development department in the company. From interview results, it understood that the key performance indicator for a department is variety of products or number of introduced new products. Therefore, it has also been competing on new product introduction. The major problems regarding flexibility improvement in the company are low skill of workers in new product design and development, and lack of additional machineries for additional features of finished products. And also benchmark experts proposed the problem as there is no practical system for the development of new products based on global demands. Hence, there is no team focusing on the global market research to facilitate their product development.

E. Time

Manufacturing lead time has great impact on total product lead time of the company. Following supply time affects total product lead time. The average manufacturing lead time of the company is that 14-15 days for hide products and 11-12 days for skin products. The total lead time which includes supply and delivery time in addition to manufacturing lead time of U.S. finishing tannery is 14-21 days while that of international tannery is 30-45 days for skin products. Since supply and delivery time is more in international market, it is not difficult to compare those values. The major problems which cause the increment of the total lead times of the company are delay of raw material supply, lack of alternative supplier for some raw materials, and lack of well-designed supply chain network.

F. Cost

Direct cost takes more percentages of total product cost which is the sum of direct and indirect cost in the company. It can be divided as material cost, labor cost, machinery cost, and other auxiliary cost. Material cost has greater impact on total product cost than others. The product cost varied from order to order because raw material cost (skins/hides) fluctuates depending on the demand of the raw materials which is seasonal. The major problems which affect product cost are rework, scrap, defects, supply chain network, and non-value added activities. Inventory costs also have an impact on product cost. Huge stock of chemical and leather auxiliaries piled up in chemical store which results capital loss.

5.4. Summary of the chapter

In this chapter, data gathered from eleven Ethiopian tannery industries and collected data from AATSC have been analyzed. The results have been discussed with respect to what has been said in numerous literatures and international investigations. The research findings reveal performance measurement and improvement practices, and major causes of poor performance in Ethiopian tannery industries and case company. Hence, the following cause-and-effect diagram of poor performance was developed based on the results of survey and case study.

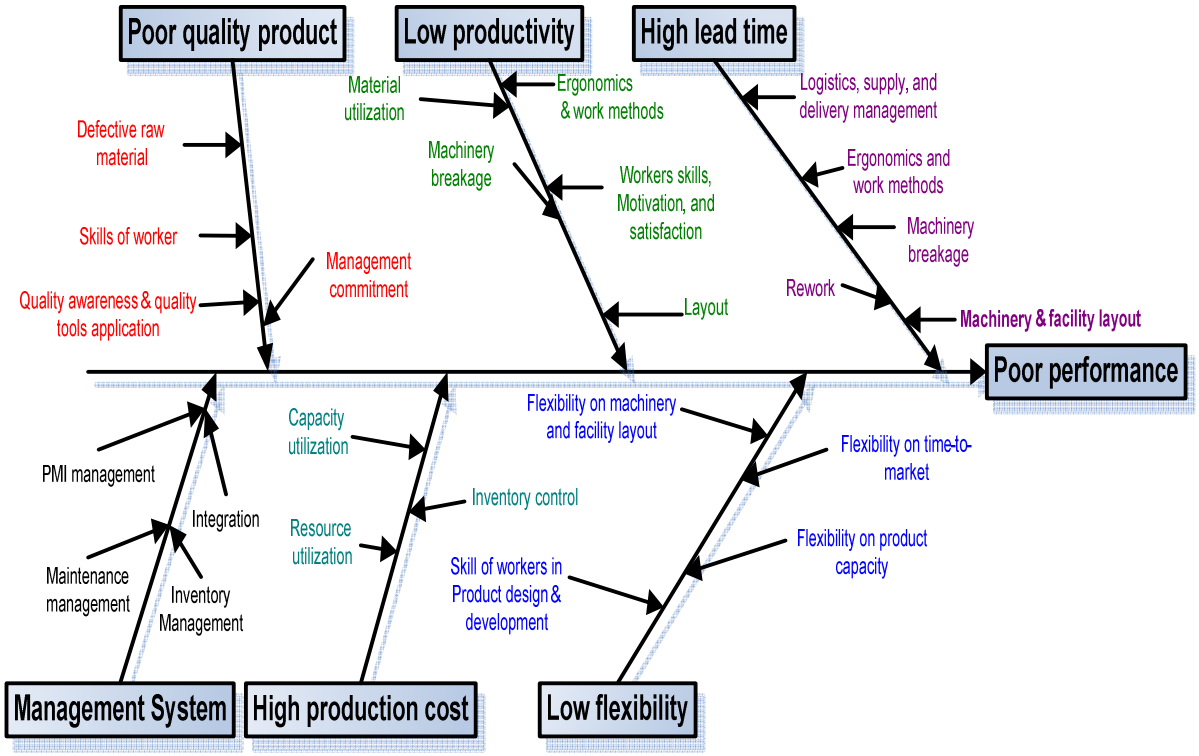


Figure 5.10: Cause and effect diagram of poor performance

As stated in this chapter, the main causes of poor performance of the company were categorized under management system, product quality, productivity, lead time, production cost, and flexibility. The researcher developed cause-and-effect diagram to make the result understandable. Performance parameters of the company were affected by different factors as indicated in figure 5.10. For example, the major causes of poor product quality are defective raw material, low skill of workers, and low quality tool application. Hence, the combination of all factors affects performance of the company.

Moreover, from research findings it understood that performance measurement strategies of the company are not encouraging to long-term performance improvement. The researcher believed that one of the vital constraints to performance decline of the company is the ways of measuring performance. Therefore, performance measurement and improvement model has been developed as a solution under the next chapter.

CHAPTER SIX

PROPOSED SOLUTION AND IMPLEMENTATION PROCESS

6.1. Introduction

During the last decades of the 20th century, it has become evident that getting and sustaining a competitive advantage could not be achieved only by the efficient handling of tangible assets (plant, inventory, equipment, and like). The management of intangible assets such as skills and knowledge of employees, customer relationships, and innovative processes became the major source of competitive advantage. Traditional systems of performance measurement, which are based solely on financial indicators, started failing to measure adequately the overall performance of the enterprises due to ignoring the impact of the intangible assets [Yulia (2006)]. Therefore, it is widely believed that the information provided by traditional performance measurement systems is insufficient for an effective management of businesses in rapidly changing and highly competitive markets. Various researchers approved that performance measurement systems must be a dynamic & living entity, capable of reflecting the needs of critical stakeholders and the processes required to fulfill these needs. Since the operation & measurement strategies that are currently in place in Ethiopian tannery industries including case company are not supporting the change process, there is a need for new styles of measurement systems which integrated with performance improvements. Hence, the main focus of this chapter is to propose performance measurement and improvement model and its implementation for Ethiopian tannery industries and case company (AATSC).

6.2. Proposed Performance Measurement and Improvement Model

In literature review of this research different performance improvement tools were discussed. From these performance improvement tools, balanced scorecard was proposed depending on formulated problems and best practices of other countries. As indicated in table 2.5, different common performance improvement tools were compared depending on their scope, implementation time, resource requirement, and staff involvement. Therefore, the researcher proposed BSC performance improvement tools for a company by justifying as:

- The research findings indicate that there are performance measurement as well as performance improvement problems. In addition performance improvement of the company is not firmly connected to the result of performance measures, which indicates no

alignment between performance measurement and performance improvement. Different researchers argue performance measurement and improvement systems succeed when the organization's strategy and performance measures are in alignment and when senior managers convey the organization's mission, vision, values and strategic direction to employees and external stakeholders. Hence, performance factors such as management system, productivity, quality, flexibility, time, and cost should be considered as a whole rather than as separate part to improve performance of the company. Since the scope of BSC is holistic model that can be used at various levels across the company, it is preferable with respect to other tools.

- The other justification is that it requires minimum implementation time (four to six months depending on level of measurements) as well as low resource investment (often just facilitation costs and staff time). If scorecards are cascaded and widely deployed, all staff members inclusive in continuous improvement. Moreover, best practices which reviewed in this research indicate that many companies became profitable and advantageous after implementing this tool.

The proposed model adapted from David Parmenter (2010) key performance indicator book. The justifications of the proposed model were:

- The proposed model has six perspectives which customized from six-perspective balanced scorecard in David Parmenter (2010) key performance indicators book. The original balanced scorecard has four perspectives. Since this original balanced scorecard has limitations, different researchers proposed additional perspectives on original BSC. Later, Kaplan and Norton have also alluded to the importance of employee satisfaction and the environment/community perspectives. The researcher also believed that the addition of these two perspectives is important because environment/community perspectives are essential for any tannery industries and employee satisfaction also a base for performance improvement of the company. However, the researcher combined employee satisfaction perspective with learning and growth perspective to minimize management system complexity.

