Acknowledgements

First of all, thanks to the Almighty GOD for giving me the patience to start and finalize this thesis work. Thank be to Holly Virgin Mary, and His saints too, for helping me during those remarkable times.

Secondly, I am deeply extending my sincere appreciation to my advisor, Dr.-Ing Daniel Kitaw, for his valuable advice, constant support, commitment, dedication, encouragement and precious guidance, creative suggestions and critical comments, and for his being everlasting enthusiastic from the beginning to the end of the project. Without his urge, no doubt, this work would not have been possible at all.

Thirdly, a word of thanks must also go to all staffs' of MOHA Soft Drinks Industry Share Company, and Sales and Marketing department staffs' of East Africa Bottling Share Company, for their cooperation in providing data, filling out questionnaire, availed themselves for an interview and provided very valuable information about Supply Chain Management System of MOHA Soft Drinks Industry Share Company. Furthermore, I would like to forward a word of appreciation to Ato Abreham Debebe who shared his experience on Supply Chain Management System.

Special thanks should also be addressed to the following staffs of MOHA Soft Drinks Industry S.C.: Ato Bayisa Gurmiesa, General Manager of NSP, Ato Bruk Getachew, Quality Control Manager, Ato Samson Getachew, Technical Manager, Ato Berhanu Assefa, Finance Manager, Ato Mulugeta Mekonen, General Manager of THP, Ato Girum Berhanu, Personnel, Ato Negussie W/Kidane, General Accountant Supervisor, Ato Ashenafi Assefa, Cost and budget Supervisor, Ato Markos Belay, Sales Manager, Ato Kefyalew Bersisa , Operation Manager of Summit Plant, Ato Amare Befikadu, A/HRD Manager, and Ato Wendewosen Mamo, Quality control Manager, Ato Fanta Wechefo, General Manager of Bure Kool Water Plant, Ato Desalegn Mezimur, Commercial Manager, Ato Merihasidek Menberu, General Manager of Gondar Pepsi Plant, Ato Tasew Gezahegn, Technical & Production Manager, Ato Abreham Amare , Production Supervisor, Ato legese Werku, Quality Control Manager, Ato Tesfay Mekonen, General Manager of Dessie plant, Ato Tesfay Mesele, Finanace Supervisor,

Ato Belay Ewunetu, Quality Control Manager for their great assistance during the data collection phase at MOHA Nefas Silk Pepsi Cola Plant, Teklehaimanot pepsi Plant, Summit Beverage Plant, Bure Kool Water Plant, Gondar Pepsi Plant and Dessie Pepsi Plant respectively. Besides, there are also many people at MOHA Soft Drink Industry S. C. who have helped me in my study visits by sharing the valuable experience. Furthermore, I would like to acknowledge my friends; Ato Moges Gebreyohanes, Tesfay Mesele, Eshitie Berhanie, Tesfakiros Weldu, Kahsu Tesfay, and Seyum Abreha for their valuable comments and suggestions.

Last, but not least, I would like to thank my wife, Sr. Kidan Abreha and my children, Zefikire and Zeeminet, for their love, encouragement, patience and support throughout the post graduate study.

Aregawi G/Eyesus – June 2006

Tables of Contents

List of Acronyms

AMASSASC Awash Melkassa Aluminium Sulphate & Sulphuric Acid Share Company

BC Barrier Cost

BW Branch Warehouse

C	Customer
CCE	Coca-Cola Enterprise
CCBE	Coca-Cola & Shweppes bottling Enterprise
CCK	Company Constructed Kiosks
CFS	Central Full Store
CLM	Council of Logistics Management
CSD	Carbonated Soft Drinks
D	Dealer
DRP	Distribution Requirement Planning
DS	Distribution System
DTDTR	Door-to-Door Truck Routes
DV	Domestic Vendor
EABSC	East Africa Bottling Share Company
ECCA	Ethiopian Custom Clearance Authority
EGS	Empty Goods Store
EN	Exit Node
ES	Empty Store
FC	Flow Cost
FGS	Finished Goods Store
Fqs	Frequency
FS	Full Store
INC	Input Node Cost
IT	Information Technology
IS	Import Supplier
LS	Local Supplier
MaN	Master Node
MFS	Material Flow System
Mfg	Manufacturing
MN	Mother Node
MPS	Master Production Scheduling
MRP	Materials Requirement Planning
MS	Manufacturing System
MOHA SISC	MOHA Soft Drinks Industry Share Company
NAC	Node Activity Cost

NSP	Nefas Silk Pepsi Plant
PS	Planning System
R	Retailer
SCCA	Supply Chain Costs Analysis
SCCT	Supply Chain Cycle Time
SCIA	Supply Chain Inventory Analysis
SCM	Supply Chain Management
SCTA	Supply Chain Time Analysis
SN	Source Node
SS	Supply System
SSRT	Supply System Response Time
StN	Storage Node
ST	Suppler Tier
TFGS	Temporary Finished Goods Store
TRWS	Temporary raw materials Stores
TSSC	Total Supply System Cost
THP	Teklehaimanot Pepsi Plant
V.A.T	Voluntary Additional Tax

List of Figures

List of Tables

Lists of Appendices

Abstract

Because of the inherent complexity of decision making in supply chains, there is a growing need for modeling supply chain system with different methodologies. A large number of manufacturing like soft drinks industry and service organizations are therefore seeking modeling systems that can help, identify and implement strategies for designing and improving their supply chain networks.

Developing a supply chain management system requires the analysis of the flow of materials from the initial sourcing to the final end customers.

Increased recognition is being placed, both in industry and in academia, on effective supply chain management. The term supply chain management (SCM) presupposes that there exists a supply chain to be managed. SCM has become a universal approach to cost effectiveness, timely delivery and the creation of growth oriented exchange system in goods and services.

With a focus on SCM in which cost, inventory and time are the key challenges, this thesis develops a model to aid the improvement of performance of supply chain system. The model is developed based on existing SCM knowledge (Initiated or adopted from literature review and pervious research works of Vikas Chandra (India-IIT, 1999)[30] and Ato Abreham Debebe (Ethiopia-AAU, 2004)[29], result of the circulated questionnaires and, interviewed questionnaires, and the results of an assessment or observations of supply chain management in Ethiopian soft drinks industries.

In order to make the research practical and realistic, an actual case study was conducted on an existing soft drinks company in Ethiopia, MOHA Soft Drinks Industry Share Company. The Nefas Silk Pepsi Plant current performances were compared with the supply chain model developed and some areas of improvements were identified such as distributions system, to minimize the cost of distribution channel, the researcher proposed direct sales using Telephone and Electronic channel to facilitate this, data base is designed for both (MOHA Soft Drinks Industry S.C. and East Africa Bottling S.C.) Ethiopian Soft Drinks Companies. Besides, the supply chain cost analysis saves Birr 2,171,780.17 (2.62 %) than the existing cost analysis.

Keywords: *Supply Chain Management System, Supply Chain Cost Analysis, Supply System (direct, indirect and packing materials), Manufacturing System, Distribution System (Depots, Kiosk, Door to Door, Plant sales & sales agent), Modeling, and Material Flow System.*

CHAPTER ONE
Introduction

The Ethiopian industries are operating today in a business environment characterized by unprecedented global competition and technological change. In order to alleviate the problem of being unable to be competent in market and technology, the concept of supply chain management is important for the firms.

Supply chain management has become a universal approach to cost effectiveness, timely delivery and the creation of growth oriented exchange system in goods and services. In Ethiopia, this issue is a major area of economic activities that concerns, directly or indirectly, private and public institutions, investors, contractors, national and international organizations as well as the diplomatic community.

1.1 Background of the Study

The Ethiopian economy has an agrarian economy in which the livelihood of about 85% of the population directly or indirectly depends on the agricultural sector. The sectoral structure of the value-added to the national economy in 2004 (GDP composition of sectors),

- Agriculture 46%
- Service Sector 41.4%
- Industry 12.6%

Out of the total share of the industry sector, manufacturing represent 7%. Major industrial sub-sectors are food, beverage, tobacco, textiles, leather, printing, paper, and non-metallic minerals. In consumer goods manufacturing food, beverage, textile, leather and shoe dominate the large and medium scale-manufacturing sub-sector in Ethiopia. These four groups, including the chemical process industries, account for 78% of the gross value of output of the large and medium scale-manufacturing sector. [46]

The Ethiopian process industries are facing serious weaknesses and constraints hindering their productivity and competitiveness. Most of the process industries are plagued with the problem of under-capacity utilization and total resource productivity declining. Even if the contribution of the manufacturing sector to export earnings has increased over the last few years, the contribution of Process industries for export is very marginal. Considering the unutilized capacity and unexploited potential in process,

a lot remains to be done. These problems can be rectified by implementing supply chain management system.

Soft Drinks Industry is one of the processing industries that play an important role in the economic development, especially for developing countries like Ethiopia. A soft drink is a cold beverage, usually sweet drink, which does not contain alcohol. In Ethiopia, soft drinks are known by the Amharic word "leslassa", meaning literally "smooth". [47]

The thesis will be carried out by taking MOHA (Mohammed Hussein Al-Amoudi) Soft Drinks Industry S. Co. as a case study.

1.2 Statement of the Problems

The following are some of the problems associated with supply chain management in Ethiopia.

A. **Poor strategic alliance**

Having proper alliance with customers, carriers, and suppliers with better information and communication technologies and management methods results in better quality of products and services with reduced costs. But the Ethiopian industries don't have this strategic alliance. Due to the lack of supply chain networking, the Ethiopian industries are highly subjected to unnecessary costs (storing, handling, moving, etc). [29]

B. **Longer lead times**

The other problem that is observed in Ethiopian industries is longer lead times (procurement, conversion, distribution) which results in unnecessary inventory costs, adds cost to products without adding value and customer dissatisfaction due to stock-out that highly affects the consumer which results major economical impact on the organizations. [29]

C. **Low customer service level**

Ethiopia is one of the developing countries where more value is not given to increase customer service level and product expectation, which result in loss of customers that have large economical impact on the organization. So this problem can rectify using supply chain that can serve to increase customer service level. [29]

1.3 Objectives of the Study

General objectives:

- To introduce a model development of supply chain management system for Ethiopian Soft Drinks Industries, this in turn will bring an economic development of the nation.
- To create awareness about the concept of supply chain management in Ethiopia.

Specific Objectives:

⇒ To develop a model of supply chain management system for MOHA Soft Drinks Industry S. C. in general and for each plants in particular.

⇒ To evaluate the SCMS model for Nefas Silk Pepsi Plant through supply chain cost analysis and Pareto analysis.

1.4 Significance of the study

The significance of this research is to explore a solution to problems related to supply chain management area in Ethiopia. It can improve efficiency and effectiveness of flow of materials and information from suppliers to customers and vice versa. It will try to address the problems associated with supply chain management for Ethiopian Soft Drinks Industries by developing suitable supply chain management model to achieve appropriate customer service in a cost effective manner. Besides, it is significant in creating awareness to Ethiopian Soft Drinks Industries such as MOHA Soft Drinks Industry Share Company and East Africa Bottling Share Company. It is also intended to fill the gap between, supplier, manufacturers, distributors and consumers or end users and developing mechanisms and handling it properly the network by applying the SCMS model.

1.5 Scope of the Study

The scope of this thesis work is to focus on the Ethiopian Soft Drinks Industries from the supply chain view, in reducing the overall cost with efficient information exchange. More emphasis will be given to the case study Model Development of Supply Chain Management System of MOHA Soft Drinks Industry Share Company.

Supply chain management in processing industry, which comes from supplier to end customers, is a complicated system, which includes tiers of suppliers and transaction of multiple semi-finished products. The level of complexity varies from organization to organization. The level of MOHA Soft Drinks Industry S.C. which owns 5 plants, 1 under construction and 1 Co-Packer or franchises (Summit Beverage) plant have more complexity than East Africa Bottling Share Company that owns two plant cited in Addis Ababa and Dire-Dawa. In this research I select MOHA for the case study and to facilitate it, the number of tier suppliers and intermediate suppliers are limited.

1.6 Limitations of the Study

The researcher faced in conducting this research was insufficient finance allocation to investigate more facts and information, and also limited availability of other sorts of resource such as computer access, printer access, and so on.

1.7 Structure (Organization) of the Thesis

This thesis contains a total of eight chapters and ten appendices. The report is structured so that the information presented to the reader is arranged in a logical sequence. It is presented in such a manner that the necessary background information is covered before going further into the next level of detail.

The contents of the chapters are as follows:

Chapter 1 – Introduction: - This chapter is to give introductory view to the reader about the thesis work, what initiated it, the problem statement, objectives, scopes, significance, limitations and how the whole thesis is organized or structured.

Chapter 2 – Research Methodologies: - will describe different aspects of the methods used and situations that the researchers must consider during each phase of the study. Different ways of carrying out a study and different ways of collecting information will be discussed. The purpose of this chapter is to make the reader understand the methodological choices made on the study.

Chapter 3 – Literature Survey: - This chapter will review in detail the literature available in the area of supply chain management system. It will cover the ideas evolving around supply system, manufacturing system, and distribution system based on the experience, research and teaching of prominent writers. Basic principles of

supply chain management, the elements, the benefit of a supply chain management system, and how to model Supply Chain Management System for Ethiopian Soft drinks Industries will be dealt thoroughly. The aim of this chapter is to give the reader fundamental background on the concept of supply chain management.

Chapter 4 – Background of Pepsi-Cola and the Case Study MOHA Soft Drinks Industry S. C.: - This chapter will give a review of company background such as, company profile, organizational structure, motto, mission, objectives, location, types of product produced, types of service provided to customers, customer supplier relationship, existing cost analysis and so on

Chapter 5 –Data Analysis and Interpretation: - This chapter will cover the finding of supply chain management elements for the model and supply chain cost analysis, and analysis and interpretation of the survey questionnaires for the case study MOHA Soft Drinks Industry S.C. The result presented here is based on 2004/2005 G.C year.

Chapter 6 –Model Development of SCMS: - This chapter will develop the Model for each plants of the Case Study MOHA Soft Drinks Industry S.C in particular and for MOHA in general. Further from this the research develop model for Ethiopian Soft Drinks Industries based on the findings presented in the previous chapter. The purpose of the chapter is to develop model of SCMS for the Ethiopian Soft Drinks Industries in general and MOHA Soft Drinks Industry S.C. plants' in particular based on the data collected.

Chapter 7 –Evaluation (Analysis) of the Model SCMS (Nefas Silk Pepsi Plant)

This chapter compares the existing cost analysis methods with that of supply chain cost analysis method by describing parameter for both methods, and then searching for improvement.

Chapter 8 – Conclusions, Recommendations, and Future Works: - This chapter will present the conclusions drawn from the study, and give some recommendations as to how the Models can be used by the MOHA Soft drinks Industry S.C. to reduce the existing costs using supply chain method in product costing. It will also include suggestions for further researches in the area, which the MOHA Soft Drinks Industry S.C. or any interested researcher can pursue.

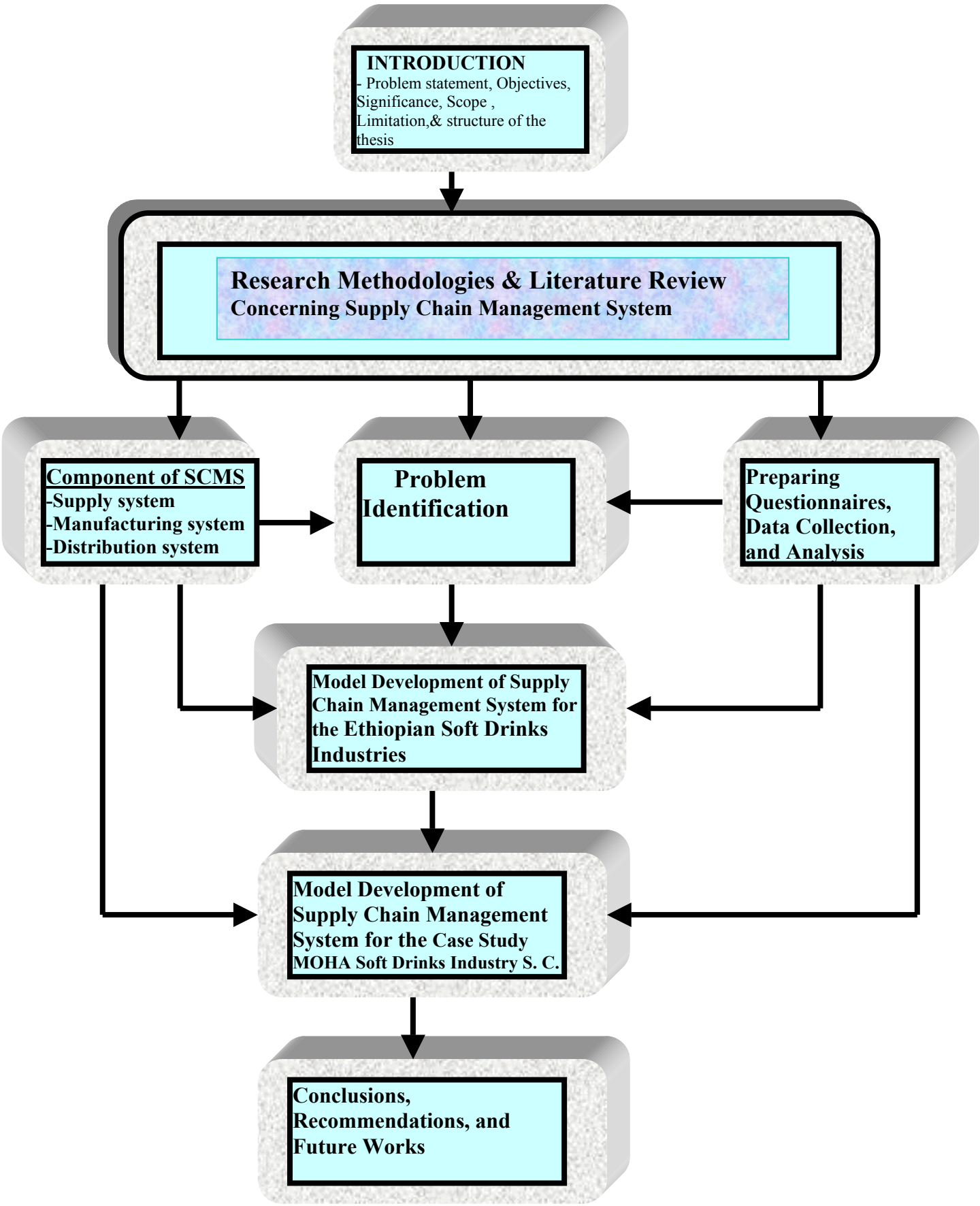


Figure 1-1: The Structure of the Thesis

CHAPTER TWO

Research Methodologies

Data are collected to develop Supply Chain Management System Model for the Ethiopian Soft drinks industries in general and for MOHA Soft Drinks Industry S. C. plants' in particular. The collected data are summarized and analyzed to reach into a meaningful conclusion and recommendation.

2.1 Research strategies (methods of data collection)

For producing empirical research, there are two methods of data collection: Qualitative and Quantitative. These two methods have their own strength and weakness. The qualitative method permits researchers to study selected issues in detail. Approaching fieldwork without being constrained by predetermined categories of analysis contributes to the depth, openness, and detail of *qualitative* inquiry. This method, however, typically produces a wealth of detailed information about a much smaller number of people and cases, which in turn increases understanding of the cases and situations studied but reduce generalization.

The *quantitative* method, on the other hand, requires the use of standardized instruments so that the varying perspective and experiences of the people can fit a limited number of predetermined response categories, to which numbers are assigned. The advantage of quantitative method is to measure the reaction of many people to a limited set of questions. Thus, it facilitates comparison and statistical aggregation of the data, which in turn gives a broad and generalized set of findings presented succinctly and parsimoniously.

In order to avoid their respective disadvantage, one important way to strengthen a research design is to use both qualitative and quantitative methods. Hence, the kinds of research strategies adopted in this study are *qualitative* and *quantitative* ones. While structured interview is designed for the *qualitative* one, questioner survey is distributed for the *quantitative*. Moreover, Literature review and practical observations are used to strengthen the research strategy technique.

2.2 Sources of Data Collection

The data of the study relies both from primary and secondary sources, believed to be the main sources of gathering information.

The primary data are collected through questionnaire and face-to-face interview. Specifically speaking, questionnaires are designed and distributed to selected staff members of MOHA Soft Drinks Industry S. C. on the basis of their educational background. Besides, structured interview is held to top management officials of each plant under MOHA Soft Drinks Industry S. C., and to selected staffs of East Africa Bottling S.C. Furthermore, consultation with supply chain management system experts and practical observation are included to crosscheck the collected data.

The secondary sources of data that the researcher used are different relevant books, Journals, Articles, senior thesis work, manuals, available documents, organizational chart, brochures, magazines (such as World Beverage International, *Tiret* and company inaguration magazines), company manuals, and electronic retrievals.

2.3 Sample Design

Reasonable sampling technique is employed in this research paper. Firstly, of the 2204 permanent employees of MOHA Soft Drinks Industry, 203 permanent employees with an educational level of college diploma and above are purposely selected. This is because of the assumption that employees with college diploma and above will understand about supply chain management easily. Of the 203, 120 employees (59%) are randomly selected and questionnaires are distributed to each plants and departments based on the size of the plant. For the big plant (Nefas Silk) with many employees having college diploma and above, more questionnaires (30) are distributed, whereas for medium and small plants, an average number of questionnaires (25, 20 and 15) are distributed. Then after, they are tabulated, analyzed and interpreted in the form of frequency and percentage to arrive at reliable conclusion.

Secondly, so as to overcome the difficulty in getting quantitative data (through questionnaire) due to fierce computation between MOHA and East Africa Bottling S.C., and at the same time to cross check the different responses of the circulated

questionnaires for the case study of MOHA Soft Drinks Industry S. C. Plants, Structure interview is conduct to two Ethiopian Soft Drink Industries: MOHA Soft Drinks Industry S. C. and East Africa Bottling S. C. MOHA Soft Drinks Industry S. C. has five plants, namely: Nefas Silk, Teklehaimant, Dessie, Gondar, and Bure Pepsi plant. Through the franchise (Co-packer) agreement it has also Summit Beverage plants. Structured interview is conducted to top management official of each plant. This interview is also held to selected staffs of East Africa Bottling S. C., which, on the other hand has two Coca-Cola plants found in Addis Ababa city and Dire-Dawa town.

It is, therefore, believed that the sample size leads to a reliable and better conclusion due to the selected personnel educational level, to whom introducing supply chain management concept is easy, and the reasonable nature of questionnaire distribution system according to the size of the plant.

Both, the circulated questionnaires and structure interview are depicted in appendix 9 and 10 respectively.

2.4 Questionnaire Survey

The purpose of the interviewed and circulated questionnaire is two fold:

- First, the questionnaire result is used as one input data for modeling supply chain management.
- The second is that questionnaire is a way of creating awareness in supply chain management. The result of the circulated questionnaire gives some insight into the climate of the MOHA Soft Drinks Industry Share Company. Furthermore, it can be used to assess the level of awareness on SCM.

The questionnaire consists of 49 questions. It was distributed to 120 MOHA Soft Drinks Industry S.C. staffs', who are representative employees of each plant as shown in table 1-1 below. Out of the 120 questionnaires, 94 were filled and returned. This means a 78.3% respondent rate.

Table 2-1: Summary of data distributed & returned

Data Collection			
Name of Plant	Number of Questionnaires Circulated	Number of Questionnaires returned	Respondent rate
Nefas Silk Pepsi Plant	30	25	25/30 = 83.3%
Teklehaimanot Pepsi Plant	25	21	21/25= 84%
Summit PLC	20	16	16/20= 80%
Bure Kool Water Plant	15	11	11/15= 73.3%
Gondar Pepsi Plant	15	12	12/15= 80%
Dessie Pepsi Plant	15	9	9/15= 60%
Total	120	94	94/120= 78.3%

Nature of the Circulated Questionnaires

The questionnaire has four sections whose main targets are described below.

Section One: Question 1-15 is mainly concerned with finding out the general attitude and awareness of the employees towards supply chain management system and the company's background such as, company profile, organizational structure, motto, mission, objectives, location, customer supplier relationship, and existing cost analysis.

Section Two: Question 16-30 is mainly concerned with assessing the *supply system*. The supply system consists of the types of indirect, direct and packing raw materials used, types of store, and criterion of supplier selection, source, types, names of suppliers and major foreign and local suppliers, factors for proper decision of inbound logistics and transportation cost of raw materials in one quintal (100 kg).

Section Three: Question 31-34 is mainly concerned with the *manufacturing system* like major process, types of products produced, production flow chart, production capacity, annual consumption of materials, and product costing parameters.

Section Four: Question 35-49 is mainly concerned with distribution system, such as Customer survey mechanism, types of service provided to customers, types and numbers of distribution channels, transportation product cost of one pallet or crate, major areas or cities of product distribution, percentage of product distribution, internal market share, and factors for proper decision of out-bound-logistics.

CHAPTER THREE

Literature Review

The term Supply Chain Management (SCM) confuses some people. Does it refer to a managerial process? Is it concerned with material management or purchasing? Is it just another name for integrated logistics? Just what is supply chain management? The definition may vary, but According to Stephen Lemay, David J.Bloomberg, and Joe B. Hanna, SCM is: “The process of planning, organizing, and controlling the flow of materials and services from suppliers to end users/customers. This integrated approach incorporates suppliers, supply management, integrated logistics, and operation (manufacturing system). [23]

When you manage a supply chain, you coordinate supply management, operations, and integrated logistics into a seamless pipeline to maintain a continual flow of products or services to include all firms involved, from the raw materials source to the final customers. [23]

3.1 Fundamentals of Supply Chain Management System

3.1.1 Principles of Supply Chain Management

To balance customers' demands with the need for profitable growth, many companies have moved aggressively to improve supply chain management. Their efforts reflect seven principles of supply chain management that working together can enhance revenue, cost control, and asset utilization as well as customer satisfaction. Successful implementation of these principles enhances creation of delighted customers and improved profit margins for the organization. The seven principles of supply chain managements are: [4, 29]

A. Customer segmentation
B. Customizing logistics networks
C. Demand planning
D. Product differentiation
E. Sourcing suppliers strategically
F. Integration of technology
G. Performance measures

Good managers recognize two important things. First, they think about the supply chain as a whole all the links involved in managing the flow of products, services, and information from their suppliers to their customers. Second, they pursue tangible outcomes-focused on revenue growth, asset utilization, and cost reduction.

Rejecting the traditional view of a company and its component parts as distinct functional entities, these managers realize that the real measure of success is how well activities coordinate across the supply chain to create value for customers, while increasing the profitability of every link in the chain.

Adherence to the seven principles transforms the tug of war between customer service and profitable growth into a balancing act. By determining what customers want and how to coordinate efforts across the supply chain to meet those requirements faster, cheaper, and better, companies enhance both customer satisfaction and their own financial performance. But the balance is not easy to strike or to sustain.

A. Customers Segmentation

Segmentation has traditionally grouped customers by industry, product, or trade channel and then taken a one-size-fits-all approach to serving them. Segmenting customers by their particular needs equips a company to develop a portfolio of services tailored to various segments. Surveys, interviews, and industry research have been the traditional tools for defining key segmentation criteria.

B. Customize the Logistics Network

Companies have traditionally taken a monolithic approach to logistics network design in organizing their inventory, warehouse, and transportation activities to meet a single standard. For some, the logistics network has been designed to meet the average service requirements of all customers; for others, to satisfy the toughest requirements of a single customer segment.

C. Demand Planning According to Market Signal

Forecasting has historically proceeded silo by silo, with multiple departments independently creating forecasts for the same products-all using their own assumptions, measures, and level of detail. Many consult the marketplace only informally, and few

involve their major suppliers in the process. Such independent, self-centered forecasting is incompatible with excellent supply chain management.

Uneven distributor demand unsynchronized with actual end-user demand made real inventory needs impossible to predict and force high inventory levels that still failed to prevent out-of-stocks.

Distributors should share information on actual (and fairly stable) end-user demand with the manufacturer, and the manufacturer will begin managing inventory for the distributors. This coordination of manufacturing scheduling and inventory deployment decisions paid off handsomely, improving fill rates, asset turns, and cost metrics for all concerned.

D. Differentiate Product Closer to the Customer

Manufacturers have traditionally based production goals on projections of the demand for finished goods and have stockpiled inventory to offset forecasting errors. These manufacturers tend to view lead times in the system as fixed, with only a finite window of time in which to convert materials into products that meet customer requirements.

E. Sourcing of Supplier Strategically

Determined to pay as low a price as possible for materials, manufacturers have not traditionally cultivated warm relationships with suppliers. Excellent supply chain management requires a more enlightened mindset. While manufacturers should place high demands on suppliers, they should also realize that partners must share the goal of reducing costs across the supply chain in order to lower prices in the marketplace and enhance margins. The logical extension of this thinking is gain-sharing arrangements to reward everyone who contributes to the greater profitability.

F. Develop a Supply Chain -wide Technology Strategy

To sustain reengineered business processes, many progressive companies have been replacing inflexible, poorly integrated systems with enterprise-wide systems.

Organizations need to build an information technology system that integrates capabilities of three essential kinds. For the short term, the system must be able to handle day-to-day transactions and electronic commerce across the supply chain and

thus help align supply and demand by sharing information on orders and daily scheduling. From a mid-term perspective, the system must facilitate planning and decision-making, supporting the demand and shipment planning and master production scheduling needed to allocate resources efficiently. To add long-term value, the system must enable strategic analysis by providing tools, such as an integrated network model, that synthesize data for use in high-level "what-if" scenario planning to help managers evaluate plants, distribution centers, suppliers, and third-party service alternatives.

G. Performance Measures

To answer the question, "How are we doing?" most companies look inward and apply any number of functionally oriented measures. But excellent supply chain managers take a broader view, adopting measures that apply to every link in the supply chain and include both service and financial metrics. First, they measure service in terms of the perfect order - the order that arrives when promised, complete, priced and billed correctly, and undamaged. Second, excellent supply chain managers determine their true profitability of service by identifying the actual costs and revenues of the activities required to serve an account, especially a key account. For many, this amounts to a revelation, since traditional cost measures rely on corporate accounting systems that allocate overhead evenly across accounts. Such measures do not differentiate, for example, an account that requires a multi-functional account team, small daily shipments, or special packaging. Traditional accounting tends to mask the real costs of the supply chain-focusing on cost type rather than the cost of activities and ignoring the degree of control anyone has (or lacks) over the cost drivers. [4, 29]

3.1.2 Supply Chain Strategies

Supply chain strategies can a major impact on creating value for a company and its supply chain partners. An effective supply chain strategy may be formulated based on collaborative strategy, demand flow strategy, and customer service level strategy integrated with technology to generate highest level of customer satisfaction [22,29].

i) Collaborative Strategy

Collaboration enables partners to jointly gain a better understanding of future product demand and implement more realistic program to satisfy that demand. Collaboration

can be manufacturer with suppliers, manufacturer with customers or close collaboration of suppliers. Manufacturers can help both parties to enhance the value of the combined activities of the network. Manufacturer could derive benefits in such key activities as product development, order fulfillment and capacity planning by close collaboration with suppliers. Collaborative product development enabled by sharing and modifying design documents can help manufacturers to develop products in better manner and with short period of time. Furthermore collaborative production scheduling with tier suppliers can eliminate the absence of raw materials and hence results in improved order fulfillment and increased capacity utilization of the manufacturers.

The collaborative opportunities between manufacturers and customers such as wholesale distributors and retailers center on demand planning and inventory replenishment.

The development of demand planning at the point of consumption by mutually agreed replenishment plan ensures to meet requirement effectively. In order to collaborate on demand planning successfully, business partners need to share and modify demand plans and forecast among each other.

Collaboration between companies and third party logistics providers may focus on jointly planning logistics activities. Collaboration with logistics provider improves transportation and enhances equipment utilization by enabling the consolidation of inbound, inter-facility, and outbound shipments among business partners.

ii) Demand Flow Strategy

Traditionally in supply chain management, the key focus and scope have been in managing the flows of materials and goods from suppliers through the manufacturing and distribution chain to the customers. The key in demand management is the continuous flow of demand information from customer and end users through distribution and manufacturing to suppliers.

iii) Customer Service Strategy

Customer satisfaction level is directly proportional to service provided by the company. The customer service can be seen as a continuum between dissatisfied and delighted

customer. The convergence being created by the information network has commoditized the product offering of the company, as a result of which customers are increasingly inclined to demand higher standards of performance. They want organizations to add value to their time and trouble. Formulating a customer service strategy involves addressing the problem of customer segmentation, cost-to-serve, and revenue management.

iv) Information Technology Strategy

Developments in information technology (IT) have enabled the integration of business information system, both horizontally and vertically. A number of IT- based supply chain information management tools are now available to provide intelligent decision support and execution management. [22]

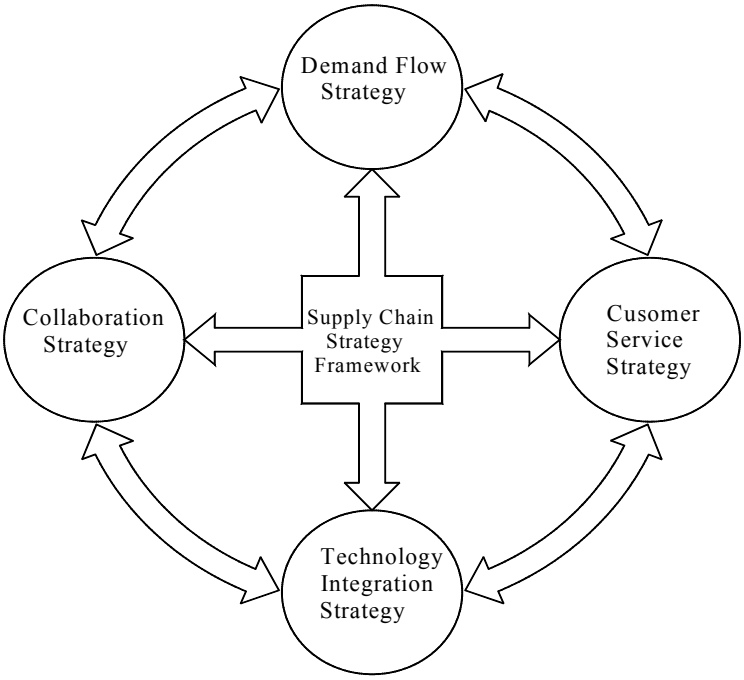


Figure 2-1: Supply Chain Strategy Framework

3.1.3 Material Flow System

Materials, in the process of passing through materials flow system are either in transit through various transportation modes, or are waiting in areas, which may be called stores. Even processing at production work centers is akin to storage for a period of processing. Therefore the materials within a material flow system is in either transit or storage mode. [22]

3.1.4 Supply System

Supply system (SS) is used for collection of materials from the vendors and for bundling them into finished products. Each material or stock number required by the subject firm has a unique set of nodes and flow paths associated with it. However, if the material is sourced from several different vendors or utilizes different nodes and flow paths, several different unique sets of nodes and flow paths will emerge. For instance, if a material is sourced form vendor A and transported by air-fright to incoming stores, and the same materials sourced from vendor B and transported by trucks to incoming stores, then it can be consider and treat as two different sets of unique nodes and flow paths.

A unique set of material; nodes and flow paths are defined as a supply chain. For the same material, alternative supply chains may exist, leading to opportunities for cost reduction through selection of optimal supply chains for each material. [14, 21]

A. Supplier Selection and Certification

Purchasing is the eyes and ears of the organization in the supplier market place, continuously seeking better buys and new materials from suppliers. Consequently, purchasing is in a good position to select suppliers for the supply chain and to conduct certification programs.

Supplier selection. To make supplier selection decisions and to review the performance of current suppliers, management must review the market segments it wants to serve and relate their needs to the supply chain. Competitive priorities are a starting point in developing a list of performance criteria to be used. Three criteria most often considered by firms selecting new suppliers are price, quality, and delivery. Because firms spend a large percentage of their total income on purchased items, finding suppliers that charge low prices is a key objective. However, the quality of a supplier's materials is also important. The hidden costs of poor quality can be high, particularly if defects are not detected until after considerable value has been added by subsequent operations. For a retailer, poor merchandise quality can mean loss of customer goodwill and future sales. In addition to this, shorter lead times and on-time delivery help the buying firm maintain acceptable customer service with less inventory. The benefits to fast, on time delivers also apply to the manufacturing sector. Many manufacturers demand quick,

dependable deliveries from their suppliers to minimize inventory levels. This constraint forces suppliers to have nearby plants of warehouses.

A fourth criterion is becoming very important in the selection of suppliers-environmental impact. Many firms are engaging in *green purchasing*, which involves identifying, assessing, and managing the flow of environmental waste and finding ways to reduce it and minimize its impact on the environment. Suppliers are being asked to be environmentally conscious when designing and manufacturing their products, and claims such as biodegradable, natural, and recycled must be substantiated when bidding on a contract.

Supplier certification. Supplier Certification program verify that potential suppliers have the capability to provide the materials of services the buying firm requires. Certification typically involves site visits by a cross-functional team from the buying firm which does an in-depth evaluation of the supplier's capability to meet cost, quality, delivery, and flexibility targets from process and information system perspectives. The team may consist of members from operations, purchasing, engineering, information systems, and accounting.

B. Suppliers Relations

The nature of relations maintained with suppliers can affect the quality, timeliness, and price of a firm's products and services. [14]

Competitive orientation. The competitive orientation to supplier relations views negotiations between buyer and seller as a zero-sum game: Whatever one side loses, the other side gains. Short-term advantages are prized over long-term commitments.

Cooperative orientation. With the cooperative orientation to supplier relations, the buyer and seller are partners, each helping the other as much as possible. A Cooperative orientation means long-term commitment, joint work on quality, and support by the buyer of the supplier's managerial, technological, and capacity development.

Both the competitive and cooperative orientations have their advantages and dis advantages. The key is to use the approach that serves the firms' competitive priorities best. Some companies utilize a mixed strategy. A company can pursue a competitive orientation by seeking price reductions from its suppliers of common supplies and infrequently purchased items on an electronic marketplace, and use a cooperative

orientation with suppliers of higher volume, more continually used materials and services and negotiating long term contracts with them.

C. Outsourcing

A special case of the cooperative orientation is outsourcing. The decision to outsource an activity, sometimes referred to as the make-or buy decision, has implications for supply chain management because it affects the number of activities under the direct control of the firm in its internal supply chain. This decision is not trivial because a firm must first have a clear understanding of its core competencies and retain them. Outsourcing has direct relevance for supply chain management because of its implications for control and flexibility. [14]

Degree of sourcing control. Sourcing control amounts to choosing the appropriate contract relationship with the supplier. This relationships range from full ownership and strategic alliances and long term contracts, which provide high degrees of control, to short-term contracts, which provide low degrees of control.

Flexibility to change the supply chain. A firm has a more flexible arrangement with a supplier if it has a short-term agreement with it. The firm can choose to renegotiate the terms of the contract or change suppliers frequently. Supply chain managers must balance the advantages of high degrees of control with those of flexibility to change. Long-term arrangements should be used only when the firm is confident that the supplier will fit into its long-term strategic plans.

D. Centralized versus localized buying

When an organization has several facilities (e.g., stores, hospitals, or plants), management must decide whether to buy locally or centrally. This decision has implications for the control of supply chain flows. [14]

Centralized buying has the advantages of increasing purchasing clout. Saving can be significant, often on the order of 10 percent or more. Increased buying power can mean getting better service, ensuring long term supply availability, or developing new suppliers capability. Companies with oversea suppliers favor centralization because of the specialized skills (e.g., understanding of foreign languages and culture) needed to be from foreign sources. Buyers also need to understand international commercial and contract law regarding the transfer of goods and services. Another trend that favors

centralization is the growth of computer based information systems and the Internet. However the biggest disadvantage of centralized buying is the loss of control at the local level. When plants or divisions are evaluated as profit or cost centers, centralized buying is undesirable for items unique to a particular facility. This item should be purchased locally whenever possible. Besides, centralized purchasing often means longer lead-time and another level in the firm's hierarchy. Perhaps the best solution is a compromise strategy, whereby both local autonomy and centralized buying are possible.

