Analysis of Supply Chain Performance Measurement System in Addis Ababa: The Case of Selected Shoe Factories

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Addis Ababa

DECLARATION

I, the undersigned, declare that this study **"Analysis of Supply Chain Performance Measurement System in Addis Ababa: The Case of Selected Shoe Factories"** is my original work and has not been presented for a degree in any other university, and that all sources of materials used for the study have been duly acknowledged.

Sentayehu Wehibe _____ _____

Signature Date

This is to certify that the above declaration made by the candidate is correct to the best of my knowledge.

Dr. Mengist H/Mariam _____ _____

Signature Date

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Approved by Board of Examiners

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List of Acronyms and Abbreviations

AHP	Analytic Hierarchy Processing
BSC	Balanced Score Card
CI	Consistency Index
CR	Consistency Ratio
CRM	Customer Relationship Management
ISRM	Internal Relationship Management
PMS	Performance Measurement System
SC	Supply Chain
SCM	Supply Chain Management
SCOR	Supply Chain Operations Reference
SRM	Supply Relationship Management
TA	Tikur Abay
USD	United States Dollar

ABSTRACT

Supply chain performance measure has a vital role in the improvement of the organization's overall performance. As a result, different measurement factors were employed and performance frameworks have been changed rapidly due to the effect of today's competitive global market over a period of time. Although Ethiopia's manufacturing sector has been developing in a way to fit in a global arena, it is still struggling at an infant stage, this show these factories has problem in their supply chain performance which indicates the presence of problems needs further improvement. This happens due to lack of holistic performance measurement approaches employed for their supply chain performance measurement. The overall objective of this study was to investigate the supply chain performance measurement practices of Ethiopian footwear companies using holistic measurement factors in combination of macro processes and decision making level within performance measurement framework. The study was conducted in three shoe manufacturing companies using a predesigned Likert scale type questionaries' for purchasing, production and marketing department each companies. Hypothesis was also developed and its significance was tested using SPSS. Additionally, AHP model was employed to check for the desirability of the measurement factors using MATLAB. For checking the internal consistency of the items under study, Cronbach's alpha was employed and it was learnt that the data were reliable. The results in between groups and within groups are compared using analysis of variances ANOVA. The priority given for each measurement factors were also measured using AHP model. Then, the result of the study shows that the majority of the performance measurement factors differ among the three manufacturing companies at a 5% significant level. Similarly, measuring factors which were given more priority or which are more desirable than other factors to be used for measuring supply chain performance in the case shoe companies were also identified. Moreover areas which need further improvement were also identified, As a result, it was devised that shoe factories should have to give due attention for developing green supplier selection policy, safe and advanced working environment, optimal inventory policy, proper waste management, proper management of obsolete raw material, proper operation of information technology and assessing on degree of bottleneck for managing bottlenecks to achieve best performance in their supply chain and to be competitive in global market.

Key words: *Supply chain performance, Performance measurement factors, supply chain Macro process, Decision making level, Desirable performance measurement factors*

CHAPTER ONE

1. INTRODUCTION

This chapter provides an introduction to the research covered in this study. It starts by explaining the background of this study and followed by formulation of problem statement which is based on the problem to be studied general and specific objective, scope, significant and limitation of the study and research methodology are presented. Finally the organization of the study is described.

1.1. Background of the Study

Performance measure has a vital role in the improvement of the organization's overall performance. It can indicate the level of progress and the necessary action required to improve the organization. It is very advantageous for managers to evaluate and control the progress of the factory's performance as an initial step in the development of the factory. Performance measurement can be used to evaluate the effectiveness of strategies in Supply Chain Management (SCM) and to indicate success and opportunities for the future. It gives significant contribution in the decision making process in SCM, especially for the process of re-planning the factory's objectives and strategies, as well as in the re-engineering process (Chan 2003).

In supply chain management there are various approaches used to efficiently and effectively integrate suppliers, manufactures, warehouses and stores so that players in the supply chain can produce and distribute their product at the right quantity and quality, at the right time to the right place with fair price. The overall target is to minimize system wide cost while satisfying service level requirements. It is proven that by having effective supply chain management of organizations, it is possible to have effective mechanism for providing rapid and reliable delivery of high-quality products and services at the minimum cost. To achieve an efficient and effective supply chain, performance evaluation of the whole supply chain is very important.

Performance frameworks have been changed rapidly due to the effect of today's competitive global market. The measurement of Performance has been made through quality management and customer satisfaction, human resource management, financial management and process management (Cuthbertson, R. and Piotrowicz, W., 2011). All performance measures need to be aligned with firms' supply chain strategies. The revolution of performance measurement shows a streamline of financial performance measurement to a balanced and integrated orientation (Luthra, S., Garg, D. and Haleem, A., 2013).

Regarding the availability of required raw material, Ethiopia is a country were hide and skin can be available in quantity at large sale level despite the quality. There is the largest livestock population in Africa and which is also among the largest population at the world level. According to the information obtained from the Ethiopian embassy website, this large population contributed and created an opportunity for the country to produce 2.7 million hides, 8.1 million sheepskins and 7.5 million goatskins annually (www) (investingleather). This enables the country to have a potential to enhance manufacturing and export production, and thereby to increase employment opportunities and then ultimately to reduce poverty. However, although it is endowed with this ample raw material availability, which is the major commodity in the export market, the manufacturing sector of the country in this sector is at its lower stage when compared with the real potential to reach.

1.2. Problem Statement

As indicated by past researches, the development of foot wear industry in Ethiopia is at its infant stage. Using the better opportunity and awareness related in the present days, there are thousands of manufacturing industries emerging from small scale to large scale level in the sector (Sonobe, Akoten and Otsuka 2007). Despite this growing momentum, these industries are not at the position to utilize the entre potential the country has endowed. That means, these industries are not reaching on the position of competing enough in the global market. The main identified reasons behind this are, insufficient availability of raw material like chemicals, accessories and spare parts at a required level in terms of quality and quantity, weak linkage between the leather industry and agriculture, less productivity and capacity

utilization, transport and logistics constraints, limited marketing capacity at factory levels (FDRE Ministry of Industry 2013). This constraint restricts local and global competition at a limited scope even below the satisfaction of the domestic market. These all are because of the weakness of these factories in conducting Supply Chain Performance measurement and adjusting themselves according to the measuring factors requirement. This is also because of the low experience these factories have in conducting Supply Chain Performance measurement which enables them to check and adjust their status in a way that enable them get competitive in the local and global market.

As a result, the quantity of the product of foot wear industry to be exported is by far below what is imported. Because of this, there is highly negative trade balance between export and import in this industry as shown in the data of the Table 1.1 which covers the period from 2005/2006 to 2010/2011.

Table 1.1: Trade Balance of Footwear Industry (000'USD)

Year	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Import	23,067	25,101	20,582	22,259	30,804	31,860
Export	805	2,349	6,040	7,650	6,114	6,449
Trade balance	(22,263)	(22,752)	(14,542)	(14,609)	(24,690)	(25,412)

Source: Summary based on Ethiopian Custom and Revenue Authority data (FDRE Ministry of Industry 2013)

These figures indicate that the Ethiopian Footwear Industries are low competitive in domestic and global market. They are unable to win the interests of their customers. The reason for their failure to win the interests of the market (customers) in a better way than their competitors is due to the tremendous problems associated with the whole spectrum of their supply chain (Gezahegn 2009).

It has been reviewed that, there have been relatively few attempts to systematically organize models for assessing the performance measurement of supply chain (Gunasekaran and Kobu 2007).For the success of supply chain management, it is important to measure its

performance (Gunasekaran, Patel and Tittiroglu 2001). Many researchers gave attention on single area of supply chain performance measurement, this study focus on the whole performance of supply chain management which have been relatively neglected (Chan 2003), (Aramyan, et al. 2007) (Chae 2009). Because of this, as many factories are now seeking for holistic perspective model which could integrate decision making level and supply chain core process in their present competitiveness in away enable to enhance their comparative advantage in both local and global market since today's competition lies on outside wall of an organization, it is determined by how effective and efficient the factories link with suppliers, distributors, wholesalers , retailers and end customers (Bogale 2016). This paper will contribute its part in suggesting possible options and future directions.

This research, therefore, is intended to employ a more comprehensive approach to study supply chain performance using measurement factors by combining both supply chain macro processes and decision making. That is, considering a balanced horizontal and vertical (hierarchical decision) view for manufacturing factories.

1.3. Research Questions

Based on the above problem statement the following questions are identified to be addressed

1. How is supply chain performance operated in shoe factories?
2. What are the major focuses of these industries as a measurement to performance of supply chain?
3. What are performance measuring systems at different decision making level in the supply chain macro processes?

1.4. Objective of the study

1.4.1. General objective

The overall objective of this study is to investigate the supply chain performance measurement practices of Ethiopian footwear companies using holistic measurement factors

in combination of macro processes and decision making level within performance measurement framework.

1.4.2. The specific objectives are:

To attain the general objective of the study, the following specific objectives are mentioned as:

- To identify the performance measuring factors operated at different decision making level against the supply chain macro processes.
- To examine whether those identified performance factors are implemented or not in the selected footwear factories.
- To compare the extent of supply chain performance differences among selected manufacturing companies.
- To prioritize the importance of the supply chain performance measurement factors in the selected footwear factories

1.5. Significance of the Study

The majority of the research on supply chain management concerns mainly industries in developed countries. As a result, there is a lack of significant study on supply chain performance measurement in developing countries which uses the holistic approach. While there are studies of general supply chain management, there is limited research on the performance measurement of supply chain management. In addition, the importance of supply chain management is growing in a number of developing countries. Therefore, this study focuses on a supply chain performance measurement framework that can be applied to the manufacturing sector in a developing country context, specifically, Addis Ababa's leather shoe manufacturing sector.

It aims to apply a complete and integrated supply chain performance measurement framework in the leather Shoe manufacturing sector in Addis Ababa which is the very important approach in a today's supply chain performance measurement. Moreover, the study will facilitate cross organizational learning. The study also helps to identify the gaps

and advice on the importance of the supply chain performance of the factories to increase the profit and competitiveness of the sector in away enable to increase the customer's satisfaction. It also brings a great contribution for policy formulators and plan makers to formulate a better direction in the development heading towards the industrialization lead economy. Furthermore it can be used as an entry point and reference for further studies to be conducted by the scholars in the subject area to devise more potential and possible solution in conducting supply chain performance.

1.6. Scope of the Study

The study is limited to supply chain performance measure of three shoe manufacturing factories located in Addis Ababa city. These manufacturing factories were selected based on the production efficiencies and experience. Similarly, due to the limited resource and time constraint the researcher has for finalizing this study, the study was limited to reaching a strategic and tactical level of the decision making hierarchy.

1.7. Organization of the Study

The first chapter presents the general introduction, problem statement, general and specific objective, significant of the study and limitation of the study and followed by chapter two which presents literature review on the various aspects related to this study which state the theoretical frame of supply chain and supply performance measure. Chapter three presents the methodologies used in answering objectives of the study. Chapter four presents the analysis of the collected data of the research while the last chapter (chapter five) presents the summary, conclusion and recommendations of the study. All other supporting documents have been attached as annexes.

The next chapter reviews literatures, key concepts and theoretical ideas related to this study.

CHAPTER TWO

2. LITERATURE REVIEW

This literature review examines key concepts and approaches used in the study.

2.1. Basics of Supply Chain

Supply Chain, Supply Chain Management and supply chain drivers

Supply chain is a group of organizations which are principally independent and linked together via service and product that separately or jointly add value to the product/service in order to deliver to the customer (Benita M. 1998). For more than three decades business management have undergone insightfully change and developments. Different concepts were raised during this period like business management re-engineering, lean thinking, strategic management, agile manufacturing, balance score card and blue ocean strategies are some of them. Now a day's supply chain management is undoubtedly emerging and rapidly growing well throughout the world. Today's business is reached at a stage of transferring to globalization, more severe competition, and heightened customer expectation. Due to these dynamic changes, focusing on management is not adequate to deliver the required competitiveness. The field for competition is transferred from 'organization to organization' to 'supply chain to supply chain'. The survival of one business is not solely determined by the individual performance or ability rather by synergy and efficiency of the supply chain.

Supply chain management is the management of relationships in the network of organizations, from original suppliers to end customers using key cross-functional business processes to build value for customers and other stakeholders. Effective supply chain management requires performing cross-functional processes within the factory and integrating them with key members of the supply chain. If supply chains are not integrated, appropriately streamlined, and managed, valuable resources will be wasted. The value of having standard business processes in place is that managers from different organizations in the supply chain can use a common language and can link-up their firms' processes with other members of the supply chain, as appropriate.

For the factories in order to define their capability in the given sector, they should make assessment individually and collectively on driving tools like: production, location, information, inventory and transportation. These supply chain drivers has been detailed in Table 2.1 one by one in order to make the roll of individual driver in the given supply chain:

Table 2.1: Supply chain drivers

SC drivers	Description
Production	This driver defines what to produce, how much to produce, Which product and when to produce. These questions help to express the quality control of product, to balance the work load required and for planning equipment maintenance
Inventory	The basic point to mention here is how much stock to have on hand. These helps to satisfy the demand of customer on time and to prevent stock out; moreover it helps to manage the stock not to be excess to prevent blockage of money.
Location	This helps to define where to produce and where to store the product for efficient and effective distribution of product.
Transportation	The basic question in this driver is how to transport the inventory or the product from one supplier to another in the chain. The advantage of deciding on this point is that to be cost wise and satisfying customer without delay
Information	Having a good decision in the supply chain escalate the productivity and profit of throughout the supply chain. So as to do suitable and direct forward information will be the best input for effective and efficient of the supply chain

2.2. Supply Chain Performance Measurement

The main purpose of measuring supply chain performance for a given factory is to evaluate whether its supply chain is improved or degraded and it also helps to maintain its suppliers and customers. The most important component in supply chain design and analysis is the formation of the right performance measures, this helps to determine the exiting efficiency

and effectiveness of supply chain (Benita M. 1998). Supply chain performance measurement system is a performance measurement model which is based on the mutually agreed goals, measures and measurement methodology that specify procedures, responsibilities and accountabilities of supply chains and the criteria of measurement system together with the supply chains (Holmberg 2000). The basic purpose of measuring performance of a given system is to quantify the efficiency and effectiveness of the organizational activity (Neely, Gregory and Platts 1995). As it was also stated by Gunasekaran & Kobu (2007) the major purpose of performance measurements are as follows:

- Pinpointing customer demand and requirement as well as capability, non-value process, problem and improvement opportunities.
- Offer better understanding of process
- Allow monitoring and controlling the achievements
- Facilitate the more communication and cooperation
- Support feedback for decision making

2.3. Evaluation of the Existing Supply Chain Models

Clearly, the approaches proposed in the literature vary in their general orientation. The result based model is oriented toward explanation of internal factors that influence external results. In this sense, it can be grouped under the term result-oriented approach. The best known model in this group is that of the balanced scorecard (BSC) proposed by Kaplan and Norton (1992). The BSC is a powerful and balanced strategic management system that facilitates the implementation of strategy, using measures to ensure that corporate vision and strategy are implemented and achieved (Kaplan and Norton, Using the balanced scorecard as a strategic management system n.d.). Therefore, one of advantages of this model is that the BSC can help senior executives clarify and operate the vision and strategy of the organization, focusing management's attention on a few but critical indicators of both current and future performance (Chia, Goh and Hum n.d.). A balanced performance evaluation of supply chain management such as balanced scorecard not only helps organizations in faster and wider progress monitoring of their operations but can also help them in improving their internal and

external functions of business such as engineering and design applications, production, quality improvement, materials management, quick response, gaining lost market shares and proper implementation of business strategies (Bhagwat and Sharma 2007a). Furthermore, Bremser and Barsky (2004) highlight the following benefits that a factory may obtain from the use of a Balance Score Card:

- The simplicity to translate a factory's strategy into operational terms;
- The alignment of the organization structure with the strategy; - the transformation of the strategy into a continual process;
- The implementation of a process for learning and adapting the firm's strategy;
- The creation of a leadership for change in the strategic management system.

However, Thakkar et al. (2009) summarize the disadvantages of the BSC model compared to the advantages of the SCOR model as follows:

- BSC does not provide a mechanism for maintaining the relevance of defined measures. SCOR adopts a building block approach and offers complete traceability.
- BSC fails to integrate top level, strategic scorecard, and operational level measures potentially making execution of strategy problematic. SCOR clearly defines the type of process (planning, execution and enabling) and configures them to suit the supply chain requirements.
- BSC fails to specify a user-centered development process. A detailed exercise on SCOR generates sufficient information to even develop tailor made software system.

The second category of approach emphasizes the hierarchy. The main model in this category is that of (Gunasekaran, Patel and Tittiroglu, Performance Measures And Metrics in supply chain Environment 2001). Gunasekaran et al. (2004) develop the frameworks that link strategic and operational measures. These frameworks can support the manager to make the right decisions on each level. However, as the frameworks base on the hierarchical model that focus on vertical way, these frameworks need to combine with other models that focus on horizontal way such as result based model or process based model. Therefore**,** this study covers for the whole supply chain system.

The supply chain operations reference (SCOR) model is really the most representative of this last group. It is a well-recognized supply chain model used in many industries around the world. The model allows supply chain partners to 'speak a common language' because it provides standardized definitions for processes, process elements and metrics. Since, the SCOR model gives standardized definitions of performance metrics for the supply chain, it is simple for managers to identify relevant measures and use them. More and more factories have adopted SCOR performance metrics as standard criteria for assessing their supply chain performance (Theeranuphattana and Tang 2008). The SCOR model enables enterprises to analyses their supply chain performance in a systematic way, to increase communication among the members found in the supply chain, and to design a better supply chain network (Hwang et al., 2008). Besides from Thakkar et al. (2009) that summarize the advantages of the SCOR model compared to the disadvantages of the BSC model, other strength of the SCOR model is that it provides a standard format to facilitate communication. It is a suitable tool for the upper management of a firm to design and reconfigure its supply chain to achieve desired performance (Huan, Sheoran and Wang 2004). However, some authors (Angerhofer and Angelides 2006) & (Gammelgaard and Vesth 2004) have noted that although oriented towards process and efficiency, the SCOR model is not oriented towards strategy. Another limitation of this model is that it does not offer a systematic method for prioritizing measures; it has also limitation in implementing this model in developing countries due to variations in environmental factors and conditions (Fasika 2012). However, lately there has been an attempt to augment it by combining it with decision making tools such as analytic hierarchy processing (AHP) (Huan, Sheoran and Wang 2004). Moreover, SCOR's lack of clear connections between functional strategies and corporate strategies might expose the organization wide alignment of resources.

2.4. Supply Chain Performance Measurement Factors Development

For a firm, it has been challenging to develop their own supply chain measuring factors although its importance is estimated from the perspectives of better overall supply chain management. However, for conducting this research in the specified shoe factories, the

framework has been used from concepts in two fields of study, namely decision making levels and supply chain macro processes for measuring the holistic performance of supply chain system. In each concept, it comprises of three themes of study. Decision making levels divide into strategic, tactical and operational. For supply chain macro processes, it can be classified into supplier relationship management (from upstream supplier), internal supply chain management (within factory) and customer relationship management (from downstream customer). Therefore, the total themes of the conceptual framework are six key themes.

2.4.1. Decision Making Levels

There is a close association between the design and management of supply chain flows (information, product and funds) and the success of a supply chain (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2004). Some factories have built their success on superior strategy and operation of their supply chain. In contrary, the failure of many businesses can be attributed to weaknesses in their supply chain strategy and operation. Successful supply chain management involves many decisions relating to the flow of information, product, and funds (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2004). Each decision should be made to raise the supply chain profitability (supply chain surplus), the difference between the revenue generated from the customer and the overall cost across the supply chain (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010). These decisions fall into three categories or levels: strategic, tactical and operational; depending on the authority decision level, the frequency of each decision and the time frame which a decision level has an impact. As a result, each category of decisions must consider uncertainty over the decision level (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2007).

2.4.1.1.Strategic decision making level

At this decision level a factory decided how to structure the supply chain for the next several years by considering the pricing and marketing for a product (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010). It decides what the chain's configuration will be, how resources will be allocated, and what processes each stage will perform. This type of decision is made by top level management decision makers include whether to buy or make a supply chain function in-house, the location and capacities of production and warehousing facilities, the products to be manufactured or stored at various locations, the modes of transportation to be made available along different shipping legs and the type of information system to be utilized (Gunasekaran, Patel and McGaughey, et al. 2004). An organization must ensure the supply chain configuration supports its strategic objectives and increases the supply chain surplus during this level. Supply chain strategic decisions are typically made for the long term (a matter of years) and are very expensive to change on short notice. Accordingly, when factories make these decisions, they must take into account uncertainty in anticipated market conditions over the next few years (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2007).

2.4.1.2.Tactical decision making level

For decisions made during this level, the time frame considered is a quarter to a year. Therefore, the supply chain's configuration determined in the strategic level is fixed (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010). This configuration establishes constraints within which tactic must be done. The goal of tactic is to maximize the supply chain surplus that can be generated over the tactical level given the constraints established during the strategic level. Factories start the tactical level with a forecast for a coming year (or a comparable time frame) of demand in different markets (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010). Tactical decisions made by mid-level management decision makers include making decisions regarding which markets will be supplied from which locations, the subcontracting of manufacturing, the inventory policies to be followed, and the timing and size of marketing

and price promotions (Gunasekaran, Patel and McGaughey, et al. 2004). Tactic establishes parameters within which a supply chain will function over a specified period of time. In the tactical level, factories must include uncertainty in demand, exchange rates, and competition over this time level in their decisions (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2007). Given a shorter time frame and better forecasts than the strategic level, factories in the tactical level try to incorporate any flexibility built into the supply chain in the strategic level and exploit it to optimize performance. As a result of the tactical level, factories define a set of operating policies that govern short-term operations (Gunasekaran, Patel and McGaughey, et al. 2004).

2.4.1.3.Operational decision making level

The time frame here is weekly or daily, and during this level factories make decisions regarding individual customer orders. At the operational level, supply chain configuration is considered fixed, and tactic policies are already defined (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010). The goal of supply chain operations is to handle incoming customer orders in the best possible manner. During this level, operational decisions made by low level managers include allocate inventory or production to individual orders, set a date that an order is to be filled, generate pick lists at a warehouse, allocate an order to a particular shipping mode and shipment, set delivery schedules of trucks and place replenishment orders (Gunasekaran, Patel and McGaughey, et al. 2004). Because operational decisions are being made in the short term (minutes, hours, or days), there is less uncertainty about demand information (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2007). Given the constraints established by the configuration and tactic policies, the goal during the operational level is to exploit the reduction of uncertainty and optimize performance (Huan, Sheoran and Wang 2004)

The strategic, tactical and operational decision making levels of a supply chain have a strong impact on overall profitability and success. It is fair to state that a large part of the success of firms can be attributed to their effective supply chain strategic, tactical, and operational decision making levels (Gunasekaran and Kobu, Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995-2004) for

research and applications 2007). The reason for studying the performance measurement system and performance measurement factors at the strategic, tactical, and operational levels is to make the right decisions so that they can support each other in achieving the overall goals and objectives of an organization. The success of strategy formulation depends upon the degree of alignment of strategies at different levels (Gunasekaran and Kobu, Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995-2004) for research and applications 2007).

2.4.2. Supply Chain Macro Processes

All supply chain processes can be classified into the following three macro processes: supplier relationship management which represents for all processes that focus on the interface between the factory and its suppliers; internal supply chain management which represents for all processes that are internal to the factory; and customer relationship management which represents for all processes that focus on the interface between the factory and its customers. The three macro processes manage the flow of information, product, and funds required to generate, receive, and fulfill a customer request (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2004). Customer relationship management and supplier relationship management form the critical links in the supply chain and the internal supply chain management process is coordinated through them.

Supply Chain processes are classified into three macro processes that manage the flow of information, product and funds required to generate, receive and fulfill a customer order. All the three macro processes are aimed at serving the same customer. Hence for a successful Supply Chain, the three macro processes need to be well integrated. Within a firm, all the supply chain activities belong to one of the three macro processes.

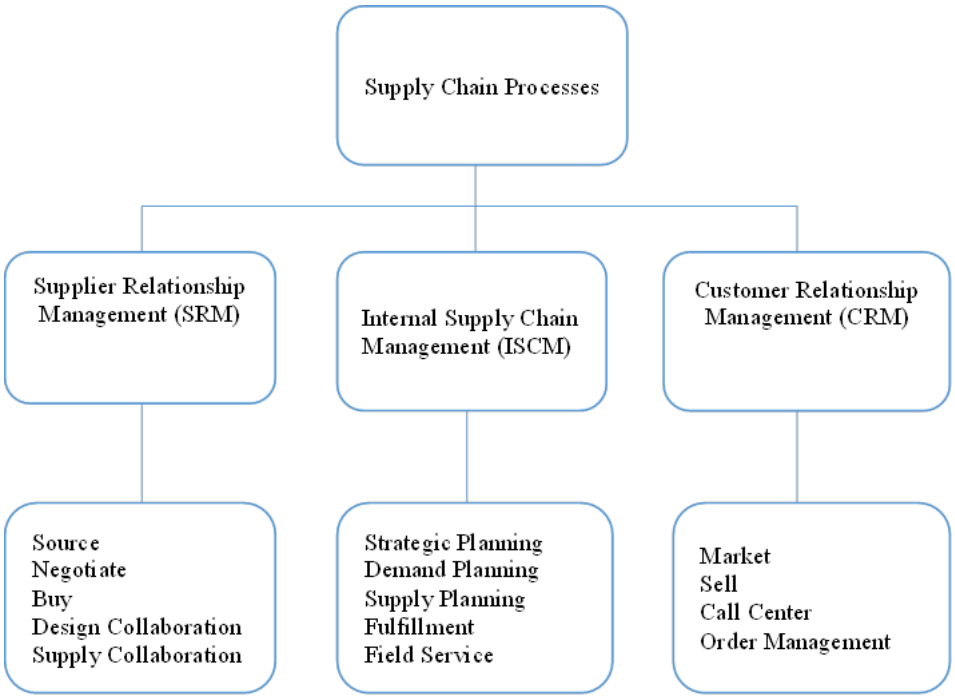


Figure 2.1: Supply chain macro processes

2.4.2.1.Supplier relationship management process

Supplier relationship management is the process that describes how a factory relates with its suppliers (Keely L., et al. 2001). Cross-functional teams tailor product and service agreements with key suppliers (Lambert, et al. 2005). Supplier relationship management macro process aims to arrange for and manage supply sources for various goods and services. Supplier relationship management processes include the evaluation and selection of suppliers for various products; negotiation of pricing and delivery terms with suppliers; the placement of replenishment orders; sharing of demand and supply plans with suppliers; and communication regarding new products and orders with suppliers (Croxton, et al. 2001).

2.4.2.2.Internal supply chain management process

The purpose of internal supply chain management macro process is to fulfill the demand of customers in a timely manner and at the minimum cost (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2004). It requires balancing the customers' requirements with the factory's supply capabilities, which includes forecasting demand and

synchronizing it with production, procurement, and distribution (Vollmann, Berry and Whybark 1997). A key to effective internal supply chain management is to meet customer requirement in terms of order fulfillment. Effective order fulfillment requires integration of the firm's manufacturing, logistics, and marketing plans. The factory should develop partnerships with key members of the supply chain to meet customer requirements and reduce total delivered cost to customer (Kumar and Sharman n.d.). Moreover, the internal supply chain management process deals with making the products and establishing the manufacturing flexibility needed to serve the target markets, which includes all activities necessary for managing the product flow through the manufacturing facilities and for obtaining, implementing, and managing flexibility (Lambert, et al. 2005). Internal supply chain management processes include the planning of internal production by deciding which products to carry at each warehouse; planning of storage capacity for the location and size of warehouses; preparation of demand and supply plans by defining inventory management policies; and fulfillment of actual orders by picking, packing and shipping that orders (Croxton, et al. 2001).

2.4.2.3.Customer relationship management process

The customer relationship management offers the arrangement for how relationships with customers are developed and maintained (Croxton, et al. 2001). Management finds key customers and customer groups to be targeted as part of the factory's business mission (Keely L., et al. 2001). Cross-functional customer teams tailor product and service agreements to meet the needs of key accounts, and segments of other customers (Lambert, et al. 2005). Customer relationship management macro process aims to generate customer demand and facilitate the placement and tracking of orders. Customer relationship management processes include pricing; the preparation of catalogues and other marketing materials; sales; management of the web site; order management and management of the call center that takes orders and provides service (Croxton, et al. 2001).

For a supply chain to be successful, it is important that the three macro processes are well integrated and serving the same customer (Croxton, et al. 2001). The organizational structure

of the firm has a great influence on the success or failure of the integration effort. In most common factories, purchasing oversees the supplier relationship management macro processes, manufacturing handles the internal supply chain management macro processes and marketing is in charge of the customer relationship management macro processes – with very little communication among them (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010). It is not unusual for marketing and manufacturing to have two different forecasts when making their plans. The lack of integration hurts the supply chain's ability to match supply and demand effectively, leading to dissatisfied customers and high costs. Thus, factories should structure a supply chain organization that mirrors the macro processes and ensures good communication and coordination among the owners of processes that interact with each other (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2007).