- In addition to the perspectives of the model indicated on this book, the researcher includes additional perspective which is supplier partnership perspective. The reason is that one of the major performance problem of Ethiopian tannery industries including case company is raw material supply and quality problem. Therefore, the researcher recommends the company should develop proper supplier management system.
- The perspectives of the model were:

1. **Financial perspectives**: Ethiopian tannery industries including AATSC are using unbalanced performance measurement system which gives more focus on financial measures. Due to this balanced scorecard which has six perspectives proposed for a company. The proposed model does not disregard the traditional financial based performance indicators. Instead they link these indicators to the strategic and operational goals using a cause and effect relationship. Therefore, the company and other tannery industries should link financial measures such as total sales volume or growth, operating income, and return-on-investment to the strategic and operational goals which facilitates performance improvement of the company.
2. **Customer-focus perspectives**: This perspective is very essential because it enables the company managers to articulate the customer and market-based strategy that will deliver superior future financial returns. It focuses on the ability of the organization to provide quality goods and services, the effectiveness of their delivery, and overall customer service and satisfaction. The improvement of customer satisfaction is certainly a business virtue to which many aspire by enhancing market share of the company. Therefore, the company should include customer focus performance measures such as market share, customer satisfaction, and customer retention in its performance measurement system. If the company gives better attention for this perspective, performance parameters such as product and service quality, and customer responsiveness improved which indirectly improves demand of the products.
3. **Internal process perspectives**: This perspective captures result of internal processes that lead to financial success and satisfied customers. It is customer driven measures that must be translated into measures of what the organization must do internally on its process to meet the customers' expectation without violating the social and environmental obligations. Internal processes are the mechanisms through which performance expectations are

achieved. It takes more percentages of total performance measures, for example, in four perspectives balanced scorecard it takes about 34%. Therefore, the company must identify the key internal processes which it must excel and monitor to ensure that outcomes will be satisfactory. The common indicators of internal processes are product/service quality, manufacturing lead time, operating costs, operating efficiency, and machine down time. The reason for giving more attention for this perspective is that it is the core for performance improvement of the company which encompasses all performance parameters like quality, time, cost, flexibility, and productivity.

4. **Learning and growth perspectives**: In order to meet changing requirements and customer expectations, it needs to have improved skills, capabilities, technologies, and organizational designs that were not available before. Processes will only succeed if adequately skilled and motivated employees, supplied with accurate and timely information, are driving them. Education and training can improve employees' knowledge and skills and have significant influence on their development. Thus, employees can generate innovative ideas for solving working problems. This enhances employee commitment and satisfaction. Therefore, the company must identify performance measures such as skills and capacity development, innovations (new products, methods, and ideas), employee compliant/satisfaction, and employee retention /turnover/absenteeism to improve its performance continuously.
5. **Environment and community perspective:** Fulfilling environmental and community obligations are critical issues throughout the world at this moment. Measurement in this area looks at increasing public awareness about being an employee of first choice, staff learning new skills through doing voluntary work in the community, reducing costs through minimizing waste, creating positive press, and increasing higher staff morale by implementing green initiatives. Additionally, environmental protection is the main objectives of this perspective. Therefore, the company must identify and work on performance measures of environment and community perspective because environmental protection is the main problem in tannery industries. The common indicators of this perspective are market stabilization, waste treatment & pollution control, cash outflow for social security, and society complaint/satisfaction.

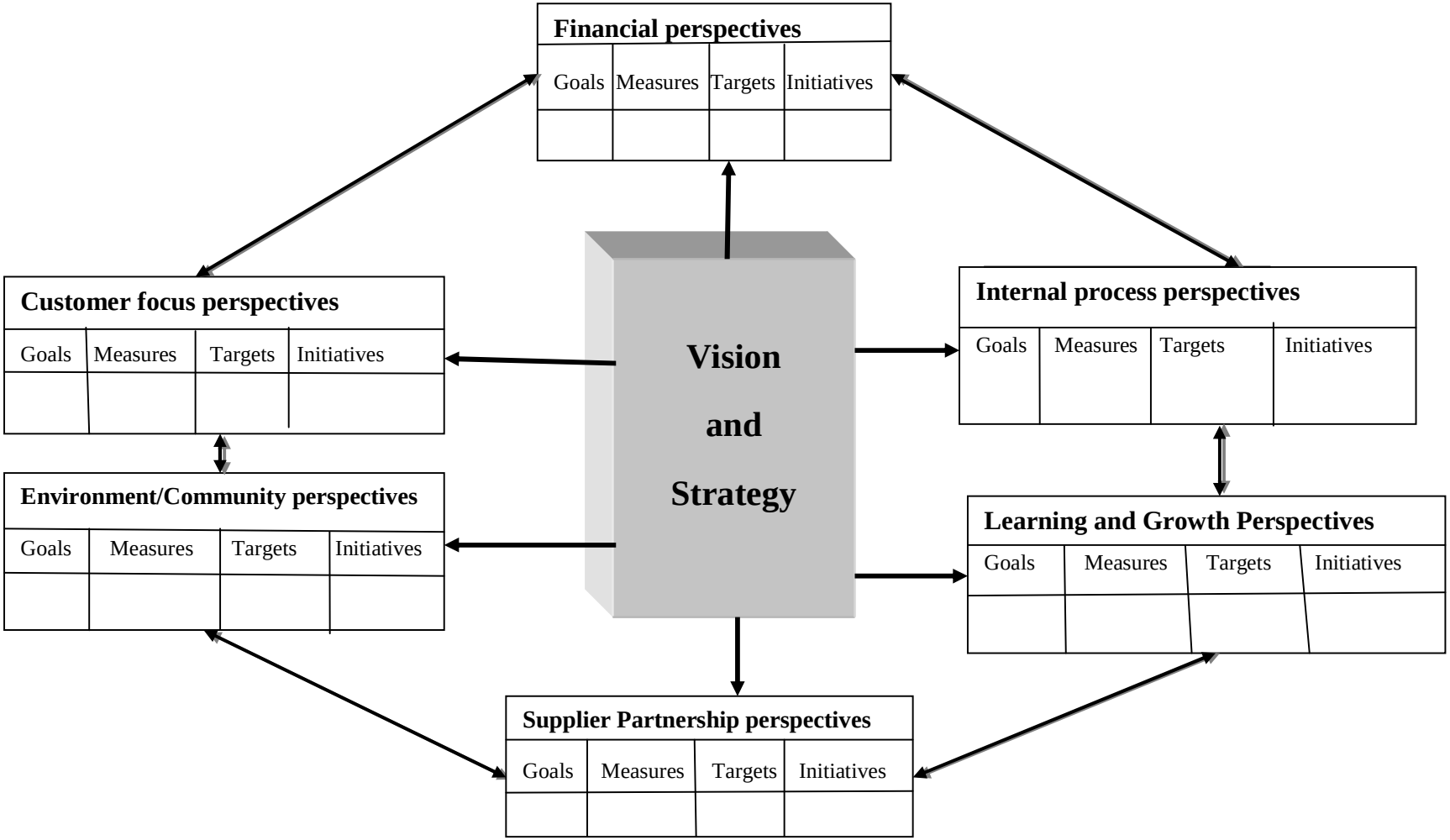


Figure 6.1: Proposed performance measurement and improvement model

Source: Adapted from David Parmenter, key performance indicator, 2010 (page 18)