3.1.5 Manufacturing System

Manufacturing system (Operations) matches production capacity and output to customer demand. This may appear simple: a customer wants 24 soft drinks, so the factory produced 24 soft drinks. Some factors work this way, but many cannot. This simplicity vanishes when quantities increase, demand patterns vary by cycle and by season, and production capacity varies as well. Most production facilities must deal with simultaneous demand from many customers: let 100 customers each want one crate or 24 bottles at same time. Not only that, but each wants different brands of soft drinks and packaged differently. At times demand exceeds capacity, creating a backlog. At other times, capacity is underused, creating costs without creating revenues. Once variation is introduced, the problem of matching out put demand becomes complex. [23]

Operation techniques focus on manufacturing, but often apply equally well to services. Three factors greatly influence the performance of an operating system: throughput, work in process, and queue length. [23]

3.1.6 Distribution System

Distribution system (DS) refers to the movement of finished goods outward from the central finished goods store to the customer, frequently via intermediaries. It subsumes the delivery of finished products to customers through the distribution networks. The activities within the distribution system include warehousing, transportation (often undertaken by third-party logistic providers), customer service and administration. A product may pass through a number of intermediate warehouses before reaching at customer or can also be sold directly to the customer from the central finished goods store. Therefore, a product can follow different distribution system in order to arrive at

customer hand. Figure 2.5 depicts a typical distribution system for a product passing through a number of intermediaries. [22]

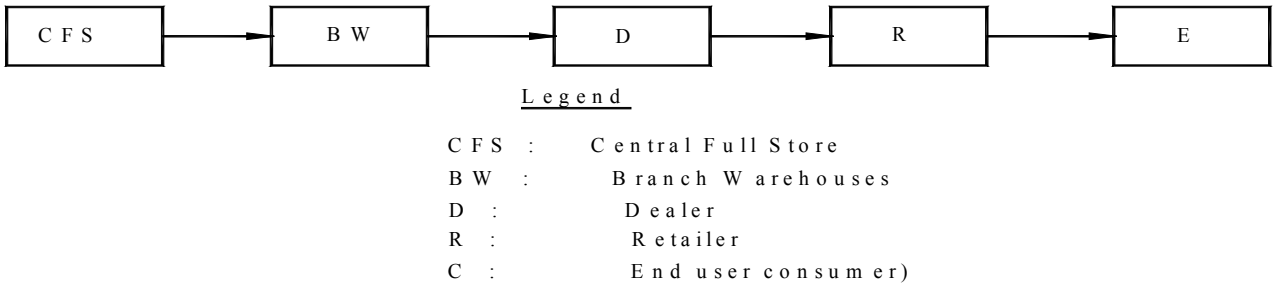


Figure 2-2: Typical Distribution System for Manufacturing Firm

3.1.7 Products Response Logistics Activities

Product response logistic has three primary activities: managing cycle (waiting) time, managing product capacity, and providing product delivery. Managing waiting time refers to methods used to reduce the time customers must wait to consume the products i.e. to reduce order cycle time in the flow of goods. Product capacity is defined as the managing, scheduling, and staffing of people and products so that the product response logistics network can meet customer demands. Product delivery is the ability to manage distribution channels to ensure the timely delivery of products (soft drinks) to the customers and activities refers to choosing the distribution channel to deliver the products to the customers. [23]

3.1.8 Intermediaries in Product Response Logistics

Intermediaries for Product response logistic providers includes agents, retailers, wholesalers, franchise, and electronic channels.

I. Agents

Agents act on behalf of principles and have authority to create a legally binding relationship between customers and PRL principals. Sales agent for product and Travel agent for service are a typical example.

II. Retailers

A second category of Product intermediary is the retailer. Retailers can be defined as intermediaries who sell products directly to the consumer.

III. Wholesalers

Product wholesalers buy Soft drinks products from product providers (MOHA and East Africa Bottling) and then resell these products to retailers.

IV. Franchises

A franchise is a contractual relationship between two parties, or plants in which the franchisor offers to maintain a continuing interest in the business of the franchisee. The franchise operates under a common trade name, format, or procedure owned by or controlled by the franchisor. The franchisee has made or will make a substantial investment in this business and has a vested interest in its success.

V. Electronic Channels.

This is a new and unique form of intermediary in that it does not require direct human involvement! It may be defined as a machine communicating with another machine in a standard format. [23]

3.1.9 Integrated Supply Chains

A basic purpose of supply chain management is to control inventory by managing the flows of materials. Inventory is a stock of materials used to satisfy customer demand or support the production of goods or services. Figure 2.2 shows how inventories are created through the analogy of a water tank. The flow of water into tanks raises the water level. The inward flow of water represents input materials such as steel, component parts, office supplies, or finished Products. The water level represents the amount of inventory held at a plant, service facility, warehouse, or retail outlet. The flow of water from the tank lowers the water level in the tank. The outward flow of water represents the demand for materials in inventory such as customer orders suppliers or requirements for suppliers. Another possible outward flow is that of scrap, which also lowers the level of usable inventory.[14]

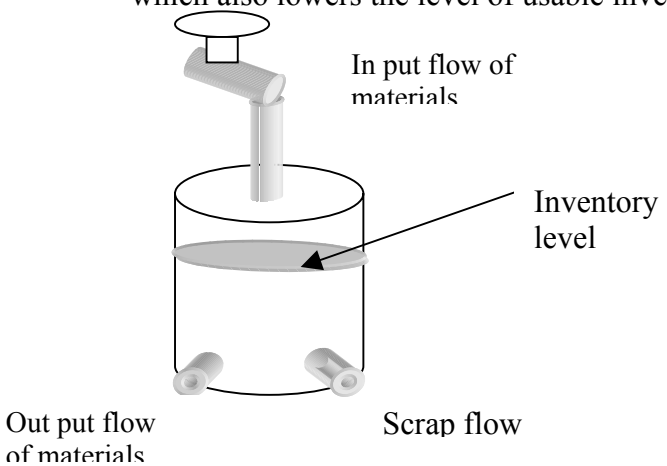


Figure 2-3: Creation of Inventory

Inventory exists in three aggregate categories, which are useful for accounting purposes. Raw materials are inventories needed for the production of goods. Work in process consists of items such as components or assemblies needed for a final product in manufacturing. Finished goods in manufacturing plants, warehouses, and retail outlets are items sold to the firm's customers.

Supply chain is the interconnected set of linkages between suppliers of materials and services that spans the transformation of raw materials into products and services and delivers them to a firm's customers.

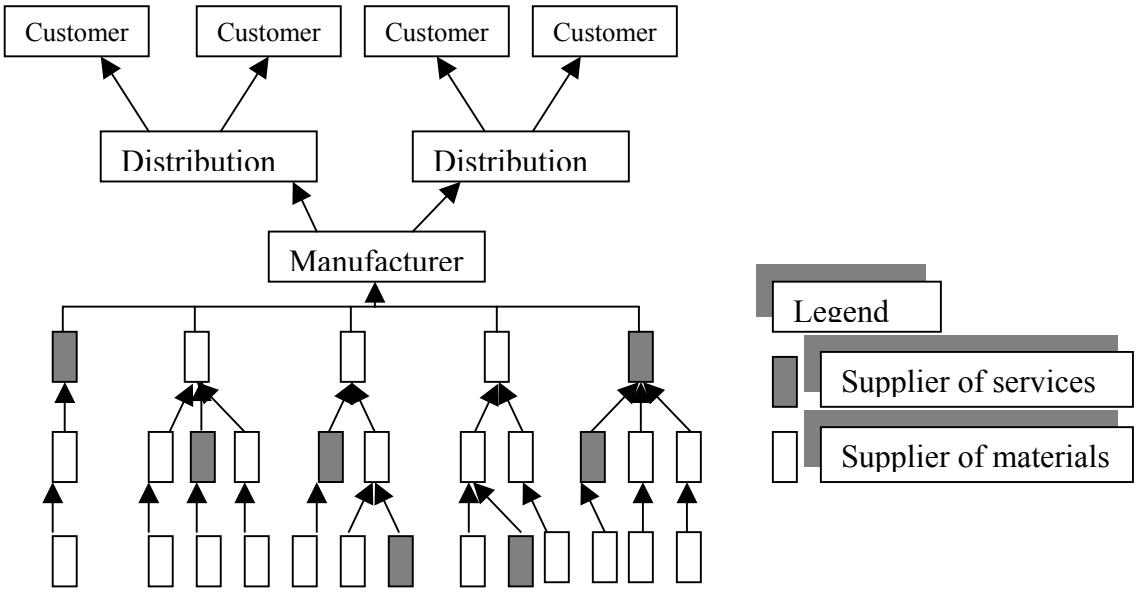


Figure 2-4: Supply chain for a manufacturing firm

The supply chain for a firm can be very complicated, as figure 2-3 however, the supply chain depicted is an oversimplification because many companies have hundreds, if not thousands, of suppliers. In this case, the firm owns its own distribution and transportation services. However, companies that engineer products to customer specifications normally do not have distribution centers as part of their supply chains. Such companies often ship products directly to their customers. Suppliers are often identified by their position in the supply chain. Here, tier 1 suppliers provide materials or services that are used directly by the firm, tier 2 suppliers supply tier 1 suppliers, and so on.

The value of supply chain management becomes apparent when the complexity of the supply chain is recognized. As above figure 2-2, the flow of materials determines inventory levels. The performance of numerous suppliers determines the inward flow of materials. The performance of the firm's marketing, production, and distribution processes determines the outward flow of products.

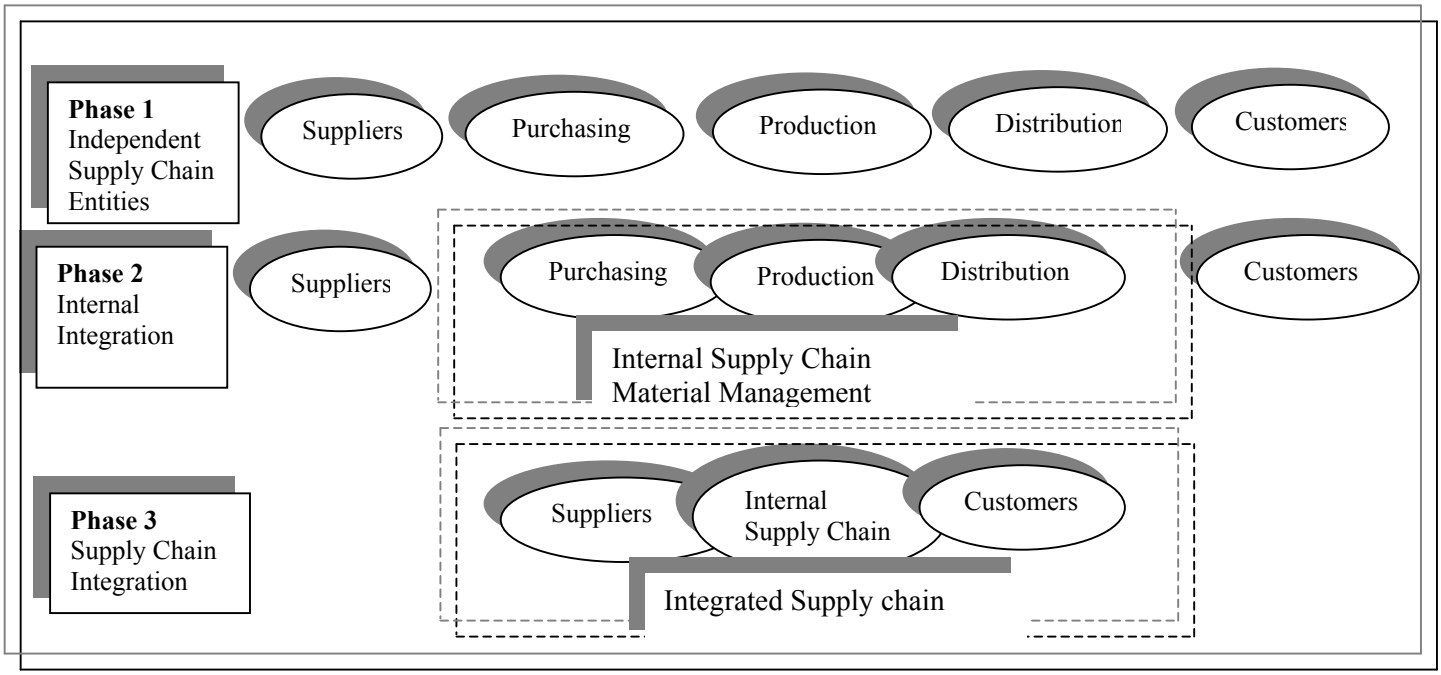


Figure 2.5: Developing an Integrated Supply Chain

Successful supply chain management requires a high degree of functional and organizational integration. Such integration does not happen overnight. Traditionally, organizations have divided the responsibility for managing the flow of materials and services among three departments: Purchasing, production, and distribution. Purchasing is the management of the acquisition process, which includes deciding which suppliers to use, negotiating contracts, and deciding whether to buy locally. Purchasing is usually responsible for working with suppliers to ensure the desired flow of materials and services for both short term and long terms. Purchasing may also responsible for the levels of raw materials and maintenance and repair inventories. Production is the management of the transformation processes devoted to producing the product or service. It is responsible for determining production quantities and scheduling the machines and employees directly responsible for the production of the good or service. Distribution is the management of the flow of materials from manufacturers to customers and from warehouses to retailers, involving the storage and transportation of products. It may also be responsible for finished goods inventories and the selection of transportation service providers. Typically, firms willing to undergo the rigors of developing integrated supply chains progress through a series of phases, as figure 2.4 shows. In phase 1, a starting point for most firms, external suppliers and customers are considered to be independent of the firm. Relations with these entities are formal, and

there is little sharing of operating information and costs. Internally, purchasing, production, and distributions act independently, each optimizing its own activities without considering the other entities. Each internal and external entity in the supply chain controls its own inventories and often utilizes control systems. Because of organizational and functional boundaries, large amounts of inventory exist in the supply chain and the overall flow of materials and services is ineffective. [14]

In phase 2, the firm initiates internal integration by creating a materials management department. Materials management is concerned with decisions about purchasing materials and services, inventories, production levels, staffing patterns, schedules, and distribution. Figure 2-4 shows the scope of materials management and typical domains of responsibility for purchasing, production, and distributions of a manufacturer. The flow of materials begins with the purchase of raw materials and services from outside suppliers. Raw materials are stored and then converted into finished products. The finished goods are stored and then shipped by means of transportation service suppliers to large supermarket chains, which have their own distribution centers. This cycle repeats over and over, as the firm responds to customer demand.

The focus is on the integration of those aspects of supply chain directly under the firm's control to create an internal supply chain. Firms in this phase utilize a seamless information and materials control system from distribution to purchasing, integrating marketing, finance, accounting, and operations. Efficiency and electronic linkages to customers and suppliers are emphasized.

Internal integration must precede phase 3, supply chain integration. The internal supply chain is extended to embrace suppliers and customers, thereby linking it to the external supply chain, which is not under the direct control of the firm. The firm must change its focus from a product or service orientation to a customer orientation. This new focus means that the firm must identify the appropriate competitive priorities for each of its market segments. For its industrial customers, the firm must develop a better understanding of their products, culture, markets, and organization. Rather than merely react customer demand, the firm strives to work with its customers so that both benefit from improved flows of materials and services. [14]

3.2 State-of- the-Art of Supply Chain Management System in Ethiopian Soft Drinks Industries

3.2.1 Background

The concept of supply chain management has its roots in the 1960s concept of logistics management – a planning tool that seeks to develop a system–wide, integrated view of the firm. Subsequently, supply chain management extends the concept of logistics management to external integration of the firm. It is conceived as "a series of linked suppliers and customers" [22].

A supply chain is a system through which organizations deliver their products and services to their customers.

It comprises an interlinked network of supplies, manufacturers, distributors and customers whereby material flows from the supplier through manufactures and distributors to the customers. Supply chain management is the systematic effort to provide intergraded management to the supply chain in order to meet customers' need and expectations. There are various definition of SCM, the followings are some of the definitions taken from different scholars [27, 40].

- "A supply chain is the alignment of firms that bring products or services to market." (Lambert, Stock, and Ellram).
- "A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers."(Ganeshan and Harrison)

The importance of supply chain is well recognized. Supply chain issues in developed countries are estimated to consume 10 percent of their Gross National Product. It is projected to be a greater proportion in the developing country like Ethiopia, where a large amount of capital is tied up in inventories and in transportation systems for moving materials.

Businesses in the world are struggling to sustain in a competitive global economy. At present, they are in the midst of a revolutionary transformation- shifting from industrial

age to information age. During the industrial age, companies succeeded by how well they could capture the benefits from economies of scale and scope. Technology was important, but ultimately success accrued to companies that could embed the new technology into physical assets that offered efficient mass production of standard products.

The emergency of the information era, which started in the last decades of the twentieth century, made obsolete many of the fundamental assumptions of industrial age competition. The information age environment requires new capabilities in organizations for competitive success. The ability of a company to mobilize and exploit its intangible assets has become far more decisive than investing and managing physical, tangible assets. Intangible assets enable an organization to develop customer relationships and loyalty. [22]

3.2.2 Supply Chain – a Paradigm Shift

The role of supply chain has changed considerably over the last three decades. In the 70s it primarily focused on the integration of warehousing and transportation within the firm. Later in 1980s the focus of supply chain management shifted to re-engineering of cost structures. At the end of 1980s its focus shifted from reducing costs to improving customer service. The benefits of improving the performance of the supply chain included revenue growth and higher profitability through greater market share and price premiums. [22]

Traditionally, the focus of companies has been on the flows within the organization or flow over which the organization has direct control. But successful supply chain management requires the recognition that the firm is simply one player in the long chain that starts with suppliers and includes transporters, distributors, and customers. Close relationships between suppliers, manufactures, transporters and customers are going to be the key to success in the times to come.

Supply chain network can be a complex web of systems, sub-systems, operations, activities, and their relationships to one another belonging to its various members such as suppliers, carriers, manufacturing plants, distribution centers, retailers and customers.

Raw material can be passed through a number of intermediate tiers of suppliers before arriving at the manufacturing system. Suppliers that directly supply raw materials to the manufacturing system are supplier tier 1. A supplier tier 2 is a supplier that supplies materials to the tier 1 suppliers. A manufacturing system can have number of tiers of suppliers.

3.2.3 Success Stories in Applying Supply Chain Management

I. Success in Dell Computer Corporation

The Dell Computer Corporation (www.dell.com), a mass customizer of personal computers, is experiencing phenomenal growth and profitability in an industry that traditionally has low profit margins. In 1996, Dell was selling laptops, desktops, and servers at the rate of one million dollar a day. Today, Dell's Web site sells more than thirty million products in a day. This success has catapulted Dell into the number 1 position among PC makers, ahead of Compaq, Apple Computer, and IBM. What is Dell's secret? In a single word- speed. A customer's order for a customized computer can be on a delivery truck in 36 hours. This capability allows Dell to keep parts, costs and inventories low- 16 days of sales- thereby enabling it to sell at prices 10 to 15 percent below those of competitors. [14]

A primary factor in filling customers' orders is Dell's manufacturing operations and the performance of its suppliers. Dell's focus is on how fast the inventory moves, not on how much is there. Such careful management of the materials and services from the suppliers through production to customers lets Dell operate more efficiently than any other computer company.

Supply chain management seeks to synchronize a firm's processes and those of its suppliers to match the flow of materials, services, and information with customer demand. Supply chain management has strategic implications because the supply system can be used to achieve important competitive priorities, as with Dell Computer Corporation. [14]

II. Success in DHL

DHL Exel Supply Chain is an innovative company and a reliable partner. Their customers put their trust in them because their logistics solutions offer them consistent

added value. Outsourcing projects are their particular strength. Their competence and global presence make them the leading supply chain partner. [50]

DHL add values through a strong supply chain partner, performance, focus and IT.

A. Added value through a strong supply chain partner

Logistical challenges: Competition in local and international markets is becoming ever fiercer. It is forcing companies in almost all sectors to refocus on their core competences. Supply chains have to be optimized and adapted flexibly to changes in the market, fluctuations in demand and changing customer behavior. Strategic alliances with logistics partners create the necessary basis for long-term success.

Success through a high-performance partnership: More and more companies are outsourcing their logistics processes. This enables them to reduce their fixed costs, make expenditure more transparent and increase the quality of their product range and customer satisfaction. They gain time and resources to further expand their business. As one of the leading supply chain partners on the market DHL Exel Supply Chain has many years of logistical competence, a thorough knowledge of the market and global presence. Their customers have a direct link to the global DHL network via DHL Exel Supply Chain.

B. Added value through performance

DHL logistics services are a component part of integrated supply chain solutions along the entire supply chain, multi-user solutions or individual customer solutions. The experience, commitment and performance of all staff ensure that they attain their common goals. A comprehensive range of value-added services secures competitive advantages for their customers.

C. Added value through focus

DHL create synergies for their customers through a consistent sector focus. In this way they can use resources jointly and benefit from each others innovative solutions. DHL Exel Supply Chain is today the logistics partner of the most successful companies worldwide - by focusing on the following key sectors: Automotive, Industrial, Technology, Consumer, Retail, Fashion and Life Sciences and Healthcare.

D. High-performance information systems for efficient logistics management

DHL IT networks for customized supply chain management guarantees the thorough processing of data in a range of processes and is an important factor in their success. They use SAP R/3 among other programs for interface optimization. Logistics services are only optimal when they work globally and comprehensively. Therefore, DHL Exel Supply Chain makes extensive use of the World Wide Web. They are an innovative leader in the use of RFID and their "TAG Fit" service can provide you with the fitting of RFID transponders to goods on an order-specific basis. [50]

III. Success in TNT

A leading provider of supply chain management and distribution support solutions to companies in the automotive, retail, electronics, utilities, telecommunications, consumer goods, heavy machinery, and rail industries TNT Logistics streamlines supply chain with real-time integration TNT Logistics, North America Inc., provides logistics support for some of the most demanding manufacturers in the Fortune 500. From its operations center in Jacksonville, Florida, TNT Logistics provides both real-time inbound supply chain support and outbound distribution support for a wide range of companies, including DaimlerChrysler, Ford, General Motors, Goodyear, Hewlett-Packard, Home Depot, John Deere & Company, and Union Pacific. TNT Logistics' range of services includes transportation, warehousing, subassembly, and inventory control—virtually all aspects of supply chain management. [51]

Transportation/Logistics Tibcosoftware –Success Stories:

- New system replaces proprietary supply chain management system
- Platform seamlessly integrates proprietary systems based on disparate operating systems
- Web-based portal allows customers and partners secure, personalized, "anywhere, anytime" access to supply chain
- Solution encompasses messaging, enterprise application integration (EAI), process automation, partner management, and portals from a single vendor Benefits
- Real-time demand chain handles more customers more rapidly
- Solution preserves previous IT investments
- Messaging solution improves scalability and reduces server bottlenecks
- Open architecture offers portability to multiple platforms
- Portal access gives customers & partners improved visibility into the supply chain

3.2.4 The Difference among a Supply Chain, a Value Chain and JIT

"Value" is defined as "any activity that increases the market form or function of the product or service." And in today's business climate, you need to maximize the value of every process in your business.[49]

The Supply Chain focuses on the activities involved with acquiring raw materials and sub assemblies, then getting them through your manufacturing process smoothly and economically. Value Chain Management looks at every step, from raw materials (including those your suppliers' suppliers use) to your customers and the eventual end user, right down to disposing of the packaging. The goal is to deliver maximum value to the end user for the least possible total cost. And it involves you, your suppliers and your suppliers' suppliers.

So how do you turn your Supply Chain into a Value Chain? By applying Lean Manufacturing Principles. It's simple in principle, straight-forward in execution, glorious in results. By adding value and cutting waste (the foundations of Lean Manufacturing) at any and every point in the Supply Chain, you create greater value in your end result, making it more valuable to your customers and/or end users. And Value Chain Management is much more than just optimizing each step in the supply chain.

JIT (Just In Time) – JIT production is management practice where the exact quantities of a product are produced or delivered just when needed whereas SCM is the Coordination of Production Planning, Sourcing and Logistics. Linking seemingly disparate business functions like demand planning, sourcing and logistics can often yield very positive results by reducing costs and improving performance in supply chain operations.

In short, the main emphasis in JIT system is the goal of zero inventories, where as Supply chain management emphasis on the integration of suppliers, manufacturers and customers. [49]

3.2.5. Top Ten Soft Drinks Companies and Brand of Market Share for 2005

As shown below on table 2-1, among top-three companies, only *Cadbury Schweppes* posted volume growth (+0.6%). Coke was down slightly (-0.1%), and Pepsi-cola was down –1.2 %. [45]

Table 3-1:Top Ten Soft Drinks Companies of Market Share for 2005

2005 Rank	Companies	2005 market share	2004 market share	Share change	2005 Cases (millions)	2004 Cases (millions)	Volume % change
1	Coca-Cola Co.	43.1	43.1	Flat	4408.4	4414.8	-0.1%
2	Pepsi-Cola Co.	31.4	31.7	-0.3	3207.8	3246.1	-1.2%
3	Cadbury Schweppes	14.6	14.5	+0.1	1494.1	1485.9	+0.6%
4	Cott Corp	5.4	5.5	-0.1	553.6	564.9	-2.0%
5	National Beverage	2.4	2.4	Flat	246.9	249.4	-1.0%
6	Red Bull	0.4	0.3	+0.1	42.3	30.0	+41.0%
7	Big Red	0.4	0.4	Flat	41.6	41.5	+0.3%
8	Hansen Natural	0.3	0.2	+0.1	34.9	20.2	+72.8%
9	Rockstar	0.2	0.1	+0.1	19.0	9.7	+96.5%
10	Monarch Co.	0.1	0.1	Flat	9.8	9.8	+0.1%
	Private label/other	1.7	1.7	Flat	165.2	167.1	-1.2%
	Total Industry	100.0	100.0		10223.6	10239.4	-0.2%

Table 3-2:Top Ten Soft Drinks Brands of Market Share for 2005

2005 Rank	Brands	2005 market share	2004 market share	Share change	2005 Cases (millions)	2004 Cases (millions)	Volume % change
1	Coke Classic (Coke)	17.6	17.9	-0.3	1796.0	1832.7	-2.0%
2	Pepsi-Cola (Pepsi)	11.2	11.5	-0.3	1141.8	1179.5	-3.2%
3	Diet Coke (Coke)	9.8	9.7	+0.1	999.0	998.0	+0.1%
4	Mt.Dew (Pepsi)	6.5	6.3	+0.2	659.7	648.0	+1.8%
5	Diet Pepsi (Pepsi)	6.0	6.1	-0.1	613.1	625.0	-1.9%
6	Sprite (Coke)	5.7	5.7	Flat	581.0	580.5	+0.1%
7	Dr Pepper (Cadbury)	5.7	5.6	+0.1	578.4	574.1	+0.8%
8	Fanta(Coke)	1.6	1.3	+0.3	167.7	130.0	+29.0%
9	CF Diet Coke (Coke)	1.5	1.7	-0.2	158.1	170.0	-7.0%
10	Sierra Mist (Pepsi)	1.4	1.4	Flat	140.5	138.8	+1.2%
10	Diet Mt Dew (Pepsi)	1.4	1.3	+0.1	140.5	130.2	+7.9%

Coke. Market leader Coca-Cola Co's corporate CSD volume was down slightly in 2005. Its market share was flat. Company benefited last year by rollouts of Coke Zero, Diet Coke with Splenda, Coke with Lime and Full Throttle energy drink; those new brands together posted volume of about 90 million cases. But its flagship brand, Coke Classic, was down, and Diet Coke was about flat. Fanta joined the top brand rankings.

Pepsi Co. PepsiCo's CSD volume was down-1.2%. Diet Pepsi, which has been growing strongly in recent years, lost volume in 2005; down -1.9%. However, Mt. Dew was up +1.8% and Diet Mt. Dew joined top brand list. Brand Pepsi-Cola was down –3.2%. [45]

3.2.6 Soft Drinks Naming Conventions in Some Part of the World

- In *Australia* and *New Zealand*, "soft drink" almost always refers to carbonated beverages. "Lemonade" is typically used only to refer to highly sweetened transparent carbonated beverages with a flavour similar to Coca-cola's *Sprite*, or Cadbury Schweppes' *7 Up*). Regionally, the term "coke" is used not only for the Coca-cola beverage, but as a generica term for other brands of cola as well.
- In *Brazil*, soft drinks are called *refrigerante*, literally meaning "cooler
- In *Bulgaria*, the name for soft drinks is *газирани напитки* (*gazirani napitki*).
- In *Canada*, "pop" is the most commonly used term among English speakers to refer to a carbonated soft drink. "Soda" is almost never used.
- In *French*, a "soft drink" is referred to as "boisson gazeuse", or informally as "liqueur" or "liqueur douce"
- In *China*, soft drinks are often called "gas/air water" (汽水).
- In *Denmark* the name for soft drinks is *sodavand*, which directly translated means soda water. The term sodavand is exclusively used for sweet non-alcoholic soft drinks like Coca-Cola, Pepsi and Fanta.
- In *Ethiopia*, soft drinks are generally known by the Amharic word "leslassa", meaning literally "smooth". The popular brand names "Koka" (Coke) and "Mirinda" (Orange Soda) are also in common parlance.
- In *German*, soft drinks are known as *Limo* short for *Limonade*, the German word for *lemonade*, but in America lemonade is an uncarbonated beverage, generally not considered a soft drink. Some regions also use *Sprudel* (from *sprudeln=to be fizzy*) or *Brause* (in eastern Germany) for carbonated non-alcoholic drinks. However, *Fruchtschorle* is one of the most popular soft drinks in Germany, but it is never called *Limo* since it contains no added sugar.
- In *Greece*, the term *Gazoza* is used to refer to clear soft drinks such as *7 Up* or *Sprite*.
- In *India*, soft drinks go by a variety of names including "soft drinks", and "cold drinks". One of the most popular is Coca-Cola's *Thums Up* brand.
- In *Ireland*, soft drinks are referred to as "minerals". Lemonade is also a generic term for a fizzy drink, and comes in two varieties — red and white. *Red lemonade* is similar to the *Scottish* drink *Irn-Bru*, and is popular both as a drink for kids and as a mixer for *spirits*.

- In *Japan*, soft drinks are commonly referred to as "juice", and by younger generations as "drink", a shortened term for "*PET*-bottle drink".
- In *Latin America*, soft drinks are called *refrescos*, and less frequently *gaseosas*.
- In the *Netherlands* (*Dutch language*), soft drinks are called *frisdrank* ('fresh drink') or abbreviated as *fris*, which not only refers to a soft drink made with lemon juice, but all soft drinks.
- In *Norwegian*, carbonated soft drinks are called *brus*, which means "fizz".
- In *Paraguay*, soft drinks are called *gaseosas*. The name *coca* is also common.
- In *Portugal*, soft drinks are called *refrigerante*.
- In *South Africa*, soft drinks are called *cool drinks* generically, although *lemonade* follows the same conventions as Australia.
- In *Swedish*, soft drinks are called *läsk*, which comes from *läskande drycker* (roughly — refreshing drinks) and denotes *carbonated* non-alcoholic soft drinks. In northern Sweden the word *dricka* (drink) is often used.
- In *Finland-Swedish lemonad* is more common and refers to all kinds of carbonated soft drinks, läsk (or läskedryck) is also used.
- In the *United Kingdom*, the term "soft drink" originally applied to carbonated drinks ("pop") and non-carbonated drinks made from *concentrates* ("squash"), although it now commonly refers to any drink that does not contain *alcohol*.
- In the West of *Scotland*, soft drinks are commonly known as "ginger", presumably referring to an early "soft drink". *Carbonated* drinks are also known as "juice" in some locations, including most of the east of Scotland.
- In the *United States*, "soft drink" commonly refers to cold, non-alcoholic beverages. Carbonated beverages are regionally known as:

  - "Coke", regardless of the brand or flavor, in most of the South. Some older generations of Southerners refer to soft drinks as "dope".
  - "Pop" in the *Midwest* and the *Pacific Northwest*.
  - "Soda" in the Northeast, parts of the South (near *Florida*) and Midwest (near *St. Louis* and eastern *Wisconsin*), and *California*.
  - "Soda pop" in some other areas
  - "Tonic" in and around *Boston, Massachusetts* and other parts of *New England*, particularly among older generations. [47]

Soft drinks are commonly sold in stores in glass, bottles and cans. They can also be dispensed using a *soda gun* (Keg). Sales earn a significant amount of money for the producers and distributors. Most famous name-brand soft drinks are produced and bottled by local or regional independent *bottling companies*. These companies license the name, and are usually sold the main ingredients, with syrup made by the main manufacturing plants of the trademark holders. [47]

In the past, most *cola*-flavoured and other soft drinks were sweetened with ordinary sugar (*sucrose*), but to save on production costs in some markets, HFCS (High-Fructose *Corn Syrup*) is now commonly used as a sweetener.

Competition in the industry among soft drink producers is widely referred to as the *cola wars*, a term mainly used to describe the ongoing battle for market supremacy between *Coca-Cola* and *Pepsi*.

3.2.7 Ethiopian Soft Drinks Industries

There were three but now, there are two Soft Drinks Industry Share Company in our country, Ethiopia. They are MOHA Soft Drinks Industry S.C. and East African Bottling S.C.

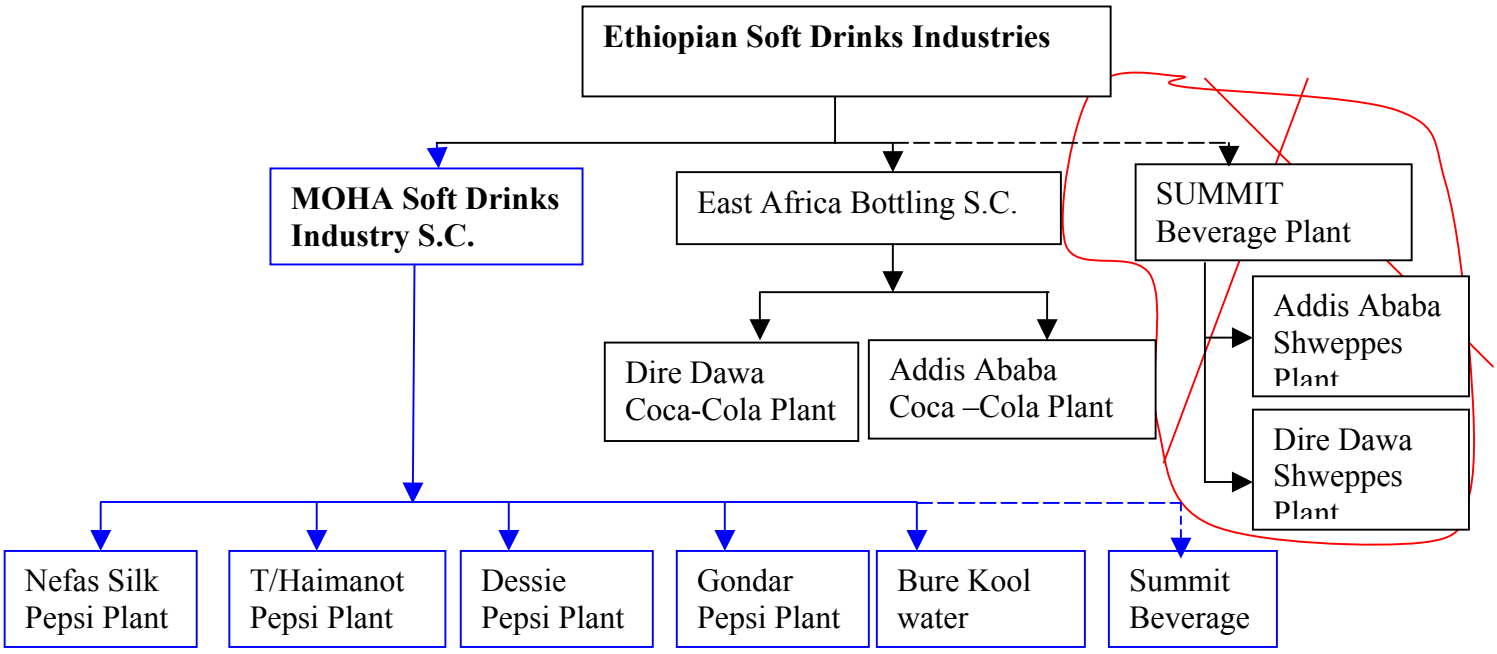


Figure 2-6: Ethiopian Soft Drinks Plants

I. East Africa Bottling Soft Drinks Share Company (EABSC)

The Coca Cola bottling plant was first established in 1959 in Addis Ababa and later in Dire Dawa. The factories were nationalized in 1975 and remained in the hands of government for over twenty years. [41]

The establishment was sold to a group of Ethiopian shareholders in 1996 and in 1999 a joint venture agreement was signed between the Ethiopian shareholders and Coca Cola SABCO, with the latter, according to William Egbe, Director of Coca Cola East Africa and Islands Region, injecting a capital of 9.1 million dollars to acquire 49% of the shares in EABSC.

According to Egbe, at the end of 2001 SABCO contributed additional capital amounting to 4.2 million dollars, raising its share to 61.3. The fund, he said, was used to implement the new expansion project.

"The joint venture between the Ethiopian shareholders and Coca Cola SABCO has allowed the deployment a total of 135 million birr in the expansion of production capacity in Addis Ababa, the improvement of sales and distribution infrastructure, and the construction of other facilities," he said, adding, "such a joint venture not only has allowed the inflow of foreign capital into Ethiopia, but it also paved the way for the introduction of new technology, modern management expertise, efficient sales and marketing system, and intense manpower training across all functions to ensure successful and rapid growth of the business."

The company has invested about 133 million birr over the past four years in the establishment of two bottling lines, the renovation of the factory and the purchase of new marketing equipments, according to Beyene Berhe, EABSC's Board chairman.
The chairman said at the inauguration ceremony that an additional investment of 100 million birr was in the pipeline for further additional marketing support and production improvements.

The chairman also said that as there was a huge potential in the Ethiopian soft drinks market, EABSC was ready to meet the challenge by providing additional capital

investment, by developing human resources and by producing high quality soft drink products.

Mr. Citos Reyes, Managing Director of East African Bottling Share Company said the two new bottling lines each installed with 72 filling heads with a combined capacity of filling 48,000 bottles per hour, are equipped with state of the art technology, increasing the capacity of the factory by three-fold. [41]

The largest Coke bottler in the world, Coca-Cola Enterprises, is in the midist of yet another growth spurt. Coca-Cola & Schweppes beverages (CCSB) is a joint venture of the Coca-Cola company (49%) and Adbury Schweppes (51%). CCSB bottles and distributes both parent companies products. After acquiring Coca-Cola & Schweppes beverages, CCE will distribute Cadbury Schweppes products in the UK.[32]

II. MOHA Soft Drinks Industry S. C.

MOHA Soft Drinks Industry S. C. is a private enterprise owning 5 Pepsi Cola plants and one franchise Summit Plant, totally runs 6 bottling Plants and one under construction in the country, namely:[35]

I. Nefas Silk Pepsi Plant
II. Tekle Haimanot Pepsi Plant
III. Gondar Pepsi Plant
IV. Dessie Pepsi & Tosa Amba Water Plant
V. Bure Pepsi & Kool Water Plant
VI. Summit Beverage Plant
VII. Awassa Pepsi Plant

I. Nefas Silk Pepsi Plant

- This plant as private company was established at a capital of 1 million Birr in 1965; and after 10 years it was nationalized by the then socialist government.
- Again in 1996 the company was transferred to private investor
- Nefas Silk Pepsi Plant is one of the biggest among other Pepsi plants in the country with a capacity of producing 400 cases worth of 12 million Birr products a month.
- The plant has a 40 % segment of the total Pepsi market share in the country.

In order to achieve this capacity and win leadership in brand and in marketing following are the endeavors that are attempted by the plant in the last few years.

- Delivering the best tasting, the highest quality and the most consistent products in the market place.
- Build on brand platforms by creating new channels, which develop the business.
- Being quicker to create and take the advantages of opportunities.
- Standardizing business operating system to:
    - Enhance their ability to provide the highest level of customer service
    - Develop ability to measure and manage key indicators (parameters) of the business in a consistent fashion.
    - Establish a set of practices and disciplines for the organization.

In order to execute marketing operations, Nefas Silk plant uses the following distribution channels:

- Sales agents
- Own operation or truck routes (door to door) distribution
- Depots
- Branch warehouses
- Company constructed kiosks

In Addis Ababa currently they have 18 trade routes to be covered daily by company owned vehicles. The plant has a plan to create 5 new trade outlets and make the number of trade routes 25 in the near future.[35]

II. Dessie Pepsi and Tosa Amba Water Plant

Dessie soft drinks factory was launched in 1944E.C at Dessie town, in a particular Kebele called Dawdo. It was established by two private investors share holding. Until the factory was Nationalized (came to public enterprise) in 1969 E.C by proclamation, it was producing at small and medium scale for almost 24 years. [33, 35]

Between 1952 E.C and 1969 E.C the factory was fully owned by one of the founders, Ato Temeles Kasaye, and the enterprise was also called Dessie Water Soda Factory. Before 1952 E.C the factory was produced only 5000 bottles per day. While after this year, ownership transformation had been made, by using moderate equipments, the

factory have produced new products called Snap Cola, Snap Orange, Snap Tonic, Syrup, Squash, Arenshata and Tosa Amba Water.