2.5. The Performance Measurement Factors

As this study adopted the integrated conceptual framework by combining two main concepts, the performance measurement factors that contained in the conceptual framework are identified on the three supply chain macro processes (supplier relationship management process , internal supply chain management and customer relationship management) along with three decision making levels(strategic, tactical and operational).

2.5.1. Supplier Relationship Management

This is one of the performance measurement factors of the supplier relationship management process which is categorized hierarchically in three decision making levels: strategic, tactical and operational.

Table 2.2: Supply chain factors in supplier relationship management

	Decision making level		
	Strategic	**Tactical**	**Operational**
supplier relationship management process	Quality supplier selection: key criteria to select the suppliers that qualify the company's standard of quality	Supplier performance: a measurement to describe how good a supplier can deliver raw materials to production facilities on time and in good conditions (Chan 2003).	Quality of products
			Delivery performance
			Overall reliability
		Selection process: the process to select the quality suppliers including selection criteria and negotiation.	Robust selection criteria
			Clear scope, specification, and criteria for selection
			Effective negotiation
			Right contract
		Green supplier: issues related to environment to evaluate and select suppliers.	Environmental policy
			Design
			Manufacturing
			Reverse logistics
	Supplier integration: a collaborative relationship between company and supplier which recognizes some degree of interdependence and cooperation on a specific project or for a specific purchase agreement (Ellram 1991)	Coordination and resource sharing: working together and sharing resource with supplier	Operations
			Decision making
			Production planning
		Information integration: the degree to which all function of company and supplier can permit information flow smoothly (Chan 2003)	Information sharing
			Collaborative planning
			Joint demand forecasting
			Standardized means of communication across functions and suppliers
		Organizational relationship: management of communication channels with supplier	Designing and maintaining of communication channels

	Decision making level		
	Strategic	**Tactical**	**Operational**
		including shared objective and risk.	Risk sharing
		Use of information technology: current capability of company's information technology system.	Common objective and teamwork
			State of art system in place
			System's effectiveness
			System improvement
	Effective procurement processes: the efficiency of the whole purchasing process to obtain the right materials from suppliers	Effective communication with production: administration of material classification and supplier database update.	Developing right material specification
			Identifying right suppliers for specific materials
		Effective management of purchase portfolio: administration of material classification and supplier database update.	Segregation of materials as per value and criticality
			Maintaining up-to-date supplier database
			Making purchase decision accordingly
		Effective contract administration: management of payment and supplier's verification	Contract selection
			Inspection and verification
			Payment
			Evaluation

2.5.2. Internal Supply Chain Management

The performance measurement factors of the internal supply chain management process are categorized hierarchically in three decision making levels: strategic, tactical and operational.

Table 2.3: Supply chain measuring factors in Internal supply chain management process

	Decision making level		
	Strategic	**Tactical**	**Operational**
Internal supply chain management process	Facility: physical location in the supply chain network where the products assemble, fabricated or stored (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2007).	Capacity utilization: directly affects the speed of response to customer demand through its impact on flexibility and lead-time	Percentage of capacity utilization:
		Efficiency: measures how well the facility is utilized (Lai, Ngai and Cheng 2002)	Capital cost:
			Operating cost:
		Flexibility: shows the extent to which the facility can respond to a changing environment and unusual demand requests	Ability to change produce:
		Quality: technology and the process to improve facility performance	State of art technology:
			Continuous improvement possibility:
		Reliability: the dependability of the facility including its kindly with environment and safety.	Environment friendly:
			Safety:
			Availability or effective maintenance:
	Inventory: includes all raw materials, work in process and finished goods within a supply chain, altering inventory policy automatically change the supply efficiency and responsiveness. (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2004)	Optimal inventory policy: the policy to improve inventory management	Decrease inventory levels:
			Decrease inventory costs:
			Shared inventory with supplier:
			Shared inventory with customer:
		Warehouse utilization: usage of warehouse for all inventory materials	Raw materials:
			Finished products:
			Spares and maintenance materials:
	Transportation Inventory: moving inventory from point to point in the supply chain. Transportation can take the form of many combinations of modes and	Capacity utilization: directly affects the speed of response to delivery order through its impact on flexibility and deliverability	Percentage of capacity utilization:
		Efficiency: how well the	Capital cost

	Decision making level		
	Strategic	**Tactical**	**Operational**
	routes, each with its own performance characteristics (Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operation 2010)	transportation is utilized (Lai, Ngai and Cheng 2002)	Operating cost
		Flexibility: the ability to change or react with little penalty in time, effort, cost or performance	Ability to change delivery modes
		Reliability: the dependability of the transportation including its delivery schedule, environment kindly and safety.	Adhering to delivery schedule
			Environment friendly
			Safety
			Availability or effective maintenance
	Internal integration: collaborative relationship within company and cooperation on a specific project which recognize some degree of independency. It consists of information concerning facility, inventory, transportation, costs and prices throughout the supply chain	Information integration: the extent to which all functions within company can pass information smoothly (Chan 2003)	Improve data validity
			Information system flexibility
			Information accuracy
			Enterprise application integration
			Real-time monitor
			Information sharing
		Internal quick response: sharing and availability of information between related departments in company	Strengthen information sharing
			Information timeliness
			Information availability
		Use of information technology:	State of art system in place
			System's effectiveness
			System improvement
		Efficiency: how well the internal supply chain is integrated by considering the related costs	Capital cost
			Operating cost
	Human resources: management of employees' improvement for a better company's internal supply chain	Motivation: inspire employees to improve their ability	
		Safety: degree to which the risks can reduce from work process	
		Training: process to provide the professional skill to the work force	

	Decision making level		
	Strategic	**Tactical**	**Operational**
		Innovation and learning: management of increasing employee's capability in learning new knowledge	
	Operations: operational performance and environmental performance of the company including company's operational improvement	Operational performance: measures the quality, flexibility and reliability of company's procedure.	Flexibility
			Customer services
			Consistence quality
			Reliability
			Waste reduction
		Environmental performance: environmental issues of the operational processes	Environmental policy
			Environmental audit
			Energy consumption
			Emission
			Reverse logistics
		Innovation: technology and the technique to improve operating performance of the company.	State of art technology
			Continuous improvement

2.5.3. Customer Relationship Management

The performance measurement factors of the customer relationship management process are categorized hierarchically in three decision making levels: strategic, tactical and operational.

Table 2.4: Supply chain factors in Customer relationship management process

	Decision making level		
	Strategic	**Tactical**	**Operational**
Customer relationship	Customer service: provision of labor and other resources, for the purpose of increasing that value that buyers receive from their purchases and from the processes leading up to the purchase	Responsiveness: the approach it takes for a firm to reply to a customer inquiry with the required information. A fast and accurate response to those requests is essential in keeping customers satisfied (Gunasekaran, Patel and McGaughey, et al. 2004).	Quality:
			Innovation:
			Customer satisfaction: the degree to which customers are satisfied with the product and/or service received (Chan 2003)
		Customer order processing and	Response time: the amount of time

	Decision making level		
	Strategic	**Tactical**	**Operational**
	(Aramyan, et al. 2007).	delivery: to providing the requested products with a short lead-time (Persson and Olhager 2002)	between an order being made and its corresponding delivery (Aramyan, et al. 2007)
			Order fill rate: the proportion of orders that can be filled immediately (Chan, 2003)
			Order flexibility: having the capability to provide products or services that meet the individual demands of customers (Gunasekaran, Patel and McGaughey, et al. 2004)
			Delivery performance:
		Handling customer complaints: the process to deal with registered complaints from customers about product or service delivered (Aramyan, et al. 2007)	System in place
			Number of complaints received
			Number of response made
		Value added service: the services to satisfy customer needs in both before and after sales.	Flexibility of services to meet particular customer needs: the flexibility in meeting a particular customer needs requirement at an agreement (Gunasekaran, Patel and McGaughey, et al. 2004)
			After sales services: provide valuable feedback that can be used to further improve supply chain performance (Gunasekaran, Patel and McGaughey, et al. 2004).
	Customer integration: collaborative relationship between company and customer which recognizes some degree of interdependence and cooperation on a specific project or for a specific order agreement (Ellram 1991)	Extent of cooperation to improve quality: the cooperation with customers to improve products' quality and to develop new product in both normal situation and under contingency	New product and service development
			Regular operations
			Under contingency
		Information integration: the extent to which all functions between company and customer can pass information smoothly (Chan 2003).	Information sharing
			Collaborative planning
			Joint demand forecasting
			Standardized means of communication across functions and customers
		Organizational relationship: the	Designing and maintaining of

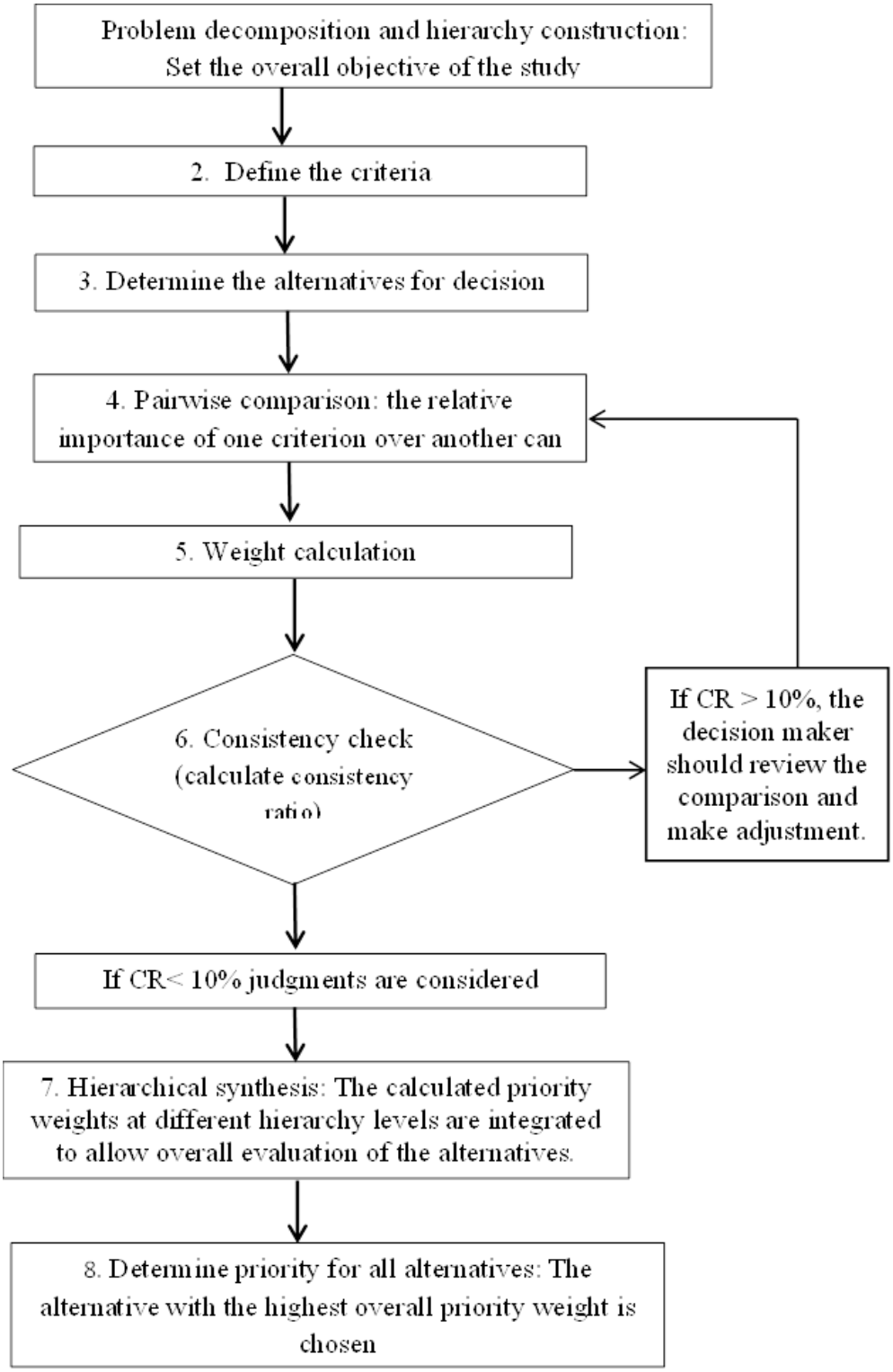
	Decision making level		
	Strategic	**Tactical**	**Operational**
		management of communication channels with customer including shared objective and risk.	communication channels
			Risk sharing: the degree to which these risks are shared (Chan 2003).
			Common objective and teamwork
		Use of information technology: the capability of the current company's information technology system	State of art system in place
			System's effectiveness
			System improvement
	Demand forecasting: supply chain planning relies on forecast data, which becomes the base for its production, material sourcing, inventory management, and all other activities in supply chain (Chae 2009) Demand forecasting usually takes demand data from salespeople who receive sales and demand information from customers.	Forecasting system in place: the current forecasting system of the company including its technology and process	State of art technology
			Forecasting model
			Forecasting process
		Decision making: the degree of transparency and speed of decision	Governance
			Fast decision making
		Reliability of demand data: to the trustworthiness of the demand data including its accuracy of forecast and decreasing of errors and volatility.	Accuracy of forecasting techniques
			Improve response to customer demands
			Decrease prediction errors
			Forecast volatility
			Increase employee's adaptation for changes
	Market analysis: the degree of company's market share and total number of customers including the government policy that affects the policy of company	Market equity: the number and the movement of market share	Percentage of market share
			Percentage of change
			Trend
		Customer acquisition: the number of customer increase and its source	Percentage of increase
			Critical zone
		Customer retention: the number of customer remain and its base	Percentage of shift
			Critical zone
		Government policy over market equity: the support from government and equal opportunity in the market	Subsidy of raw materials
			Equal trade opportunity
			Knowledge sharing among public and

	Decision making level		
	Strategic	**Tactical**	**Operational**
			private sectors

2.6. Analytic Hierarchy Process (AHP)

The quantitative data about comparing the importance of each performance measurement factor from the conceptual framework was also collected for measuring performance of supply chain for each specified factories by using the analytic hierarchy process (AHP). AHP is a multi-criteria decision making approach for those factors arranged in the hierarchical structure (T. l. Saaty 1990). AHP provides a theory and a corresponding methodology, which support the modeling of unstructured problems.

The analytic hierarchy process was developed to reflect the way people naturally behave and think. It is a decision making tool that can help describe the general decision operation by decomposing a complex problem into a multi-level hierarchic structure of objectives, criteria, sub criteria and alternatives (T. l. Saaty 1990). AHP's hierarchic structure reflects the natural tendency of the human mind to sort elements of a system into different levels and to group like elements in each level, which can facilitate decision maker's easy understanding from a human factor point of view (S. Huan, et al. 2004)



Source: (T. Saaty 1980)

Figure 2.2: Overall steps in computing AHP

The basic principle of computing AHP is through asking the respondent to rate the importance of the characteristics under study for comparison. That means, respondents asked to choose whether cost is very much more important, rather more important, as important, and so on down to very much less important, than operability. Each of these judgments is assigned a number on a scale and the level of importance is measured based on the already established rating scale.

Table 2.5: The Saaty Rating Scale

Intensity of importance	Definition	Explanation
1	Equal importance	Two factors contribute equally to the objective
3	Somewhat more important	Experience and judgment slightly favor one over the other.
5	Much more important	Experience and judgment strongly favor one over the other.
7	Very much more important	Experience and judgment very strongly favor one over the other. Its importance is demonstrated in practice.
9	Absolutely more important.	The evidence favoring one over the other is of the highest possible validity.
2,4,6,8	Intermediate values	When compromise is needed

Source: (T. Saaty 1980)

2.6.1.1.Pair-wise Comparison, Weight Calculation and Maximum Eigenvalue (λ max)

A basic, but very reasonable, assumption is that if attribute A is absolutely more important than attribute B and is rated at 9, then B must be absolutely less important than A and is valued at 1/9. Then relative weights, importance, or value, of the factors, such as cost and

operability, which are relevant to the problem in question (technically, this list is called an eigenvector) is calculated.

The Saaty's method was dealt with consistency of the pairwise comparison matrix. A consistent matrix mean e.g. if the decision maker says a criterion x is equal important to another criterion y (so the comparison matrix will contain value of axy = 1= ayx), and the criterion y is absolutely more important as an criterion w (ayw = 9; awy = 1/9); then the criterion x should also be absolutely more important than the criterion w (axw = 9; awx = 1/9). Unfortunately, the decision maker is often not able to express consistent preferences in case of several criteria. Then, the Saaty's method measures the inconsistency of the pairwise comparison matrix and set a consistency threshold which should not be exceeded.

In ideal case the comparison matrix (A) is fully consistent, the rank (A) = 1 and $\lambda = n$ (n = number of criteria). In this case, the following equation is valid: $A \times x = n \times x$ (where x is the eigenvector of A). The vector x represent the weights this study is looking for. In the non-consistent case (which is more common) the comparison matrix A may be considered as a perturbation of the previous consistent case. When the entries aij changes only slightly, then the eigenvalues change in a similar fashion. Moreover, the maximum eigenvalue (λmax) is closely grater to n while the remaining (possible) eigenvalues are close to zero. Thus, in order to find weights we are looking for the eigenvector which corresponds to the maximum eigenvalue (λmax) were followed.

In order to obtain weights from calculated eigenvector the values have to be normalized by the following formula. The weights have to sum up to 1.

$$Wj = \frac{wj}{\sum wi}$$

2.6.1.2.Consistency Index (CI)

The consistency index (CI) is calculated as follows (Prof. Saaty)

$$CI = \frac{\lambda_{max} - n}{n-1}$$

Where:

λmax: the maximum Eigen value

n: the size of comparison matrix

2.6.1.3.Consistency Ratio (CR)

Consistency Ratio (CR) is calculated to measure how consistent the judgments have been relative to large samples of purely random judgments. If the CR is much in excess of 0.1 the judgments are untrustworthy because they are too close for comfort to randomness and the exercise is valueless or must be repeated (Sarode and Khodke n.d.). It is easy to make a minimum number of judgments after which the rest can be calculated to enforce a perhaps unrealistically perfect consistency. The calculated priority weights at different hierarchy levels are integrated to allow overall evaluation of the alternative to determine priority for all alternatives. Then the alternative with the highest overall priority weight is chosen (Huan, Sheoran and Wang 2004). Consistence ratio (CR) is calculated as the ratio of consistency index and random consistency index (RI). The RI is the random index representing the consistency of a randomly generated pairwise comparison matrix It is derived as average random consistency index as indicated in the Table 2.6. The value of RI depends on the number of criteria's being compared.

Table 2.6: Random consistency index

N	1	2	3	4	5	6	7	8	9	10
RCI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.51

Then,

$$CR(A) = \frac{CI}{RI(n)}$$

2.6.2. Advantages and Disadvantages of AHP

2.6.2.1.Advantages of AHP

The AHP is a useful technique for discriminating between competing options in the light of a range of objectives to be met. The calculations are not complex and, while the AHP relies on what might be seen as a mathematical trick, you don't need to understand the math's to use the technique. According to Abdul-Hamid, 1999, it has the following advantages:

- A subjective decision process can be formalized owing to the hierarchy structure. This leads to accurate decisions.
- Ensures consistency of the decision judgment.
- Clearer understanding of the problem by dividing it into sub-problems.
- The comparison may be made by teams or an iterative process until an agreement is reached by the team members.
- Sensitivity analysis may be performed by the results using computers before final judgment is rendered.

2.6.2.2.Disadvantages of AHP

One of the disadvantages of the AHP is that it only works because the matrices are all of the same mathematical form – known as a positive reciprocal matrix. The reasons are not for the mathematically daunted, so we will simply state that point. To create such a matrix requires that, if we use the number 9 to represent 'A is absolutely more important than B', then we have to use 1/9 to define the relative importance of B with respect to A. Some people regard that as reasonable; others are less happy about it.

The other seeming drawback is that if the scale is changed from 1 to 9 to, say, 1 to 29, the numbers in the end result, which we called the Value for Money Vector, will also change. In many ways, that does not matter as the VFM (not to be confused with the Viable Final Matrix) simply says that something is relatively better than another at meeting some objective.

CHAPTER THREE

3. RESEARCH METHODOLOGY

This chapter deals with the methodologies that were used in this study: The choice of data type and source of data, research approach, data collection techniques and methods, data analysis, selection criteria's of the case factories together with appropriate description given to each approach.

The identified measurement factors for the study were adopted from (Asawin 2012). It was applied for a manufacturing firm's operating in developing country, Thailand. The study uses both qualitative and quantitative approaches to have the wider data for the determination of deep analysis and understanding of supply chain performance measurement factors in use in the specified shoe manufacturing companies.

Revising published case studies, performance measurement systems were reviewed to understand supply chain performance measurement and the variety of frameworks employed including performance measurement factors. Accordingly, more applicable conceptual supply chain performance measurement framework was adopted for this particular study.

Following this, the adopted conceptual supply chain performance measurement framework was applied to the purposively selected three shoe manufacturing companies operating in Addis Ababa. Data was collected from these case study companies using matrix and Likert scale data type questions. For further enriching of the data, both published and unpublished data sources were revised. These data were collected from different groups based on supply chain core process and hierarchal approach. Regarding core process, members or staff related to supplier relationship, internal relationship and customer relationship were considered independently. Similarly, the questions were also organized by taking into consideration the hierarchical level of the case study firms. These levels are strategic, tactical and operational.

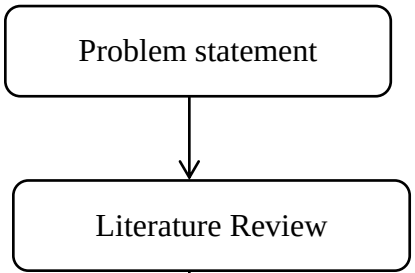


Figure 3.1: Overall thesis methodology

The collected data were analyzed and interpreted using ANOVA for Likert scale type data and AHP for matrix. For Likert scale data collection, a form of a questionnaire was designed and respondents were asked to indicate, using a five-point Likert scale (1 = strongly agree, 2 = Agree, 3 = neither agree nor disagree, 4 = Disagree and 5 = strongly disagree), to rate the perception of the respondents on supply chain performances.

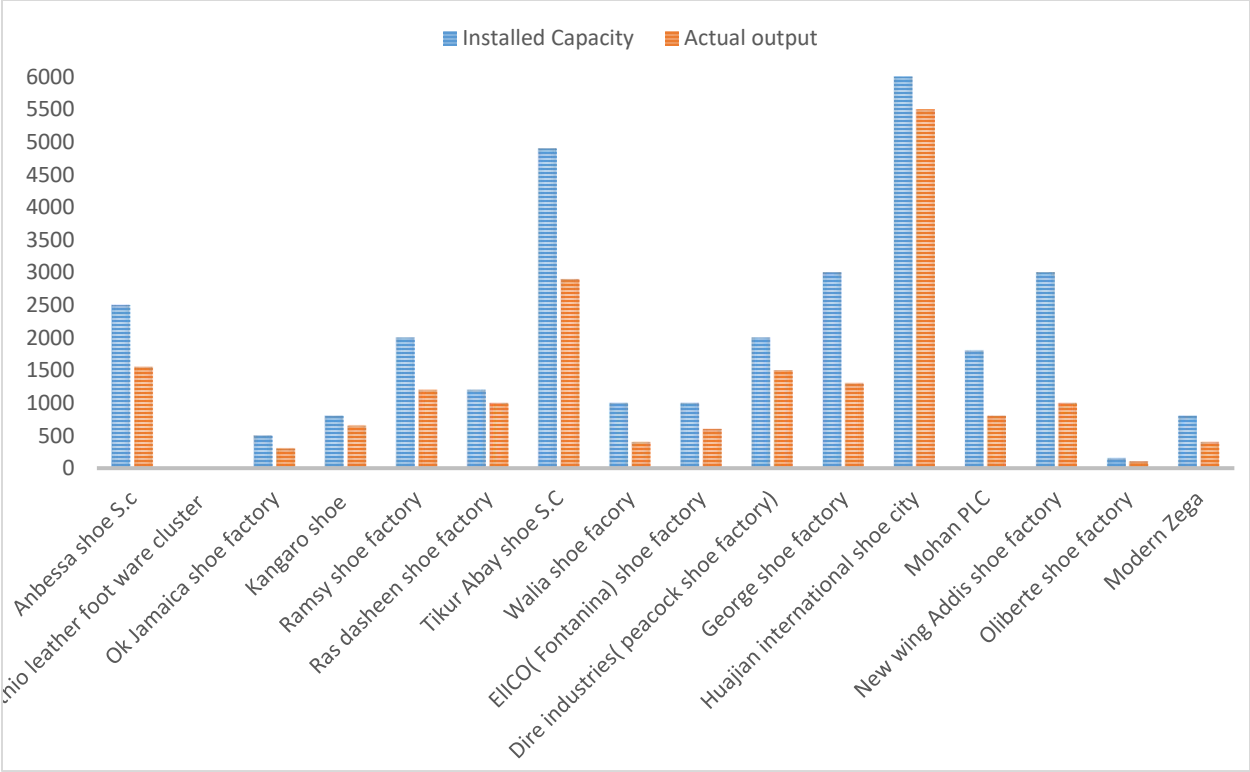
Then, Analysis of Variance (ANOVA) was applied to compare the mean Supply Chain Performance differences among the case factories. Similarly, the analytic hierarchy process (AHP) was also employed to undertake quantitative data analysis. Reliability test was also conducted to measure internal consistency of the data's collected for the study.

3.1. Data Collection

This study used both primary and secondary data considering relevance and its relation with performance measurement of the company. Personal observation was also one way considered for understanding the operationalizing environment situation.

3.1.1. Selection of the Case Factories

Selection of the factories was to focus on specific case areas within the shoe manufacturing sector of Addis Ababa city. These three case study manufacturing shoe factories were purposively selected for the purpose of this study: namely Anbessa, Tikur Abay & Peacock. All these are categorized under private and share factories and all are located in Addis Ababa. Moreover these case study factories were selected purposively because they are expected to be representative of the sector based on the selection criteria's. Two criteria's were taken in to consideration to select the case factories; these are on efficient utilization of resources and year of experience in the sector. Accordingly, their installed and actual daily production capacity were computed and the efficiencies of the factories were computed as follows Tikur Abay with 59%, Peacock shoe factory with 75% and Anbessa with 62% were sorted out for the study by the researcher, in this case year of experience in the sector was also taken in to consideration whereby Tikur Abay has 61 years, Anbessa has 78 years of experiences and Peacock has 17 years of experience in the sector.



Source: Own computation

Figure 3.2: Selection criteria's of the case study companies

3.1.2. Primary Data Collection

Primary data were collected from the case study factories engaged in the production of shoe focusing on the performance measurement of supply chain. Likert scale questions were developed and used for data collection. The questionnaires used for undertaking this study have a pertinent content with the theme of this study. Then, pilot test were conducted to check for the content relevancy prior to actual data collection. This helped the researcher to realize whether there are any difficulties in relation to the questions and to amend based on the feedback of the pre-test or to check the reliability and validity of the data that the researcher collected. These questions were prepared in English in a simple and easily understandable manner. This makes the questions simple, clear, and understandable to respondents.

For measuring the supply chain performance of the factories, the questionnaires were arranged in a five point Likert scale which ranges from 1 (the worst) to 5 (which is best) whereby 3 was considered as the average which needs also improvement. Generally, mean results above 3 were considered as better performance and mean values below 3 were taken as a lower value which needs further improvement for the betterment of the supply chain performance to be enhanced in these shoe factories. These questionnaires were collected from Professional officers and department head. For this purpose, a total of 42 questionnaires were distributed and 37 were filled out and collected back which accounted as 88.1%. The detail numbers of respondents were indicated in Table 3.1.

Table 3.1: Questionnaires fill and return rate

	Factory	**Purch. Dept**	**Prod Dept**	**Mark. Dept**	**Total**
Professional officers and head	Tikur Abay	9	5	4	18
	Anbessa	4	6	3	13
	Peacock	2	5	4	11
	Total	15	16	11	42
Questionnaire distributed for officers	Tikur Abay	9	5	4	18
	Anbessa	4	6	3	13
	Peacock	2	5	4	11
	Total	15	16	11	42
Questionnaires' filled out and Returned	Tikur Abay	6	5	4	15
	Anbessa	4	5	3	12
	Peacock	2	5	3	10
	Total	12	15	10	37
Proportion of questionaries' used	Tikur Abay	66.7	100.0	100.0	88.1
	Anbessa	100.0	83.3	100.0	92.3
	Peacock	100.0	100.0	75.0	90.9
	Total	80.00	93.75	90.91	88.10

3.1.3. Reliability Test

Developed by Lee Cronbach in 1951, Cronbach's alpha is a tool used to measure the reliability or internal consistency. That means, high reliability for the test indicates consistently measuring the satisfaction and low reliability stands for measuring something else, or possibly nothing at all. A rule of thumb for interpreting alpha the result of Likert scale questions is indicated as follow.

