Multi-criteria Performance Measurement Model Development for Ethiopian Manufacturing Enterprises

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Abstract

To be competent as a world-class manufacturer, manufacturing organizations need to have a number of critical ingredients: one such ingredient is that of an appropriate performance measurement system. Measurement systems incorporating financial and non-financial measures have been a topic of considerable interest to both business practitioners and academics for most of the 1990s. The main focus of this research thesis is to formulate a multi-criteria performance measurement model that comprises critical both tangible & intangible measures.

This research paper reviews worldwide researches that address the correlation between applying appropriate performance measures, and their impacts on strategic performance outcomes. The research has been conducted in a sample of 28 Ethiopian manufacturing enterprises. The vital financial results of these surveyed companies are compared to the international industry benchmarks. The extent of utilization of financial & non-financial measures in strategic planning and organizational performance evaluation is also studied.

The results from this research study assure that one of the major constraints for performance degradation in selected companies is the lack of proper performance measurement systems and strategies. The negative impact of traditional performance measures and operation strategies on improvement of business results is clearly determined. Depending upon the research findings, a MCPM model with its implementation steps is recommended as a solution using the need assessments from participant enterprises.

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List of abbreviations

ABC	Activity Based Costing
AISBSC	Advanced Information Service Scorecard
ASPHT	Akakaki Spare Parts And Hand Tools
BITSC	Balanced Information Technology Scorecard
BPR	Business Process Re-Engineering
BSC	Balanced Scorecard
ECCMI	Ethiopian Crown Cork & Can Manufacturing Industry
EFQM	European Foundation for Quality Management
JIT	Just-In-Time
KPI	Key Performance Indicators
MBNQA	Malcolm Baldridge National Quality Award
MCPM	Multi-Criteria Performance Measurement
MDG	Millennium Development Goal
PM	Performance Measure
PMS	Performance Measurement System
PPESA	Privatization & Public Enterprises Supervising Agency
ROA	Return On Asset
ROCE	Return On Capital Employed
SMART	Strategic Measuring And Reporting Technique
TQM	Total Quality Management
UNIDO	United Nations International Development Organization

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Problem

During the last few decades, organizations all over the world have made several changes to gain and sustain competitive advantages in global markets. To withstand the challenges, they 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 an organization's performance both internally and externally within its respective market target & also rethinking of performance management system through effective performance measurement [17].

But, Sub-Saharan African manufacturing firms (including Ethiopia), to be internationally competitive, either their existing firms will have to experience a prolonged period of productivity growth, or new firms will have to replace them. If possible it is desirable to raise the productivity of the existing firms rather than write them off to achieve the Millennium Developing Goal (MDG) in the manufacturing sectors by taking rational & radical actions to improve the productivity & performance of the existing firms [16]. In addition, an overview performance of Ethiopian manufacturing enterprises during the last few years has been declined and was unstable. This is because Ethiopian manufacturing sector is faced with serious problems like inadequate policies & strategies for industrial development, and insufficient provisions to encourage growth and improving the level of performance of domestic industry [23].

Therefore, one of the techniques that must be taken into consideration is performance management using valuable measurement systems. In performance management process a company manages its performance

with its corporate & functional strategies and objectives. The vital merit of this process is to provide a proactive closed loop-control system, where the corporate and functional strategies are deployed to all business processes, activities, tasks & personnel. Feedback is also obtained through an effective & efficient performance measurement system.

From these concepts, it can be said that: "performance measurement system is the heart of performance management process and managerial decision for the company's performance improvement" [6]. Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it; you can't improve it [19]. Performance measures are the lifeblood of organizations, since without them no decisions can be made [29].

There is a criticism that traditional performance measurement systems rely solely on a single measure mainly on financial measures such as profit, return on investment, sales per employee, efficiency and so on. It has been observed that exclusive reliance on these financial indicators in management system promoted short-term behavior. This is short-term focus, where long-term value creation was sacrificed to short-term performance was causing organizations to neglect long–term viability issues [8]. According to Neely (1999) in today's business environment, where organizations compete on the basis of non-financial factors, they need information on how they are performing across a broader spectrum of dimensions not only financial but also operational [26].

A recent survey, for example, found that "72 % of business leaders agree that a successful business will better serve its shareholders by focusing on the needs of its customers, employees, suppliers and the wider community"[25]. Similarly, a survey conducted by Lingle and Schiemann (1996) found that: "organizations which are tops in their industry, stellar

financial performers and adept change leaders, distinguish themselves by the following characteristics: having agreed-upon measures that managers understand; balancing financial and non-financial measurement; linking strategic measures to operational ones; updating their strategic scorecard regularly; and clearly communicating measures and progress to all employees" [26].

As the performance measurement practice of Ethiopian manufacturing enterprises is taken into consideration, they are victims of fundamental problems since they are not following the above measurement strategies and principles. All the above writers have told us that thinking towards improvement without setting appropriate performance measurement system is a nightmare that leads to wrong decision.

Hence one can state that: "although performance measurement is a critical part of decision-making and performance improvement, Ethiopian manufacturing enterprises do not measure their performance in an effective & efficient manner." Given the relationship between performance measurement (independent variable) and performance improvement (dependent variable), it is indispensable that companies to develop and implement a multi-dimensional performance measurement system. This is because the traditional existing measurement system is lacking in linking & alignment with the company's vision, mission & strategic objectives. Furthermore, it does not embrace critical financial & non-financial measures according to the needs of critical stakeholders.

The final outcome of the wrong decisions reflects on the overall business performance of the firms like low sales growth-rate, profitability, customer satisfaction, employee satisfaction, social responsibility and so on [25]. Depending on these facts and theories of performance measures, the researcher's thesis argument is that: "measuring performance in multiple dimensions improves the long-run business performance of

Ethiopian manufacturing enterprises. This is performed by identifying the leading and lagging performance indicators; focusing on a few critical performance indicators; and linking a few critical performance indicators with their strategic objectives."

It seems that this fact is taken into consideration, the reason why at the moment Ethiopian government is forcing public companies to replace the existing finance-based traditional performance measurement and evaluation system [11]. Therefore, it is the right time conducting a research in Ethiopian enterprises to develop reliable & sustainable performance measurement model based on the existing problems.

1.2 General Objective of the Thesis

The purpose of this thesis is to develop a multi-criteria and balanced performance measurement model that helps to make appropriate decision towards performance improvement for Ethiopian manufacturing industries.

1.3 Specific Objectives of the Thesis

The specific objectives of this thesis are to:

1. Assess the current business output and performance measurement practices of the enterprises;
2. Analyze the negative impact of traditional performance measurement systems on companies' overall business results;
3. Indicate how companies can measure their performance in a multi-dimensional financial & non-financial performance factors; and
4. Indicate how the proposed multi-criteria performance measurement model improves the company's decision-making process and business outcomes.

1.3 Significance of the Thesis

The final output of this research paper is a multi-criteria and balanced performance measurement model for Ethiopian manufacturing enterprises. And its long-range outcome is to lead the companies to make best decision for their future business performance improvement both in short and long-range.

Beneficiaries of the results of this research work are:

1. Managers and owners of all Ethiopian manufacturing enterprises can use this tool to assess and measure their performance with an integration of financial and non-financial indicators;
2. Government bodies can utilize to control the performance of state-owned manufacturing companies and to award companies "in-best-class" in their business performance;
3. Finally, it may be applicable to service providing industries using some modifications.

1.4 Scopes and Limitations of the Thesis

The scope of this research work is limited to selected Ethiopian manufacturing industries.

1.5 Structure of the Thesis

The thesis is sub-divided into five chapters. Each chapter of the thesis illustrates different aspects of the research work. These are outlined as follows:

Chapter One: Introduction of the thesis.
It introduces background of the problem, purpose & objectives of the research, significance of the thesis, and its scopes and limitations.

Chapter Two: Review of the literature.
This part of the thesis briefly discusses:

- The basic concepts of performance measurement;

- The performance measurement models and frameworks that have been investigated by different researchers with their merits & drawbacks; and
- Performance measurement revolutions and its state-of-the-art.

Chapter Three: Research Methodology.

The research approaches, research strategies and quality of research design are described in this chapter.

Chapter Four: Data Analysis and Result Discussions.

This chapter includes:

- Analysis of companies' current financial performance;
- Performance measurement/ evaluation practices;
- Relation between two variables (performance measurement exercises and business outputs);
- Multi-criteria performance measurement model development; and
- Comparison between the traditional performance measurement technique and the proposed one.

Chapter Five: Conclusions, Recommendations and Future Research Directions

CHAPTER TWO

2. REVIEW OF LITRETURE

2.1 Introduction

As it has been aforementioned in the previous chapter, much has been written on the subject matter of performance measurement, is the premise that performance measurement systems are burning issues that must be researched to ensure competitiveness.

This chapter starts with brief discussion of the various concepts of performance measurement like the reasons for measurement and different characteristics of an effective & efficient performance measures. It also reviews variety of measurement models and frameworks that have been investigated by different researchers starting from traditional finance-based DuPont pyramids to widely accepted balanced & multi-criteria frameworks. The advantages and drawbacks of each measurement model/ framework are also described in brief.

2.2 Basic Concepts of Performance Measurement

Lord Kelvin, a renowned British physicist, is reputed to have said:
"When you can measure what you are speaking about, and express it in numbers, you will know something about it…[otherwise] your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in thought advanced to the stage of science"[25,34]. This quote is popular in measurement circles, because it makes clear the main reasons why performance is measured in organizations. Neely (1995) described performance measurement as the process of quantifying action, where measurement is the process of quantification and action correlates with performance. He further proposed that performance should be defined as the efficiency and effectiveness of action, which leads to the following definitions [14,26,27].

1. Performance measurement is defined as the process of quantifying the efficiency and effectiveness of action;
2. A performance measure is defined as a metric used to quantify the efficiency and/ or effectiveness of an action; and
3. Performance measurement system is defined as the set of metrics used to quantify the efficiency and effectiveness of an action.

2.2.1 Reasons for Performance Measurement

Vital of reasons for measuring performance can be classified in to the following categories [4,15,25]:

1. Strategy formulation;
2. Manage the strategy implementation process;
3. Challenge assumptions (this is by focusing not only on the implementation of an intended strategy but also on making sure that its content is still valid);
4. Check position;
5. Comply with the non-negotiable parameters to survive like legal requirements, environmental parameters, etc.);
6. Communicate directions to the employees;
7. Communication with external stakeholders;
8. Provide feedback;
9. Evaluate and reward behavior;
10. Benchmark the "best practices" of performance;
11. Inform managerial decision-making processes; and
12. Encourage improvement and learning.

2.2.2 Characteristics of an Effective and Efficient Performance Measures

Performance measurement systems have to fulfill the following characteristics to be an effective and efficient for business improvement [4, 14,27, 29,34,37].

1. **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 over time and some performance measures must change too. Therefore there is a need for flexibility in the performance measurement systems.
2. **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.
3. **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.
4. **Be easily accessible:** a one of measurement system's goal 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.
5. **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.
6. **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. Skinner (1986) termed this phenomenon the "productivity paradox". Measurement systems must therefore 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.

7. **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.
8. **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.
9. **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.
10. **Motivate employees:** performance measures should indicate the role of evaluating and rewarding behaviors, and encouraging improvement and learning.

2.3 Trends in Performance Measurement Development

Throughout history, performance measures have been used to assess the success of organizations. To achieve sustainable business success in the demanding world marketplace, a company must use relevant performance measures. By the start of the twentieth century, the nature of organizations had evolved and ownership & management were increasingly separated. As a result, measures of return on investment were applied so that owners could monitor the performance that managers were achieving [18]. Some of performance measurement models/ frameworks, which have been developed by different researchers with their advancements and limitations, are described in next section of the literature survey.

2.3.1 Finance Based Performance Measures

Traditional performance measurement systems go back along way in their origin and applications. It is thought, for instance, that the double entry bookkeeping was first used in Venice around the fourteenth century [38]. Some of financed based measurement systems are:

1. DuPont's Pyramid

In 1903, three DuPont cousins consolidated their small enterprises with many other small single-unit family firms. They then completely reorganized the American explosives industry and installed an organizational structure that incorporated the "best practice" of the day. The highly rational managers at DuPont continued to perfect these techniques, so that by 1910 that company was employing nearly all the basic methods that are currently used in managing big business [26,32].

2. Costs and Accounting Management

The common means of monitoring business performance in today's industry is based on cost and management accounting practices. These techniques were developed in the late nineteenth and early twentieth centuries to meet the needs of expanding manufacturing industries. By the 1930s, fully integrated cost and management accounting systems were developed, regulated, subjected to independent auditing and linked to external financial operating systems. But, Johnson & Kaplan argued that: "today's management accounting information driven by the procedures and cycles of the organizations reporting system are too late, aggregated, and distorted to be relevant for managers' planning and control decisions." McNair [1992] also added "managers need clear, timely, and relevant signals from their internal information systems to understand root causes or problems, to initiate correction actions & to support decisions at all levels of the organization" [38].

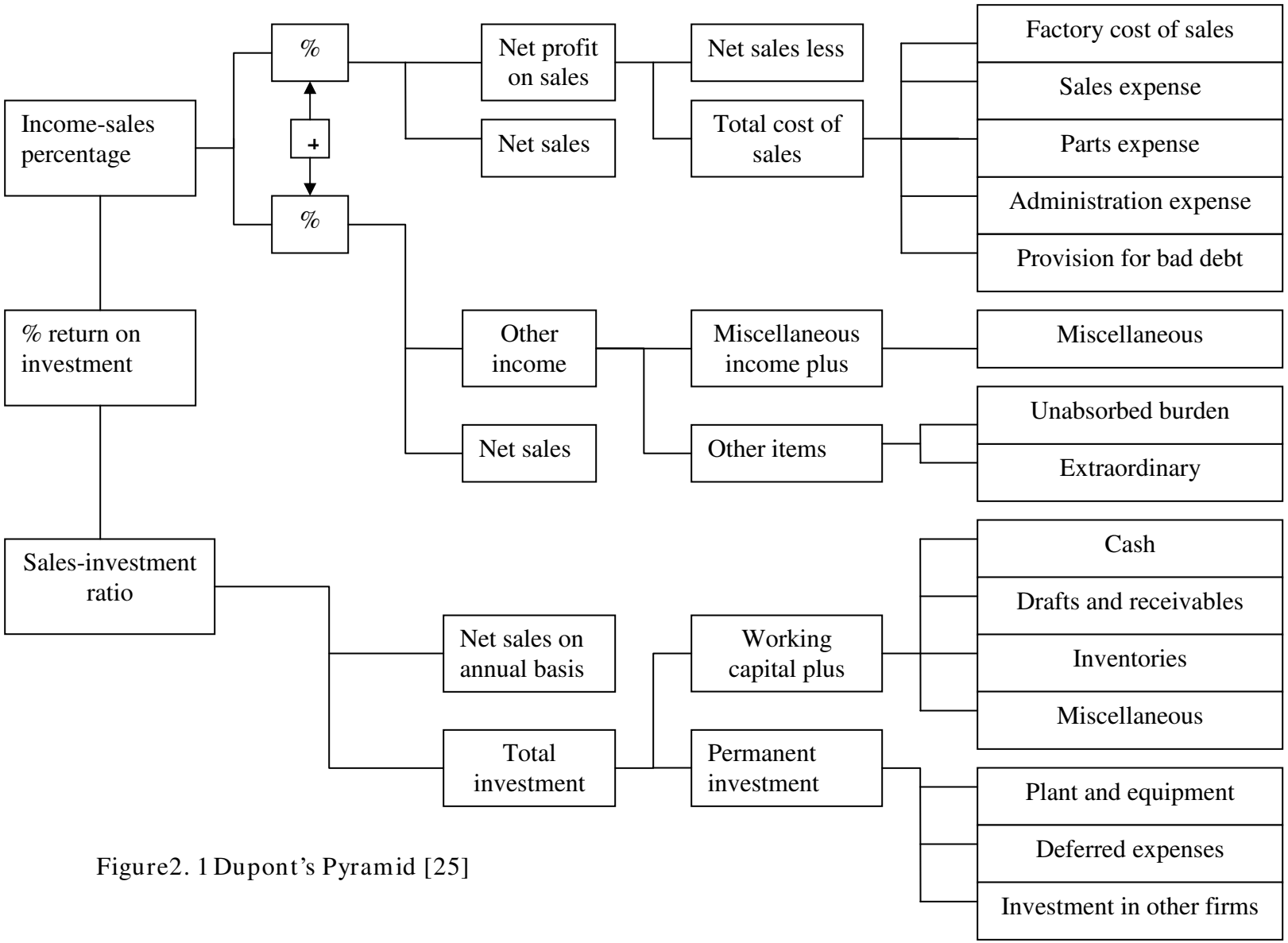


Figure2. 1 Dupont's Pyramid [25]

Hence, applying performance measures that solely consist of financial performance measures cause problems for a company to make proper decisions.

3. Activity-Based Costing (ABC)

The usefulness of those cost accounting systems has been questioned by several authors in guiding a company towards strategic competitive decisions, especially related to manufacturing [36]. Following the First World War, companies such as Sears Roebuck and General Motors were starting to use sophisticated budgeting and management accounting techniques. The DuPont pyramid's drawbacks were indicated by such studies, as its cost analysis relates to the past and fails to indicate future performance, thus encouraging short-term measures. The post-war phase saw a paradigm shift in organizations from only financial measures to both financial and non-financial measures in their objectives and performance measures [32].

A new approach to cost accounting, known as activity-based costing (ABC), was developed by Johnson and Kaplan (1987) in the late 1980s as an attempt to resolve some of the fundamental inadequacies of traditional cost accounting. ABC is concerned with both direct & indirect cost of activities within a company and their relationships to the manufacture of specific products rather than to basic functional areas. In this way, it is believed that ABC results in a more accurate identification of costs than traditional cost allocation [34]. However, there are researchers who argued that ABC provides more accurate product costs has never been proved. More importantly, an improved cost accounting system will not entirely solve the problem with financial measures. Other measures rather than costs are needed to adequately gauge manufacturing performance relative to a competitive strategy [29].

2.3.2 Limitations of Traditional Performance Measures

By the 1980s there was a growing realization that the traditional performance measures were no longer sufficient to manage organizations competing in modern markets. In recent years, enormous changes have been taken place in technology and production techniques that have made management accounting systems no longer useful [21,25]. These out-of-date techniques are at best irrelevant and at worst positively harmful [8]. Numerous researchers have exposed limitations of these traditional approaches. These limitations could be summarized as [2,5,14,26,28,36,37]:

- 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, like delayed capital investment;
- 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 than 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.

2.3.3 Multi-dimensional Performance Measures

Traditional performance measurement systems (based on financial measures) have failed to identify and integrate all those factors critical in contributing business excellence as mentioned before. During the last twenty years a number of performance measurement frameworks (multiple dimensional) have been developed in academics and business environments to overcome the drawbacks of traditional measures. Internationally well-known models/ frameworks are identified and described in this section.

A. Sink and Tuttle Model

A classical approach to a performance measurement system is the Sink and Tuttle model, which claims that the performance of an organization is a complex interrelationship between seven performance criteria. These criteria are effectiveness, efficiency, product/ service quality, productivity, quality of work-life, innovation and profitability [33]. Although much has changed in industry since this model was first introduced, these seven performance criteria are still important. However, the model has several major limitations. For example, it does not consider the need for flexibility, which has increased markedly during the last few decades. The model is also limited by the fact that it does not consider the customer perspective [34].