In 1971 E.C, the plant discontinued other soda products and stared producing Pepsi cola, Mirinda brand and carbonated Tosa water. However, due to old age and poor technical condition of machinery and equipment, the production of soft drinks was discontinued starting from October 1996 and the plant totally shifted to bottling of carbonated Tossa water. In the meantime, MOHA has set a crush program to rehabilitate or relocate the existing factory so as to reactivate the soft drinks production as well as increase volume of the mineral water product to a level where we can meet the demand of both products in the region. [33, 35]

III. Gondar Pepsi Plant

Until the period of Nationalization in 1969 E.C, Wulk-fite Water Factory in Gondar town was owned by private investors. After the nationalization the factory was owned by Ethiopian Beverage Corporation. This factory was supplied by equipments from Dessie soft drinks factory during the 1969 E.C nationalization and using those equipments it was producing Snap Cola and Snap Orange starting from 1970 E.C.

However, due to two major obstacles: a repeated problem in functions of equipments and lack of demand for products, the factory's existence was not long lasting. To extend the life period of the factory, Ethiopian government took action to do societal demand based studies through the corporation. Based on the study, the present, modern, *Gondar soft drinks factory* have been established. [34, 35]

IV. Bure Pepsi and Kool Water Plant

Bure Baguna Mineral Water Factory was launched on 30 Nehasie 1985 E.C by private shareholders. The shareholders made a contractual agreement with Guna Construction Company to facilitate the construction process of the factory. But due to unknown reasons, the agreement was interrupted and the factory's construction process was delayed for about two years. On September 1988 E.C., the construction process began with a new company and ended up in the mid 1989 E.C., the year in which the people of Bure town in the Amhara Regional State, west of Gojam, was thrilled with joy and happiness due to the arrival of a new machine from Germany. [31]

On 11Nehasie, 1989 E.C., experts from Germany, in collaboration with experts from the country, installed and commissioned the machine. After fulfilling its spare parts, on 15 Hidar 1990 E.C, they made their first attempt to see if the factory produced its output. And it was ended. Then, the foreign Experts trained the indigenous ones how to operate the factory. Finally, the factory was inaugurated on Tahsas 29, 1990 E.C.. Since two days from the date of inauguration, the factory had begun distributing its output for sale, and had served the society for about four years.

However, since 1994 E.C, due to internal problems, such as disagreement among shareholders and external influences, like powerful pressures exerted from the competing factories to discard it from the market, the factory quit its operation.

Nevertheless, in the beginning of Meskerem, 1998E.C, through the help of MOHA Soft Drinks Industry Share Company, it has begun its function in a new spirit – a company which was inspired by the interest and feelings of the society towards the product, and be convinced to buy it from Development Bank, which Claimed /taken away the factory from the incapable shareholders to repay the money they owed from the bank.

Now Bure Baguna Mineral Water Factory is producing soft drinks, such as Mirinda Orange, Pepsi, Mirinda Apple, Mirinda Tonic and 7UP and Bure Mineral Water. [31]

V. Teklehaimanot Pepsi Plant

Teklehaimanot Pepsi plant was established in 1961 as " Saba Tej" share company, but nationalized in 1975 replacing the old line and started producing Pepsi cola, Mirinda and team brands in January 1978.

In Addis Ababa currently they have 18 trade routes to be covered daily by company owned vehicles. The plant has a plan to create 2 new trade outlets and make the number of trade routes 20 in the near future.

In order to build on their brand platform, like the sister plants Nefas Silk Plants and others, they use various promotional schemes, advertisement campaigns, and to win market versus competition, at times, they employ a seasonal discount scheme. [35]

VI. Summit Beverage Plant

The summit beverages plant is providing Ethiopia with the first new choices in soft drinks in years. Summit has a new and wide range of internationally renowned brands of soft drink including: Orange Crush, Sport Cola, Schweppes Tonic, Pineapple, Club Soda, Mineral Water and Canada Dry Ginger Ale, with more to come. All are non-alcoholic.[32]

Summit Partners PLC is an American company that opened a branch investment of about US$100 million. Summit Partners PLC is an international investor with a wide range of manufacturing projects planned in Ethiopia. The first projects are Summit Beverages, Summit Engineered Plastics, and Summit Glassworks in Addis Ababa, plus a soft drink Bottling Plant in Dire Dawa. Summit partners (Ethiopia) PLC has acquired 100,000 square meter of land for the construction of three of the plants at Kotebe. Construction work on the Beverage Plant, which occupies an area of 24,000 Sq.m, was completed in one year. The Plant has been producing seven flavors of soft drinks and mineral waters. It operates under a franchise obtained from Schweppes, a developer of soft drinks flavors for 200 years, who sell their products in 185 countries around the world. Now, the Plant has been producing five flavors of soft drinks (Pepsi, Mirinda Orange, Mirinda Apple, Mirinda Tonic and 7 UP) and mineral waters.

The Summit Beverages Bottling Plant was designed by a top American arichtect engineering firm, Ghafari associates, in Detroit, Michigan. Construction documents were prepared by National Consultants, an Ethiopian architect –engineering company. The building of the plant was undertaken by MIDROC Construction, a leading general contractor in Ethiopia.

The bottling line machinery was designed, manufactured and installed to be Central Bottling International. Ltd., from the united Kingdom. CBI maintains the highest of standards and provided Summit with the most advanced technology in the soft drinks industry in Africa. The bottling lines and computerized system are built lines and computerized systems are built to international specifications.

There are three production lines. The first line produces beverages in standard returnable 300 ml, glass bottles. The second line, which is the first of its kind in

Ethiopia, produces non-returnable one liter plastic bottles (PET bottles). A third line produces distilled water in 20 litre containers.

Summit Beverages is the first bottling company in Ethiopia to use home produced sugar. A distinguishing feature at Summit Beverages is a Sugar treatment Plant. Special sugar refining equipment has been installed to bring the sugar to the highest standard for the production of soft drinks to ensure consistency of taste and to win customer approval.

An advanced effluent water treatment system is also the first of its kind in Ethiopia. In fact, it is only the second of its kind in all of Africa outside South Africa. This environmental conservation system enables farmers of the surrounding areas to use the cleaning water released from the factory for crop irrigation and for cattle.
A special feature enjoyed by all visitors to the factory is a Viewing Gallery. There is a glass-enclosed walk away on the upper level from which the entire bottling line can be watched in action.

What makes the Summit Beverage Plant so special are the stainless steel pipe work and fixtures installed throughout the factory: the modern, high tech machinery, the Bottling Hall, the sugar treatment Room, the Syrup Mixing Tanks and the Water Treatment equipment. Wall of rich, polished red granite (Juparana from Harrar) and floors of non-slip red granite make scrubbing easier and help to make the plant properly and hygienically clean.

The technology of a computerized manufacturing system, the distribution and sales strategy and, most of all, the company's regard for precise quality control coupled with respect for the employees, are what makes Summit Beverage outstanding and certain to succeed.

Now, Summit Beverage is a co-packer of MOHA. Due franchise agreement between MOHA and Summit Beverage Factory, MOHA produced its different mix of products.

VII. Awassa Pepsi Plant

Awassa Pepsi Plant, a new Pepsi cola plant with a capacity of 36,000 ml is under construction in Awassa, which can cover the demand of soft drinks of the southern region.[35]

Cover History of Logo of Pepsi Cola

Figure 2-7: Cover History Pepsi (Logo)

There is the Colonel Tom Parker (Elvis Presley's manager) school, which says, "As long as they spell your name right, it's all good publicity." It's better to be talked about than not. And Project Blue is definitely being talked about. [37]

In the UK, for example, where blue was launched with the fanfare generally reserved for a royal divorce, the press is really going to town-mostly with tired wordplay posing as headlines: "Red faces as Pepsi gets the blues," in Marketing Week and "Case of the blues" in the Sunday Telegraph. Both publications questioned the impact Pepsi has made on the market.

The new quarter globe icon (below) represents the final (?) stage of the Pepsi logo. The evolution is easy to trace, taking a look back across time to the first red, while and blue logotypes. While the new logo does not represent any thing specifically, it does "play back as being futuristic." and having some implications of representing the earth and

the "global village." Certainly a very hip and very positive message to send as we rocket towards the millennium.

Place with the blue re-launch, pointing to the difference between the hoopla and the actual sales. Pepsi contests this, saying that it has indeed boosted volume and market share since going blue. The truth is that it's just too early too tell.

"We need more time to read the impact on market share." says d'Amore. "We're getting a lot of trial but can't say anything about repeat purchase. But we see a very positive response within parameters such as top of mind awareness, brand awareness, this is a brand for me, and this is a brand I would like to be seen with.

"It was absolutely essential for us to cut through the clatter because we're coming from behind," says d'Amore to those critics who call the big blue firestorm overkill. "Really, the way for us to establish our presence is with these events. There is only one Concorde, and we took it. There is only one space station, and we took it. I think we're very far from saturation and I think [those are some of] the best investments we've made. We're right on track."

The key thing to realize about Project Blue is that it is not a plan for 1996 but one for the future. A quick leap in sales doesn't signify a leap of faith-- this is a long-term project with long term goals.

"We feel the entire cola industry has enormous potential because the per capitals are so low," says d'Amore of the journey into the next millennium. "We're driving both fronts--top line growth through share gains and category growth." The race is not always to the swift. Or to the red. [37]

3.2.8 Contributors to Supply Chain Management System

I. Ethiopian Contributor

Ato Abreham Debebe is one of the supply chain management contributors for Ethiopian Beverage Industries, on the thesis entitled in *Model development of Supply Chain Management System- a case study on Meta Abo Brewery*. [29]

II. Foreign Contributor

Vikas Chandra, is one of the supply chain management contributor for Indian Industries, on the thesis entitled in *Supply Chain analysis: A System Approach to materials management,*(1999), New Delhi IIT, India.

Another contributor is Mr. John Peter Koss, who was writing the following articles on the supply chain management for Beverage Industry, which were taken from Magazine of World Beverage International.

Discussions with beverage producers, distributors and contract packing operators reveal an intense stand to understand the beverage industry's attention to an integration concept of the supply chain. Definitions of "Supply chain" varied according to where an individual functions in the overall cycle. A common response was "getting the right product, in the right amount, at the right place, in the right time, and perhaps at the right cost.

Understanding of supply chain depended on the extent to which management had converted operating philosophies relative to supply and demand. A few beverage producers look at a totally integrated supply chain. Others direct efforts toward the end of the chain retail outlets and consumers. In theory, supply chain management means total coordination and control of all "supplies."

The concept of total supply chain integration seems desirable. To realize an integrated structure, all segments must be evaluated and understood before installing systems and procedures. Defining some segments will stress the importance of integrating the supply chain and the philosophy changes required to accomplish an effective system.

Where does the chain begin and end? What are the segments and what happens in each segment? What is or should be the final control point for a beverage producer?

The supply chain can be viewed in three basic segments. *Input* of supplies, *conversion* to finished product and *output* of finished product. Just remember supply chain management is necessary, complex, expensive and must be understood.

Input starts the chain by ordering / receiving raw and packaging materials supplies and service needed for production in today's environment available computerized programs help management accomplish minimization of inventories for material and service categories. Critical to input effectiveness are quality, quantity, and timing through supplier coordination supply chain input quality, quantity, or delivery problems can impair plan operating efficiency and disrupt the chain.

Conversion is the next step in the supply chain cycle. It will not be executed effectively if previous *input* preparation has not been made. *Input* requires more external coordination. Which *Conversion* requires more internal planning and control. Unless all materials and services are under real time control, the conversion segment can become a disaster resulting in losses, missed schedules, unnecessary change- over and high-cost production. Because this part of the supply chain is basically internal, it appears to be receiving less attention than *input* or *output*. *Conversion* in the supply chain is extremely important because it transforms materials and services into a finished product. Those products, qualities, and packaging being prepared are now being driven more by consumer needs and demands than by inventory philosophies and physical storing capabilities.

Output is the final step in the supply chain cycle. Finished product is sent directly to delivery vehicles, or placed in the warehouse for staging orders in either case, *output* to consumers by various methods of distribution must ensure cost effective supply chain conclusion. Preparation for distribution actual distribution and assurance of proper quality product/packaging quantities and delivery are mandatory for efficient supply chain management. [38]

CHAPTER FOUR

Background of Pepsi-Cola & the Case Study MOHA SISC

The main purpose of the case study is to apply the model and to illustrate the merits and demerits of the model. To select industries for the application of the model, a survey of industries like sugar industries, leather and beverage industries has been under taken. From these industries, the supply chain system of sugar industries and leather industries are limited to few tier of suppliers and few raw materials type. Therefore, in this thesis, in order to include the various supply chain partners, Soft drinks industries have been selected to evaluate the model. As a result, the case of MOHA Soft Drinks Industry S. CO. has been selected for the evolution and application of the model.

4.1 Historical Background of Pepsi Cola and MOHA

4.1.1 When did Pepsi Cola Started and Where?

Pepsi cola traces its origins to 1898 when Caleb Bradham, a pharmacist in New Bern, North Carolina, created a curative drink for dyspepsia called Pepsi cola. Pepsi cola later referred to simply as Pepsi was mixture carbonate water, cane sugar syrup, and an extract from tropical kola nuts. To sell this product, Bradham formed the Pepsi cola company in 1903. In addition to selling the drink at drugstore Counters; Bradhem bottled Pepsi for sale on store shelves. At this time, bottling was a new innovation in food packaging. [35, pp. 2-14]

However, due to major increases in the price of sugar, Braham began to lose money on Pepsi and in 1923 he failed for bankruptcy.

The craven Holding company of crawen country, North Carolina, Purchased the company's assets. In 1931 Charles G. Guth of the loft company in New York City Purchased Pepsi-Cola from the holding company. Guth had difficulty getting the business going again, but he increased sales by selling larger bottles at an unchanged price. By 1933 Pepsi Cola was sold by 313 franchised U.S. dealers bottled in the United States, Cuba, and England sold in 83 countries.

4.1.2 When did Pepsi Start in Ethiopia?

Nefas silk Pepsi cola, is the first Pepsi cola plant in Ethiopia and was established in 1966 as a share company with an initial capital of 1 Million Birr. The capacity of the bottling line at that time was 20,000 bottles per hour (bph). In 1986, the plant was renovated and expanded to a capacity of 50,000 bph with twin fillers. Total renovation and expansion investment cost was Birr 6,647,944.00.

4.1.3 Background of MOHA

Mohammed Hussein AL-Amoudi (MOHA) soft Drinks Industry S.C was formed and registered under the commercial code of Ethiopia on the 15th of May 1996. This company was formed after the acquisition of four Pepsi cola plants located at Addis Ababa (Nefas Silk and Tekle haimanot), Gondar and Dessie, which were purchased by Sheik Mohammed H. Al-Amoudi in the 18th of January 1996, through BID, which was tendered by Ethiopian privatization Agency. The hand-over of the factories was finalized on the 4th of April 1996. [35,pp.18-20]

4.1.4 Objectives and Motto of MOHA

The business purposes of MOHA soft drinks Industry S.C. as stipulated in the Memorandum of Association are: -

A. To manufacture, buy, sell, bottle, distribute and deal in non-alcoholic beverages, mineral and aerated waters by ingredients there of in Ethiopian and elsewhere.
B. To manufacture, sell and distribute bottles, corks, corkscrews all type of crates.
C. To manufacture, sell and distribute carbon dioxide.

Where as the Motto of MOHA is “Ask or Dare for more”.

4.1.5 Capital and Number of Employees Before and After Purchase

Capital before purchase: Capital of the four plants before the purchase was Birr 7,237,223 comprising Birr 5,771,000 Birr 768,576 and Birr 697,647 of Addis Ababa, Gondar and Dessie plants respectively. [35, pp.18-20]

The total purchase price of these four factories was Birr 111,816,958 and the current capital for each plants is listed in appendix 2.

The total number of employees of these plants during the purchase was 1400 and the current number of employees is listed for each plant in the appendix 2.

4.1.6 The Product Mixes of the Company

- Pepsi cola (Cola flavor)
- Mirinda (Orange flavor)
- 7 up (Lemmon flavor)
- Mirinda Tonic
- Tosa Carbonated water (not mineral water)
- Mirinda Apple
- Bure Kool Water
- PET Bottles Soft Drinks and Kool water
- Keg Soft drinks and Kool Water

4.1.7 Organizational Structures

MOHA operates with a Head office, which located at Addis Ababa and led by a chief executive officer (CEO) appointed by the chairman of the board of Directors. Hierarchically, the CEO is accountable to the Chairman of the board. [35]

Currently, the activities of the company reporting to the CEO are grouped in the following functions:

1. Finance Division
2. Human Resource Division
3. Marketing division
4. Technical division
5. Procurement and stores/Supplies Division
6. Quality control and production Division
7. Audit and Inspection service
8. MIS Service
9. Legal service
10. Plants at different locations
11. Regional office.

The Division Heads at the Head office mainly deal with conceptual activities to support the CEO. The plant general managers are delegate with autonomous right to direct, organize, plan, control and administer the overall operation of their respective plants within the limit of their approved budget.

The activities of the plant managers reporting to the plant general managers are categorized and grouped in to the following functions. [35,pp.18-20]

Under big and medium size plants:

1. Finance manager
2. Human Resource manger
3. Sales manager
4. Technical manager
5. Procurement and stories/ Supplies Manager
6. Production manager
7. Quality control manager

Under small size plants:

1. Finance & Human Resource manager
2. Commercial Manager
3. Technical and Production Manager
4. Quality control manager

- Big size plants: - Nefas Silk and Awassa Pepsi Plant (under construction)
- Medium Size Plant: - Tekelehaimanot and Summit
- Small Size plants:- Gondar, Dessie Pepsi, and Bure Pepsi and Kool Water Plants

4.2 Manufacturing Process Flow of MOHA Soft Drinks Industry S.C.

There are four major manufacturing processes in production of soft drinks. These are carbonation, water treatment, bottle washing and syrup preparation processes.

I. Carbonation Process Flow.

CO_2 gas from Refrigeration tank→ CO_2 gas purifier →Mixing (Carbonator) or direct line from CO_2 factory → CO_2regulatory →CO_2 filter → CO_2 gas dissolution with product →Carbonator Delivery is against receipt & the same is taken as consumption

II. Water Process Flow.

From municipality water tap and from 4 different bore holes incase of Nefas Silk Plant, 1.To reservoir→ Coagulation water treatment system→ Syrup & beverage preparation, 2.To reservoir→Softener→Washer, boiler, & other domestic used. All except Nefas Silk Plant follow the following water process: Tap water from municipality→Water storage tanks→Water treatment by Coagulation tank→Sand filtration→Carbon (Activated) purifier→Pollishing→Bottling

III. Bottle Washed Process Flow

ReturnedBottle (sales)→empty bottles stores/sales→Depalletizing→Decasing→ Sorting→Neck inspection→Pre rinse clean→Caustic soak→ Caustic spray jet→Warm water spray→Final rinse (Cold water) →Fresh water spray jet→Clean bottles discharge →Bottle washer→Washed bottles inspection→Filling crowning→Full inspection → Date coder→Case packing→Palletizing→Full goods store-sales

IV. Syrup Process Flow.

Granulated sugar, treated water, concentrates, & Filter media or filter aids from store →steam & 85^0C;Agitator →Simple syrup preparation→ Filtration cooling→Syrup storage→Flavour blending →Finished syrup→Aging→Proportioner→Bottling.

The manufacturing process flow charts of the case study MOHA Soft Drinks Industry S. C. for each plant are drawn as follow.

4.2.1 MOHA Soft Drinks Industry S. C. Nefas Silk Pepsi Plant Process Flow

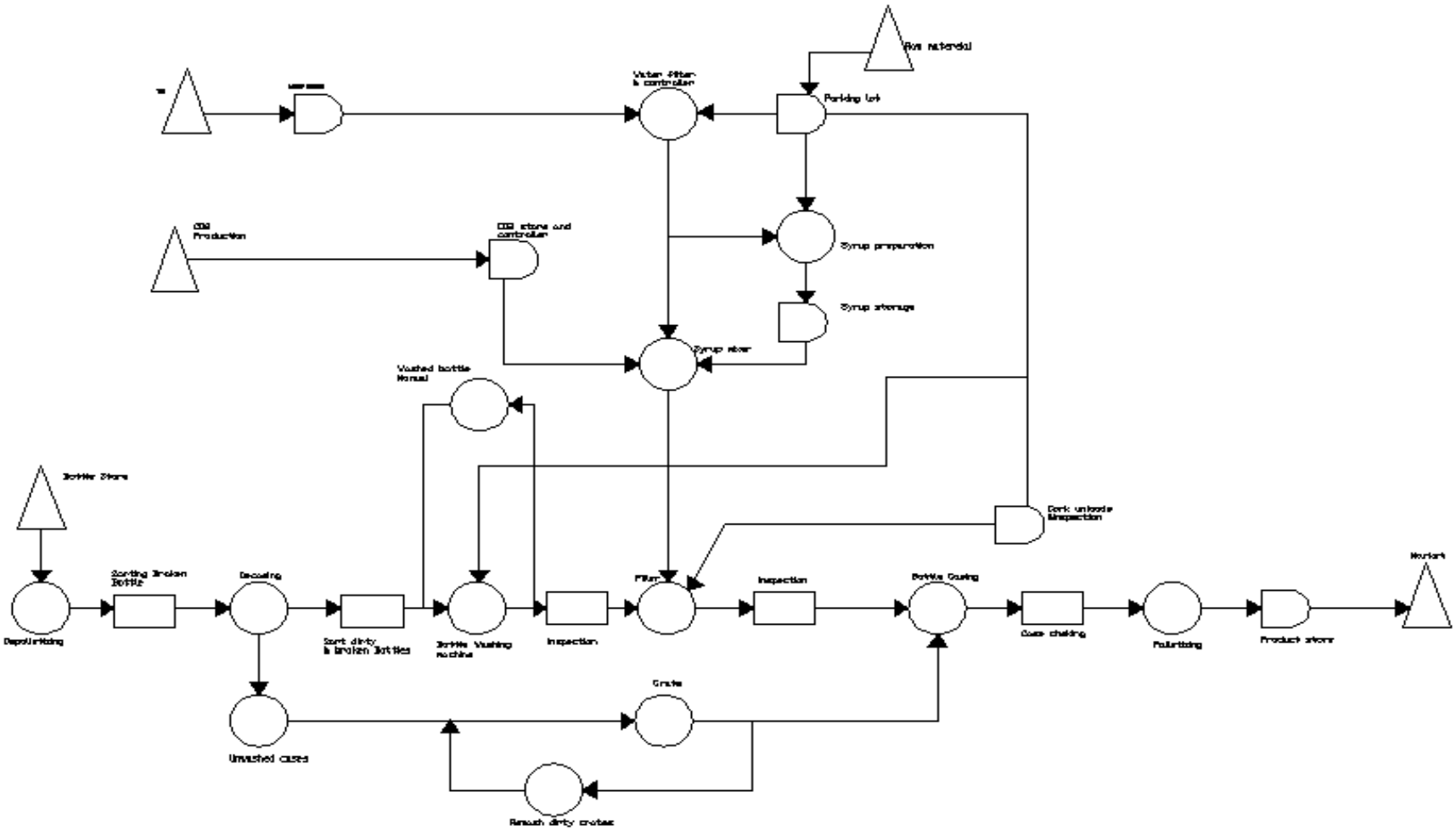


Figure 4-1: Production Flow Chart of Nefas Silk Pepsi Plant

4.2.2 MOHA Soft Drinks Industry S. C. Teklehaimanot Plant Process Flow

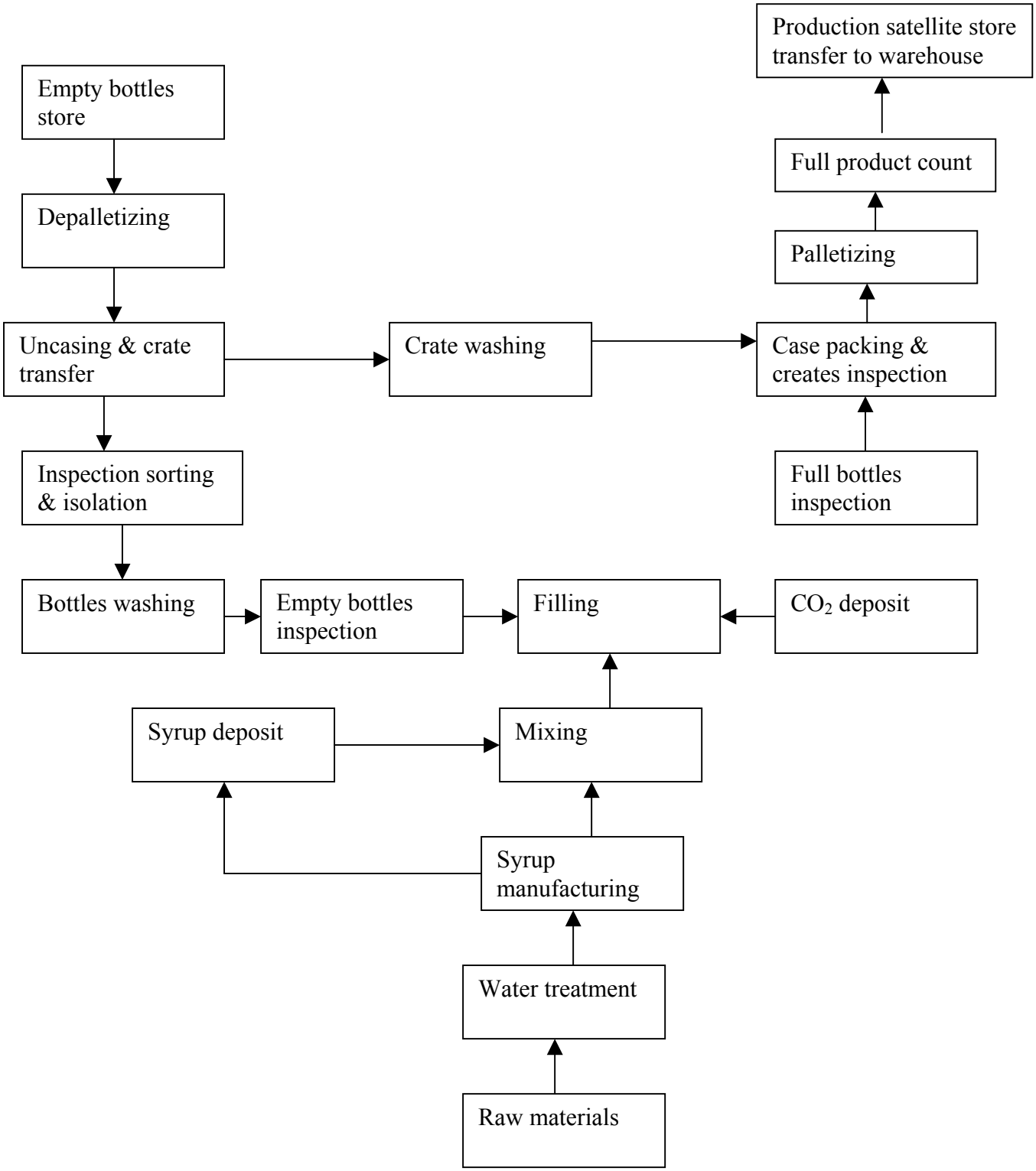


Figure 4-2: Production Flow Chart of Teklehaimanot Pepsi Plant

4.2.3 MOHA Soft Drinks Industry S. C. Gondar Pepsi Plant Process Flow

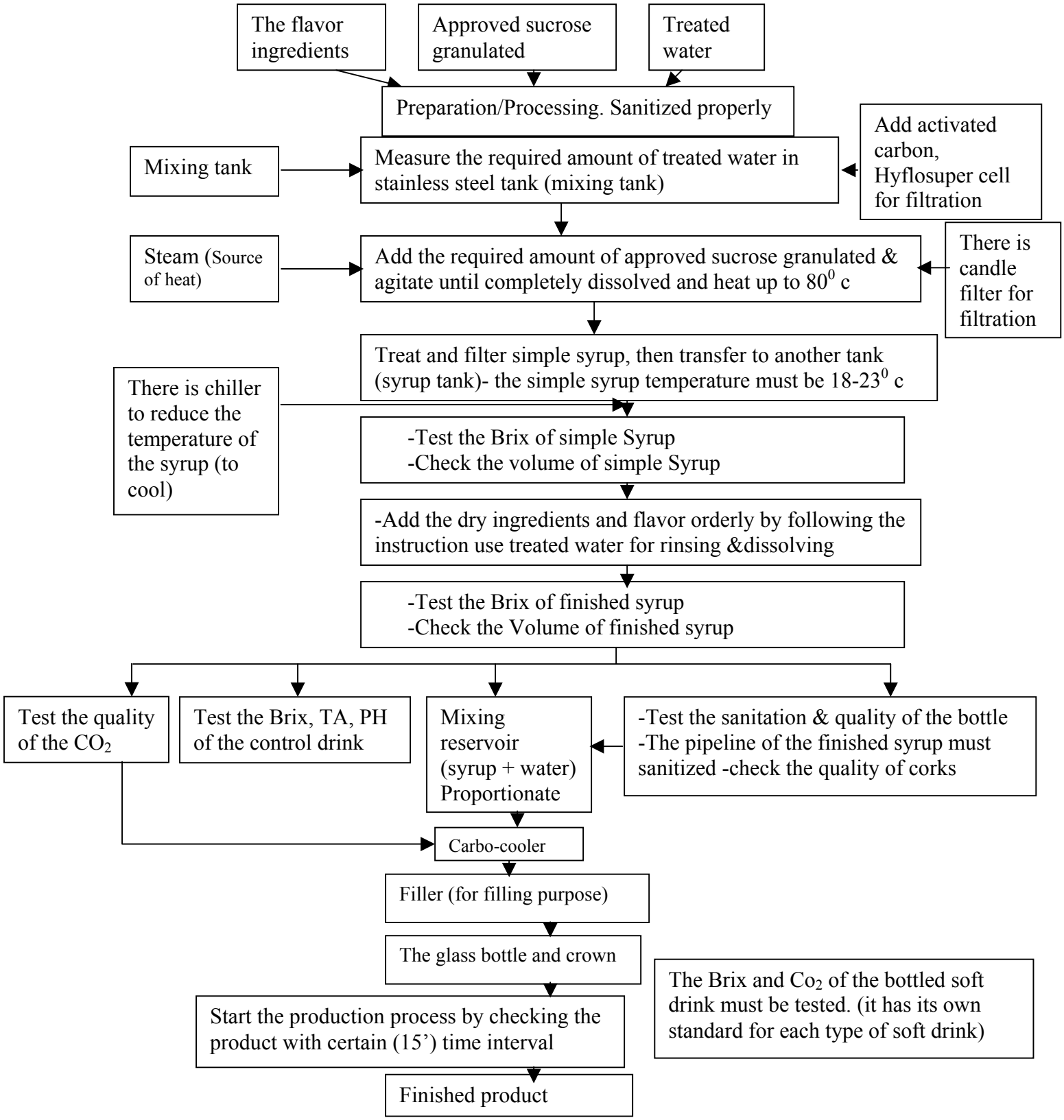


Figure 4-3: Production Flow Chart of Gondar Pepsi Plant

4.2.4 MOHA Soft Drinks Industry S. C. Dessie Pepsi & Tosa Amba Water Plant Process Flow

Dessie Pepsi Plant is now producing Tosa Amba Carbonated Water.It is not producing soft drinks rather distributing soft drinks from sister Plants for the sake of this reason the process flow chart is drawn for Tosa Amba Carbonated Water.

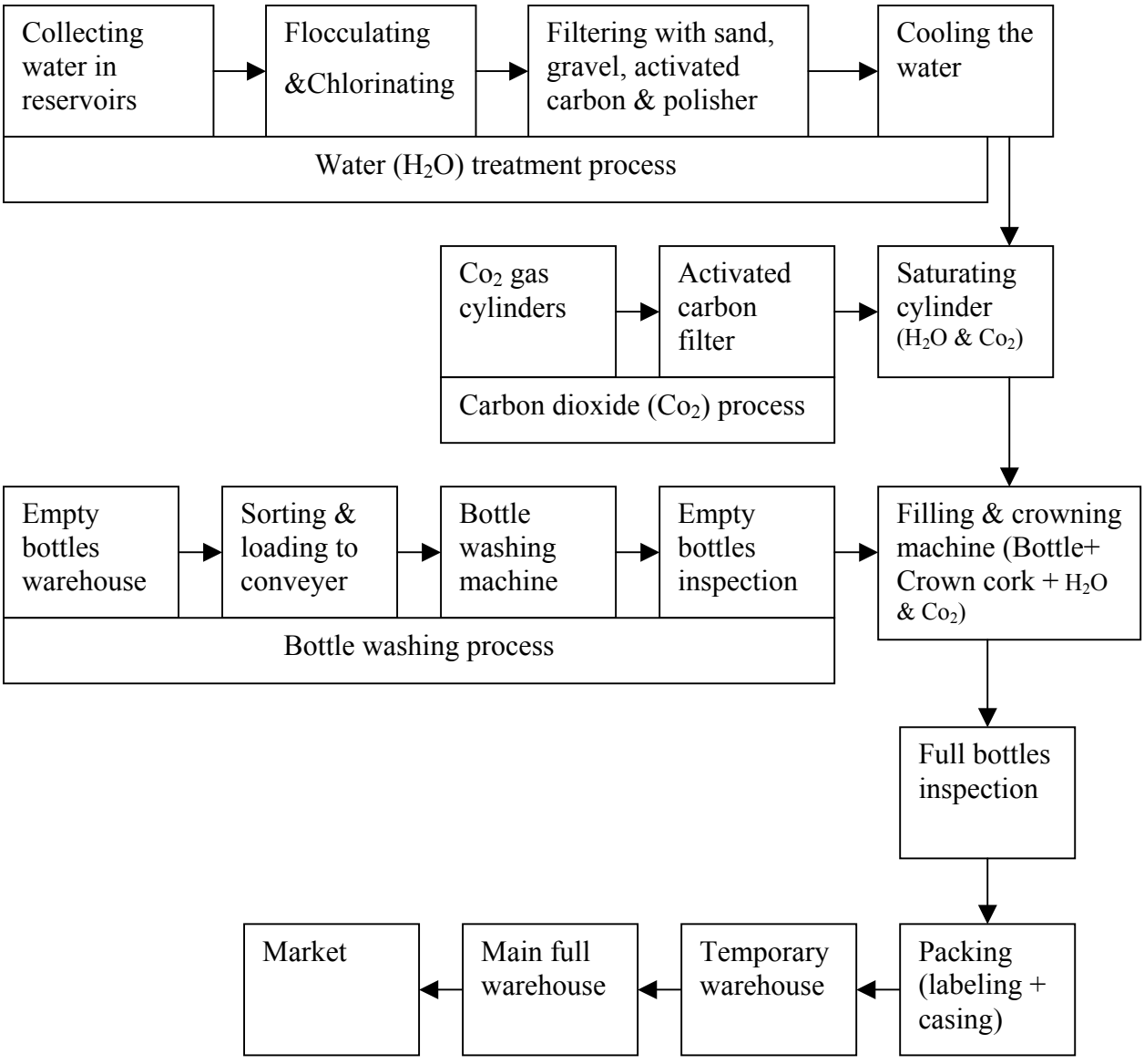


Figure 4-4: Production Flow Chart of Dessie Pepsi and Tosa Amba Water Plant

4.2.5 MOHA Soft Drinks Industry S. C. Bure Pepsi and Kool Water Process Flow

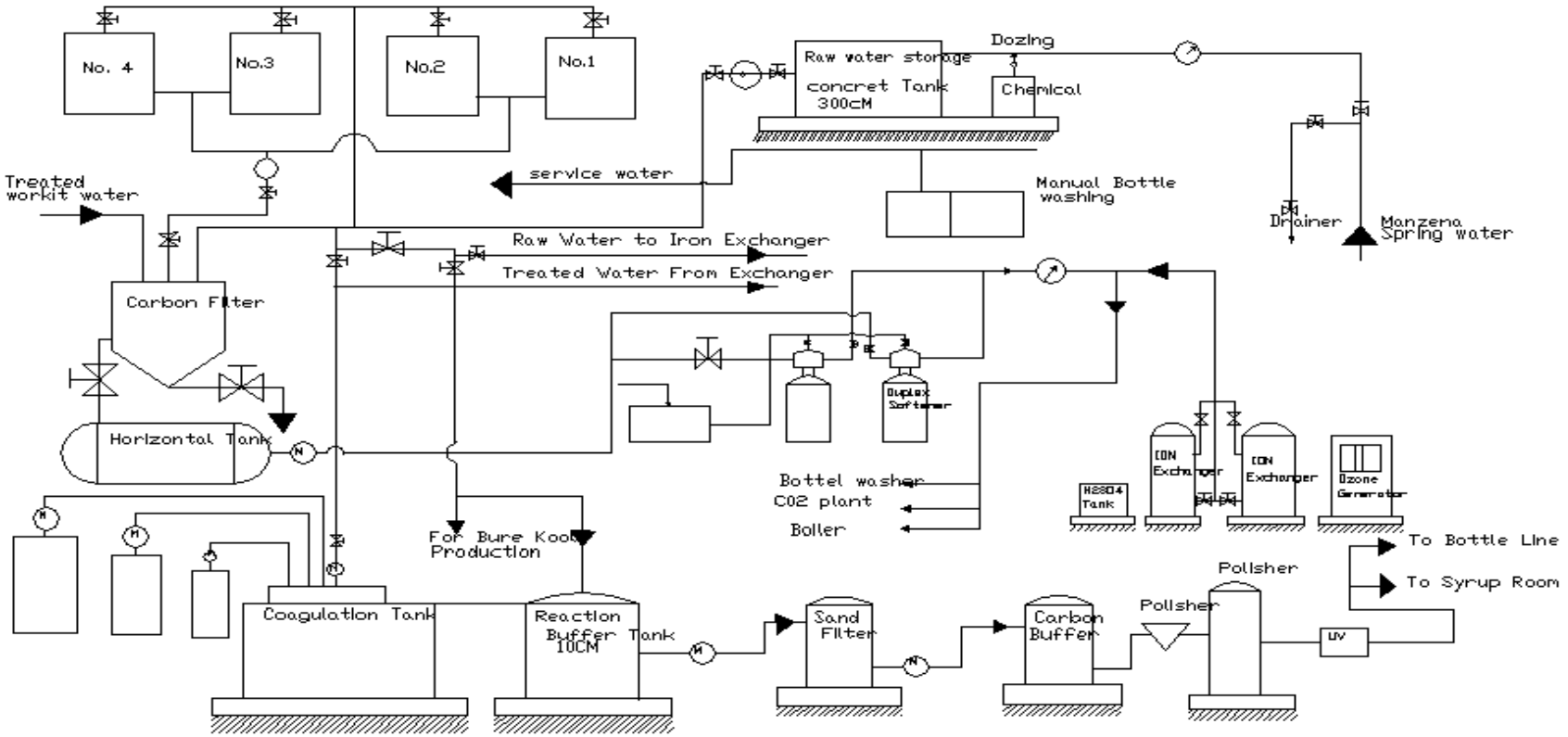


Figure 4-5: Production Flow Chart of Bure Pepsi and Kool Water Plant

4.2.6 Summit Beverages Plant Process Flow

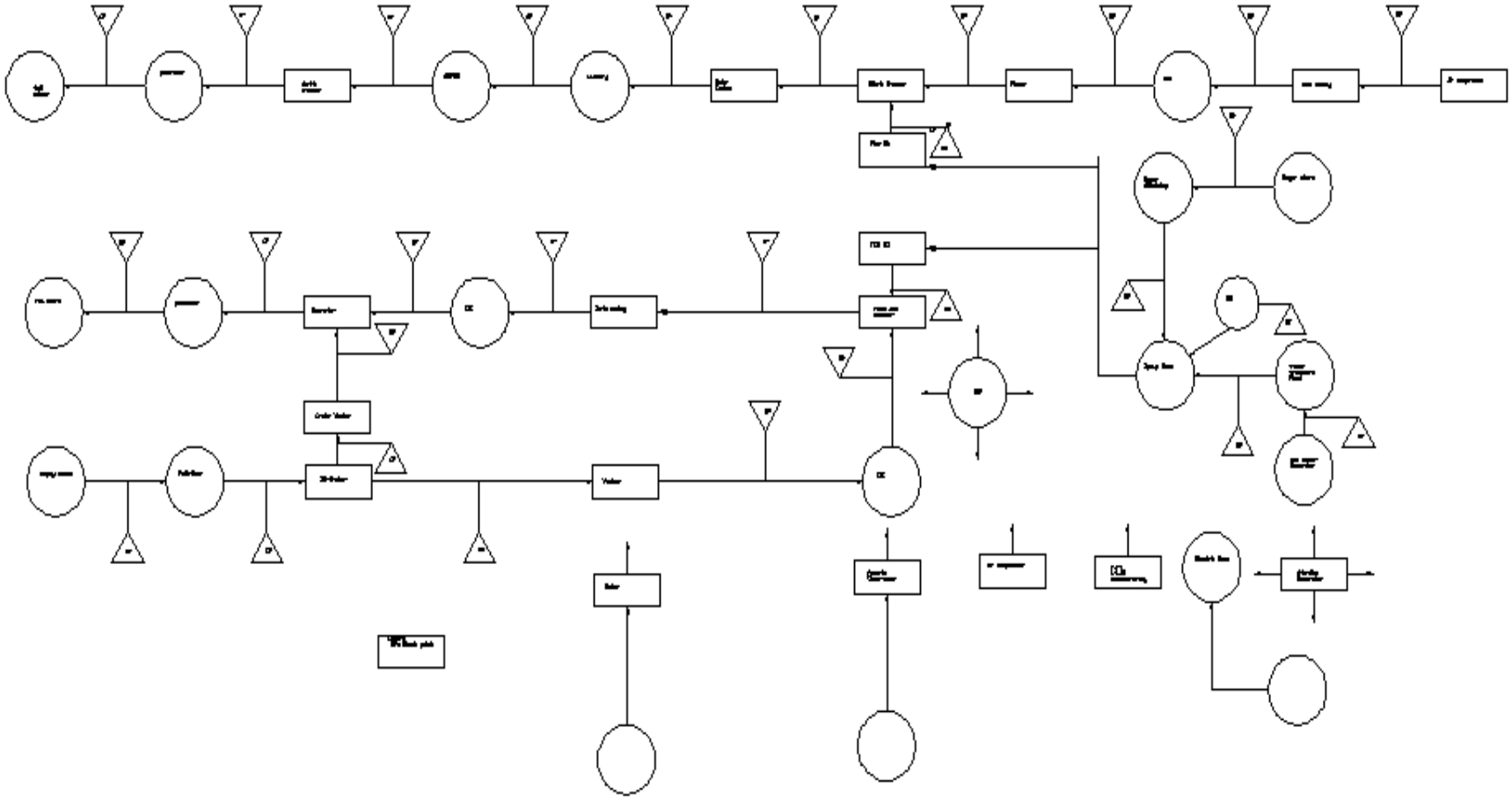


Figure 4-6: Production Flow Chart of Summit Beverage Plant

CHAPTER FIVE

Data Analysis and Interpretation

5.1 Data Collection (Survey Questionnaires)

Having designed the survey for, a first draft questionnaire was distributed to selected MOHA Soft Drinks Industry Plants such as Nefas Silk and Teklehaimant, and the Co-Packers Summit beverages plants of Procurement, and store supplies, Sales, Production, Quality control, and Finance department staff members and my senior researchers for their suggestion and comment. After correcting the comments and suggestion getting from them. The questionnaires sent to my advisor for his valuable comment and suggestion. Based on his response and pallet survey, certain adjustments were made to the structure, concepts, and wordings of the questionnaires, to improve its clarity. After this correction the questionnaires were circulated to 120 Staffs of MOHA soft drinks Industry and the Co-packer too.