Table 3.2: Cronbach's alpha acceptance level

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Based on this interpretation, analysis was done and Cronbach's alpha result is presented in Table 3.3.

Table 3.3: Computed Cronbach's alpha result

No	Macro processes	Strategic level	No of items	Cronbach's alpha result	Decision
1	SRM	Quality supplier selection	8	0.784	Acceptable
		Supplier integration	7	0.917	Excellent
		Effective procurement processes	8	0.866	Good
2	ISRM	Facility	9	0.855	Good
		Inventory	7	0.882	Good

No	Macro processes	Strategic level	No of items	Cronbach's alpha result	Decision
		Internal integration	5	0.741	Acceptable
		Human resource	6	0.667	Questionable
		Operation	8	0.774	Acceptable
3	CRM	Customer service	14	0.723	Acceptable
		Customer integration	8	0.839	Good
		Demand forecasting	8	0.757	Acceptable

3.1.4. Secondary Data Collection

For further enrichment of the data, secondary sources were reviewed. For this both published and unpublished documents, and information from related data bases of the case factories and sectors pertaining to the leather shoe factors like institute of leather and leather products were evaluated.

3.2. Data Analysis

According to the performance measuring framework to be used in this study, supply chain performance measurement framework comprises of measurement factors with respect to supplier relationship management, internal supply chain management and customer relationship management. It also further organized hierarchically across a decision making levels (strategic, tactical and operational). That means, to measure the performance in holistic approach, the frame work considers decision making level and supply chain macro processes. The decision making levels concept (the left in the figure below) is the intention to measure the performance in vertical (hierarchical decision) view. By contrast, the supply chain macro processes concept (the right in the figure below) is the intention to measure the performance in horizontal (cross-process) view. Both of them have relationship through their interactions to develop an integrated supply chain performance measurement conceptual framework.

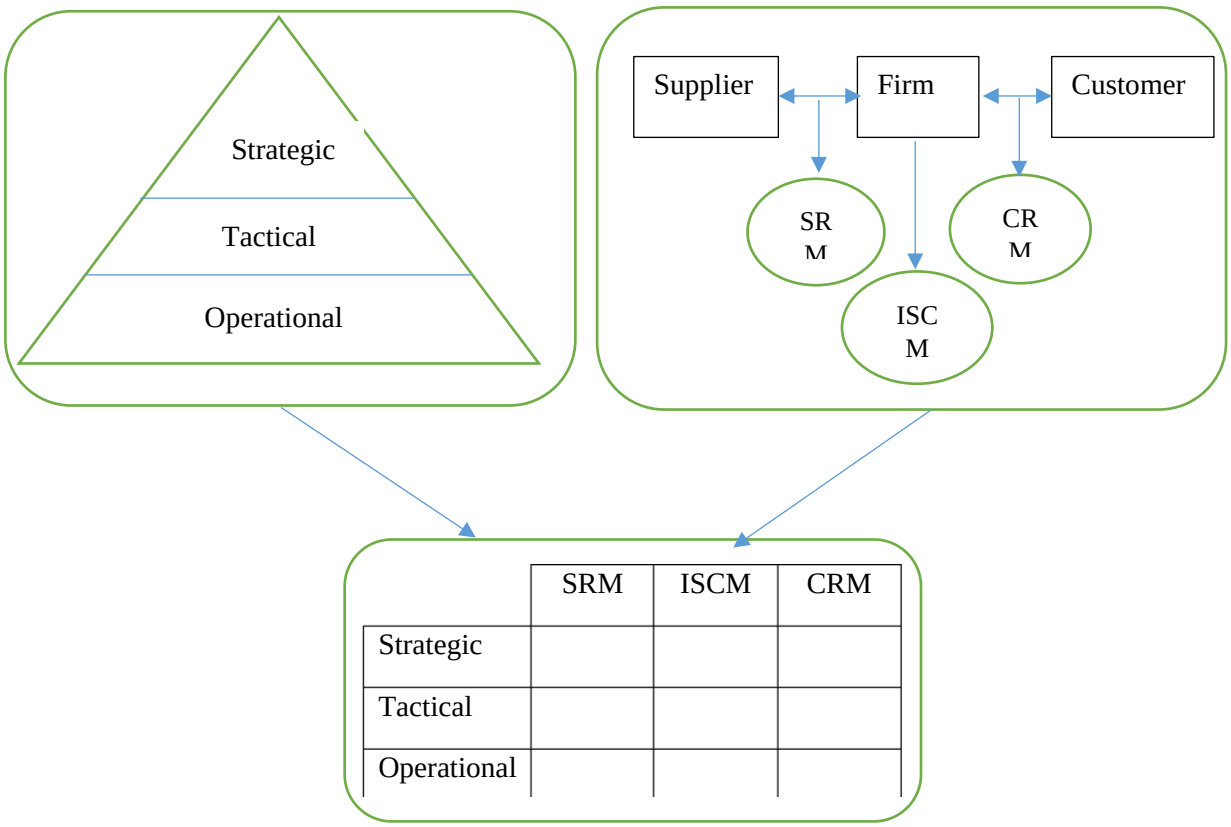


Figure 3.3: The overall approach - Decision making levels vs Supply chain process matrix set up

3.2.1. Qualitative and Quantitative Data Analysis

Qualitative data were used for studying supply chain performance of the selected case study factories using piloted questionnaires. The respondents were oriented to rate their opinion which ranges from 1 to 5 which is a Likert scale type data. This way, the respondent's opinion was converted for quantitative analysis. Then, quantitative analysis was employed and the data's collected from the factories understudy were analyzed and computed quantitatively to draw the relationship existing between them hierarchically and horizontally.

3.2.1.1.Likert scale

The Likert scale data collected was coded and entered in to SPSS and computed using descriptive statistics. For each and every item the mean value was calculated for each factory under study. The mean value was computed by adding the response within each factory and dividing it by the number of the respondents in that factory. Thus, the result has been considered as the performance of a given factory understudy in that particular practice. In addition, Analysis of Variance (ANOVA) was applied to compare the mean Supply Chain Performance differences among the case factories. In the analysis, the term group was used to represent factories. Thus based on the number of factories under study, in this study, three groups were considered. In the analysis of variance, respondents in each factory were included to obtain degree of freedom within group (factory).

3.2.1.2.Analytic Hierarchy Process (AHP)

For conducting this study, questionnaires were prepared to be filled by the factories to know their opinion on the area of the study. Then, the raw data obtain through questionnaires were fed to the MATLAB software to determine eigen value for each alternatives and obtain their priority level. The result of these three factories were compared and presented in the following chapter in data presentation, analysis and interpretation part.

CHAPTER FOUR

4. DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter deals with the presentation, analysis and interpretation of the data gathered from the concerned respondents that are collected through different data collection techniques presented in the previous chapter in relation to the objective of the thesis to answer the research questions.

4.1. Demography Characters of the Respondents

With regard to the position of the respondents, out of eighteen respondents twelve were officers and six of them were heads of departments of Tikur Abay Shoe Factory, for the case of Anbessa Shoe Factory, data collected from twelve respondents out of them six were officer and the remaining six were heads of different departments and out of six respondents three were officers and three were heads of different departments from Peacock Shoe Factory. In terms of their education level, out of thirty six respondents, six were MSc holders, fifteen are BSc or BA holders and the remaining fifteen were diploma holders. The majority of the respondents have two to five years of work experience. Similarly, the majority twenty one out of thirty six of the respondents were male in terms of their sex category while the remaining fifteen were females. The detail information on their composition according to the macro-processes and respective factories are summarized in Table 4.1.

Table4. 1: Demographic character of the respondents

Processes	**Descriptions**		**Factory Name**			**Total**
			Tikur Abay	**Anbessa**	**Peacock**	
Supplier relationship management	Position of the respondent	Head	2	2	1	5
		Officer	4	2	1	7
		Total	6	4	2	12

Processes	Descriptions		Factory Name			Total
			Tikur Abay	Anbessa	Peacock	
	Education level of the respondent	Msc	1	0	1	2
		Bsc or BA	1	3	1	5
		Diploma	4	1	0	5
		Total	6	4	2	12
	Work experience of the respondent in years	Less than one	0	2	1	3
		Two to three	3	1	0	4
		Three to five	3	1	0	4
		Greater than five	0	0	1	1
		Total	6	4	2	12
	Sex of the respondent	M	4	1	2	7
		F	2	3	0	5
		Total	6	4	2	12
Internal relationship management	Position of the respondent	Head	2	2	1	5
		Officer	4	2	1	7
		Total	6	4	2	12
	Education level of the respondent	Msc	1	0	1	2
		Bsc or BA	1	3	1	5
		Diploma	4	1	0	5
		Total	6	4	2	12
	Work experience of the respondent in years	Less than one	0	2	1	3
		Two to three	3	1	0	4
		Three to five	3	1	0	4
		Greater than five	0	0	1	1
		Total	6	4	2	12
	Sex of the	M	4	1	2	7

Processes	Descriptions		Factory Name			Total
			Tikur Abay	Anbessa	Peacock	
	respondent	F	2	3	0	5
		Total	6	4	2	12
Customer relationship management	Position of the respondent	Head	2	2	1	5
		Officer	4	2	1	7
		Total	6	4	2	12
	Education level of the respondent	Msc	1	0	1	2
		Bsc or BA	1	3	1	5
		Diploma	4	1	0	5
		Total	6	4	2	12
	Work experience of the respondent in years	Less than one	0	2	1	3
		Two to three	3	1	0	4
		Three to five	3	1	0	4
		Greater than five	0	0	1	1
		Total	6	4	2	12
	Sex of the respondent	M	4	1	2	7
		F	2	3	0	5
		Total	6	4	2	12
Total	Position of the respondent	Head	6	6	3	15
		Officer	12	6	3	21
		Total	18	12	6	36
	Education level of the respondent	Msc	3	0	3	6
		Bsc or BA	3	9	3	15
		Diploma	12	3	0	15
		Total	18	12	6	36
	Work experience of the respondent	Less than one	0	6	3	9
		Two to three	9	3	0	12

Processes	Descriptions		Factory Name			Total
			Tikur Abay	Anbessa	Peacock	
	in years	Three to five	9	3	0	12
		Greater than five	0	0	3	3
		Total	18	12	6	36
	Sex of the respondent	M	12	3	6	21
		F	6	9	0	15
		Total	18	12	6	36

Source: Own computation

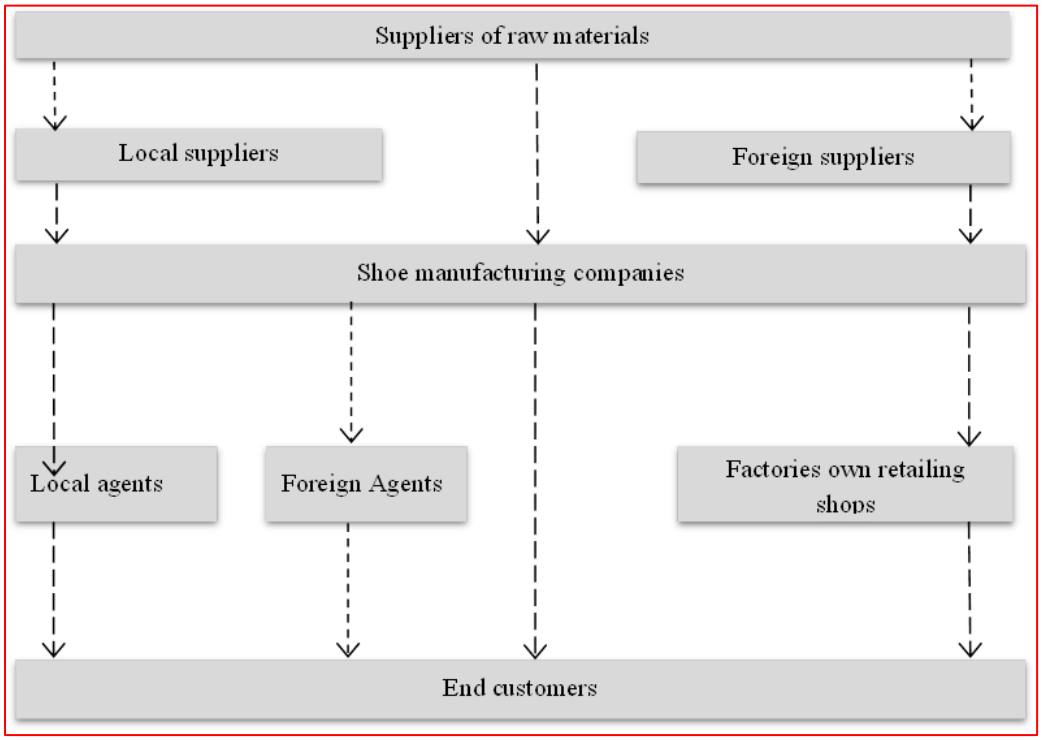
4.2. Supply Chain of Shoe Factories in Addis Ababa

The installed capacity of Peacock Shoe Factory is (in 8hrs) 2000 pairs/day in eight working hour and the annual sales volume is 59196 and 39464 pair of shoes for local and export market from the 75% actual capacity it has reached respectively. It gets its raw materials from local and foreign suppliers and similarly sells its product to local and foreign consumers.

Tikur Abay shoe factory has two units: Old and new manufacturing unit. The old manufacturing unit has installed capacity of 3900 pairs of shoes per day in eight working hour, whereas; it's actual is 2300 pairs of shoes per day in eight working hour. From the products of this section, 20% of the product is exported to foreign customers. Similarly, the installed capacity of the new manufacturing section is 1000 pairs of shoes per day in eight working hours, though; it produces 600 pairs of shoes per day in eight working hours. Regarding the customers, 80% of the product of this section is sent abroad. The company also collects its raw materials from both local and abroad directly and through agents.

Anbessa shoe factory has also the market share of 96% Local and 4%Export. Its installed capacity is 2500 pairs of shoes per day in eight working hours but it actually produces 1550 pairs of shoes per day in eight working hours. The suppliers of the raw materials are

both from local and abroad through agents and direct bilateral agreement with the supplying companies. The customers of the company are also both from local and abroad market.



Source: Own computation

Figure 4.1: Overall supply chain of the shoe manufacturing companies

4.3. Supplier Relationship Management Process: Purchasing

Supplier relationship management processes refers to the interaction between the supplier and the factory. It includes the evaluation and selection of suppliers for various products, negotiation of pricing and delivery terms with suppliers, the placement of replenishment orders, sharing of demand and supply plans with suppliers& communication regarding new products and orders with suppliers. In practice, SRM requires building closer, more collaborative relationships with key suppliers in order to disclose and understand new value and reduce risk of failure. Generally, it gives the structure for how relationships

with suppliers are developed and maintained. For this study quality supplier selection, supplier integration and effective procurement processes are taken into consideration and the finding was presented separately in detail.

4.3.1. Supplier- Factory Relationship

4.3.1.1.Quality Supplier Selection

Quality supplier selection provides the means/ criteria to be used to select the perfect suppliers that qualify for the factory's standard of required quality. To evaluate this, supplier performance, selection process and green supplier are the factors that were taken into consideration in evaluating the supply performance of the factory. Accordingly, as indicated in Table 4.2, referring to the factories supplier relationship management measurement criteria, supplier performance was computed and it was found that, three of the factories under study are found at a satisfactory level in terms of ensuring the quality of the materials these factories were receiving from the supplier which ranges from (4.17) by Tikur Abay to (4.5) by Anbessa and Peacock whereby the overall mean performance is (4.33). Similarly, it was found satisfactory which ranges from (3.75) by Anbessa to (5.0) by Peacock in using performance measurement procedure to be employed for preventive procedure in case when the supplier can't satisfy delivery criteria. As computed, the average mean performance is (4.08). With regard to setting arrangement with supplier to keep stock ready for routine and urgent requirement in their warehouse, the respondents were requested to rate the level of satisfaction and indicated their feeling which ranges from (4.33) by Tikur Abay to (4.75) by Peacock. The overall mean value is (4.5), which is also at a satisfactory level.

Regarding selection processes, it was rated by each respective factories and it was found in a satisfactory level in terms of using well developed criteria to select their supplier which ranges from (4.25) to (4.5). Similarly in developing/ setting a feedback system to identify the area of improvement, the overall mean value was found (4.08), which ranges from (3.75) by Anbessa to (4.33) by Tikur Abay, which all were rated in the satisfactory

level. The overall level of satisfaction in using a standard contract for all suppliers and standard procedure for effective negotiation is (3.83) which was above the average. In detail all the three factories understudy were rated above average level of satisfaction (3.17) by Tikur Abay, (4.5) by Anbessa and Peacock.

With regard to the green supplier, the overall mean for employing a system to ensure that the supplier is following same line of environmental policy and works towards environmental friendly manufacturing process by following national and international regulation is above the average which is (3.08). In detail, Anbessa rated (3.5) which indicated that this factory is performing in a satisfactory level. However, respondents from Peacock and Tikur Abay were rated (3.0) and (2.83) respectively it is suggested the need for further improvement. Similarly, all the three factories were performing in satisfactory level range in awarding third party certification and conducting regular survey on existing system. The overall mean is (3.08) which was above the average.

Table 4.2: Comparison of quality supplier selection

Supply chain practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Has a system to ensure it received quality material from supplier	Tikur Abay	6	4.17	0.408	0.167	3.740	4.600
	Anbessa	4	4.50	0.577	0.289	3.580	5.420
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	4.33	0.492	0.142	4.020	4.650
Uses performance measurement procedure to be employed for preventive procedure in case when the supplier can't satisfy delivery criteria	Tikur Abay	6	4.00	1.095	0.447	2.850	5.150
	Anbessa	4	3.75	0.957	0.479	2.230	5.270
	Peacock	2	5.00	0.000	0.000	5.000	5.000
	Total	12	4.08	0.996	0.288	3.450	4.720
Set arrangement with	Tikur Abay	6	4.33	1.211	0.494	3.060	5.600

Supply chain practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
supplier to keep stock ready for routine and urgent requirement in their warehouse	Anbessa	4	4.75	0.500	0.250	3.950	5.550
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	4.50	0.905	0.261	3.930	5.070
Choose its supplier using well developed criteria	Tikur Abay	6	4.50	0.548	0.224	3.930	5.070
	Anbessa	4	4.25	0.957	0.479	2.730	5.770
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	4.42	0.669	0.193	3.990	4.840
Set a feedback system to identify the area of improvement	Tikur Abay	6	4.33	0.516	0.211	3.790	4.880
	Anbessa	4	3.75	0.957	0.479	2.230	5.270
	Peacock	2	4.00	0.000	0.000	4.000	4.000
	Total	12	4.08	0.669	0.193	3.660	4.510
Use a standard contract for all suppliers and standard procedure for effective negotiation	Tikur Abay	6	3.17	1.169	0.477	1.940	4.390
	Anbessa	4	4.50	0.577	0.289	3.580	5.420
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.83	1.115	0.322	3.130	4.540
Ensures that the supplier is following same line of environmental policy and works towards environmental friendly manufacturing process following national and international regulation	Tikur Abay	6	2.83	0.983	0.401	1.800	3.870
	Anbessa	4	3.50	0.577	0.289	2.580	4.420
	Peacock	2	3.00	1.414	1.000	-9.710	15.710
	Total	12	3.08	0.900	0.260	2.510	3.660
Awarded third party certification and conducts regular survey on existing	Tikur Abay	6	3.00	1.095	0.447	1.850	4.150
	Anbessa	4	3.25	0.957	0.479	1.730	4.770

Supply chain practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
system	Peacock	2	3.00	1.414	1.000	-9.710	15.710
	Total	12	3.08	0.996	0.288	2.450	3.720

Source: Own computation

4.3.1.2.Supplier integration

Supplier relationship indicates collaboration to be reached between the supplier and factory which provides the extent of cooperation and interdependence for a specific purchase agreement. This includes coordination and resource sharing, information integration, organizational relationship and use of information technology. It is used for improving the part of the supply chain to be enhanced between manufacturers and suppliers of ingredients, raw materials and packaging. Through exchanging information both parties are able to exercise judgment on costs, quantities and delivery time and production in order to streamline the product flow and to move to a collaborative relationship.

Accordingly, in terms of coordination and resource sharing, the factories under study were rated above the average level except Tikur Abay (2.83) which is below the mean. The overall average mean value is (3.42) which are at satisfactory level of performance. In a similar manner, Tikur Abay is rated below the mean value in helping supplier to take any critical decision during any unforeseen situation which is (2.67), this indicates that it needs improvement for further competitiveness. However, for the remaining two factories understudy, Anbessa and Peacock, the mean rate was at (3.5) which was above the mean. Similarly the overall mean is (3.08) which is lightly in a satisfactory level.

Regarding Information integration, its performance was evaluated and the overall mean value is (3.25) in using well developed collaboration planning and (2.83) in making

forecasting along with suppliers which is found below the satisfactory level of the performance mainly because of the small rate given by Tikur Abay Factory which is (2.33) as indicated in Table 4.3. As far as organizational relationship is concerned, the three factories has a below average level of satisfaction in terms of employing a system to achieve common objective like sharing a risk with suppliers which is (2.83) found below the average and needs further improvement.

Supply practices	**Factory**	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**	
						Lower Bound	**Upper Bound**
Cooperates with supplier to improve operation process	Tikur Abay	6	2.83	0.983	0.401	1.800	3.870
	Anbessa	4	4.00	1.414	0.707	1.750	6.250
	Peacock	2	4.00	0.000	0.000	4.000	4.000
	Total	12	3.42	1.165	0.336	2.680	4.160
During any unforeseen situation, it helps supplier to take any critical decision	Tikur Abay	6	2.67	1.633	0.667	0.950	4.380
	Anbessa	4	3.50	1.000	0.500	1.910	5.090
	Peacock	2	3.50	0.707	0.500	-2.850	9.850
	Total	12	3.08	1.311	0.379	2.250	3.920
There is coordination and understanding to facilitate urgent requirement between the factory and supplier	Tikur Abay	6	2.17	1.169	0.477	0.940	3.390
	Anbessa	4	4.25	0.957	0.479	2.730	5.770
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.25	1.485	0.429	2.310	4.190

Informs supplier in advance for an extra requirement of material due to sudden or planned requirements	Tikur Abay	6	3.17	1.169	0.477	1.940	4.390
	Anbessa	4	4.00	0.816	0.408	2.700	5.300
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.67	1.073	0.310	2.980	4.350
Developed collaboration planning in use for information integration	Tikur Abay	6	3.17	1.169	0.477	1.940	4.390
	Anbessa	4	3.00	0.816	0.408	1.700	4.300
	Peacock	2	4.00	0.000	0.000	4.000	4.000
	Total	12	3.25	0.965	0.279	2.640	3.860
Makes forecasting along with suppliers	Tikur Abay	6	2.33	1.366	0.558	0.900	3.770
	Anbessa	4	3.50	0.577	0.289	2.580	4.420
	Peacock	2	3.00	1.414	1.000	-9.710	15.710
	Total	12	2.83	1.193	0.345	2.080	3.590
Employ a system to achieve common objective like sharing a risk with suppliers	Tikur Abay	6	2.33	1.366	0.558	0.900	3.770
	Anbessa	4	3.25	1.258	0.629	1.250	5.250
	Peacock	2	3.50	0.707	0.500	-2.850	9.850
	Total	12	2.83	1.267	0.366	2.030	3.640

Table 4.3: Comparison of Supplier relationship

Source: Own computation

4.3.1.3.Effective procurement processes

Effective procurement processes refers to the efficiency of the whole purchasing process to obtain the right materials from suppliers. Developing an effective procurement process

is a very use full means in a todays challenging and intricate business environment. If this employed in place, it saves time and money, serves as a conduit for achieving entity's objectives, ensures compliance with regulatory policies and provides a framework to guide procurement officers in the achievement of their tasks and duties. The performance measurement factors for effective procurement processes are effective communication with production and effective management of purchase portfolio. From this perspective, the procurement system of these factories understudy were assessed as detailed below.

According to the finding of the study, effective communication production was rated in terms of having a material specification list in place to guide a supplier; it was rated as with the overall mean value of (3.58). The case factories were asked about their status on having a system enables to ensure that specification matches to end customer requirement, it was also rated above the average with the overall mean value of (3.58). Similarly the factory's performance in terms of following a procedure to decide right specification and right quantity required to purchase was also above the average with the overall mean value of (4.08). With regard to setting a specific numbers of suppliers to keep ready for getting required material to reduce supplier power, it was also rated above the average with the overall mean value of (3.67). This indicated that effective communication production of the factories understudy was found in the satisfaction performance level.

Similarly, effective management of purchase portfolio variable was also found above the mean level with the overall mean of (3.92) for having critical item list and a system to keep safety inventory level, (3.58) for supplier designated for supplying critical item, (3.17) for updating its supplier database regularly and (3.5) for arranging alternative supplier to supply the critical item in emergency which all are above the mean level. This also indicates that the factory's performance is satisfactory with this regard.

Table 4.4: Comparison of Effective procurement processes

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Has material specification list in place to guide a supplier	Tikur Abay	6	3.00	1.095	0.447	1.850	4.150
	Anbessa	4	4.00	0.816	0.408	2.700	5.300
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.58	1.084	0.313	2.890	4.270
A system enables to ensure that specification matches to end customer requirement	Tikur Abay	6	3.17	0.408	0.167	2.740	3.600
	Anbessa	4	3.75	0.957	0.479	2.230	5.270
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.58	0.793	0.229	3.080	4.090
Follows a procedure to decide right specification and right quantity required to purchase	Tikur Abay	6	3.83	0.753	0.307	3.040	4.620
	Anbessa	4	4.25	0.957	0.479	2.730	5.770
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	4.08	0.793	0.229	3.580	4.590
Specific numbers of suppliers to keep ready for getting required material to reduce supplier power	Tikur Abay	6	3.67	1.751	0.715	1.830	5.500
	Anbessa	4	3.25	1.258	0.629	1.250	5.250
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.67	1.435	0.414	2.750	4.580
Has critical item list and a system to keep safety inventory level	Tikur Abay	6	3.50	0.837	0.342	2.620	4.380
	Anbessa	4	4.25	0.957	0.479	2.730	5.770
	Peacock	2	4.50	0.707	0.500	-1.850	10.850
	Total	12	3.92	0.900	0.260	3.340	4.490
Has supplier designated	Tikur Abay	6	3.50	0.837	0.342	2.620	4.380

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
for supply critical item	Anbessa	4	3.50	1.000	0.500	1.910	5.090
	Peacock	2	4.00	0.000	0.000	4.000	4.000
	Total	12	3.58	0.793	0.229	3.080	4.090
Updates its supplier database regularly	Tikur Abay	6	2.50	1.378	0.563	1.050	3.950
	Anbessa	4	4.25	0.957	0.479	2.730	5.770
	Peacock	2	3.00	1.414	1.000	-9.710	15.710
	Total	12	3.17	1.403	0.405	2.270	4.060
Arranges alternative supplier to supply the critical item in emergency	Tikur Abay	6	3.00	1.095	0.447	1.850	4.150
	Anbessa	4	4.50	1.000	0.500	2.910	6.090
	Peacock	2	3.00	1.414	1.000	-9.710	15.710
	Total	12	3.50	1.243	0.359	2.710	4.290

Source: Own computation

4.3.2. ANOVA Result for Supplier Relationship Management

As presented in Table 4.5, ANOVA was used for measuring and differentiating the significance of the null hypothesis under study.

4.3.2.1.Quality Supplier Selection

Supplier performance in terms of factors like having a system to ensure it received quality material from supplier which was rejected at F (2, 9) = 0. 643, P= 0.548 and in terms of using performance measurement procedure to be employed for preventive procedure in case when the supplier can't satisfy delivery criteria is also rejected at F (2, 9) = 1.114, P= 0.37. Similarly in terms of setting arrangement with supplier to keep stock ready for routine and urgent requirement in their warehouse was also rejected F (2, 9) =

0.218, P= 0.808. This revealed that there is a significant different in supplier performance among the factories under study.

Regarding selection process, it was measured in terms of choosing its supplier using well developed criteria and found that it was rejected at F (2, 9) = 0.158, P= 0.856. Similarly it was measured in terms of setting a feedback system to identify the area of improvement and it is revealed that it was also rejected at F (2, 9) =0.918, P= 0.434. This indicated that there is a significant difference among the case study firms. However, the hypothesis of using a standard contract for all suppliers and standard procedure for effective negotiation was accepted at F (2, 9) = 2.88, P= 0.108. This indicated that there was no significant difference among the shoe factories under study. Similarly, green supplier was measured in terms of employing a system to ensure that the supplier is following same line of environmental policy and works towards environmental friendly manufacturing process, by following national and international regulation and awarding a third party certification and conducts regular survey on existing system whereby both indicated that the hypothesis was rejected at F (2, 9) =0.622 with P=0.558 and F (2, 9) =0.07 with P= 0.933 respectively which revealed that there is a significant difference among the firms understudy.