Table 6.1: Summary of proposed performance measures for a company

Performance parameters	**Goals**	**Performance Measures**
Financial perspectives	• Improving cash flow or profitability of the company	• Total sales volume/growth • Operating profit • Return on asset/capital employed • Return on investment
Customer-focus perspectives	• Improving customer satisfaction by customer survey results • Firm's responsiveness to change for a product or services	• Increase in market share • Reduction in customer complaint • Increase customer retention/ acquisition • Customer profitability
Internal process perspectives	• Firm's success in focusing on its core internal processes • Firm's ability to control all its internal processes • The quality improvement of firm's products or services	• Improvement in product and service quality • Reduction in manufacturing lead time (MLT) • Reduction in operating costs • Improvement in operating efficiency • Machine down time availability
Learning and Growth perspectives	• The competency of employees in the company • The satisfaction level of employees based on salary and promotions • Management expertise and other know-how to facilitate innovation and learning • Technology research and development effort and success	• Employee complaint /satisfaction • Employee retention /turnover/absenteeism • Accidents and working environment • Salary, incentive and reward • Training and education • Skill & capacity development • Qualification growths • Innovation (new products, methods, ideas, etc)
Environment and community perspectives	• Professional licenses, and quality or environmental certifications • Community perception on the company	• Market stabilization • Waste treatment & pollution control • Cash outflow for social security
Supplier Partnership perspectives	• Improving supplier relationship to improve material quality and supply time	• Material quality • Delivery time • Material cost

6. **Supplier partnership perspectives:** Working with suppliers as a partnership in a long-term relationship of loyalty and trust is too essential to improve the quality of incoming raw material and decrease costs. Since the major problems of tannery industries in our country are raw material quality problem, delay in delivery of raw materials, and material cost fluctuation, they must work together with their suppliers to improve delivery of their products and also to minimize incoming inspection, internal and external failure costs. It encourages a joint approach to problem solving, offering cost reduction, and quality improvement. The common indicators of this perspective are material quality, delivery time, and materials cost.

6.3. Implementation Process of Proposed Model

The development of performance measurement and improvement systems can be divided into three main phases. These are: design of performance measures or key performance indicators for each perspective, implementation of the performance measures, and use of the performance measures for continuous improvement [Mike Bourne et al. (2000)]. Depending on this main phases and research findings, the following implementation process was proposed for a company. The proposed implementation model is adapted from performance-based management handbook by considering research findings and the proposed improvement model itself. The proposed implementation process works continuously and discussed as follows.

Step 1: Awareness creation about performance management

The use of performance measures in the company is hardly new. Company has been measuring financial performance, quality, quantity, production cost, lead time, and productivity as long as ways to measure those things have existed. What is new to some extent is having those who the work determine some of what should be measured in order that they might better control, understand, and improve what they do. Therefore, the purpose of this step is to give an understanding of performance measurement and improvement. It is not intended to be an in-depth look at the subject, only a briefing for the not-so-experienced company workers. Moreover, leadership commitment to the development and use of performance measures is a critical element in the success of the performance measurement system.

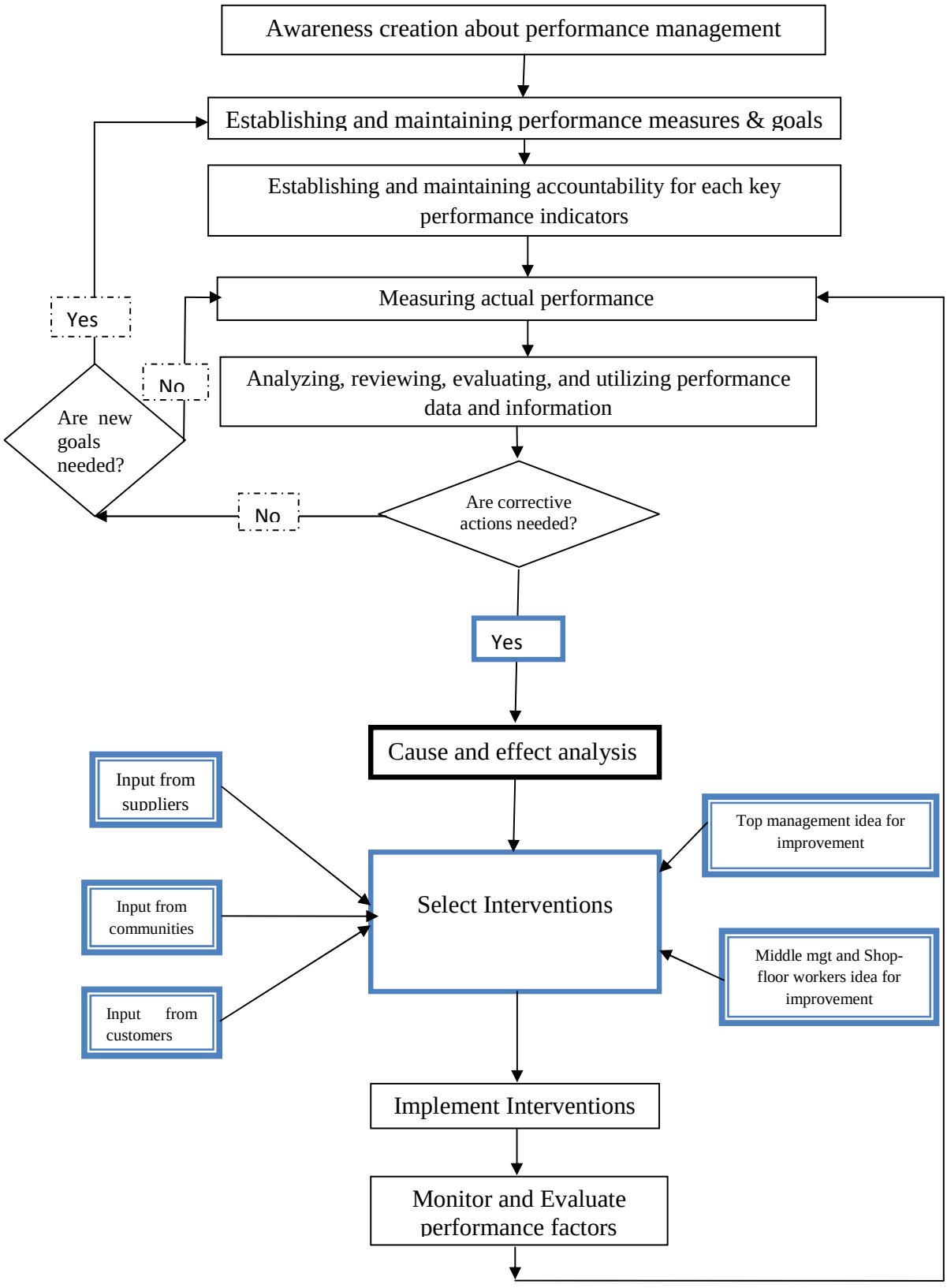


Figure 6.2: Implementation process of proposed model

Source: Adapted from Performance-Based Management Process/Handbook Model (2001)

Step 2: Establishing and maintaining performance measures & goals

In order to meaningfully interpret the results of performance measurements and determine the success of the company, desired performance goals must be defined. These desired performances address the quality, quantity and timeliness of performance and sets initial and final target levels of performance. Hence, the company needs to establish or maintain the desired performance goals which could be high product quality, reduction of lead time, high productivity, minimum production cost, and different product mix. The company should establish/maintain key performance indicators for each department.

The most common mistake organizations make is measuring too many variables. The next most common mistake is measuring too few. Therefore, the company should not let one of the following be the pitfall of performance measurement system.

- Amazing too much data
- Focusing on the short-term
- Failing to base business decisions on the data
- Summarizing data as meaningless
- Measuring too little
- Collecting inconsistent, conflicting, and unnecessary data
- Encouraging competition and discouraging teamwork
- Establishing unrealistic and unreasonable measures
- Failing to link measures
- Measuring progress too often or not often enough
- Ignoring the customer
- Asking the wrong questions/looking in the wrong places
- Confusing the purpose of the performance measurement systems

Step 3: Establishing and maintaining accountability for each key performance indicators

Successful deployment of an integrated performance measurement system is related strongly to developing a successful system of accountability to performance measures. Therefore, the company must develop system of accountability. Each performance measure needs to have an owner who is responsible for that measure. Employees need to know how the measurements for which they are being held accountable relates to the overall success/failure of the organization, and they are most likely to meet or exceed performance goals when they are empowered with the

authority to make decisions and solve problems related to the results for which they are accountable.

Step 4: Measuring actual performance

In this step, actual performance data are collected. The data gathered for this stage will serve as the baseline for determining the effectiveness of the intervention in the latter stage. After the interventions have been implemented for a designated time period, performance data can be compared to baseline data to determine whether or how much performance has changed.

Step 5: Analyzing, reviewing, evaluating, and utilizing performance data and information

Once the desired and actual levels of performance have been defined and collected, identifying the performance gaps becomes a matter of comparing the two levels. The gap should be described using the same indicators that were employed to describe desired and actual performance. The gap description shows, in objective terms, the difference between actual performance and the performance the company wants to achieve (best practice). Hence, based on the result further decision can be taken whether correction and intervention are required in order to eliminate the gap or improve desired goals.