The survey questionnaire contains 49 questions requiring three types of answers.

1. The first type is an ordinals scale, excellent, very good, good, fair and poor and other one is very high, high, low, very low, none.
2. The second type is a nominal scale, Yes or No.
3. Subjective type question that need brief answer is the third types of questions.

The reason why a need of survey circulated questionnaires is due to the fact that the case study MOHA Soft Drinks Industry S. C. runs six bottling plants as a result of this circulated questionnaires is mandatory to have uniform insight of requisition of data.

5.2 Data Analysis and Interpretation for the Survey Questionnaires

Having designed the data in to four sections: awareness of SCM, supply system, manufacturing and distribution systems, the employees were inquired to respond if they are aware of the supply chain management system, supply chain cost and inventory analysis, responsible department for this system, supply selection factors, in and out-bound logistics and its value, the extent of the plant to measure the in and out bound logistics, their distribution channel, each channels market share and factors to be

considered for the proper decision of the in and outbound logistics. Then after, the data are analyzed and interpreted as follows:

Section one: Awareness of SCM

Of the 94 employees with diploma and above diploma, 57 % the respondents believed that the supply chain management's awareness is not satisfactory (32% of them said poor; 22% of them fair and 3% of them put it with no response). However, 43 % (2% with excellent response, 16% & 25% respond very good & good respectively) of them came with a satisfactory response about their awareness to the SCM.

From the above data, one can infer that the majority of employees with diploma and above diploma do not have good awareness about SCM. This result might in turn leads to the generalization that the other staffs whose educational level is below diploma might not have a better awareness to SCM in any circumstances.

With regard to the extent of the plant to use supply chain cost analysis methods, 65% of the respondents are against the plant to use the system in a better manner (24%fair, 29% poor, and 12% with no response), whereas the remaining 35% are in favor of the plants (6% excellently, 10% very good and 19% good).

From the above data, one can conclude that the lion's share of the employees do not agree for the use of the supply chain cost analysis method in their plant.

On top of the above three questions, the respondents were requested to respond about the most responsible department/s for SCM in their plant. Plants such as NSP (44%), THP (38.1%), and Summit (50%), articulated that the procurement, production and sales departments are the most responsible division for SCM. However, this is not true for the other Plants. For Gondar & Dessie, all departments are the most responsible ones, whereas for the Bure Plant, Procurement and sales (commercial) departments are the only responsible ones for SCM.

From the above data, one can infer that there is no clear and cut demarcation for the body who is mostly responsible for the SCM at MOHA level. This in turn might indicate the low awareness level of the respondents towards SCM awareness.

Furthermore, the respondents were asked if their plants use supply chain cost analysis. 74.5% of them came with no response, whereas 22.3% indicates that they do not use the supply chain cost analysis method. Only small fingered-counted respondents (3.2%) confirmed for their usage.

In spite of this, a remarkable number of respondents (39.4%) confessed for the identification of the problems related to SCM though massive number of respondents (30.8% unable to identify, and 29.8 % with no response) is still unable to identify the problem. Of those who agreed to identify the problem, 70 % declared they do not solve the identified supply chain related problems so far.

Section 2 Supply System

With regard to this supply system, 56% of the respondents confirmed that the awareness of the staff about the in-bound logistics (material flow from suppliers to manufacturers) and its value is not good, but the rest (44 %) have better awareness.

In relation to the extent of the plant to measure the in-bound logistics, while 52% responded for the low measurement of in-bound logistics in their plants, 48 % agreed for high measurement, with ware house location, warehouse size and capacity (34% for each) and local regulations (30.9%) as factors considered for the proper distribution of the inbound logistics. On top of that 78% are in consent to have a common knowledge of their raw materials to be imported from abroad, with price (85%), quality (59%) and vendor location (51%) as their criterion for suppliers' selection respectively.

As one can see from the above data, remarkable staffs have poor awareness of inbound logistics and its value with low measurement. By and large, about 25% of them are also not aware of the fact that their raw materials (bottles, sometimes sugar) are imported form abroad though they know that price is their best selection criteria.

Section 3: Manufacturing System

In relation to the manufacturing system, the employees were inquired to list the types of products manufactured in their plant. 97% of them are aware of the fact that their plant produced Pepsi, 93% Mirinda Orange, 86% Mirinda Apple, 77% 7UP and 64% Mirinda Tonic. However, significant number of employees is not aware of that Bure Kool water, Tosa Amba Carbonated Water, and Kool Water and soft drinks with pet and keg packages are products of MOHA Soft Drinks Industry S. C.

Section 4: Distribution System

The employees were requested to respond if they are aware of the out-bound logistics and its value, the extent the plant measure the outbound logistics, their distribution channel, each channels market share and factors to be considered for the proper decision of the outbound logistics.

More than half of the employees (53%) admitted that their awareness about the outbound logistics and its value is not satisfactory. Almost 2/3 of the employees agreed to the low extent of the plant to measure the outbound logistics, with truck routes in which they are highly aware of it (93.6%), sales agent next (90.4%), and branch warehouse followed (87.3%). However, kiosks (77.7%) and depots (75.5%) are the least known distribution channels by the employees.

In relation to the market share of their channels, truck routes (30%, 51.6%, 49.4% and 41.3%) are the best distribution channel for SNP, THP, Summit and Dessie plants with a lion share in their market share. But for Gondar plant, the market share of sales agent is preferable. While branch warehouses are used as a substitution distribution channel for the former four, a truck route is for the later. Finally, according to the respondents, the plants used warehouse location (39.4%), warehouse size and capacity (38.3%), contract carriers (34%), local regulation (33%), and number of warehouse (33%) as their best factors to be considered for proper decision of the outbound logistics.

Having understanding the result of the pre-questionnaire survey that the staff hardly grasps the supply chain management system, morning session briefing was undertaken by the researcher for 15 minutes for two days at their plants, such as Gondar, Bure and Dessie Pepsi Plants. Moreover, small group discussion for each department of MOHA SISC Plants is undertaken.

5.3 Data Analysis and Interpretation for the Model

The results of the statistical analysis are applied in the analysis of the model in chapter seven. Besides, the result of the survey findings is used in the different chapter of the thesis. For details, the summaries of survey questionnaires and structured interviews are reported in the appendix 9 & 10. Finally, the results are interpreted and used to develop the model of SCMS for the case study and for the Ethiopian Soft Drinks Industries.

CHAPTER SIX

Model Development of Supply Chain Management System

Because of the inherent complexity of decision making in supply chains, there is a growing need for modeling supply chain system with different methodologies. A large number of Ethiopian Processing Industries like Soft Drinks Industries and Service Organizations are therefore seeking modeling systems that can help, identify and implement strategies for designing and improving their supply chain networks.

Developing a supply chain management system requires the analysis of the flow of materials from the initial sourcing to the final end customers.

6.1Material Flow System

Every manufacturing system has its own material flow system (MFS) in order to collect raw materials from geographically dispersed vendors and distribute finished products to customers at a widely dispersed geographical location.

Materials, in the process of passing through a materials flow system are either *in transit* through various transportation modes, or are waiting in areas which may be called *stores*. [22, 29]

Assumptions in developing the material flow model

- Materials can pass through a number of tiers of suppliers with some value addition. But, single tier of suppliers is assumed under this thesis. Extending the model can be possible in order to treat a multiple tier of suppliers system.
- Manufacturing firm can directly import raw materials or can have the raw materials from the source. But for this thesis work it is assumed that, raw materials are purchased either from the import suppliers or domestic vendors and stored in raw material warehouse to supply for the manufacturing system.
- Entry into the MFS takes place at any vendor's plant or point of sale. This cut-off point is usually sufficient for analysis for most purposes. On the other hand, exit from the system takes place wherever the materials are finally consumed.
- Finished products can pass through a number of stages before reaching to customer or may be directly sold to the local from the central full store.

6.2 Terminologies and Assumption for Model Analysis

6.2.1 Terminologies

The following terms were important in analysis of the model.

a) Nodes

These are essentially storage areas where materials:

- ❖ Wait for demand to occur;
- ❖ Wait while production or conversion activity is carried out;
- ❖ Wait for some specific node activity such as custom clearance, freight consolidation or break-bulk, inspection, loading etc...

The nodes, as stores, serve the following functions in the MFS:

- ❖ Isolate the demand side from supply side and prevents system breakdown due to differing demand/supply rates and uncertainty factors;
- ❖ Act as combiners of flows or divider of flows;
- ❖ Act as phase change point for a flow, i.e. receive multi-phase supplies and issue in single phase lots;
- ❖ Act as frequency change point, for the flow, i.e., receive at one batch frequency, issue of another.

There are five different types of nodes, which constitute a supply chain.

I. **Source Nodes (SN):** The nodes where material enters the system; these are usually vendor plant location or vendor warehouse.

II. **Exit Nodes (EN):** The nodes where material leaves the system. These are usually customer's delivery areas. However, it is possible that exit nodes may be within the subject firm.

III. **Mother Node (MN):** These are nodes where the materials undergo production /conversion activity. These can be within or without a subject firm.

IV. **Master Node (MaN):** There is only one master node for each supply system and that is the node where all supply chains terminates, i.e., central full store (CFS).

V. **Storage Node (StN):** These nodes are areas where material simply waits, without any conversion activity.

b) Flow paths

These are route/mode combinations between two nodes through which the material moves. Materials can move between two nodes A and B by rail, road, sea, air, courier etc. Conceptually, each transport mode between nodes A and B constitutes a different flow path, and has a different cost and transit time. Generally there are two types of flow paths:

I. **Normal Flow Paths**: These are flow paths along which the movement or flow of material is not impeded by barriers, which have extra cost and time implications, in addition to the usual freight and insurance costs.
II. **Barrier Flow Paths**: These are flow paths across which barriers exist, to impede flow and have additional cost and time implications.

c) Chain link

The basic building blocks of supply chains are chain links. A chain link is two nodes connected by a flow path. The supply chain will usually consist of one or more chain links. [22, 29]

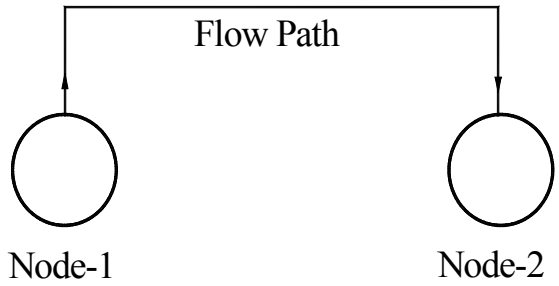


Figure 6-1: Chain Link

6.2.2 Assumptions

The following assumptions are taken into consideration for the analysis of supply chain systems.

I. Material flows go through the MFS from source nodes to exit nodes, while cash flows take place in the reverse direction, i.e. from exit nodes to source nodes. On the other hand the flow of information is assumed to be in both directions i.e. from source node to exit node and vice versa.

II. For each item of material requirement, a unique supply chain can be identified. The items supply chain maps, the nodes and flow paths through which the material enters the MFS, moves through and exits the system. Each supply chain is a unique combination of material, nodes and flow paths.

III. There are essentially two types of costs in supply chain system, one stream of costs due to *information flows* and the other due to *material flows*. The cost due to information flow is low as compared to material flow and therefore in this thesis more emphasis is given to material flow costs.

6.3 Principles for Model Analysis

The achievement of supply chain objectives (profitability, high asset turnover and high level of customer service) is directly related to the efficient management of costs, inventory and time. Therefore, supply chain has three specific techniques for each of these resources. [29]

i) Supply Chain Cost Analysis (SCCA)

The primary process of material flow through the MFS involves the expenditure of costs at each and every node and flow path of the supply chain. Whether the expenditure /cost is justified or not depends upon careful design of the supply chain system. However, it is extremely important to note that cost will be incurred at each node or flow path.

At each node/flow path, costs incurred due to materials flow fall into one or more of the following categories.

a) **Input Node Cost (INC):** These costs are incurred only at source nodes of a supply chain and constitute the ex-works price paid to the vendor.
b) **Flow costs (FC):** These costs are incurred only along flow paths and include freight costs, and transit insurance costs etc.
c) **Barrier costs (BC):** These costs are incurred only at a barrier along the flow path, causing a node to appear due to the barrier. These costs includes sales tax, excise tax, custom duties etc.
d) **Node Activity Costs (NAC):** There are a large variety of NAC which are possible at a node. However, it is not necessary that all of them occur at all nodes. The kind of NAC at a node depends primarily upon the nature of the node. Some of the NAC which may appear in an analysis of supply chain cost are:

- Delay cost
- Custom clearance or barrier clearance cost
- Bonding/de-bonding costs at bonded warehouse
- Loading/unloading or material handling costs
- Damage/transit damage costs

- Inspection costs at inspection nodes, or quality system and surveillance costs
- Processing costs at mother nodes
- Cost due to scrap/reject or loss of yield
- Insurance costs,
- etc…

The above mentioned costs give a flavor of the range of costs which are possible and must be included in cost analysis to get a true picture of ultimate cost to the subject firm. It is absolutely essential to consider all costs along the supply chain to arrive at the correct picture of costs.

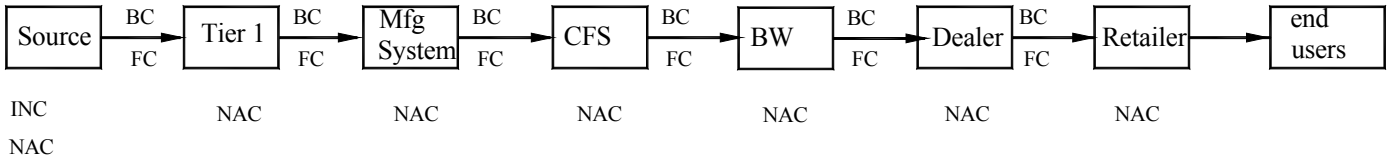


Figure 6-2: Different Costs within the Supply Chain System

Table 6: 1: *Matrix for Supply Chain Analysis*

Node No.	***INC***	***NAC***	***BC***	***FC***	***Total***
1					
2					
3					
4					
5					
.					
.					
.					
Total	$\sum INC$	$\sum NAC$	$\sum BC$	$\sum FC$	*SCC*

For each unique supply chain, a unique supply chain cost (SCC_j) can be defined as:

$$SCC_j = \sum_{i=1}^{m} INC_i + \sum_{i=1}^{n} FC_i + \sum_{i=1}^{p} BC_i + \sum_{i=1}^{q} NAC_i + \sum_{i=1}^{r} CTU_i \quad (5.1)$$

Where;

m = Number of input nodes

n = Number of flow paths

p = Number of barrier flow paths

q = Number of intermediate nodes

r = Number of nodes/ flow paths where CTU is occurred

INC_i = Input node cost

FC_i = Flow cost

BC_i = Barrier cost

NAC_i = Node activity cost

CTU_i = Capital tie- up cost

Note that capital tie-up costs (CTU) are costs incurred if material spends more time in the supply chain than the credit period offered. It is defined as:

$$CTU_j = V \times R \times d_j \quad (5.2)$$

Where:

CTU_j = Capital tie-up cost at the j^{th} node/ flow path

V = The amount of capital (usually the price to vendor plus any non-credit costs incurred)

R = Rate of capital cost

d_j = Time period at the j^{th} node after credit period has expired

The concept of supply chain cost measures the total ultimate cost of material to a subject firm arising due to the particular supply chain in question. It is obvious that the structure of the supply chain will determine supply chain cost and any modification of supply chain structure will affect the supply chain cost.

The stage by stage analysis necessitated by SCCA models the material flow or the supply process, and reveals hidden material and supply costs which may not be obvious and may be misallocated by traditional cost accounting systems. SCCA introduces a transparency or clarity, which may not be available to managers operating under information generated by standard accounting systems.

The five costs are calculated and enumerated for each node and flow path in the supply chain. During the analysis, some methodological issues are important:

a) Supply chain analysis considers a large variety of costs as forming part of a single cost. It is extremely important to normalize them to a single unit of measure. Suggested units of measure are cost/unit of material or cost/batch of materials.

b) The nature of costs involved in SCCA is such that they may vary with number of units, quality or weight or the batch size. This is due to the fact that costs have fixed and variable or semi-variable components and can vary with batch sizes or batch frequencies considered.

c) There is a problem of double counting of costs. For supply chains which share a common node such as the mother node, the costs which are incurred at the common node have to be allocated to the various supply chains passing through. For example, the processing cost at a mother node has to be allocated to individual supply chains. This allocation may be done on the basis of number of supply chains sharing a node and on the basis of value represented by each supply chain.

If SCC_j represents the cost of the j^{th} supply chain cost, then the total supply system cost $(TSSC)$ can be defined as;

$$TSSC = \sum_{j=1}^{n} SCC_j \qquad (5.3)$$

ii) Supply Chain Inventory Analysis (SCIA)

If the MFS is to meet demand in the shortest possible time, it is necessary that inventory must be carried at the nodes constituting the MFS; otherwise demands may go unmet for longer periods of time. Therefore, it is essential for the MFS, and the supply chain constituting it, to carry inventory at its nodes and flow paths. At any given point of time, a supply chain may have inventory at its nodes and flow paths. [29]

The basic objective of SCIA is to design supply chains in consonance with a target level of customer service and system and supply chain inventories. The optimization of node/ flow path inventory levels will ensure smooth operations.

Supply chain inventory (SCI_k) for k^{th} supply chain, can be defined as;

$$SCI_k = \sum_{i=1}^{n} IN_i + \sum_{j=1}^{m} IF_j \qquad (5.4)$$

Where;

IN_i = Inventory at i^{th} node of the supply chain

IF_j = Inventory at j^{th} flow path of the supply chain

n, m = The number of nodes and the number of flow paths respectively

Similarly, the total system inventory (TSI) is defined as:

$$TSI = \sum_{k=1}^{p} SCI_k \qquad (5.5)$$

Where the supply system consist of p supply chains.

The primary problem of inventory management is to maintain optimal inventory levels at various flow paths and nodes in line with demand rates and the uncertainties associated with them.

iii) Supply Chain Time Analysis (SCTA)

The supply system has two dimensions for time associated with each node, flow path and the total system. The first dimension is related to the time taken to satisfy a demand and is designated as supply system response time (SSRT). SSRT is the difference or time elapsed between notice of a demand and arrival of material to meet demand. The second dimension is related to task performance by each node and flow path. Each node and flow path has a characteristic task performance cycle time associated with it. This is called the node cycle time (NCT_i) for the i^{th} node and flow path cycle time (FCT_j) for the j^{th} flow path.[29]

Therefore the supply chain cycle time $(SCCT)$ is defined as the sum total of time a batch of material takes to move through the supply chain as follows:

$$SCCT = \sum_{i=1}^{n} NCT_i + \sum_{j=1}^{m} FCT_j \qquad (5.6)$$

where a supply chain has n nodes and m flow paths.

It is obvious that only under special conditions will a customer wait for the duration of the supply chain cycle time for his demand to be met. The objective of customer service demands that SSRT be as close to zero as possible. If TSI/SCI tends to zero then SSRT approaches the maximum SCCT amongst all supply chain cycle times.

Although the performance measurements for supply chain are cost, inventory and time, under this thesis, more emphasis is given to cost. Minimizing cost can be achieved through various reasons like elimination of unnecessary nodes or flow paths. Therefore, concentrating on cost minimization has direct impact on the other performance measures for supply chain i.e. inventory turn over rate and supply chain response time.

The basic objective of any supply chain system is to ensure effective utilization of the three resources- cost, time and inventory. Therefore, in order to achieve these objectives, properly developed model for the analysis of each parameter is essential.

The model developed under this thesis tries to achieve the above-mentioned objectives giving more emphasis to supply chain cost. Besides the analysis of the cost, inventory and time for a

given supply chain system, this model tries to generate different alternatives and suggest a means to select the optimal solution for the supply chain problem.

This model can be applied either for the development of the new supply chain system or for an improvement of the existing system. As an application for the existing system, the model is used to evaluate the performance of the existing system and tries to identify the areas of improvement. On the other hand, the model can also be applicable for the development of new supply chain system from scratch by generating different alternatives.

The following procedures are important in order to apply the model either for the existing system or for developing a new system.

1. Develop material flow system for the supply chain with network representation.
2. Identify the different nodes and develop nodal representation for the material flow
3. Generate as many alternatives as possible.
4. Calculate the cost, inventory and time for each alternative.
5. Select the alternative with optimal cost, time and inventory.

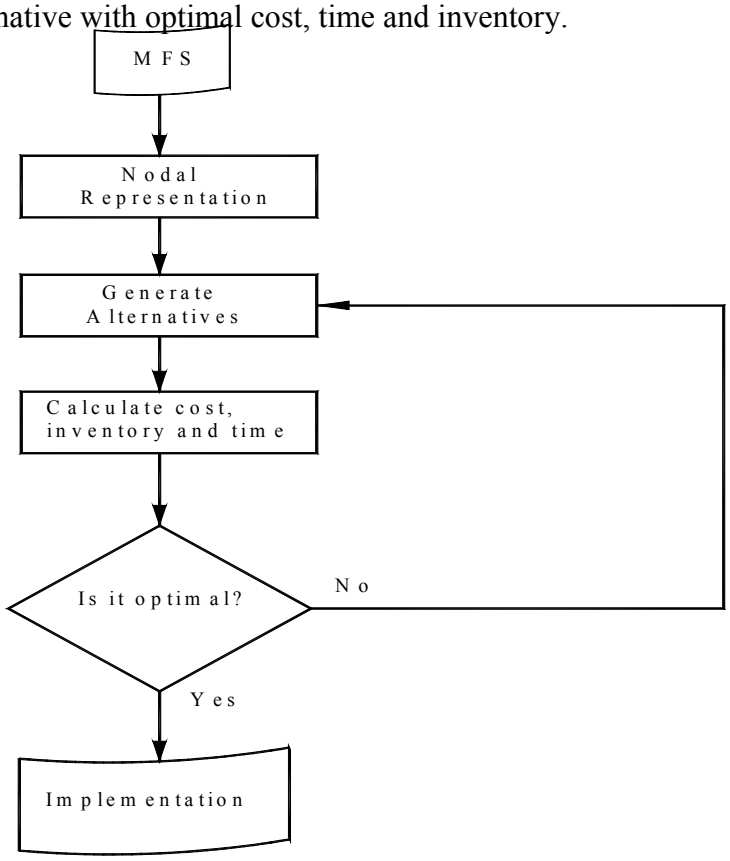


Figure 6-3: Flow Diagram for Application of the SCM Model

6.4 Proposed Model Development of SCMS for the Ethiopian Soft Drinks Industries

The following each model drawn from figure 6-4 to 6-20 has three systems; namely:

1. Supply system
2. Manufacturing system
3. Distribution system

1. The supply system includes sourcing suppliers (local and foreign suppliers), packing, indirect, and direct raw materials stores, water treatment section, and syrup preparation section
2. The manufacturing system consists of four major processes. These are bottles washing processes, water treatment process, syrup manufacturing process, and carbonation process.
3. The distribution system comprises different distribution channels. These are central full stores, branch warehouses, depots, sales agent, kiosks, door to door or truck routes, plant sales, dealers, retailers and end users(consumers)

The East Africa Bottling S.C. (Coca-Cola) uses bottles and Glasses manufactured from Addis Bottles and Glass Factory whereas the MOHA SISC imports and uses glasses manufactured in United Arab Emirates. The East Africa Bottling S.C. manufactures and uses its own CO_2 gas but all the plants under MOHA SISC use the CO_2 gas manufactured at Nefas Silk CO_2 Plant; however, the Summit plant rarely uses the CO_2 gas, when there is a problem with regard to CO_2 production, produced in Nefas Silk CO_2 Plant because it can produce its own CO_2.

With regard to sugar use, both soft drinks companies use sugar from abroad and local. From abroad, they import it from European Economic Corporation grade 2 and from local, they use sugar from Wonji sugar factories than Metehara and Fenchie sugar factories because of quality and proximity (short delivery time). The reason for importing and using a sugar from abroad is for blending purpose because the imported sugar has high quality so that it can meet need for soft drink specification.

Both companies use different chemicals from local and abroad. They use different chemicals from local like Hydrated lime, Alumnium sulphate and Sulphuric acid from Awash Melekasa

Alumnium sulphate and Sulphuric acid S.C.. Both use Caustic Soda Liquid from Caustic Soda S.C. Similarly, both uses other chemicals like common salt from local suppliers.

There are also chemicals which are imported and used by both companies like Activated Carbon from Norite; Calcium Hypochlorite, Amberlite, Hyflo Supercell. P_3 Componenta and others from Bolvines Chemical Limited; Caustic Soda Flakes, MonoEthanol amine, P_3 Descaler from Sap International Coroporation; however, MOHA SISC imports and uses concentrates from Ireland Pepsi Cola International whereas East Africa Bottling S.C., imports and uses concentrates from Coca Cola International and it is the difference in the of concentrate that results in a difference flavour.

In relation to Crown Corks, both companies use local product from Ethiopian Crown Corks and Can Factory. Incase of Plastic crates, MOHA SISC use s plastic crates from Summit (SEPCO) but EABSC uses plastic crates from Ethiopian Plastic Factory.
Both uses water supplied by the Municipalities in different cities (Addis Ababa, DireDawa, Gondar, Bure, and Dessie). In both companies cases water is treated though the use of different chemicals mentioned above. This treated water together with the concentrates and the treated sugar make up syrup. Moreover, the treated water is used for bottles washing.

In the manufacturing system, the syrup, treated water and CO_2 gas are pumped through the use of different size of pipes and filled into different brands of soft drinks glasses, PET bottles and keg. These filled glasses and PET bottles are sealed with different brands of Crown Corks. After this, labeling and issuing of expired date are done.

The final product is stored in central full store. Then it is distributed to branch warehouses, depots, sales agents, kiosks, door to door and plant sales. The product from warehouses is distributed to dealers, then to retailers and finally to consumers but from plant sales, door to door, depots and sales agents, the product is distributed to the retailers and then to consumers. There is also a case where the product is addressed directly to the end users (consumers) from door to door, depots and sales agent. In the case of kiosks, the product is directly addressed to the end users.

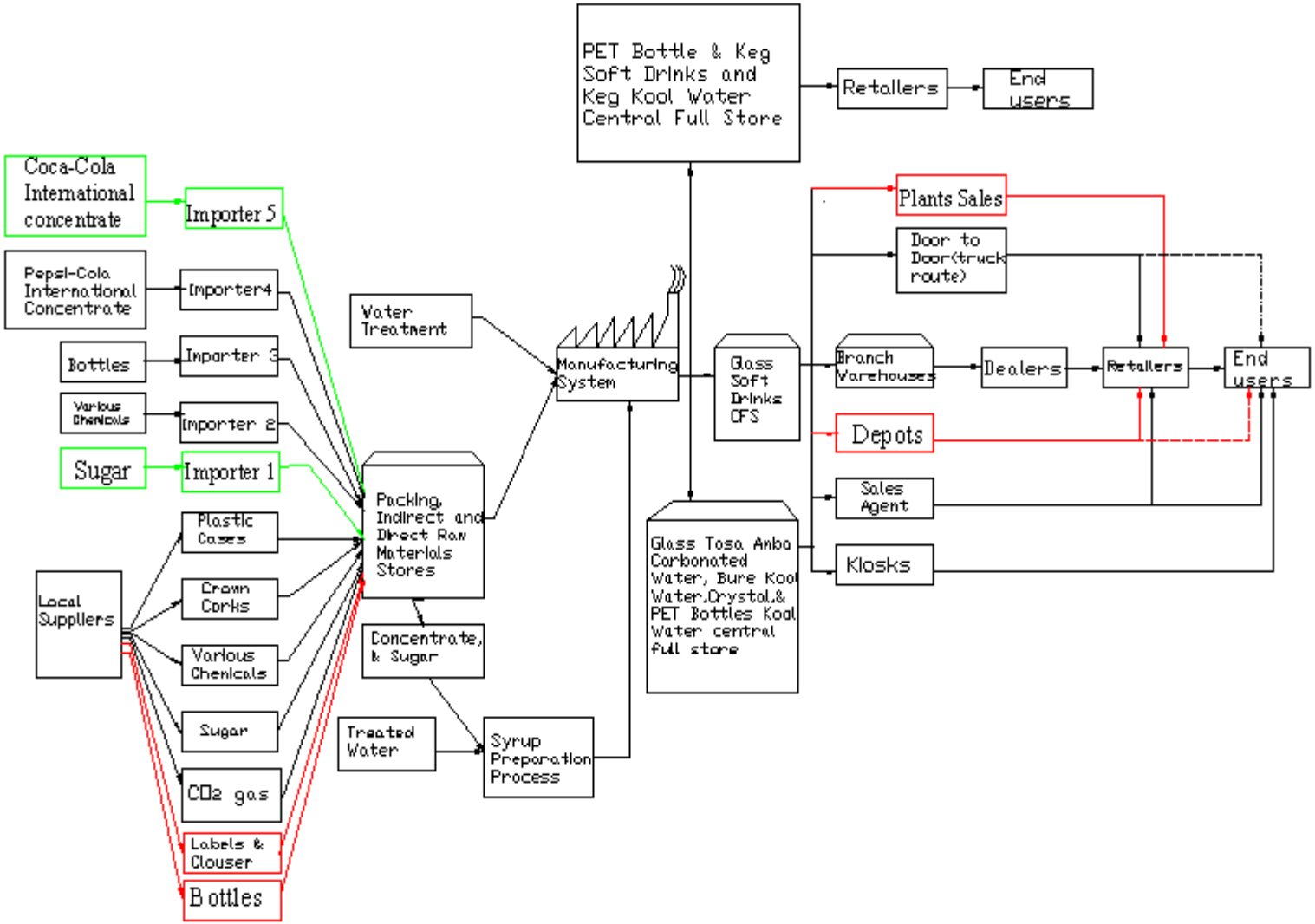


Figure 6-4: Existing Material Flow System for Ethiopian Soft Drinks Industries

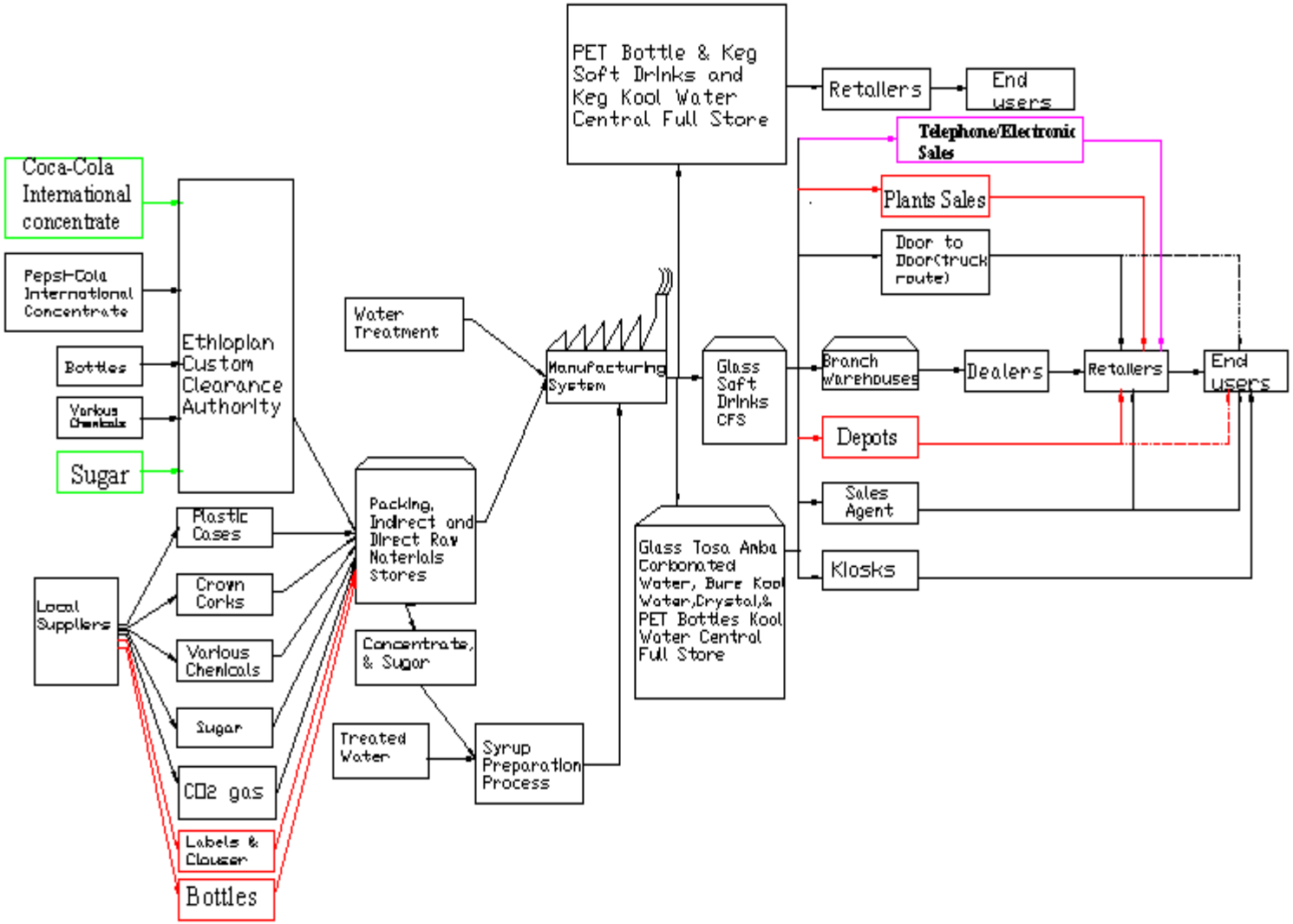


Figure 6-5: Proposed Model of SCMS for Ethiopian Soft Drinks Industries

6.5 Proposed Model Development of SCMS for MOHA SISC

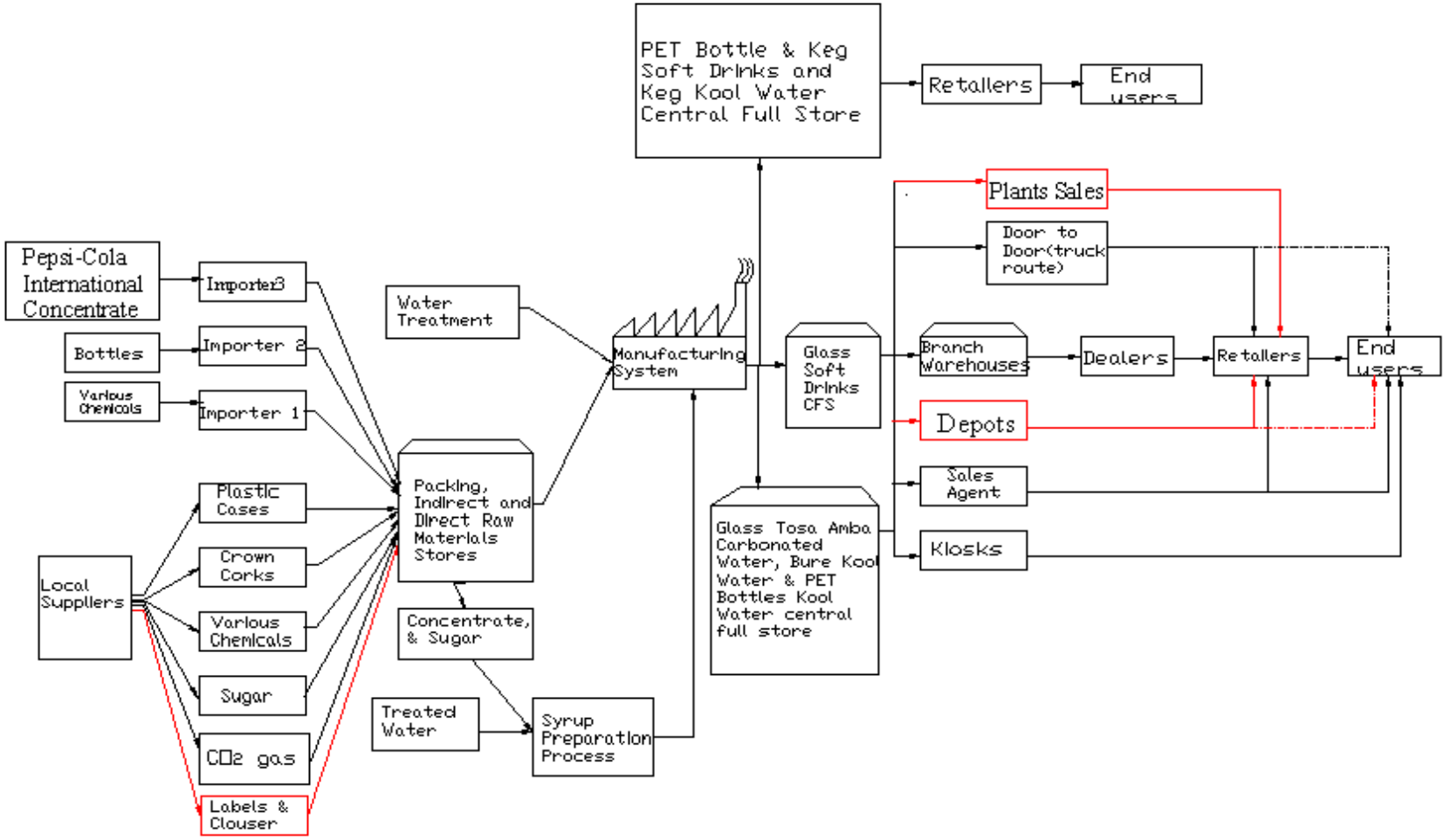


Figure 6-6: Existing Material Flow System for MOHA Soft Drinks Industry S. C.

Figure 6.4 shows the existing material flow system for Ethiopian Soft Drinks industries S.C. According to the flow system, imported raw materials, (such as bottles, various chemicals, sugar, Coca-Cola concentrates, and Pepsi- Cola concentrates) and locally produced raw materials, (such as plastic cases, crown corks, various chemicals, sugar, carbon dioxide gas, labels and bottles) are put into stores to transport them directly into the manufacturing system through roller-conveyer. However, raw materials such as concentrates, sugar and various chemicals are placed in syrup preparation room before moved to the manufacturing system through pipeline. All the raw materials are, then after, processed into finished products in this system to be distributed to end users through different channels (branch warehouses, depots, sales agent, kiosks, door to door or truck routes, plant sales, dealers, and retailers).