B. Performance Measurement Matrix

A performance measurement matrix reflecting the need for a balanced measurement is proposed by Keegan (1989), who categorized the measures as cost or non-cost, and external or internal, thus reflecting a greater balance of measures. This framework allows the organizations to plot their measures and identify the need for adjustment with measurement focus. But its drawback is that this simple framework does

not reflect all attributes of measures, yet could accommodate any measures of performance [27].

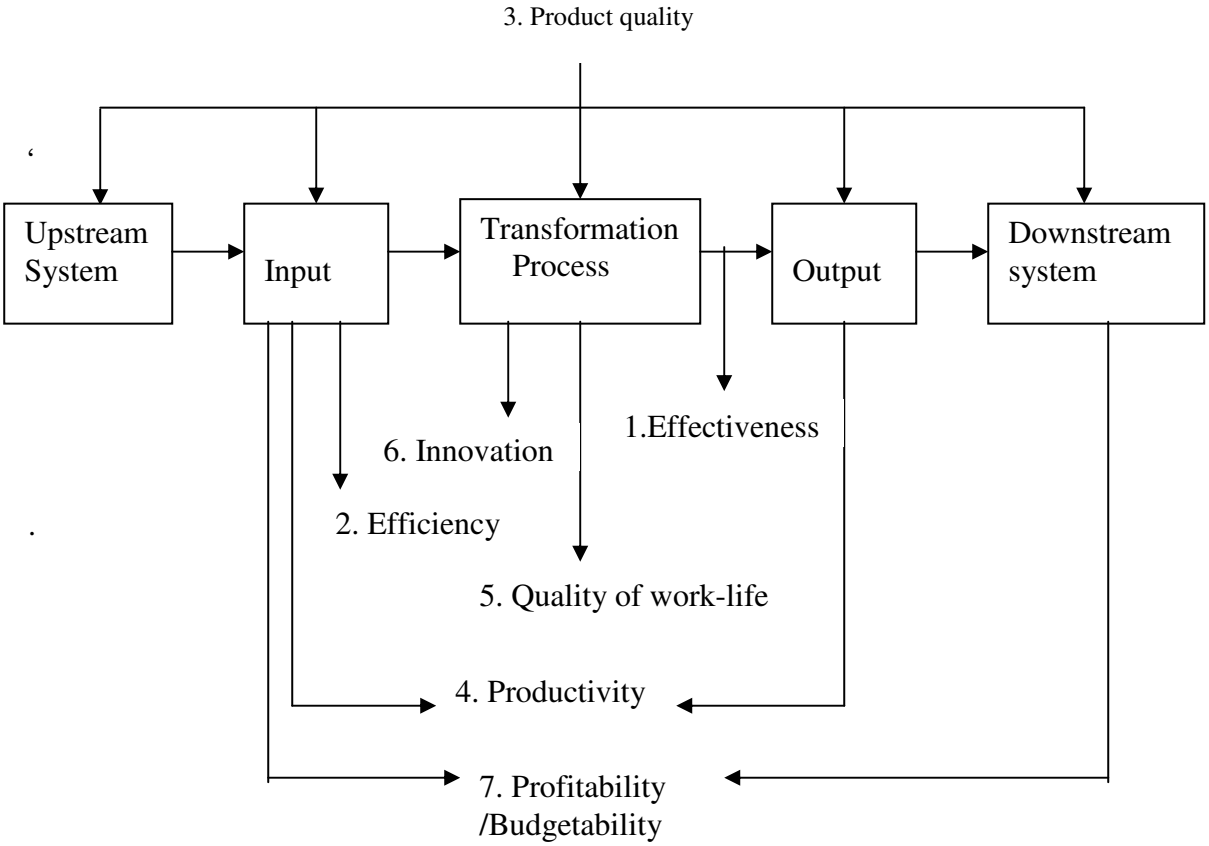


Figure2. 1 Sink and Tuttle model [21]

C. SMART Pyramid

The strategic measurement and reporting technique (SMART) pyramid was developed by Lynch and Cross (1991). It facilitates the need for inclusion of measures that are focused internally and externally. The purpose of this performance pyramid is to link an organization's strategy with its operations by translating objectives from the top to down (based on customer priorities) and measures & outcomes from bottom to up. This performance measurement system includes four levels of objectives that address the organization's external effectiveness (left side of the pyramid) and its internal efficiency (right side of the pyramid) as indicated on figure 2.3. [34]. Ghalayini (1997) suggest that the main

strength of the performance pyramid is its attempt to integrate corporate objectives with operational performance indicators. However, this approach does not provide any mechanism to identify key performance indicators, nor does it explicitly integrate the concept of continuous improvement [13].

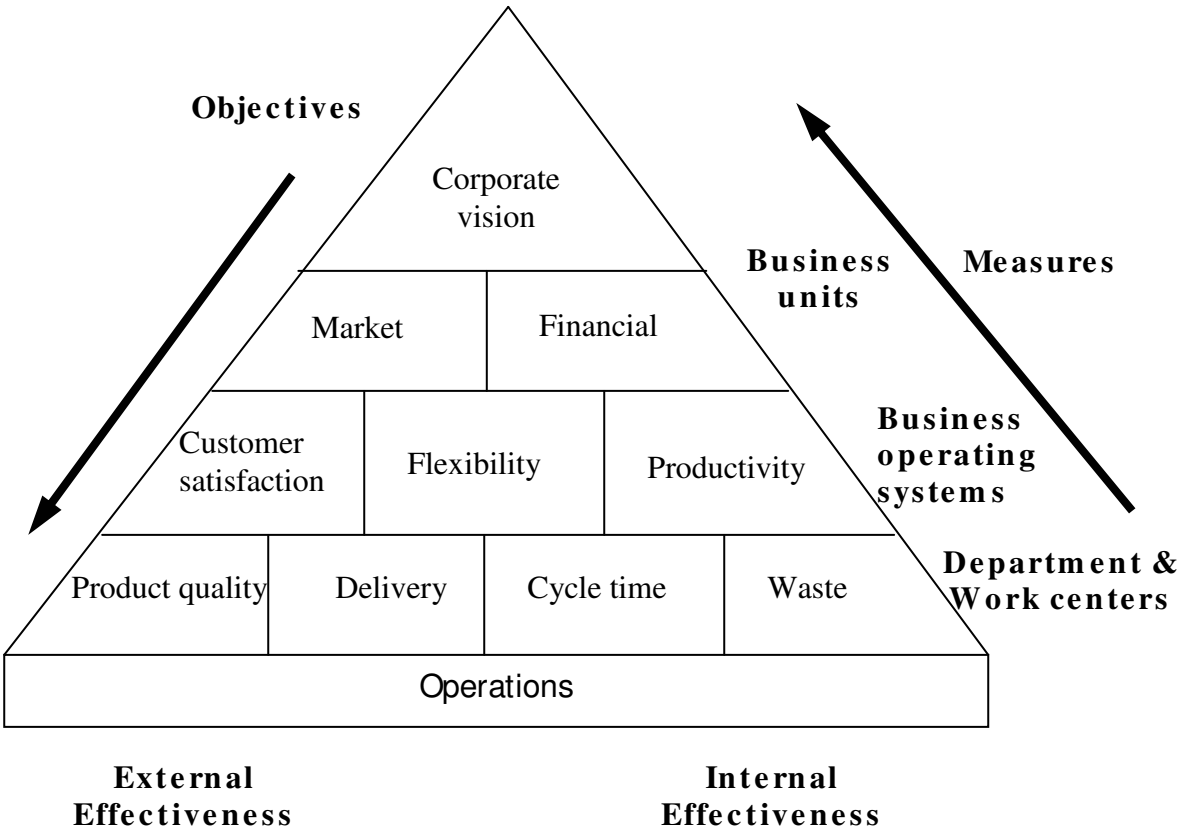


Figure2. 2 SMART pyramid [34]

D. Medori & Steeple Integrated Framework

Medori and Steeple (2000) present an integrated framework for auditing and enhancing performance measurement systems. This approach consists of six detailed described stages. Similar to most frameworks, the starting point begins with defining the company's manufacturing strategy and success factors (stage 1). In the next stage, the primary task is to match the company's strategic requirements with six defined competitive priorities (e.g. product quality, cost, flexibility, time, delivery and future growth; stage 2). Then, the selection of the most suitable measures takes

place by the use of a checklist that contains 105 measures with full descriptions (stage 3). After the selection of measures, the existing performance measurement system is audited to identify which existing measures will be kept (stage 4). An essential activity is the actual implementation of the measures in which each measure is described by eight elements: title, objective, benchmark, equation, frequency, data source, responsibility and improvement (stage 5). The last stage is based around the periodic review of the company's performance measurement system (stage 6) [22]. A major advantage is that it can be used both to design a new performance measurement system and to enhance an existing one. It also contains a unique description of how performance measures should be realized. Its limitations are mainly located in stage 2, where a performance measurement grid is created in order to give the performance measurement system and its basic design. Little guidance is given here, and the grid is only constructed from six competitive priorities only [34].

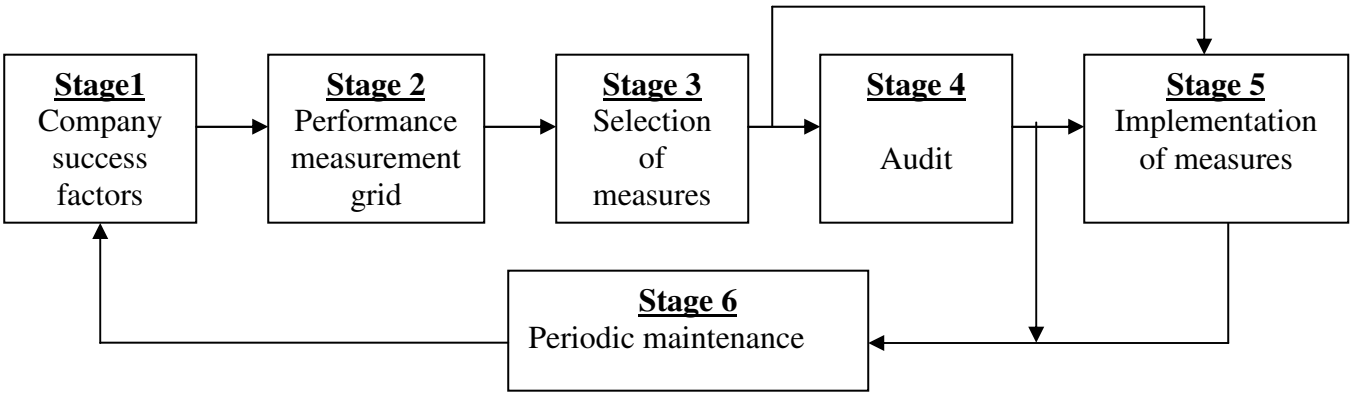


Figure2. 3 Medori & Steeple integrated framework [22]

E. Performance Prism

One of the more recently developed conceptual frameworks is the performance prism, which suggests that a performance measurement system should be organized around five distinct but linked perspectives of performance such as [19, 32, 34]:

1. Stakeholder Satisfaction: who are our key stakeholders and what do they want and need?
2. Stakeholder Contribution: what do we want and need from our stakeholders on a reciprocal basis?
3. Strategies: what strategies do we need to put in place to satisfy these twin sets of wants and needs?
4. Processes: what processes do we need to put in place to enable us to execute our strategies?
5. Capabilities: what capabilities do we need to put in place to allow us to operate and improve these processes?

The performance prism has a much more comprehensive view of different stakeholders than other frameworks. Neely (2000) argued that it is not possible to form a proper strategy before the stakeholders and their needs have been clearly identified [34].

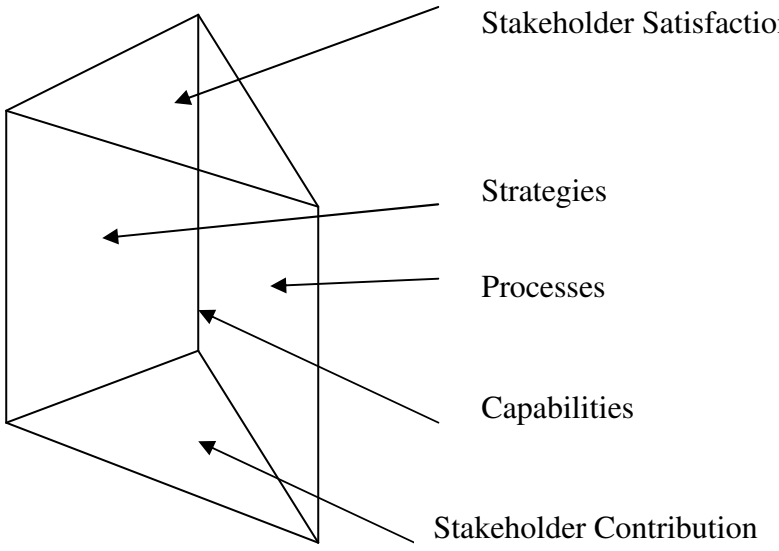


Figure2. 4 Performance prism [19,34]

The strength of this conceptual framework is that it first questions the company's existing strategy before the process of selecting measures is started. In this way, the framework ensures that the performance measures have a strong foundation. The performance prism also

considers new stakeholders (such as employees, suppliers, alliance partners or intermediaries) who are usually neglected when forming performance measures. However, although the performance prism extends beyond "traditional" performance measurement, it offers little about how the performance measures are going to be realized. Another weakness, which also applies to the frameworks described previously, is that little or no consideration is given to the existing performance measurement systems that companies may have in place.

2.3.4 Self-Assessment Frameworks

The other two popular self-assessment frameworks are Malcolm Baldridge National Quality Award (MBNQA) and the European Foundation for Quality Management's (EFQM) Business Excellence Model. The MBNQA was established by the US congress in 1997 to raise the awareness about quality and to boost up performance of American business organizations [38]. Based on the 1999 award examination criteria, there are nineteen critical factors covering seven key areas.

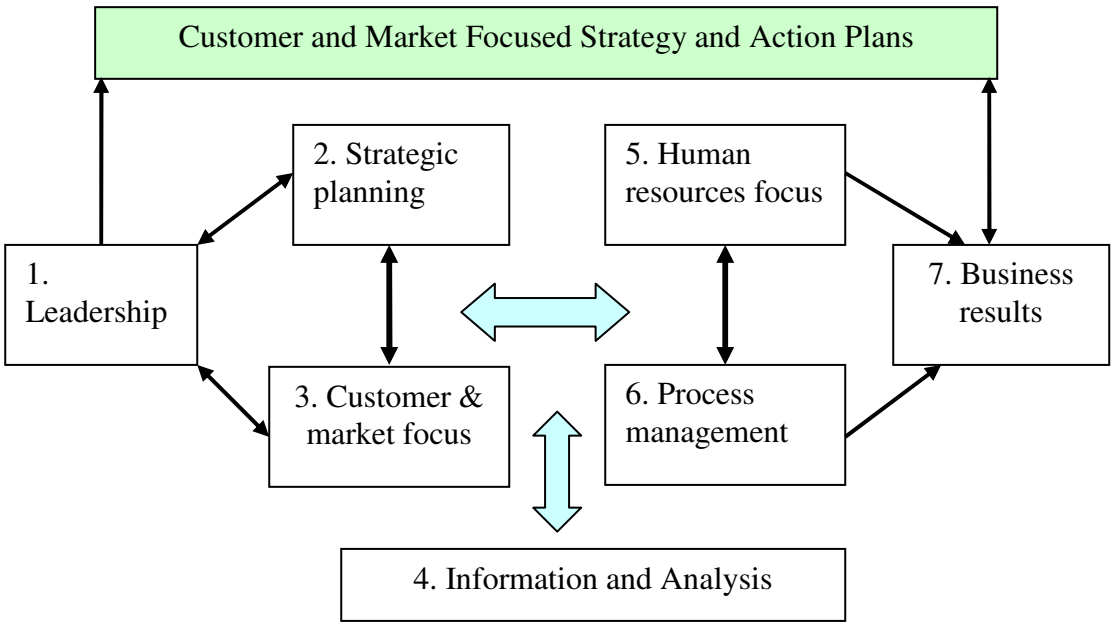


Figure2. 5 The MBNQA framework [4]

The European version of the Baldridge Award is the European Business Excellence Model that was launched by EFQM in 1992 to accelerate the process of making TQM a decisive factor in achieving global competitiveness [25,38].

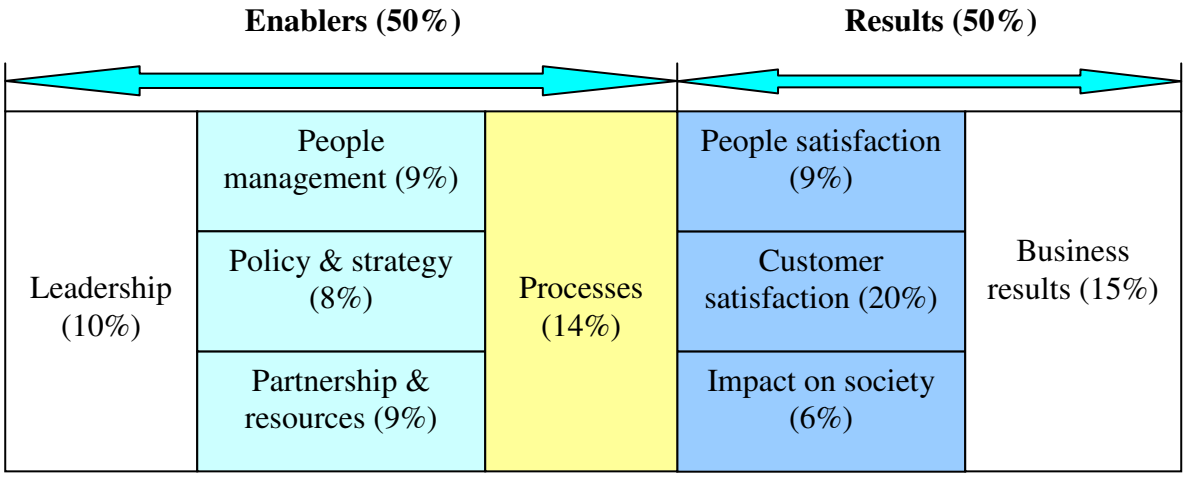


Figure2. 6 European Business Excellence Model [25]

The EFQM Excellence Model is relatively worthy since each main criterion enables organizations to assess their abilities in order to achieve excellence business results. The other difference is that business results have the greatest weight in the MBNQA but customer satisfaction in the EFQM award [25]. The limitation of these two self-assessment frameworks is that they are huge and general to tackle specific problems in a short period of time [38].

2.3.5 Balanced Scorecard Performance Measures

Performance measures that were developed from costing and accounting systems have been criticized in various reasons. In an attempt to overcome these criticisms performance measurement frameworks have been developed to encourage a more balanced view. For example, Azzone (1991) for the first time presented multi-dimensional balanced performance measurement concepts prior to Kaplan and Norton (1992). These performance measures are simple and easy to use. However, the

main disadvantage of these performance measures is their sole focus on time and neglecting the other performance measures like cost, delivery and quality, without controlling which the companies cannot compress time [32].