4.3.2.2.Supplier integration

Coordination and resource sharing was measured in terms of cooperation with supplier to improve operation process, helping supplier to take any critical decision during any unforeseen situation and informing supplier in advance for an extra requirement of material due to sudden or planned requirements whereby all were rejected at F (2, 9) =1.696 with P=0.237, F (2, 9) =0.557 with P= 0.592 and F (2, 9) =0.6322 with P=0.019 respectively which shows there was a significant difference among the shoe factories. However, the finding revealed that there was no significant differences in terms of coordination and understanding to facilitate urgent requirement between the factory and supplier at F (2, 9) =6.322 with p=0.019. Similarly, information integration was measured in terms of developing a collaboration planning in use for information integration and

making forecasting along with suppliers and both have a significant difference and rejected at F (2, 9) =0.722 with P= 0.512 and F (2, 9) = 1.216 with P=0.341 respectively. Organizational relationship was also measured in terms of employing a system to achieve common objective like sharing a risk with suppliers and it was found that it has a significant differences and rejected at F (2, 9) =0.951 with P= 0.422.

4.3.2.3.Effective procurement processes

Effective communication production was evaluated in terms of developing a material specification list in place to guide a supplier, following a procedure to decide right specification and right quantity required to purchase and coordinating with specific numbers of suppliers to keep ready for getting required material to reduce supplier power whereby all three are rejected at F (2, 9) =2.338 with P= 0.152, F (2, 9) =0.616 with P= 0.561 and F (2, 9) =0.455 with P= 0.648. This indicated that there was a significant difference among the shoe factories. However, there was no significant differences in terms of using a system enables to ensure that specification matches to end customer requirement at F (2, 9) =3.122 with P=0.093. Similarly, effective management of purchasing was evaluated in terms of having a critical item list and a system to keep safety inventory level, having a supplier designated for supplying critical item, updating its supplier database regularly and arranging alternative supplier to supply the critical item in emergency and all were rejected at F (2, 9) = 1.444 with P= 0.286, F (2, 9) =0.288 with P= 0.756, F (2, 9) = 2.342 with P= 0.152 and F (2, 9) = 2.455 with P= 0.141 respectively. This indicated that there was a significant difference among the case study shoe factories.

Table 4.5: ANOVA result for Supplier relationship management

Hypotheses	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing companies in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
Has a system to ensure it received quality material from supplier	0.643	0.548	Rejected
Uses performance measurement procedure to be employed for preventive procedure in case when the supplier can't satisfy delivery criteria	1.114	0.37	Rejected
Set arrangement with supplier to keep stock ready for routine and urgent requirement in their warehouse	0.218	0.808	Rejected
Choose its supplier using well developed criteria	0.158	0.856	Rejected
Set a feedback system to identify the area of improvement	0.918	0.434	Rejected
Use a standard contract for all suppliers and standard procedure for effective negotiation	2.88	0.108	Accepted
Has a system to ensure that the supplier is following same line of environmental policy and works towards environmental friendly manufacturing process, by following national and international regulation	0.622	0.558	Rejected
Awarded third party certification and conducts regular survey on existing system	0.07	0.933	Rejected
Cooperates with supplier to improve operation process	1.696	0.237	Rejected
During any unforeseen situation, it helps supplier to take any critical decision	0.557	0.592	Rejected
There is coordination and understanding to facilitate urgent requirement between the factory and supplier	6.322	0.019	Accepted
Informs supplier in advance for an extra requirement of material due to sudden or planned requirements	1.607	0.253	Rejected
Developed collaboration planning in use for	0.722	0.512	Rejected

Hypotheses	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing companies in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
information integration			
Makes forecasting along with suppliers	1.216	0.341	Rejected
Employ a system to achieve common objective like sharing a risk with suppliers	0.951	0.422	Rejected
Has material specification list in place to guide a supplier	2.338	0.152	Rejected
A system enables to ensure that specification matches to end customer requirement	3.122	0.093	Accepted
Follows a procedure to decide right specification and right quantity required to purchase	0.616	0.561	Rejected
Specific numbers of suppliers to keep ready for getting required material to reduce supplier power	0.455	0.648	Rejected
Has critical item list and a system to keep safety inventory level	1.444	0.286	Rejected
Has supplier designated for supply critical item	0.288	0.756	Rejected
Updates its supplier database regularly	2.342	0.152	Rejected
Arranges alternative supplier to supply the critical item in emergency	2.455	0.141	Rejected

Source: Own computation

4.4. Internal Supply Chain Management Process: Production Department

In today's business environment, proper arrangement of internal supply chain management process is a crucial step in ensuring heightened competitiveness. It needs to balance the customers' requirements with the factory's supply capabilities, which includes forecasting demand and synchronizing it with production, procurement, and distribution. Internal supply chain management process includes the planning of internal production by deciding which products to carry at each warehouse; planning of storage

capacity for the location and size of warehouses; preparation of demand and supply plans by defining inventory management policies; and fulfillment of actual orders by picking, packing and shipping that orders. It aims at fulfilling demands generated by the customers in a timely manner and at the lowest possible cost.

4.4.1. Internal Integration and Enabling Requirements

4.4.1.1.Facility

As an internal supply relationship management practice, this study also tried to know the facility management practices of those selected factories understudy. It is the actual physical location in the supply chain network where product is stored, assembled, or fabricated. For this, five factors were taken into consideration for this study. These variables are capacity utilization, efficiency, flexibility, quality and reliability.

To discuss on each variables one by one, capacity utilization was measured in terms of employing a system to optimize the idle time caused by nonscheduled work or end of shift which has the overall mean of (3.67), it was found above the mean level. Regarding the position of each factory, all are rated above the mean at a better satisfaction level. In a similar manner, efficiency was also measured in terms of whether these factories are preparing a plan to reduce fixed cost and the average mean value is in a satisfaction level with the overall mean of (3.27) even though Anbessa shoe factory gave a value below the average (2.4) which indicates further improvement. Similarly, flexibility is found in satisfactory in terms of employing flexible facility to accommodate a market uncertainty which has the overall mean of (4.27). Similarly, as a variable to measure facility, quality was also measured and found satisfactory in terms of implementing a system to further improve production increasing with regard to automation with the overall mean of (3.8). In addition to these variables, reliability was also measured and performed in a satisfactory level in terms employing reliable facility to address market needs environmentally friendly, documenting safety or pollution control procedure, placing instruction for operation posted near each machine, employing a planned maintenance

system and in maintaining minimum stock level for critical spares with the overall mean of (4.2), (3.67), (4.0), (3.73) and (3.73) respectively which all shown a better level of satisfaction. Each factory was also rated above the mean as indicated in Table 4.6.

Table 4.6: Facility

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Employs a system to optimize the idle time caused by nonscheduled work or end of shift	Tikur Abay	5	3.60	1.140	0.510	2.180	5.020
	Anbessa	5	3.40	0.894	0.400	2.290	4.510
	Peacock	5	4.00	0.000	0.000	4.000	4.000
	Total	15	3.67	0.816	0.211	3.210	4.120
Prepares a plan to reduce fixed cost	Tikur Abay	5	3.20	1.643	0.735	1.160	5.240
	Anbessa	5	2.40	1.140	0.510	0.980	3.820
	Peacock	5	4.20	0.837	0.374	3.160	5.240
	Total	15	3.27	1.387	0.358	2.500	4.030
Facility is flexible to accommodate market uncertainties	Tikur Abay	5	4.20	1.095	0.490	2.840	5.560
	Anbessa	5	3.80	1.095	0.490	2.440	5.160
	Peacock	5	4.80	0.447	0.200	4.240	5.360
	Total	15	4.27	0.961	0.248	3.730	4.800
Implements a system to further improve production increasing with regard to automation	Tikur Abay	5	3.80	1.304	0.583	2.180	5.420
	Anbessa	5	3.40	0.894	0.400	2.290	4.510
	Peacock	5	4.20	0.447	0.200	3.640	4.760
	Total	15	3.80	0.941	0.243	3.280	4.320
The facility is reliable to address market needs	Tikur Abay	5	4.40	0.894	0.400	3.290	5.510
	Anbessa	5	4.20	0.447	0.200	3.640	4.760

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
environmentally friendly	Peacock	5	4.00	0.707	0.316	3.120	4.880
	Total	15	4.20	0.676	0.175	3.830	4.570
Documented safety or pollution control procedure	Tikur Abay	5	3.60	1.140	0.510	2.180	5.020
	Anbessa	5	3.00	1.414	0.632	1.240	4.760
	Peacock	5	4.40	0.894	0.400	3.290	5.510
	Total	15	3.67	1.234	0.319	2.980	4.350
There is instruction for operation posted near each machine	Tikur Abay	5	4.40	1.342	0.600	2.730	6.070
	Anbessa	5	3.00	1.225	0.548	1.480	4.520
	Peacock	5	4.60	0.548	0.245	3.920	5.280
	Total	15	4.00	1.254	0.324	3.310	4.690
Has a planned maintenance system	Tikur Abay	5	3.80	1.304	0.583	2.180	5.420
	Anbessa	5	3.00	1.225	0.548	1.480	4.520
	Peacock	5	4.40	0.894	0.400	3.290	5.510
	Total	15	3.73	1.223	0.316	3.060	4.410
It maintains minimum stock level for critical spares	Tikur Abay	5	3.20	1.304	0.583	1.580	4.820
	Anbessa	5	3.60	0.894	0.400	2.490	4.710
	Peacock	5	4.40	0.894	0.400	3.290	5.510
	Total	15	3.73	1.100	0.284	3.120	4.340

Source: Own computation

4.4.1.2. Inventory

In general, inventory management includes aspects such as controlling and overseeing ordering inventory, storage of inventory and controlling the amount of product for sale. It used to ensure having the right inventory at the right quantity, in the right place, at the

right time, and at the right cost. The study assessed the extent of the factories understudy in managing all raw materials, work in process and finished goods within a supply chain. Proper inventory policy with in the factory can ensure efficiency and responsiveness. For the study, optimal inventory policy and warehouse utilization was also given an emphasis to evaluate the performance of these factories in inventory management. Accordingly, optimal inventory policy is rated below the average satisfaction level with the overall mean value of (2.87) which indicated that it needs further improvement in terms of employing a system to reduce inventory cost which was rated (2.8) by Tikur Abay, (2.2) by Anbessa and (3.6) by Peacock. Hence, it can be inferred that from this mean value, Tikur Abay and Anbessa needs to be further improved.

The overall mean in terms of establishing vendor managed inventory (VMI) arrangement with supplier is (3.0). This resulted from the low level given by Tikur Abay which is (2.8). Although the overall mean is above the average mean in implementing a system to manage inventory level during sudden fluctuation in customer demand with the value (3.2), it needs improvement for Tikur Abay Shoe Factory with the value of (2.6) which is below the average mean. With regard to the performance of warehouse utilization, Tikur Abay shoe factory has rated (2.8) which is below the average mean although the overall men is (3.27) which is above the average for the three factories. Hence, Tikur Abay needs further improvement in terms of this. Similarly, Anbessa rated (1.8) values in using a procedure to deal with obsolete raw material in stock which is by far below the average mean and resulted in the low level of overall mean which is (2.87). From this, it can be conclude that Anbessa shoe factory needs further improvement with this regards.

The other variables considered in inventory is flexibility which showed the overall mean above average with the value (3.13) and (3.6) for employing flexible logistics to accommodate market uncertainties and follows a system to react during sudden demand fluctuation respectively. With regard to reliability performance in inventory, it is measured in reliability of the logistics to address market needs and has an overall value of (3.0) resulted from (2.4) value by Tikur Abay which needs further improvement.

However, in terms of employing a system to mark present performance, it is measured in meeting delivery schedule and has the overall value (3.6) which is above the average value indicate that the performance of the factories understudy are in a satisfactory level.

Table 4.7: Inventory

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Employees a system to reduce inventory cost	Tikur Abay	5	2.80	1.304	0.583	1.180	4.420
	Anbessa	5	2.20	1.095	0.490	0.840	3.560
	Peacock	5	3.60	1.140	0.510	2.180	5.020
	Total	15	2.87	1.246	0.322	2.180	3.560
Has vendor managed inventory (VMI) arrangement with supplier	Tikur Abay	5	2.80	1.304	0.583	1.180	4.420
	Anbessa	5	3.00	0.707	0.316	2.120	3.880
	Peacock	5	3.20	1.095	0.490	1.840	4.560
	Total	15	3.00	1.000	0.258	2.450	3.550
Developed a system to manage inventory level during sudden fluctuation in customer demand	Tikur Abay	5	2.60	1.140	0.510	1.180	4.020
	Anbessa	5	3.20	0.837	0.374	2.160	4.240
	Peacock	5	3.80	1.095	0.490	2.440	5.160
	Total	15	3.20	1.082	0.279	2.600	3.800
Has a system to select suitable channel, scheduling location of warehouses	Tikur Abay	5	3.40	1.517	0.678	1.520	5.280
	Anbessa	5	2.80	0.837	0.374	1.760	3.840
	Peacock	5	3.60	0.894	0.400	2.490	4.710
	Total	15	3.27	1.100	0.284	2.660	3.880
Has a procedure to deal with	Tikur Abay	5	3.00	1.581	0.707	1.040	4.960

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
obsolete raw material in stock	Anbessa	5	1.80	0.837	0.374	0.760	2.840
	Peacock	5	3.80	0.447	0.200	3.240	4.360
	Total	15	2.87	1.302	0.336	2.150	3.590
Logistics are flexible to accommodate market uncertainties	Tikur Abay	5	3.00	1.225	0.548	1.480	4.520
	Anbessa	5	3.20	1.304	0.583	1.580	4.820
	Peacock	5	3.20	0.447	0.200	2.640	3.760
	Total	15	3.13	0.990	0.256	2.580	3.680
Has a system to react during sudden demand fluctuation	Tikur Abay	5	3.40	1.517	0.678	1.520	5.280
	Anbessa	5	3.60	0.894	0.400	2.490	4.710
	Peacock	5	3.80	0.447	0.200	3.240	4.360
	Total	15	3.60	0.986	0.254	3.050	4.150
Logistics are reliable to address market needs	Tikur Abay	5	2.40	1.140	0.510	0.980	3.820
	Anbessa	5	3.00	1.000	0.447	1.760	4.240
	Peacock	5	3.60	0.548	0.245	2.920	4.280
	Total	15	3.00	1.000	0.258	2.450	3.550
Has a system to mark present performance in terms of meeting delivery schedule	Tikur Abay	5	3.20	1.483	0.663	1.360	5.040
	Anbessa	5	3.40	1.342	0.600	1.730	5.070
	Peacock	5	4.20	0.447	0.200	3.640	4.760
	Total	15	3.60	1.183	0.306	2.940	4.260

Source: Own computation

4.4.1.3.Internal Integration

Internal integration refers to a collaborative relationship within factory in a way enables to ensure interdependence and cooperation. Under this, information integration, internal

quick response, use of information technology and efficiency were variables considered as a part of conducting performance measurement.

As mentioned above information integration is one of the factors considered for measuring internal integration. Information integration is measured in terms of whether the factories are applying real time monitoring system in use to monitor, review, evaluate and modify the overall processes and functions performed which is in a satisfactory level with a mean value (3.53). Similarly, in employing a system to strengthen information sharing as measure of internal quick response, it is valued above the average mean which is (3.13) although Anbessa shoe factory has a lower value below the average. As a measure of efficiency of information integration, following a system to reduce its operating cost is rated at (3.6) which is above the average mean value and is in a satisfactory level.

Table 4.8: Comparison of Internal integration

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Apply real time monitoring system in use to monitor, review, evaluate and Modify the overall processes and functions performed	Tikur Abay	5	3.20	0.837	0.374	2.160	4.240
	Anbessa	5	3.40	1.342	0.600	1.730	5.070
	Peacock	5	4.00	0.707	0.316	3.120	4.880
	Total	15	3.53	0.990	0.256	2.980	4.080
Has a system to strengthen information sharing	Tikur Abay	5	3.60	0.548	0.245	2.920	4.280
	Anbessa	5	1.60	0.894	0.400	0.490	2.710
	Peacock	5	4.20	0.837	0.374	3.160	5.240
	Total	15	3.13	1.356	0.350	2.380	3.880
Has a system to reduce its operating cost	Tikur Abay	5	3.80	1.304	0.583	2.180	5.420
	Anbessa	5	2.00	1.225	0.548	0.480	3.520

	Peacock	5	3.60	0.548	0.245	2.920	4.280
	Total	15	3.13	1.302	0.336	2.410	3.850

Source: Own computation

4.4.1.4.Human resource management

Human Resource Management is the function within an organization that focuses on the recruitment, management, and providing direction for the people who work in an organization. It is a system employed by the factories through managing their employees for the betterment of factories' internal operation. It includes variables like motivation, safety, training and innovation and learning which all activities are apart from hiring and firing.

In terms of human resource management, establishing a system in place to motivate workers to get best out of them was rated to measure the motivation of the workers and indicated that it has an overall value of (2.33) which is below the average and needs further improvement across all the factories understudy. However, in terms of employing a system for continuous skill development process, it was rated at (3.27) values which is above the average mean value although Peacock has registered the minimum mean value of (2.8) which shows that further improvement is needed. Employer's safety is also the other variable used in measuring the performance of the factories in terms of human resource management. It was measured by using safety procedure to ensure that the working environments are safe and follow all safety regulation which was valued (3.13) above the mean value although further improvement is necessary in Anbessa shoe factory which rated (2.0) below the average mean value.

Training was also measured in terms of applying a system to improve the skill and to compensate the skill gap when a retire worker with high skills has been replaced with novice and both have the overall mean value of (3.6) and (3.4) respectively which is above the mean value. The other variable used as the measure of human resource management was following a system to encourage human resources to be innovative and

keep tradition of learning which has a mean value of (3.07) above the mean value although Anbessa is rated the lower level (2.8) which is below the average mean. Hence, this needs further improvement for a better performance of the factory in terms of its human resource management.

Table 4.9: Comparison of Human Resource Management

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Established a system in place to motivate staffs workers to get best out of them	Tikur Abay	5	2.40	0.894	0.400	1.290	3.510
	Anbessa	5	1.80	1.304	0.583	0.180	3.420
	Peacock	5	2.80	1.304	0.583	1.180	4.420
	Total	15	2.33	1.175	0.303	1.680	2.980
Has a system for continuous skill development process	Tikur Abay	5	3.60	0.894	0.400	2.490	4.710
	Anbessa	5	3.40	0.548	0.245	2.720	4.080
	Peacock	5	2.80	0.837	0.374	1.760	3.840
	Total	15	3.27	0.799	0.206	2.820	3.710
Uses safety procedure to ensure that the working environments are safe and follow all safety regulation	Tikur Abay	5	3.80	0.837	0.374	2.760	4.840
	Anbessa	5	2.00	1.225	0.548	0.480	3.520
	Peacock	5	3.60	0.894	0.400	2.490	4.710
	Total	15	3.13	1.246	0.322	2.440	3.820
Has a system to improve the skill	Tikur Abay	5	3.60	1.140	0.510	2.180	5.020
	Anbessa	5	3.80	0.447	0.200	3.240	4.360
	Peacock	5	3.40	0.894	0.400	2.290	4.510
	Total	15	3.60	0.828	0.214	3.140	4.060
Has a system to compensate the skill gap when a retire worker with high skills has been replaced with novice	Tikur Abay	5	3.80	0.837	0.374	2.760	4.840
	Anbessa	5	3.00	1.225	0.548	1.480	4.520
	Peacock	5	3.40	0.548	0.245	2.720	4.080

	Total	15	3.40	0.910	0.235	2.900	3.900
Has a system to encourage human resources to be innovative and keep tradition of learning	Tikur Abay	5	3.20	0.837	0.374	2.160	4.240
	Anbessa	5	2.80	1.095	0.490	1.440	4.160
	Peacock	5	3.20	0.447	0.200	2.640	3.760
	Total	15	3.07	0.799	0.206	2.620	3.510

4.4.1.5.Operation

Operation is the alignment of all business units within an organization to ensure that they are working together to achieve core business goals. For measuring operation, operational performance and environmental performance variables were considered. Studying about these enable us to identify and know factories operational performance, environmental performance and operational improvement or level of implementing innovative means for enhancing the factories more competitiveness in the existing market.

For measuring operation, operational performance and environmental performance variables were used for the study. Accordingly, operational performance was measured whether the factories have operation reacts with the fluctuation of uncertain demand, works on reducing material usage and waste, established a system to eliminate the non-value adding activities between order and start of processing and applying a system to maximize its throughput which all shows the overall mean value of (3.73), (3.47), (3.6) and (3.73) respectively whereby all are above the average mean value. However, in reducing material usage and waste, it was rated below the average mean (2.2) by Anbessa Shoe Factory which needs further improvement.

Similarly, environmental performance was measured in terms of establishing a system for internal or external audit process, working on reducing energy consumption and arranging an alternative source of energy for consumption and all have overall mean value of (3.8), (3.4) and (3.27) respectively which is above the average mean although Anbessa rated as (2.6) which indicate that it needs for improvement in working on reducing energy consumption and Tikur Abay rated (2.8) which indicated the need for improvement in terms of arranging an alternative source of energy for consumption. In

contrary to this, in managing emission related issues, it is rated overall mean of (2.87) which is because of the low mean value rated by Anbessa (2.6) and Peacock (2.8) which indicates that both factories need improvement in terms of this.

Table 4.10: Comparison of Operation

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Operation reacts with the fluctuation of uncertain demand	Tikur Abay	5	3.20	0.837	0.374	2.160	4.240
	Anbessa	5	4.00	0.000	0.000	4.000	4.000
	Peacock	5	4.00	0.000	0.000	4.000	4.000
	Total	15	3.73	0.594	0.153	3.400	4.060
Has a system to reduce material usage and waste	Tikur Abay	5	4.00	0.707	0.316	3.120	4.880
	Anbessa	5	2.20	1.095	0.490	0.840	3.560
	Peacock	5	4.20	0.837	0.374	3.160	5.240
	Total	15	3.47	1.246	0.322	2.780	4.160
Has a system to eliminate the non-value adding activities between order and start of processing	Tikur Abay	5	3.60	0.548	0.245	2.920	4.280
	Anbessa	5	3.00	1.414	0.632	1.240	4.760
	Peacock	5	4.20	0.837	0.374	3.160	5.240
	Total	15	3.60	1.056	0.273	3.020	4.180
Has a system to maximize its throughput	Tikur Abay	5	3.80	0.837	0.374	2.760	4.840
	Anbessa	5	3.40	0.894	0.400	2.290	4.510
	Peacock	5	4.00	0.707	0.316	3.120	4.880
	Total	15	3.73	0.799	0.206	3.290	4.180
Established a system for internal or external audit process	Tikur Abay	5	4.20	0.837	0.374	3.160	5.240
	Anbessa	5	3.00	1.225	0.548	1.480	4.520
	Peacock	5	4.20	1.304	0.583	2.580	5.820
	Total	15	3.80	1.207	0.312	3.130	4.470

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Works on reducing energy consumption	Tikur Abay	5	3.60	0.894	0.400	2.490	4.710
	Anbessa	5	2.60	1.140	0.510	1.180	4.020
	Peacock	5	4.00	0.707	0.316	3.120	4.880
	Total	15	3.40	1.056	0.273	2.820	3.980
Arranged an alternative source of energy for consumption	Tikur Abay	5	2.80	0.837	0.374	1.760	3.840
	Anbessa	5	3.60	1.517	0.678	1.720	5.480
	Peacock	5	3.40	0.894	0.400	2.290	4.510
	Total	15	3.27	1.100	0.284	2.660	3.880
Has a system to manage emission related issue	Tikur Abay	5	3.20	1.304	0.583	1.580	4.820
	Anbessa	5	2.60	1.140	0.510	1.180	4.020
	Peacock	5	2.80	0.837	0.374	1.760	3.840
	Total	15	2.87	1.060	0.274	2.280	3.450

Source: Own computation

4.4.2. ANOVA Result for Internal Supply Chain Management

ANOVA was analyzed for internal supply chain management. It was categorized in to different groups.

4.4.2.1.Facility

As a measuring factor of facility, capacity utilization was measured in terms of employing a system to optimize the idle time caused by nonscheduled work or end of shift & it was evaluated and rejected at F (2, 12) =0.667 with P= 0.531. This indicated that there is significant difference among the factories. Efficiency was also measured in terms of preparing a plan to reduce fixed cost and it revealed that there is no significant difference among the factory at F (2, 12) = 2.596 with P=0.116. Flexibility was also measured in using a variable flexible facility to accommodate market uncertainties and

rejected at F (2, 12) =1.462 with P=0.270. This revealed that there is significant difference among the factories. Similarly, quality was also evaluated in terms of using flexible facility to accommodate market uncertainties and it is found that there is a significant difference among the firms at F (2, 12) =0.889 with P= 0.437. As far as reliability is concerned, it was measured in terms of reliability of the facility to address market needs environmentally friendly, documenting safety or pollution control procedure, employing a planned maintenance system and whether these factories maintain minimum stock level for critical spares whereby all are rejected at F (2, 12) =0.4 with P=0.679, F (2, 12) =1.805 with P=0.206, F (2, 12) =1.850 with P=0.199 and F (2,12) =1.697 with P= 0.224 respectively. This indicated that the hypothesis of all is rejected at 5% significant level. Additionally, it was evaluated in terms of the presence of operation instruction posted near each machine and this revealed that there is no significant differences at F (2, 12) =3.167 with P=0.079.

4.4.2.2.Inventory

Under this, optimal inventory policy is also measured in turn in terms of employing a system to reduce inventory cost, using vendor managed inventory (VMI) arrangement with supplier and applying a system to manage inventory level during sudden fluctuation in customer demand whereby all are rejected at F (2, 12) =1.762 with P= 0.213, F (2, 12) =0.176 with P=0.84 and F (2, 12) =1.687 with P= 0.226 respectively. This revealed that there is significant difference among the firms. Warehouse utilization was also evaluated in employing a system to select suitable channel, scheduling location of warehouses and using a procedure to deal with obsolete raw material in stock. From these variables, employing a system to select suitable channel, scheduling location of warehouses is rejected at F (2, 12) =0.684 with P = 0.523 while employing a procedure to deal with obsolete raw material in stock is accepted at F (2, 12) =4.471 with P=0.035. Flexibility was also evaluated in terms of using flexible logistics to accommodate market uncertainties and applying a system to react during sudden demand fluctuation whereby both are rejected at F (2, 12) =0.059 with P=0.943 and F (2, 12) =0.182 with P= 0.836

respectively. This indicated that there is a significant difference among the factories understudy. Reliability was also evaluated in terms of reliability of logistics to address market needs and in using a system to mark present performance in terms of meeting delivery schedule were rejected at F (2, 12) = 2.077 with P=0.168 and F (2, 12) =1.0 with P=0.397 respectively. This also revealed that there is significant difference among the factories.

4.4.2.3.Internal Integration

Information integration was also measured in terms of applying real time monitoring system in use to monitor, review, evaluate and modify the overall processes and functions performed is rejected at F (2, 12) =0.867 with P=0.445. That means there is significant difference among the firms. Internal quick response was measured in terms of employing a system to strengthen information sharing and efficiency was also measured in using a system to reduce its operating cost whereby both were accepted at F (2, 12) =15.444 with P=0.00 and F (2, 12) =4.171 with P = 0.042 respectively. This indicated that there is no significant difference.

4.4.2.4.Human Resource

Motivation was measured in establishing a system to motivate workers to get best out of them and employing a system for continuous skill development process whereby both are rejected at F (2, 12) =0.905 with P=0.431 and F (2, 12) =4.867 with P=0.274 respectively. Similarly, safety was also evaluated in terms of using safety procedure to ensure that the working environments are safe and follow all safety regulation and accepted at F (2, 12) =4.867 and P=0.028. This indicates there is no significant difference. Training was also evaluated in terms of applying a system to improve the skill and to compensate the skill gap when a retire worker with high skills has been replaced with novice which rejected at a 5% significant level with F (2, 12) =0.261, P =0.775 and F (2, 12) =0.96, P=0.41 respectively. Regarding innovation and learning, it was evaluated and revealed that there is significant different among the factories in terms of

encouraging human resources to be innovative and keep tradition of learning at F (2, 12) =0.381 with P= 0.691 which is rejected at 5% significant level.

4.4.2.5.Operation

To measure the performance operation, operational performance is one of the measuring variable to be evaluated in terms of whether operation reacts with the fluctuation of uncertain demand and reducing material usage and waste reacts with the fluctuation of uncertain demand and it was found accepted with F (2, 12) =4.571 with P=0.033, F (2, 12) =7.583 with P=0.007 respectively. In terms of other variables like employing a system to eliminate the non-value adding activities between order and start of processing and applying a system to maximize its throughput whereby it was found rejected at 5% significant level at, F (2, 12) =1.8 with P=0.207 and F (2, 12) =0.7 with P=0.516 respectively. Similarly environmental performance was measured in establishing a system for internal or external audit process, arranging an alternative source of energy for consumption and applying a system to manage emission related issues were rejected at F (2, 12) =1.846 with P= 0.2, F (2, 12) =0.684 with P=0.523 and F (2, 12) =0.378 with P=0.693 respectively. This indicated that there is a significance difference among the factories. However, working on reducing energy consumption was found accepted at F (2, 12) =3.0 with P=0.088. This indicated that there is no significant difference among the factory.