The proposed model, in Figure 6.5, reveals three systems: Supply system, manufacturing system and distribution system. The supply system includes sourcing suppliers (local and foreign suppliers), packing materials' stores, direct and indirect raw materials stores, water treatment section, and syrup preparation section. Under the manufacturing system, there are bottles washing processes, water treatment process, syrup manufacturing process, and carbonation process. The third system comprises different distribution channels (branch warehouses, depots, sales agent, kiosks, door to door or truck routes, plant sales, dealers, and retailers), central full stores and end users (consumers).

The proposed model differs from the existing material flow in that the imported raw materials are passing through Ethiopian Custom Clearance Authority, and the model uses additional distribution channels such as, direct sales using telephone and other electronic channels.

Unlike EABSC, MOHASISC imported bottles from United Arab Emirates and concentrates from Ireland Pepsi-Cola International.

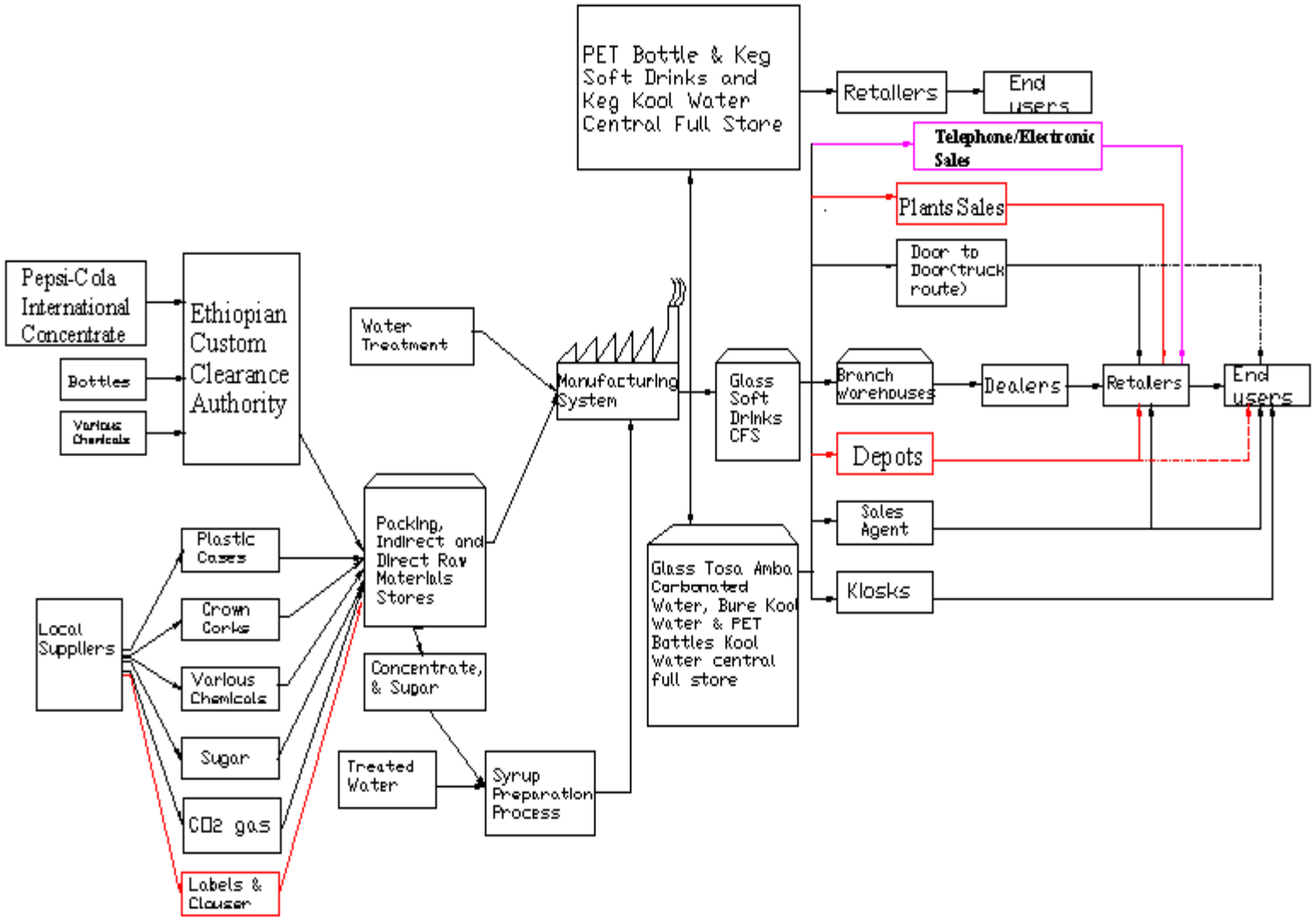


Figure 6-7: Supply Chain Model for MOHA Soft Drinks Industry Share Company

6.5.1 Model Development of SCMS for Nefas Silk Pepsi Plant

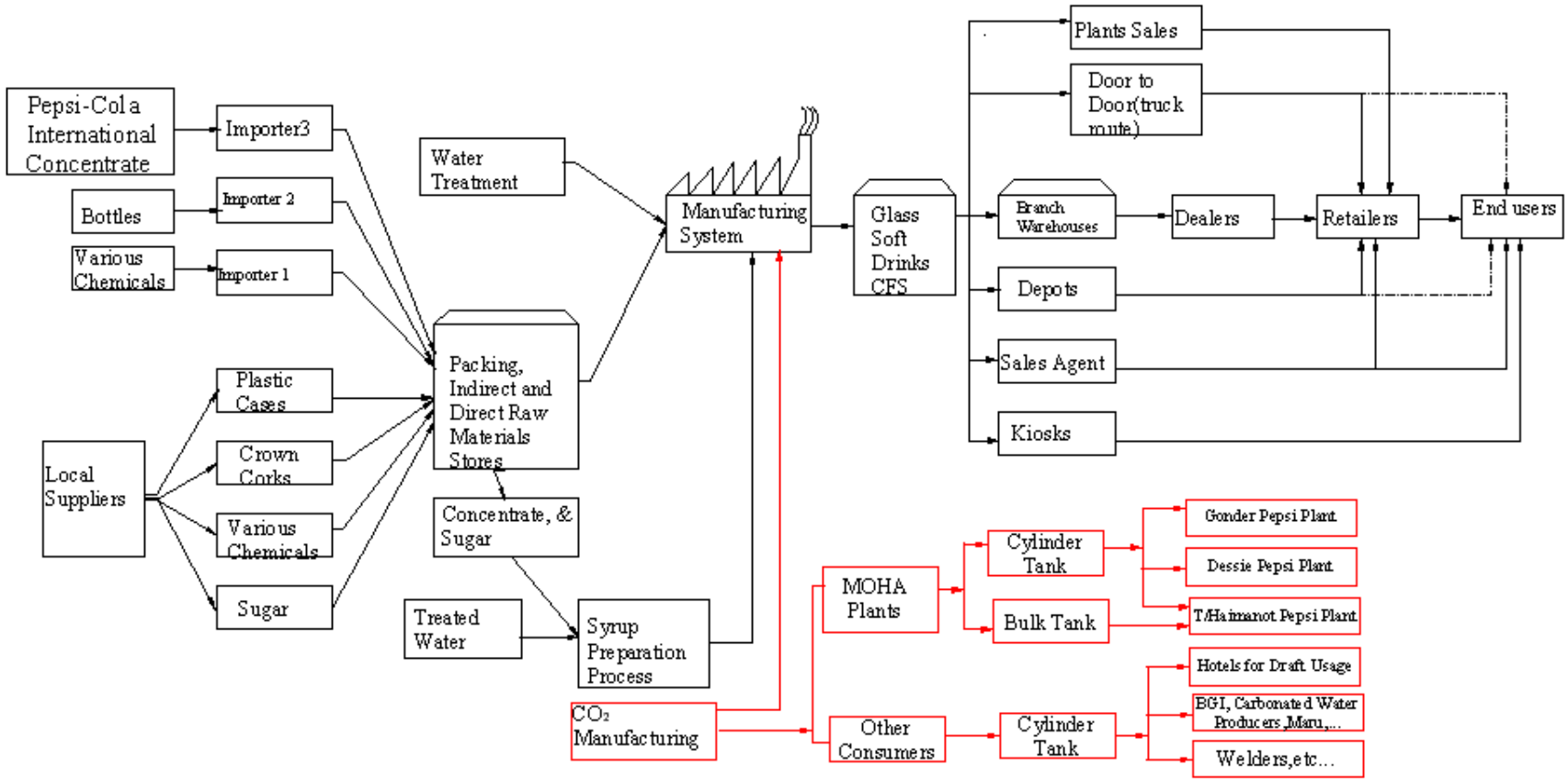


Figure 6-8: Existing Material Flow System for MOHA SISC Nefas Silk Plant

The material flow of NSP difference with the other MOHA SISC Plants are besides the soft drinks NSP manufactured and sale CO_2 gas to other MOHA SISC plants and other consumers in bulk and cylinder tank. Besides, CO_2 gas is transported through pipe lines directly from CO_2 manufacturing section. Moreover, unlike the other MOHA SISC Plants, NSP do not use Bottles and Crown corks of 7UP and Mirinda Tonic brands.

The proposed SCMS model for NSP differs from the existing material flow by the proposed new channel (direct sales using telephone and electronic channel) and the imported raw materials are passed through Ethiopian Custom Clearance Authority.

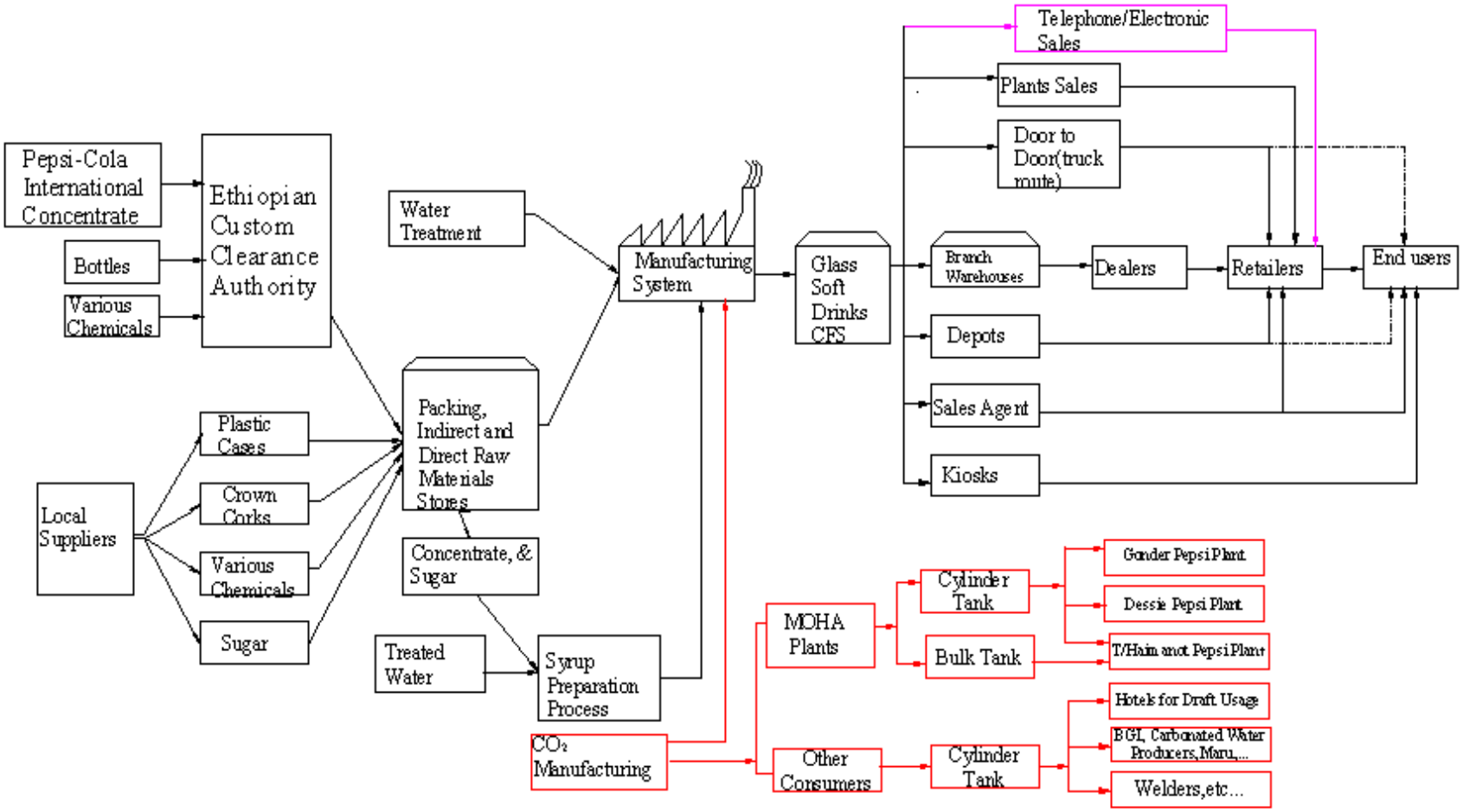


Figure 6-9: Supply Chain Model for MOHA SISC Nefas Silk Plant

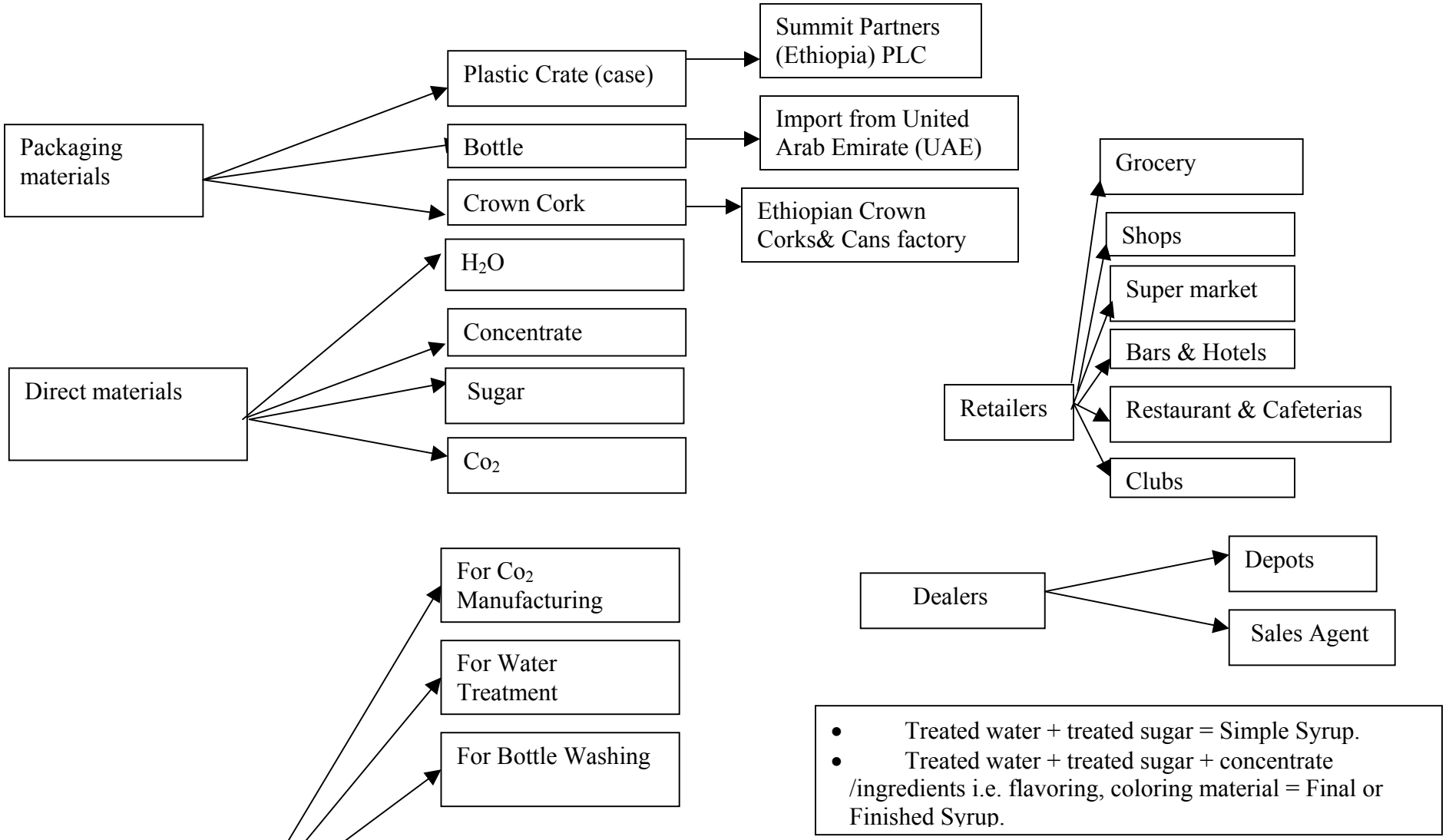


Figure 6-10: Description for the Supply Chain Models

6.5.2 Model Development of SCMS for Teklehaimanot Pepsi Plant

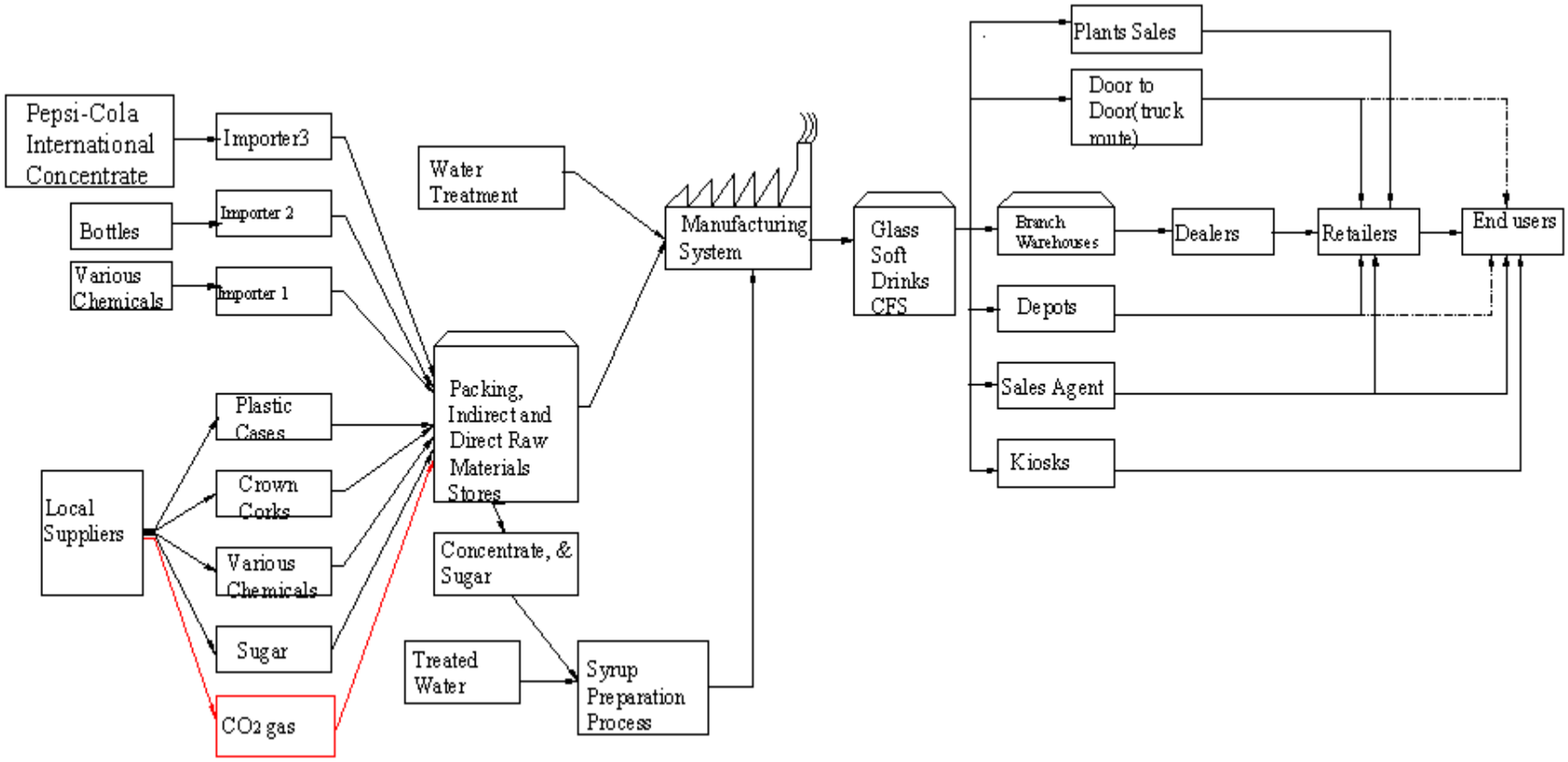


Figure 6-11: Existing Material Flow System for MOHA SISC Teklehaimanot Pepsi Plant

The existing material flow differ from the other sister plants by transportation of CO_2 gas. It is transported through bulk tank and sometimes in cylinder tank. Unlike NSP, THP uses all soft drinks brands (7 UP, Mirinda Apple, Mirinda Tonic, Orange and Pepsi) of Bottles and Crown corks.

The proposed SCMS model for THP differs from the existing material flow by the proposed new channel (direct sales using telephone and electronic channel) and the imported raw materials are passed through Ethiopian Custom Clearance Authority.

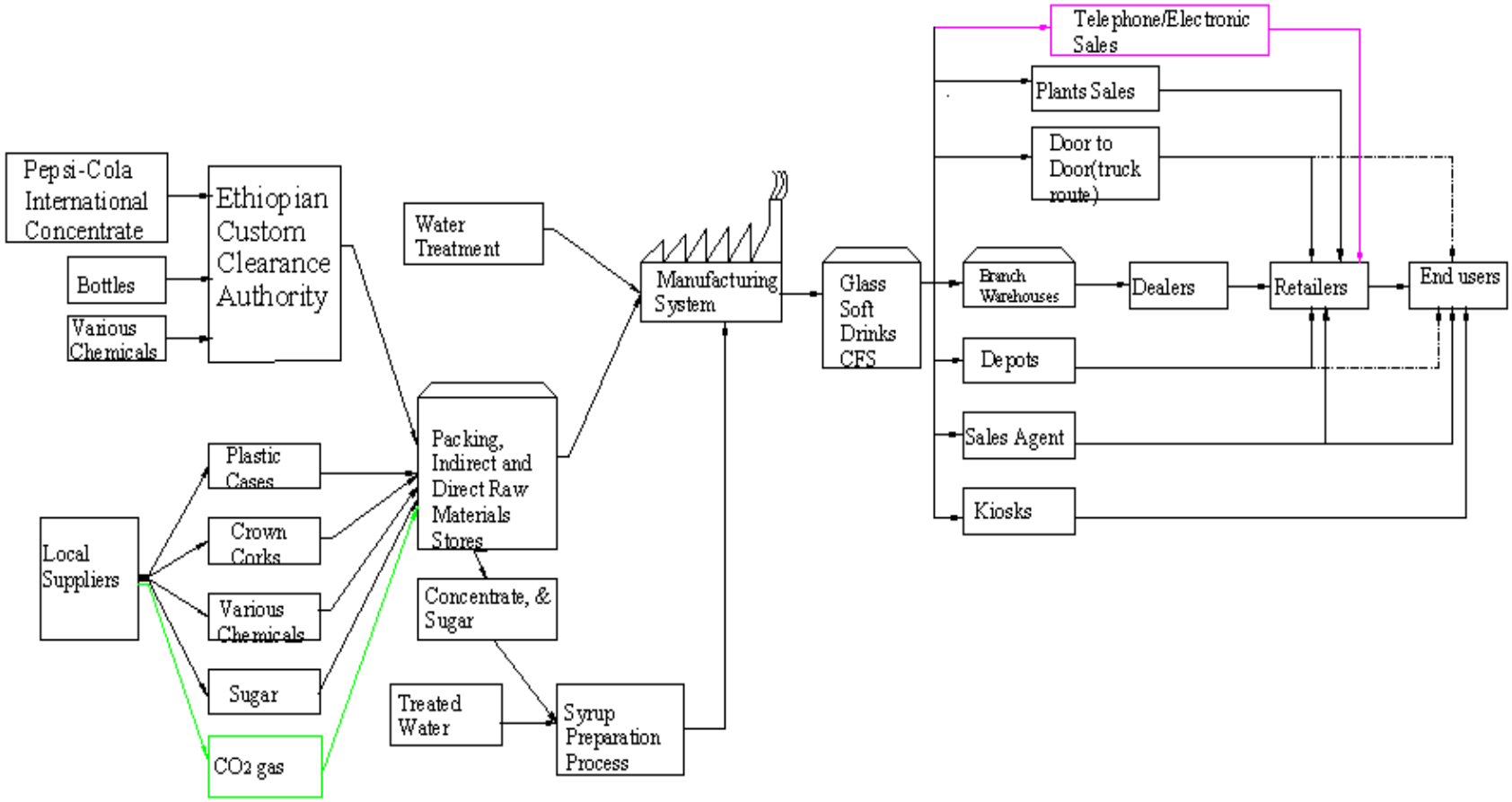


Figure 6-12: Supply Chain Model for MOHA SISC Teklehaimanot Pepsi Plant

6.5.3 Model Development of SCMS for Gondar Pepsi Plant

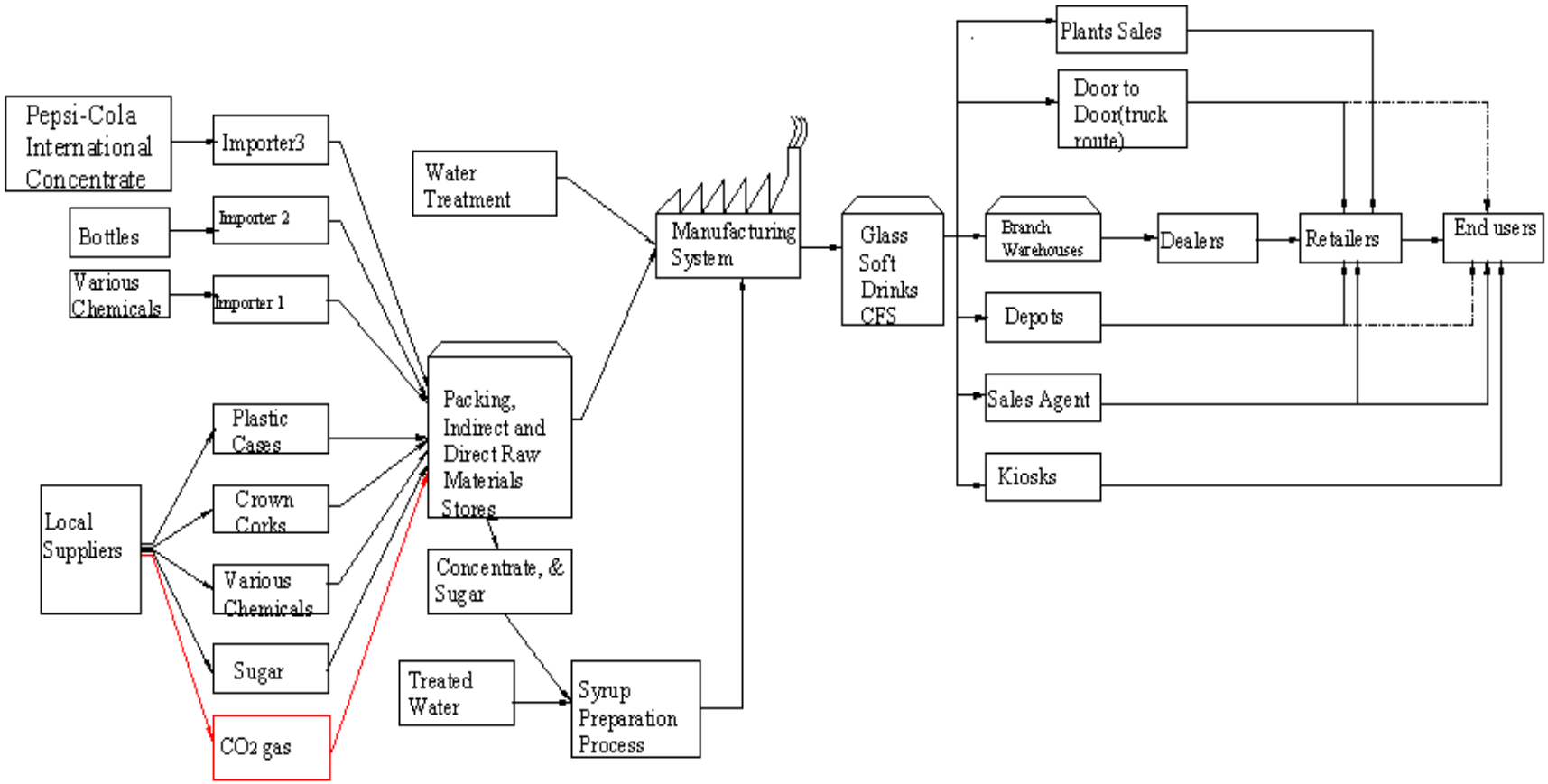


Figure 6-13: Existing Material Flow System for MOHA SISC Gondar Pepsi Plant

The existing material flow of Gondar Pepsi Plant differs with NSP and THP by transportation of CO_2 gas. It is transported and used by cylinder tank.

The proposed SCMS model for Gondar Pepsi Plant differs from the existing material flow by the proposed new channel (direct sales using telephone and electronic channel) and the imported raw materials are passed through Ethiopian Custom Clearance Authority. Besides, it has an access to buy CO_2 gas from Gondar Dashen Brewery.

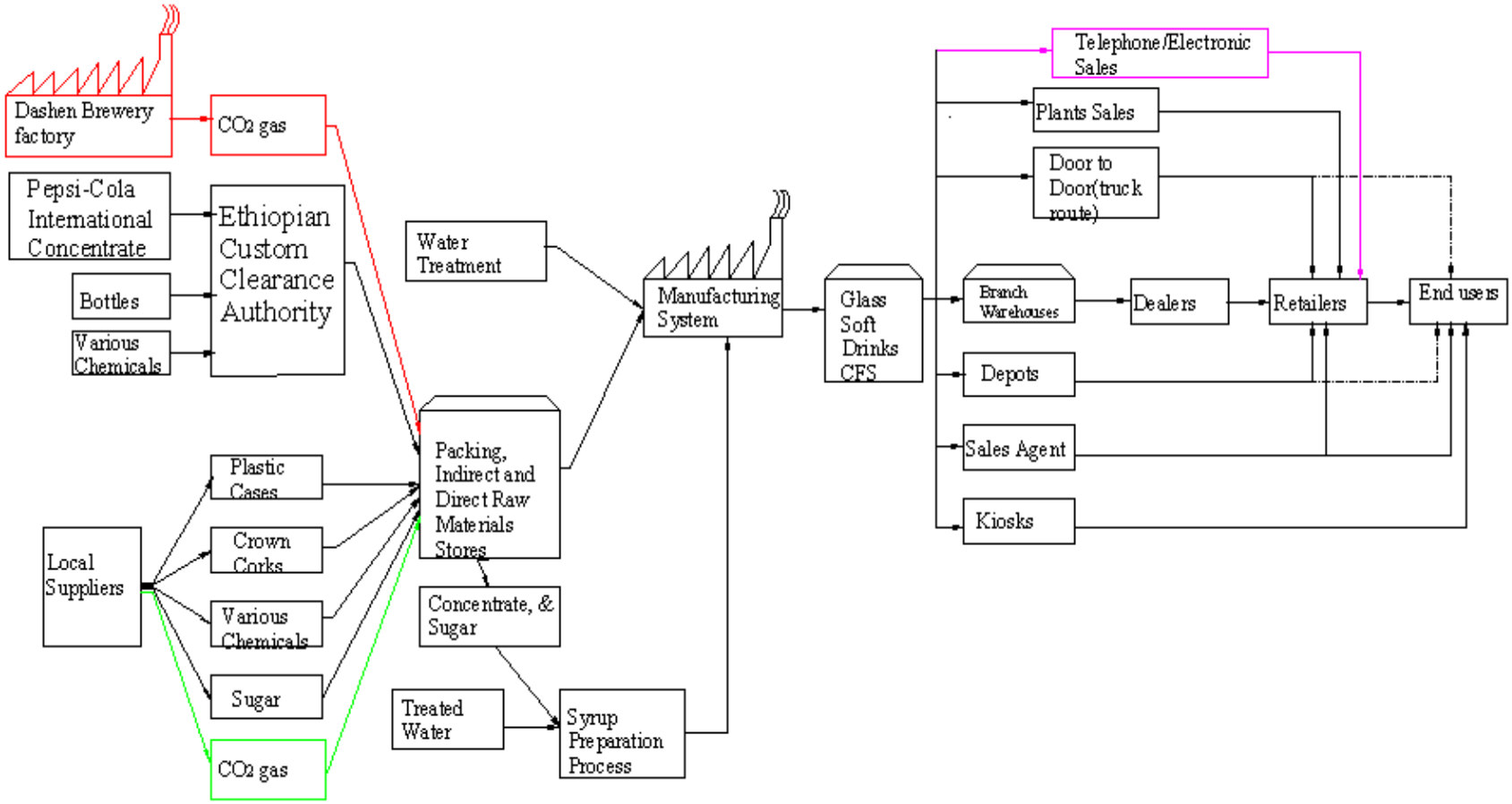


Figure 6-14: Supply Chain Model for MOHA SISC Gondar Pepsi Plant

6.5.4 Model Development of SCMS for Bure Pepsi and Kool water Plant

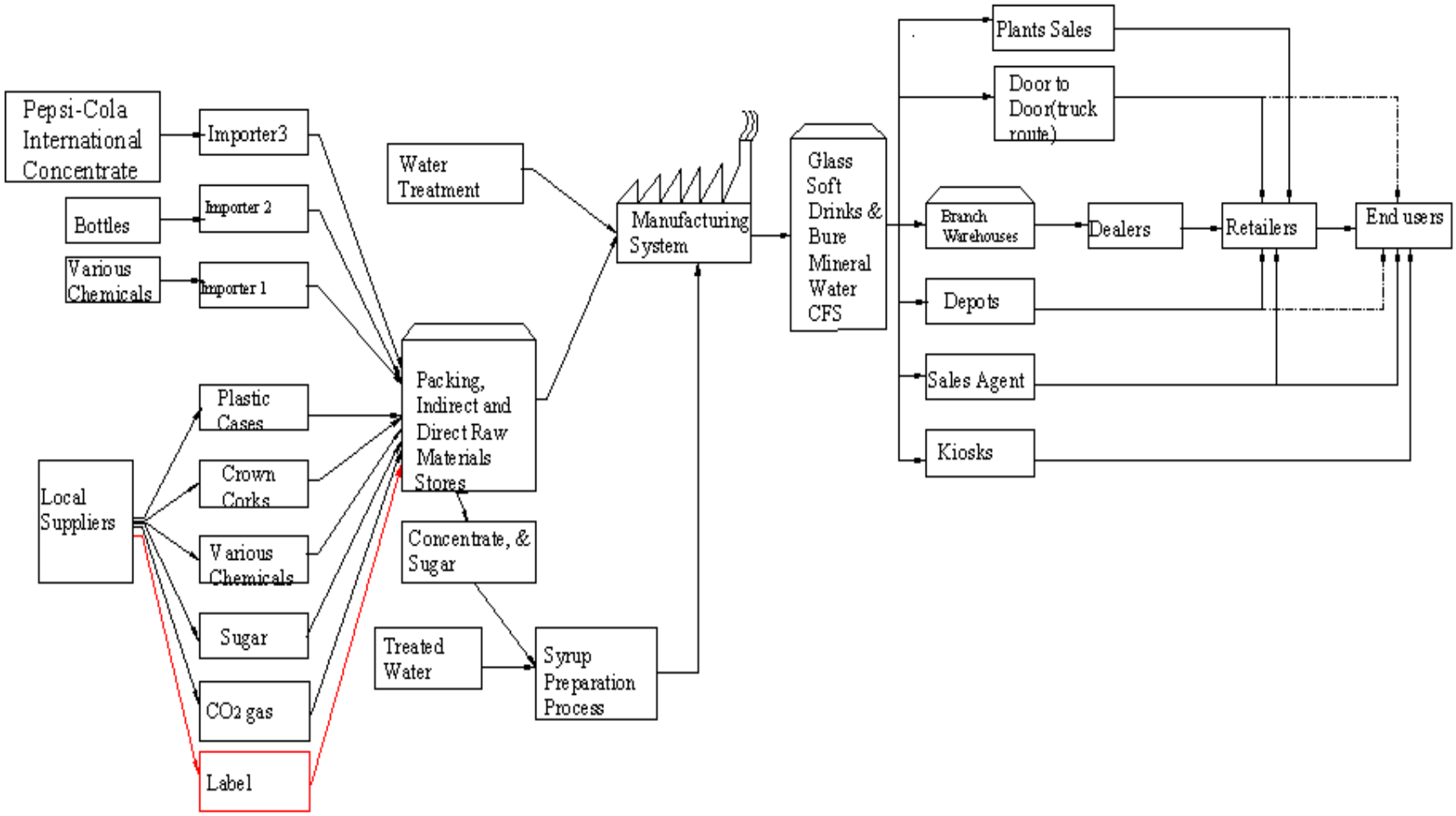


Figure 6-15: Existing Material Flow System for MOHA SISC Bure Pepsi & Kool Water Plant

The existing material flow of Bure Kool Water and Pepsi Plant differ from the other sister plants in kool water packaging material (labels) due to additionally produced Bure kool water.

The proposed SCMS model for Bure Kool Water and Pepsi Plant differs from the existing material flow by the proposed new channel (direct sales using telephone and electronic channel) and the imported raw materials are passed through Ethiopian Custom Clearance Authority (ECCA).