Since the appearance of the balanced scorecard (BSC) in 1992, it has gained widespread acceptance as a nuanced tool for performance measurement and strategic management in the for-profit sector [2,12]. The balanced scorecard model was developed as a means for addressing the strategy development process, continuing in monitoring strategy achievement and performance measurement. It does this by dividing measures into four different, inter-related perspectives [3,30]:

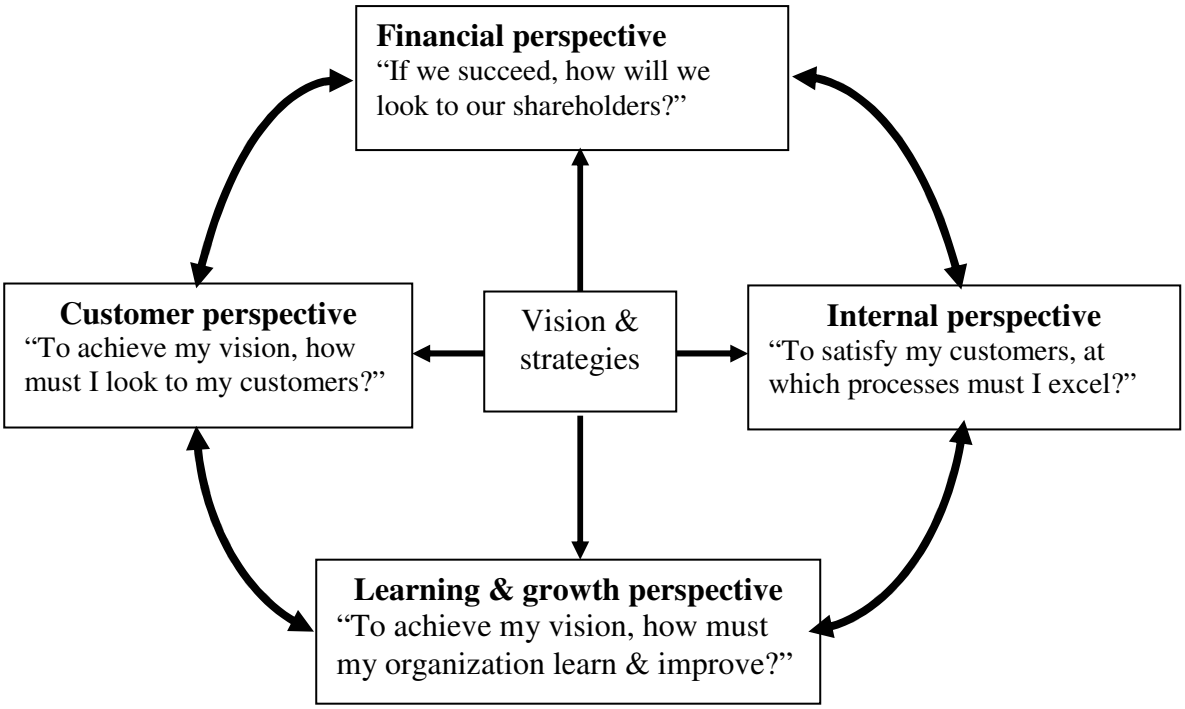


Figure2. 7 Balanced Scorecard Model [17]

1. Financial Perspective: How do we look to the shareholders? The strategy for the growth, profitability and risk viewed from the shareholder.

2. Customer Perspective: How do our customers see us? The strategy for creating value and differentiation from the perspective of the customer.
3. Internal Business Processes perspective: what must we excel at? The strategic priorities for various business processes that create customer and shareholder satisfaction.
4. Innovation and Learning Perspective: Can we continue to improve and create value? The priorities to create a climate that supports organizational change, innovation and growth.

By integrating objectives, measures, targets and initiatives of each of the four perspectives to support the overall vision and strategy, the BSC demonstrates its value as a strategic management instrument that goes beyond mere financial indicators by emphasizing the importance of non-financial perspectives. To ensure financial performance, the other perspectives act as drivers and need to be given balanced weighting [12].

The implementation process of the BSC can be described as a series of four steps [17,30].

1. Translating the vision and gaining consensus;
2. Communicating the objectives, setting goals and linking strategies;
3. Setting targets, allocating resources and establishing milestones; and
4. Providing feedback and learning.

Kaplan and Norton have proposed the use of strategy maps (sometimes referred to as success maps) to understand how the drivers of performance affect the top-level objectives. Strategy or success maps explicitly link performance outcomes to the drivers of those outcomes. By selecting appropriate performance drivers and outcome measures to fit the theory of business in a chain of cause and effect relationships, the organization will have a better idea of how to achieve its potential competitive advantages [12].

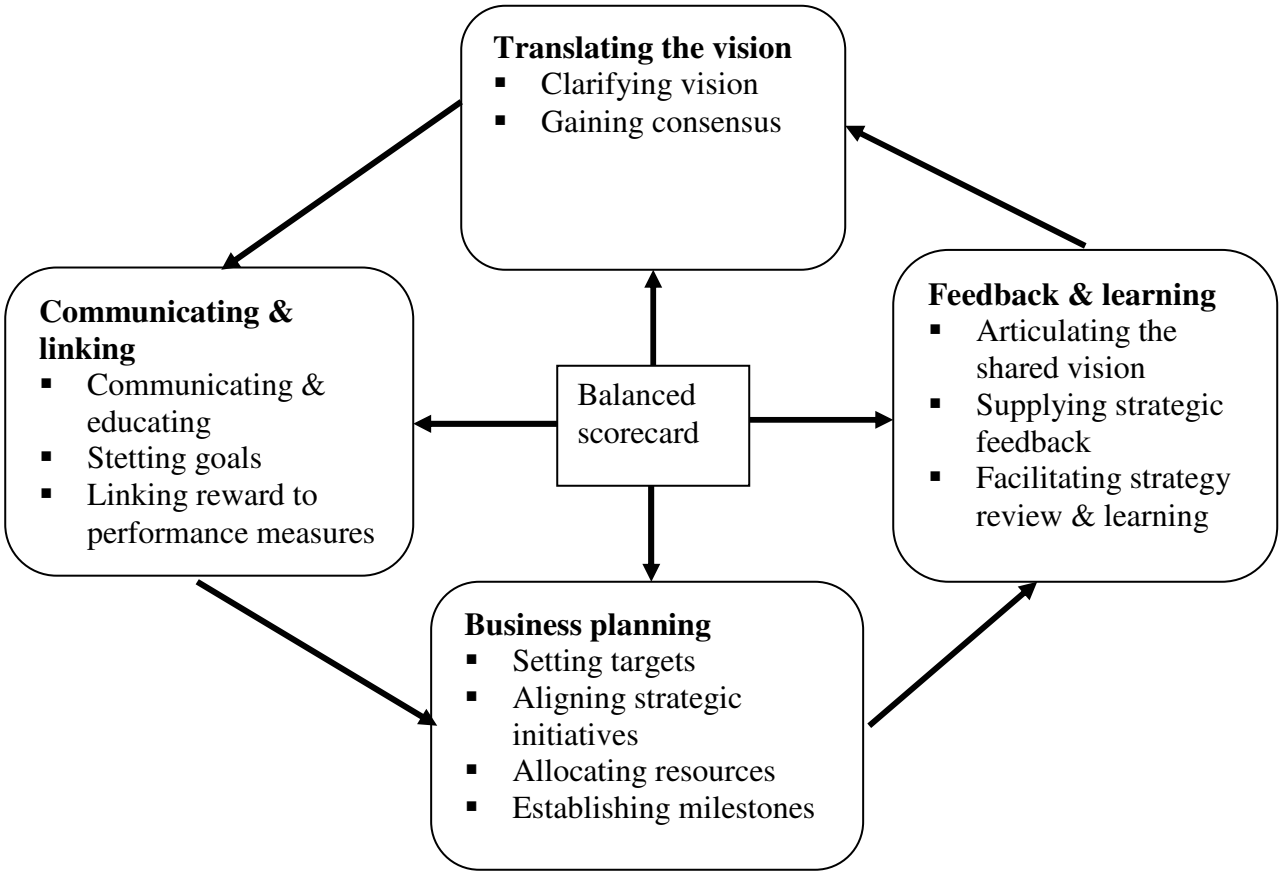


Figure2. 8 Managing strategy: Four processes [17]

Beyond the Balanced Scorecard

In spite of the wide usage of the balanced scorecard, it has recently been deemed inadequate in various circumstances. There are five important limitations to the original balanced scorecard model [2,12,25]:

A. Emphasis on customer perspective, which implicitly ignores the broader market perspectives;
B. It fails to adequately highlight the contributions that employees and suppliers make to help the company to achieve its objectives;
C. It does not identify the role of the community in defining the environment within which the company works;
D. It does not identify performance measures to assess stakeholders' contribution; and

E. It fails to account for the importance of "motivated employees", which is particularly critical in the service sector.

To overcome such shortcomings, many organizations have modified the scorecard for their own use. Fore instance, Best Foods added a fifth dimension to their BSC called "People Development". Also, several European organizations (like Nokia) are highlighting the importance of human resource management and are adding similar dimensions as Best Foods [12). The modified scorecard in the figure 2.8 has included some additional measurement perspectives that were not available in the original BSC model. Similarly, Balanced IT Scorecard (BITSC) and BSC of advanced information service (AISBSC) are also modified scorecards of certain companies depending on their strategies as shown in table 2.1.

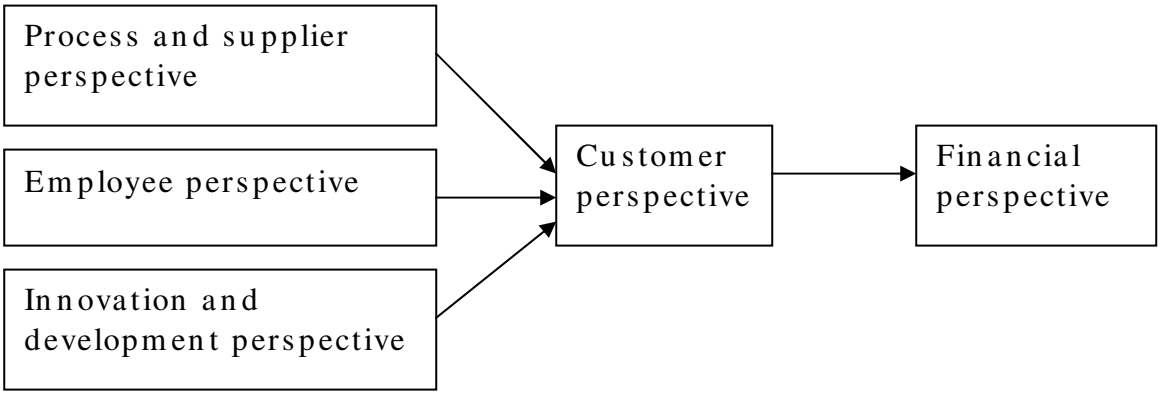


Figure2. 9 ABB's scorecard Model [25]

Performance measurement models and frameworks that have been developed by different researchers are summarized as below.

Table2. 1Compiled summary of performance measurement models

SN	Model/Framework	Performance Measures/Indicators
1	DuPont Pyramid(1910)	Financial ratio, return on investment (ROI)[25]
2	Cost & Management Accounting (1930)	Profitability and revenues [38].
3	ABC (1987)	Cost of activities of a specific product [34].

SN	Model/Framework	Performance Measures/Indicators
4	Sink Tuttle (1989)	Efficiency, effectiveness, quality, productivity, quality of work& innovation, profitability/ budgetability [33].
5	PM Matrix (1989)	Cost factors, non-cost factors, external factors, internal factors [25]
6	SMART Performance Pyramid (1991)	Quality, delivery, process time, cost, customer satisfaction, flexibility, productivity, marketing measures, financial measures [34].
7	Malcolm Baldridge Award (1987)	Leadership, strategic planning, customer & market focus, information & analysis, human resource focus, process management, & business results [4].
8	EFQM Business Excellence Model (1992)	Enablers: leadership, people management, policy & strategy, resources, processes; Results: people & customer satisfaction, impact on society; and business results [25].
9	BSC (1992)	Financial, customer, internal business, learning & growth [17].
10	Integrated PM Framework (2000)	Quality, flexibility, timeliness, finance, customer satisfaction [22].
11	Performance Prism (2001)	Stakeholders' satisfaction, strategies, processes, capabilities, stakeholders' contribution [34].
12	Balanced IT Scorecard (BITSC) (2003)	Financial perspective, customer satisfaction, internal process, infrastructure & innovation, people perspective [32].
13	BSC of Advanced Information Service (AISBSC) (2003)	Financial perspective, customer perspective, people, process, infrastructure & innovation [32].

2.4 Performance Measurement Revolutions and Its State-of-the-Art

The shortcomings in traditional measures have resulted in a crisis in performance measurement and a subsequent revolution to overhaul existing measuring performance systems to ensure that they reflect organizations' competitive circumstances. This revolution has led many organizations to invest large amounts of effort and resources into the design and implementation of new performance measurement systems. Hence, the following items describe that performance measurement concepts are receiving a major amount of attention worldwide.

Between 1994 and 1996, some 3,615 articles on performance measurement were published. This is equivalent to one new article on business performance measurement appearing every five hours of every working day. In 1996, new books on the subject appeared at a rate of one every two weeks in the USA alone [26]. In a 1994 white paper on competitiveness, the UK government declared: "to achieve sustainable business in the demanding world marketplace, a company must...use relevant performance measure." Besides, in US the National Academy of Engineering asserted: "world-class manufacturers recognize the importance of metrics in helping to define goals and performance expectations for their organizations. They adopt or develop appropriate metrics to interpret & describe quantitatively the criteria used to measure the effectiveness of the manufacturing system and its many interrelated components" [25].

Chartered financial analysts did not exist before 1963. Through 1971, about 3,000 financial analysts were chartered. From 1972 through 1981, some 3,800 more analysts were chartered, but from 1982 through 1992 more than 8,200 new-chartered financial analysts were added [26]. Business Intelligence, a professional conference-organizing company,

based in the UK, has hosted 23 conferences on performance measurement since January 1994. Over 2,500 delegates from some 800 different firms have attended these. Worldwide there are now more than 50 different Web sites devoted to business performance measurement [25].

A 1996 corporate performance measurement study of 312 American organizations showed that financial measures accounted for only 27% of the participants' measurement criteria; the remaining 73% covered areas such as product/service quality, customer satisfaction, productivity, workforce, and market indicators [26].

Alan Meekings, a consultant with Gemini, claims that "in the early 1990s, British Rail's Network South East used performance indicators to help grow off-peak income by 28 percent, reduce controllable costs by 30 percent, and improve both service delivery and customer satisfaction from worst ever to best ever on record." Legal and General's 1996 annual report places considerable emphasis on non-financial performance measures. In his statement, the Chief Executive Officer, David Prosser, highlights the importance of the virtuous circle: "competitive products = more sales = greater shareholder value"[26].

One of the successful companies in designing performance measures is Tektronix in US, a manufacturer of portable measurement instruments that was faced with increasing competition from Japanese imports. Tektronix was forced to adopt a strategy of continuous improvement. The results were impressive: "cycle time dropped from an average of twenty-five weeks to seven days. Inventory levels dropped by 80 percent, while sales increased. The number of instruments in work-in-progress dropped from 1,500 to 125. Floor space occupied by the division was dropped by more than 50 percent. Five products that had previously been built on separate lines were now built on one line. The number of vendors

dropped from 1,500 to fewer than 200. Quality was up, and more than 70 percent of sales were delivered within two days of the customer order. Above all, market share was maintained, and profitability was excellent". Finally it recognized that one of the major barriers to its successful implementation was the existing accounting system. And Tektronix decided that more appropriate measures for their new strategy would be: output rate, output per person, output per salary dollar, cost of sales ratio, floor space, cycle time, cycle time efficiency, pass rate, field failure rate and service level [29].

Further evidence of the value of business performance measurement is provided by work carried out by researchers at the University of Michigan and the Stockholm School of Economics, on the Swedish Customer Satisfaction Barometer. They have identified a significant positive correlation between customer satisfaction and financial performance. In the summary of their empirical findings, they have investigated that an annual one-point increase in customer satisfaction has a net present value of $7.48 million over five years for a typical firm in Sweden [26]. There are also dimensions of business performance other than customer satisfaction it is important to measure. Research completed in 1998 by Gallup in US more dramatic results. He reported that organizations achieving higher levels of employee satisfaction than their rivals outperform them by 22% in terms of productivity, 38% in terms of customer satisfaction, 27% in terms of profitability and 22% in terms of employee retention [25].

Data from the USA research company Gartner group suggest that 40 percent of the largest businesses in the USA had adopted the balanced scorecard by the end of 2000. Data collected by the Balanced Scorecard Collaborative put the figure even higher; suggesting that over 50 percent of surveyed firms worldwide had adopted the balanced scorecard by the middle of 2001, with a further 25 percent considering it [18].

Kidusan Yohannes W/ Ghiorgis at Free State University conducted a research in selected Eritrean manufacturing firms. The results of this research have shown that the positive correlation between non- financial performance measurement practices (customer, internal business process, and employee measures) and financial business results specifically sales growth and return on total asset [19].

In Ethiopia, Ato Abiot Mindaye conducted a research during 2005 in three state-owned enterprises that are currently operating in service and trade sectors. The findings of the research have addressed that [1]:

- The companies use traditional accounting, financial budget, cash and human resources management system; and
- Both the management and employees are willing to improve the company's performance.

2.4 Summary

In this chapter fundamental points concerning performance measurement systems were arisen and discussed. At this moment, researches on the subject matter of performance measurement are hot issues for the companies to be competitive in the global markets. To exist in a competitive market, organizations need reliable and sustainable improvement on their business performance. Measurement is the first step for business performance improvement. Hence, there are a number of opportunities to conduct researches in companies, which are characterized by their poor business performance like in Ethiopia.

CHAPTER THREE

3. RESEARCH METHODOLOGY AND DATA COLLECTION

3.1 Introduction

The previous chapters described the various concepts and its impacts of implementing proper performance measures to improve business results. This chapter discusses briefly the research methods that have been exploited to conduct the research thesis such as:

- Research approaches;
- Research strategies; and
- Research design quality.

3.2 Quantitative and Qualitative Research Approaches

It is important to identify and understand the research approaches to be undertaken. This is because it influences the research instruments to be employed and the ultimate goal of the thesis. In addition, its selection should be based on the problem of interest, resources available, skills & training of the researcher, and the audience for the research [9].

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. These techniques cover the ways research participants are selected randomly from the study population in an unbiased manner.

Qualitative research is described as the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships [9]. Depending on those facts, this research thesis was conducted using the combination of both qualitative and quantitative research approaches.

Quantitative techniques were employed to analyze business results and multi-dimensional performance measurement practices in surveyed Ethiopian manufacturing enterprises. These business outputs have been compared with global norms. Companies' utilizations of financial and non-financial performance measures have been analyzed quantitatively in a Likert scale of five score points in order to perceive their influences on business performance of companies.

Qualitative approaches were also exploited during MCPM model development process. They were carried out using open-ended observations & interviews in order to get detail information for "how" and "why" questions from concerned persons in industries, and supervising agencies. The success map of proposed MCPM model and existing performance measurement framework & strategy have been outlined by qualitative research approaches.

3.3 Research Strategies

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 [39]. According to the research objectives in this study, preferable research strategies were selected like literature survey, a questionnaire survey, interviews, and archival records & documentations.

3.3.1 Survey of Literatures

The review of literature discussed the basic concepts about performance measurement. These were evolution of various measurement models in the age of numerous business environments; discussions about multi-criteria & balanced performance measurement systems; and the drawbacks of the traditional methods. These concepts were obtained from various books, international research journals, masters & doctoral theses, magazines, and Internet websites.

3.3.2 Data Collection

This section discusses two important things. These are brief description of respondent companies and data collection methods.

Brief Description of Respondent Enterprises

Twenty-eight Ethiopian manufacturing enterprises were surveyed to conduct this research. The surveyed companies with their manufacturing sectors are categorized as shown in table 3.1 (their name is indicated in annex B). The respondents' job position is shown in table 3.2. Organizations with their different ranges of their full-time employees are shown in table 3.3. Average numbers of full-time employees in selected companies are 835 and an average work experience of the respondents is about eight years. Tables 3.4 & 3.5 reveal respondent companies' categories based on annual revenues and net total assets respectively. Average values of net sales and total assets for respondent firms are 70.5 & 99.3 million Birr respectively.