Step 6: Cause and effect analysis

Once performance gaps have been described and if the result indicates under performance or extra improvement required, the next step is to determine the cause of those gaps by cause and effect analysis. During this analysis performance factors which affect management system, quality, productivity, flexibility, time, and cost should be deeply examined. Using the performance factors as a starting point, the stakeholder group should participate in a root cause analysis. The research developed cause-and- effect analysis in previous chapter depending on research findings. So the company can use and improve this cause and effect diagram during performance measurement and improvement practices.

Step 7: Select interventions

The stakeholder group should next select interventions that will tackle the root causes discovered during the previous stage. During selection of interventions, information from customers, suppliers, community, and every staffs of the company should identify. Each intervention or set of interventions must address at least one root cause. Hence, the team may consult experts in each possible intervention areas in designing and developing the selected interventions.

Step 8: Implement interventions

During the implementation stage, management commitment is required for properly implementing the designed interventions, also for allocating budgets and resources, and monitoring progress. Hence, performance improvement team may recruit additional expertise as needed, assures organizational readiness, applies the interventions, and enable and monitor organizational change.

Step 9: Monitor and evaluate performance factors

Through monitoring and evaluation, the team measures the change in the performance gaps identified during gap analysis. Monitoring happens on an ongoing basis so that changes in implementation can be made as needed. Whenever possible, the team should develop an evaluation method that can be integrated into workplace processes and remain in the workplace after the interventions as a feedback device for workers and managers. The final evaluation should be measured again for performance gaps and assess the extent to which they have closed the gap as a result of the interventions.

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATION

7.1. Conclusion

The research was studied by classifying key performance indicators of Ethiopian tannery industries into five categories such as quality, productivity, flexibility, time, and cost. There are different performance factors that affect these performance parameters. Therefore, performance interpretation, performance measurement & improvement practices, and performance factors of Ethiopian tannery industries and case company were studied. The results were concluded as:

- Performance and productivity is interpreted incorrectly in tannery industries including case company. They mostly interpreted with respect to financial and product output. These affect performance improvement of tannery industries.
- Financial performance measures are the main focus of performance measurement system in our country. This affects improvement practices of the industries. The result of essential non-financial performance measures such as measures of: quality, productivity, flexibility, and time are not used for improvement practices of the company.
- Financial, quality, and productivity performance of the company were analyzed, and they indicate that sales performance of the company has been increasing while foreign sales performance and annual outputs have been decreasing. And also machine productivity is below international benchmark and the maximum capacity utilization of the company is 70%. Moreover, the rejected percentage of the company's product is more than grade 1-3 products.
- Performance improvement factors of the company also studied with regard to management system, productivity, quality, flexibility, time, and cost. The findings were:
    - The performance problems regarding management systems are performance and improvement planning, supplier and customer management, inventory management, maintenance management, and training & human resource management.
    - The quality definition in the company is "conformance to specification" and rejected percentage is the key performance indicator for quality performance measurement. The major product quality problems in the company are poor raw material quality (such as flay cuts, putrefaction, dirt, dung, and animal diseases

(ekek)), improper practices due to low skill of workers, inexistence of quality control system between some consecutive operation (for example, between beamhouse and tanning operation), and insufficient lab facilities.

- The key performance indicators of productivity in the company are output per employee for labour productivity; output per machine running time for machine productivity; and rework, scrap, and defect percentages for material productivity. The major productivity problems in the company are low skill and motivation of workers, poor layout, inaccessibility of technology and automated machines, improper work methods, and maintenance problems.
- Product variety is the key performance indicator of flexibility in the company, which affected by major problems like low skill of workers in new product development and market study, and lack of machineries for additional features of finished products.
- Manufacturing lead time, supply lead time, and delivery lead time are key performance indicators of total product lead time in the company. The major factors which cause high product lead time are delay of raw material supply, lack of alternative local supplier for some raw materials, and lack of well-designed supply chain network.
- Total product cost is derived from direct and indirect costs in the company. Direct cost which affected by rework, scrap, defects, poor supply chain network integration, and non-value added activities contributes much of total product cost.

- Finally, the research proposed performance measurement and improvement model with its implementation process to improve performance of the company.

7.2. Recommendation

The research assessed performance measurement and improvement practices as well as performance problems, and finally concluded by proposing balanced scorecard performance improvement model as a solution in the above section. The research recommended the following improvement solution for a company.

- The company must be devoted to change existing working-culture by breaking down the barrier between the management and shop-floor workers in order to engage the organization's employees towards common strategies that will alleviate the current performance measurement and improvement practices.
- Performance improvement model and its implementation steps have been proposed through a thorough analysis of drawbacks and merits of numerous international models and research findings. However, actual implementation of proposed model requires another research which is beyond the scope of this research. Therefore, detail actual implementation steps should be developed for a company.
- In order to have a continuous improvement, it is essential to monitor their performance on regular basis. Therefore, the company should design performance improvement plans in such a way that it can be implemented in practice and should focus on the key performance improvement areas.
- Moreover, the research also recommends improvement solutions for some performance problems based on literature review and research findings.
    - The company should design proper management system for performance measurement and improvement planning, supplier and customer management, inventory management, maintenance management, and training & human resource management. The reason is that there is a problem regarding integration of vision, objectives, and strategy in performance management. Additionally, managements are responsible for planning and executing performance improvement programs in allocating budgets and resources, and monitoring progress.
    - Productivity has great impact on performance of the company because it affects other performance parameters such as quality, time, flexibility, and product cost. Therefore, the company should give prior improvement attention for productivity factors such as

skill of workers, layout, material handling techniques, work methods, maintenance management, inventory management, and supplier & customer management.

- The company should advance quality definition from “conformance to specification” to state of the art definition. It must have quality improvement plan to improve its performance where it should include a quality policy that contains goals and methods to achieve it. Quality control techniques should include monitoring incoming raw material quality levels as well as utilizing statistical quality control methods to improve product quality.
- The company should design proper supply chain network and management system in addition to minimization of productivity problems to reduce total product lead time.
- The company should include flexibility with respect to time and volume in addition to product variety which practiced before. To achieve it, the company should give attention for improving workers skill in new product development in addition to productivity improvement.
- The company should give more attention for resource utilization to reduce total product cost. Because direct cost contributes more percentages of total product cost in tannery industries.

FUTURE RESEARCH DIRECTION

Ethiopian tannery industries are characterized by poor performance measurement system by implementing financial performance measurement rather than quality measurement, employee performance measurement, customer satisfaction and flexibility measurement. Taking into consideration these facts, this research proposed balanced scorecard which has six perspectives with implementation process. However, detail actual implementation and performance improvement factors required. Therefore, the researcher suggested the following for future researchers:

- Actual implementation of balanced scorecard for Addis Ababa Tannery Share Company is suggested for future researchers. Specific performance indicators and accountability for each measure should be developed for each performance perspectives of the model.
- Performance improvement factors such as quality, productivity, flexibility, time, and cost should be studied in detail based on their priorities.

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APPENDIXES

Appendix A: Designed questions for survey study

ADDIS ABABA INSTITUTE OF TECHNOLOGY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF MECHANICAL ENGINEERING
INDUSTRIAL ENGINEERING STREAM

Title of the Thesis: "Performance Measurement and Improvement for Ethiopian Tannery Industries"

By: Tadele Mamo

Advisor: Dr. Ing. Daniel Kitaw (Associate Professor of Mechanical Engineering)
Co-Advisor: Ato Amare Matebu (PhD candidate)

Questionnaire Survey for Ethiopian Tannery Industries

Dear Participants;

With sincerity we would like to extend our deep appreciation to your company and the staff for the willingness and cooperation in undertaking this valuable research. We ask your kind cooperation in answering the questions as truthfully as possible and your response will be highly confidential. For other questions pertaining to this project, please contact Addis Ababa University, Institute of Technology, Mechanical Engineering Department.

Yours Sincerely,

Thank you for your assistance!!!

I. Preliminary Information

A. Respondent profile

1. Your current position in the company……..
2. Qualification level: College diploma ☐ B.A/B.Sc ☐ MA/MSc & Above ☐
3. Your work experience in this company: Below 2 years ☐ 2-5 years ☐
   5-10 years ☐ Above 10 years ☐

B. Company profile

4. Name of your company.....
5. Company location……..
6. Date of establishment.....
7. Number of employees currently working in the firm: Direct labor.....
   Indirect labor……...
8. Latest capital assets (Birr).....