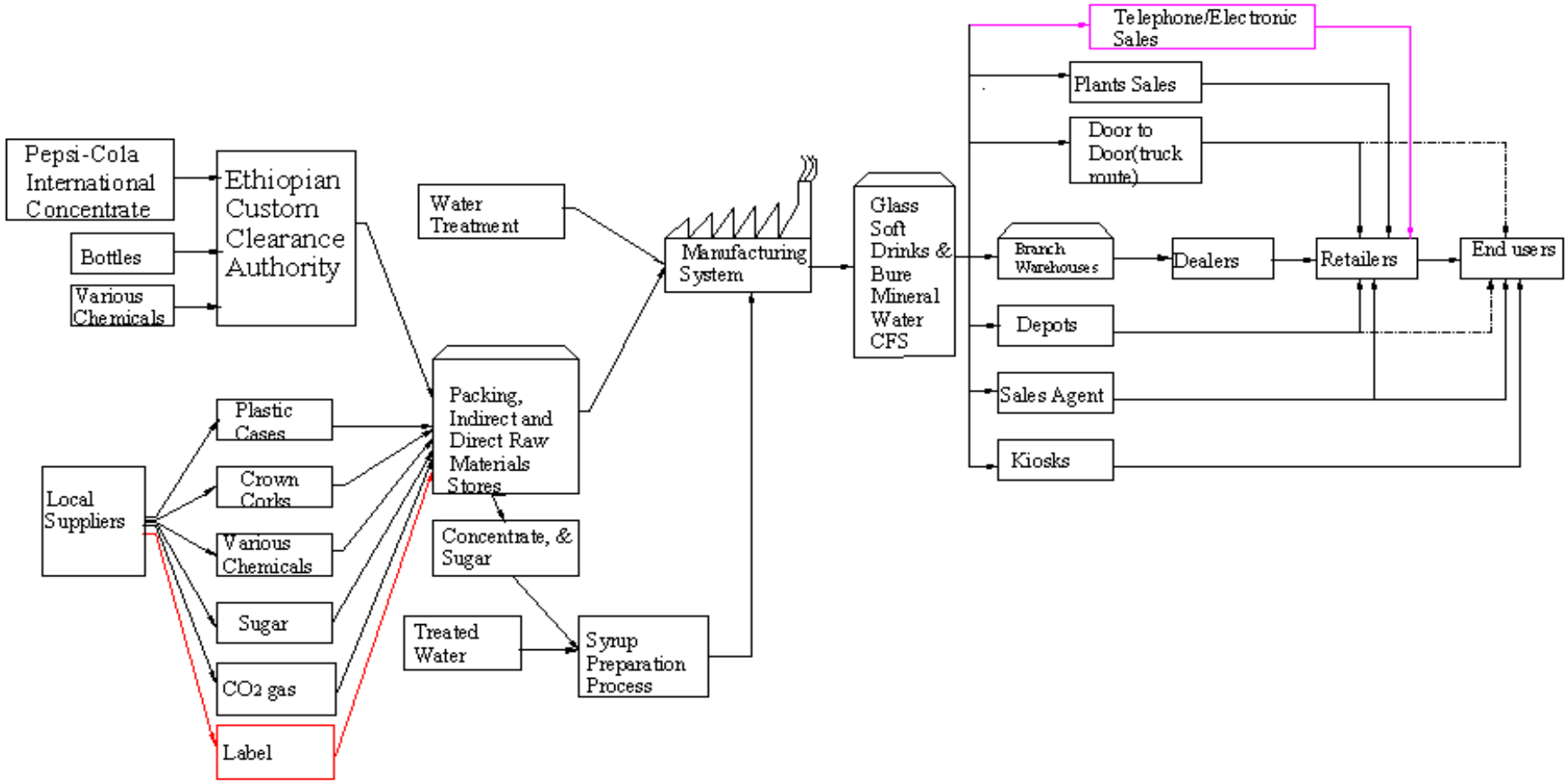


Figure 6-16: Supply Chain Model for MOHA SISC Bure Pepsi and Kool Water Plant

6.5.5 Model Development of SCMS for Dessie Pepsi and Tosa Amba Water Plant

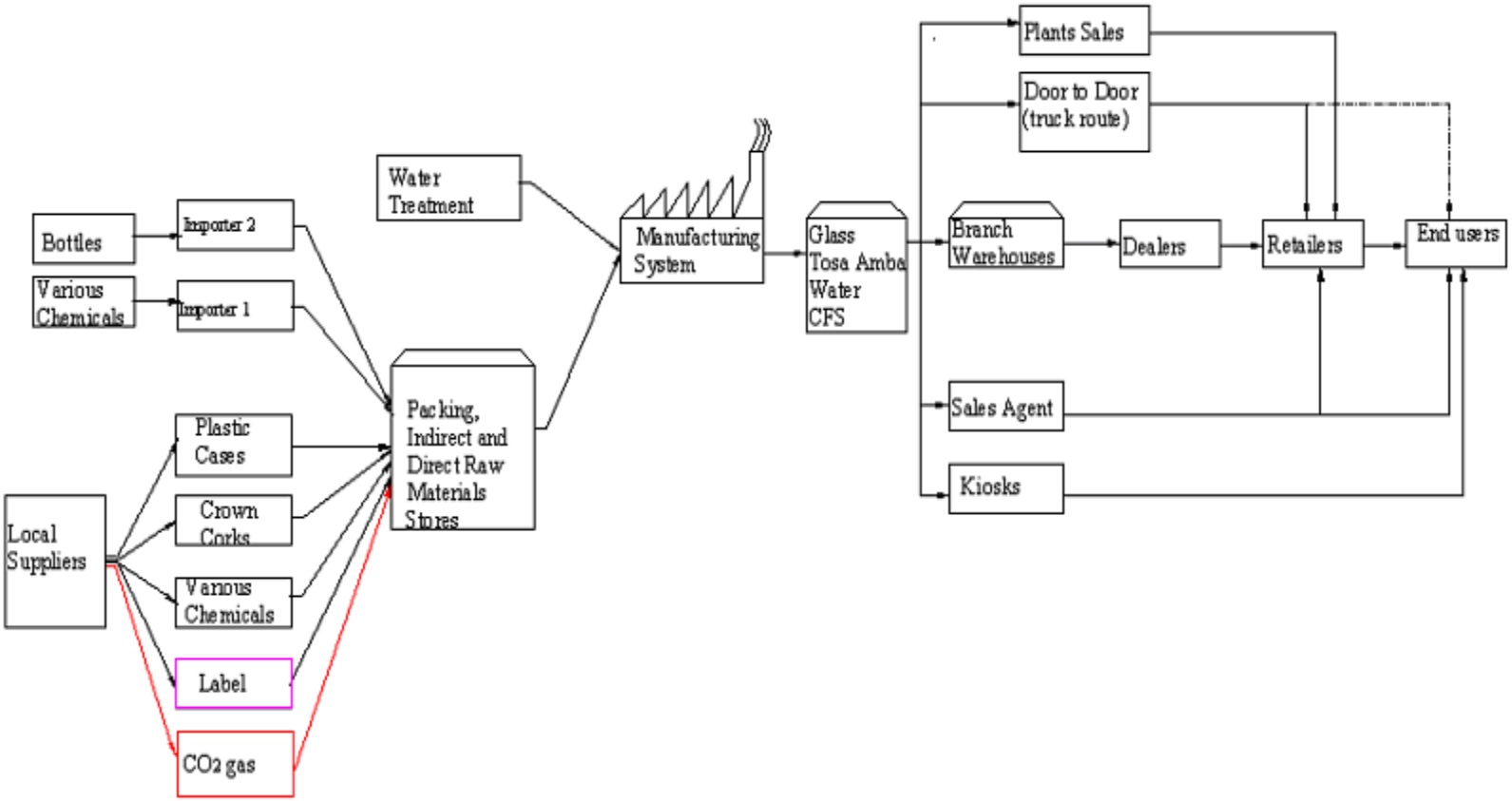


Figure 6-17: Existing Material Flow System for MOHA SISC Dessie Pepsi and Tosa Amba Water Plant

In Dessie Pepsi plant, the existing material flow system does not use depots, and telephone and electronic distribution channels so as to promote their direct sales. Moreover, the flow system does not include Ethiopian Custom Clearance Authority. The proposed model, as shown in figure 6-18 below is, therefore, made to include such channels and ECCA so as to enable the imported raw materials to pass through it.

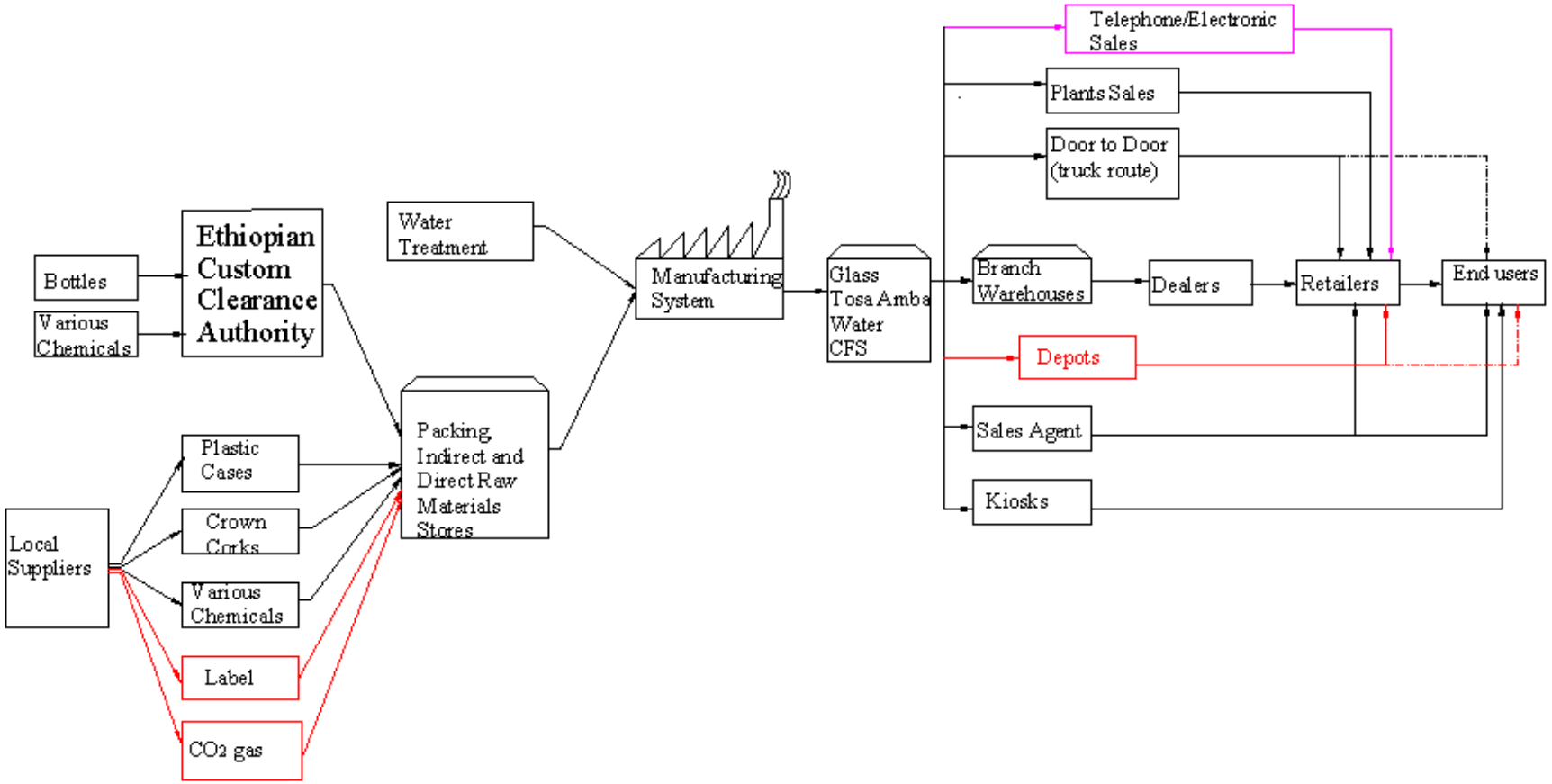


Figure 6-18: Supply Chain Model for MOHA SISC Dessie Pepsi and Tosa Amba Water Plant

6.5.6 Model Development of SCMS for Summit Beverage Plant

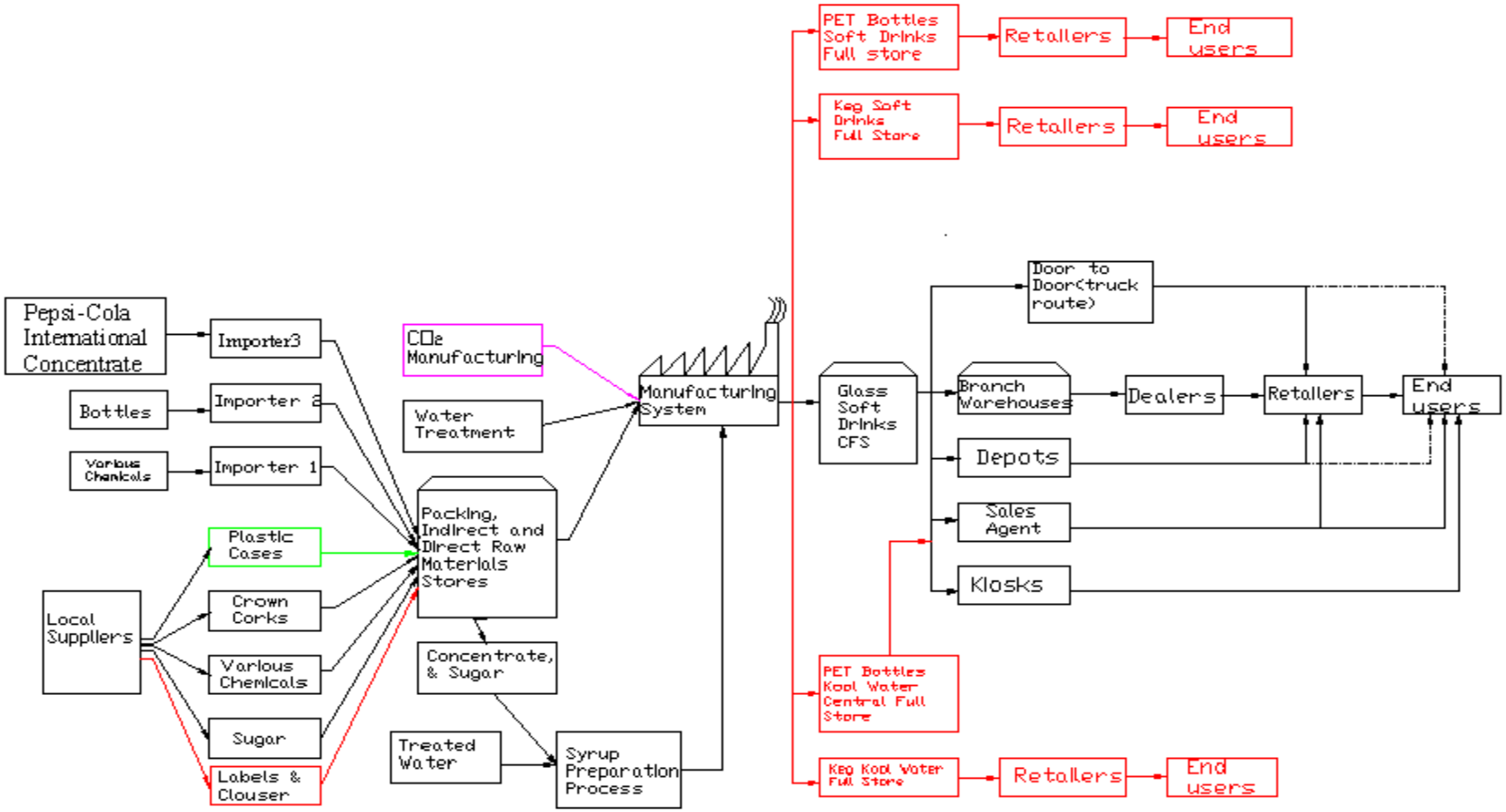


Figure 6-19: Existing Material Flow System for MOHA SISC Co-packer Summit Plant

The existing material flow of Summit Beverage differ from the other sister plants in soft drinks and kool water packaging material (keg, PET bottles, labels and closures) due to additionally produced kool water and soft drinks packaging through Keg and PET bottles.

The proposed SCMS model for Summit Beverage differs from the existing material flow by the proposed new channel (direct sales using telephone and electronic channel) and Plant sales, and the imported raw materials are passed through Ethiopian Custom Clearance Authority.

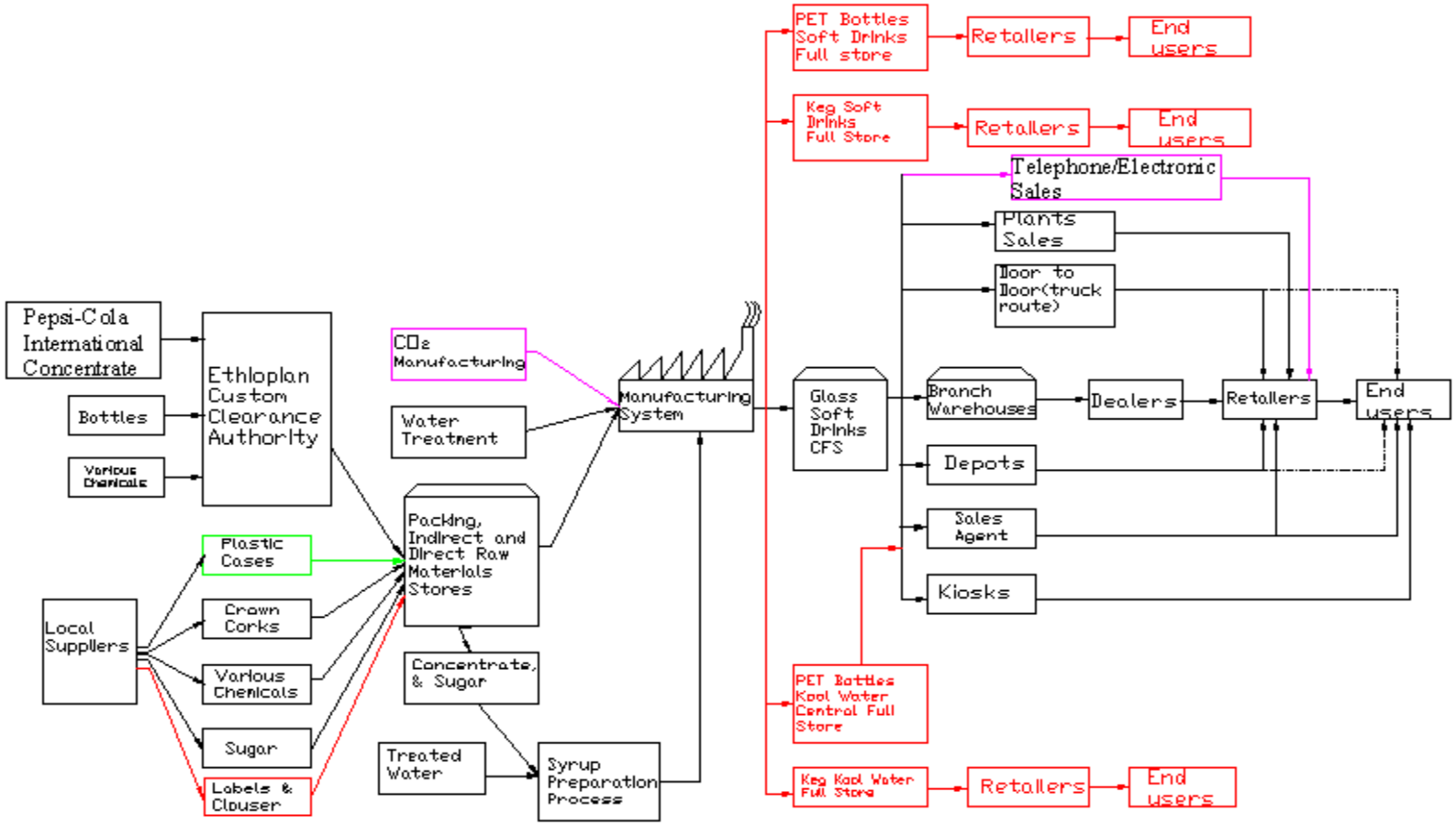


Figure 6-20: Supply Chain Model for MOHA SISC Co-packer Summit Plant

*Source Initiated from{Adopted from Vikas Chandra (India, IIT,1990)[30] & Abreham Debebe (Ethiopia, AAU, 2004)[29]}

CHAPTER SEVEN

Evaluation (Analysis) of the Model (Nefas Silk Pepsi Plant)

7.1 Existing Material Flow Model

Materials used to produce soft drinks are generally categorized as direct materials indirect materials and Packing materials. The direct materials are ingredients for the soft drinks, which are converted to product through various conversion processes, while the indirect materials (mostly various chemicals) are added in order to facilitate the various reactions. Under this thesis, the researcher used direct materials, indirect materials (Specially various Chemicals, and laboratory reagents) and packing materials for the cost of supply chain system. The direct materials include concentrates (flavour or dry Component of different brands), sugar, CO_2, and water where as packing materials are different brands of crown corks, glasses, logos (labels), closure and Crates (Plastic Cases), the indirect materials are various chemicals as shown in the table 7:1 below.

The following table shows the list of various direct, indirect, and packing raw materials that are used for the production of soft drinks and their sources.

Table 7-1:Raw Materials and the Source of Raw Materials for MOHA SISC Plants

Types Of Raw Materials	**Local Supplier Name**	**Foreign Supplier Name**
Direct Materials		
Pepsi Concentrate 'A' & 'B'		Pepsi cola International Company
Mirinda Concentrate 'M1' & 'D1'		Pepsi cola International Company
7-Up Flavor		Pepsi cola International Company
7-Up Dry Component		Pepsi cola International Company
Mirinda Tonic Flavor		Pepsi cola International Company
Mirinda Tonic Dry Component		Pepsi cola International Company
Mirinda Apple Flavour		Pepsi cola International

		Company
Mirinda Apple Component		Pepsi cola International Company
Sugar	Ethiopian Sugar Industry Support Center (Wonji & Metehara Sugar Factories)	
Co2	Nifas Silk CO_2 Plant	
Water	Municipal water	
Indirect Materials		
Activated Carbon for Water		Norite
Activated Carbon for Sugar		Norite
Aluminum Sulphate	Awash Melkasa Aluminium Sulphate (AMASSASC)	
Amberlite		Bolvinos Chemical Limited
Calcium Hypo chlorite	WOLDOBA GLOBAL PLC	Bolvinos Chemical Limited
Caustic Soda Flaxes	YANET PLC, EUREKA IND. Supply, & NAPE IMPEX Trading	Sap International corporation
Caustic Soda Liquid	Caustic Soda Share Company	
Common Salt	Mefch & Whole sale Trading enterprise Horn Bound Plc	
Freon R-22	There are many (e.g. Excel Commercial)	
Hydrated Lime	Awash Melkasa	
Hyflo Supercell		Bolvines Chemical Limited
Largo Simple	Repi Soap factory	
Lewatit		Bolvines Chemical Limited
M.Glycol		Bolvines Chemical Limited
Mono Ethanol amine		Sap International

		Corporation
P_3 Componenta		Bolvines Chemical Limited
P_3 Descaler	HALDAG PLC	Sap International Corporation
P_3 Ferisol		Bolvines Chemical Limited
P_3 Stabilon		Bolvines Chemical Limited
Potassium Permanganate		Sap International Corporation
Soda Ash	Abijata Soda Ash Enterprise	
Defoamer Type	HALDAG PLC	Nord- Import-u-Export
P3-Ket-W		Bolvines Chemical Limited
Sulphuric Acid	Awash Melkasa Aluminium sulphate (AMASSASC)	
Different Chemicals	AFRO-GERMANY & AGECA (Ethiopia) Company	
Packing Materials		
Pepsi, 7-Up, Mirinda, Mirinda Tonic, Mirinda Apple Crown Cork	Ehiopian Crown Cork & Can Factory A/A	
Crates (Plastic cases)	Summit Plastic Plant (SEPCO)	
PET Bottles	Summit Beverage Plant	
Glass		Arab United Emirates

*Source: MOHA Soft Drinks Industry S. C. Plants (2005)

7.2 Supply Chain Cost Analysis for the Model

Supply chain management is primarily concerned with the utilization of three resources efficiently to manage the flow of materials through the system, i.e. effective utilization of costs, inventory and time. If an organization operates at optimal cost with optimal inventory and optimal time, then the organization is on the way to achieve the primary objectives of any organization that are;[22,29]

- Profitability through the profit leverage effect of cost reductions,
- High asset turnover rates, i.e. improving the velocity of material flow, and
- High levels of customer service.

7.2.1 Existing Costing System

The existing costing method at MOHA Soft Drinks Industry S. C. is a traditional accounting system that has some draw back such as double counting and being unable to detect some hidden costs. Besides the traditional costing system works effectively on the monthly or yearly basis and it is a time dependent costing method.

Although traditional cost accounting is the easiest and least complicated of the cost analysis method, this method of cost analysis typically ignores future liability costs and considers all indirect costs as overhead or omits them altogether. These overhead costs, if considered, are randomly allocated to a process or product based on some measurable, yet arbitrary parameter (e.g., labor hours, capital equipment costs). This method is the most common accounting method used throughout Ethiopian Soft drinks industry Share Company.

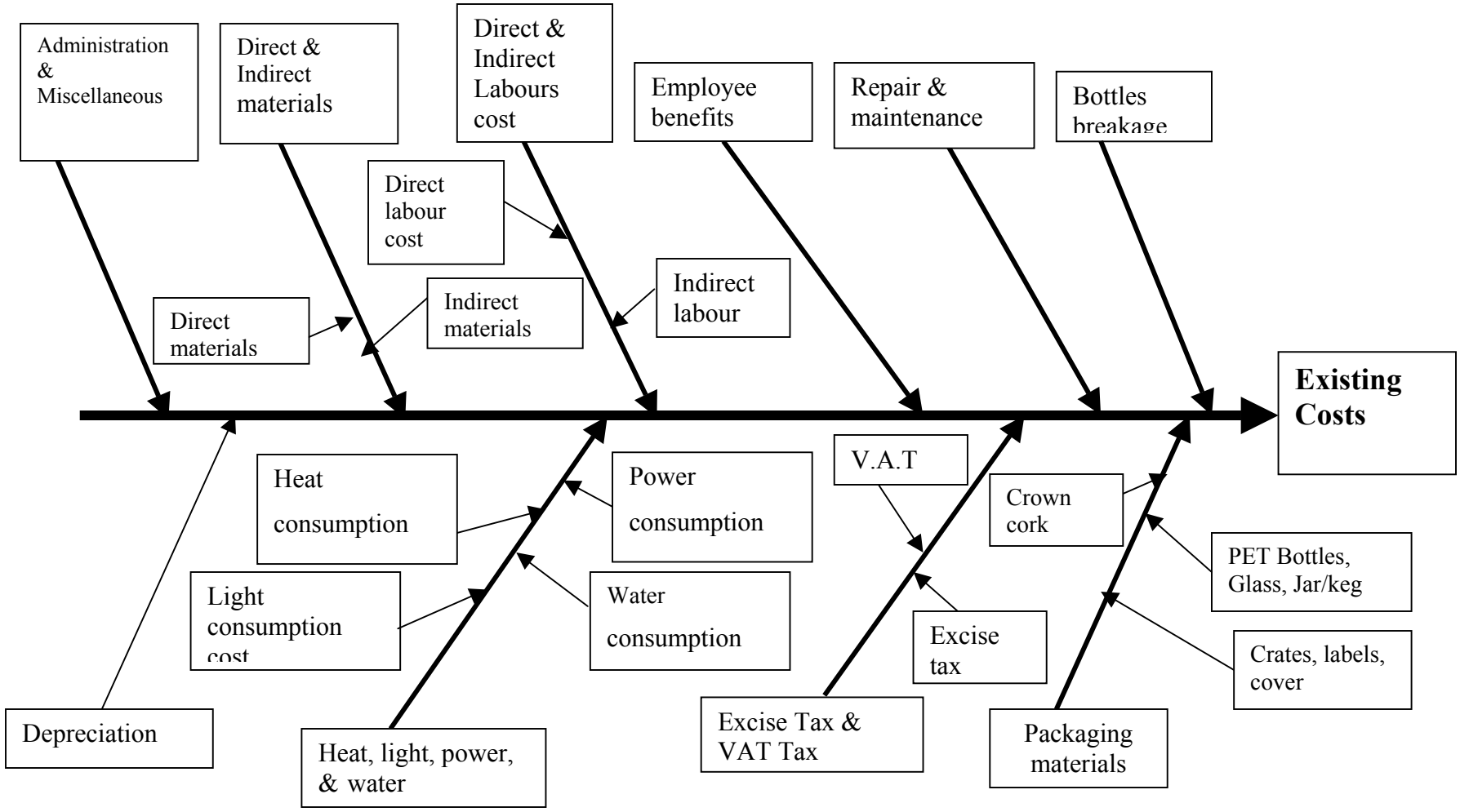


Figure 7-1: Existing Costs Drivers (Factors)

7.2.2 Proposed Method of Costing

I. Supply Chain Cost Analysis

The stage by stage analysis necessitate by supply chain cost analysis system models the materials flow or supply chain process, and reveals hidden material and supply chain costs which may not be obvious and may be misallocated by traditional cost accounting system . Supply chain cost analysis introduces a transparency or clarity which may not be available to mangers operating under information generated standard accounting system. During the analysis of cost using supply chain models, it is better to normalize to a single unit of measures. Suggested units of measure are cost/unit of materials or cost/batch of materials. Since the production of Soft drinks is batch type in nature, a cost/batch of materials has been selected as a single unit of cost measure.

As it was indicated in the developed model, the cost component for supply chain system includes, input node cost (INC), node activity cost (NAC), flow cost (FC), and barrier cost (BC). Table 7.2 shows a summary of cost analysis using supply chain model.
For the computation of supply chain analysis the researcher considers Nefas Silk Plants due to this plant is a big size of among the rest of MOHA Soft Drinks Plants.

In order to use supply chain model for cost analysis, the existing material flow system should have to be modified to the developed model format. Therefore, the existing material flow system can be modified as shown in figure 7-2.

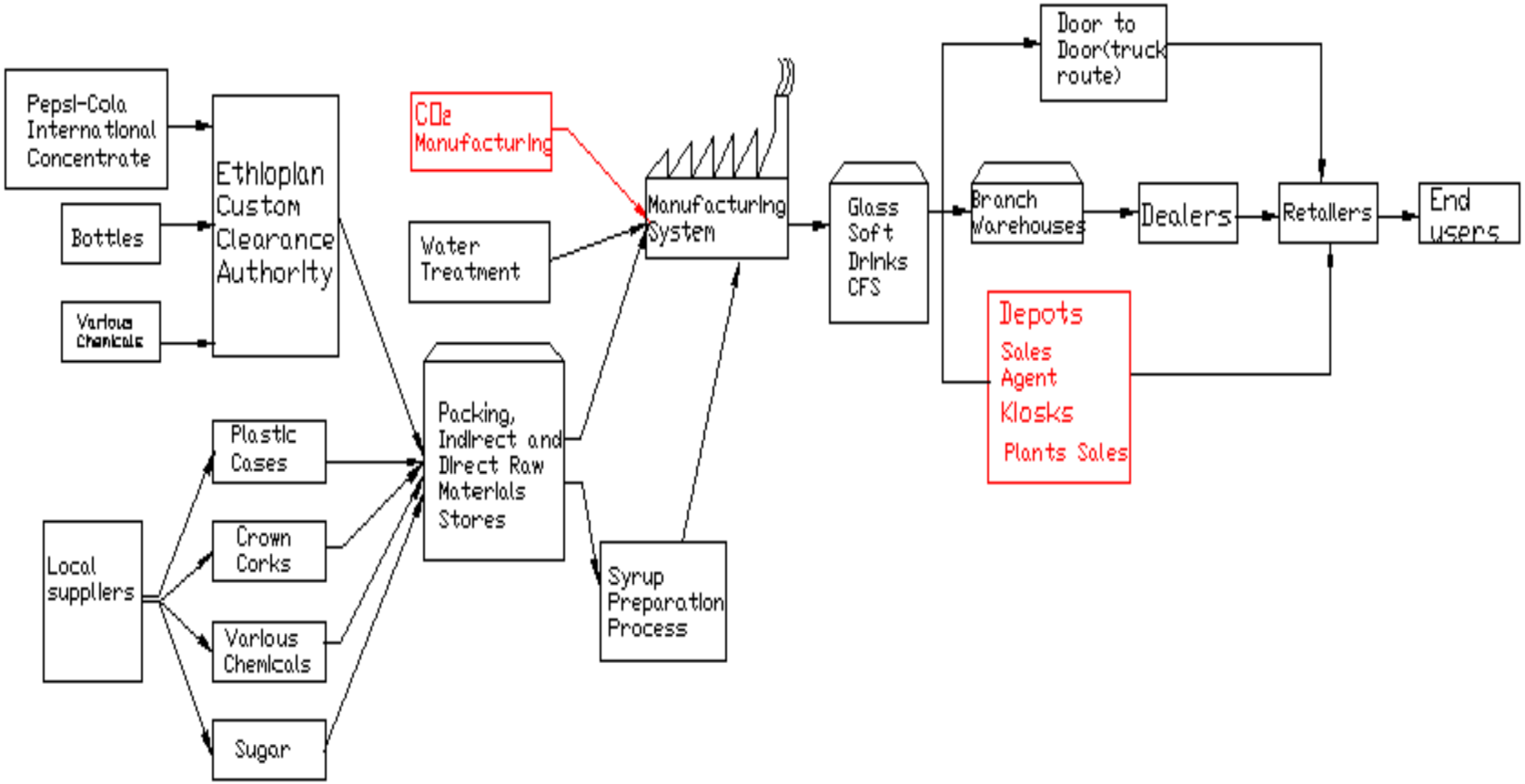


Figure 7-2: Modified SCMS Model for MOHA SISC Nefas Silk Pepsi Plant

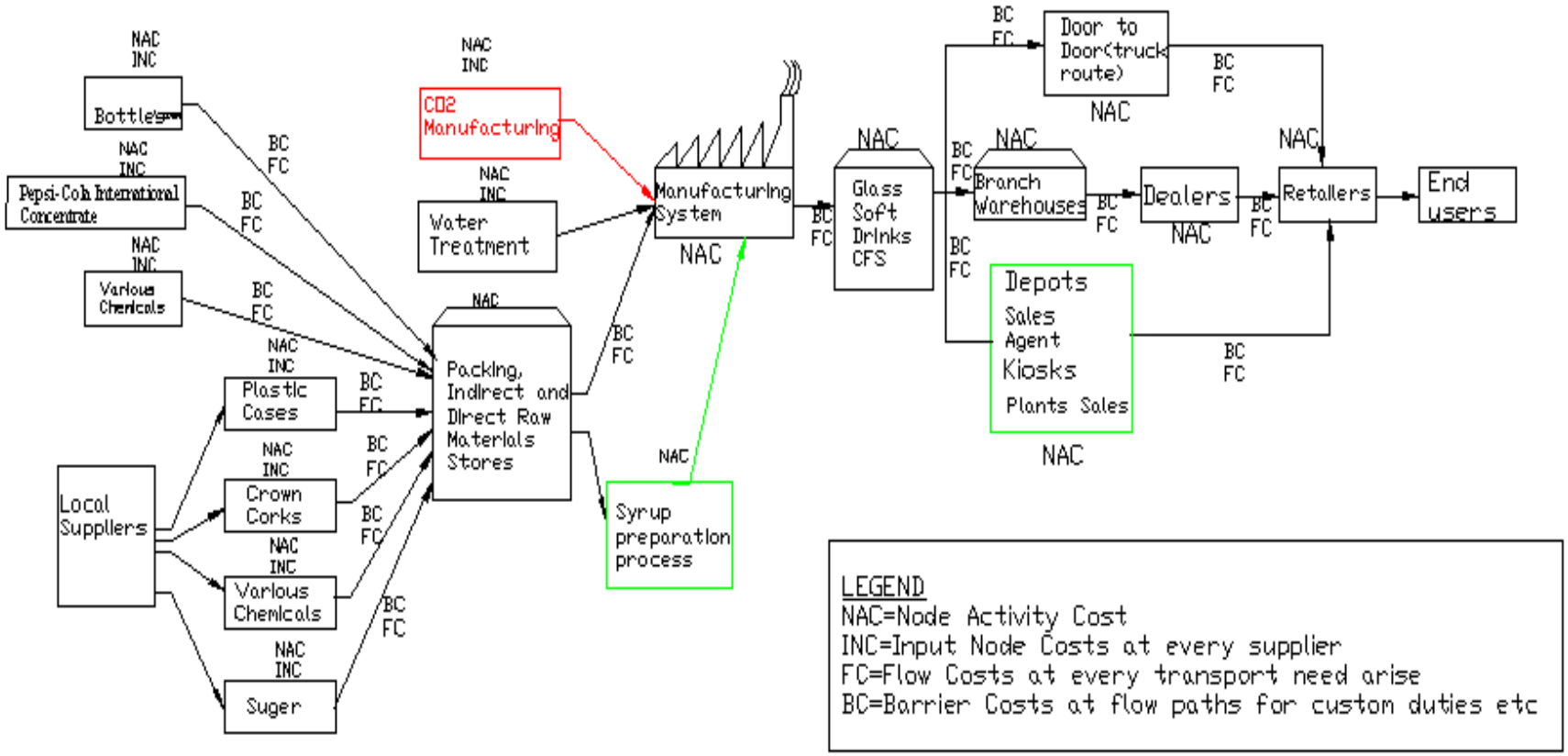


Figure 7-3: Supply Chain Cost Component for MOHA SISC Nefas Silk Pepsi Plant

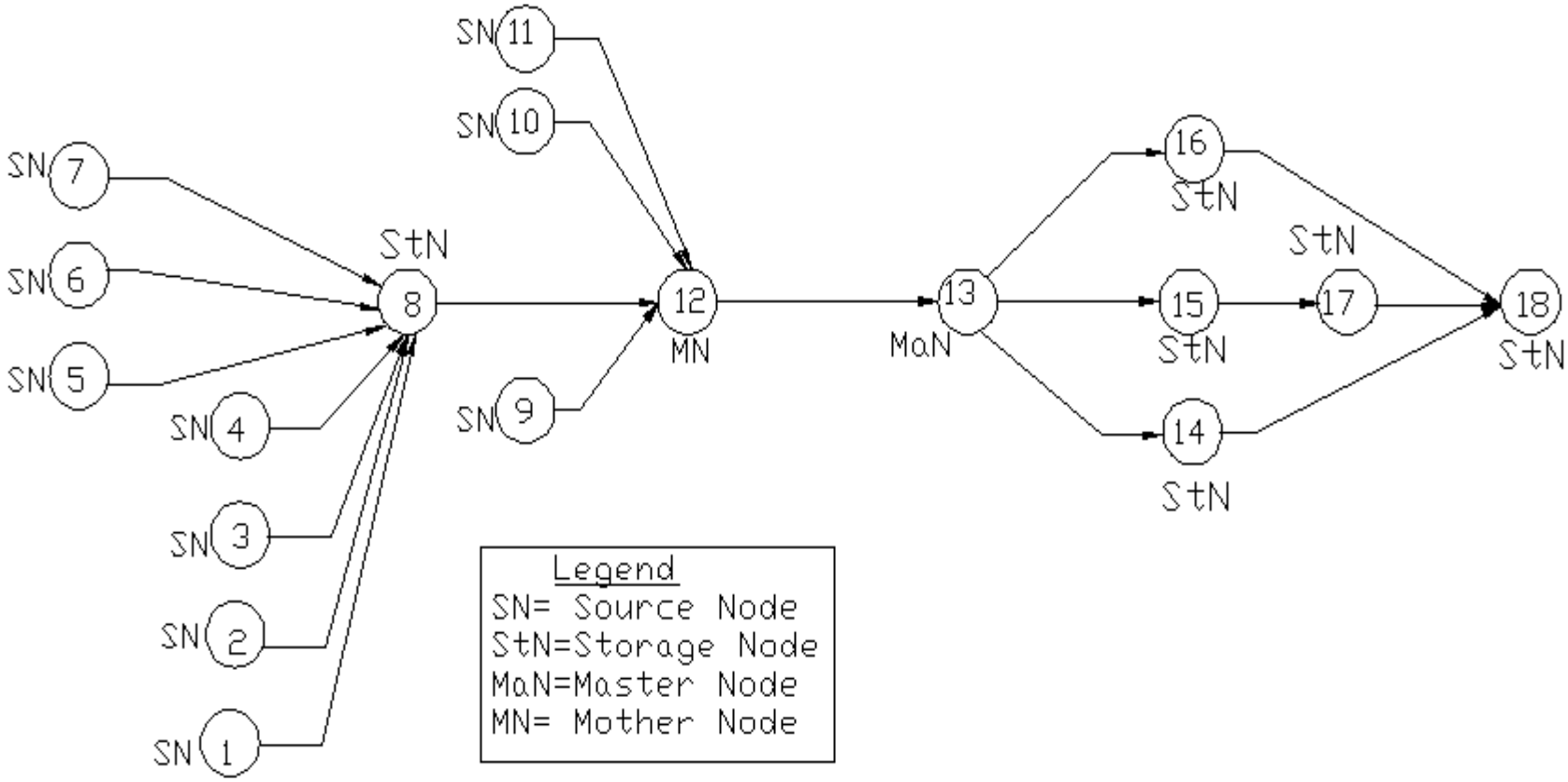


Figure 7-4: Nodal representation and Numbering of Nodes for MOHA SISC Nefas Silk Pepsi Plant

Table 7-2: Matrix of Supply Chain Cost Analysis[1]

Node No.	INC	NAC	BC	FC	Total
1	38.94	16,597.25	4,457.24	756.73	21,850.16
2	11.67	905.84	67.26	631.27	1,616.05
3	15.92	7,190.29	1,166.99	215.10	8,588.29
4	3.53	365.32	80.31	33.75	482.90
5	25.51	1,590.06	47.47	176.73	1,839.77
6	77.95	32,353.54	9,952.85	1,589.14	43,973.48
7	32.37	3,329.53	1,188.62	719.74	5,270.26
8	0.00	286.35	56.83	30.75	373.92
9	0.00	308.81	0.00	0.00	308.81
10	13.00	40.74	0.00	0.00	53.74
11	8.69	1,491.41	0.00	0.00	1,500.10
12	0.00	3,772.82	0.00	0.00	3,772.82
13	0.00	429.37	87.62	53.52	570.51
14	0.00	668.45	333.06	370.82	1,372.33
15	0.00	3,142.32	1,711.19	2,819.37	7,672.89
16	0.00	5,221.43	2,538.26	2,648.01	10,407.70
17	0.00	285.09	159.79	230.55	675.43
18	0.00	206.41	86.94	116.26	409.61
Total	227.58	78,185.01	21,934.44	10,391.74	110,738.77

(* One batch means one go preparation of syrup, total number of batch=450+267+11=728)

Therefore, total supply chain cost for a single batch can be obtained by summing up the total cost of INC, NAC, BC and FC.

$$SCC = \sum INC + \sum NAC + \sum BC + \sum FC$$

$$= 227.58 + 78,185.01 + 21,934.44 + 10,391.74$$

SCC = 110,738.77 Birr/batch*

As a result, the yearly supply chain cost for MOHA SISC Nefas Silk Plant can be determined by multiplying the single supply chain cost per batch by the number of batches produced in one year.

$$SCC/year = SCC/batch \times No.of\ batch/year$$

$$= 110,738.77x\ 728$$

SCC/year = **80, 617, 822.29 Birr**

[1]Source: *Note that the values in the tables are taken from the Production Cost Analysis of MOHA SISC Nefas Silk Plant based on the existing traditional accounting method of 2005*

The total Production cost of Soft drinks determined from the traditional accounting system is Birr 82,789,602.46 for the year 2005 where as the total supply chain cost of soft drinks computing is Birr 80,617,822.29, which saves Birr 2,171,780.17 (2.62 %). This amount (Birr 2,171,778.47) of saving by supply chain cost is due to traditional double costing effect.