The respondents' educational qualification is as follows:

- 3% are technical & vocational school graduates;
- 14% are diploma graduates; and
- Remaining 83% are university bachelor holders & above.

Enterprise were selected randomly somewhat by taking into consideration their convenience to the researcher's data collection purpose. This survey was conducted from March10 – April 30, 2007.

The ownership of respondent companies in this research is:

- 26 are public enterprises & privatized within a period of a year;
- One of them is a share company; and
- One of them is a private company.

Most of surveyed companies are state-owned. This is happened for two reasons:

1. In Ethiopian most of complex companies are state-owned; and
2. Private companies were not voluntary to provide information due to some misconceptions.

Table3. 1 Sampled companies in five manufacturing sectors.

SN	Manufacturing Sector	Frequency	Percent
1	Textile and garment	6	21%
2	Leather and leather products	4	14%
3	Food and edible oil products	9	32%
4	Basic metal and metal products	4	14%
5	Sugar and beverage industries	5	18%
	Total	28	100%

(Source: research survey)

Table3. 2 Respondents with their job positions

SN	Job Position	Frequency	Percent
1	General manager	2	5%
2	Production and technical manager	7	17%
3	Administrative manager	2	5%
4	Finance manager	3	7%
5	Commercial manager	3	7%
6	Management service head	2	5%
7	Plan & information head	14	33%
8	Statistics export	3	7%
9	Public Enterprises Supervising Expert	4	10%
10	Ministry of Trade & Industry Expert	2	5%
	Total	42	100%

(Source: research survey)

The respondents' job positions indicate that they are responsible to involve and participate in the formulation of strategic plans and evaluation of strategic and corporate business performances.

Table3. 3 Companies with different employee number categories

SN	Number of employees	Frequency	Percent
1	150 and below	4	14%
2	151 - 500	11	39%
3	501 - 1000	7	25%
4	1001 - 2000	4	14%
5	Above 2000	2	7%
	Total	28	100%

(Source: research survey)

Table3. 4 Respondent enterprises with their annual revenues

SN	Revenue [000,000Birr]	Frequency	Percent
1	20 and below	7	25.00%
2	21 - 50	11	39.29%
3	51 - 100	6	21.43%
4	Above 100	4	14.29%
	Total	28	100.00%

(Source: research survey)

Table3. 5 Respondent companies with their annual total assets

SN	Net total assets [000,000Birr]	Frequency	Percent
1	20 and below	6	21.43%
2	21 - 50	8	28.57%
3	51 - 150	7	25.00%
4	151 - 250	5	17.86%
5	Above 250	2	7.14%
	Total	28	100.00%

(Source: research survey)

Data Collection Methods

Primary and secondary data were gathered using both quantitative and qualitative data collection methods. Different data collection methods that were exploited to carryout this research thesis. These methods are:

1. Questionnaire Survey

Questionnaire survey was conducted to obtain primary and secondary data. It was distributed to the concerned persons in order to assess the existing situations regarding to companies' business performance, and their utilizations of financial & non-financial performance measures. These results from respondents were obtained in two ways.

1. Face-to-face interview; and
2. Sending the questionnaire to concerned personnel with the help of researcher's colleagues who have better understanding about the survey instrument. This method was applied for most of enterprises where found away from Addis Ababa.

The survey questionnaire was developed based on the knowledge gained from the all-embracing literatures in the areas of performance measurement. This questionnaire consists of an introduction letter and survey instrument. The introduction letter explains the purpose and intent of the survey, the consent statement of the survey.

The survey instrument contains four sub-sections such as:

Company Details: this section incorporates company's name, address (location), types of ownership, total number of full-time employees, and respondents' current position & qualification. It is to get general overviews of surveyed enterprises.

Current Business Results Assessment Section: it consists of two types of survey questions. The first part is secondary data collection format. It was designed to gather data on performance indicators such as annual revenue, production, cost of production, profit before tax and total net

assets during the past four years. The second part contains six questions to assess levels of companies' customer & employee satisfaction, process quality, employee skill & capability, community relation, and supplier partnership. Respondents were asked to rate their firms with a scale of five points (Score of 5 = Excellent, 4 = Very Good, 3 = Good, 2 = Fair, & 1= Poor).

Existing Performance Measurement Assessment Section: it incorporates general & specific types of questions. The general questions were developed to examine the importance of performance measures; their linkage with strategic goals & missions; and the integration of financial and non-financial measures. Specific questions were also designed in order to determine the extent of utilization financial and non-financial performance measures. Respondents were requested to provide their responses with a Likert scale of five points (Score of 5 =Very Highly, 4 = Highly, 3 =Moderately, 2 =Lowly, & 1=Very Lowly). These were performed in seven major perspectives (financial, market & customer, process, employee satisfaction, training & development, community, and supplier partnership). Each major perspective also contains three to five performance indicators.

Implementation Need & Precondition Assessment Section: in this section, questions were prepared to examine companies' needs concerning modern performance measurement systems. Besides, respondents were asked to what extent preconditions (top management commitment, everybody's commitment, working culture change, transparency, trust, honesty & responsibility) have to be fulfilled to make operational the new style of measurement system properly.

2. Interviews

An 85% of the questionnaire survey was carried out with face-to-face interview. This was a nice opportunity to the researcher to make clear questions in his survey instrument and to carryout detail oral & open

interview with respondents. In addition, the researcher conducted open interviews with special personnel. The purpose of this interview was to obtain in-depth information about the challenges that are facing Ethiopian enterprises. And also to obtain more detailed feedbacks and suggestions that determine what type of measurement system is required for Ethiopian manufacturing enterprises. Total number persons who were contacted to conduct this research have shown in table 3.2 above. But, detail interviewed persons during model development process are shown in table 3.6.

Table3. 6 Interviewed personnel

N	Job position	Company
1	Production & technical manager	ECCCMI S.C
2	Production & technical manager	Tikur Abay Shoe S.C
3	Head, management service	Metahara Sugar Factory
4	QMS representative	Meta Abo Brewery S.C
5	Head, production planning & control	ASPHT S.C
6	Head, Planning & programming	Adei Ababa Yarn S.C
7	Head, Plan & information	Kality Food S.C
8	Head, Quality service	Akaki Garment S.C
9	Head, Plan & information	Akaki Textile S.C
10	Head, textile & leather sector	PPESA
11	Head, Brewery and printing sector	PPESA
12	Head, Food processing sector	PPESA

3. Observation of Records & Documentations

Besides of the survey questionnaire, observations were carried out. These methods were essential for the researcher to take his action depending on existing working conditions. Existing operation strategy and finance-based performance measurement framework have been sketched though observing enterprises' strategic plans. Additional secondary data &

information were gathered concerning performance of Ethiopian manufacturing companies and challenges that are facing them at the moment. The different sources are:

- Privatization and Public Enterprises Supervising Agency;
- Ministry of Trade & Industry;
- UNIDO reports; and
- Central statistics authority.

3.3.3 Data Analysis and Discussions

Data that were gathered with the help of above collection methods have been analyzed quantitatively and qualitatively. The researcher analyzed those data and information using various tools available in Microsoft Spreadsheet. These outputs have been presented with the supporting of tables, charts and graphical methods. The results from data analysis have also been applied as an input to develop a multi-criteria performance measurement model, illustrate imperative conclusions, recommendations, & future research directions.

Secondary data were quantitatively analyzed to compare the current financial performance status sampled Ethiopian manufacturing enterprises with international industry norms. Financial performance indicators like profit margin, ROA, and sales growth were calculated by taking an average of latest four fiscal years. Employee productivity indicators were determined from their business results and number employees of fiscal year 2005/06.

Moreover, the existing manufacturing strategy and measurement framework with their shortcomings have been examined with supporting diagrams. This was done qualitatively using data that were obtained with the help of record and documents observation methods.

Primary data from survey instrument were also examined quantitatively. These primary data have been used to determine perceived intangible performance levels, extent of utilization of financial & critical non-financial performance measure/ indicators, linkage performance measure and strategic goals, the need of modern styles of performance measures, preconditions to implement MCPM system properly.

The relationship between appropriate performance measures and business results improvement has been described in more of qualitative way. Due to some shortcomings in sample size and nature of financial performance of Ethiopian manufacturing enterprises, extensive quantitative analysis has not been carried out to determine their correlation. For example, most of profitable companies (sugar and brewery) are not in fierce competition due to government policy.

After the results of data analysis were discussed in-depth, solution to the existing problem has been proposed by developing a multi-criteria and balanced performance measurement model. This has been performed using information that were obtained from need assessment survey, in-depth interviews from respondent firms & supervising agents, and standard literature surveys. Finally fundamental conclusions and recommendations, and future research directions are provided from the research results.

3.4 Research Design Quality

According to Yin (2003), there are basically two different ways of judging the quality of research design, i.e. validity and reliability [32].

3.4.1 Validity of the Research Design

Validity is the extent to which any instrument measures what is intended to measure. Content validity of the survey questionnaire was validated by presenting the instrument to five independent industry professionals,

one academic professional in the field performance measurement, and to the research advisor. The results led to make minor changes in the instrument, which were made prior to administering the survey.

3.4.2 Reliability of Research Design

Reliability refers to whether you get the same answer by using an instrument to measure something more than once [39]. The over all results from survey have assured that performance measurement practices in selected Ethiopian manufacturing enterprises is financial focused and unbalanced between historical financial and critical non-financial measures. The results of this research work have indicated that sampled Ethiopian companies are poor in their business performance with poor operation and measurement strategy. This output has been obtained by evaluating different companies with the same survey instrument. This implies that similar answers were obtained using an instrument more than once.

CHAPTER FOUR

4. DATA ANALYSIS AND DISCUSSIONS

4.1 Introduction

It has been discussed that the development of multiple dimensional PMSs, which are appropriate for modern manufacturing firms, is a topic of increasing concern both to academics and practitioners. Besides, the drawbacks with existing systems, particularly those based on traditional cost accounting principles were widely examined in previous chapters theoretically & practically in worldwide researches.

This chapter practically discusses the following key points using data & information that were gathered in sampled enterprises:

- Analysis of companies' current financial performance;
- Analysis of financial & non-financial performance measures utilization;
- Relationship between measurement utilization & business outputs; and
- Multi-criteria performance measurement model development process.

4.2 Analysis of Financial Performance Overviews

The financial performance of surveyed Ethiopian manufacturing companies is studied. The results of this study are compared with international industry benchmarks to make performance gap analysis. Financial indicators for this analysis are:

- Profit margin
- Return on total asset
- Sales growth
- Profit before tax/ employee
- Revenue/ employee
- Total asset/ employee

Table 4.1 summarizes average financial results of surveyed companies during the past four fiscal years and their deviations from international industry norms.

Table4. 1 Summary of companies' financial performance

SN	Sales growth [%]	Profit margin before income tax [%]		Return on total assets (ROA)[%]	
		Actual performance	Gap (World Average=13.21]	Actual performance	Gap (World Average=8.30)
1	45.95	-58.52	-71.73	-32.61	-40.91
2	-10.31	-36.88	-50.09	-13.68	-21.98
3	-8.96	-43.82	-57.03	-23.28	-31.58
4	21.81	-6.64	-19.85	-3.23	-11.53
5	6.93	31.05	17.84	21.22	12.92
6	19.05	12.30	-0.91	16.02	7.72
7	-8.61	-0.04	-13.25	-0.02	-8.32
8	36.83	1.41	-11.80	0.92	-7.38
9	11.10	24.79	11.58	41.55	33.25
10	7.94	34.68	21.47	32.33	24.03
11	-3.81	5.38	-7.83	4.54	-3.76
12	2.82	-13.07	-26.28	-8.26	-16.56
13	12.95	7.42	-5.79	9.64	1.34
14	-0.04	-10.75	-23.96	-8.32	-16.62
15	4.27	-0.08	-13.29	-0.88	-9.18
16	2.30	-11.65	-24.86	-5.50	-13.80
17	4.96	-9.45	-22.66	-8.14	-16.44
18	6.36	-17.71	-30.92	-44.51	-52.81
19	4.93	18.56	5.35	10.01	1.71
20	-20.28	-24.96	-38.17	-3.50	-11.80
21	5.58	6.63	-6.58	4.92	-3.38
22	-21.65	-12.55	-25.76	-0.78	-9.08
23	10.20	7.01	-6.20	10.27	1.97
24	-1.50	12.14	-1.07	32.50	24.20
25	51.85	8.49	-4.72	3.16	-5.14
26	20.67	-8.35	-21.56	-2.7796	-11.08
27	2.40	15.07	1.86	12.48	4.18
28	0.77	22.70	9.49	8.53	0.23
Average	**7.30**	**-1.67**	**-14.88**	**2.32**	**-5.98**

(Source: researcher's computation from survey results, and sources for global norms: Philip M. Parker, Professor, INSEAD, and copyright 2003 cited at www.ICONGROUPINTERNATIONAL.com)

(SN = Serial number of sampled enterprises, see annex B)

Figures 4.1 & 4.2 indicate gaps between financial ratios of surveyed enterprises and world benchmarks in terms of profit margin and ROA respectively.

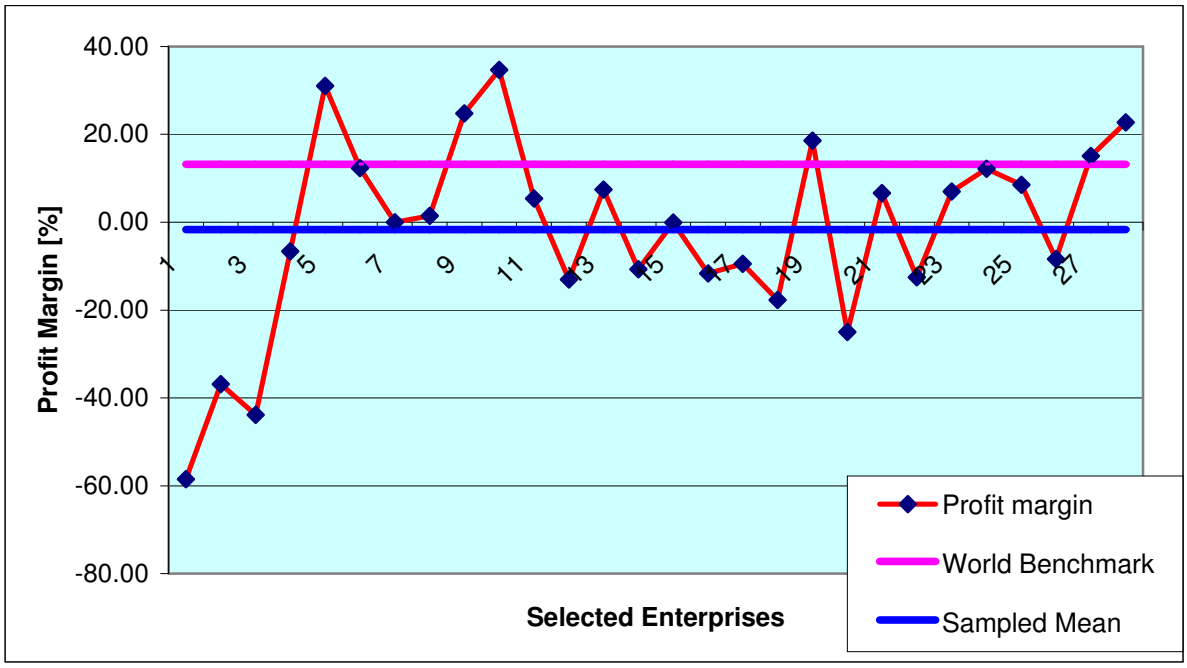
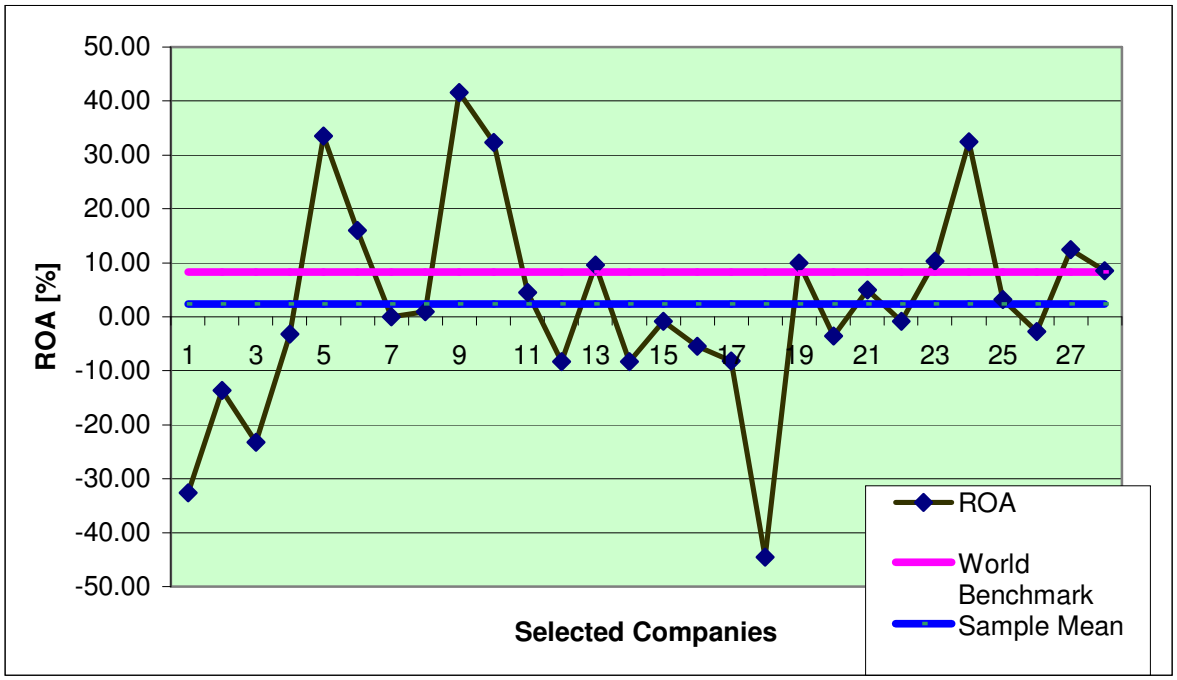


Figure4. 1 Profit margin before income taxation



(Source: researcher's computation from survey results)

Figure4. 2 Annual return on total assets (ROA)

Similarly, table 4.2 shows labor productivity outputs of surveyed enterprises during year 2005/06 & their variations from world averages.