Table 4.11: ANOVA result for internal supply chain management

Hypotheses	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing factories in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
Employs a system to optimize the idle time caused by nonscheduled work or end of shift	0.667	0.531	Rejected
Prepares a plan to reduce fixed cost	2.596	0.116	Accepted

Hypotheses	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing factories in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
Facility is flexible to accommodate market uncertainties	1.462	0.27	Rejected
Implements a system to further improve production increasing with regard to automation	0.889	0.437	Rejected
The facility is reliable to address market needs environmentally friendly	0.4	0.679	Rejected
Documented safety or pollution control procedure	1.805	0.206	Rejected
There is instruction for operation posted near each machine	3.167	0.079	Accepted
Has a planned maintenance system	1.85	0.199	Rejected
It maintains minimum stock level for critical spares	1.697	0.224	Rejected
Employees a system to reduce inventory cost	1.762	0.213	Rejected
Has vendor managed inventory (VMI) arrangement with supplier	0.176	0.84	Rejected
Developed a system to manage inventory level during sudden fluctuation in customer demand	1.687	0.226	Rejected
Has a system to select suitable channel, scheduling location of warehouses	0.684	0.523	Rejected
Has a procedure to deal with obsolete raw material in stock	4.471	0.035	Accepted
Logistics are flexible to accommodate market uncertainties	0.059	0.943	Rejected
Has a system to react during sudden demand fluctuation	0.182	0.836	Rejected
Logistics are reliable to address market needs	2.077	0.168	Rejected
Has a system to mark present performance in terms of meeting delivery schedule	1	0.397	Rejected
Apply real time monitoring system in use to monitor, review, evaluate and Modify the overall processes and functions performed	0.867	0.445	Rejected
Has a system to strengthen information sharing	15.444	0	Accepted
Has a system to reduce its operating cost	4.171	0.042	Accepted
Established a system in place to motivate staffs workers to get best	0.905	0.431	Rejected

Hypotheses	ANOVA Among Firms		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing factories in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
out of them			
Has a system for continuous skill development process	1.444	0.274	Rejected
Uses safety procedure to ensure that the working environments are safe and follow all safety regulation	4.867	0.028	Accepted
Has a system to improve the skill	0.261	0.775	Rejected
Has a system to compensate the skill gap when a retire worker with high skills has been replaced with novice	0.96	0.41	Rejected
Has a system to encourage human resources to be innovative and keep tradition of learning	0.381	0.691	Rejected
Operation reacts with the fluctuation of uncertain demand	4.571	0.033	Accepted
Has a system to reduce material usage and waste	7.583	0.007	Accepted
Has a system to eliminate the non-value adding activities between order and start of processing	1.8	0.207	Rejected
Has a system to maximize its throughput	0.7	0.516	Rejected
Established a system for internal or external audit process	1.846	0.2	Rejected
Works on reducing energy consumption	3	0.088	Accepted
Arranged an alternative source of energy for consumption	0.684	0.523	Rejected
Has a system to manage emission related issue	0.378	0.693	Rejected

Source: own computation at 5% significance level

4.5. Customer Relationship Management Process: Sales and Marketing

Customer relationship management is all aspects of interactions that a factory has with its customers, whether it is sales or service-related. It refers to the principles, practices and guidelines that an organization follows when interacting with its customers. From the organization's point of view, this entire relationship encompasses direct interactions with customers, such as sales and service-related processes, and forecasting and analysis of

customer trends and behaviors. Moreover, it provides the structure for how relationships with customers are developed and maintained encompassing pricing; the preparation of catalogues and other marketing materials; sales; management of the web site; order management and management of the call center that takes orders and provides service.

4.5.1. Factory to Customer Relationship

4.5.1.1.Customer Service

Customer service is the provision of service to customers before, during and after a purchase. It concerns about the priority of an organization assigns to customer service related to components such as product innovation and pricing and the support you provide for your customers in both before and after they buy your product that helps them have an easy and enjoyable experience with you. Similarly, it refers to the provision of labor and other resources, for the purpose of increasing the value that buyers receive from their purchases and from the processes leading up to the purchase. At this level, four measuring variables were considered. These are responsiveness, customer order processing& delivery, handling customer complaints and value added services.

Responsiveness is one of the factor used to measure customer service using variables like employing business strategy with respect to customer service, using a system to create an outstanding customer experience with optimum cost, implementing a system to improve the quality of customer service and using a system to get feedback from customer about its effectiveness with the overall mean value of (3.7), (3.3), (3.4) and (3.8) respectively which all found in better satisfactory level.

Customer order processing and delivery was also studied in terms of facing constraints and bottleneck in its process to achieve required fill rate, establishing a system to manage its bottleneck and Has a web-based supply chain and inventory management system which have overall mean value of (4.3), (3.1) and (2.8) respectively. In establishing a system to manage its bottleneck, although the overall is above the average mean value, the mean value of Tikur Abay is (2.75) which is below the average and needs further

improvement. However, the overall mean value for owing a web-based supply chain and inventory management system below the average value because of the low value rated by Tikur Abay is (2.5) and Peacock is (2.67) which both of them need further improvement in terms of this.

The way factories handling customer complaints was also measured in terms of documenting procedure to deal with customer complaint, giving opportunity to its customer to lodge a complaint, dissolving a customer complaint promptly and whether the factories have a system to reduce the number of complaint whereby all of them have the overall mean value above the average mean although Peacock rated below average mean in dissolving a customer's complaint promptly which was (2.33) which needs further improvement. Similarly, in terms of using a criteria to decide which complaint needs urgent response as a variable for measuring how to handle customer complaints, it has a lower mean value of (2.6) which is below the average because of the low mean value (2.0) rated by Tikur Abay which needs further improvement. In addition to these, value added service was measured as part of customer service in terms of whether the factory is providing after sales service to its customers and has developed a system that enable to know its customers are satisfied with after sales service which both have the above average mean value of (3.3) and (3.3) respectively.

Table 4.12: Comparison of Customer service

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Employs business strategy with respect to customer service	Tikur Abay	4	3.75	1.258	0.629	1.75	5.75
	Anbessa	3	3.33	0.577	0.333	1.9	4.77
	Peacock	3	4.00	0	0	4	4.00
	Total	10	3.70	0.823	0.26	3.11	4.29
Has a system to create an	Tikur Abay	4	3.00	0.816	0.408	1.7	4.30

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
outstanding customer experience with optimum cost	Anbessa	3	3.33	0.577	0.333	1.9	4.77
	Peacock	3	3.67	1.155	0.667	0.8	6.54
	Total	10	3.30	0.823	0.26	2.71	3.89
Has a system to improve the quality of customer service	Tikur Abay	4	3.25	0.5	0.25	2.45	4.05
	Anbessa	3	3.67	1.155	0.667	0.8	6.54
	Peacock	3	3.33	1.155	0.667	0.46	6.20
	Total	10	3.40	0.843	0.267	2.8	4.00
Has a system to get feedback from customer about its effectiveness	Tikur Abay	4	4.00	0.816	0.408	2.7	5.30
	Anbessa	3	4.00	0	0	4	4.00
	Peacock	3	3.33	0.577	0.333	1.9	4.77
	Total	10	3.80	0.632	0.2	3.35	4.25
Faces constraints and bottleneck in its process to achieve required fill rate	Tikur Abay	4	4.50	0.577	0.289	3.58	5.42
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	4.67	0.577	0.333	3.23	6.10
	Total	10	4.30	0.675	0.213	3.82	4.78
Established a system to manage its bottleneck	Tikur Abay	4	2.75	0.5	0.25	1.95	3.55
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	3.00	1.732	1	-1.3	7.30
	Total	10	3.10	0.994	0.314	2.39	3.81
Has a web-based supply chain and inventory management system	Tikur Abay	4	2.50	0.577	0.289	1.58	3.42
	Anbessa	3	3.33	0.577	0.333	1.9	4.77
	Peacock	3	2.67	0.577	0.333	1.23	4.10
	Total	10	2.80	0.632	0.2	2.35	3.25
Has documented procedure to deal with customer complaint	Tikur Abay	4	3.25	0.5	0.25	2.45	4.05
	Anbessa	3	3.67	0.577	0.333	2.23	5.10

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
	Peacock	3	4.33	0.577	0.333	2.9	5.77
	Total	10	3.70	0.675	0.213	3.22	4.18
Gives opportunity to its customer to lodge a complaint	Tikur Abay	4	4.00	0.816	0.408	2.7	5.30
	Anbessa	3	4.00	0	0	4	4.00
	Peacock	3	3.33	1.155	0.667	0.46	6.20
	Total	10	3.80	0.789	0.249	3.24	4.36
Dissolves a customer complaint promptly	Tikur Abay	4	3.00	0.816	0.408	1.7	4.30
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	2.33	1.155	0.667	-0.54	5.20
	Total	10	3.00	0.943	0.298	2.33	3.67
Has criteria to decide which complaint needs urgent response	Tikur Abay	4	2.00	0.816	0.408	0.7	3.30
	Anbessa	3	3.00	1	0.577	0.52	5.48
	Peacock	3	3.00	0	0	3	3.00
	Total	10	2.60	0.843	0.267	2	3.20
Has a system to reduce the number of complaint	Tikur Abay	4	3.50	0.577	0.289	2.58	4.42
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	3.67	1.155	0.667	0.8	6.54
	Total	10	3.60	0.699	0.221	3.1	4.10
Gives after sales service to its customers	Tikur Abay	4	3.25	0.957	0.479	1.73	4.77
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	3.00	0	0	3	3.00
	Total	10	3.30	0.675	0.213	2.82	3.78
Has developed a system enable to know that its customers are satisfied with after sales service they received	Tikur Abay	4	3.00	0.816	0.408	1.7	4.30
	Anbessa	3	3.33	0.577	0.333	1.9	4.77
	Peacock	3	3.67	1.155	0.667	0.8	6.54

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
	Total	10	3.30	0.823	0.26	2.71	3.89

Source: Own computation

4.5.1.2.Customer Integration

Customer integration is the component of customer relationship management which puts technology in place that allows customers to process their own transactions and to have direct contact with the organization. It is a way for the organization to do business with substantial savings on human resources. It refers to a collaborative relationship between factory and customer for interdependence and cooperation which could be based on mutual benefit. This means that the need for middlemen is reduced. To know the level of customer integration of the factories understudy, four factors were considered. These are extent of cooperation to improve quality, information integration, organizational relationship and use of information technology.

As a measurement of customer integration, extent of cooperation to improve quality is one area of study. To evaluate this, these factories position in terms of using regularly updated online catalogue which readily explain the price and shipping cost, it was found that all the factories understudy have an overall mean value of (2.1) which is below average mean. In detail Tikur Abay, Anbessa and Peacock have a value of (1.5), (3.0) and (2.0) respectively which shows the need for further improvement.

Similarly, information integration was measured in terms of maintaining transparency with its customer about product quality and availability, employing strategies to get to customer and for customer to get to it, cooperation with customer in developing joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities and whether standard means of communication across functions and customers. The overall mean value of these

measuring variables are (3.9), (4.1), (3.2) and (3.4) respectively which is above the average mean value although further improvement is needed by Tikur Abay in areas of making cooperation with its customer to develop joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities which has a mean value of (2.5).

Similarly, the factories position in developing system enable to identify, understand, and anticipate its customer's needs was measured and has the overall mean value of (2.9) which indicate the need for further improvement. This was resulted from Tikur Abay's mean value which was rated below the mean value at (2.5). In addition to these, organizational relationship was measured in terms of sharing its risk with its customer and matches its objective with its customer's requirements shows the overall average mean of (3.7) which is above the average mean. In contrary to this, the use of information technology was also rated although it showed lower overall mean of (1.9) that indicated the need for further improvement by all factories understudy.

Table 4.13: Comparison of Customer integration

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Regularly update its online catalogue and this online catalogue readily explain the price and shipping cost	Tikur Abay	4	1.50	0.577	0.289	0.58	2.42
	Anbessa	3	3.00	1	0.577	0.52	5.48
	Peacock	3	2.00	0	0	2	2.00
	Total	10	2.10	0.876	0.277	1.47	2.73
Maintains transparency with its customer about product quality and availability	Tikur Abay	4	4.00	1.155	0.577	2.16	5.84
	Anbessa	3	3.33	0.577	0.333	1.9	4.77
	Peacock	3	4.33	0.577	0.333	2.9	5.77
	Total	10	3.90	0.876	0.277	3.27	4.53
Has made strategies to get to	Tikur Abay	4	4.00	0.816	0.408	2.7	5.30

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
customer and for customer to get to it	Anbessa	3	4.00	1	0.577	1.52	6.48
	Peacock	3	4.33	0.577	0.333	2.9	5.77
	Total	10	4.10	0.738	0.233	3.57	4.63
Cooperates with its customer to develop joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities	Tikur Abay	4	2.50	0.577	0.289	1.58	3.42
	Anbessa	3	4.00	1	0.577	1.52	6.48
	Peacock	3	3.33	0.577	0.333	1.9	4.77
	Total	10	3.20	0.919	0.291	2.54	3.86
Developed a system enable to identify, understand, and anticipate its customer's needs	Tikur Abay	4	2.50	0.577	0.289	1.58	3.42
	Anbessa	3	3.33	1.155	0.667	0.46	6.20
	Peacock	3	3.00	1.732	1	-1.3	7.30
	Total	10	2.90	1.101	0.348	2.11	3.69
Has standard means of communication across functions and customers	Tikur Abay	4	3.25	0.957	0.479	1.73	4.77
	Anbessa	3	3.33	1.155	0.667	0.46	6.20
	Peacock	3	3.67	1.155	0.667	0.8	6.54
	Total	10	3.40	0.966	0.306	2.71	4.09
Shares its risk with its customer and matches its objective with its customer's requirements	Tikur Abay	4	4.00	0.816	0.408	2.7	5.30
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	3.33	1.155	0.667	0.46	6.20
	Total	10	3.70	0.823	0.26	3.11	4.29
Has state of art arrangement for online direct sale	Tikur Abay	4	1.50	0.577	0.289	0.58	2.42
	Anbessa	3	2.00	1	0.577	-0.48	4.48
	Peacock	3	2.33	0.577	0.333	0.9	3.77
	Total	10	1.90	0.738	0.233	1.37	2.43

Source: Own computation

4.5.1.3.Demand Forecasting

Demand forecasting is an estimate of sales during a specified future period based on proposed marketing plan and a set of particular uncontrollable and competitive forces. This enables an organization to take various business decisions, such as planning the production process, purchasing raw materials, managing funds, and deciding the price of the product. It has a crucial role in the management of every business. It helps an organization to reduce risks involved in business activities and make important business decisions. Apart from this, demand forecasting provides an insight into the organization's capital investment and expansion decisions. In addition to this, supply chain planning relies on forecast data, which becomes the basis for its production, material sourcing, inventory management and all other activities in supply chain. It was evaluated in terms of demand forecasting system as a performance measurement factor for this study. Accordingly, it was measured in terms of considering uncertainty factor due to global economic crunch, political instability, environment, or other factor for forecasting which showed the overall mean value above the average mean (3.70) as indicated in Table 4.14. This revealed that it is found in the satisfactory level.

Table 4.14: Comparison for Demand forecasting

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Considers uncertainty factor due to global economic crunch, political instability, environment, or other factor for forecasting	Tikur Abay	4	3.50	0.577	0.289	2.58	4.42
	Anbessa	3	3.67	0.577	0.333	2.23	5.10
	Peacock	3	4.00	1	0.577	1.52	6.48
	Total	10	3.70	0.675	0.213	3.22	4.18

Source: Own computation

4.5.1.4.Market Analysis

Market analysis was also measured in terms of market equity, customer acquisition, and customer retention and government policy over market equity. As one measuring variable of market analysis, market equity is evaluated in using a well-developed system to differentiate products in order to get competitive advantage which has the overall mean (4.0) above the average mean. Similarly, customer acquisition was measured in terms of building relationship with its targeted customer and regularly updating customer database which have the overall mean value of (4.3) and (2.7) respectively. The second value (2.7) is below the average mean value comes from the separated value of Tikur Abay (2.0) and Anbessa (2.67). From this low value of the two factories which resulted in low average value, it can be easily understood that this needs further improvement in areas of regularly updating customer database.

In addition to these, in customer retention, variables like developing a system enables to build customer's loyalty, employing strategies in respect of retaining existing customer, creating new customer and rewards its loyal customer and implements a matrix enables to identify old product with new customer was measured and indicated the overall mean value of (3.1), (3.3) and (3.2) were computed respectively which are above the average mean value.

Table 4.15: Comparison for market analysis

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Developed a system to differentiate products in order to get competitive advantage	Tikur Abay	4	4.25	0.5	0.25	3.45	5.05
	Anbessa	3	4.00	1	0.577	1.52	6.48
	Peacock	3	3.67	1.528	0.882	-0.13	7.46
	Total	10	4.00	0.943	0.298	3.33	4.67

Supply practices	Factory	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
Builds relationship with its targeted customer	Tikur Abay	4	4.50	0.577	0.289	3.58	5.42
	Anbessa	3	4.00	0	0	4	4.00
	Peacock	3	4.33	0.577	0.333	2.9	5.77
	Total	10	4.30	0.483	0.153	3.95	4.65
Has customer database and regularly updates it	Tikur Abay	4	2.00	0.816	0.408	0.7	3.30
	Anbessa	3	2.67	1.528	0.882	-1.13	6.46
	Peacock	3	3.67	0.577	0.333	2.23	5.10
	Total	10	2.70	1.16	0.367	1.87	3.53
Developed a system enables to build customer's loyalty	Tikur Abay	4	2.75	0.5	0.25	1.95	3.55
	Anbessa	3	3.00	1	0.577	0.52	5.48
	Peacock	3	3.67	0.577	0.333	2.23	5.10
	Total	10	3.10	0.738	0.233	2.57	3.63
Has strategies in the respect of retaining existing customer and creating new customer and rewards its loyal customer	Tikur Abay	4	3.50	1	0.5	1.91	5.09
	Anbessa	3	3.67	1.155	0.667	0.8	6.54
	Peacock	3	2.67	0.577	0.333	1.23	4.10
	Total	10	3.30	0.949	0.3	2.62	3.98
Has matrix enables to identify old product with new customer	Tikur Abay	4	3.25	0.5	0.25	2.45	4.05
	Anbessa	3	3.33	0.577	0.333	1.9	4.77
	Peacock	3	3.00	0	0	3	3.00
	Total	10	3.20	0.422	0.133	2.9	3.50
The government gives or considers subsidy on raw material for your factory	Tikur Abay	4	4.00	0.816	0.408	2.7	5.30
	Anbessa	3	4.00	1	0.577	1.52	6.48
	Peacock	3	3.00	1	0.577	0.52	5.48
	Total	10	3.70	0.949	0.3	3.02	4.38

Source: Own computation

Although, Peacock has below average mean value of (2.67) in terms of employing strategies in the respect of retaining existing customer and creating new customer and rewards its loyal customer are variables which need further improvement. Government policy over market equity is also used in measuring the performance of market analysis. It was measured in terms of the government role in considering subsidy on raw materials shows the overall mean value of (3.7) which is above the average mean.

4.5.2. ANOVA Result for Customer Relationship Management

4.5.2.1. Demand Forecasting

Demand forecasting system was evaluated in terms of considering uncertainty factor due to global economic crunch, political instability, environment, or other factor for forecasting and rejected at F (2, 7) = 0.414 with P= 0.676 which indicated that there is significant difference among the factories.

4.5.2.2.Customer Service

Responsiveness was measured in terms of employing a business strategy with respect to customer service, following a system to create an outstanding customer experience with optimum cost, employing a system to improve the quality of customer service and a system to get feedback from customer about its effectiveness whereby all are rejected at F (2, 7) = 0.442 with P= 0.66, F (2, 7) = 0.503 with P= 0.625, F (2, 7) = 0.182 with P= 0.837 and F (2, 7) = 1.225 with P= 0.35 respectively. This indicated that there is a significant difference among the factories.

Similarly, customer order processing and delivery was evaluated in terms of facing constraints and bottleneck in its process through achieving required fill rate, establishing a system to manage its bottleneck and using a web-based supply chain and inventory management system which all are rejected at F (2, 7) =2.65 with P= 0.139, 0.7 with P=0.528 and F (2, 7) = 1.9 with P=0.219 respectively. This indicates that there is a significant difference among the factories. Handling customer complaints was also

measured in terms of documentation procedure to deal with customer complaint which is accepted at F (2, 7) = 3.388 and P= 0.094. This indicates that there is no significant difference. Similarly, handling customer compliant was also evaluated in terms of whether the factory gives an opportunity to its customer to lodge a complaint, dissolves a customer complaint promptly, use an established criteria to decide which complaint needs urgent response and follows a system to reduce the number of complaint were used for measuring the way of handling customer complaints and all are found rejected at F (2, 7) =0.7 with P=0.528, F (2, 7) =1.750 with P=0.242, F (2, 7) =2.1 with P=0.913 and F (2, 7) =0.054 with P=0.948 respectively. Value adding services were also evaluated in terms of giving after sales service to its customers and employing a well-developed system enable to know that its customers are satisfied with after sales service they are receiving whereby both are rejected at F (2, 7) =0.7 with P=0.528 and F (2, 7) = 0.503 with P= 0.625 respectively.

4.5.2.3.Customer Integration

The extent of cooperation to improve quality was measured in terms of whether the factory regularly updating online catalogue and whether this online catalogue readily explains the price and shipping cost is found accepted at a 5% significant level at F (2, 7) =4.55 with P= 0.054. This indicates as there is no significant difference. Similarly, information integration was also measured in terms of maintaining transparency with its customer about product quality and availability, in developing strategies to get to customer and for customer to get to it, in developing a system enable to identify, understand, and anticipate its customer's needs and in establishing a standard means of communication across functions and customers whereby all are found rejected at F (2, 7) =1.028 with P=0.406, F (2, 7) =0.175 with P=0.843, F (2, 7) 0.447 with P=0.657 and F (2, 7) =0.137 with P= 0.837 respectively. It was also measured in terms of cooperation with its customer to develop joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities and accepted at F (2, 7) =3.755 with P=0.078 which indicate there is no significant difference among the factories under study. Additionally, organizational relationship was measured

in terms of sharing its risk with its customer and matches its objective with its customer's requirements was also rejected at F (2, 7) =0.503 with P= 0.625. Use of information technology was also measured in terms of following state of art arrangement for online direct sale and this also rejected at F (2, 7) =1.17 with P= 0.362.

4.5.2.4.Market Analysis

Market equity was evaluated and rejected at F (2, 7) = 0.275 with P= 0.767 in terms of using a developed system to differentiate products in order to get competitive advantage. This indicated that there is significant difference among the factories under study. Customer acquisition was evaluated in terms of building relationship with its targeted customer and whether it regularly updating its customer database and both were rejected at F (2, 7) = 0.91 with P= 0.445 and F (2, 7) =2.275 with P= 0.173 respectively. Customer retention was also measured in terms of implementing a well-developed system enables to build customer's loyalty, using strategies with respect of retaining existing customer and creating new customer and rewards its loyal customer and employing matrix enables to identify old product with new customer and all are rejected at F (2, 7) =1.52 with P= 0.283, F (2, 7) =0.976 with P= 0.423 and F (2, 7) =0.453 with P= 0.653 respectively. Similarly, government policy over market equity was also measured in whether the government gives or considers subsidy on raw materials and was rejected at 5% significant level at F (2, 7) =1.225 with P=0.35 which indicated that there is a significant difference among the factories.

Table 4.16: ANOVA result for Customer relationship management

Hypothesis	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing factories in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
Considers uncertainty factor due to global economic crunch, political instability, environment, or other	0.414	0.676	Rejected

Hypothesis	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing factories in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
factor for forecasting			
Employs business strategy with respect to customer service	0.442	0.66	Rejected
Has a system to create an outstanding customer experience with optimum cost	0.503	0.625	Rejected
Has a system to improve the quality of customer service	0.182	0.837	Rejected
Has a system to get feedback from customer about its effectiveness	1.225	0.35	Rejected
Faces constraints and bottleneck in its process to achieve required fill rate	2.65	0.139	Rejected
Established a system to manage its bottleneck	0.7	0.528	Rejected
Has a web-based supply chain and inventory management system	1.9	0.219	Rejected
Has documented procedure to deal with customer complaint	3.388	0.094	Accepted
Gives opportunity to its customer to lodge a complaint	0.7	0.528	Rejected
Dissolves a customer complaint promptly	1.75	0.242	Rejected
Has criteria to decide which complaint needs urgent response	2.1	0.193	Rejected
Has a system to reduce the number of complaint	0.054	0.948	Rejected
Gives after sales service to its customers	0.7	0.528	Rejected
Has developed a system enable to know that its customers are satisfied with after sales service they received	0.503	0.625	Rejected
Regularly update its online catalogue and this online catalogue readily explain the price and shipping cost	4.55	0.054	Accepted

Hypothesis	**ANOVA Among Firms**		
Null Hypothesis (HO) HO: There is no performance difference among the selected case study shoe manufacturing factories in the following supply relationship management practices	**F-Calculated**	**Significance**	**Decision**
Maintains transparency with its customer about product quality and availability	1.028	0.406	Rejected
Has made strategies to get to customer and for customer to get to it	0.175	0.843	Rejected
Cooperates with its customer to develop joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities	3.755	0.078	Accepted
Developed a system enable to identify, understand, and anticipate its customer's needs	0.447	0.657	Rejected
Has standard means of communication across functions and customers	0.137	0.874	Rejected
Shares its risk with its customer and matches its objective with its customer's requirements	0.503	0.625	Rejected
Has state of art arrangement for online direct sale	1.177	0.362	Rejected
Developed a system to differentiate products in order to get competitive advantage	0.275	0.767	Rejected
Builds relationship with its targeted customer	0.91	0.445	Rejected
Has customer database and regularly updates it	2.275	0.173	Rejected
Developed a system enables to build customer's loyalty	1.52	0.283	Rejected
Has strategies in the respect of retaining existing customer and creating new customer and rewards its loyal customer	0.976	0.423	Rejected
Has matrix enables to identify old product with new customer	0.453	0.653	Rejected
The government gives or considers subsidy on raw material for your factory	1.225	0.35	Rejected

Source: Own computation

4.6. AHP - Result and Discussion

Pair wise comparison of each factory across each process was investigated and the result is presented in this subsection. Summarized tables which show the priority of each factory in terms of the identified performance factors is also presented.

4.6.1. Supplier Relationship Management

Supplier relationship management has been measured in terms of identified performance measures factors and the priority given for each is presented in Table 4.16. To compare their performance, a summary of local and global priorities with respect to performance measurement factors is presented below.

Table 4.17: Local and global priorities of performance measurement factors in SRM

Decision level	Factors	Tikur Abay		Anbessa		Peacock	
		Local	Global	Local	Global	Local	Global
Strategic	Quality supplier selection (QSS)	0.490		0.443		0.525	
Tactical	Supplier performance (Sper)	0.548	0.269	0.525	0.232	0.512	0.269
	Selection process (SePro)	0.211	0.103	0.334	0.148	0.128	0.067
	Green supplier (GS)	0.241	0.118	0.142	0.063	0.360	0.189
Strategic	Supplier integration (SI)	0.312		0.387		0.334	
Tactical	Coordination and resource sharing (CRS)	0.309	0.096	0.309	0.120	0.400	0.133
	Information integration (II)	0.293	0.091	0.293	0.114	0.293	0.098
	Organizational relationship (OR)	0.238	0.074	0.238	0.092	0.198	0.066
	Use of information technology (UIT)	0.160	0.050	0.160	0.062	0.109	0.036
Strategic	Effective procurement processes (EPP)	0.198		0.170		0.142	
Tactical	Effective communication with production (ECP)	0.400	0.079	0.400	0.068	0.623	0.088

	Effective management of purchase portfolio (EMPP)	0.400	0.079	0.400	0.068	0.239	0.034
	Effective contract administration (ECA)	0.200	0.040	0.200	0.034	0.137	0.019
			1		**1**		**1**

Source: Own computation

As indicated in Table 4.17, in this section, QSS, SI and EPP were considered across the three case study factories. Accordingly, in the strategic level, Tikur Abay gives priority for QSS than others (0.490) followed by SI (0.312).

Similarly Anbessa and Peacock shoe factory also prefer QSS than others by (0.443) and 0.525) respectively. This indicated that, QSS has more preference than others. As far as tactical level is considered, in TA, from QSS, Sper has been given priority (0.548) followed by GS (0.241) and then SePro (0.211). This also shows that Sper is the most important factor while SePro is the least important. And finally, from SI, CRS (0.309) is more preferred followed by II. However, OR (0.238) and UIT (0.160) are less preferred by this factory from SI.