C. Organizational information

9. What are the objectives and mission of the company for its performance? ……
10. Does the company set its goals and targets for its performance? Yes ☐ No ☐
11. Does the company establish its clear vision of the future for its performance? Yes ☐ No ☐
12. Does the company evaluate its performance activities regularly? Yes ☐ No ☐
13. Does the company identify problems of performance improvement? Yes ☐ No ☐

14. Does the company have a training program? □ Yes □ No
15. Provide an average expenditure on training (as a percentage of total expenditure) in a year.
    □ < 2% □ 2-4% □ 4-6% □ 6-8% □ > 8%
16. Does the company provide incentive based on performance for its operators? □ Yes □ No

II. Considerations and Interpretations of performance in the company

17. In your opinion, what is the working definition of performance in your firm? Please tick (✓) or circle the number that applies to you!

Rating Scale:

Disagree	Undecided	Agree
1	2	3

Performance is:				
1.	Efficiency and effectiveness	1	2	3
2.	Wider in scope than productivity	1	2	3
Productivity is:				
3.	Output per worker	1	2	3
4.	Output per capital	1	2	3
5.	Output per materials	1	2	3
6.	Output per inputs of material, labor, capital, etc	1	2	3
7.	Sales per employee	1	2	3
8.	Jobs completed per jobs scheduled	1	2	3
9.	Output per labor cost	1	2	3
10.	Output per work hours	1	2	3

Other, please specify……

III. Performance measurement/ evaluation practices in the company

A. General performance measurement and improvement practices in the company

18. The importance of performance measurement/evaluation for decision making in your company is;
    □ Low □ Moderate □ High
19. How often is the performance evaluation being reported?
    □Weekly □ Monthly □ Quarterly □ Twice a Year □ Yearly □ other ……
20. Does your company use a financial performance measurement approach? □ Yes □ No
    If the answer is yes, please state ……
21. The degree of alignment & linkage between strategic performance measures and strategic goals is;
    □ Low □ Moderate □ High
22. The degree of integration between financial and non-financial measures in the firm is;
    □ Low □ Moderate □ High
23. Is your performance measurement/evaluation system computer-based? □ Yes □ No
24. Rate the key driver of performance in your company. Please tick (✓) or circle the number of rating that applies!

Highly	Moderately	Rarely
1	2	3

1.	Investment in machinery and equipment	1	2	3
2.	Education and training of employees	1	2	3
3.	Planned utilization of raw materials	1	2	3
4.	Innovation	1	2	3
5.	Government spending and security	1	2	3

Other, please specify ……

25. Does your company have a plan to implement Balanced Scorecard (BSC)? □ Yes □ No

26. To what extent does your company utilize performance measures that are described below during performance evaluations? Please tick (✓) or circle the number of rating that applies! **(3 = Highly, 2 = Moderately & 1= Rarely).**

S.No	Descriptive performance measures			
1	**Financial Measures**			
	Total sales volume/growth	1	2	3
	Operating profit	1	2	3
	Return on asset/capital employed	1	2	3
	Return on investment	1	2	3
2	**Customer and Market Measures**			
	Increase in market share	1	2	3
	Reduction in customer complaint	1	2	3
	Increase customer retention/ acquisition	1	2	3
	Customer profitability	1	2	3
3	**Internal Process/Operation Measures**			
	Improvement in product and service quality	1	2	3
	Reduction in manufacturing lead time (MLT)	1	2	3
	Reduction in operating costs	1	2	3
	Improvement in operating efficiency	1	2	3
	Machine down time availability	1	2	3
4	**Employee Satisfaction Measures**			
	Employee complaint /satisfaction	1	2	3
	Employee retention /turnover/absenteeism	1	2	3
	Accidents and working environment	1	2	3
	Salary, incentive and reward	1	2	3
5	**Training & Development Measures**			
	Training and education	1	2	3
	Skill & capacity development	1	2	3
	Qualification growths	1	2	3
	Innovation (new products, methods, ideas, etc)	1	2	3
6	**Social and Environmental Measures**			
	Market stabilization	1	2	3
	Waste treatment & pollution control	1	2	3
	Cash outflow for social security	1	2	3
	Society complaint/satisfaction	1	2	3
7	**Supplier Partnership Measures**			
	Material quality	1	2	3
	Delivery time	1	2	3
	Material cost	1	2	3

27. What could be the strategy to improve performance of the firm in the future? (More than one answer possible)
    - □ Improve the networks with input suppliers
    - □ Expand total production capacity and invest in advance production technology
    - □ Computerize design & manufacturing, management system, advertising & marketing
    - □ Diversify local sales into exports
    - □ Other, please specify ……

B. General Trends of the company's Financial performance

28. What are the sources of finance for your company?
    □ Own fund □ Foreign loan □ Local loan □ Credit from supplier □ Advanced payment
29. Does the company have working capital problems? □ Yes □ No
30. Does the organization have arrears in payment of bank loan or exceed overdraft limits? Yes □ No □
31. Is the company's profit increasing for the last three years (2000, 2001, 2002 E.C)? Yes □ No □
32. How much percentage of profit is reinvested per year in average? ……
33. Has the company's market share increased for last three years (2000, 2001, 2002 E.C)? Yes□ No □

C. Performance Improvement factors

i. Productivity

34. Does the company have Productivity Improvement Program? □ Yes □ No
35. Does the company determine its resource (labor, materials, machines, etc) utilization rate? □ Yes □ No
    If your answer is yes, the utilization rate in % for: Labour ……
    Material ……..
    Machine …….
    Energy ……
    Miscellaneous ……
36. Does the company identify and recognize the productivity problems? □ Yes □ No

If the answer is yes, what are they? ……

37. Does the employees in the company aware about productivity improvement? □ Yes □ No
38. Do you think trial runs save time, save cost and minimize production errors and faults? □ Yes □ No

Labour productivity

39. Does the company measure labor productivity? □ Yes □ No
40. Are the company's work standards compared with both national & international standards? □ Yes □ No
41. What is the workers' absenteeism and labor turnover in your company? Indicate the number in the box.

Monthly Absenteeism (in number)	1-20	21 - 50	>51
Labor turnover/month (in number)	1- 10	11-20	>21

Machine productivity

42. What are the reasons of machine failure?
    □ Lack of preventive maintenance □ Due to aging of machines/ equipments
    □ Improper handling of machines □ other, please specify _____
43. Are machinery maintenance services available locally? □ Yes □ No
44. What is the lead time to obtain spare parts? _____

Material productivity

45. Please give the average percentage of the rework, defects, and scrap in your production process.

Rework %	Scrap %	Defects %

46. Please provide the percentage cost of each of the following issues as a percentage of total unit costs.

Labour %	Raw materials %	Accessories %	Electricity, water & gas %	Rent %	Other expenses %

47. How do you rate the reasons for **not being fully operational** in your company [put ✓ mark on the number that applies]? **Rating scale:**

Low Effect	**Medium Effect**	**High Effect**
1	**2**	**3**

	Type of reasons	Rating		
1.	Raw material shortage	1	2	3
2.	Shortage of spare parts	1	2	3
3.	Lack of market	1	2	3
4.	Working capital shortage	1	2	3
5.	Frequent machinery breakage	1	2	3
6.	Government rules and regulation	1	2	3

Other, please specify……

ii. Quality

48. How is quality defined in your company? ----------
49. Quality awareness level in the company is: □ Low □ Moderate □ High
50. Employee participation in quality activities is: □ Low □ Moderate □ High
51. Does the company calculate the cost of quality? □ Yes □ No
52. Does the company recognize and solve the quality related problems? □ Yes □ No
53. Does the company identified customer requirements? □ Yes □ No
54. Are objectives of the company linked to customer needs and expectations? □ Yes □ No