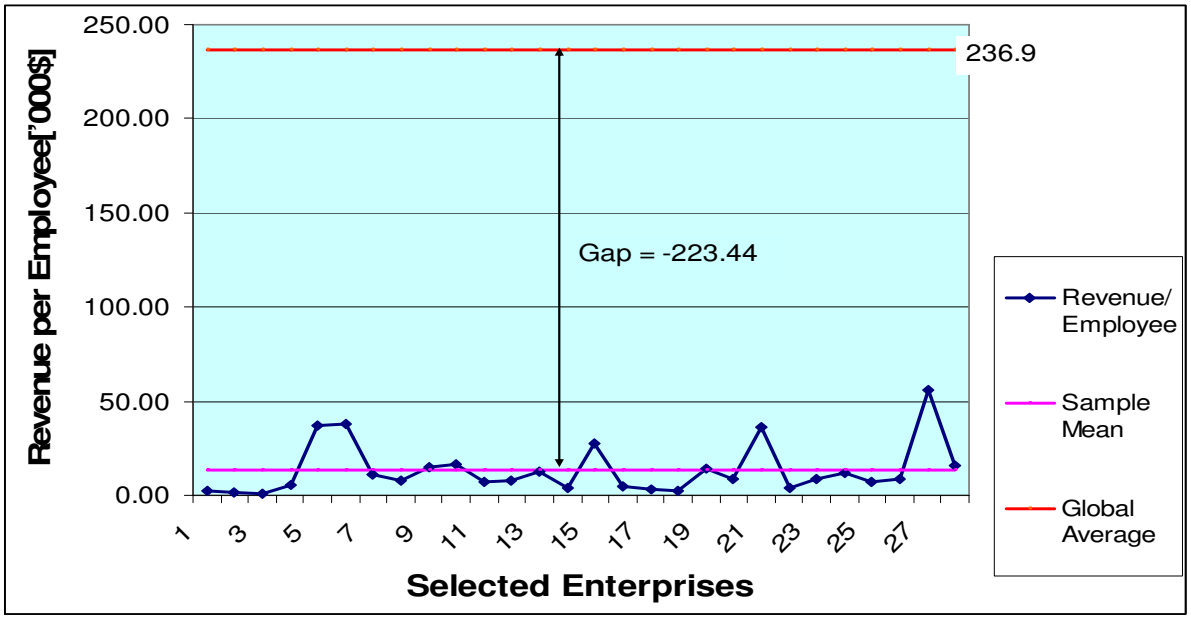
Table4. 2 Summary of employee productivity

SN	Revenue/employee ['000$]		Pretax Profit/ employee ['000$]		Total asset/employee ['000$]	
	AP	Gap (WA=236.9)	AP	Gap (WA=38.39)	AP	Gap (WA=751.17)
1	2.01	-234.89	-0.95	-39.24	3.63	-747.54
2	1.57	-235.33	-0.93	-39.22	6.34	-744.83
3	1.01	-235.89	-0.68	-38.97	3.18	-747.99
4	5.75	-231.15	0.03	-38.26	5.59	-745.58
5	37.17	-199.73	10.37	-27.92	27.69	-723.48
6	38.23	-198.67	4.64	-33.65	25.14	-726.03
7	10.81	-226.09	0.34	-37.95	21.87	-729.30
8	8.06	-228.84	0.33	-37.96	27.72	-723.45
9	14.65	-222.25	1.58	-36.71	8.16	-743.01
10	16.37	-220.53	3.67	-34.62	17.18	-733.99
11	7.17	-229.73	0.19	-38.10	10.01	-741.16
12	7.88	-229.02	-1.42	-39.71	12.82	-738.35
13	12.58	-224.32	0.66	-37.63	8.20	-742.97
14	4.31	-232.59	-0.59	-38.88	5.94	-745.23
15	27.36	-209.54	-0.97	-39.26	27.33	-723.84
16	5.00	-231.90	-0.55	-38.84	11.67	-739.50
17	3.43	-233.47	-0.36	-38.65	4.48	-746.69
18	2.71	-234.19	-0.61	-38.90	0.79	-750.38
19	14.15	-222.75	1.81	-36.48	20.05	-731.12
20	8.29	-228.61	-4.23	-42.52	52.19	-698.98
21	36.35	-200.55	0.10	-38.19	35.60	-715.57
22	4.19	-232.71	-1.94	-40.23	19.19	-731.98
23	8.65	-228.25	0.52	-37.77	4.37	-746.80
24	11.71	-225.19	0.77	-37.52	3.09	-748.08
25	6.86	-230.04	0.58	-37.71	18.39	-732.78
26	9.04	-227.86	0.44	-37.85	10.82	-740.35
27	55.97	-180.93	8.61	-29.68	76.69	-674.69
28	15.60	-221.30	3.05	-35.24	40.37	-710.80
Mean	**13.46**	**-223.44**	**0.87**	**-37.42**	**18.16**	**-733.02**

(Source: researcher's computation from survey results)

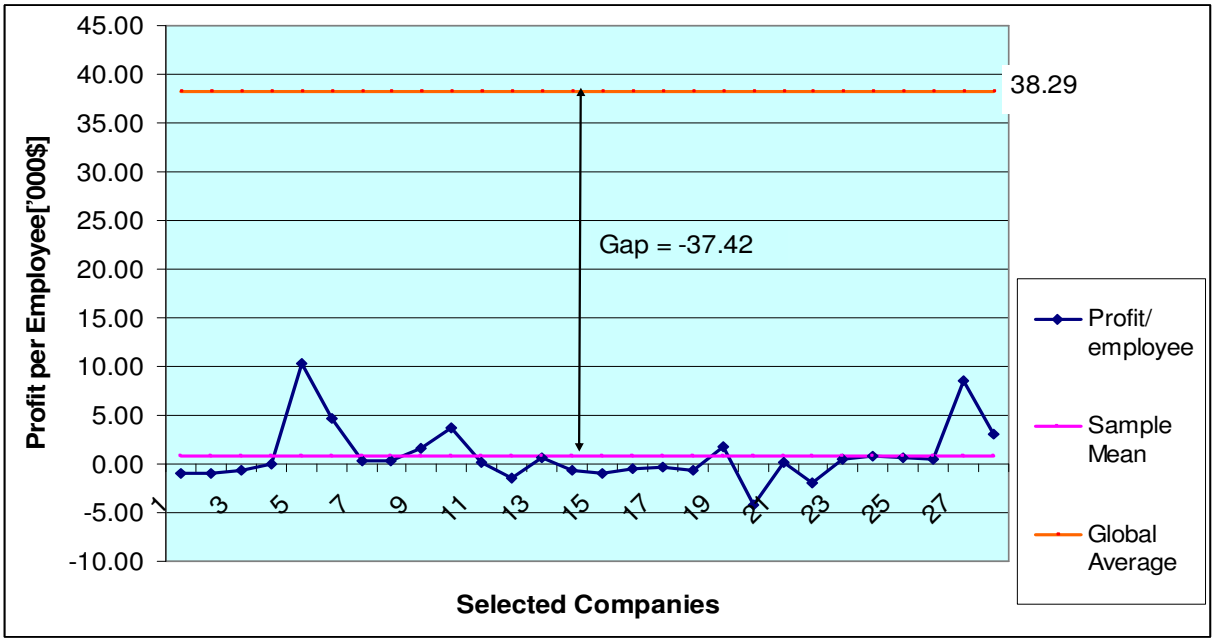
(AP=actual performance, WA=world average)

Figures 4.3 & 4.4 also reveal labor productivity variations between surveyed organizations and international norms graphically in terms of net sales per employee & profit before taxation per employee respectively.



(Source: researcher's computation from survey results)

Figure4. 3 Net Sales/ Revenue per employee



(Source: researcher's computation from survey results)

Figure4. 4 Profit before income tax per employee

The results from the above tables and figures can be summarized as shown in table 4.3.

Table4. 3 Number of enterprises below world average

SN	Performance indicator	Enterprises below international norm	
		[Number]	[%]
1	Profit margin	22	79%
2	Return on total asset	18	64%
3	Revenue per employee	28	100%
4	Pretax profit per employee	28	100%
5	Total asset per employee	28	100%

(Source: researcher's computation from tables 4.1 & 4.2)

Generally strategic performance of surveyed enterprise is disappointing as compared to global norms. Further, the ranges in financial ratios are high between sampled companies. For instance, in the case of profit margin, the minimum value is -58.52% (in textile sector) and the maximum value is 34.68 % (in sugar production sector). Similarly, in the case of ROA, the minimum value is -44.51% (in textile sector) and 41.55% (in sugar production). This is because some enterprises are safeguarded from global competition due to government policy. Profit margin (2.04 to -7.84%) and ROA (6.72 to -1.88%) declined during the past four years. Sales and production growth rates were also unstable (see annex C).

4.3 Analyzing Utilization of Performance Measures

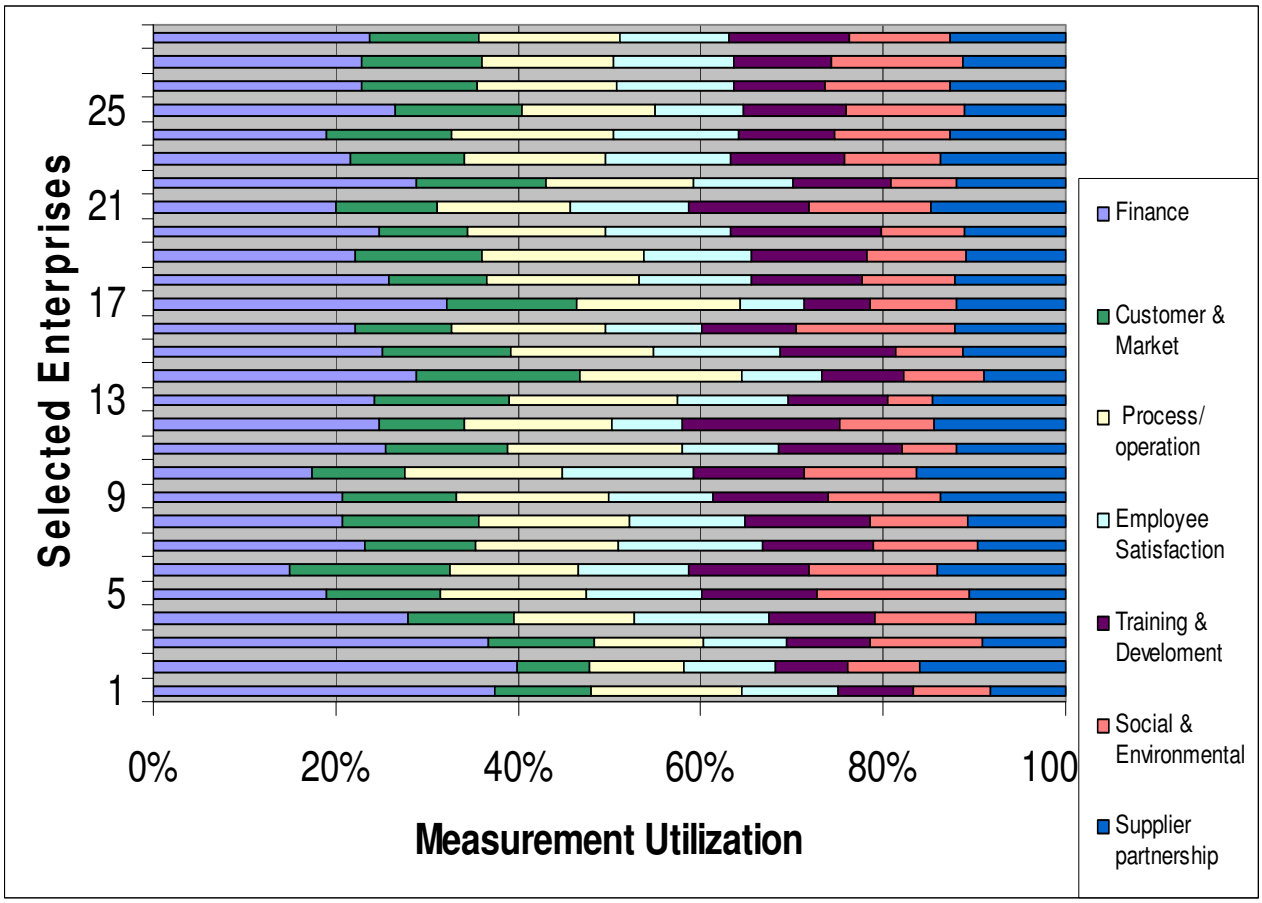
Strategic business results of sampled enterprises are much below from international norms. On the other hand, the necessity of performance measures that integrate leading & lagging indicators have been emphasized to compete in modern manufacturing. A questionnaire survey was carried out to investigate the extent of utilization of financial and non-financial measures in selected manufacturing enterprises. Respondent companies were asked to rate their current utilization of various performance indicators with five Linkert scales (see annex A).

Table 4.4 & figure 4.5 indicate summarized utilization rates of performance indicators in seven major perspectives. (Frequency distributions are also described in annex D).

Table4. 4 Financial and non-financial performance measurement utilization

SN	Performance measurement practice scores						
	Finance	Customer & Market	Process/ Operation	Employee Satisfaction	Training & Development	Social & Environmental	Supplier partnership
1	4.50	1.25	2.00	1.25	1.00	1.00	1.00
2	5.00	1.00	1.30	1.25	1.00	1.00	2.00
3	4.00	1.25	1.30	1.00	1.00	1.33	1.00
4	4.25	1.75	2.00	2.25	1.75	1.67	1.50
5	4.50	3.00	3.80	3.00	3.00	4.00	2.50
6	4.25	5.00	4.00	3.50	3.75	4.00	4.00
7	4.75	2.50	3.20	3.25	2.50	2.33	2.00
8	4.50	3.25	3.60	2.75	3.00	2.33	2.33
9	4.50	2.75	3.60	2.50	2.75	2.67	3.00
10	4.25	2.50	4.25	3.50	3.00	3.00	4.00
11	4.25	2.25	3.20	1.75	2.25	1.00	2.00
12	4.00	1.50	2.60	1.25	2.75	1.67	2.33
13	5.00	3.00	3.80	2.50	2.25	1.00	3.00
14	3.25	2.00	2.00	1.00	1.00	1.00	1.00
15	4.50	2.50	2.80	2.50	2.25	1.33	2.00
16	4.25	2.00	3.25	2.00	2.00	3.33	2.33
17	4.50	2.00	2.50	1.00	1.00	1.33	1.67
18	4.25	1.75	2.75	2.00	2.00	1.67	2.00
19	4.75	3.00	3.80	2.50	2.75	2.33	2.33
20	4.50	1.75	2.75	2.50	3.00	1.67	2.00
21	5.00	2.75	3.60	3.25	3.25	3.33	3.67
22	4.00	2.00	2.25	1.50	1.50	1.00	1.67
23	4.75	2.75	3.40	3.00	2.75	2.33	3.00
24	4.50	3.25	4.25	3.25	2.50	3.00	3.00
25	4.75	2.50	2.60	1.75	2.00	2.33	2.00
26	4.50	2.50	3.00	2.50	2.00	2.67	2.50
27	4.75	2.75	3.00	2.75	2.25	3.00	2.33
28	5.00	2.50	3.25	2.50	2.75	2.33	2.67
Mean	**4.46**	**2.39**	**2.99**	**2.28**	**2.25**	**2.13**	**2.32**
%	**24%**	**13%**	**16%**	**12%**	**12%**	**11%**	**12%**

(Source: researcher's computation from survey results)

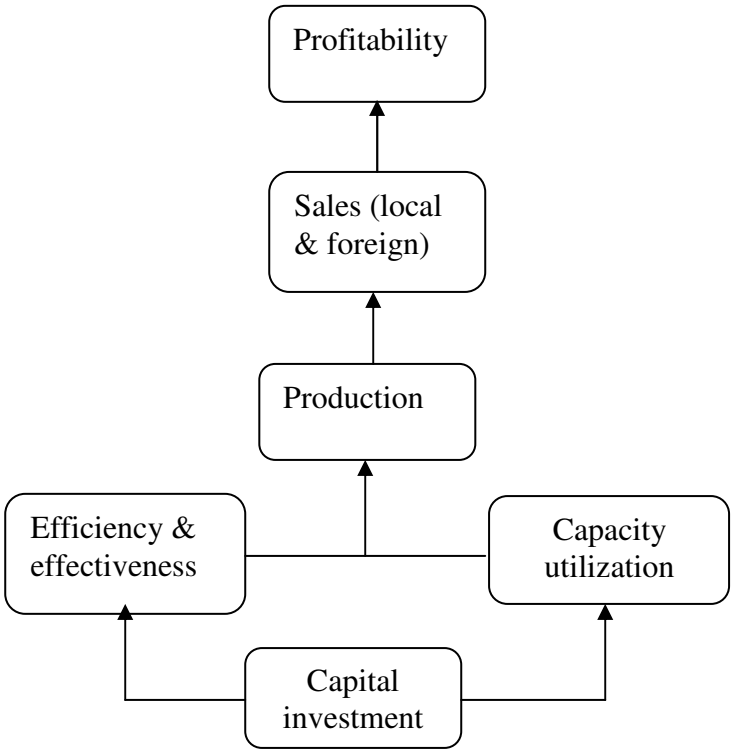


(Source: questionnaire survey results)

Figure4. 5 Enterprises' measurement utilization

The results derived from table 4.4 & figure 4.5 expose that utilization financial and non-financial measures is unbalanced i.e. surveyed companies are largely utilizing financial performance indicators (like profit, sales growth and return on asset) to evaluate their strategic performance. However, the utilization of critical non-financial measures (customer, process, employee, learning & improvement, social and suppliers' performance) is discouraging. But numerous researchers argued in previous chapters that 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.

Furthermore, open interviews & observations were performed as a research strategy to get in-depth information. Generally the current companies' manufacturing strategy and traditional cost & management accounting performance measurement framework were obtained as shown in figures 4.6 & 4.7 respectively.



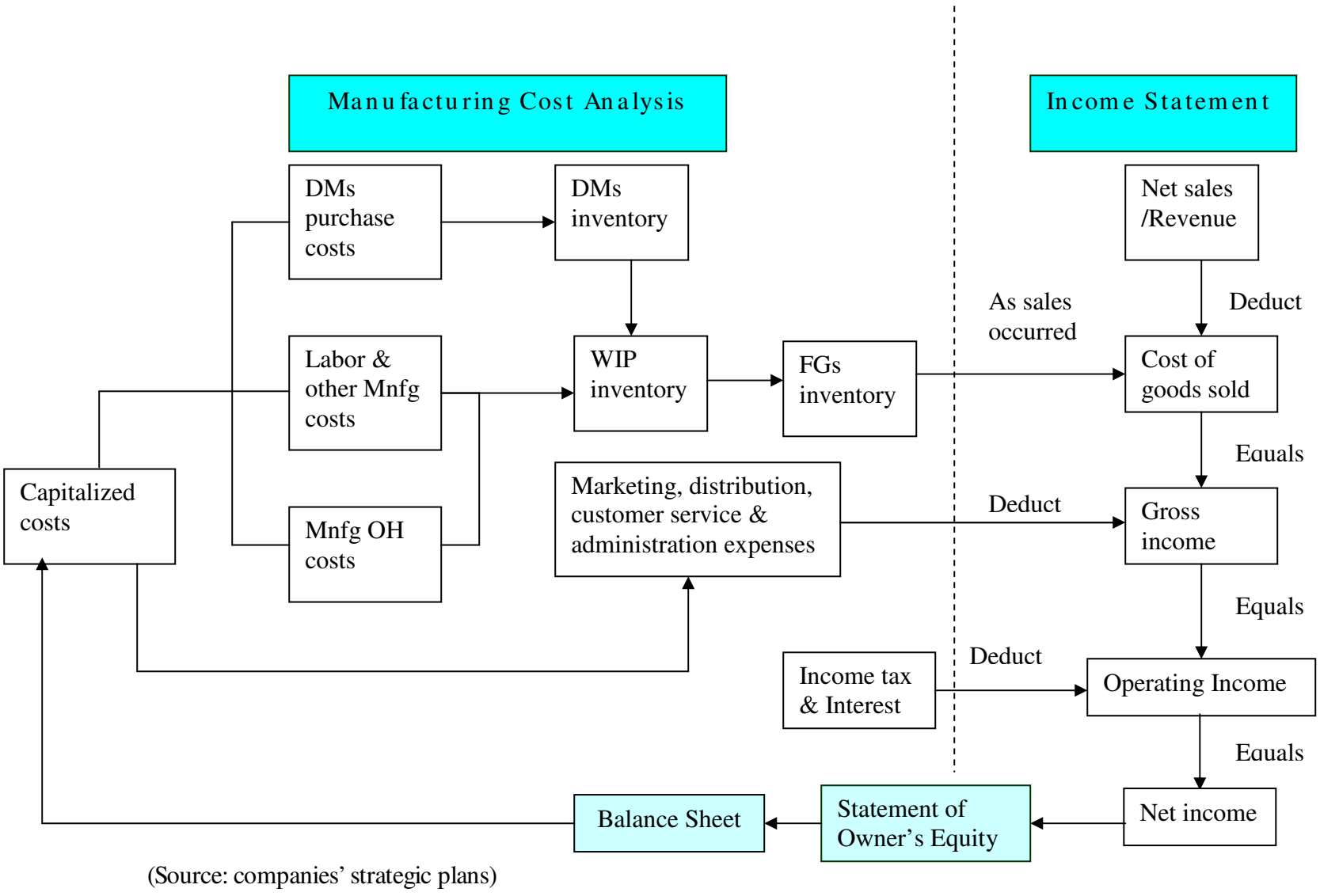
(Source: companies' strategic plans)

Figure4. 6 Existing manufacturing strategy

The main components of the traditional accounting management system are:

- Cost allocation techniques;
- Income statements;
- Statement of owner's equity; and
- Statement of cash flow.