With regarding to the overall performance measuring factors (global priority) of Tikur Abay shoe factory is, Sper (0.269) the most desirable factor followed by GS (0.118) and then SePro (0.103). From this it can be inferred that Sper is the most desirable factor than others sin Tikur Abay shoe factory.

Regarding the preference in Anbessa shoe factory, under QSS, Sper is the most preferred followed by SePro (0.525) and GS (0.142) consecutively. From this it is also observed that SePro is the most preferred Factor while SePro is the least. Similarly, CRS (0.309) is the most preferred factor from SI, followed by II (0.293), OR (0.238) and UIT (0.160) consecutively from high preference to low preference. It can be inferred that CRS is the most important factor from SI in Anbessa shoe factory.

Concerning the overall performance measuring factors (global priority), Sper (0.232) is the most followed by SePro (0.148) and then CRS (0.120) according to their preference which indicated that the most desirable measuring factors than others in Anbessa shoe factory.

Peacock shoe factory has also given priority for Sper (0.512) from QSS followed by GS (0.360) and then SePro (0.128). This shows that Sper is the most important factor than others. Under SI, CRS (0.400) is the most preferred factor followed by II (0.293) and then OR (0.198) by this factory. UIT (0.109) is the least preferred. From this result, it can be observed that CRS is the most important factor than others. Similarly, under EPP, ECP (0.623) is the most preferred factor followed by EMPP (0.239) and then ECA (0.137) which shows the more importance of ECP than others.

As far as the overall performance measuring factors (global priority) is concerned, Sper (0.269), GS (0.189) and CRS (0.133) were found with the highest value. This indicated that Sper, GS and CRS are the most desirable measuring factors than others in Peacock shoe factory.

4.6.2. Internal Supply Chain Relationship Management

The process to identify priority factors to measure supply chain performance of each case study factory in terms of internal supply chain management macro process is computed in pair-wise comparison and weight calculation as indicated in Table 4.18.

At a strategic level, F, I, T II HR and O were also considered across the three cases study factories. To discuss in detail, in the strategic level of Tikur Abay shoe factory, I gives priority equally for I and II (0.222) followed by F (0.206). In Anbessa shoe factory, priority is also given for T (0.199) followed by F (0.185). Similarly, in peacock shoe factory, priority was given for O (0.193) followed by I (0.176).

Table 4.18: Local and global priorities of performance measurement factors in ISRM

Decision level	Factors	Tikur Abay		Anbessa		Peacock	
		Local	Global	Local	Global	Local	Global
Strategic	Facility (F)	0.206		0.185		0.158	
Tactical	Capacity utilization (CU)	0.309	0.064	0.2	0.037	0.196	0.031
	Efficiency (E)	0.291	0.06	0.215	0.04	0.17	0.027
	Flexibility (F)	0.116	0.024	0.154	0.028	0.23	0.036
	Quality (Q)	0.193	0.04	0.246	0.045	0.225	0.036
	Reliability (R)	0.091	0.019	0.186	0.034	0.18	0.028
Strategic	Inventory (I)	0.222		0.18		0.176	
Tactical	Optimal inventory policy (OIP)	0.75	0.166	0.8	0.144	0.667	0.117
	Warehouse utilization (WU)	0.25	0.055	0.2	0.036	0.333	0.059
Strategic	Transportation (T)	0.201		0.199		0.088	
Tactical	Capacity utilization (CU)	0.284	0.057	0.482	0.096	0.431	0.038
	Efficiency (E)	0.216	0.043	0.296	0.059	0.235	0.021
	Flexibility (F)	0.217	0.044	0.134	0.027	0.189	0.017
	Reliability (R)	0.284	0.057	0.088	0.018	0.146	0.013
Strategic	Internal integration (II)	0.222		0.18		0.18	
Tactical	Information integration (II)	0.434	0.096	0.243	0.044	0.293	0.053
	Efficiency (E)	0.172	0.038	0.174	0.031	0.207	0.037
	Internal quick response (IQR)	0.222	0.049	0.34	0.061	0.293	0.053
	Use of information technology (UIT)	0.172	0.038	0.243	0.044	0.207	0.037
Strategic	Human Resource (HR)	0.117		0.149		0.168	
Tactical	Motivation (M)	0.375	0.044	0.308	0.046	0.189	0.032
	Innovation and learning (IL)	0.212	0.025	0.216	0.032	0.378	0.064

	Safety (S)	0.133	0.015	0.183	0.027	0.161	0.027
	Training (T)	0.281	0.033	0.294	0.044	0.272	0.046
Strategic	Operation	0.116		0.128		0.193	
Tactical	Operational performance (OP)	0.241	0.028	0.548	0.07	0.539	0.104
	Environmental Performance (EP)	0.548	0.064	0.211	0.027	0.297	0.057
	Innovation (I)	0.211	0.024	0.241	0.031	0.164	0.032
			1		**1**		**1**

Source: Own computation

In tactical level under Facility, Tikur Abay shoe factory gives priority for CU (0.309) followed by E (0.291). Similarly, Anbessa shoe factory gives priority for factories like Q (0.246) followed by E (0.215). In peacock shoe factory Q (0.225) is more preferred than others followed by F (0.230). This indicates that CU (0.031) is the most preferred factor in Tikur Abay shoe factory. Similarly, Q is the most preferred factor in Anbessa and Peacock shoe factory.

Regarding the overall performance measuring factors (global priority) of Tikur Abay shoe factory, from facility, CU (0.064) was the highest value obtained followed by E (0.06). In Anbessa shoe factory, Q (0.045) was the most preferred factor followed by E (0.04). Similarly in Peacock shoe factory, Q (0.036) and F (0.036) were equally preferred followed by CU. This indicated that, CU, Q and F were the most desirable factors in these shoe manufacturing factories.

With regard to inventory, OIP was given priority by Tikur Abay, Anbessa and Peacock shoe factory with 0.75) (0.8) and (0.667) respectively. This indicated that OIP was given more priority than other. The overall performance measuring factors (global priority) of the case study companies were also studied for inventory. Accordingly, all the three companies Tikur Abay, Anbessa and Peacock gave priority for OAI with the computed value (0.166), (0.144) and (0.117) respectively. This revealed that OAI was the most desirable factor in measuring inventory.

Transportation was also evaluated and in Tikur Abay shoe factory CU (0.284) and R (0.284) were given priority. In Anbessa shoe factory CU (0.482) was given priority followed by E (0.296). Similarly, CU (0.431) and E (0.235) were given priority than others in Peacock shoe factory. Similar to other factors, global priority for transportation was also investigated and found that CU and R were given equal high priority with (0.057) in Tikur Abay shoe factory. Similarly, Anbessa and peacock shoe factory gave high priority for CU with a value (0.096) and (0.038) respectively. This indicates that CU is the most desirable factor given priority than others in evaluating transportation.

As far as internal integration is concerned, in Tikur Abay shoe factory, II (0.434) is given more priority followed by IQR (0.222). Similarly, IQR (0.34) was given more priority followed by II (0.243) and UIT (0.243) in Anbessa shoe factory. In Peacock shoe factory II (0.293) and IQR (0.293) was given more priority followed by E (0.207) and UIT (0.207). With regard to the overall performance measuring factors (global priority) of internal integration for Tikur Abay shoe factory, II (0.096) was the most desirable factor followed by IQR (0.049). In Anbessa shoe factory, IQR (0.061) was the most desirable factor and similarly, II (0.053) and IQR (0.053) were the most desirable factors in peacock shoe factory.

Human resource management was also evaluated in terms of factors like Motivation, Innovation and learning, Safety and Training. According to the computed finding, Tikur Abay shoe factory M (0.375 was given priority followed by T (0.281). Similarly, in Anbessa shoe factory M (0.308) was given priority followed by T (0.294). In peacock shoe factory IL (0.378) is given priority followed by T (0.272). The global priority was also computed and found that M (0.044) is more preferred than others in Tikur Abay shoe factory. Similarly, M (0.046) is the most preferred factor in Anbessa shoe factory. Regarding the global priority for peacock, IL (0.064) is the most desirable factor. This indicated that, M and IL were the most important factors by the case study companies in human resource.

With regard to operation, in Tikur Abay shoe factory, E (P 0.548) was given priority than others followed by OP (0.241). In Anbessa shoe factory OP (0.548) was given priority followed by I (0.241). Similarly, in Peacock shoe factory OP (0.539) was given priority followed by EP (0.297). As far as the overall performance measuring factors (global priority) is concerned, EP (0.064) was found the highest value in Tikur Abay shoe factory, I (0.031) was found the highest value in Anbessa shoe factory and OP (0.104) was computed the highest value than other factors in peacock shoe factory. This revealed that EP, I and OP were the desirable factors in Tikur Abay, Anbessa and peacock shoe factory respectively.

4.6.3. Customer Service Relationship

The process to identify priority factors to measure supply chain performance of each case study factory in terms of customer service relationship management macro process is computed in pair-wise comparison and weight calculation as indicated in Table 4.19.

Table 4.19: Local and global priorities of performance measurement factors in CRM

Decision level	Factors	Tikur Abay		Anbessa		Peacock	
		Local	Global	Local	Global	Local	Global
Strategic	Customer service (CS)	0.457		0.342		0.399	
Tactical	Responsiveness (R)	0.424	0.194	0.411	0.140	0.391	0.179
	Customer order processing and delivery (COP)	0.162	0.074	0.268	0.092	0.320	0.146
	Handling customer complaints (HCC)	0.252	0.115	0.103	0.035	0.144	0.066
	Value added service (VAS)	0.162	0.074	0.218	0.074	0.144	0.066
Strategic	Customer integration (CI)	0.202		0.165		0.183	
Tactical	Extent of cooperation to improve quality (ECI)	0.482	0.097	0.417	0.069	0.459	0.093
	Information integration (II)	0.193	0.039	0.170	0.028	0.205	0.041
	Organizational relationship (OR)	0.162	0.033	0.228	0.037	0.147	0.030
	Use of information technology (UIT)	0.163	0.033	0.185	0.030	0.189	0.038
Strategic	Demand forecasting (DF)	0.120		0.206		0.163	

Tactical	Forecasting system in place (FSP)	0.548	0.066	0.328	0.068	0.328	0.039
	Decision making (DM)	0.241	0.029	0.261	0.054	0.261	0.031
	Reliability of demand data (RDD)	0.211	0.025	0.411	0.085	0.411	0.049
Strategic	Market analysis (MA)	0.221		0.288		0.254	
Tactical	Market equity (ME)	0.382	0.085	0.294	0.085	0.449	0.099
	Customer acquisition (CA)	0.298	0.066	0.382	0.110	0.269	0.059
	Customer retention (CR)	0.121	0.027	0.201	0.058	0.146	0.032
	Government policy over market equity (GP)	0.199	0.044	0.122	0.035	0.136	0.030
			1		**1**		**1**

Source: Own computation

The priority of factors in customer relationship management of the shoe factory's understudy is also studied. According to the finding of the study, in Tikur Abay shoe factory, from CS, R (0.424) is given priority than others which is followed by HCC (0.252) and COP (0.162) and VAS (0.162) which has equal preference at a low level. This indicates that R is the most important while VAS is the least. Then, from CI, ECI (0.482) is the most preferred followed by II (0.193), UIT (0.163) and OR (0.162). From this result it can be observed that ECI is the most important factor while OR is the least important. Finally, as far as tactical level factors From DF is concerned, FSP (0.548) is the most preferred factor followed by DM (0.241) and RDD (0.211). From this result, it can be inferred that FSR is the most important factors than others considered under DF. From MA, ME (0.382) is the most preferred factor followed by CA (0.298) and GP (0.199) and it was observed that ME factor is the most important. Concerning the overall performance measuring factors (global priority), R(0.194), HCC(0.115) and ECI(0.097) are the most desirable measuring factors than others in Tikur Abay shoe factory.

Performance measuring factors from Anbessa shoe factory were also evaluated and from CS, R (0.411) is the most preferred followed by COP (0.268), VAS (0.218) and HCC (0.103). That means R had more importance than other factors. Next to this, CI was evaluated and from this, ECI (0.417) is the most preferred followed by OR (0.228) UIT (0.185) and II (0.170). This indicated that, ECI is the most important factor and II is the

least. And then, from DF, RDD (0.411) is given priority followed by FSP (0.328) and DM (0.261). And this indicated that RDD is the most important factor. From MA, CA (0.382) is given priority followed by ME (0.294), CR (0.20) and GP (0.122). This also indicated that CA is the most important. The overall performance measuring factors (global priority) of Anbessa shoe factory is R (0.140), CA (0.110) and COP (0.092).

In Peacock shoe factory, from CS, similar to the others, R (0.391) is the most preferred followed by COP (0.320) and HCC (0.144) and VAS (0.144) which has equal preference. This indicates that R has more importance than others. Similarly from CI, ECI (0.459) is more preferred than others followed by II (0.205), UIT (0.189) and OR (0.147). This also depicted that ECI is the most important factor while OR is the least. And then from DF, RDD (0.411) is the most preferred followed by FSP (0.328) and DM (0.261) and it can be observed that RDD is the most important. Finally, from MA, ME (0.449) is the most preferred factor followed by CA (0.269), CR (0.146) and GP (0.136). This also indicated that ME is the most important factor while GP is the least important. For the overall performance measuring factors (global priority), R (0.179) COP (0.146) and ME (0.099) which revealed the desirability of these factors.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

This study is entitled as ‘Analysis of supply chain performance measurement system in Addis Ababa: The case of selected shoe factories. It was conducted with the overall objective of this study is to investigate the supply chain performance measurement practices of Ethiopian footwear companies using holistic measurement factors in combination of macro processes and decision making level within performance measurement framework.

The study was done by combining Macro Processes (Supplier Relationship Management, Internal relationship management and Customer relationship management) and Hierarchical Decision Making level (Strategic, Tactical and Operational) in a holistic approach. It was evaluated the performance of these three shoe manufacturing factories selected based on two criteria’s such as an efficient utilization of resources and year of experience in the sector. Accordingly, the factories fulfilling the stated criteria were identified and considered for this study. These shoe factories are: Tikur Abay, Anbessa and Peacock shoe manufacturing factories. The data for the study was categorized in to two: Likert scale type data and Analytic hierarchy process (AHP). Accordingly collected data were interpreted and summarized to show the supply chain performance of these factories understudy.

As per the finding of this study, in supplier relationship management, it was found that, quality supplier selection was evaluated in supplier performance, selection process and green supplier. Accordingly, all the factors are in the satisfactory level which revealed a good performance except in green supplier factor where respondents from Peacock and Tikur Abay rated (3.0) and (2.83) respectively which suggested the need for further improvement. Supplier integration was also evaluated using factors coordination and resource sharing, information integration, organizational relationship and use of

information technology. It was shown that there is the need for further improvement in areas like coordination and resource sharing, helping supplier to take any critical decision during any unforeseen situation and using well developed collaboration planning by Tikur Abay. Similarly, all the three factories need improvement in organizational relationship. Unlike the above factors, these three factories have been evaluated and found in a good performance in effective procurement processes in terms of effective communication with production and effective management of purchase portfolio which all are above the average mean level.

As far as the significance difference in the factors across the factories are concerned, the null hypothesis for using a standard contract for all suppliers and standard procedure for effective negotiation, the existence of coordination and understanding to facilitate urgent requirement between the factory and supplier and a system enables to ensure that specification matches to end customer requirement was accepted which indicated that there is no significant difference among the factories understudy at a 5% significant level.

In internal relationship management, internal integration was evaluated in terms of facility. Under this, factors like capacity utilization, efficiency, flexibility, quality and reliability were measured and found in a better performance except in Anbessa shoe factory where low value was obtained in efficiency in whether these factories are preparing a plan to reduce fixed cost.

Inventory was also used to assess internal relationship in terms of controlling and overseeing ordering inventory, storage of inventory and controlling the amount of product for sale. Optimal inventory policy is rated below the average because of the low value in employing a system to reduce inventory cost by Tikur Abay and Anbessa. Establishing vendor managed inventory (VMI) arrangement with supplier is also low which suggest the need for further improvement in implementing a system to manage inventory level during sudden fluctuation in customer demand and performance of warehouse utilization by Tikur Abay shoe factory. Anbessa also shows a poor performance in using a procedure to deal with obsolete raw material in stock. Similarly,

Anbessa and Tikur Abay shows a low value which is below the average in evaluating reliability of the logistics to address market needs that suggested the need for improvement for a better performance.

Internal integration was measured in information integration, internal quick response, use of information technology and efficiency and all factories have a good performance with regard to this. Human resource management was also evaluated in terms of motivation, safety, training and innovation and learning. As obtained from the study all factories are in a poor performance in establishing a system in place to motivate workers to get best out of them. However, they are found in a satisfactory level by all factories except poor performance indicated in employing a system for continuous skill development process in Peacock shoe factory, in using safety procedure to ensure that the working environments are safe and follow all safety regulation and following a system to encourage human resources to be innovative and keep tradition of learning in Anbessa shoe factory. Operation is also measured in terms of operational and environmental performance and found good in all factories understudy except low performance seen in Anbessa in reducing material usage and waste and in both Anbessa and Peacock in managing emission related issues.

With regard to the hypothesized variables, the majority were rejected except variables like the factory prepares a plan to reduce fixed cost, instruction for operation is properly placed and posted near each machine, established a procedure to deal with obsolete raw material in stock, employs a system to strengthen information sharing, employs a system to reduce its operating cost, uses safety procedure to ensure that the working environments are safe and follow all safety regulation, operation reacts with the fluctuation of uncertain demand, use a system to reduce material usage and waste and works on reducing energy consumption were accepted which indicated that there is no significant difference among the factories understudy at a 5% significant level.

In customer relationship management, customer service was also measured in responsiveness, customer order processing and delivery, handling customer complaints

and value added services whereby establishing a system to manage its bottleneck by Tikur Abay, owing a web-based supply chain and inventory management system by Anbessa and Peacock, dissolving a customer's complaint promptly by Peacock, using a criteria to decide which complaint needs urgent response as a variable for measuring how to handle customer complaints by Tikur Abay are revealed the need for further improvement for a better performance.

In customer integration, extent of cooperation to improve quality is in a poor performance across the three factories' understudy which needs further improvement. In maintaining transparency with its customer about product quality and availability, employing strategies to get to customer and for customer to get to it, cooperation with customer in developing joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities and whether there is a standard means of communication across functions and customers, the performance is in a satisfactory level by all factories. However, in developing system enable to identify, understand, and anticipate its customer's needs is poor which needs further improvement by Tikur Abay. Similarly, all factories are in a poor performance in using information technology which indicates the need for further improvement. Market analysis is in a poor performance in regularly updating customer database for customer acquisition by Tikur Abay and Anbessa which indicate the need for further improvement. Similarly Peacock needs improvement in employing a strategy in respect of retaining existing customer and creating new customer and rewards its loyal customer.

Regarding the null hypothesis of variables in customer relationship management, all variables used are rejected at a 5% significant level except in using a documented procedure to deal with customer complaint, regularly update its online catalogue and this online catalogue readily explain the price and shipping cost and cooperates with its customer to develop joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies and competitive activities which are accepted and indicated that there is no significant difference among the factories understudy.

Finally, AHP was applied and it was found that in supplier relationship management in Tikur Abay shoe factory, Sper (0.269) is the most desirable factor followed by GS (0.118) and then SePro (0.103). From this it can be inferred that Sper is the most desirable factor than others in Tikur Abay shoe factory. Concerning the overall performance measuring factors (global priority), similarly Sper (0.232) is the most needed factor followed by SePro (0.148) and then CRS (0.120) according to their preference in Anbessa shoe factory. As far as the overall performance measuring factors (global priority) is concerned, Sper (0.269), GS (0.189) and CRS (0.133) were found with the highest value. This indicated that Sper, GS and CRS are the most desirable measuring factors than others in Peacock Shoe factory.

Similarly in internal relationship management, with regard to the overall performance measuring factors (global), OIP (0.166), II (0.096) and EP and CU (0.064), in Tikur Abay, OIP (0.144), M (0.096) and IAL (0.059) in Anbessa and OIP (0.117), OP (0.104) and IAL (0.064) in Peacock shoe factory. This indicated that these factors are more desirable than others in the shoe factories understudy.

In customer relationship management, concerning the overall performance measuring factors (global priority); R (0.194), HCC (0.115) and ECI (0.097) are the most desirable measuring factors than others in Tikur Abay shoe factory. Similarly, in Anbessa shoe factory, R (0.140), CA (0.110) and COP (0.092) are the most desirable factors. The desirable factors in Peacock are also R (0.179) COP (0.146) and ME (0.099) which revealed that these are the most preferred factors in these shoe manufacturing factories.

5.2. Recommendations

Three case study companies which fulfilled the selection criteria were selected and considered. The collected data for the studies were also analyzed and interpreted. The study result can be used as a starting point to evaluate the differences which may exist across different companies in the country which are under different leadership practices and working culture. It can also provide a great contribution in characterizing the existing supply chain system of the shoe manufacturing companies in SCP measurement researches. The specific areas that need attention for further betterment of the SCP by these case study companies are identified as follows:

- These companies should give attention in developing green supplier selection policy regarding to environmental principles including materials, energy use, solid residue, liquid residue and end of life which supports for further improvement in managing activities against the green supplier.
- For a further better benefit, creating a working environment where advanced cooperation prevails is important. Bringing employees together and providing incentives can motivate the workers for better work and ownership that could result in further improvement of the performance of the company in turn. Moreover, it is necessary to improve workers professional skill through developing a continuous skill development process. It is also crucial in determining the level of commitment to product profitability and customer satisfaction.
- The companies should also focus on improvement in areas like using safety procedure to ensure that the working environments are safe and follow all safety procedures.
- The company should take into attention and implement an optimal inventory policy to avoid unnecessary losses. This can be realized through focusing on maintaining a vendor managed inventory through establishing a better

communication with suppliers and customers. Additionally, web-based supply chain and inventory management system is necessary for effective benefit of the company.

- The company should give attention in properly managing obsolete raw materials to avoid unnecessary losses and then to improve its performance. Proper waste management should also be given emphasis for further improvement.
- In the current competitive environment proper operation of information technology is necessary. Regularly updating customer database for customer acquisition is required for effective performance. There should also be a system in place to improve customer handling including identifying, understanding and anticipating. Moreover, employing a better strategy to be used in retaining existing customer, creating new customer and rewards its loyal customer could further improve the company's performance.
- The organization should also develop a system to perform failure free, under specified operating conditions and time without demand on the support system, measured as a mean time between maintenance actions. Also, a measure of a system's ability to operate without logistics support in order to be competent in the market by satisfying its customer.
- It is important for the organization to assess the degree of bottleneck for managing bottleneck. These bottlenecks can be addressed through, adding resources to the bottleneck operation (more people), minimizing downtime, eliminate non-value activities, investing in more machinery which completes the same action and optimizing the bottlenecks operation, to provide a constant buffer stock upstream of the bottleneck, to reduce time wasted in set ups and changeovers and to train more operators for the bottlenecked machines.

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7. ANNEX

Annex 1

1. Supplier relationship management - ANOVA

Practices in SRM		Sum of Squares	df	Mean Square	F	Sig.
Has a system to ensure it received quality material from supplier	Between Groups	0.333	2	0.167	0.643	0.548
	Within Groups	2.333	9	0.259		
	Total	2.667	11			
Uses performance measurement procedure to be employed for preventive procedure in case when the supplier can't satisfy delivery criteria	Between Groups	2.167	2	1.083	1.114	0.37
	Within Groups	8.75	9	0.972		
	Total	10.917	11			
Set arrangement with supplier to keep stock ready for routine and urgent requirement in their warehouse	Between Groups	0.417	2	0.208	0.218	0.808
	Within Groups	8.583	9	0.954		
	Total	9	11			
Choose its supplier using well developed criteria	Between Groups	0.167	2	0.083	0.158	0.856
	Within Groups	4.75	9	0.528		
	Total	4.917	11			
Set a feedback system to identify the area of improvement	Between Groups	0.833	2	0.417	0.918	0.434
	Within Groups	4.083	9	0.454		
	Total	4.917	11			
Use a standard contract for all suppliers and standard procedure for effective negotiation	Between Groups	5.333	2	2.667	2.88	0.108
	Within Groups	8.333	9	0.926		
	Total	13.667	11			
Has a system to ensure that the supplier is following same line of environmental policy and works towards environmental friendly	Between Groups	1.083	2	0.542	0.622	0.558
	Within Groups	7.833	9	0.87		

Practices in SRM		Sum of Squares	df	Mean Square	F	Sig.
manufacturing process, by following national and international regulation	Total	8.917	11			
Awarded third party certification and conducts regular survey on existing system	Between Groups	0.167	2	0.083	0.07	0.933
	Within Groups	10.75	9	1.194		
	Total	10.917	11			
Cooperates with supplier to improve operation process	Between Groups	4.083	2	2.042	1.696	0.237
	Within Groups	10.833	9	1.204		
	Total	14.917	11			
During any unforeseen situation, it helps supplier to take any critical decision	Between Groups	2.083	2	1.042	0.557	0.592
	Within Groups	16.833	9	1.87		
	Total	18.917	11			
There is coordination and understanding to facilitate urgent requirement between the factory and supplier	Between Groups	14.167	2	7.083	6.322	0.019
	Within Groups	10.083	9	1.12		
	Total	24.25	11			
Informs supplier in advance for an extra requirement of material due to sudden or planned requirements	Between Groups	3.333	2	1.667	1.607	0.253
	Within Groups	9.333	9	1.037		
	Total	12.667	11			
Developed collaboration planning in use for information integration	Between Groups	1.417	2	0.708	0.722	0.512
	Within Groups	8.833	9	0.981		
	Total	10.25	11			
Makes forecasting along with suppliers	Between Groups	3.333	2	1.667	1.216	0.341
	Within Groups	12.333	9	1.37		
	Total	15.667	11			
Employ a system to achieve common objective like sharing a risk with	Between Groups	3.083	2	1.542	0.951	0.422

Practices in SRM		Sum of Squares	df	Mean Square	F	Sig.
suppliers	Within Groups	14.583	9	1.62		
	Total	17.667	11			
Has material specification list in place to guide a supplier	Between Groups	4.417	2	2.208	2.338	0.152
	Within Groups	8.5	9	0.944		
	Total	12.917	11			
A system enables to ensure that specification matches to end customer requirement	Between Groups	2.833	2	1.417	3.122	0.093
	Within Groups	4.083	9	0.454		
	Total	6.917	11			
Follows a procedure to decide right specification and right quantity required to purchase	Between Groups	0.833	2	0.417	0.616	0.561
	Within Groups	6.083	9	0.676		
	Total	6.917	11			
Specific numbers of suppliers to keep ready for getting required material to reduce supplier power	Between Groups	2.083	2	1.042	0.455	0.648
	Within Groups	20.583	9	2.287		
	Total	22.667	11			
Has critical item list and a system to keep safety inventory level	Between Groups	2.167	2	1.083	1.444	0.286
	Within Groups	6.75	9	0.75		
	Total	8.917	11			
Has supplier designated for supply critical item	Between Groups	0.417	2	0.208	0.288	0.756
	Within Groups	6.5	9	0.722		
	Total	6.917	11			
Updates its supplier database regularly	Between Groups	7.417	2	3.708	2.342	0.152
	Within Groups	14.25	9	1.583		
	Total	21.667	11			
Arranges alternative supplier to supply	Between	6	2	3	2.455	0.141

Practices in SRM		Sum of Squares	df	Mean Square	F	Sig.
the critical item in emergency	Groups					
	Within Groups	11	9	1.222		
	Total	17	11			

4. Internal relationship management

ANOVA						
Practices in ISRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Employs a system to optimize the idle time caused by nonscheduled work or end of shift	Between Groups	0.933	2	0.467	0.667	0.531
	Within Groups	8.400	12	0.7		
	Total	9.333	14			
Prepares a plan to reduce fixed cost	Between Groups	8.133	2	4.067	2.596	0.116
	Within Groups	18.800	12	1.567		
	Total	26.933	14			
Facility is flexible to accommodate market uncertainties	Between Groups	2.533	2	1.267	1.462	0.27
	Within Groups	10.400	12	0.867		
	Total	12.933	14			
Implements a system to further improve production increasing with regard to automation	Between Groups	1.600	2	0.8	0.889	0.437
	Within Groups	10.800	12	0.9		
	Total	12.400	14			
The facility is reliable to address market needs environmentally friendly	Between Groups	0.400	2	0.2	0.4	0.679
	Within Groups	6.000	12	0.5		
	Total	6.400	14			
Documented safety or pollution control procedure	Between Groups	4.933	2	2.467	1.805	0.206
	Within Groups	16.400	12	1.367		
	Total	21.333	14			
There is instruction for operation posted	Between Groups	7.600	2	3.8	3.167	0.079