55. Does the company have a procedure for evaluating subcontractors or suppliers? □ Yes □ No
56. Are there inspection & tests for incoming, in-process and final products? □ Yes □ No
57. Does the company have quality management system (TQM, ISO 9000 QMS, etc)? □ Yes □ No

iii. Quality of work life

58. Do you have the right material handling equipments? (For safety and efficiency) □ Yes □ No
59. What preventive methods do you apply to avoid accidents/ risks? ----------
60. Is the physical working environment suitable for workers? □ Yes □ No

iv. Inventory management

61. Access to the raw materials is: □ Own made □ locally purchased □ Imported □ Partially Imported
62. How is a raw material purchase done if it imported from aboad?
    □ Directly from export customer □ Through agent/sourcing office □ Subcontractor
    □ other, please specify ----------
63. If raw materials locally supplied then, what are the problems with local inputs?
    □ Lack of inputs/ raw materials □ Inferior quality
    □ Problem with reliability □ High cost of inputs relative to imported
    □ other, please specify ----------
64. If the inputs are fully or partially imported then, what are the problems with importing process?
    □ Delay in clearing goods through customs □ Duty exemption is not recognized
    □ Reliability on foreign suppliers is problematic □ High cost of inputs
    □ Minimum order size □ other ……
65. Are you purchasing raw materials in economical quantities? □ Yes □ No
66. How the Company ensure the quality of goods (raw materials) from your suppliers?
    □ Inspection □ Auditing □ ISO certification
    □ Performance measurement □ other ……
67. Have you arranged cost effective delivery? (Consider time, cost, reliability, safety) □ Yes □ No
68. Does the company have an inventory control system to ensure ideal stock levels (no overstocks or out of stocks)? □ Yes □ No
69. Do you have systems and records in place (electronic or manual) to track the number and cost of stock purchased, sold and on hand? □ Yes □ No
70. Are your records checked against a physical stock take regularly? □ Yes □ No

v. Product development/Innovation

71. Does the company have product design and development department? □ Yes □ No
72. How many new products has your company introduced in the last three years? _____
73. Does the company production system flexible in handling different volume of production and delivery time adjustments? □ Yes □ No
74. How trained is the staff for effective design change? □ Low □ Moderate □ High
75. Does the company consider the customer requirements in the product design? □ Yes □ No
76. How is the degree of computerization of the organization production and distribution functions?
    □ Low □ Moderate □ High
77. Has your company undertaken any of the following initiatives in the last three years? (More than one answer possible)
    - Developed a major new product line
    - Agreed a new joint venture with foreign partner
    - Upgraded an existing product line
    - Obtained a new licensing agreement
    - Discontinued at least one product (not produced) line
    - Closed at least one existing plant or outlet
    - Outsourced a major production activity that was previously conducted in-house
    - Brought in-house of a major production activity that was previously outsourced
    - Introduced new technology on the way that the main product is produced

D. Factors affecting performance

78. Please tell us if any of the following issues are a **problem for performance improvement**; please judge its severity as an obstacle on three point scale (**1 = No obstacle, 2 = Moderate obstacle, 3 = Major obstacle**).

S.No	**Factors**	1	2	3
1	High production cost			
2	Old technology (machines, methods, etc)			
3	Less diversified production			

4	Poor quality & shortage of raw materials			
5	Wastage of time, materials, etc			
6	Labor problems (shortage, low skill and less motivation)			
7	Poor management			
8	Poor inventory control system			
9	High lead times (production & order)			
10	Shortage of working capital			
11	Low demand for the products			
12	Poor layout of the facilities			
13	Low resource utilization			
14	Poor working conditions			

Other, please specify with its rates……

79. How do you rate the effect of the following factors on the performance of your company [put ✓ mark on the number that applies]? **Rating scale:**

Low Effect	**Medium Effect**	**High Effect**	**Most critical**
1	**2**	**3**	**4**

	Causes of poor performance				
1	**poor quality product**	1	2	3	4
	Defective raw material	1	2	3	4
	Low skills of workers	1	2	3	4
	Low quality awareness and quality tool application	1	2	3	4
	Low management commitment	1	2	3	4
2	**Low productivity**	1	2	3	4
	Machinery breakage	1	2	3	4
	Poor ergonomics and work method	1	2	3	4
	Layout (process layout, machinery layout, etc)	1	2	3	4
	Low workers skill, motivation and satisfaction	1	2	3	4
	Low material utilization due to rework, scrap and defects	1	2	3	4
3	**High production cost**	1	2	3	4
	Low capacity utilization	1	2	3	4
	Poor resource utilization (machine, labor, material, capital, energy, etc)	1	2	3	4
	Poor inventory control	1	2	3	4
4	**Low flexibility**	1	2	3	4
	Low skill of workers in product design & development	1	2	3	4
	Low flexibility on machinery and facility layout	1	2	3	4
	Low flexibility on product capacity	1	2	3	4
	Low flexibility on time to market	1	2	3	4
5	**High lead time (MLT, supply and delivery lead time)**	1	2	3	4
	Poor logistics, supply and delivery management	1	2	3	4
	Poor machinery and facility layout	1	2	3	4
	Poor ergonomics and work method	1	2	3	4
	Rework	1	2	3	4
	Machinery breakage	1	2	3	4

Note: MLT= Manufacturing Lead-Time

THANK YOU FOR RESPONDING ALL THE QUESTIONS!

Appendix B: Survey Results

Organizational information

1. Does the company set its goals and targets for its performance? Yes=100% No=0
2. Does the company establish its clear vision of the future for its performance? Yes=100% No=0
3. Does the company evaluate its performance activities regularly? Yes=91.7% No=8.3%
4. Does the company identify problems of performance improvement? Yes=100% No=0
5. Does the company have a training program? Yes=75% No=25%
6. Provide an average expenditure on training (as a percentage of total expenditure) in a year.

Average expenditure on training	Total	Percentages (%)
Less than 2%	3	33.3
2 – 4%	1	11.1
4 – 6%	2	22.2
6 – 8%	2	22.2
Greater than 8%	1	11.1

7. Does the company provide incentive based on performance for its operators? Yes=45.6% No=54.5%
8. The importance of performance measurement/evaluation for decision making in your company;
   □ Low=0 □ Moderate=76.9% □ High=23.1%
9. How often is the performance evaluation being reported?
   □Weekly=27.3% □ Monthly=18.2% □ Quarterly
   □ Twice a Year=36.4% □ Yearly=18.2%
10. Does your company use a financial performance measurement approach? Yes=50% No=50%
11. The degree of alignment & linkage between strategic performance measures and strategic goals;
    □ Low=20% □ Moderate=50% □ High=30%
12. The degree of integration between financial and non-financial measures in the firm is;
    □ Low=25% □ Moderate=75% □ High=0
13. Is your performance measurement/evaluation system computer-based? Yes=41.7% No=58.3%
14. Does your company have a plan to implement Balanced Scorecard? Yes=33.3% No=66.7%
15. What could be the strategy to improve performance of the firm in the future?
    □ Improve the networks with input suppliers=58.3%
    □ Expand total production capacity and invest in advance production technology=91.7%
    □ Computerize design & manufacturing, management, advertising & marketing=33.3%
    □ Diversify local sales into exports= 41.7%

General Trends of the company's financial performance

16. What are the sources of finance for your company?
    □ Own fund only=45.5% □ Own fund and local loan=36.4%
    □ Own fund and advanced payment=9.1% □ Local loan and advanced payment=9.1%
17. Does the company have working capital problems? Yes=77.8% No=22.2%
18. Does the organization have arrears in payment of bank loan or exceed overdraft limits?
    Yes=12.5% No=87.5%
19. Is the company's profit increasing for the last three years (2000, 2001, 2002 E.C)? Yes=75% No=25%
20. Has the company's market share increased for last three years (2000, 2001, 2002 E.C)?
    Yes=77.8% No=22.2%

Performance interpretation

	Disagree		Undecided		Agree	
	Frequency	%	Frequency	%	Frequency	%
Performance						
Efficiency and effectiveness			4	33.3	8	66.7
Wider in scope than productivity	3	25	4	33.3	5	41.7
Productivity						
Output per worker	1	8.3	2	16.7	9	75
Output per capital	2	16.7	6	50	4	33.3

Output per materials	1	8.3	8	66.7	3	25
Output per inputs of material, labor, capital, etc			4	33.3	8	66.7
Sales per employee	5	41.7	5	41.7	2	16.7
Jobs completed per jobs scheduled	1	8.3	3	25	8	66.7
Output per labor cost	2	16.7	6	50	4	33.3
Output per work hours	1	8.3	3	25	8	66.7