(See its detail description in annex F)



(Source: companies' strategic plans)

Figure4. 7 Existing accounting management performance measurement framework

(DM= direct material, FG= finished good, WIP = work-in-process, Mnfg= manufacturing)

Performance indicators that are incorporated in the above operation strategy are capacity utilization, capital budget/ investment utilization, production volume, efficiency, effectiveness, and financial ratios (ROA, profit margin, ROCE, etc) as strategic goal and performance evaluation criteria with no integration. According to Neely (1998), such performance measures encourage supervisors to keep machines & people busy and producing products, even they have no market demand. In extreme case, the business can be left to write off vast quantities obsolete inventory [25]. In addition, the existing cost accounting management framework indicates that all of its outputs are financial related which have been performed in the past.

4.4 Relationship between Business Performance and Performance Measurement

The findings from above data analysis reveal that selected Ethiopian manufacturing enterprises are:

1. Low, decreasing, and unstable in their business performance as they are compared to global norms.
2. With outdated manufacturing strategy and performance measurement system.
3. Utilizing performance measures in unbalanced way.
4. With poor alignment between their strategies & performance measures.

Moreover, the review of literature described that many researchers have investigated the positive correlation between the exploitation of appropriate multi-dimensional PMSs and overall business success. Some of them are:

1. Alan Meekings has determined the role of performance indicators to improve income by 28%, costs by 30%, and service delivery &

customer satisfaction from worst to best in British Rail's Network South East.

2. David Prosser investigated 'competitive product' = 'more sales' = 'greater shareholder value' in Legal & Generals.
3. Researchers at the University of Michigan and the Stockholm School of Economics have explored that an annual one-point increase in customer satisfaction has a net present value of $7.48 million over five years for a typical firm in Sweden.
4. Gallup in US has also investigated that companies attaining high levels of employee satisfaction enhance by 22, 38, 27, & 22% in productivity, customer satisfaction, profitability, & employee retention respectively.

Vital non-financial performance indicators from these research reviews are service delivery, customer satisfaction, competitive product, employee satisfaction, and employee retention.

According to this research study, fourteen companies that have attained negative values in profit margin and ROA, their average non-financial measurement utilizations are 1.70, 2.41, 1.80, 1.77, 1.64, & 1.75 in customer, operation, employee satisfaction, training & development, community, and supplier measures respectively from five scale points. This comparison between sampled companies shows that relatively lower users of critical non-financial measures are lower business performers.

Now, it is recognized practically that with the business era of more demanding customers and more competitive markets, existing cost accounting systems and manufacturing strategies are insufficient to resist the changes, which are facing Ethiopian enterprises at the moment. Therefore, the existing measurement frameworks are lagging indicators that they provide only historical financial data; they provide little indication of how performance is achieved or how it can be

improved in future; encourage short-term benefits & local optimization; they are internally rather than externally focused, with little regard for competitors or customers; lack in strategic focus; and often inhibit innovation; and incapable to penalize overproduction.

The results of this study by no means suggest that multi-criteria performance measurement systems directly lead to business success. This merely offers companies the opportunity to carryout improvements, and focus on getting closer to customers & other critical stakeholders. Companies must have the right strategy in place, the right products/ services, the right commitment, and the right investment strategy in order to be successful in their business. The most important driver behind to attain these things is utilizing an appropriate PMS.

4.5 Multi-criteria Performance Measurement Model Development

It is widely believed that the information provided by cost & accounting based 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 are not supporting the change process, there is a need for new styles of measurement systems that are appropriate to the demands of the modern manufacturing industry.

Depending upon facts in literature survey and the research findings, a solution has been proposed to challenges, which are facing the companies by developing a MCPM model. Different types MCPM models/ frameworks have been reviewed in the literature. No one was free from critics. The model developed in this study tries to consider the

merits of various international models that have been investigated before. This MCPM model is not completely new but it is modified by incorporating important features of existing models. It considers critical stakeholders like Neely's (2001) Performance Prism. It also starts from vision statement and moves down to operational goals like SMART pyramid. The model focuses measures to be a few critical i.e. not more than 25 like that of Kaplan & Norton Balanced Scorecard. The weight allocation techniques for major performance perspectives are proposed from two self-assessment frameworks (EFQM business excellence model and MBNQA). Moreover, its implementation process is similar to Medori & Steeple (2000) Integrated Framework. Its implementation strategy map is outlined using the principles and philosophies of modern manufacturing philosophies like TQM.

Hence, the developed MCPM Model incorporates the features of Performance Prism, BSC, SMART Pyramid, Self-assessment Tools, & Integrated Frameworks. This model is a new style of performance measurement for Ethiopian manufacturing industries. In addition, it is developed practically considering their existing challenges. Then, the model is powerful to enhance the companies' decision making process and to improve their business performance in the long-term.

In the development process of this model, besides the basic four perspectives of Kaplan and Norton (1992) balanced scorecard; social & environmental, employee satisfaction and supplier partnership perspectives are considered depending on the respondents' feedbacks & feelings. As much as possible, this model tries to tackle the shortcomings of existing traditional performance measures.

Therefore, it addresses seven perspectives, which are linked to each other for providing total measurement effectiveness. These perspectives are:

i. Financial Measures;
ii. Customer and Market Measures;
iii. Operational/ Process Measures;
iv. Supplier Partnership Measures;
v. Social and Environmental Measures;
vi. Employee Satisfaction Measures; and
vii. Training and Development Measures.

The proposed MCPM model is expressed in two parts such as "Strategy Map" and "Scorecard".

The strategy map is used to hypothesize the core mid-term strategies that are adopted from total quality management (TQM) concepts. It also outlines what kind of values should be provided to specific stakeholders, how working methods should be changed and organizational abilities should be increased in order to realize the strategic financial results. It is outlined using as input standard literatures, suggestions & feedbacks from respondents. This strategy map represents the causal relationships among strategic goals and key performance measures. The validity of this hypothesized relationship can be verified through exhaustive research works by using a PDCA (Plan-Do-Check-Act) cycle [24]. Since there are a number of conflicting goals (like product/ service quality & cost, training outcomes & training investments, etc) in the strategy map, the optimum values must be determined for conflicts.

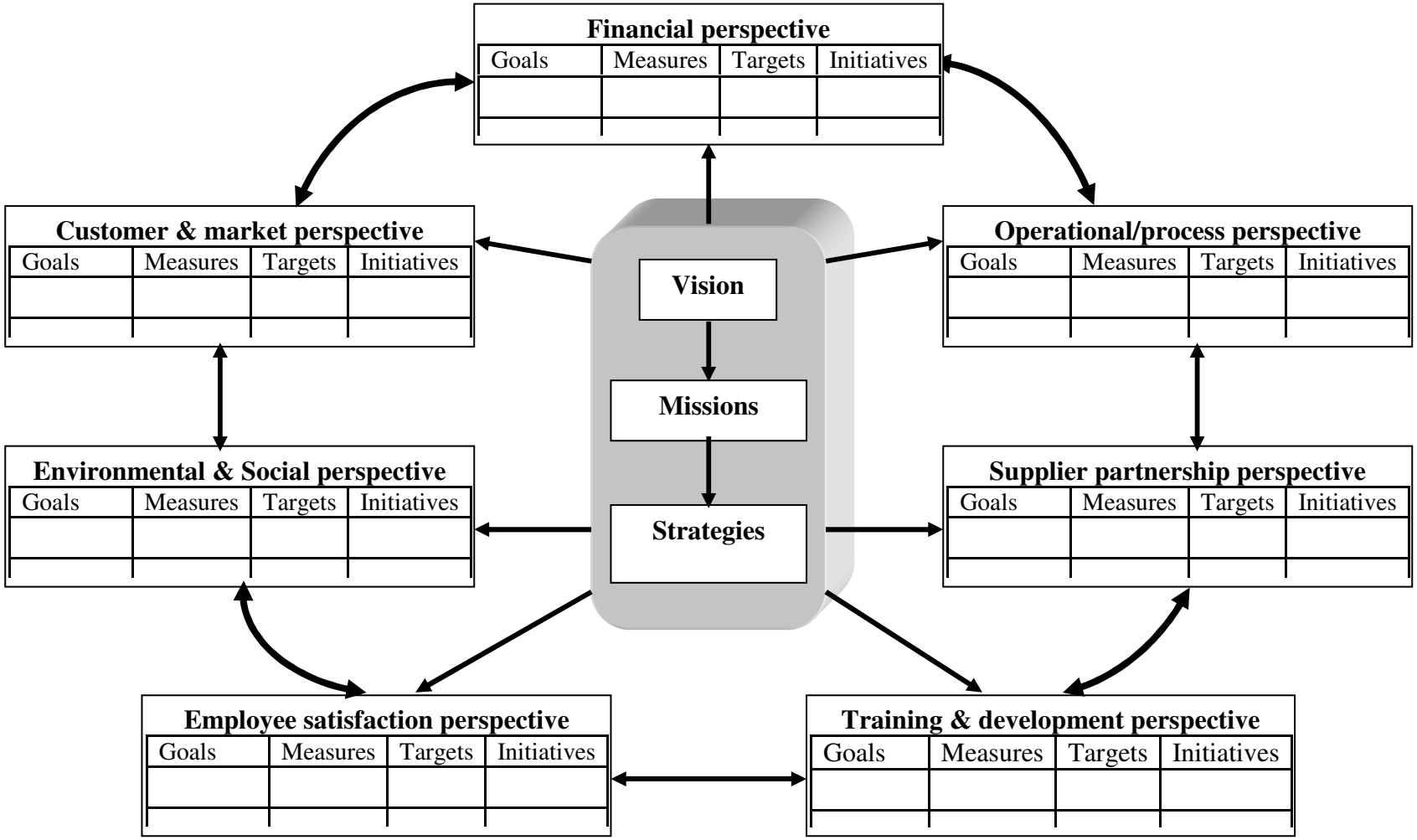


Figure4. 8 Proposed Multi-criteria Performance Measurement Model

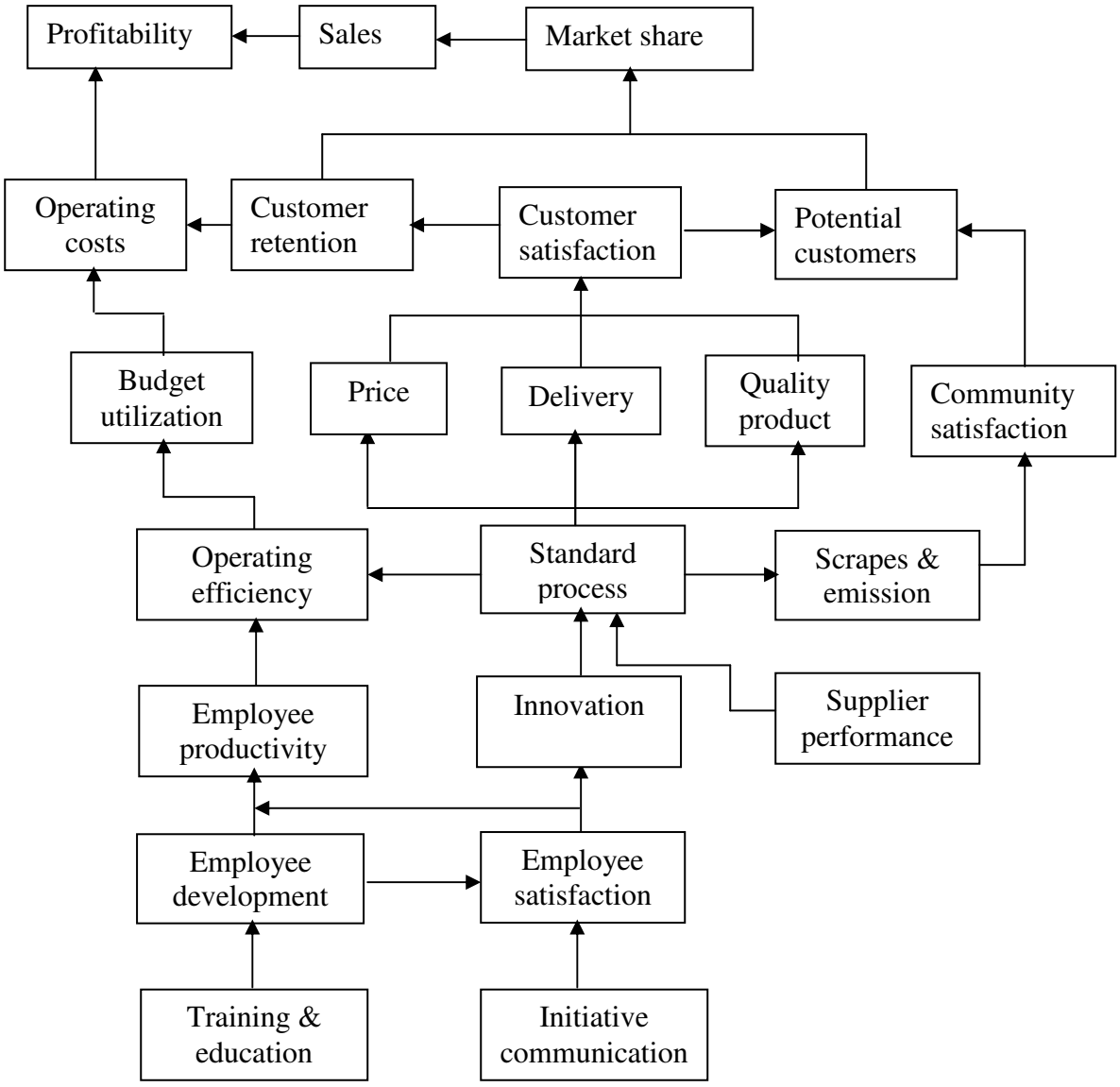


Figure4. 9 Proposed Strategy Map/ Success Map

The second part of the model is a Scorecard that is used to manage the implementation and achievement status of the given strategic goals and target values. It is a table that presents the following factors:

1. Strategic goals specified in the strategy map;
2. Key performance measures/ indicators for each strategic goal;
3. Baselines for target values;
4. Target values; and
5. Initiatives & scoring rates.

Table4. 5 Proposed Scorecard

Performance perspectives	Strategic goals	Performance measures/indicators	Wt [%]	Base line	Target value	Score/rate					
						0	1	2	3	4	5
Finance	Increasing profitability	Profit margin									
		ROA									
	Increasing revenue	Sales growth									
Customers & Market	Expansion of market share	Market share growth									
	Increasing customer satisfaction	Satisfied customers									
		Retained customers									
		New customers added									
Community	Increasing community satisfaction	Community complaints									
	Reducing pollution	Scrapes & wastages reduced									
Operation/ Process	Improving delivery time	Orders delivered on time									
	Enhancing product & service quality	Failure cost (internal & external)									
	Reducing operating costs	Total operation costs									
	Enhancing process efficiency	Process efficiency									
	Reducing product cycle times	Product cycle times									
Supplier Partnership	Improving material quality	Defect rate									
	Decreasing lead time	Lead time									
	Improving raw materials costs	Raw material costs									
Employee Satisfaction	Enhancing employee satisfaction	Satisfied employees									
	Reducing accidents	Accident frequency rate									
	Reduction of employee turnover	Employee turnover									
Training & Development	Improving employee productivity	Output/employee									
	Enhancing R & D	Innovations									
	Enhancing training & education	Employee skill level									
		Qualification growth									

The Scorecard contains important features such as performance rating and weight allocation for measurement perspectives. Concerning to rating techniques, companies may use different types of ranges with respect to their targets. In addition, the initiative and reward policies have to also be integrated with these performance scores. According to Numura Research Institute (2003) the relationship between company's accomplishment and initiative scores can be summarized as below.

Table4. 6 Relation between achievement and scores: adopted from [24]

SN	**Accomplishment relative to target values**	**Scores**
1	Accomplishment >= 110% target value	5 points
2	100% <= Accomplishment < 110% target value	4 points
3	90% <= Accomplishment < 100% target value	3points
4	80% <= Accomplishment < 90% target value	2 points
5	70% <= Accomplishment < 80% target value	1 point
6	Accomplishment < 70% target value	0 point

Hence, companies can use it as a benchmark to develop their own rating strategies.

Weight allocation for different measurement perspectives should be estimated though verifying the cause and effect relationship coefficients on final business results. Moreover, they can adopt it from internationally accepted measurement frameworks like European Foundation for Quality Management (EFQM) Business Excellence Model and its US equivalent the Malcolm Baldridge Quality Award. According to these self-assessment frameworks, weights given to each perspective have to equally be shared to every performance indicator under it.

Table4. 7 Proposed weight allocation for measurement perspectives

SN	Measurement Perspectives	Weight [%]
1	Finance	16
2	Customer & market	25
3	Internal process	25
4	Employee Satisfaction	10
5	Training & development	10
6	Social & environmental	8
7	Supplier partnership	6
Total		100

4.5.1 Justification of the Developed MCPM Model

The strategy map of the model specifies the critical elements and their linkages for an organization's strategy using seven measurement perspectives. The next section deals with the justifications why & how KPIs are selected for those major perspectives.

Financial Measures

The objective of this MCPM model is neither to degrade nor eliminate the importance of accounting based financial measures. But it is to strengthen them by aligning them with critical intangible measures as shown in the strategy map. According to Kaplan & Norton (1996) advanced performance measurement systems do 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. The general objectives that should typically be reflected in financial perspectives are marginal profit, revenue growth, asset utilization, and total cost reduction [17].

Customer and Market Measures

This perspective captures the ability of an organization to provide quality goods and services, the effectiveness of their delivery, and overall

customer service and satisfaction [3]. The improvement of customer satisfaction is certainly a business virtue to which many aspire by enhancing market share of a company. Customer retention is normally a direct result of high level of customer satisfaction. Building a highly loyal customer base cannot be done as an add-on. It must be an integral to a company's base business strategy. High customer loyalty means that profit margins can be higher as the cost of acquiring new customers is reduced. By understanding the economic effect of customer retention on revenues, costs, and cash flows can be intelligently invested either to acquire or retain high quality of customers [38]. The widely accepted performance indicators in such perspective are market share, customer satisfaction, customer retention, and customer acquisition.

Process/ Operation Measures

This perspective relates to the production of the company's goods or services and involves developing efficient work processes that minimize costs and maximize product & service quality. These are 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. Managers need to focus on those critical internal operations that enable to satisfy their customer needs [35]. To satisfy & delight customers, companies must monitor properly product/ service quality dimensions, costs/ prices, delivery, and safety factors by executing continuous improvement on the manufacturing systems [30]. Then, the vital process measures are delivery time, product quality, operating cost/ price, product cycle times, and operations efficiency.