ANOVA						
Practices in ISRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
near each machine	Within Groups	14.400	12	1.2		
	Total	22.000	14			
Has a planned maintenance system	Between Groups	4.933	2	2.467	1.85	0.199
	Within Groups	16.000	12	1.333		
	Total	20.933	14			
It maintains minimum stock level for critical spares	Between Groups	3.733	2	1.867	1.697	0.224
	Within Groups	13.200	12	1.1		
	Total	16.933	14			
Employees a system to reduce inventory cost	Between Groups	4.933	2	2.467	1.762	0.213
	Within Groups	16.800	12	1.4		
	Total	21.733	14			
Has vendor managed inventory (VMI) arrangement with supplier	Between Groups	0.400	2	0.2	0.176	0.84
	Within Groups	13.600	12	1.133		
	Total	14.000	14			
Developed a system to manage inventory level during sudden fluctuation in customer demand	Between Groups	3.600	2	1.8	1.687	0.226
	Within Groups	12.800	12	1.067		
	Total	16.400	14			
Has a system to select suitable channel, scheduling location of warehouses	Between Groups	1.733	2	0.867	0.684	0.523
	Within Groups	15.200	12	1.267		
	Total	16.933	14			
Has a procedure to deal with obsolete raw material in stock	Between Groups	10.133	2	5.067	4.471	0.035
	Within Groups	13.600	12	1.133		
	Total	23.733	14			
Logistics are flexible to accommodate market uncertainties	Between Groups	0.133	2	0.067	0.059	0.943
	Within Groups	13.600	12	1.133		
	Total	13.733	14			

ANOVA						
Practices in ISRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Has a system to react during sudden demand fluctuation	Between Groups	0.400	2	0.2	0.182	0.836
	Within Groups	13.200	12	1.1		
	Total	13.600	14			
Logistics are reliable to address market needs	Between Groups	3.600	2	1.8	2.077	0.168
	Within Groups	10.400	12	0.867		
	Total	14.000	14			
Has a system to mark present performance in terms of meeting delivery schedule	Between Groups	2.800	2	1.4	1	0.397
	Within Groups	16.800	12	1.4		
	Total	19.600	14			
Apply real time monitoring system in use to monitor, review, evaluate and Modify the overall processes and functions performed	Between Groups	1.733	2	0.867	0.867	0.445
	Within Groups	12.000	12	1		
	Total	13.733	14			
Has a system to strengthen information sharing	Between Groups	18.533	2	9.267	15.444	0
	Within Groups	7.200	12	0.6		
	Total	25.733	14			
Has a system to reduce its operating cost	Between Groups	9.733	2	4.867	4.171	0.042
	Within Groups	14.000	12	1.167		
	Total	23.733	14			
Established a system in place to motivate staffs workers to get best out of them	Between Groups	2.533	2	1.267	0.905	0.431
	Within Groups	16.800	12	1.4		
	Total	19.333	14			
Has a system for continuous skill development process	Between Groups	1.733	2	0.867	1.444	0.274
	Within Groups	7.200	12	0.6		
	Total	8.933	14			
Uses safety procedure to ensure that the working environments are safe and	Between Groups	9.733	2	4.867	4.867	0.028
	Within Groups	12.000	12	1		

ANOVA						
Practices in ISRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
follow all safety regulation	Total	21.733	14			
Has a system to improve the skill	Between Groups	0.400	2	0.2	0.261	0.775
	Within Groups	9.200	12	0.767		
	Total	9.600	14			
Has a system to compensate the skill gap when a retire worker with high skills has been replaced with novice	Between Groups	1.600	2	0.8	0.96	0.41
	Within Groups	10.000	12	0.833		
	Total	11.600	14			
Has a system to encourage human resources to be innovative and keep tradition of learning	Between Groups	0.533	2	0.267	0.381	0.691
	Within Groups	8.400	12	0.7		
	Total	8.933	14			
Operation reacts with the fluctuation of uncertain demand	Between Groups	2.133	2	1.067	4.571	0.033
	Within Groups	2.800	12	0.233		
	Total	4.933	14			
Has a system to reduce material usage and waste	Between Groups	12.133	2	6.067	7.583	0.007
	Within Groups	9.600	12	0.8		
	Total	21.733	14			
Has a system to eliminate the non-value adding activities between order and start of processing	Between Groups	3.600	2	1.8	1.8	0.207
	Within Groups	12.000	12	1		
	Total	15.600	14			
Has a system to maximize its throughput	Between Groups	0.933	2	0.467	0.7	0.516
	Within Groups	8.000	12	0.667		
	Total	8.933	14			
Established a system for internal or external audit process	Between Groups	4.800	2	2.4	1.846	0.2
	Within Groups	15.600	12	1.3		
	Total	20.400	14			
Works on reducing energy consumption	Between Groups	5.200	2	2.6	3	0.088

ANOVA						
Practices in ISRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Within Groups	10.400	12	0.867		
	Total	15.600	14			
Arranged an alternative source of energy for consumption	Between Groups	1.733	2	0.867	0.684	0.523
	Within Groups	15.200	12	1.267		
	Total	16.933	14			
Has a system to manage emission related issue	Between Groups	0.933	2	0.467	0.378	0.693
	Within Groups	14.800	12	1.233		
	Total	15.733	14			

5. Customer relationship management

ANOVA						
Practices in CRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Employs business strategy with respect to customer service	Between Groups	0.683	2	0.342	0.442	0.66
	Within Groups	5.417	7	0.774		
	Total	6.100	9			
Has a system to create an outstanding customer experience with optimum cost	Between Groups	0.767	2	0.383	0.503	0.625
	Within Groups	5.333	7	0.762		
	Total	6.100	9			
Has a system to improve the quality of customer service	Between Groups	0.317	2	0.158	0.182	0.837
	Within Groups	6.083	7	0.869		
	Total	6.400	9			
Has a system to get feedback from customer about its effectiveness	Between Groups	0.933	2	0.467	1.225	0.35
	Within Groups	2.667	7	0.381		
	Total	3.600	9			
Faces constraints and bottleneck in its process to achieve required fill rate	Between Groups	1.767	2	0.883	2.65	0.139
	Within Groups	2.333	7	0.333		

ANOVA						
Practices in CRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Total	4.100	9			
Established a system to manage its bottleneck	Between Groups	1.483	2	0.742	0.7	0.528
	Within Groups	7.417	7	1.06		
	Total	8.900	9			
Has a web-based supply chain and inventory management system	Between Groups	1.267	2	0.633	1.9	0.219
	Within Groups	2.333	7	0.333		
	Total	3.600	9			
Has documented procedure to deal with customer complaint	Between Groups	2.017	2	1.008	3.388	0.094
	Within Groups	2.083	7	0.298		
	Total	4.100	9			
Gives opportunity to its customer to lodge a complaint	Between Groups	0.933	2	0.467	0.7	0.528
	Within Groups	4.667	7	0.667		
	Total	5.600	9			
Dissolves a customer complaint promptly	Between Groups	2.667	2	1.333	1.75	0.242
	Within Groups	5.333	7	0.762		
	Total	8.000	9			
Has criteria to decide which complaint needs urgent response	Between Groups	2.400	2	1.2	2.1	0.193
	Within Groups	4.000	7	0.571		
	Total	6.400	9			
Has a system to reduce the number of complaint	Between Groups	0.067	2	0.033	0.054	0.948
	Within Groups	4.333	7	0.619		
	Total	4.400	9			
Gives after sales service to its customers	Between Groups	0.683	2	0.342	0.7	0.528
	Within Groups	3.417	7	0.488		
	Total	4.100	9			
Has developed a system enable to	Between Groups	0.767	2	0.383	0.503	0.625

ANOVA						
Practices in CRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
know that its customers are satisfied with after sales service they received	Within Groups	5.333	7	0.762		
	Total	6.100	9			
Regularly update its online catalogue and this online catalogue readily explain the price and shipping cost	Between Groups	3.900	2	1.95	4.55	0.054
	Within Groups	3.000	7	0.429		
	Total	6.900	9			
Maintains transparency with its customer about product quality and availability	Between Groups	1.567	2	0.783	1.028	0.406
	Within Groups	5.333	7	0.762		
	Total	6.900	9			
Has made strategies to get to customer and for customer to get to it	Between Groups	0.233	2	0.117	0.175	0.843
	Within Groups	4.667	7	0.667		
	Total	4.900	9			
Cooperates with its customer to develop joint demand forecasting which helps the factory for new product offerings, pricing changes, new technologies, and competitive activities	Between Groups	3.933	2	1.967	3.755	0.078
	Within Groups	3.667	7	0.524		
	Total	7.600	9			
Developed a system enable to identify, understand, and anticipate its customer's needs	Between Groups	1.233	2	0.617	0.447	0.657
	Within Groups	9.667	7	1.381		
	Total	10.900	9			
Has standard means of communication across functions and customers	Between Groups	0.317	2	0.158	0.137	0.874
	Within Groups	8.083	7	1.155		
	Total	8.400	9			
Shares its risk with its customer and matches its objective with its customer's requirements	Between Groups	0.767	2	0.383	0.503	0.625
	Within Groups	5.333	7	0.762		
	Total	6.100	9			
Has state of art arrangement for online direct sale	Between Groups	1.233	2	0.617	1.177	0.362
	Within Groups	3.667	7	0.524		
	Total	4.900	9			

ANOVA						
Practices in CRM		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Considers uncertainty factor due to global economic crunch, political instability, environment, or other factor for forecasting	Between Groups	0.433	2	0.217	0.414	0.676
	Within Groups	3.667	7	0.524		
	Total	4.100	9			
Developed a system to differentiate products in order to get competitive advantage	Between Groups	0.583	2	0.292	0.275	0.767
	Within Groups	7.417	7	1.06		
	Total	8.000	9			
Builds relationship with its targeted customer	Between Groups	0.433	2	0.217	0.91	0.445
	Within Groups	1.667	7	0.238		
	Total	2.100	9			
Has customer database and regularly updates it	Between Groups	4.767	2	2.383	2.275	0.173
	Within Groups	7.333	7	1.048		
	Total	12.100	9			
Developed a system enables to build customer's loyalty	Between Groups	1.483	2	0.742	1.52	0.283
	Within Groups	3.417	7	0.488		
	Total	4.900	9			
Has strategies in the respect of retaining existing customer and creating new customer and rewards its loyal customer	Between Groups	1.767	2	0.883	0.976	0.423
	Within Groups	6.333	7	0.905		
	Total	8.100	9			
Has matrix enables to identify old product with new customer	Between Groups	0.183	2	0.092	0.453	0.653
	Within Groups	1.417	7	0.202		
	Total	1.600	9			
The government gives or considers subsidy on raw material for your factory	Between Groups	2.100	2	1.05	1.225	0.35
	Within Groups	6.000	7	0.857		
	Total	8.100	9			

Annex 2

1. Supplier Relationship Management

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	QSS	SI	EPP
QSS	1.000	2.000	2.000
SI	0.500	1.000	2.000
EPP	0.500	0.500	1.000
SUM	2.000	3.500	5.000

	QSS	SI	EPP	Weight
QSS	0.500	0.571	0.400	0.490
SI	0.250	0.286	0.400	0.312
EPP	0.250	0.143	0.200	0.198
				1

λmax= 3.054 n = 3

CI= 0.027 CR = 0.046

Pairwise comparison and weight calculation for Anbessa shoe factory

	QSS	SI	EPP
QSS	1.000	1.000	3.000
SI	1.000	1.000	2.000
EPP	0.333	0.500	1.000
SUM	2.333	2.500	6.000

	QSS	SI	EPP	Weight
QSS	0.429	0.400	0.500	0.443
SI	0.429	0.400	0.333	0.387
EPP	0.143	0.200	0.167	0.170
				1.000

λmax= 3.0154 n = 3

CI= 0.008 CR = 0.013

Pairwise comparison and weight calculation for Peacock shoe factory

	QSS	SI	EPP
QSS	1.00	2.00	3.00
SI	0.50	1.00	3.00
EPP	0.33	0.33	1.00
SUM	1.83	3.33	7.00

	QSS	SI	EPP	Weight
QSS	0.545	0.600	0.429	0.525
SI	0.273	0.300	0.429	0.334
EPP	0.182	0.100	0.143	0.142
				1.000

λmax= 3.0468 n = 3

CI= 0.023 CR = 0.040

Quality Supplier Selection

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	Sper	SePto	GS
Sper	1.00	3.00	2.00
SePro	0.33	1.00	1.00
GS	0.50	1.00	1.00
SUM	1.83	5.00	4.00

	Sper	SePto	GS	Weight
Sper	0.545	0.600	0.500	0.548
SePro	0.182	0.200	0.250	0.211
GS	0.273	0.200	0.250	0.241
				1.000

λmax= 3.015 n = 3

CI= 0.008 CR = 0.013

Pairwise comparison and weight calculation for Anbessa shoe factory

	Sper	SePto	GS
Sper	1.00	2.00	3.00
SePro	0.50	1.00	3.00
GS	0.33	0.33	1.00
SUM	1.83	3.33	7.00

	Sper	SePto	GS	Wieght
Sper	0.545	0.600	0.429	0.525
SePro	0.273	0.300	0.429	0.334
GS	0.182	0.100	0.143	0.142
				1.000

λmax= 3.047 n = 3

CI= 0.023 CR = 0.040

Pairwise comparison and weight calculation for Peacock shoe factory

	Sper	SePto	GS
Sper	1.00	3.00	2.00
SePro	0.33	1.00	0.25
GS	0.50	4.00	1.00
SUM	1.83	8.00	3.25

	Sper	SePto	GS	weight
Sper	0.545	0.375	0.615	0.512
SePro	0.182	0.125	0.077	0.128
GS	0.273	0.500	0.308	0.360
				1.000

λmax= 3.103 n = 3

CI= 0.052 CR = 0.089

Supplier integration

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	CRS	II	OR	UIT
CRS	1.00	1.00	1.00	3.00
II	1.00	1.00	2.00	1.00
OR	1.00	0.50	1.00	2
UIT	0.333	1	0.5	1
SUM	3.33	3.50	4.50	7.00

	CRS	II	OR	UIT	WEIGHT
CRS	0.300	0.286	0.222	0.429	0.309
II	0.300	0.286	0.444	0.143	0.293
OR	0.300	0.143	0.222	0.286	0.238
UIT	0.100	0.286	0.111	0.143	0.160
					1.000

λmax = 4.243 n = 4.000

CI = 0.081 CR = 0.090

Pairwise comparison and weight calculation for Anbessa shoe factory

	CRS	II	OR	UIT
CRS	1.00	1.00	1.00	3.00
II	1.00	1.00	2.00	1.00
OR	1.00	0.50	1.00	2
UIT	0.333	1	0.5	1
Sum	3.33	3.50	4.50	7.00

	CRS	II	OR	UIT	Weight
CRS	0.300	0.286	0.222	0.429	0.309
II	0.300	0.286	0.444	0.143	0.293
OR	0.300	0.143	0.222	0.286	0.238
UIT	0.100	0.286	0.111	0.143	0.160
					1.000

λmax = 4.243 n = 4.000

CI = 0.081 CR = 0.090

Pairwise comparison and weight calculation for Peacock shoe factory

	CRS	II	OR	UIT
CRS	1.00	2.00	2.00	3.00
II	0.50	1.00	3.00	2.00
OR	0.50	0.33	1.00	3
UIT	0.333	0.5	0.333	1
SUM	2.33	3.83	6.33	9.00

	CRS	II	OR	UIT	weight
CRS	0.429	0.522	0.316	0.333	0.400
II	0.214	0.261	0.474	0.222	0.293
OR	0.214	0.087	0.158	0.333	0.198
UIT	0.143	0.130	0.053	0.111	0.109
					1.000

λmax = 4.259 n = 4.000

CI = 0.086 CR = 0.096

Effective Procurement Process

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	ECP	EMPP	ECA
ECP	1.00	1.00	2.00

	ECP	EMPP	ECA	WEIGHT
ECP	0.400	0.400	0.400	0.400

EMPP	1.00	1.00	2.00		EMPP	0.400	0.400	0.400	0.400
ECA	0.50	0.50	1.00		ECA	0.200	0.200	0.200	0.200
SUM	2.50	2.50	5.00						1.000

λmax= 3.000 n = 3.000

CI = 0.000 CR = 0.000

Pairwise comparison and weight calculation for Anbessa shoe factory

	ECP	EMPP	ECA		ECP	EMPP	ECA	Weight
ECP	1.000	1.000	2.000		ECP	0.400	0.400	0.400	0.400
EMPP	1.000	1.000	2.000		EMPP	0.400	0.400	0.400	0.400
ECA	0.500	0.500	1.000		ECA	0.200	0.200	0.200	0.200
SUM	2.500	2.500	5.000						1.000

λmax= 3.000 n = 3.000

CI = 0.000 CR = 0.000

Pairwise comparison and weight calculation for Peacock shoe factory

	ECP	EMPP	ECA		ECP	EMPP	ECA	weight
ECP	1.00	3.00	4.00		ECP	0.632	0.667	0.571	0.623
EMPP	0.33	1.00	2.00		EMPP	0.211	0.222	0.286	0.239
ECA	0.25	0.50	1.00		ECA	0.158	0.111	0.143	0.137
SUM	1.58	4.50	7.00						1.000

λmax= 3.015 n = 3.000

CI = 0.008 CR = 0.013

2. Internal Supply Chain Management Relationship

Pair wise comparison and weight calculation for Tikur Abay shoe factory

	F	I	T	II	HR	O
F	1.000	2.000	1.000	1.000	2.000	1.000
I	0.500	1.000	2.000	2.000	2.000	2.000
T	1.000	0.250	1.000	2.000	3.000	2.000
II	1.000	0.500	0.500	1.000	1.000	2.000
HR	0.500	0.500	0.333	1.000	1.000	2.000
O	1.000	0.500	1.000	0.500	0.500	1.000
Sum	5.000	4.750	5.833	7.500	9.500	10.000

	F	I	T	II	HR	O	weight
F	0.200	0.421	0.171	0.133	0.211	0.100	0.206
I	0.100	0.211	0.343	0.267	0.211	0.200	0.222
T	0.200	0.053	0.171	0.267	0.316	0.200	0.201
II	0.200	0.105	0.086	0.133	0.105	0.200	0.138
HR	0.100	0.105	0.057	0.133	0.105	0.200	0.117
O	0.200	0.105	0.171	0.067	0.053	0.100	0.116
							1.000

λmax = 6.561 CI = 0.112 RCI = 1.240

CR = 0.090 n = 6.000

Pairwise comparison and weight calculation for Anbessa shoe factory

	F	I	T	II	HR	O
F	1.000	2.000	0.500	1.000	2.000	1.000
I	0.500	1.000	2.000	1.000	0.500	2.000
T	2.000	0.250	1.000	2.000	2.000	0.500
II	1.000	1.000	0.500	1.000	1.000	2.000
HR	0.500	2.000	0.500	1.000	1.000	1.000
O	1.000	0.500	1.000	0.500	1.000	1.000
Sum	6.000	6.750	5.500	6.500	7.500	7.500

	F	I	T	II	HR	O	weight
F	0.167	0.296	0.091	0.154	0.267	0.133	0.185
I	0.083	0.148	0.364	0.154	0.067	0.267	0.180
T	0.333	0.037	0.182	0.308	0.267	0.067	0.199
II	0.167	0.148	0.091	0.154	0.133	0.267	0.160
HR	0.083	0.296	0.091	0.154	0.133	0.133	0.149
O	0.167	0.074	0.182	0.077	0.133	0.133	0.128
							1

λmax = 6.529 CI = 0.106 RCI = 1.240

CR = 0.085 n = 6

Pairwise comparison and weight calculation for Peacock shoe factory

	F	I	T	II	HR	O
F	1.000	1.000	2.000	0.500	1.000	1.000
I	1.000	1.000	1.000	1.000	2.000	1.000
T	0.500	0.250	1.000	0.500	1.000	0.500
II	2.000	2.000	2.000	1.000	0.500	1.000
HR	1.000	0.500	1.000	3.000	1.000	0.500
O	1.000	0.500	3.000	1.000	2.000	1.000
Sum	6.500	5.250	10.000	7.000	7.500	5.000

	F	I	T	II	HR	O	weight
F	0.154	0.190	0.200	0.071	0.133	0.200	0.158
I	0.154	0.190	0.100	0.143	0.267	0.200	0.176
T	0.077	0.048	0.100	0.071	0.133	0.100	0.088
II	0.308	0.381	0.200	0.143	0.067	0.200	0.216
HR	0.154	0.095	0.100	0.429	0.133	0.100	0.168
O	0.154	0.095	0.300	0.143	0.267	0.200	0.193
							1

λmax = 6.585 CI = 0.117 RCI = 1.24
CR = 0.094 n = 6

Facility

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	CU	E	F	Q	R
CU	1.000	1.000	3.000	2.000	3.000
E	1.000	1.000	3.000	2.000	2.000
F	0.333	0.333	1.000	0.500	2.000
Q	0.500	0.500	2.000	1.000	3.000
R	0.333	0.500	0.500	0.333	1.000
SUM	3.167	3.333	9.500	5.833	11.000

	CU	E	F	Q	R	weight
CU	0.316	0.300	0.316	0.343	0.273	0.309
E	0.316	0.300	0.316	0.343	0.182	0.291
F	0.105	0.100	0.105	0.086	0.182	0.116
Q	0.158	0.150	0.211	0.171	0.273	0.193
R	0.105	0.150	0.053	0.057	0.091	0.091
						1.000

λmax = 5.147 n = 5.000
CI = 0.037 CR = 0.033

Pairwise comparison and weight calculation for Anbessa shoe factory

	CU	E	F	Q	R
CU	1.000	1.000	2.000	1.000	0.500
E	1.000	1.000	2.000	1.000	1.000
F	0.500	0.500	1.000	0.500	2.000
Q	1.000	1.000	2.000	1.000	2.000
R	2.000	1.000	0.500	0.500	1.000
SUM	5.500	4.500	7.500	4.000	6.500

	CU	E	F	Q	R	weight
CU	0.182	0.222	0.267	0.250	0.077	0.200
E	0.182	0.222	0.267	0.250	0.154	0.215
F	0.091	0.111	0.133	0.125	0.308	0.154
Q	0.182	0.222	0.267	0.250	0.308	0.246
R	0.364	0.222	0.067	0.125	0.154	0.186
						1.000

λmax = 5.414 n = 5.000
CI = 0.103 CR = 0.092

Pairwise comparison and weight calculation for Peacock shoe factory

	CU	E	F	Q	R
CU	1.000	1.000	0.500	1.000	2.000
E	1.000	1.000	1.000	1.000	0.500
F	2.000	1.000	1.000	0.500	2.000
Q	1.000	1.000	2.000	1.000	1.000
R	0.500	2.000	0.500	1.000	1.000
SUM	5.500	6.000	5.000	4.500	6.500

	CU	E	F	Q	R	WEIGHT
CU	0.182	0.167	0.100	0.222	0.308	0.196
E	0.182	0.167	0.200	0.222	0.077	0.170
F	0.364	0.167	0.200	0.111	0.308	0.230
Q	0.182	0.167	0.400	0.222	0.154	0.225
R	0.091	0.333	0.100	0.222	0.154	0.180
						1.000

λmax = 5.417 n = 5.000

CI = 0.104 CR = 0.093

Transportation

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	CU	E	F	R
CU	1.000	1.000	2.000	1.000
E	1.000	1.000	0.500	1.000
F	0.500	2.000	1.000	0.500
R	1.000	1.000	2.000	1.000
SUM	3.500	5.000	5.500	3.500

	M	IAL	S	T	weight
M	0.286	0.200	0.364	0.286	0.284
IAL	0.286	0.200	0.091	0.286	0.216
S	0.143	0.400	0.182	0.143	0.217
T	0.286	0.200	0.364	0.286	0.284
					1.000

λmax= 4.249 n = 4.000

CI = 0.083 CR = 0.092

Pairwise comparison and weight calculation for Anbessa shoe factory

	CU	E	F	R
CU	1.000	2.000	4.000	4.000
E	0.500	1.000	3.000	3.000
F	0.250	0.333	1.000	2.000
R	0.250	0.250	0.500	1.000
SUM	2.000	3.583	8.500	10.000

	M	IAL	S	T	weight
M	0.500	0.558	0.471	0.400	0.482
IAL	0.250	0.279	0.353	0.300	0.296
S	0.125	0.093	0.118	0.200	0.134
T	0.125	0.070	0.059	0.100	0.088
					1.000

λmax= 4.011 n = 4.000

CI = 0.004 CR = 0.004

Pairwise comparison and weight calculation for Peacock shoe factory

	CU	E	F	R
CU	1.000	2.000	3.000	2.000
E	0.500	1.000	2.000	1.000
F	0.333	0.500	1.000	2.000
R	0.500	0.500	0.500	1.000
SUM	2.333	4.000	6.500	6.000

	M	IAL	S	T	weight
M	0.429	0.500	0.462	0.333	0.431
IAL	0.214	0.250	0.308	0.167	0.235
S	0.143	0.125	0.154	0.333	0.189
T	0.214	0.125	0.077	0.167	0.146
					1.000

λmax= 4.013 n = 4

CI = 0.004 CR = 0.0048

Internal Integration

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	II	E	IQR	UIT
II	1.000	2.000	3.000	2.000
E	0.500	1.000	0.500	1.000
IQR	0.333	2.000	1.000	1.000
UIT	0.500	0.500	1.000	1.000
SUM	2.333	5.500	5.500	5.000

	II	E	IQR	UIT	weight
II	0.429	0.364	0.545	0.400	0.434
E	0.214	0.182	0.091	0.200	0.172
IQR	0.143	0.364	0.182	0.200	0.222
UIT	0.214	0.091	0.182	0.200	0.172
					1.000

λmax= 4.011 n = 4.000

CI = 0.004 CR = 0.004

Pairwise comparison and weight calculation for Anbessa shoe factory

	II	E	IQR	UIT
II	1.000	2.000	0.500	1.000
E	0.500	1.000	0.500	1.000
IQR	2.000	2.000	1.000	1.000
UIT	1.000	1.000	1.000	1.000
SUM	4.500	6.000	3.000	4.000

	II	E	IQR	UIT	weight
II	0.222	0.333	0.167	0.250	0.243
E	0.111	0.167	0.167	0.250	0.174
IQR	0.444	0.333	0.333	0.250	0.340
UIT	0.222	0.167	0.333	0.250	0.243
					1.000

λmax= 4.121 n = 4

CI = 0.040 CR = 0.0449

Pairwise comparison and weight calculation for Peacock shoe factory

	II	E	IQR	UIT
II	1.000	2.000	1.000	1.000
E	0.500	1.000	1.000	1.000
IQR	1.000	1.000	1.000	2.000
UIT	1.000	1.000	0.500	1.000
SUM	3.500	5.000	3.500	5.000

	II	E	IQR	UIT	WEIGHT
II	0.286	0.400	0.286	0.200	0.293
E	0.143	0.200	0.286	0.200	0.207
IQR	0.286	0.200	0.286	0.400	0.293
UIT	0.286	0.200	0.143	0.200	0.207
					1.000

λmax= 4.121 n= 4.000

CI= 0.040 CR= 0.045

Human Resource

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	M	IAL	S	T
M	1.000	3.000	2.000	1.000
IAL	0.333	1.000	3.000	0.500
S	0.500	0.333	1.000	0.500
T	1.000	1.000	2.000	1.000
SUM	2.833	5.333	8.000	3.000

	M	IAL	S	T	weight
M	0.353	0.563	0.250	0.333	0.375
IAL	0.118	0.188	0.375	0.167	0.212
S	0.176	0.063	0.125	0.167	0.133
T	0.353	0.188	0.250	0.333	0.281
					1.000

λmax= 4.078 n = 4.000

CI = 0.026 CR = 0.029

Pairwise comparison and weight calculation for Anbessa shoe factory

	M	IAL	S	T
M	1.000	2.000	1.000	1.000
IAL	0.500	1.000	2.000	0.500
S	1.000	0.500	1.000	0.500
T	1.000	1.000	2.000	1.000
SUM	3.500	4.500	6.000	3.000

	M	IAL	S	T	weight
M	0.286	0.444	0.167	0.333	0.308
IAL	0.143	0.222	0.333	0.167	0.216
S	0.286	0.111	0.167	0.167	0.183
T	0.286	0.222	0.333	0.333	0.294
					1.000

λmax= 4.034 n = 4.000

CI = 0.011 CR = 0.012

Pairwise comparison and weight calculation for Peacock shoe factory

	M	IAL	S	T
M	1.000	0.500	1.000	1.000
IAL	2.000	1.000	2.000	2.000
S	1.000	0.500	1.000	0.500
T	1.000	1.000	2.000	1.000
SUM	5.000	3.000	6.000	4.500

	M	IAL	S	T	WEIGHT
M	0.200	0.167	0.167	0.222	0.189
IAL	0.400	0.333	0.333	0.444	0.378
S	0.200	0.167	0.167	0.111	0.161
T	0.200	0.333	0.333	0.222	0.272
					1.000