Performance measurement and improvement practices

A. Utilization of performance measures

S.No	Descriptive performance measures	Utilization rate			Total	Mean
		1	**2**	**3**		
1	**Financial Measures**					
	Total sales volume/growth	2	2	7	27	2.45
	Operating profit		4	7	29	2.64
	Return on asset/capital employed		3	8	30	2.73
	Return on investment	1	2	8	29	2.64
	Total	3	11	30	115	
	Mean	0.75	2.75	7.5	28.75	**2.61**
	Percentages (%)	6.82	25	68.18	25.25	
2	**Customer and Market Measures**					
	Increase in market share	1	3	7	28	2.55
	Reduction in customer complaint		4	7	29	2.64
	Increase customer retention/ acquisition	1	7	3	24	2.18
	Customer profitability	5	3	3	20	1.82
	Total	7	17	20	101	
	Mean	1.75	4.25	5		**2.29**
	Percentages	15.91	38.64	45.45		
3	**Internal Process/Operation Measures**					
	Improvement in product and service quality	1	3	7	28	2.55
	Reduction in manufacturing lead time (MLT)		7	4	26	2.36
	Reduction in operating costs	2	2	7	27	2.45
	Improvement in operating efficiency		6	5	27	2.45
	Machine down time availability	1	6	4	25	2.27
	Total	4	24	27	133	
	Mean	0.8	4.8	5.4	26.6	**2.42**
	Percentages	7.3	43.6	49.1		
4	**Employee Satisfaction Measures**					
	Employee complaint /satisfaction	1	8	2	23	2.09
	Employee retention /turnover/absenteeism	3	6	2	21	1.91
	Accidents and working environment	2	5	4	24	2.18
	Salary, incentive and reward	5	3	3	20	1.82
	Total	11	22	11	88	
	Mean	2.75	5.5	2.75		**2.0**
	Percentages	25	50	25		
5	**Training & Development Measures**					
	Training and education	2	5	4	24	2.18
	Skill & capacity development	1	4	6	27	2.45
	Qualification growths	1	5	5	26	2.36
	Innovation (new products, methods, ideas, etc)	1	5	5	26	2.36
	Total	5	19	20	103	
	Mean	1.25	4.75	5		**2.34**

	Percentages	11.4	43.2	45.4		
6	**Social and Environmental Measures**					
	Market stabilization	2	4	5	25	2.27
	Waste treatment & pollution control		6	5	27	2.45
	Cash outflow for social security	1	7	3	24	2.18
	Society complaint/satisfaction	1	5	5	26	2.36
	Total	4	22	18	102	
	Mean	1	5.5	4.5		**2.32**
	Percentages	9.1	50	40.9		
7	**Supplier Partnership Measures**					
	Material quality	1	6	4	25	2.27
	Delivery time		5	6	28	2.54
	Material cost	1	3	7	28	2.54
	Total	2	14	17	81	
	Mean	0.67	4.67	5.67		**2.45**
	Percentages	6.1	42.4	51.5		

B. Performance improvement

- **Performance key driver**

		Highly		Moderately		Rarely	
		Total	%	Total	%	Total	%
1	Investment in machinery and equipment	3	23.1	8	61.5	2	15.4
2	Education and training of employees	5	38.5	6	46.1	2	15.4
3	Planned utilization of raw materials	5	38.5	7	53.8	1	7.7
4	Innovation	1	7.7	9	69.2	3	23.1
5	Government spending and security	3	23.1	8	61.5	2	15.4

- **Performance improvement factors**

A. Productivity

21. Does the company have Productivity Improvement Program? Yes=100% No=0
22. Does the company determine its resource utilization rate? Yes=61.5% No=38.5%

Utilization rate

Resource utilization rate	**Labour**		**Material**		**Machine**		**Energy**		**Miscellaneous**	
	Total	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
Less than 15%	1	20			1	20	1	20	4	100
16– 30%	2	40			2	40	3	60		
31– 45%					2	40				
46 – 60%	2	40	3	60			1	20		
Greater than 60%			2	40						

23. Does the company identify and recognize the productivity problems? Yes=90.9% No=9.1%
24. Does the employees in the company aware about productivity improvement? Yes=81.8% No=18.2%
25. Do you think trial runs save time, save cost and minimize production errors and faults? Yes=81.8% No=18.2%

Labour productivity

26. Does the company measure labor productivity? Yes=83.3% No=16.7%
27. Are the company's work standards compared with both national & international standards?
    Yes=75% No=25%
28. What is the workers' absenteeism and labor turnover in your company?

Monthly Absenteeism (in number)	1-20 = 90.9%	21 – 50 = 9.1%	>51
Labor turnover/month (in number)	1- 10 = 70%	11-20 = 30%	>21

Machine productivity

29. What are the reasons of machine failure?
    □ Lack of preventive maintenance=90.9% □ Due to aging of machines/ equipments=63.6%
    □ Improper handling of machines=45.5%

30. Are machinery maintenance services available locally? Yes=83.3% No=16.7%
31. What is the lead time to obtain spare parts? Two weeks to a month = 37.5%
Two to four months = 37.5%
High and very high = 25%

- **Material productivity**

Table: Average percentage of production process as rework, scrap, and defects

Average percentage of production process	**Rework**		**Scrap**		**Defects**	
	Total	**%**	**Total**	**%**	**Total**	**%**
Less than 2%	2	28.6	2	28.6	1	14.3
3–10%	5	71.4	3	42.8	3	42.8
11–20%			1	14.3	1	14.3
21–30%					1	14.3
Greater than 30%			1	14.3	1	14.3

Table: Average partial percentage cost to total unit product cost

Partial percentage cost to total unit costs	Labour		Raw material		Accessories		Electricity, water, and others		Rent		Other expenses	
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
Less than 5%	2	28.6			1	20	2	28.6	2	66.7	4	66.7
5–10%	3	42.8			2	40	4	57.1			2	33.3
11–20%	2	28.6			2	40	1	14.3	1	33.3		
21–30%												
Greater than 30%			7	100								

- **Problems of not being fully operational:**

Table: Reasons for not being fully operational

S. No.	Type of reasons	**Low effect**		**Medium effect**		**High effect**	
		Frequency	%	Frequency	%	Frequency	%
1	Raw material shortage	3	25	3	25	6	50
2	Shortage of spare parts	6	50	2	16.7	4	33.3
3	Lack of market	5	41.7	4	33.3	3	25
4	Working capital shortage	4	33.3	5	41.7	3	25
5	Frequent machinery breakage	5	41.7	6	50	1	8.3
6	Government rules and regulation	4	36.4	6	54.5	1	9.1

B. Quality

32. Quality awareness level in the company is: □ Low □ Moderate = 61.5% □ High = 38.5%
33. Employee participation in quality activities is: □ Low □ Moderate = 92.3% □ High = 7.7%
34. Does the company calculate the cost of quality? Yes=90% No=10%
35. Does the company recognize and solve the quality related problems? Yes=84.6% No=15.4%
36. Does the company identified customer requirements? Yes=100% No=0
37. Are objectives of the company linked to customer needs and expectations? Yes=81.8% No=18.2%
38. Does the company have a procedure for evaluating subcontractors or suppliers? Yes=50% No=50%
39. Are there inspection & tests for incoming, in-process and final products? Yes=91.7% No=8.3%
40. Does the company have quality management system? Yes=18.2% No=81.8%

C. Quality of work life

41. Do you have the right material handling equipments? Yes=75% No=25%
42. What preventive methods do you apply to avoid accidents/ risks?
    - By giving awareness about the accident and protective materials for workers, and using safety devices on each machine.
43. Is the physical working environment suitable for workers? Yes=83..3% No=16.7%

D. Inventory management

44. Access to the raw materials is:

□ locally purchased=50% □ locally purchased and imported=25%
□ locally purchased and partially imported=8.3% □ Partially Imported=16.7%

45. How is a raw material purchase done if it imported from abroad?
□ Directly from export customer=77.8% □ Through agent/sourcing office=44.4% □ Subcontractor=0

46. If raw materials locally supplied then, what are the problems with local inputs?
□ Lack of inputs/ raw materials=50% □ Inferior quality=50%
□ Problem with reliability=12.5% □ High cost of inputs relative to imported=12.5%

47. If the inputs are fully or partially imported then, what are the problems with importing process?
□ Delay in clearing goods through customs=70% □ Duty exemption is not recognized=10%
□ Reliability on foreign suppliers is problematic=0 □ High cost of inputs=60% □ Minimum order size=10%