Employee Satisfaction Measures

Processes will only succeed if adequately motivated employees, supplied with accurately and timely information. Satisfied employees are loyal to

their organization. They are also preconditions for increasing productivity, responsiveness, and quality of products/ services [19]. The longer employees stay within the company, the more they become familiar with the business, the more they learn, and the more valuable they can be. Those employees who deal directly with customers day after day have a powerful effect on customers' loyalty. It is with employees that the customer builds a bond of trust & expectations. But when those people leave, the bond is broken [38]. Employee satisfaction survey and turnover are important performance indicators in this perspective.

Training and Development Measures

This perspective of measurement model identifies the infrastructure that an organization must build to create growth and improvement. 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 [38]. Education and training can improve employees' knowledge and skills and have a significant influence on their development. Thus, employees can generate innovative ideas for solving working problems. This enhances employee commitment and satisfaction [39]. Deming (1986) stressed the importance of education & training for continual updating and improvement, identifying one source of human motivation at work; more generally, growing, learning, and developing one's self [10].

Social and Environmental Measures

Fulfilling environmental and social obligations are critical issues throughout the world at this moment. Every business has to develop an environmental strategy and make it public. Innovation & development should focus on durable product designs that are refillable, reusable and recyclable to minimize operational scrapes & wastages [38]. Technology upgrading programs, which would align both internal & external factors to a firm, to address the more serious environmental pollution problems

and enhance productivity in the utilization of energy, water & material resources are indispensable [16]. By fulfilling social obligations, companies are able to maintain their goodwill & reputation in the community. In long-term, this will create potential customers from the society [20]. Depending on these facts reducing of scrape and environmental wastages are selected as strategic goals and measures in this perspective.

Supplier Partnership Measures

Manufacturing industry spends on average 55% of its turnover on purchasing goods & services. Rather than treat purchasing, as a means of obtaining materials more quickly & cheaply, it is better that companies take a strategic view [38]. Deming [1986] strongly recommended that working with the suppliers as a partner in a long-term relationship of loyalty & trust is too essential to improve the quality of incoming material and decrease costs. The firms must work together with their suppliers to improve delivery of their products and also to minimize incoming inspection, internal and external failure costs [10]. The benefits of such partnership are due to less people administration. Furthermore, it encourages a joint approach to problem solving, offering cost reduction, and quality improvement. Therefore, the performance measurement model has to include the supplier partnership perspectives. Improving delivery time, materials quality and costs must be vital components of strategy of the firm.

These are international notions concerning facts about performance measurement strategies. Besides, need assessment was conducted to view the interest of respondent enterprises on the admission the above measurement perspectives. The results were so hopeful that most of them have agreed that these perspectives to be included in the new MCPM system (see annex E).

4.5.2 Advantages of the MCPM Model over Traditional PMS

Existing traditional performance measures have been criticized due their various shortcomings. In order to withstand these weaknesses, the new model places emphasis on non-financial, external and future looking performance measures. Its merits are:

Strategic Focus: this model starts from company's vision statement; it outlines the strategy map to indicate the cause and effect relationships between strategies to achieve final business objectives.

Flexible and Responsive: the proposed model is not rigid like that of traditional cost accounting frameworks. It has opportunities to add, modify and eliminate performance measures as the firm changes its strategies.

Integration Lagging & Leading Indicators: it has been definitely shown that the model includes financial measures (lagging indicators) and operational measures (leading indicators).

Consideration of Critical Stakeholders: the formulated model consists of performance measures in multiple dimensions by taking into consideration the needs of owners/ shareholders, customers, employees and suppliers.

Focus on Vital Success Factors: the reason behind the formulation of success map is to determine the cause & effect relationships between performance factors and business results. Hence, critical factors that have higher impact on the success of company's business strategy will be identified easily.

Motive: since the model integrates initiatives in the strategy map, it has a power to motivate employees. It also encourages for innovation of new ideas, methods, systems, and products.

Identification of Improvement Areas: this MCPM model contains performance indicators in seven major perspectives that are linked each other using a success map. This provides better opportunity to managers to identify business areas that need improvement.

4.5.3 Limitations of the Proposed MCPM Model

The pitfalls of this proposed multi-criteria performance measurement model are its opportunity to fail due to certain potential mistakes during design & implementation stages. These are summarized as below:

Not linking and aligning performance measures to strategy: in order to a firm successfully compete on its strategic objectives; relationships must exist between the firm's strategies, organizational actions, and performance measures [21]. To encourage the achievement of goals, performance measures should be congruent with company's strategy [7].

Unverified success map: the linkages in the strategy map have to be verified with cause and effect relationships. Unless measures are firmly connected to results from a defined process, it is difficult to know what corrective actions to take as well as be able to predict with confidence what effects those changes will have [4,5,24].

Unattainable performance targets: Deming's tenth point states "eliminate slogans, exhortations and asking the work force for unrealistic targets." In other words, when a gap exists between target values and attainable capacity, it leads to non-achievable performance and "losing spiral" resulting from low moral [10].

Measuring incorrectly: according to Goldratt [1990] dysfunctional behavior may result from inappropriate metrics: "if you measure me in an illogical way ... do not complain about illogical behavior" [7]. Focusing to inappropriate activities may prevent firms to maintain the required improvements in the firms. Therefore, performance measures must be vital few versus the trivial many to avoid unnecessary ambiguities.

Lack of communication and awareness: performance measurement systems succeed when the organization's strategy and performance measures are in alignment and when senior managers communicate the organization's mission, vision, values and strategic directions to employees and external stakeholders [4].

Failure to identify preconditions for implementation: to implement MCPM systems effectively, important preconditions must be fulfilled. Some of these are management commitment, work culture change, critical stakeholders' commitment, transparency, trust, honesty, responsibility and accountability [12].

4.6 MCPM System Implementation

The need for advanced operation strategy and performance measurement system to improve strategic performance of selected companies is undeniable. Based on this reality, a MCPM model has been developed with its proposed success map. After preconditions are fulfilled, the following general steps are essential for successful implementation of the new MCPM system.

1. Establishing Strategic Plans

Strategic Plans set the foundation for effective performance measurement systems. Senior managers must clearly place the organization's mission, vision, values and strategic directions based on the needs of internal and external stakeholders. Specifically market demands and process capabilities have to be examined in-depth.

2. Formulating Strategy/ Success Map

After establishing clear objectives that the firm strives to achieve, a strategy map must be drawn adequately to show the cause and effect relationships. Strategic outcomes of the key performance parameters such as financial, customer, market, operation, employee satisfaction,

etc have to be estimated properly in success map to attain the company's vision, missions & business objectives in the long-run.

3. Identifying All the Possible Performance Measures

This stage links all the possible success factors with company's strategies to achieve its strategic goals. All the possible leading and lagging performance measures in all perspectives may be included.

4. Selecting Key Performance Indicators (KPIs)

This stage is to narrow down the list of all possible measures into a shortest one that provides the KPIs, which will be used in each perspective. Usually, there are many processes and activities within an organization; each potentially needs a number of performance measures. With this reality in mind, the secret to develop a success map is to clearly identify the organization's "key" business processes, that is, those having the highest impact on the success or failure of the organization's strategies. According to Kaplan & Norton (1996), a typical scorecard may employee 20-25 measures [17,35].

5. Establishing Targets & Initiatives to KPIs

Measurement alone is not good enough. Enterprises must drive behavioral changes within the organization if they expect to execute their strategy. Attainable targets & initiatives should be designed to stretch the organization in meeting its strategic objectives. Targets need to be realistic so that people feel comfortable about trying to execute them.

6. Actual Implementation

At this stage, strategic plans, measures, targets and initiatives have to be communicated in companywide and the new system must be become operational. The results and responses obtained from different functional & operational perspectives must be analyzed and reported to management to take necessary action.

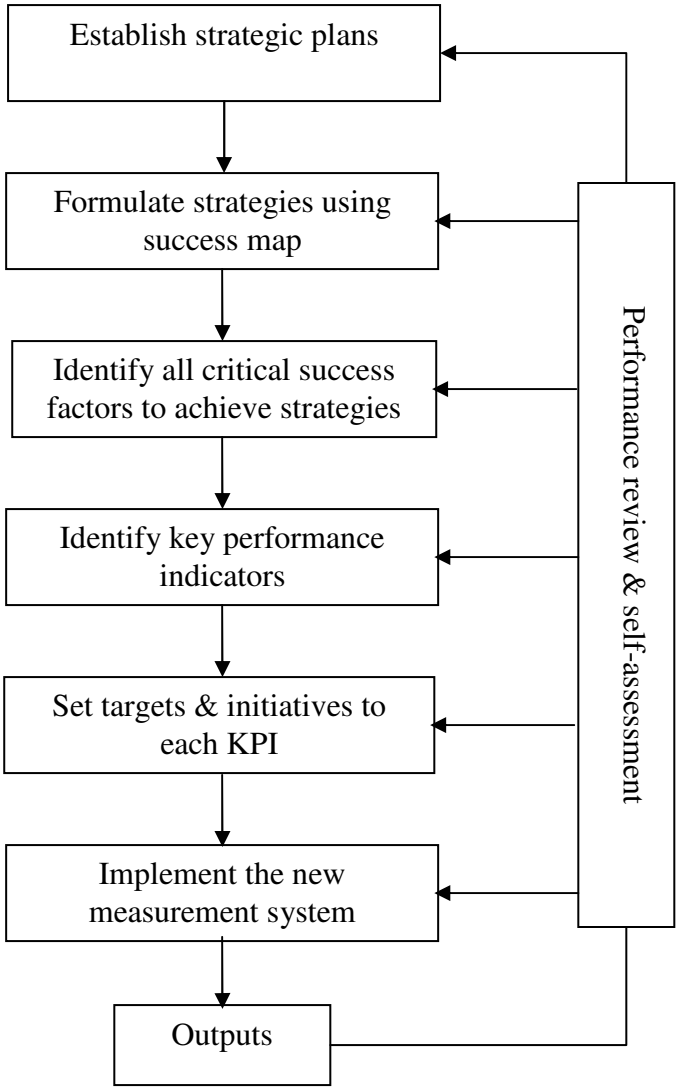


Figure4. 10 MCPM System Implementation

7. Performance Review & Self-Assessment

The management compares the actual output levels with the desired one in order to make business gap analysis. This enables the company to monitor the viability of the existing strategy and adjust its implementation and, if necessary, to make fundamental changes in the strategy itself in a continually changing environment in a quick & timely fashion.

4.7 Summary

In this chapter, data gathered from 28 Ethiopian manufacturing enterprises 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 the existence of great deviations between business outputs of surveyed companies & international norms. Moreover, operation & performance measurement strategies are not encouraging to long-term business performance improvement. It has been believed that one of the vital constraints to performance decline of these organizations is their ways of measuring performance. Performance measurement systems are at the most irrelevant and out-dated situation for decision making in dynamic market environments.

Depending on the research findings, a MCPM model has been developed as a solution, which integrates financial and non-financial measures in a balanced way. This model aligns all critical tangible and intangible measures to business strategies using a success map. Besides its implementation steps have been described with taking into consideration the existing manufacturing environments in Ethiopia. The merits and demerits of this model have also been discussed briefly.

CHAPTER FIVE

5. CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH DIRECTIONS

In this paper the researcher has argued that traditional performance measurement systems, based on management accounting techniques, fail to improve performance of manufacturing enterprises in today's market situation. The research findings have ensured this reality in chapter four practically. Now, it is pertinent to provide significant conclusions, recommendations and directions for future researches.

5.1 Conclusions

Recent literatures related to manufacturing performance measurement concentrate that an integration of financial & non-financial measures is lifeblood for firms exist in global completion. However, results obtained in this research study indicate that companies' business outputs are disappointing as compared with international benchmarks. Besides, performance measurement systems and strategies are traditional finance based & short-term efficiency focused.

Therefore, fundamental conclusions of this study can be pointed out as:

1. Measurement systems incorporating financial and operational measures are critical issues in business environment.
2. Traditional cost accounting techniques provide inadequate & misleading information to managers who are making decision in complex market driven situations.
3. Ethiopian manufacturing enterprises are suffering due to irrelevant performance measurement systems to boost up their business.
4. It is the right time for developing a MCPM model that advances the decision making process and business outcomes.
5. The MCPM model developed in this research will have a great contribution to resist challenges for manufacturing firms in Ethiopia.

5.2 Recommendations

In situations such as increased global competition, shortened product life cycles, accelerated technological advancements, and enhanced customer requirements; competing solely on financial measures is no more significant. It has also been understood that there exists a direct correlation between pertaining valid performance measures and strategic performance. The importance of developing a MCPM system to recover Ethiopian manufacturing enterprises from their provoking productivity and profitability decline has been accepted. To make practical the aforementioned conclusions, the following vital recommendations are provided.

1. Management commitment must be achieved in order to fulfill the preconditions and infrastructures for successful implementation of relevant operations strategies & measurement systems.
2. Endeavor must be devoted to change existing work-culture in order to engage the organization's employees towards common strategies that will alleviate the current business situation.
3. Since well-rehearsed adages declared that: "What gets measured gets done" and "You get what you measure", it is essential to develop strategies, performance measures, and initiatives which will facilitate a competitive advantage in global markets.
4. Management accounting based PMSs are no longer useful. Modern performance measures should be primarily using non-financial measures, related to manufacturing strategy, intended to foster improvement, easy to use, and responsive.
5. MCPM model and its implementation steps have been proposed through a thorough analysis of drawbacks and merits of numerous international models. In addition feedbacks were gathered concerning existing challenges in manufacturing sector. Then, managers should use it as a basement to develop their own MCPM system.

5.3 Future Research Directions

Researches concerning performance measures are critical issues in world-class manufacturers in order to maintain their reputation and stay in the market. But the reverse is true in low performing companies like in Ethiopia. If these circumstances are prolonged, the gaps will broaden more. And Ethiopian enterprises will be out of the market completely in near future because of fierce global competition. Taking into consideration these facts, researches concerning development of relevant performance measures are issues whether to exist or not for country's enterprises.

A MCPM model has been developed using responses in 28 sampled manufacturing enterprises, which are mostly state-owned. Since the sample size is not large enough, the study is unable to represent the entire manufacturing sectors. Moreover, detail analysis in a specific company has not been conducted. According to these limitations, the researcher's suggestions for future researchers are:

1) Researches incorporating larger sample sizes (including both private & public enterprises) should be conducted.
2) Specific performance measurement systems should be developed to a specific company according to its particular challenges.
3) Finally, since the service sector is also as important as to the manufacturing sector for economic development, measurement systems and strategies for service giving companies must be researched & developed based on their nature of business.

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7. ANNEXES

Annex A – Survey Questionnaire

Addis Ababa University

School of Graduate Studies

Faculty of Technology, Department of Mechanical Engineering

Graduate Program in Industrial Engineering

By: Fentahun Moges

E-mail: mogesfenta@yahoo.com

Mechanical Engineering (Industrial Engineering Stream) studies, 2005-07 March, 2007

TITLE: "Multi-Criteria Performance Measurement Model Development for Ethiopian Manufacturing Enterprises"

Questionnaire Survey in Ethiopian Manufacturing Enterprises

Acknowledgement to the respondent

Hereby, I would like to express my gratitude for your dedicated cooperation. Had it not been your genuine cooperation of filling this questionnaire, it would have not been possible to conduct this thesis. This questionnaire is conducted for the purpose of fundamental scientific research. Therefore, we assure you that the information obtained from this questionnaire will be kept confidential and will not be transferred to other parties for any other purpose. You may feel free to verify these statements from us personally. For other questions pertaining to this thesis, please contact the thesis advisor.

Yours Sincerely,

Dr. Ing. Daniel Kitaw (Associate Professor of Mechanical Engineering)
Associate Dean for Research and Graduate Programs
Technology Faculty, Addis Ababa University, Phone: 0111232439, Fax: 00251(11) 1239480

I. Company details

a. Company name_____
b. Company address_____
c. Your current position_____
d. Highest Qualification_____
e. Your work experience in this company in year _____
f. Types of Ownership: Private _____ Public_____
g. Total number of full–time employees _____

II. Data collection about the existing business performance results

A. Please, fill the table below with appropriate values that have been recorded & documented before from your company's performance evaluation reports.

Performance Criteria	Budget Year			
	2002/03	2003/04	2004/05	2005/06
Sales [Birr]				
Production [Birr]				
Cost of Production [Birr]				
Profit before income tax [Birr]				
Total Asset [Birr]				

B. Please, rate the following performance results with a scale of five points based on the current status of your enterprise, and tick (X) mark on space given in a table. (Score of 5 = Excellent, 4 = Very Good, 3 = Good, 2 = Fair, & 1= Poor).

S/N	Description	Score				
		1	2	3	4	5
1	Customer satisfaction level					
2	Process quality improvement					
3	Employees' skill & capability					
4	Employee satisfaction level					
5	Fulfilling social & environmental obligations					
6	Supplier partnership					

III. The purpose of this questionnaire survey section is to assess the existing performance measurement and evaluation practices.

A. For general questions # (1-9), please circle a choice number that best describes the current status of your enterprise.

1. The importance performance measurement/evaluation for decision making in your enterprise is 1) Extremely Low 2) Low 3) Moderate 4) High 5) Extremely High
2. How often is the performance evaluation being reported? 1) Weekly 2) Monthly 3) Quarterly 4) Twice a Year 5) Yearly 6) If any other _____
3. How does your company use performance evaluation reports to identify areas that need strategic focus? 1) Never 2) Rarely 3) Sometimes 4) Frequently 5) Always
4. Does your enterprise use any one of performance measurement approach such as multi-criteria, integrated, or balanced scorecard? 1) Yes 2) No
5. The degree of alignment & linkage between strategic performance measures and strategic goals is 1) Extremely Low 2) Low 3) Middle 4) High 5) Extremely High
6. How does the company modify its performance measures as it changes its strategic objectives? 1) Never 2) Rarely 3) Sometimes 4) Frequently 5) Always
7. Is there a link between the enterprise's strategic objectives/goals & employees' performance appraisal? 1) Yes 2) No
8. The degree of integration between financial and non-financial measures in the firm is 1) Extremely Low 2) Low 3) Moderate 4) High 5) Extremely High
9. Is your performance measurement/evaluation system computer-based? 1) Yes 2) No

B. To what extent does your company utilize performance measures that are described from question # 10-16 during strategic performance evaluation? Please tick (X) mark on space provided in each table with a scale of five points. (Score of 5 =Very Highly, 4 =Highly, 3 =Moderately, 2 =Lowly, & 1=Very Lowly).

10. **Financial Measures**

S/N	Description performance measures	Score				
		1	2	3	4	5
1	Total sales volume/growth					
2	Operating profit					
3	Return on asset/capital employed					
4	Return on investment					

11. Customer and Market Measures

S/N	Description performance measures	Score				
		1	2	3	4	5
1	Increase in market share					
2	Reduction in customer complaint					
3	Increase customer retention/ acquisition					
4	Customer profitability					

12. Internal Process/Operation Measures

S/N	Description performance measures	Score				
		1	2	3	4	5
1	Improvement in product and service quality					
2	Reduction in manufacturing lead time (MLT)					
3	Reduction in operating costs					
4	Improvement in operating efficiency					
5	Down time & machineries availability					

13. Employee Satisfaction Measures

S/N	Description performance measures	Score				
		1	2	3	4	5
1	Employee complaint /satisfaction					
2	Employee retention /turnover/absenteeism					
3	Accidents and working environment					
4	Salary, incentive and reward					

14. Training & Development Measures

S/N	Description performance measures	Score				
		1	2	3	4	5
1	Training and education					
2	Skill & capacity development					
3	Qualification growth					
4	Innovation (new products, methods, ideas, etc)					

15. Social and Environmental Measures

S/N.	Description performance measures	Score				
		1	2	3	4	5
1	Market stabilization					
2	Waste treatment & pollution control					

3	Cash outflow for social security					
4	Society complaint/satisfaction					

16. Supplier Partnership Measures

S/N	Description performance measures	Score				
		1	2	3	4	5
1	Materials quality					
2	Delivery time					
3	Materials cost					

IV. The purpose this survey section is to get information for the need of multi-criteria performance measurement approach and pre-conditions to implement it

For questions # (17 to 20), please choose and circle the number among given alternatives on the be-half your company.