Advantage of using supply chain cost analysis method

- Introduce total cost awareness in operational staff.
- It is a ways to eliminate double costing effect, hidden costs, non- value added activities and provides a means to focus on real value added.
- It does not require very sophisticated mathematics to understand and hence would be appealing to average staff members.
- In general, supply chain cost analysis is more comprehensive tool for analysis and decision making as compared to the existing fragmented tools.

II. Pareto Cost Analysis

In order to minimize the cost incurred by the raw materials, it is important to locate the raw material warehouse to their proper location and to allocate with proper capacity. But focusing on major raw materials will help to minimize cost due to raw materials. In order to identify the major raw materials which have major impact on cost of materials, principles of Pareto's Law *(ABC analysis)* is essential.

Pareto's law, which can be succinctly stated: "the vital few the trivial many". The law was identified by Vilfredo Pareto, an Italian economist and sociologist who studied the distribution of wealth in Italy and found that most of it was held by a small percentage of the population. Pareto's law applies not only to the distribution of wealth but to many other distributions as well. The law is often identified as the 80-20 rule, although exact percentage may differ from 80 and 20. [14]

What is suggested by Pareto's law is that the most attention and effort in any study or project should be focused on the smaller portion of the population that is seen to be the most important.

i) Improvement at Supply System

Table 7-3: Nefas Silk Plant cost expense of 4 consecutive years

Year in G.C	Distribution Expense	Administration expense	Production Cost Expense
2002	20,948,995.40	2,976,371.64	55,379,276.20
2003	19,277,140.61	3,241,515.48	44,843,103.17
2004	19,118,549.65	4,657,051.81	47,742,868.69
2005	23421129.82	4,156,105.47	57,448,737.50

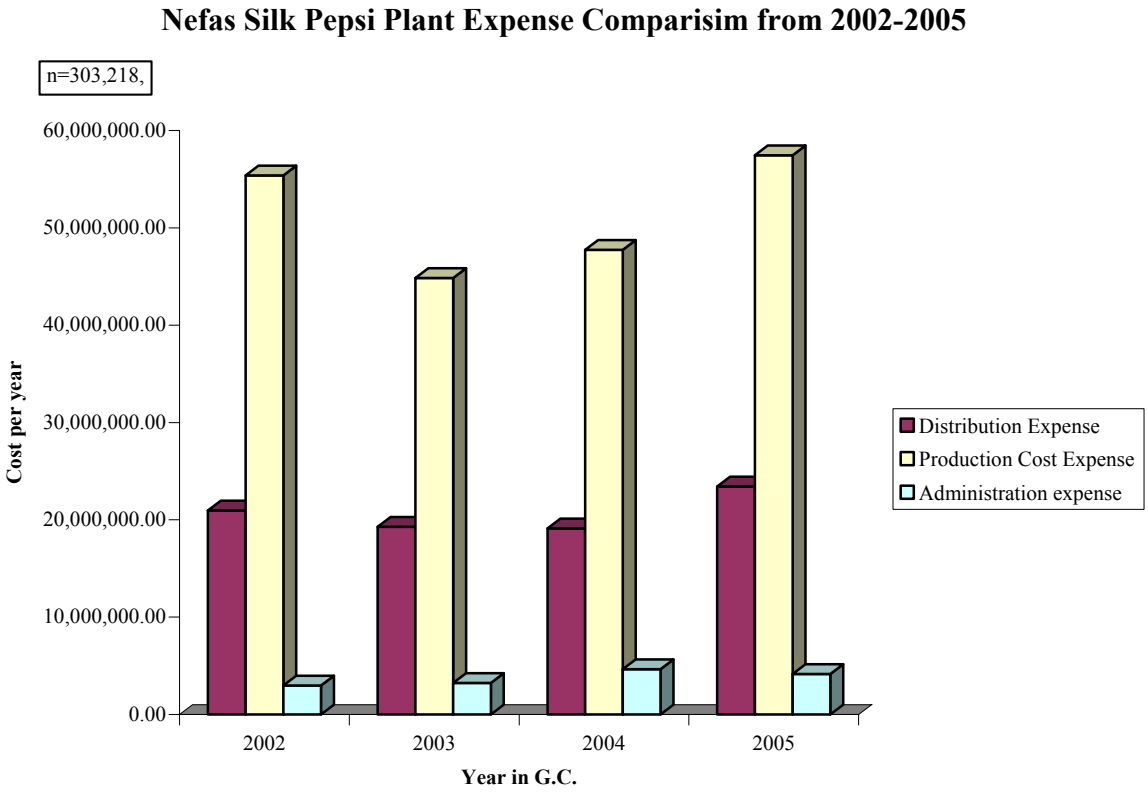


Figure 7-5:Production, distribution & administration cost of NSP from 2002-2005

According to figure 7-5, it is observed that 2003 and 2004 years were in decline and 2005 is a bit increment and also the recent accessed data. For these reasons, the researcher took the 2005-year data for further analysis.

Table 7-4:Nefas Silk Plant Cost analysis of 2005

Nefas Silk Pepsi Plant 2005 year cost	
Production Cost Expense	57,448,737.50
Distribution Expense	23,421,129.82
Administration expense	4,156,105.47
Total	85,025,972.79

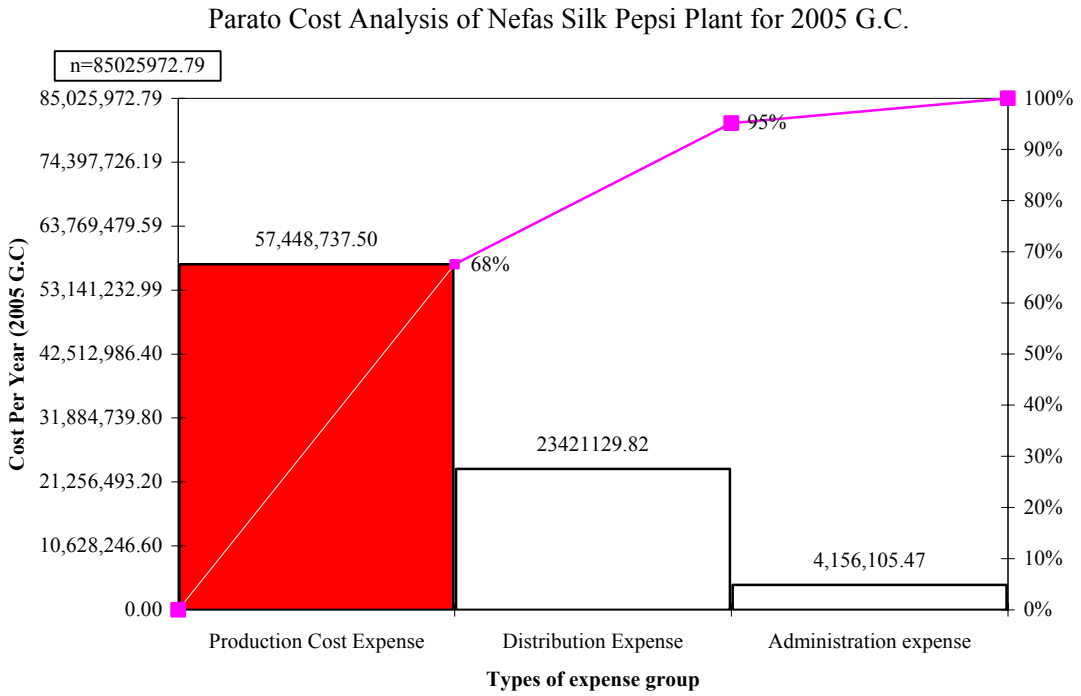


Figure 7-6: Production, distribution & administration cost of NSP for 2005

Therefore, from figure 7-6 Pareto analysis, production cost and distribution cost takes the highest cost and the company should take care of it

Table 7-5:Nefas Silk Plant Production Cost Expense of 2005

NSP product cost expense of 2005 Year	
Types of production cost	Cost in Birr
Direct materials	38,943,257.45
Crown cork	5,234,528.87
Heat, Light & Fuel	3,148,073.17
Direct labour	2,697,799.44
Repair & Maintenance	2,486,761.42
Indirect Materials	2,340,151.93
Indirect labour	1,098,591.74

Employee's Benefit	975,954.60
Miscellaneous	263,763.46
Depreciation	259,855.42
Total	57,448,737.50

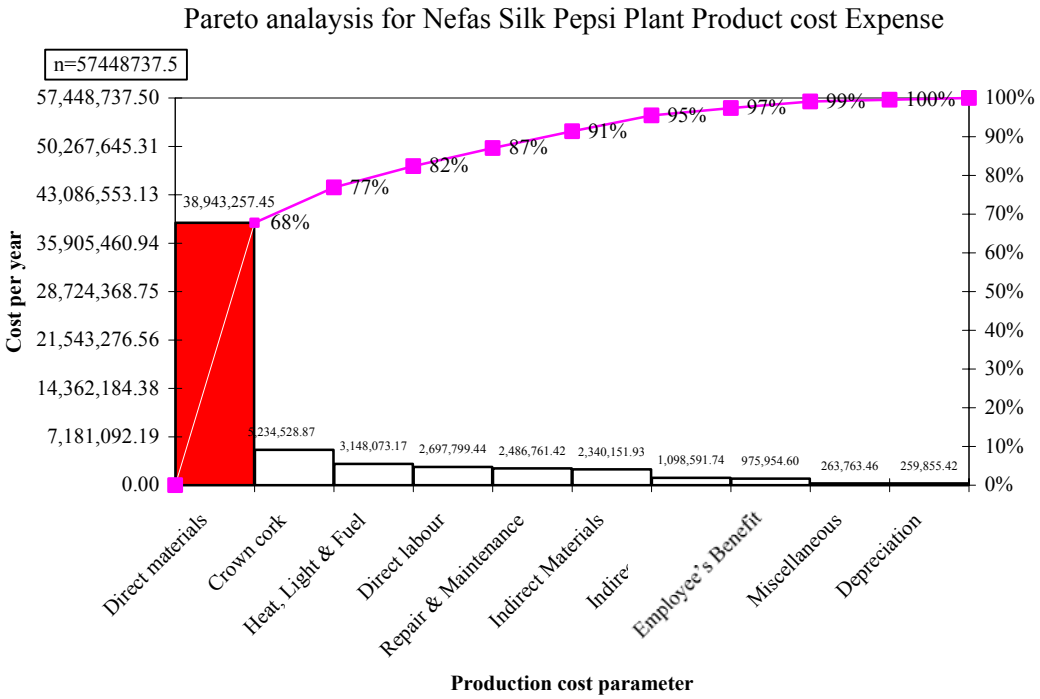


Figure 7-7: Production cost analysis of NSP for 2005

According to figure 7-7 Pareto analysis, direct materials (68%) is the highest. So concentrating on direct materials will have great influence for the improvement of cost.

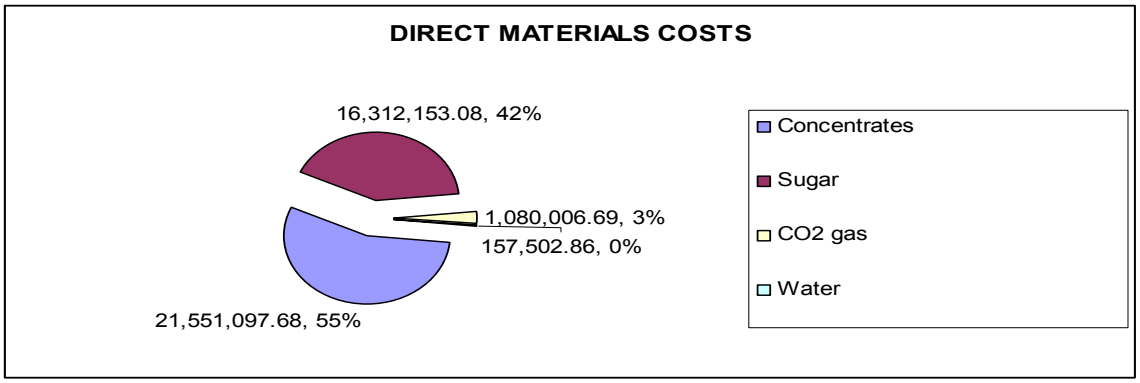


Figure7-8: Direct materials cost analysis of NSP for 2005

As per figure 7-8, of the direct materials, concentrates (55%)is the highest and sugar (42 %) is the next. Therefore, focusing on concentrate and sugar will improve the cost

ii) Distribution System

The research search further improvement for the second highest cost i.e. distribution system.

Table 7-6:Nefas Silk Plant Distribution Cost of 2005

NSP Distribution cost expense of 2005 Year	
Parameters of Distribution cost	Cost in Birr
Advertising	4,782,288.09
Labour Cost	4,287,610.56
Depreciation	3,037,129.54
Fuel & Lubricants	2,680,323.40
Repair & Maintenance	2,052,504.47
Bottles & Cases Breakage	1,927,753.64
Empoyees, Benefit	1,245,745.42
Traveling & Perdiem	486,631.43
Insurance Property	269,959.58
Commission	242,467.76
Total	21,012,413.89

Pareto Analaysis of Distribution Expenses of Nefas Silk Plant

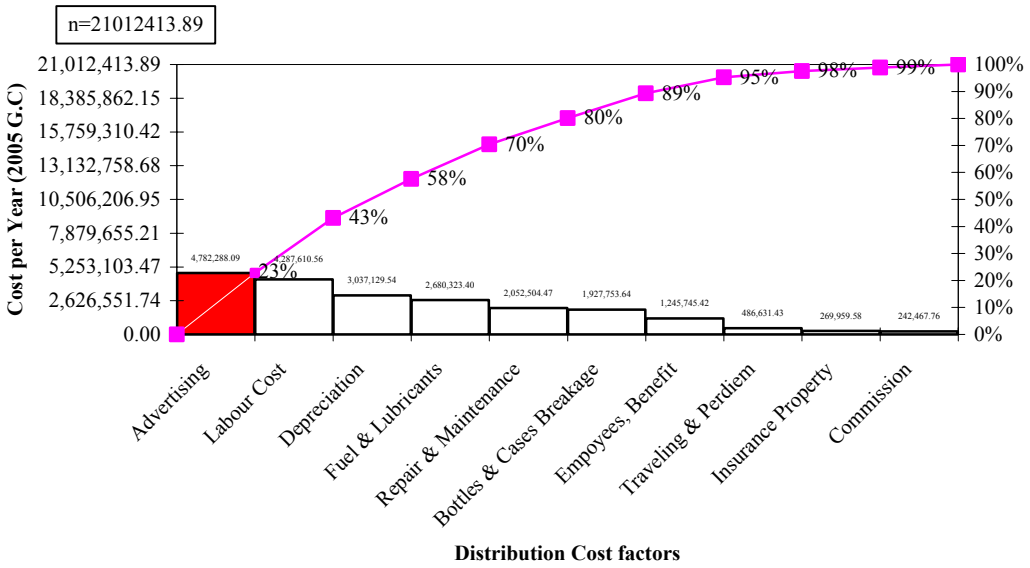


Figure 7-9: Distribution cost analysis of NSP for 2005

According to figure 7-9 Pareto analysis, advertising and labour cost are the highest cost. Therefore, concentrating on these will have great influence for the improvement of cost. Another assessment of distribution sales cost analysis is on the distribution channels.

Table 7-7:Nefas Silk Plant Distribution Channels Cash sales of 2005

NSP Internal market share of 2005 Year	
Types of Channels	In Birr
Branch warehouses	23,421,129.82
Addis Ababa sales outlet (Routes)	6,554,043.42
Sales Agent	4,060,845.08
Depots	2,323,906.82
Kiosks	972,733.21
UP country Depots	357,425.21
UP Country	316,078.30
Plant Sales	153,186.80
Total	38,159,348.66

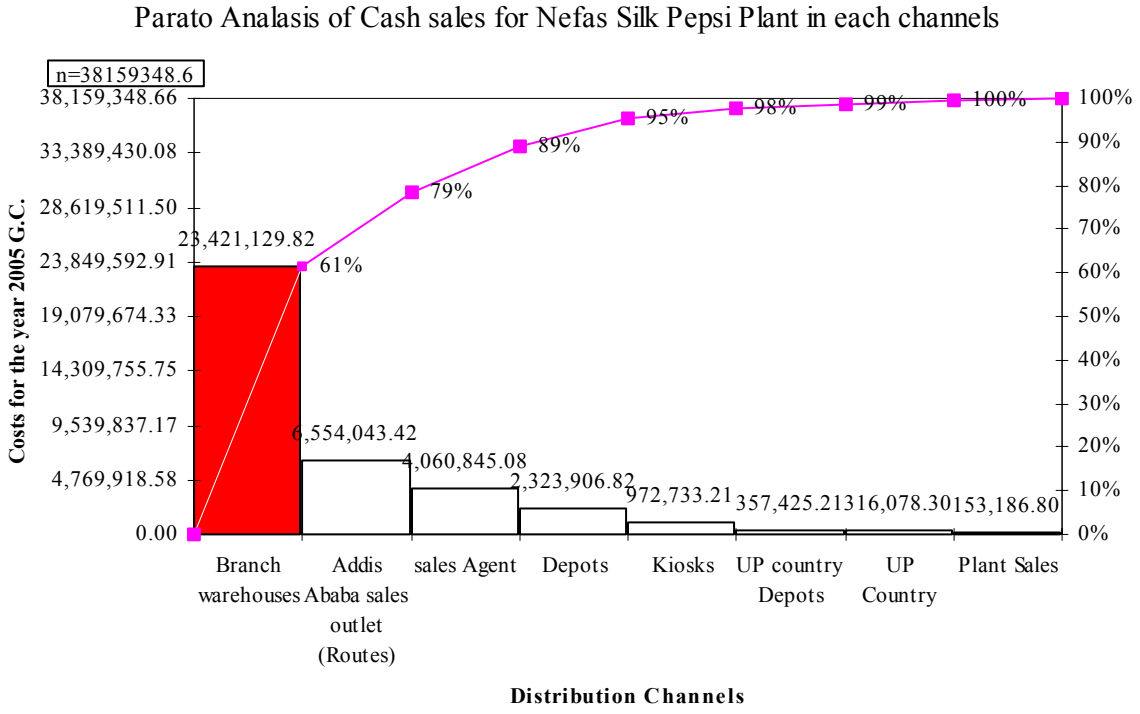


Figure 7-10: Distribution channels sales cost analysis of NSP for 2005

The result of figure 7-10 Pareto analysis shows, Branch warehouse and Addis Ababa sales outlet (routes) shares 79 % of the distribution Channels.

The other point that is observed from the distribution system is that, the factory should have to work more in order to improve the percentage of distribution channels of Kiosks, Up country depots, Up country truck routes, plant sales as well.

Table 7-8:Nefas Silk Plant Each Distribution Channels Cash Sales of 2005

NSP sales through each distribution channels cash sales of 2005 Year	
Types of distribution channls	In Birr
Addis Ababa warehouse	14,738,218.84
Addis Ababa sales outlet (Routes)	6,554,043.42
sales Agent	4,060,845.08
Nazerth branch warehouse	2,491,397.66
Depots	2,323,906.82
Awassa branch warehouse	2,112,091.46
Shashemen branch warehouse	1,687,888.81
Kiosks	972,733.21
Wolayta branch warehouse	883,034.69
Harar branch warehouse	578,326.19
DireDawa branch warehouse	512,152.75
Asebe Teferi branch warehouse	418,019.42
UP country Depots	357,425.21
UP Country	316,078.30
Plant Sales	153,186.80
Total	38,159,348.66

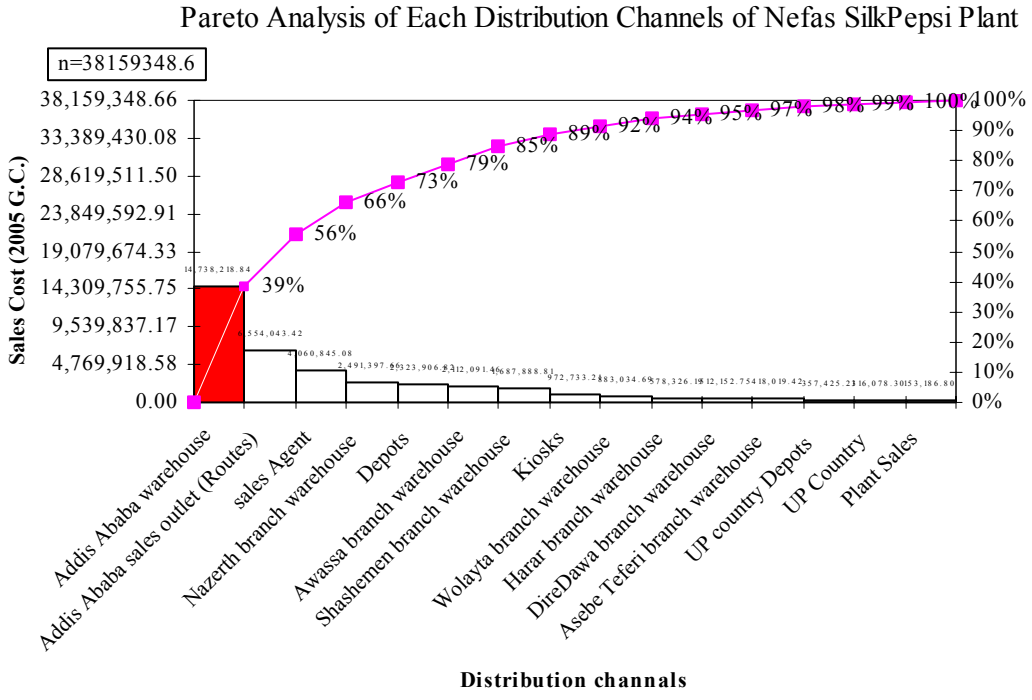


Figure 7-11: Branch warehouses & other channels sales cost analysis of NSP for 2005

According to figure 7-11 Pareto analysis, Addis Ababa warehouse has the highest share. As the result of the above anlysis, a database is tried to designed to minimize the cost.

The distribution system of NSP is depicted in figure 7-13 below where as the distribution channels of MOHA SISC plants' is tabulated in table 7-10.

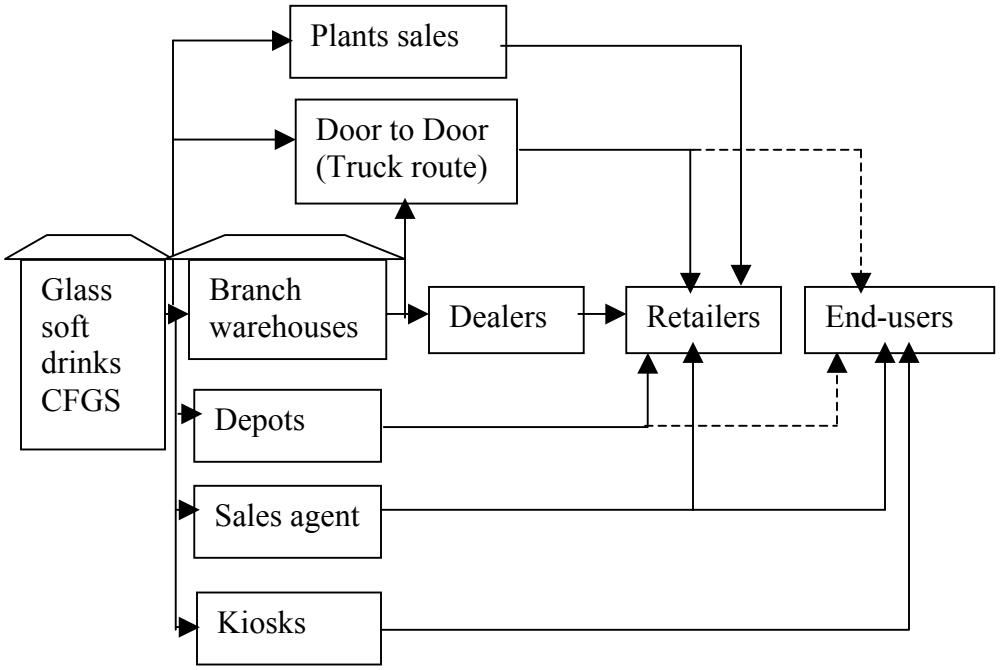


Figure 7-12: Glass Soft Drinks Distribution System of MOHA Nefas Silk Plant

Table 7-9: Number of each distribution channels of MOHA SISC Plants

Name of Plant	Number of kiosks	Number of Depots	Number of Sales Agent	Number of Truck routes	Number of Branch warehouse	Number of Plant sales
Dessie	9+4=13	0	2	6	2	1
Bure	1	2	13	5	2	1
Gondar	4	1	11	7	3	1
Summit	8+3=11	18+0=18	1	4+2=6	1	0
Nefas Silk	44+6=50	28+50=78	25	18+10=28	6	1
T/Haimanot	36+8=44	26+13=49	13	18+9=27	3	1

**Source: MOHA Soft Drinks Industry S.C. Nefas Silk Pepsi Plant (2005)*

ii) Manufacturing System

If a factory have different products, it is better to identify product(s) which have great impact on the factory supply chain cost. In order to determine such product(s), it is better to draw Pareto's diagram for the products either on the basis of cost of product produced or volume of products produced.

In the case of Soft Drinks in Nefas Silk Plant is Glass Soft Drinks, the products of the factory are Pepsi, Mirinda, (Mirinda orange, and Mirinda Apple. The product share of each by volume and cost is shown in Table 7-9.

Table 7-10: Percentage by Volume and Cost of Products for MOHA SISC Nefas Silk Plant

Types of Product	Volume Produced Per Year (lt)	Percentage By Volume	Cost Of Product Produced Per Year [Birr]	Percentage By Cost
Pepsi	10,553,000	37 %	30,287,000	37 %
Mirinda	17,881,000	62 %	51,318,000	62 %
7UP	415,000	1%	1,191,000	1 %
Total	28,849,000	100%	82,796,000	100 %

Source: MOHA Soft Drinks Industry S.C. Nefas Silk Pepsi Plant (2005)

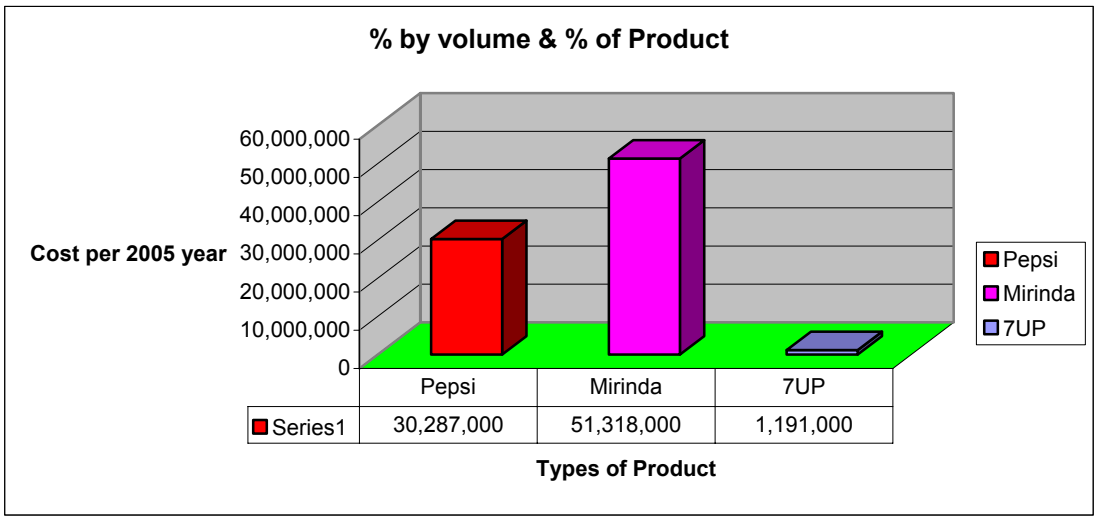


Figure 7-13: Annual products consumption of NSP for 2005

According to figure 7-12, the highest product consumption is Mirinda. Therefore, concentrating on Mirinda will have great influence for the improvement of cost.

7.2.2 Performance analysis of Supply chain parameter

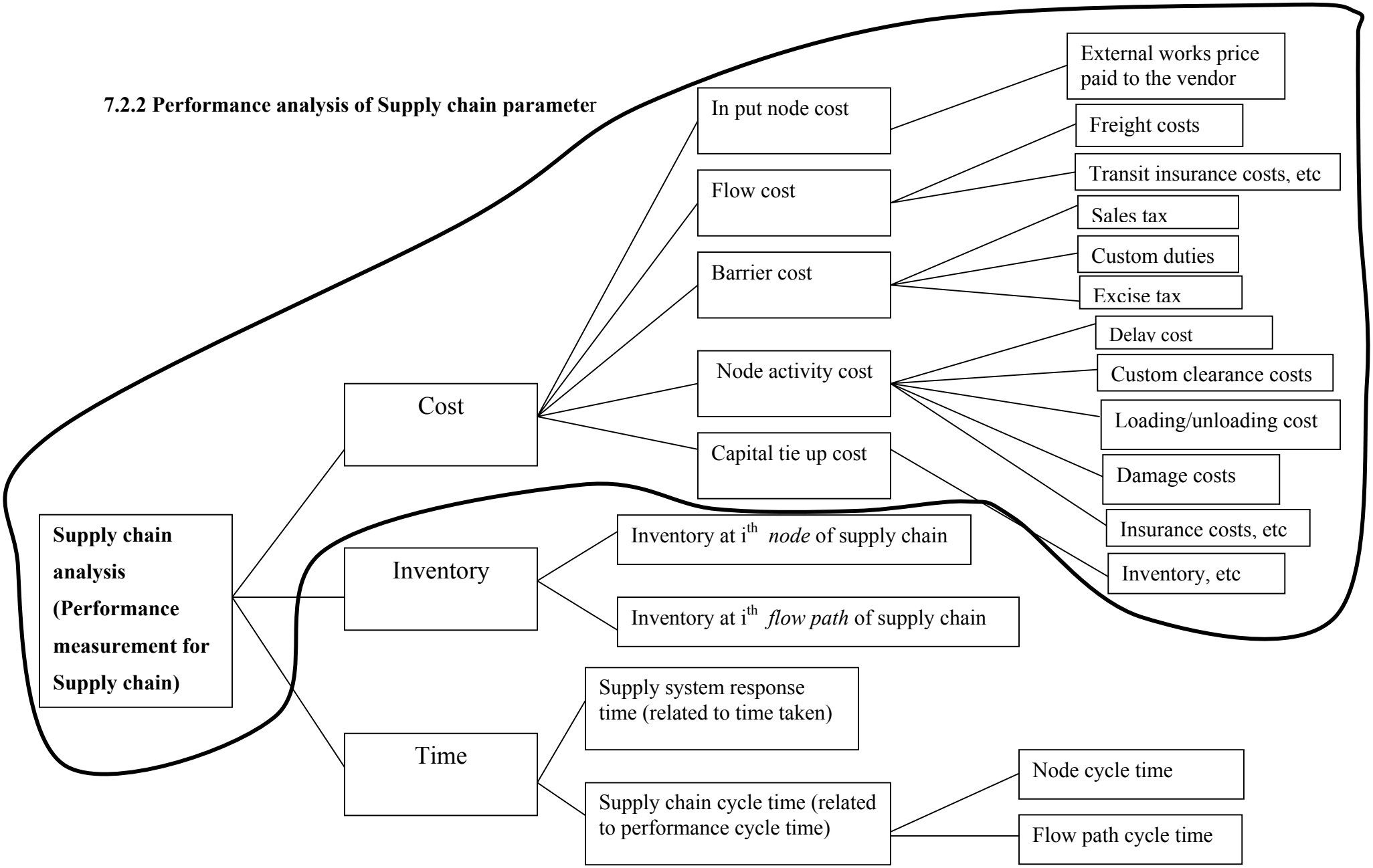


Figure 7-14: Supply Chain Analysis (Performance Measurement for Supply Chain)

7.3 Searching for improvement

Gondar Pepsi Plant buys CO_2 gas from Nefas Pepsi Plant which incurred high transportation cost, However, CO_2 gas is the by product of Dashen beer Factory, which is cited in Gondar town that minimize transportation cost, delay cost, damage of cylinder during transportation, and so on costs, if Gondar Pepsi Plant buy from the near by factory Dashen brewery.

Another thing the researcher search for improvement is that from the financial data a great amount of capital used for distribution system such as for sales promotion, distribution channel, and so on. As result of this the researcher designs database using visual basic access (VBA) for both Ethiopian Soft Drinks Industries i.e. the case study MOHA Soft Drinks Industry S.C. and East Africa Bottling S. C.). A visual basic access user interface data base is included with this thesis. The data base can be used for easy information access. It can also minimize labour work. It is designed in a user friendly approach hence can be used without difficulty. The database has the following capabilities:

- Adding/deleting distribution system, supply system and manufacturing data
- Navigating distribution, production and supply cost database
- Editing existing records

The overview of database for both Ethiopian Soft Drinks Industries is depicted in appendix 7

CHAPTER EIGHT

Conclusions, Recommendations, and Future Works

8.1 Conclusions

I. Based on the analysis made on supply system (raw materials), manufacturing system (Production) and distribution system (trade route), the following conclusions are drawn:

- Both Ethiopian Soft Drinks Industries do not use e-commerce. That is, there is no transaction or direct sales through telephone, and other electronic devices.
- Among the existing six trade routes (kiosks, sales agents, depots, plant sales, door to door and branch warehouses) *plant sales* and *depots* distribution channels have not yet practiced at Summit Beverage Plant and Dessie Pepsi Plant respectively.
- Gondar Pepsi Plant has access of CO_2 gas from Gondar Dashen Brewery, where CO_2 gas is it's by product.
- Nefas Silk Pepsi Plant and Tekelehaimanot Pepsi Plant, which had 18 truck roots before, promoted them to 25 and 20 respectively. This is incurring huge amount of money for truck routes map, which were designed through manual hand draft, that can't be modified easily.
- Nefas Silk Pepsi Plant, which has 7 number of branch warehouses. The number of branch warehouses is decreased to 6. To explain it in a not shell, the branch warehouse of Dire-Dawa moved and merged with that of Harer due to minimum distribution system as compare with Dire-Dawa Coca-Cola Plant.
- The total supply chain cost is found to be better than the existing accounting system. To make it specific, in the year 2005, while the supply chain cost analysis is Birr 80, 617,822.29, the existing cost analysis is Birr 82,789,602.46, which is saving Birr 2,171,780.17 (2.62 %).
- Taking 2005 year's total cost of NSP, through the Pareto cost analysis; it was found that the distribution cost (27%) is higher next to the production cost (68%).
- Of the production cost, direct materials (68%) have the lion's share. Further analysis of direct materials shows concentrate (55 %) is the highest and sugar (42%) the next.
- Among the distribution cost, advertisement (23%) and labour cost (20%) are the highest.

- Another way analysis of distribution cost for the existing six distribution channels shows branch warehouses (61%) are the highest, followed by truck routes (18 %).
- Mirinda is highly demanded of the three-product mix of Nefas Silk Pepsi Plant as per 2005. However the main brand of the plant is Pepsi.

II. Based on analysis and interpretation of the survey questionnaires and structure interview, the following conclusions are forwarded.

- The employees in each plant not only have low awareness about SCM but hardly used supply chain cost analysis and unidentified responsible department about SCM system at MOHA SISC level.
- The staffs have less awareness about inbound and out bound logistics & its value with low measurement. Moreover, significant numbers of employees are not able to identify whether where their raw materials (bottles and sometimes sugar) are imported, even though price is main selection criteria at MOHA level.
- The employee are hardly aware of the fact that MOHA produces Bure Kool Water, Tosa Amba Carbonated Water, and soft drinks with PET and Keg packs at MOHA level
- Massive numbers of MOHA employees have low awareness to kiosks and depots from the other distribution channels.
- Truck routes are found to have the highest market share for SNP, THP, Summit and Dessie Pepsi plants, where as for Gondar Pepsi plant *sales agent* takes the lead. In spite of this, all plants used *warehouse location* as their best factor for proper decision of the outbound logistics.
- One of the filler machine of Nefas Silk Plant is too old, which costs high amount of repair and maintenance cost.
- The bottle washing machine is also the main reason for the huge amount of repair and maintenance cost, high down time and frequent interruption of production.

8.2 Recommendations

Based on the given conclusions, the following recommendations are forwarded.

- Ethiopian Soft Drinks Industries should have used electronic communication, such as telephone, e-mail, web pages, etc to promote their direct sales
- It is advisable for Summit Beverage Plant and Dessie Pepsi Plant to use *plant sales* and *depots* distribution channels respectively so as to increase their percentage distribution.
- While the Gondar Pepsi Plant should have bought CO_2 gas from Dashen Brewery, a factory found in the same city and CO_2 gas is its by product, Gondar Pepsi Plant has bought this gas from Nefas Silk CO_2 Plant in Addis Ababa. Had the Gondar Pepsi plant bought from Dashen Brewery, it would have minimized its transportation cost, damage cost, insurance and other costs.
- Both Nefas Silk and Teklehaimanot Pepsi Plants need to have used AutoCAD soft wares to drawn their truck routes map to enable them modify the drawing when needed. This is also important for documentation and accessibility.
- Nefas Silk Pepsi plant's distribution channels, especially kiosks, depots and truck routes need to have been increased in numbers for Upcountry sales such as Dire-Dawa and others.
- Usage of supply chain cost is recommended so as to eliminate hidden cost, non value added costs and double costing effect.
- Focus should be given to concentrates and sugar, and to the creation of strong alliances with the suppliers of these raw materials
- Since the distribution cost analysis shows, advertisement is the highest, using database is advisable to minimize the expense and facilitate the process of advertisement campaign as well. For this reason, the database system for both East Africa Bottling S.C. and MOHA Soft Drinks Industry S.C. is designed.
- Since, the analysis, in addition shows, labour cost is the next highest cost, it is recommended to use AutoCAD to minimize it. Consequently a truck route map of number 18 drawn by an AutoCAD is drowned for Nefas Silk Plant.

- Nefas Silk Pepsi plant should focus on branch warehouse, especially for Addis Ababa warehouse and Nazareth branch warehouse.
- Nefas Silk Pepsi plant and Other MOHA Soft Drinks Industry Plants should focus on Mirinda Orange because of the highest demand among the other soft drinks of it.
- Trainings and seminars should be conducted about supply chain management and supply chain cost, inventory and cycle time analysis.
- The old filler machine of Nefas Silk Plant should be replaced by new filler machine in order to minimize, down time cost, maintenance and repair cost.
- The top management of Nefas Silk Plant should give strong attention to bottle washer machine so as to minimize frequent interruption of production.

8.3 Future works

In this thesis more emphasis has been given on the design of supply chain models in processing industries(Ethiopian Soft Drinks) giving emphasis on cost (supply chain cost and Pareto analysis), which is one of the quantitative performance measures. The concept of supply chain management can be applied for either manufacturing industries or service giving industries. Hence one can extend the model so as to include the supply chain system in Manufacturing industries (such as Textile, Spare parts, and service giving industries such as Bank, Hotel, Hospital, and others) on another *quantitative* performance measure such as lead times, fill rate, customer response time, profitability and others.

It has been very interesting to study supply chain management system on Ethiopian Soft Drinks Industries. On the other hand, one potential for further study area is to deeply look for qualitative supply chain performance measures elements (such as customer satisfaction, flexibility, information and material flow integration, effective risk management, supplier performance) for Ethiopian Soft Drinks Industries. Another study prospect could be to look at supply chain management system of the other Ethiopian Processing Industries. Additional prospective study area is Ethiopian Manufacturing Industries. Specially conducting similar analysis on the services firms' areas would also be an interesting area to investigate.

Further potential area of study is to develop model of Global supply chain management system. Modeling in supply chain can be performed on a single nation basis as what the researcher developed Model for Ethiopian Soft Drinks Industries or on a global basis as Dell, DHL and TNT did. Global supply chains (GSCs) are supply chain that operate (i.e. contain facilities) in multiple nations. When modeling GSCs, there are additional considerations affecting supply chain performance like export regulation, duty rates, and exchange rates that are not present in supply chains operating in a single nation.

A supply chain modeling can be facilitated by using web pages, especially in the phases of alternative generation of different supply chain systems and the evaluation of these systems. It could be even more interesting, in the future, if one can generate supply chain alternatives and evaluate the alternatives based on supply chain parameters with the aid of web front like, exel supply chain incase of DHL.

References

Books and Journals

[1] Benita, M. Beamon. "Supply Chain Design and Analysis: Models and Methods." International Journal of Production Economics. Vol. 55, No. 3, 1998. pp.281-294.