λmax= 4.262 n = 4.000

CI = 0.087 CR = 0.097

Operation

pairwise comparison and weight calculation for Tikur Abay shoe factory

	OP	EP	I
OP	1.000	0.500	1.000
EP	2.000	1.000	3.000
I	1.000	0.333	1.000
SUM	4.000	1.833	5.000

	OP	EP	I	weight
OP	0.250	0.273	0.200	0.241
EP	0.500	0.545	0.600	0.548
I	0.250	0.182	0.200	0.211

λmax = 3.015 n = 3.000

CI = 0.008 CR = 0.009

Pairwise comparison and weight calculation for Anbessa shoe factory

	OP	EP	I
OP	1.000	3.000	2.000
EP	0.333	1.000	1.000
I	0.500	1.000	1.000
SUM	1.833	5.000	4.000

	OP	EP	I	weight
OP	0.545	0.600	0.500	0.548
EP	0.182	0.200	0.250	0.211
I	0.273	0.200	0.250	0.241
				1.000

λmax = 3.015 n = 3.000

CI = 0.008 CR= 0.009

Pairwise comparison and weight calculation for Peacock shoe factory

	OP	EP	I
OP	1.000	2.000	3.000
EP	0.500	1.000	2.000
I	0.333	0.500	1.000
SUM	1.833	3.500	6.000

	OP	EP	I	WEIGHT
OP	0.545	0.571	0.500	0.539
EP	0.273	0.286	0.333	0.297
I	0.182	0.143	0.167	0.164
				1.000

λmax = 3.006 n = 3.000

CI = 0.003 CR = 0.003

3. Customer Relationship Management

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	CS	CI	DF	MA
CS	1.000	3.000	3.000	2.000
CI	0.333	1.000	2.000	1.000
DF	0.333	0.500	1.000	0.500
MA	0.500	1.000	2.000	1.000
SUM	2.167	5.500	8.000	4.500

	CS	CI	DF	MA	WEIGHT
CS	0.462	0.545	0.375	0.444	0.457
CI	0.154	0.182	0.250	0.222	0.202
DF	0.154	0.091	0.125	0.111	0.120
MA	0.231	0.182	0.250	0.222	0.221
					1.000

λmax = 4.041 n = 4.000
CI = 0.014 CR = 0.015

Pairwise comparison and weight calculation for Anbessa shoe factory

	CS	CI	DF	MA
CS	1.000	2.000	1.000	2.000
CI	0.500	1.000	1.000	0.500
DF	1.000	1.000	1.000	0.500
MA	0.500	2.000	2.000	1.000
SUM	3.000	6.000	5.000	4.000

	CS	CI	DF	MA	WEIGHT
CS	0.333	0.333	0.200	0.500	0.342
CI	0.167	0.167	0.200	0.125	0.165
DF	0.333	0.167	0.200	0.125	0.206
MA	0.167	0.333	0.400	0.250	0.288
					1.000

λmax = 4.186 n = 4.000
CI = 0.062 CR = 0.069

Pairwise comparison and weight calculation for Peacock shoe factory

	CS	CI	DF	MA
CS	1.000	0.500	2.000	1.000
CI	2.000	1.000	2.000	2.000
DF	0.500	0.500	1.000	1.000
MA	1.000	0.500	1.000	1.000
SUM	4.500	2.500	6.000	5.000

	CS	CI	DF	MA	WEIGHT
CS	0.222	0.200	0.333	0.200	0.239
CI	0.444	0.400	0.333	0.400	0.394
DF	0.111	0.200	0.167	0.200	0.169
MA	0.222	0.200	0.167	0.200	0.197
					1.000

λmax = 4.061 n = 4.000
CI = 0.020 CR = 0.022

Customer Service

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	R	COP	HCC	VAS
R	1.000	2.000	3.000	2.000
COP	0.500	1.000	0.500	1.000
HCC	0.333	2.000	1.000	2.000
VAS	0.500	1.000	0.500	1.000
SUM	2.333	6.000	5.000	6.000

	R	COP	HCC	VAS	WEIGHT
R	0.429	0.333	0.600	0.333	0.424
COP	0.214	0.167	0.100	0.167	0.162
HCC	0.143	0.333	0.200	0.333	0.252
VAS	0.214	0.167	0.100	0.167	0.162
					1.000

λmax = 4.153 n 4.000
CI= 0.051 CR 0.057

Pairwise comparison and weight calculation for Anbessa shoe factory

	R	COP	HCC	VAS
R	1.000	2.000	3.000	2.000
COP	0.500	1.000	4.000	1.000
HCC	0.333	0.250	1.000	0.500
VAS	0.500	1.000	2.000	1.000
SUM	2.333	4.250	10.000	4.500

	R	COP	HCC	VAS	WEIGHT
R	0.429	0.471	0.300	0.444	0.411
COP	0.214	0.235	0.400	0.222	0.268
HCC	0.143	0.059	0.100	0.111	0.103
VAS	0.214	0.235	0.200	0.222	0.218
					1.000

λmax = 4.093 n = 4.000
CI = 0.031 CR = 0.035

Pairwise comparison and weight calculation for Peacock shoe factory

	R	COP	HCC	VAS
R	1.000	1.000	3.000	3.000
COP	1.000	1.000	2.000	2.000
HCC	0.333	0.500	1.000	1.000
VAS	0.333	0.500	1.000	1.000
SUM	2.667	3.000	7.000	7.000

	R	COP	HCC	VAS	WEIGHT
R	0.375	0.333	0.429	0.429	0.391
COP	0.375	0.333	0.286	0.286	0.320
HCC	0.125	0.167	0.143	0.143	0.144
VAS	0.125	0.167	0.143	0.143	0.144
					1.000

λmax = 4.018 n = 4.000
CI = 0.006 CR = 0.007

Customer Integration

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	ECI	II	OR	UIT
ECI	1.000	4.000	3.000	2.000
II	0.250	1.000	1.000	2.000
OR	0.333	1.000	1.000	1.000
UIT	0.500	0.500	1.000	1.000
SUM	2.083	6.500	6.000	6.000

	ECI	II	OR	UIT	WEIGHT
ECI	0.480	0.615	0.500	0.333	0.482
II	0.120	0.154	0.167	0.333	0.193
OR	0.160	0.154	0.167	0.167	0.162
UIT	0.240	0.077	0.167	0.167	0.163
					1.000

λmax = 4.168 n 4.000
CI= 0.056 CR 0.062

Pairwise comparison and weight calculation for Anbessa shoe factory

	ECI	II	OR	UIT
ECI	1.000	2.000	2.000	3.000
II	0.500	1.000	1.000	0.500
OR	0.500	1.000	1.000	2.000
UIT	0.333	2.000	0.500	1.000
SUM	2.333	6.000	4.500	6.500

	ECI	II	OR	UIT	WEIGHT
ECI	0.429	0.333	0.444	0.462	0.417
II	0.214	0.167	0.222	0.077	0.170
OR	0.214	0.167	0.222	0.308	0.228
UIT	0.143	0.333	0.111	0.154	0.185
					1.000

λmax = 4.207 n = 4.000
CI = 0.069 CR = 0.077

Pairwise comparison and weight calculation for Peacock shoe factory

	ECI	II	OR	UIT
ECI	1.000	3.000	3.000	2.000
II	0.333	1.000	2.000	1.000
OR	0.333	0.500	1.000	1.000
UIT	0.500	1.000	1.000	1.000
SUM	2.167	5.500	7.000	5.000

	ECI	II	OR	UIT	WEIGHT
ECI	0.462	0.545	0.429	0.400	0.459
II	0.154	0.182	0.286	0.200	0.205
OR	0.154	0.091	0.143	0.200	0.147
UIT	0.231	0.182	0.143	0.200	0.189
					1.000

λmax = 4.061 n = 4.000
CI = 0.020 CR = 0.022

Demand forecasting

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	FSP	DM	RDD
FSP	1.000	2.000	3.000
DM	0.500	1.000	1.000
RDD	0.333	1.000	1.000
SUM	1.833	4.000	5.000

	FSP	DM	RDD	WEIGHT
FSP	0.545	0.500	0.600	0.548
DM	0.273	0.250	0.200	0.241
RDD	0.182	0.250	0.200	0.211

λmax = 3.015 n = 3.000
CI = 0.008 CR = 0.013

Pairwise comparison and weight calculation for Anbessa shoe factory

	FSP	DM	RDD
FSP	1.000	1.000	1.000
DM	1.000	1.000	0.500
RDD	1.000	2.000	1.000
SUM	3.000	4.000	2.500

	FSP	DM	RDD	WEIGHT
FSP	0.333	0.250	0.400	0.328
DM	0.333	0.250	0.200	0.261
RDD	0.333	0.500	0.400	0.411

λmax = 3.054 n = 3.000
CI = 0.027 CR = 0.046

Pairwise comparison and weight calculation for Peacock shoe factory

	FSP	DM	RDD
FSP	1.000	1.000	1.000
DM	1.000	1.000	0.500
RDD	1.000	2.000	1.000
SUM	3.000	4.000	2.500

	FSP	DM	RDD	WEIGHT
FSP	0.333	0.250	0.400	0.328
DM	0.333	0.250	0.200	0.261
RDD	0.333	0.500	0.400	0.411
				1.000

λmax = 3.054 λmax = 3.054
CI = 0.027 CI = 0.027

Market Analysis

Pairwise comparison and weight calculation for Tikur Abay shoe factory

	ME	CA	CR	GP
ME	1.000	1.000	2.000	4.000
CA	1.000	1.000	3.000	1.000
CR	0.500	0.333	1.000	0.500
GP	0.250	1.000	2.000	1.000
SUM	2.750	3.333	8.000	6.500

	ME	CA	CR	GP	WEIGHT
ME	0.364	0.300	0.250	0.615	0.382
CA	0.364	0.300	0.375	0.154	0.298
CR	0.182	0.100	0.125	0.077	0.121
GP	0.091	0.300	0.250	0.154	0.199
					1.000

λmax= 4.268 n = 4.000
CI = 0.089 CR = 0.099

Pairwise comparison and weight calculation for Anbessa shoe factory

	ME	CA	CR	GP
ME	1.000	0.500	2.000	3.000
CA	2.000	1.000	1.000	4.000
CR	0.500	1.000	1.000	1.000
GP	0.333	0.250	1.000	1.000
SUM	3.833	2.750	5.000	9.000

	ME	CA	CR	GP	WEIGHT
ME	0.261	0.182	0.400	0.333	0.294
CA	0.522	0.364	0.200	0.444	0.382
CR	0.130	0.364	0.200	0.111	0.201
GP	0.087	0.091	0.200	0.111	0.122
					1.000

λmax= 4.270 n = 4.000
CI = 0.090 CR = 0.100

Pairwise comparison and weight calculation for Peacock shoe factory

	ME	CA	CR	GP
ME	1.000	3.000	2.000	3.000
CA	0.333	1.000	3.000	2.000
CR	0.500	0.333	1.000	1.000
GP	0.333	0.500	1.000	1.000
SUM	2.167	4.833	7.000	7.000

	ME	CA	CR	GP	WEIGHT
ME	0.462	0.621	0.286	0.429	0.449
CA	0.154	0.207	0.429	0.286	0.269
CR	0.231	0.069	0.143	0.143	0.146
GP	0.154	0.103	0.143	0.143	0.136
					1.000

λmax= 4.196 n = 4.000

CI = 0.065 CR = 0.073

Annex: 3

Addis Ababa University
School of Mechanical and Industrial Engineering Program

Thesis title: **Analysis of Supply Chain Performance Measurement System in Ethiopia: The Case of Selected Shoe Factories in Addis Ababa**

The objectives to be addressed by this questionnaire are:

- To examine the extent of implementation of performance measurement factors by these specified shoe industries
- To analysis the mean difference across these shoe factors in the extent of practicing supply chain performance measurement factors

Dear respondents,
The purpose of this questionnaire is to collect data that helps to know the supply chain performance of shoe factories operated in the country and draw a lessons and also forward remedy or solution where gap is observed. For this to get real, your genuine concern and willingness in filling the questions will helps to make good compressive summary and the report successful. The data's gathered for this study will be used for only educational purpose.

Thus, kindly allocated a few minutes to be frank and complete in concentration. The responses that you will make is summarized in a collective manner and will be kept confidential and anonymous. i.e. the data's gathered for this study may be published provided that you will not be identified. For further clarification, no need of hesitation to call on: **0911786084**.

I would like to thank in advance for your cooperation and patience.

Questionnaire for Purchasing Department: Manager, Deputy Manager, Assistant manager, and Officers.
Please put a tick mark for each listed questions (To study supply chain performance on supplier relationship management)

No	Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	i. Company name: ---------- ii. Name of the respondent: ---------- iii. Position: ---------- iv. Education level: ---------- v. Work experience in the company: ---------- vi. Sex: ----------					
2	Has a system to ensure it received quality material from supplier					
3	Uses performance measurement procedure to be employed for preventive procedure in case when the supplier can't satisfy delivery criteria					
4	Set arrangement with supplier to keep stock ready for routine and urgent requirement in their warehouse					
5	Choose its supplier using well developed criteria					
6	Set a feedback system to identify the area of improvement					

7	Use a standard contract for all suppliers and standard procedure for effective negotiation					
8	Has a system to ensure that the supplier is following same line of environmental policy and works towards environmental friendly manufacturing process, by following national and international regulation					
9	Awarded third party certification and conducts regular survey on existing system					
10	Cooperates with supplier to improve operation process					
11	During any unforeseen situation, it helps supplier to take any critical decision					
12	There is coordination and understanding to facilitate urgent requirement between the company and supplier					
13	Informs supplier in advance for an extra requirement of material due to sudden or planned requirements					
14	Developed collaboration planning in use for information integration					
15	Makes forecasting along with suppliers					
16	Employ a system to achieve common objective like sharing a risk with suppliers					
17	Has material specification list in place to guide a supplier					
18	A system enables to ensure that specification matches to end customer requirement					
19	Follows a procedure to decide right specification and right quantity required to purchase					
20	Specific numbers of suppliers to keep ready for getting required material to reduce supplier power					
21	Has critical item list and a system to keep safety inventory level					
22	Has supplier designated for supply critical item					
23	Updates its supplier database regularly					
24	Arranges alternative supplier to supply the critical item in emergency					

Addis Ababa University
School of Mechanical and Industrial Engineering Program

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- To examine the extent of implementation of performance measurement factors by these specified shoe industries
- To analysis the mean difference across these shoe factors in the extent of practicing supply chain performance measurement factors

Dear respondents,
The purpose of this questionnaire is to collect data that helps to know the supply chain performance of shoe factories operated in the country and draw a lessons and also forward remedy or solution where gap is observed. For this to get real, your genuine concern and willingness in filling the questions will helps to make good compressive summary and the report successful. The data's gathered for this study will be used for only educational purpose.

Thus, kindly allocated a few minutes to be frank and complete in concentration. The responses that you will make is summarized in a collective manner and will be kept confidential and anonymous. i.e. the data's gathered for this study may be published provided that you will not be identified. For further clarification, no need of hesitation to call on: **0911786084**.

I would like to thank in advance for your cooperation and patiency.

Questionnaire for production department: Manager, Deputy Manager, Assistant manager, and Officers. Please put a tick mark for each listed questions (To study supply chain performance on internal supply chain management)

No	Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	i. Company name: ---------- ii. Name of the respondent: ---------- iii. Position: ---------- iv. Education level: ---------- v. Work experience in the company: ---------- vi. Sex: ----------					
2	Employs a system to optimize the idle time caused by nonscheduled work or end of shift					
3	Prepares a plan to reduce fixed cost					
4	Facility is flexible to accommodate market uncertainties					
5	Implements a system to further improve production increasing with regard to automation					
6	The facility is reliable to address market needs environmentally friendly					
7	Documented safety or pollution control procedure					
8	There is instruction for operation posted near each machine					
9	Has a planned maintenance system					
10	It maintains minimum stock level for critical spares					
11	Employees a system to reduce inventory cost					
12	Has vendor managed inventory (VMI) arrangement with supplier					

13	Developed a system to manage inventory level during sudden fluctuation in customer demand					
14	Has a system to select suitable channel, scheduling location of warehouses					
15	Has a procedure to deal with obsolete raw material in stock					
16	Logistics are flexible to accommodate market uncertainties					
17	Has a system to react during sudden demand fluctuation					
18	Logistics are reliable to address market *needs*					
19	Has a system to mark present performance in terms of meeting delivery schedule					
20	Apply real time monitoring system in use to monitor, review, evaluate and Modify the overall processes and functions performed					
20	Has a system to strengthen information sharing					
21	Has a system to reduce its operating cost					
22	Established a system in place to motivate staffs workers to get best out of them					
23	Has a system for continuous skill development process					
24	Uses safety procedure to ensure that the working environments are safe and follow all safety regulation					
25	Has a system to improve the skill					
26	Has a system to compensate the skill gap when a retire worker with high skills has been replaced with novice					
27	Has a system to encourage human resources to be innovative and keep tradition of learning					
28	Operation reacts with the fluctuation of uncertain demand					
29	Has a system to reduce material usage and waste					
30	Has a system to eliminate the non-value adding activities between order and start of processing					
31	Has a system to maximize its throughput					
32	Established a system for internal or external audit process					
33	Works on reducing energy consumption					
34	Arranged an alternative source of energy for consumption					
35	Has a system to manage emission related issue					

Addis Ababa University
School of Mechanical and Industrial Engineering Program

Thesis title: **Analysis of Supply Chain Performance Measurement System in Ethiopia: The Case of Selected Shoe Factories in Addis Ababa**

The objectives to be addressed by this questionnaire are:

- To examine the extent of implementation of performance measurement factors by these specified shoe industries
- To analysis the mean difference across these shoe factors in the extent of practicing supply chain performance measurement factors

Dear respondents,
The purpose of this questionnaire is to collect data that helps to know the supply chain performance of shoe factories operated in the country and draw a lessons and also forward remedy or solution where gap is observed. For this to get real, your genuine concern and willingness in filling the questions will helps to make good compressive summary and the report successful. The data's gathered for this study will be used for only educational purpose.

Thus, kindly allocated a few minutes to be frank and complete in concentration. The responses that you will make is summarized in a collective manner and will be kept confidential and anonymous. i.e. the data's gathered for this study may be published provided that you will not be identified. For further clarification, no need of hesitation to call on: **0911786084**.

I would like to thank in advance for your cooperation and patiency.

Questionnaire for marketing department: Manager, Deputy Manager, Assistant manager, and Officers.
Please put a tick mark for each listed questions (To study supply chain performance on customer relationship management)

No	Questions	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	i. Company name: ---------- ii. Name of the respondent: ---------- iii. Position: ---------- iv. Education level: ---------- v. Work experience in the company: ---------- vi. Sex: ----------					
2	Employs business strategy with respect to customer service					
3	Has a system to create an outstanding customer experience with optimum cost					
4	Has a system to improve the quality of customer service					
5	Has a system to get feedback from customer about its effectiveness					
6	Faces constraints and bottleneck in its process to achieve required fill rate					
7	Established a system to manage its bottleneck					
8	Has a web-based supply chain and inventory management system					
9	Has documented procedure to deal with customer complaint					
10	Gives opportunity to its customer to lodge a complaint					
11	Dissolves a customer complaint promptly					

12	Has criteria to decide which complaint needs urgent response					
13	Has a system to reduce the number of complaint					
14	Gives after sales service to its customers					
15	Has developed a system enable to know that its customers are satisfied with after sales service they received					
16	Regularly update its online catalogue and this online catalogue readily explain the price and shipping cost					
17	Maintains transparency with its customer about product quality and availability					
18	Has made strategies to get to customer and for customer to get to it					
19	Cooperates with its customer to develop joint demand forecasting which helps the company for new product offerings, pricing changes, new technologies, and competitive activities					
20	Developed a system enable to identify, understand, and anticipate its customer's needs					
21	Has standard means of communication across functions and customers					
22	Shares its risk with its customer and matches its objective with its customer's requirements					
23	Has state of art arrangement for online direct sale					
24	Considers uncertainty factor due to global economic crunch, political instability, environment, or other factor for forecasting					
25	Developed a system to differentiate products in order to get competitive advantage					
26	Builds relationship with its targeted customer					
27	Has customer database and regularly updates it					
28	Developed a system enables to build customer's loyalty					
29	Has strategies in the respect of retaining existing customer and creating new customer and rewards its loyal customer					
30	Has matrix enables to identify old product with new customer					
31	The government gives or considers subsidy on raw material for your company					

Annex: 4

Matrix Questions: For measuring the performance of SC on supplier relationship management

Interviewee group: Purchasing department

- To measure supply chain performance on supplier relationship **management**

According to the figure, the performance measurement factors are divided into three main decision making level at strategic, tactical, and operational levels.
Could you compare the importance between each performance measurement factor in the same decision making level, in 1 to 9 pair-wise comparison scales?

1 – Equally preferred
2 – Equally to moderately
3 – Moderately preferred
4 – Moderately to strongly
5 – Strongly preferred
6 – Strongly to very strongly
7 – Very strongly preferred
8 – Very strongly to extremely
9 – Extremely preferred

How to fill the question (the following tables)

1. In the "preferred column" compare between "1" and" 2" indicated in the bracket i.e. the degree of importance of the macro process for your company. If your choice is "1" put 1 and if you prefer "2" put 2.
2. In the "scale column" compare the importance per the aforementioned scale 1 to 9. You can put your choice from 1 to 9 per your preference.

Supplier relationship management

	Factors in strategic level	Preferred	Scale
1	Quality supplier selection (1) - Effective procurement processes (2)		
2	Supplier integration (1) - Effective procurement processes (2)		
3	Quality supplier selection (1) - Supplier integration (2)		

1. Quality supplier selection (Strategic level)

	Factors in tactical level	Preferred	Scale
1.1	Supplier performance (1) - Green supplier (2)		
1.2	Selection process (1) - Green supplier (2)		
1.3	Supplier performance (1) - Selection process (2)		

2. Supplier integration (Strategic level)

	Factors in tactical level	Preferred	Scale
2.1	Coordination and resource sharing (1) - Use of information technology (2)		
2.2	Information integration (1) - Use of information technology (2)		
2.3	Organizational relationship (1) - Use of information technology (2)		
2.4	Coordination and resource sharing (1) - Information integration (2)		
2.5	Coordination and resource sharing (1) - Organizational relationship (2)		
2.6	Information integration (1) - Organizational relationship (2)		

3. Effective procurement processes (Strategic level)

	Factors in tactical level	Preferred	Scale
3.1	Effective communication with production (1) - Effective contract administration (2)		
3.2	Effective management of purchase portfolio (1) - Effective contract		

	administration (2)		
3.3	Effective communication with production (1) - Effective management of purchase portfolio (2)		

Matrix questions: For measuring the performance of supply chain on internal SC management

Interviewee group: Production department

- **To measure supply chain performance on internal supply chain management**

According to the figure, the performance measurement factors are divided into three main decision making level at strategic, tactical, and operational levels.

Could you compare the importance between each performance measurement factor in the same decision making level, in 1 to 9 pair-wise comparison scales?

1 – Equally preferred
2 – Equally to moderately
3 – Moderately preferred
4 – Moderately to strongly
5 – Strongly preferred
6 – Strongly to very strongly
7 – Very strongly preferred
8 – Very strongly to extremely
9 – Extremely preferred

How to fill the questions (the following table)

1. In the "preferred column" compare between "1" and" 2" indicated in the bracket i.e. the degree of importance of the macro process for your company. If your choice is "1" put 1 and if you prefer "2" put 2.
2. In the "scale column" compare the importance per the aforementioned scale 1 to 9. You can put your choice from 1 to 9 per your preference.

Internal supply chain management

	Factors in strategic level	Preferred	Scale
1	Facility (1) - Operations (2)		
2	Inventory (1) - Operations (2)		
3	Transportation (1) - Operations (2)		
4	Internal integration (1) - Operations (2)		
5	Human Resources (1) - Operations (2)		
6	Facility (1) - Inventory (2)		
7	Facility (1) - Transportation (2)		
8	Facility (1) - Internal integration (2)		
9	Facility (1) - Human Resources (2)		
10	Inventory (1) - Transportation (2)		
11	Inventory (1) - Internal integration (2)		
12	Inventory (1) - Human Resources (2)		
13	Transportation (1) - Internal integration (2)		
14	Transportation (1) - Human Resources (2)		
15	Internal integration (1) - Human Resources (2)		

1. Facility (Strategic level)

	Factors in tactical level	Preferred	Scale
1.1	Capacity utilization (1) - Reliability (2)		
1.2	Efficiency (1) - Reliability (2)		

1.3	Flexibility (1) - Reliability (2)		
1.4	Quality (1) - Reliability (2)		
1.5	Capacity utilization (1) - Efficiency (2)		
1.6	Capacity utilization (1) - Flexibility (2)		
1.7	Capacity utilization (1) - Quality (2)		
1.8	Efficiency (1) - Flexibility (2)		
1.9	Efficiency (1) - Quality (2)		
1.10	Flexibility (1) - Quality (2)		

1 Inventory (Strategic level)

	Factors in tactical level	Preferred	Scale
2.1	Optimal inventory policy (1) - Warehouse utilization (2)		

2 Internal integration (Strategic level)

	Factors in tactical level	Preferred	Scale
4.1	Information integration (1) - Efficiency (2)		
4.2	Internal quick response (1) - Efficiency (2)		
4.3	Use of information technology (1) - Efficiency (2)		
4.4	Information integration (1) - Internal quick response (2)		
4.5	Information integration (1) - Use of information technology (2)		
4.6	Internal quick response (1) - Use of information technology (2)		

3 Human resources (Strategic level)

	Factors in tactical level	Preferred	Scale
5.1	Motivation (1) - Innovation and learning (2)		
5.2	Safety (1) - Innovation and learning (2)		
5.3	Training (1) - Innovation and learning (2)		
5.4	Motivation (1) - Safety (2)		
5.5	Motivation (1) - Training (2)		
5.6	Safety (1) - Training (2)		

4 Operations (Strategic level)

	Factors in tactical level	Preferred	Scale
6.1	Operational performance (1) - Innovation (2)		
6.2	Environmental performance (1) - Innovation (2)		
6.3	Operational performance (1) - Environmental performance (2)		

Matrix **questions: For measuring the performance of SC on customer relationship management**

Interviewee group: Marketing department

- **To measure supply chain performance on customer relationship management**

According to the figure, the performance measurement factors are divided into three main decision making level at strategic, tactical, and operational levels.
Could you compare the importance between each performance measurement factor in the same decision making level, in 1 to 9 pair-wise comparison scales?

1 – Equally preferred
2 – Equally to moderately
3 – Moderately preferred
4 – Moderately to strongly
5 – Strongly preferred
6 – Strongly to very strongly
7 – Very strongly preferred
8 – Very strongly to extremely
9 – Extremely preferred

How to fill the questions (the following table)

1. In the "preferred column" compare between "1" and" 2" indicated in the bracket i.e. the degree of importance of the macro process for your company. If your choice is "1" put 1 and if you prefer "2" put 2.
2. In the "scale column" compare the importance per the aforementioned scale 1 to 9. You can put your choice from 1 to 9 per your preference.

Customer relationship management

	Factors in strategic level	Preferred	Scale
1	Customer service (1) - Market analysis (2)		
2	Customer integration (1) - Market analysis (2)		
3	Demand forecasting (1) - Market analysis (2)		
4	Customer service (1) - Customer integration (2)		
5	Customer service (1) - Demand forecasting (2)		
6	Customer integration (1) - Demand forecasting (2)		

1 Customer service (Strategic level)

	Factors in tactical level	Preferred	Scale
1.1	Responsiveness (1) - Value added service (2)		
1.2	Customer order processing and delivery (1) - Value added service (2)		
1.3	Handling customer complaints (1) - Value added service (2)		
1.4	Responsiveness (1) - Customer order processing and delivery (2)		
1.5	Responsiveness (1) - Handling customer complaints (2)		
1.6	Customer order processing and delivery (1) - Handling customer complaints (2)		

1 Customer integration (Strategic level)

	Factors in tactical level	Preferred	Scale
2.1	Extent of cooperation to improve quality (1) - Use of information technology (2)		
2.2	Information integration (1) - Use of information technology (2)		
2.3	Organizational relationship (1) - Use of information technology (2)		
2.4	Extent of cooperation to improve quality (1) - Information integration		

	(2)		
2.5	Extent of cooperation to improve quality (1) - Organizational relationship (2)		
2.6	Information integration (1) - Organizational relationship (2)		

2 Demand forecasting (Strategic level)

	Factors in tactical level	Preferred	Scale
3.1	Forecasting system in place (1) - Reliability of demand data (2)		
3.2	Decision making (1) - Reliability of demand data (2)		
3.3	Forecasting system in place (1) - Decision making (2)		

3 Market analysis (Strategic level)

	Factors in tactical level	Preferred	Scale
4.1	Market equity (1) - Government policy over market equity (2)		
4.2	Customer acquisition (1) - Government policy over market equity (2)		
4.3	Customer retention (1) - Government policy over market equity (2)		
4.4	Market equity (1) - Customer acquisition (2)		
4.5	Market equity (1) - Customer retention (2)		