17. The need for your company to use a performance measurement system that integrates financial & non-financial measures is 1) Low 2) Moderate 3) High

18. Do you agree the following performance measures to be included as organization's strategic goal & performance evaluation criteria? Please choose 'Yes' or 'No' and tick (X) mark on space provided in a table.

S/N	Description	Yes	No
1	Financial perspectives		
2	Customer perspectives		
3	Internal process		
4	Employee perspectives		
5	Learning, growth & innovation perspectives		
6	Supplier perspectives		
7	Social perspectives		

19. How often should the performance evaluation be reported? 1) Weekly 2) Monthly 3) Quarterly 4) Twice a Year 5) Yearly

20. To what extent would the following pre-condition be fulfilled for a successful multi-criteria performance measurement system implementation? And tick (X) mark on space provided in a table to indicate your choice.

	Pre-conditions	Fully	Moderate	Hardly/not
1	Top management commitment			
2	Every body's commitment			
3	Working culture change			
4	Transparency, trust, honesty & responsibility			

Annex B – List of Surveyed Companies

SN	**Name of Surveyed Companies**	**Permanent Employees [2005/06]**
1	Adei Ababa Yarn S.C	1507
2	Akaki Garment S.C	336
3	Akaki Textile S.C	1785
4	Anbessa Shoe Factory	657
5	Meta Abo Brewery S.C	796
6	Ethiopian Crown Cork & Can Mnfg S.C	160

7	Kality Food S.C	506
8	Akaki Spare Parts & Hand Tools S.C	650
9	Wonji/Shoa Sugar Factory	3050
10	Metahara Sugar Factory	3807
11	Tikur Abay Shoe Factory	520
12	Addis Engineering Center	259
13	Addis Ababa Tannery S.C	318
14	Gulele Garment S.C	294
15	Ethiopia Tannery S.C	772
16	Kombolcha Textile S.C	1750
17	Bahir Dar Textile S.C	1878
18	Dire Dawa Textile S.C	1785
19	Fafa Food S.C	354
20	Addis Mojio Edible Oil S.C	287
21	Dire Dawa Food S.C	352
22	Bahir Dar Edible Oil S.C	121
23	Adea Flour & Pasta S.C	424
24	Nazareth Edible Oil S.C	79
25	East African Holding Business Group	80
26	Kotebe Metal Tools Factory	154
27	Assela Malt Factory	135
28	Ambo Mineral Waters S.C	552

Annex C –Detail survey questionnaire outputs of "section II"
Sub-section – A

	Annual Profit before Income Taxation				Annual Net Total Assets			
SN	2002/03	2003/04	2004/05	2005/06	2002/03	2003/04	2004/05	2005/06
1	-6996	-11250	-11674	-11761	24497	22139	46776	45059
2	-1192	-3382	-2471	-3256	15571	20859	20062	17565
3	-8287	-9172	-9723	-12607	59571	52376	42965	32265
4	-2491	-1122	-1855	184		29557	28522	30284
5	64203	67565	67930	68060	201131	206435	210977	181822
6	5155	3641	3740	6161	26454	26194	30571	33375
7	654	-2416	230	1428	95954	94075	91904	91254
8	-3739	2957	4751	1754	139549	147769	149524	148560
9	92925	124974	53323	39731	178662	182064	203784	205181
10	159034	222830	109130	115100	406526	464132	523908	539363
11	3610	2418	377	823	40471	38164	38073	42933
12		-1805	-2286	-3034		33119	27709	27383
13	866	2845	2571	1742	18801	20524	21409	21511
14	-1176	-1944	128	-1534	15578	11228	8911	15587
15	4812	4280	-4820	-6169	1181505	182409	177241	173949
16	-8564	-8359	-9849	-8000	142707	154430	169351	168370
17	-1183	-7347	-5639	-	57424	51632	69262	-
18	-4695	-5495	-15729	-12551	36565	37293	21573	16182

19	13140	5033	3526	5278	65700	55922	176300	58514
20	1584	-5953	-6573	-10014	93176	350176	111407	123500
21	12123	11787	783	281	121230	142012	71182	103320
22	425	-103	-500	-1936	21250	10300	16667	19149
23	1580	1954	2014	1829	21067	20787	16495	15280
24	2013	952	750	503	6494	2505	2083	2012
25	723	522	5997	5636	30506	23836	140117	67904
26	-687	-463	559	-	8959	9775	13748	-
27	255	11492	16402	8876	4041	72459	93672	85182
28	17454	16813	13394	14100	193075	174590	172159	183833

SN	Profit margin before income tax				Mean	Return on total assets (ROA)				Mean
	02/03	03/04	04/05	05/06		02/03	03/04	04/05	05/06	
1	-76.5	-67.9	-42.5	-47.2	-58.5	-28.6	-50.8	-25.0	-26.1	-32.6
2	-13.5	-24.3	-34.7	-75.0	-36.9	-7.7	-16.2	-12.3	-18.5	-13.7
3	-31.4	-38.7	-41.6	-63.6	-43.8	-13.9	-17.5	-22.6	-39.1	-23.3
4	-14.1	-5.0	-8.1	0.6	-6.6	-2.4	-3.8	-6.5	0.6	-3.0
5	32.1	32.9	31.0	27.9	31.0	31.9	32.7	32.2	37.4	33.6
6	17.1	10.5	9.5	12.1	12.3	19.5	13.9	12.2	18.5	16.0
7	1.1	-4.9	0.5	3.2	0.0	0.7	-2.6	0.3	1.6	0.0
8	-21.2	9.7	13.1	4.1	1.4	-2.7	2.0	3.2	1.2	0.9
9	33.9	37.4	17.1	10.8	24.8	52.0	68.6	26.2	19.4	41.6
10	37.4	51.0	27.9	22.4	34.7	39.1	48.0	20.8	21.3	32.3
11	10.3	7.4	1.1	2.7	5.4	8.9	6.3	1.0	1.9	4.5
12	-	-10.7	-10.5	-18.0	-13.1	-	-5.5	-8.3	-11.1	-8.3
13	3.8	12.0	8.7	5.3	7.4	4.6	13.9	12.0	8.1	9.6
14	-11.1	-18.3	1.1	-14.7	-10.8	-7.6	-17.3	1.4	-9.8	-8.3
15	3.1	2.9	-2.7	-3.5	-0.1	0.4	2.4	-2.7	-3.6	-0.9
16	-11.9	-9.2	-14.5	-11.1	-11.7	-6.0	-5.4	-5.8	-4.8	-5.5
17	0.0	-2.5	-15.3	-10.6	-9.5	-2.1	-14.2	-8.1		-8.1
18	-9.9	-9.3	-29.1	-22.5	-17.7	-12.8	-14.7	-72.9	-77.6	-44.5
19	29.4	18.7	13.3	12.8	18.6	20.0	9.0	2.0	9.0	10.0
20	4.0	-23.3	-29.5	-51.1	-25.0	1.7	-1.7	-5.9	-8.1	-3.5
21	13.0	12.3	0.9	0.3	6.6	10.0	8.3	1.1	0.3	4.9
22	4.7	-1.3	-7.3	-46.3	-12.6	2.0	-1.0	-3.0	-10.1	-3.0
23	7.0	8.0	7.0	6.1	7.0	7.5	9.4	12.2	12.0	10.3
24	18.9	8.8	14.3	6.6	12.1	31.0	38.0	36.0	25.0	32.5
25	5.8	4.6	13.2	10.3	8.5	2.4	2.2	4.3	7.8	3.2
26	-19.6	-10.3	4.9	-	-8.4	-7.7	-4.7	4.1	-	-2.8

27	0.5	20.1	24.4	15.4	15.1	6.3	15.9	17.5	10.4	12.5
28	24.5	26.4	20.4	19.5	22.7	9.0	9.6	7.8	7.7	8.5

SN	Annual Net Sales Performance				Annual Production Performance			
	2002/03	2003/04	2004/05	2005/06	2002/03	2003/04	2004/05	2005/06
1	9140	16573	27465	24936	7733	20210	25974	23802
2	8861	13900	7115	4341	7797	12214	7362	3319
3	26413	23696	23395	19809	28044	26451	21336	18671
4	17653	22619	22919	31163	15200	23370	19108	22648
5	199846	205422	219075	243958	199698	207151	221686	244392
6	30218	34625	39435	50746	29197	34571	29275	50828
7	59615	49303	49101	45108	45601	31264	44073	49298
8	17664	30430	36419	43172	15894	26170	37555	33566
9	274227	334087	312106	368467				
10	424839	437147	390762	513969				
11	34926	32561	34983	30750	27913	28513	28519	26266
12	-	16939	21689	16832				
13	23102	23745	29618	32979				
14	10585	10630	11734	10450				
15	155892	150348	179021	174170	47425	47710	47522	48247
16	72191	90899	68034	72203	64561	65320	57467	57561
17	48269	48159	53046		34325	35944	51495	
18	47492	58845	53980	55831	42405	60358	60173	59268
19	44704	26890	26424	41316	27949	20692	21692	35656
20	39978	25543	22318	19615	39633	23345	21695	27048
21	93020	96039	83091	105500	73727	79961	71256	137639
22	9044	8061	6815	4183	7511	8645	5043	4548
23	22660	24442	28685	30230	18201	20945	23703	26409
24	10659	10848	5249	7629	8058	9713	5108	6259
25	12407	11302	39425	54722				
26	3504	4488	11488		2295	3782	7771	
27	55125	57227	67343	57721	40343	41275	43934	47801
28	71401	63610	65643	72222	27312	22923	25482	26979

SN	Revenue Growth			Mean	Production Growth			Mean
	2003/04	2004/05	2005/06		2003/04	2004/05	2005/06	
1	81.32	65.72	-9.21	45.95	161.35	28.52	-8.36	60.50
2	56.87	-48.81	-38.99	-10.31	56.65	-39.72	-54.92	-12.66
3	-10.29	-1.27	-15.33	-8.96	-5.68	-19.34	-12.49	-12.50
4	28.13	1.33	35.97	21.81	53.75	-18.24	18.53	18.01
5	2.79	6.65	11.36	6.93	3.73	7.02	10.24	7.00
6	14.58	13.89	28.68	19.05	18.41	-15.32	73.62	25.57

7	-17.30	-0.41	-8.13	-8.61	-31.44	40.97	11.86	7.13
8	72.27	19.68	18.54	36.83	64.65	43.50	-10.62	32.51
9	21.83	-6.58	18.06	11.10				
10	2.90	-10.61	31.53	7.94				
11	-6.77	7.44	-12.10	-3.81	2.15	0.02	-7.90	-1.91
12	-	28.04	-22.39	2.82				
13	2.78	24.73	11.35	12.95				
14	0.43	10.39	-10.94	-0.04				
15	-3.56	19.07	-2.71	4.27	0.60	-0.39	1.53	0.58
16	25.91	-25.15	6.13	2.30	1.18	-12.02	0.16	-3.56
17	-0.23	10.15	0.00	4.96	4.72	43.26		23.99
18	23.91	-8.27	3.43	6.36	42.34	-0.31	-1.50	13.51
19	-39.85	-1.73	56.36	4.93	-25.97	4.83	64.37	14.41
20	-36.11	-12.63	-12.11	-20.28	-41.10	-7.07	24.67	-7.83
21	3.25	-13.48	26.97	5.58	8.46	-10.89	93.16	30.24
22	-10.87	-15.46	-38.62	-21.65	15.10	-41.67	-9.82	-12.13
23	7.86	17.36	5.39	10.20	15.08	13.17	11.42	13.22
24	1.77	-51.61	45.34	-1.50	20.54	-47.41	22.53	-1.45
25	0.81	78.67	76.07	51.85				
26	28.08	155.97		92.03	64.79	105.47		
27	3.81	17.68	-14.29	2.40	2.31	6.44	8.80	5.85
28	-10.91	3.20	10.02	0.77	-16.07	11.16	5.87	0.32
	8.67	7.33	6.52					

Sub-section - B

SN	Description	Score					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Customer satisfaction level	6	8	10	4	0	68	2.43	0.19
2	Process quality improvement	7	10	6	5	0	65	2.32	0.20
3	Employees' skill & capability	6	9	10	3	0	66	2.36	0.18
4	Employee satisfaction level	5	11	9	3	0	66	2.36	0.18
5	Fulfilling social & environmental obligations	7	10	7	4	0	64	2.29	0.19
6	Supplier partnership	8	12	6	2	0	58	2.07	0.17

Annex D – Detail survey questionnaire outputs of "Section III"
Sub-section - A

Q.NO	Score					Total	Mean	Std. dev.
	1	2	3	4	5			

1	0	7	13	7	1	86	3.07	0.16
2	NA	NA	NA	NA	NA	NA	NA	NA
3	4	12	10	3	0	70	2.50	0.14
4	0	28	NA	NA	NA	NA	NA	NA
5	9	14	4	1	0	53	1.89	0.15
6	6	10	8	3	1	67	2.39	0.21
7	2	27	NA	NA	NA	NA	NA	NA
8	4	17	5	2	0	61	2.18	0.15
9	0	28	NA	NA	NA	NA	NA	NA

Sub-section – B (Utilization of financial & Non-financial performance measures)

10. Financial Performance Indictors

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Sales volume/growth	0	0	1	7	20	131	4.68	0.11
2	Operating profit	0	0	2	5	21	131	4.68	0.12
3	Return on asset	0	0	3	7	18	127	4.54	0.13
4	Return on investment	0	0	8	13	7	111	3.96	0.14
	Total	0	0	14	32	66	500		
	Mean	0	0	3.5	8	16.5	125	4.46	0.14
	Percentage	0.0	0.0	12.5	28.57	58.93			

11. Customer & Market Performance Indictors

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Market share	5	12	9	1	1	65	2.32	0.18
2	Customer complaint	4	6	12	4	2	78	2.79	0.21
3	Customer retention	7	7	11	2	1	67	2.39	0.21
4	Customer profitability	9	13	2	3	1	58	2.07	0.21
	Total	25	38	34	10	5	268		
	Mean	6.25	9.5	8.5	2.5	1.25	67	2.39	0.21
	Percentage	22.32	33.93	30.36	8.93	4.46			

12. **Operation/Process Performance Indictors**

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Product/service quality	2	9	14	2	1	75	2.68	0.17
2	Manufacturing lead time	3	13	9	3	0	68	2.43	0.16

3	Operating costs	1	3	8	13	3	98	3.50	0.19
4	Operating efficiency	2	4	12	8	2	88	3.14	0.19
5	Down time	2	3	12	10	1	89	3.18	0.18
	Total	10	32	55	36	7	418		
	Mean	2	6.4	11	7.2	1.4	83.6	2.99	0.19
	Percentage	7.14	22.86	39.29	25.71	5.0			

13. Employee Satisfaction Performance Indictors

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Employee complaint	6	9	12	1	0	64	2.29	0.16
2	Employee turnover	7	9	10	2	0	63	2.25	0.18
3	Accidents	8	10	9	1	0	59	2.11	0.17
4	Incentive and reward	6	8	9	5	0	69	2.46	0.20
	Total	27	36	40	9	0	255		
	Mean	6.75	9	10	2.25	0	63.75	2.28	0.18
	Percentage	24.11	32.14	35.71	8.04	0.0			

14. Training & Development Performance Indictors

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Training and education	4	7	8	8	1	79	2.82	0.22
2	Skill & capacity development	5	10	11	2	0	66	2.36	0.17
3	Qualification growth	12	11	3	2	0	51	1.82	0.17
4	Innovation	8	14	4	2	0	56	2.00	0.17
	Total	29	42	26	14	1	252		
	Mean	7.25	10.5	6.5	3.5	0.25	63	2.25	0.20
	Percentage	25.9	37.5	23.21	12.5	0.89			

15. Environmental and Social Welfare Performance Indictors

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Pollution control	8	11	5	2	2	63	2.25	0.23
2	CF for social security	11	10	4	2	1	56	2.00	0.21
3	Society complaint	8	12	4	4	0	60	2.14	0.19
	Total	27	33	13	8	3	179		
	Mean	9.00	11.00	4.33	2.67	1.00	59.67	2.13	0.21
	Percentage	32.14	39.29	15.48	9.52	3.57			

16. Supplier Partnership Performance Indictors

N	Description performance measures	Utilization Rate					Total	Mean	Std. dev.
		1	2	3	4	5			
1	Materials quality	7	12	5	3	1	63	2.25	0.21
2	Delivery time	9	9	8	2	0	59	2.11	0.18
3	Materials cost	4	10	9	3	2	73	2.61	0.21
	Total	20	31	22	8	3	195		
	Mean	6.67	10.33	7.33	2.67	1.00	65.00	2.32	0.21
	Percentage	23.81	36.90	26.19	9.52	3.57			

Annex E - Detail of outputs survey questionnaire

Q17	Low	Moderate	High
Frequency	0	2	26

Q18	Description	Yes	No
1	Financial perspectives	100%	0%
2	Customer perspectives	100%	0%
3	Internal process	100%	0%
4	Employee perspectives	100%	0%
5	Training & development	100%	0%
6	Supplier perspectives	93%	7%
7	Social perspectives	93%	7%

Q19	1	2	3	4	5
Frequency	0	3	19	5	1

Q20	Pre-conditions	Fully	Moderate	Hardly
1	Top management commitment	93%	7%	0
2	Every body's commitment	43%	57%	0
3	Working culture change	86%	14%	0
4	Transparency, trust, honesty & responsibility	89%	11%	0

Annex F - Detail descriptions of traditional PM framework

Direct material costs

Beginning inventory---------- xx
Purchased direct materials----------+ xx
Cost of direct materials available for use---------- xxx
Ending inventory---------- -xx
Direct materials used---------- xxx
Direct manufacturing labor & Energy---------- xxx

Indirect manufacturing costs

Materials handling costs---------- xx
Lubricant and coolant---------- xx

Indirect manufacturing labor---------- xx
Depreciation plant equipment and buildings---------- xx
Property tax---------- xx
Insurance expense---------- xx
Total ---------- +xxx
Manufacturing costs incurred in a year---------- xxx
Add beginning work-in-process---------- +xx
Total manufacturing costs to accounts---------- xxx
Deduct beginning work-in-process---------- -xx
Cost of goods manufactured---------- xxx
Add beginning finished goods---------- +xx
Cost of goods available for sale---------- xxx
Deduct ending finished goods---------- -xx
Cost of goods sold---------- **xxx**

Income statement

Net sales/Revenue ---------- xxx
Cost of goods sold---------- -xxx
Gross profit---------- xxx
Marketing, distribution, customer service &administration costs---- -xx
Operating profit----------xxx
Deduct income tax & interest---------- -xx
Net income (profit) ---------- **xxx**

Statement of Owner's Equity

Beginning owner's equity/capital---------- xxx
Additional cash contributed/investment---------- xxx
Net profit---------- xxx
Cash withdrawal---------- -xx
Change in owner's equity---------- xxx
Ending owner's equity/capital---------- **xxx**

Balance Sheet

Owner's equity---------- xxx
Liabilities---------- +xx
Total asset---------- **xxx**