48. Are you purchasing raw materials in economical quantities? Yes=100% No=0

49. How the Company ensure the quality of goods (raw materials) from your suppliers?
□ Inspection=84.6% □ Auditing=0
□ ISO certification=7.7% □ Performance measurement=7.7%

50. Have you arranged cost effective delivery? Yes=90% No=10%

51. Does the company have an inventory control system to ensure ideal stock levels (no overstocks or out of stocks)? Yes=91.7% No=8.3%

52. Do you have systems and records in place (electronic or manual) to track the number and cost of stock purchased, sold and on hand? Yes=83.3% No=16.7%

53. Are your records checked against a physical stock take regularly? Yes=83.3% No=16.7%

E. Product development/innovation

54. Does the company have product design and development department? Yes=81.8% No=18.2%

55. How many new products has your company introduced in the last three years? Many new products developed

56. Does the company production system flexible in handling different volume of production and delivery time adjustments? Yes=100% No=0

57. How trained is the staff for effective design change? □ Low = 8.3% □ Moderate = 75% □ High = 16.7%

58. Does the company consider the customer requirements in the product design? Yes=100% No=0

59. How is the degree of computerization of the organization production and distribution functions?
□ Low = 16.7% □ Moderate = 83.3% □ High

60. Has your company undertaken any of the following initiatives in the last three years?
 Developed a major new product line=63.6%
 Agreed a new joint venture with foreign partner=18.2%
 Upgraded an existing product line=54.5%
 Obtained a new licensing agreement=0
 Discontinued at least one product (not produced) line=36.4%
 Closed at least one existing plant or outlet=0
 Outsourced a major production activity that was previously conducted in-house=18.2%
 Brought in-house of a major production activity that was previously outsourced=9.1%
 Introduced new technology on the way that the main product is produced=63.6%

- **Problem of performance improvement**

S.No	**Factors**	**No obstacle**		**Moderate obstacle**		**Major obstacle**	
		Frequency	%	Frequency	%	Frequency	%
1	High production cost	3	25	4	33.3	5	41.7
2	Old technology	7	58.3	4	33.3	1	8.3
3	Less diversified production	4	33.3	8	66.7		
4	Poor quality & shortage of raw materials	1	8.3	6	50	5	41.7
5	Wastage of time, materials, etc	7	58.3	5	41.7		
6	Labor problems	8	66.6	2	16.7	2	16.7
7	Poor management	5	41.7	5	41.7	2	16.7
8	Poor inventory control system	5	41.7	7	58.3		
9	High lead times (production & order)	4	33.3	8	66.7		

10	Shortage of working capital	3	27.3	2	18.2	6	54.5
11	Low demand for the products	8	66.7	4	33.3		
12	Poor layout of the facilities	8	66.7	4	33.3		
13	Low resource utilization	6	50	6	50		
14	Poor working conditions	6	50	6	50		

- **Causes of poor performance**

S. No.	**Causes of poor performance**	**Rate**				**Total**	**Mean**
		1	**2**	**3**	**4**		
1	**poor quality product**						
	Defective raw material		1	4	4	30	3.33
	Low skills of workers	1	4	4		21	2.33
	Low quality awareness and quality tool application		5	3		19	2.4
	Low management commitment	1	3	3	1	20	2.5
	Total	2	13	14	5	90	
	Mean	0.5	3.25	3.5	1.25		**2.65**
	Percentages	**5.9**	**38.2**	**41.2**	**14.7**		
2	**Low productivity**						
	Machinery breakage	3	3	3		18	2.0
	Poor ergonomics and work method	3	6			15	1.67
	Layout (process layout, machinery layout, etc)	4	4	1		15	1.67
	Low workers skill, motivation and satisfaction	4	4	1		15	1.67
	Low material utilization due to rework, scrap and defects	3	4	2		17	1.89
	Total	17	21	7	0	80	
	Mean	3.4	4.2	1.4	0		**1.78**
	Percentages	**37.8**	**46.7**	**15.5**			
3	**High production cost**						
	Low capacity utilization	1	4	4		21	2.33
	Poor resource utilization	1	5	3		20	2.22
	Poor inventory control	3	5	1		16	1.78
	Total	5	14	8	0	57	
	Mean	1.67	4.67	2.67			**2.11**
	Percentages	**18.5**	**51.9**	**29.6**			
4	**Low flexibility**						
	Low skill of workers in product design & development	1	6	2		19	2.11
	Low flexibility on machinery and facility layout	1	6	2		19	2.11
	Low flexibility on product capacity	1	8			17	1.89
	Low flexibility on time to market	2	5	2		18	2.0
	Total	5	25	6	0	73	
	Mean	1.25	6.25	1.5	0		**2.03**
	Percentages	**13.9**	**69.4**	**16.7**			
5	**High lead time**						
	Poor logistics, supply and delivery management	1	5	3		20	2.22
	Poor machinery and facility layout	1	7	1		18	2.0
	Poor ergonomics and work method	2	6	1		17	1.89
	Rework	4	4	1		15	1.67
	Machinery breakage	2	4	2	1	20	2.22
	Total	10	26	8	1	90	
	Mean	2.0	5.2	1.6	0.2		**2.0**
	Percentages	**22.2**	**57.8**	**17.8**	**2.2**		

Appendix C: Case Results

Table: Summary of company's' financial performance in ETH Birr

	1997 E.C	**1998 E.C**	**1999 E.C**	**2000 E.C**	**2001 E.C**
Hide Product Total Sales	32,570,834	36,750,324	37,844,372	40,427,394	39,127,161
Skin Product Total Sales	32,659,037	36,880,776	38,028,578	44,390,096	46,939,972
Local Sales for skin product	23,386,082	27,675,725	27,212,385	32,887,123	39,550,982
Foreign Sales for skin product	9,272,953	9,205,051	10,815,793	11,502,973	7,388,990

Table: Summary of actual output in Square feet

Type of product	**1997E.C**	**1998E.C**	**1999E.C**	**2000E.C**	**2001E.C**
Hide product	5,427,419	5,557,044	4,689,354	4,032,648	3,105,512
Skin product	5,461,198	5,601,287	4,736,357	4,799,753	4,345,182

Table: Performance gap on machine productivity

Section	**Machine**	**Capacity / Benchmark** • Cow -(Sides/hr) • Skins – (pcs/hr)	**Actual Rate** • Cow -(Sides/hr) • Skins – (pcs/hr)
Beamhouse	Lime splitting	180	Not used
	Fleshing machine Investa	240	80
	Fleshing machine Gozzini	240	180
	Fleshing machine Rizzi	240	120
	Fleshing machine RM (Skins)	500	425
Tanyard (Tanning)	Sammying Mercier	300	250
	Splitting (Turner)	160	160
	Splitting (Moineous)	160	160
	Shaving (Rizzi)	90	84
	Shaving (Aletti)	90	84
Crust Preparation	Setting out (Investa)	180	160
	Setting out (Investa)	180	160
	Vaccum Drying (Incoma)	200	190
	Vaccum Drying (Gozzini) - skins	240	200
	Staking (Mollisa)	180	160
	Staking (Bajjio)	180	140
Finishing	Buffing (Turner)	300	200
	Buffing (Aletti)	180	130
	De-dusting (Rizzi)	300	240
	Roller coating (Incoma)	300	300
	Ironing (Investa)	160	140
	Ironing (Investa)	160	140
	Autospray (Frateli)	300	300
	Measuring machine	600	500

Appendix D: International benchmark

Performance indicators	Dimension	International benchmark (=100%)
A. Production 1. Weight category	Kg/hide Ft^2/hide	25-30Kg $43ft^2$
2. Soaking input	Tone/day	7.5-10tons 300-350pcs
3. Output/day	Ft^2/Kg	20300
4. Yield	Ft^2/day/production worker	2
5. Productivity	Ft^2/day/production worker	270
6. Water consumption	M^3/day M^3/tone of hide	<250 <25
7. Rework, claims	%	- internal up to 5% - external up to 2%
B. Production cost 1. Material cost	% 	50-70
2. Chemical cost	%	10
3. Labour cost	%	7-15
4. Energy cost	%	3
5. Environmental protection cost	%	2-5
C. Effluent treatment 1. Effluent treatment capacity	Hrs/day	20hrs/day
2. Solid waste	Tone/day	0.5 cca
3. Factory compound	-	<0.6

Source: Documents from LIDI