[2] Bernard, W. Taylor. Introduction to Management Science. 5th ed. Englewood Cliffs: Prentice-Hall, 1996.

[3] Christopher, Gopal and Gerard Cahill. Logistics in Manufacturing. Business on Irwin, 1992.

[4] David, John, et al. The Seven Principles of Supply Chain Management. Reed Business Information: a division of Reed Elsevier Inc, January 1997.

[5] David, N. Burt, W. Dobler, and L. Starling. World Class Supply Management: The key to Supply Chain Management. 7th ed. New York: McGraw-Hill, 2002.

[6] Donald, Waters. Operation Management. 2nd ed. New Delphi: Crest Publishing House, 2001.

[7] Donald, W. Dobler, and David N. Burt. Purchasing and Supply Management. 6th ed. New York: Mc Graw-Hill, 1996.

[8] Hai, Lu, and Yirong Su. "Logistics and Transport Management." Graduate Business School, School of Economics and Commercial Law ,Göteborg University. M.A Thesis No. 29, 2002.

[9] Heung, Suk Hwang. Design of supply-chain logistics system considering service level. China: Elsevier Science ltd, 2002.

[10] Hitosh, Kume. Statistical methods for Quality Improvement. 7th ed. Tokyo: 3A Corporation, 1985. pp 18-23.

[11] H., Donald Ratliff, and William G. Nulty. "Logistics Composite Modeling". School of Industrial & Systems Engineering ,Georgia Institute of Technology. Atlanta: GA 30332 USA,1996.

[12] James, H. Greene. Production and Inventory Control Handbook. 3rd ed. New York: McGraw - Hill, 1997.

[13] John, J. Coyle. The Management of Business Logistics. 4th ed. New York: West Publishing Company, 1996.

[14] Lee, J. Krajewski, and Larry P. Ritzman. Operations Management: Strategy and Analysis. 6th ed. New Delhi: Prentice-Hall of India P. Lt, 2003. pp 498-516.

[15] Meenakshi Sundram & Sameer G. Mehta , "A comparative study of three different supply chain approaches." International Journals of physical Distribution & logistics management. vol.32, No.7, 2002. PP.532-555.

[16] Norman, Gaither. Production and Operations Management. 7th ed. New York: Wadsworth Publishing Company, 1996.

[17] Paul, D. Larson et al "SCM: The Four Perspectives Models." Iowa State University, College of Business. IA 50011 USA:300 Carver Hall, Ames,2001.

[18] Paul, Gopalakrishnan, and M. Sandresan. Materials Management an Integrated Approach, 2nd ed. New Delphi: Prentice-Hall, 1998.

[19] Raghuram, G., and Rangaraj N. Logistics and Supply Chain Management Cases and Concepts. New Delphi: Macmillan, 2000.

[20] Richard, J. Tersine. Principle of Inventory and Materials Management. 4th ed., Englewood Cliffs: Prentice- Hall, 1994.

[21] Sergio, G. Lazzarini, et al. "Integrated Supply Chain and Network Analysis." The study of netcahins, John M. Olin School of Business, 2000.

[22] Shay, B.S. Supply Chain Management in the twenty–first Century. New Delphi: Macmillan Indian Limited, 2000.

[23] Stephen, Lemay, David J. Bloomberg, and Joe B. Hanna. Logistics. New Delhi: Prentice –Hall of India Private Limited, 2002.

[24] Teresa, Wu, and Peter O'Grady, "A Net Work Based Approach to the Design of Supply Chains." Internet Lab Technical Report.TR 2001-10, 2000.

[25] Thomas, Behlau et al. "Modeling and Simulation of Supply Chains." Department of Logistics and Materials Handling Engineering, Otto-von-Guericke University of Magdeburg. Germany: Magdeburg, 1996.

[26] Tjendra, Santoso. "A Stochastic Programming Approach for Supply Chain Network Design Under Uncertainty." Georgia Institute of Technology. Atlanta: 765 Ferst Drive GA 30332, June 2003.

[27] Yoon, Chang, and Harris Makatsoris. "Supply Chain Modeling Using Simulation." Institute for Manufacturing, University of Cambridge. Cambridge: CB2 1RX, UK, I. J. of Simulation Vol. 2 No. 1.

[28] Y., Wu, and G. Freizelle et al. "A Simulation Study on Supply Chain Complexity in Manufacturing Industry." Institute for Manufacturing, University of Cambridge. Cambridge: Mill Lane, CB2 1RX, UK, 2001.

Thesis

[29] Debebe, Abreham. "Model Development of Supply Chain Management System: Acase Study On Meta Abo Brewery." Addis Ababa University, Ethiopia: 5 kilo, June 2004.

[30] Vikas, Chandra. "Supply Chain analysis: A System Approach to Materials Management." Institute of India Technology. New Delhi: IIT-Hall, 1999.

Magazines and Employee Hand Books

[31] Bure Mineral Water Strategic Plan, 2005

[32] Inauguration Magazine of Summit Partner (Ethiopia) PLC, 1999.

[33] Magazine of Ethiopia Beverage Corporations for the new filler machine installation of Dessie Pepsi Plant, 1981

[34] Magazine of Ethiopia Beverage Corporations for the new filler machine installation of Gondar Pepsi Plant, 1982

[35] MOHA, Employee Handbook,PP-2-4,8-14

[36] Tiret MIDROC Magazine, pp 15-16,Vol.5

[37] Edison, Mike. "Cover History of Pepsi." World Beverage International. Vol.7 No.4. July/August, 1996.p24.

[38] Koss, John, Peter. "Another View of the Supply Chain." World Beverage International. Vol.15 No. 6. November/December, 1997.p66.

WWW (World Wide Web) Sources

[39] Basic concept of Supply chain Management; retrieved from: http://media.wiley.com/product_data/excerpt/72/04712351/0471235172.pdf

[40] Council of Logistic Management; retrieved from: www.clm1.org.

[41] East African Bottling S.C. Inauguration of the two new bottling lines; retrieved from: http://www.addistribune.com/Archives/2003/03/07-03-03/East.htm

[42] Ethiopian Privatization Agency; retrieved from: http://www.telecom.net.et/~epa/Sectors/beverages_prof.html

[43] Strategic Partnering Approach Improvement for SCM: retrieved from: http://andrianto.ath.cx/files/strategic_partnering_thesis_abstract.pdf

[44] Supply Chain Management Papers: retrieved from: http://www.eil.utoronto.ca/iscm/papers/

[45] Top Ten Soft drinks Market Share in 2005: retrieved from: http://www.beverage-digest.com/pdf/top-10_2006.pdf

[46] The Present Situation of the Process Industries in Ethiopia: retrieved from: http://www.selamta.net/economy.html (by Ato Gashew Gebeyehu)

[47] Wikipedia Dictionary: retrieved from: http://www.answers.com/topic/soft-drink

[48] Microsoft® Encarta® 2006. © 1993-2005 Microsoft Corporation.

[49] The Difference between a Supply Chain and a Value Chain; retrieved from: http://www.wmep.org/valuechainmanagement.html

[50] The DHL Supply Chain Management Solution; retrieved from: http://www.dhl.de/dhl?tab=1&skin=hi&check=yes&lang=de_EN&xmlFile=3001283

[51] TNT Supply Chain Management Solution; retrieved from: http://64.233.183.104/search?q=cache:Y7Cqb7KsRioJ:www.tibco.com/resources/customers/successstory_tntlogistics.pdf+TNT+Supply+chain+management.pdf

Appendices

Appendix 1: Glossary of Soft Drinks and Supply Chain Terminologies

1. *Soft Drinks*: A nonalcoholic, flavored, carbonated beverage, usually commercially prepared and sold in bottles, glass or cans.
2. *Concentrate: solid* components (sugar, syrup) in a solution
3. *Net Content*: the volume of soft drink in a bottle (standard = 300 ml).
4. *Fill Point*: liquid level height as filled in a bottle (standard = 57mm down from the top)
5. Carbonation Volume: Volume of CO_2 in a filled & crowned bottle
6. *Supply chain* is a series of linked suppliers, manufacturers, distributors and customers.
7. *Direct raw materials* are ingredients, which are converted to product through various conversion processes.
8. *Indirect raw materials* are added in order to facilitate the various reactions.
9. *Inbound logistics* is a process material flow from suppliers to manufacturers.
10. *Outbound logistics* is the distributions of finished products to end-users.
11. *Depots*: a warehouse used for storing and distributing things (soft drinks)
12. *Dealers*: (seller or trader) a person or company whose business is buying and selling
13. *PET Bottles*: recyclable plastic: a type of plastic used for recyclable containers of Soft drinks. *Full form* polyethylene terephthalate.
14. *Keg*: an aluminum barrel that is used for storing and transporting soft drinks
15. *Plastics Crates/Cases*- an open plastic box used to carry or store 24 glasses of soft drinks.
16. *Syrup*: flavored sweet liquid: a liquid made of Concentrate and sugar dissolved in water by heating, widely used in candy and Soft drinks making.
17. *Kiosks*: small roofed street booth: a small permanent or temporary structure on a sidewalk that sells items such as soft drinks.
18. *Crown corks*: a usually cylindrical piece of material used as a bottle stopper
19. *Door to Door*: covering all houses in area: done or going from one house to the next to distribute Soft drinks using truck
20. *Retailers*: Intermediaries who sells products (Soft drinks) directly to end users

Appendix 2: Background of the Case study Plants for survey questionnaires

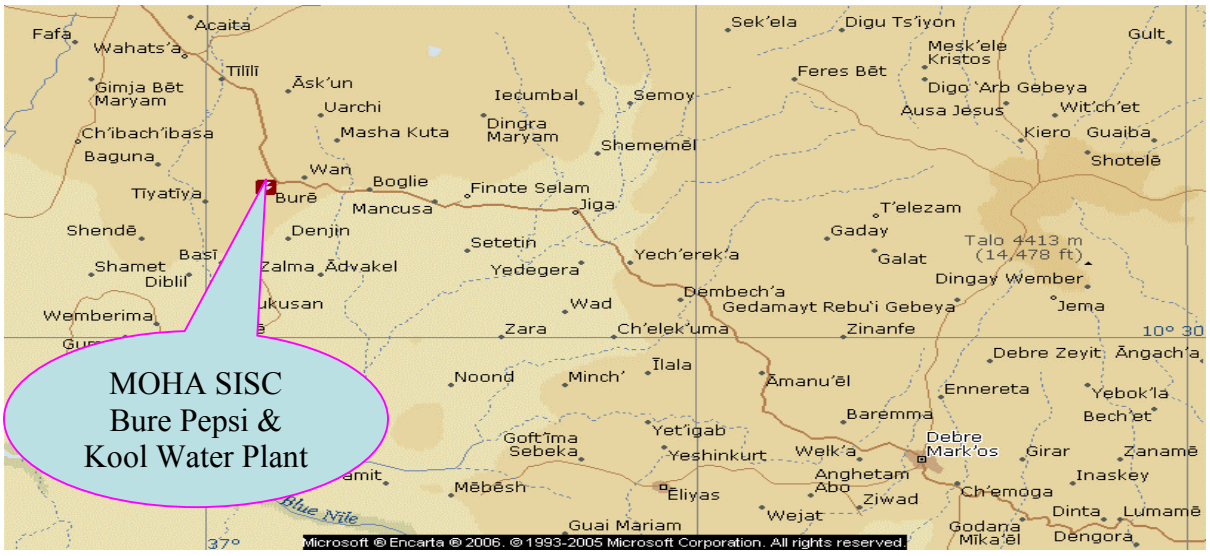
Name of the Plant	Nefas Silk Pepsi Plant	Teklehaimant Pepsi Plant	Summit Beverage Plant	Dessie Plant	Gondar Pepsi Plant	BureKool water & Pepsi Plant
Total employee	889	585	310	154	306	120
Region	14	14	14	3	3	3
City/Town	Addis Ababa	Addis Ababa	Addis Ababa	Dessie	Gondar	Bure
Location	Near Gotera	Near Mercato	Around CMC	Dawdo	Around Pizza	Near Ambosebel
Area	18,636 m^2	12,789 m^2	24,000 m^2	6,106.25m^2	6,203.4 m^2	11,814 m^2
Production capacity Designed	2083 cases/hr	1000 cases/Hr	1000 cases/hr	150 cases/hr	250 cases/hr	625 cases/hr
Attainable	1027 cases/hr	900 cases/hr	800 cases/hr	140 cases/hr	248 cases/hr	500 cases/hr
Actual	934 cases/hr	850 cases/hr	600 cases/hr	115 cases/hr	240 cases/hr	400 cases/hr
Product produced	A,B, C	A,B,C,D,E	A,B,C,D,E,F,G	H	A,B,C,E	A, B, C,J
Plant established	April, 1957E.C.	1961 E.C.	1991E.C.	1944 E.C.	1970 E.C.	1985 E.C
Current Capital (Birr)	69,230,132.77	42,840,704.00	105,861,896.00	7,904,628.00	17,650,340.25	23,386,000.00
Sub-city	kirkos	Lideta	Bole	Southern Wello Zone	Gondar	East Gojam Zone
Kebele	06	30	16	17	13	03
Telephone	011-4655211	011-2750122	011-6604865-75	033-1111690	058-1110533	058-7740610
Fax	011-4654844	011-2751732	011-6604862	033-1116235	058-1114170	058-7740612
E-mail	MohaNSP @ethionet.et	MohaTHP @ethionet.et	Summit@ethionet.et	Not applicable	Not applicable	Not applicable
Owner ship	Private	Private	Private	Private	Private	Private

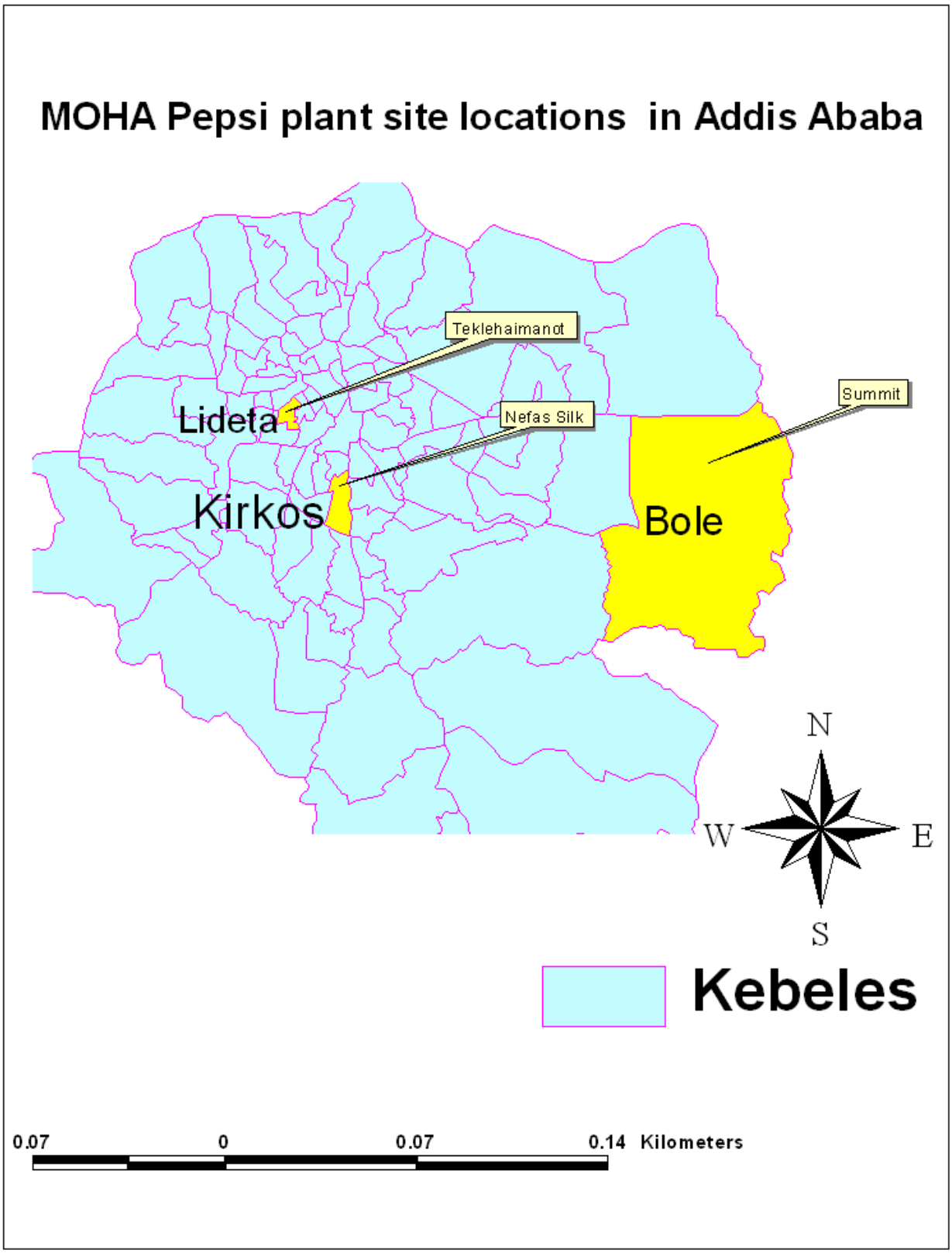
Legend

A= Pepsi, B=Mirinda Orange, C=Mirinda Apple, D=Mirinda Tonic, E=7UP, F= keg, G=PET, H=Tosa Amba Carbonated Water J= Bure kool water

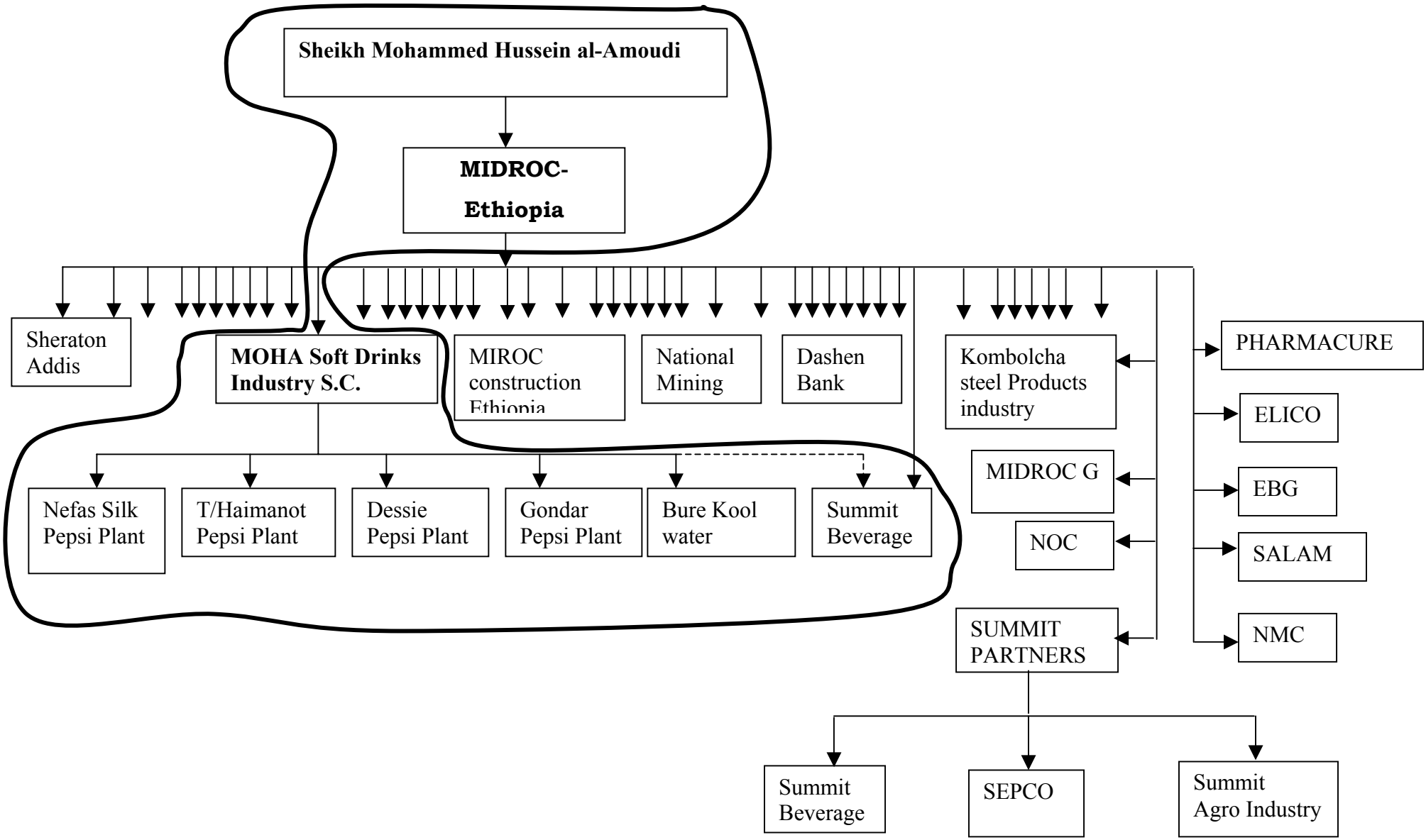
One Cases of soft drinks=24 Glass, One Cases of Tosa Amba carbonated water and Bure kool water=20 Glass and bottles

Appendix 3: Map of the field trip to the Cite of the Soft drinks Plant town



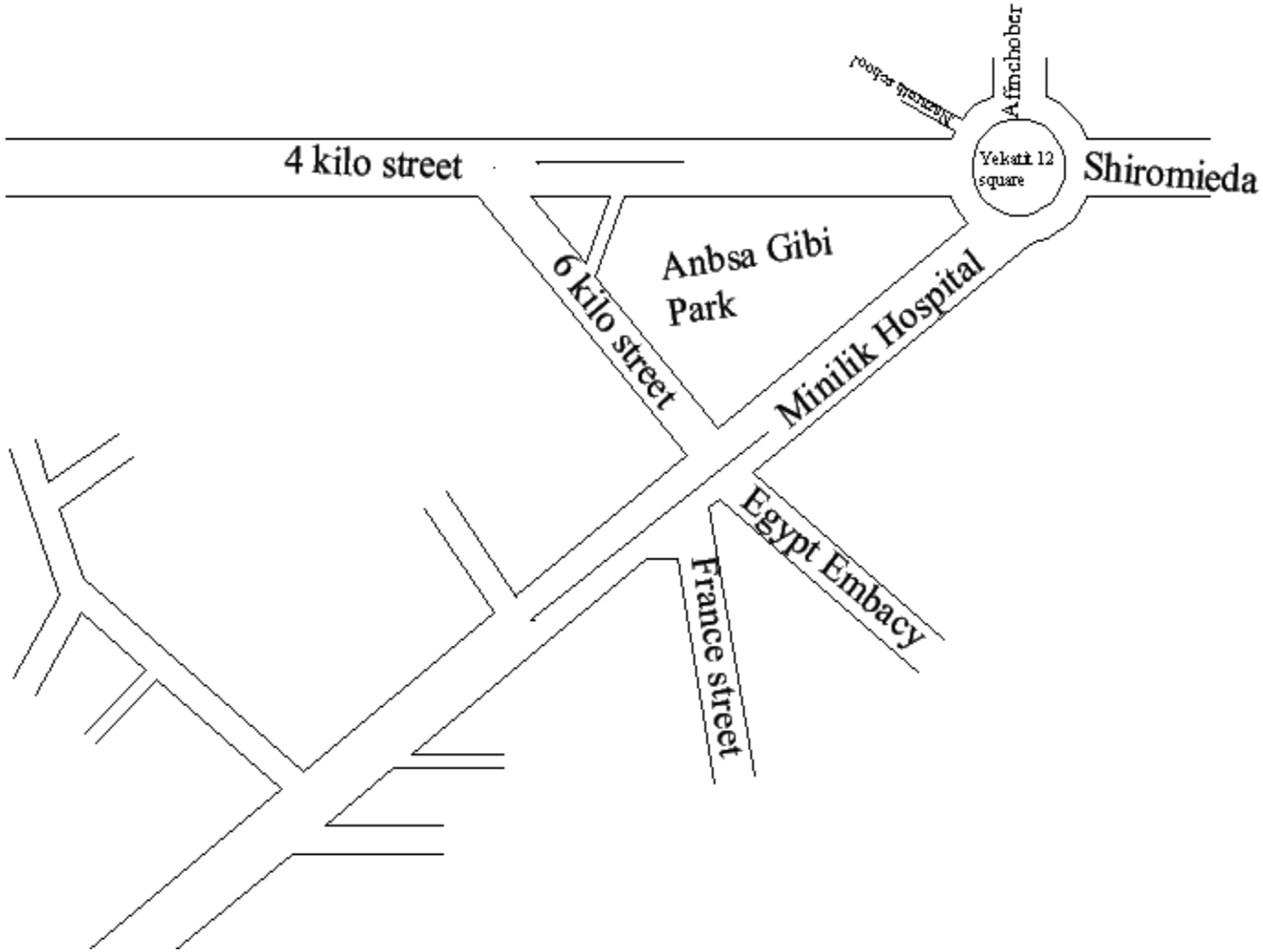

MOHA Pepsi plant site locations in Addis Ababa
Teklehaimanot
Summit
Nefas Silk
Lideta
Kirkos
Bole
N
W
E
S
Kebeles
0.07
0
0.07
0.14 Kilometers

Appendix 4: Coverage of the Case Study

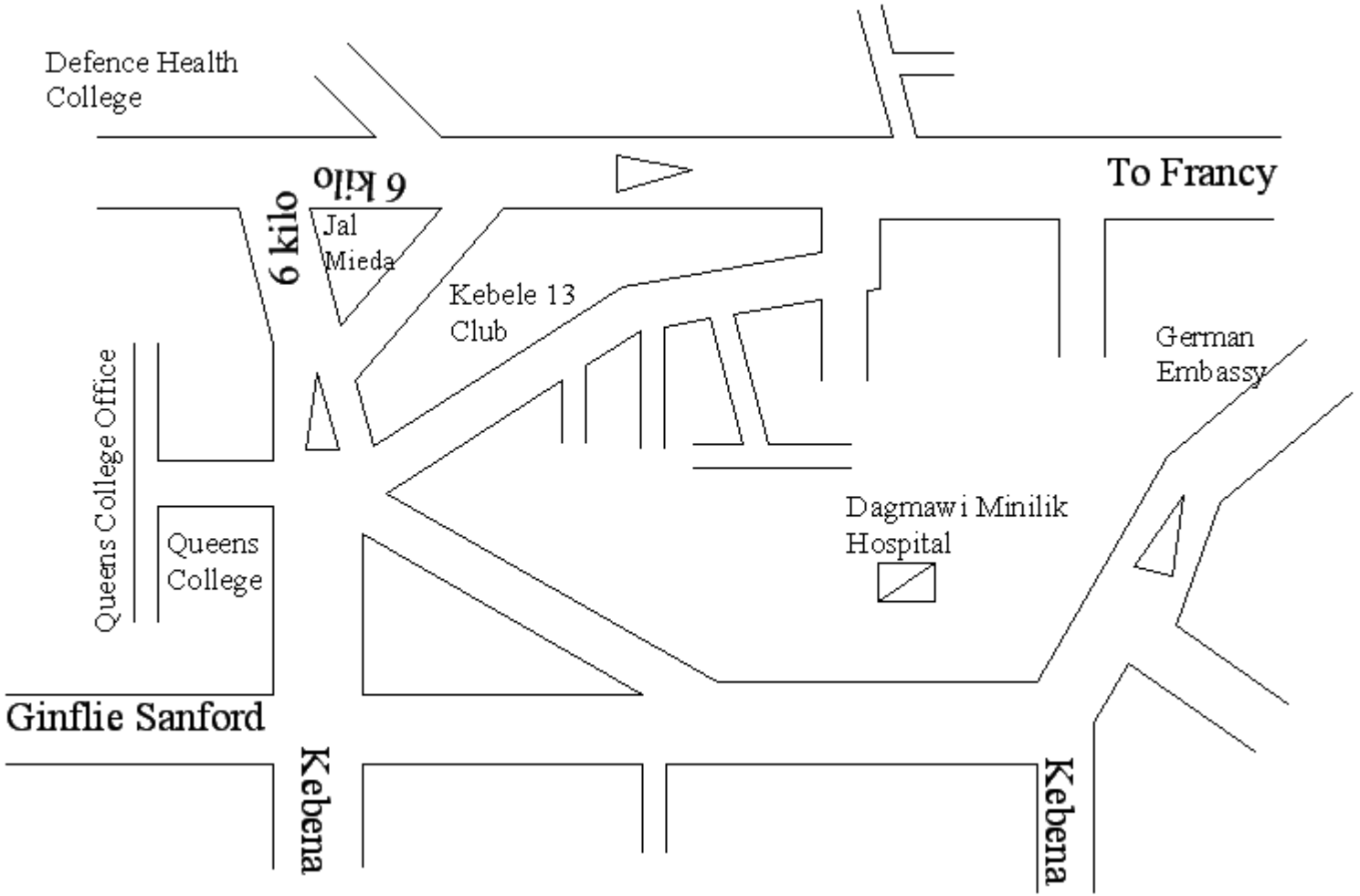


Appendix 5: one of the eighteenth sales routes of Nefas Silk Plant.

I.

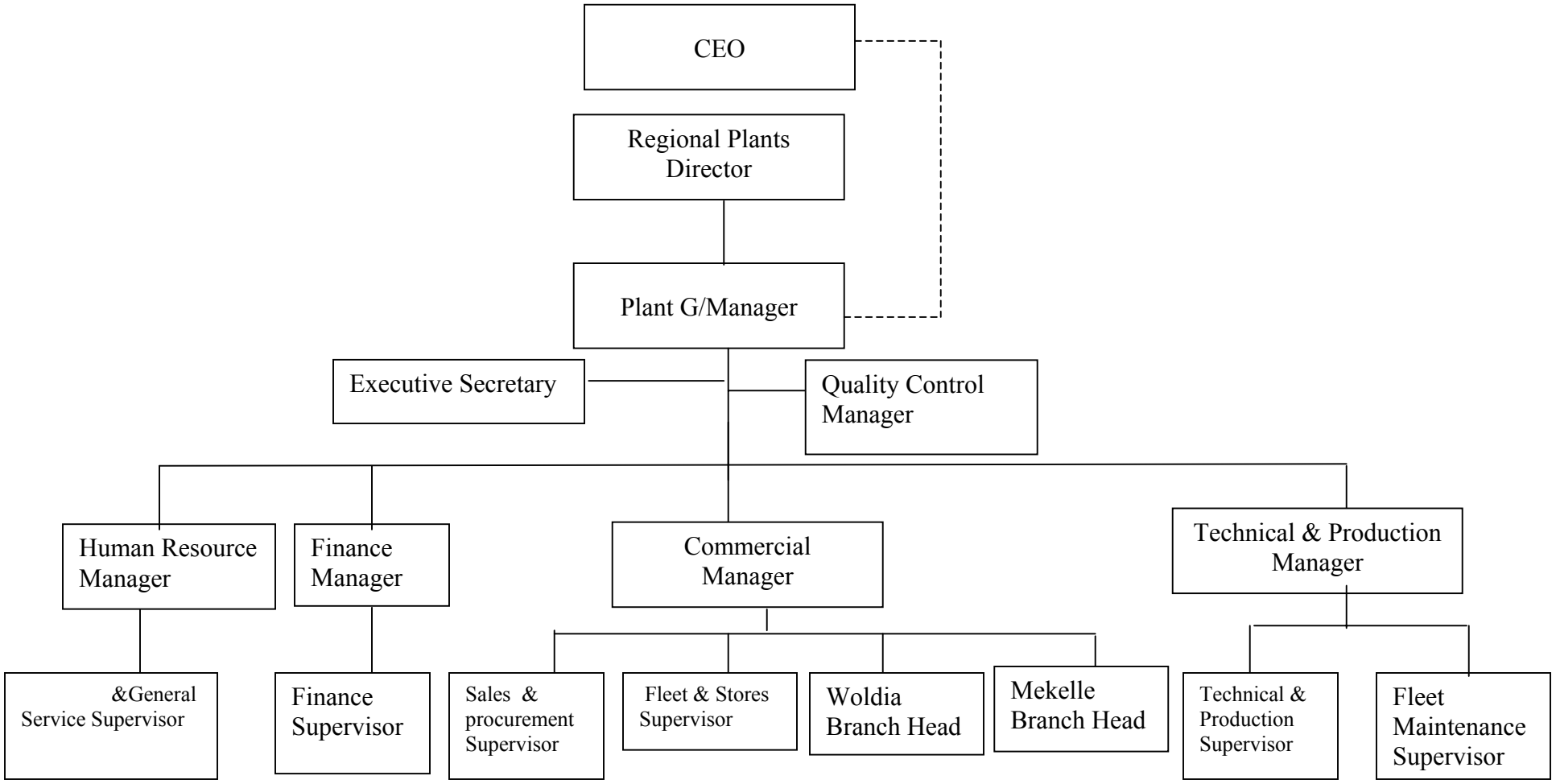


II.

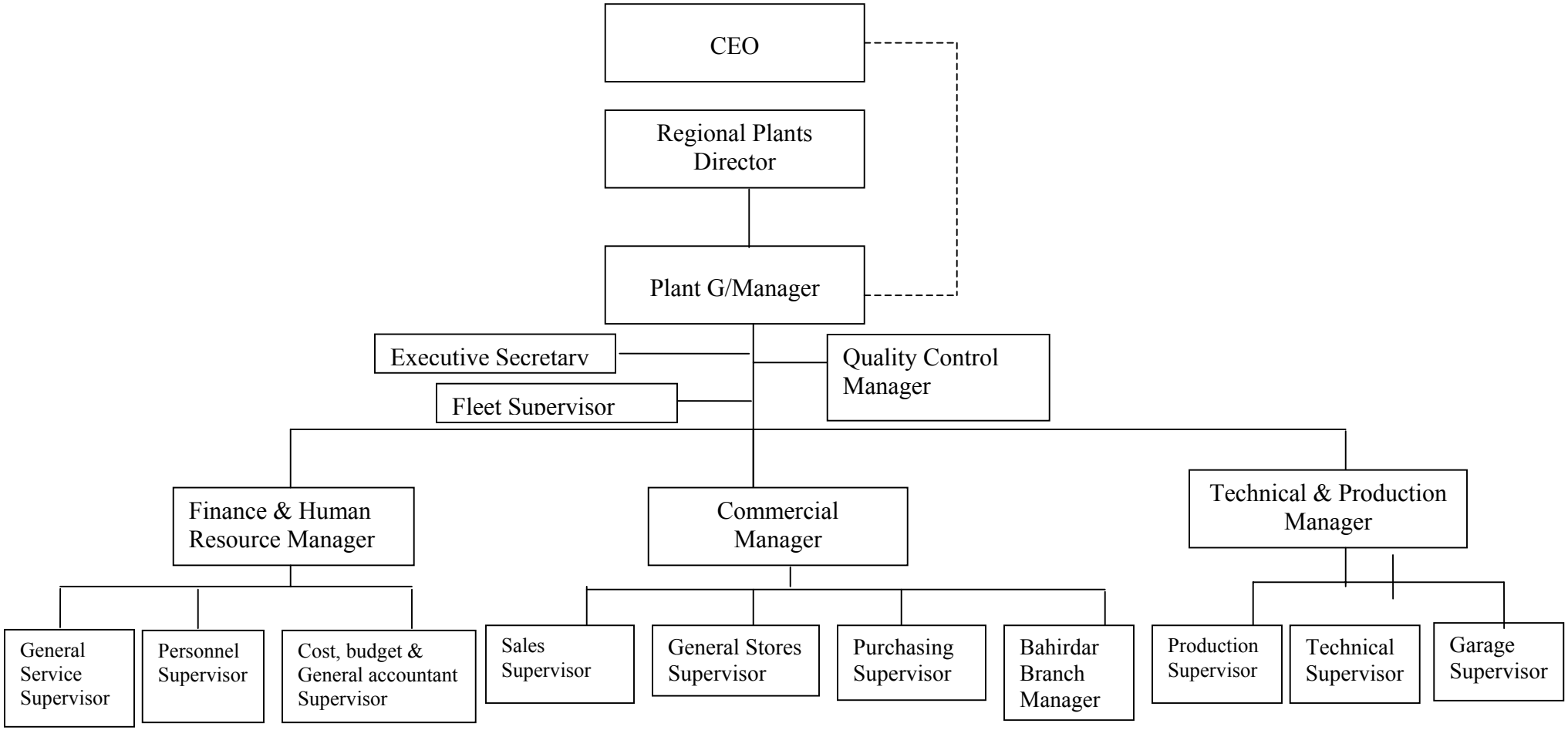

Defence Health College
To Francy
6 kilo
6 kilo
Jal Mieda
Kebele 13 Club
German Embassy
Queens College Office
Queens College
Dagmawi Minilik Hospital
Ginflie Sanford
Kebena
Kebena

Appendix 6: Organizational Structures of NSP,THP,Dessie,Gondar,Bure&Summit Plants

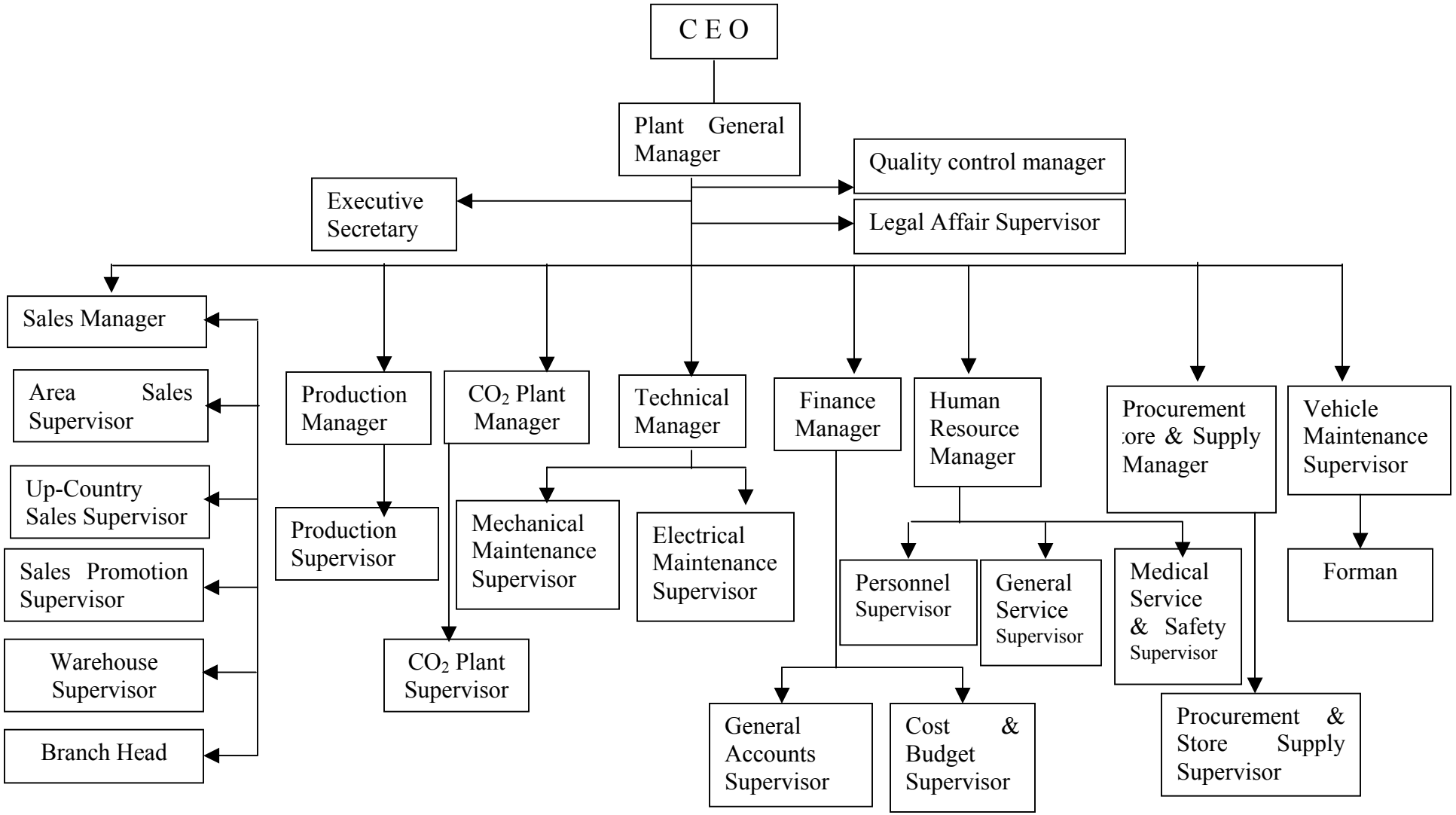
MOHA SOFT DRINKS INDUSTRY S.C DESSIE PEPSI & TOSA AMBA WATER PLANT ORGANIZATION STRUCTURE



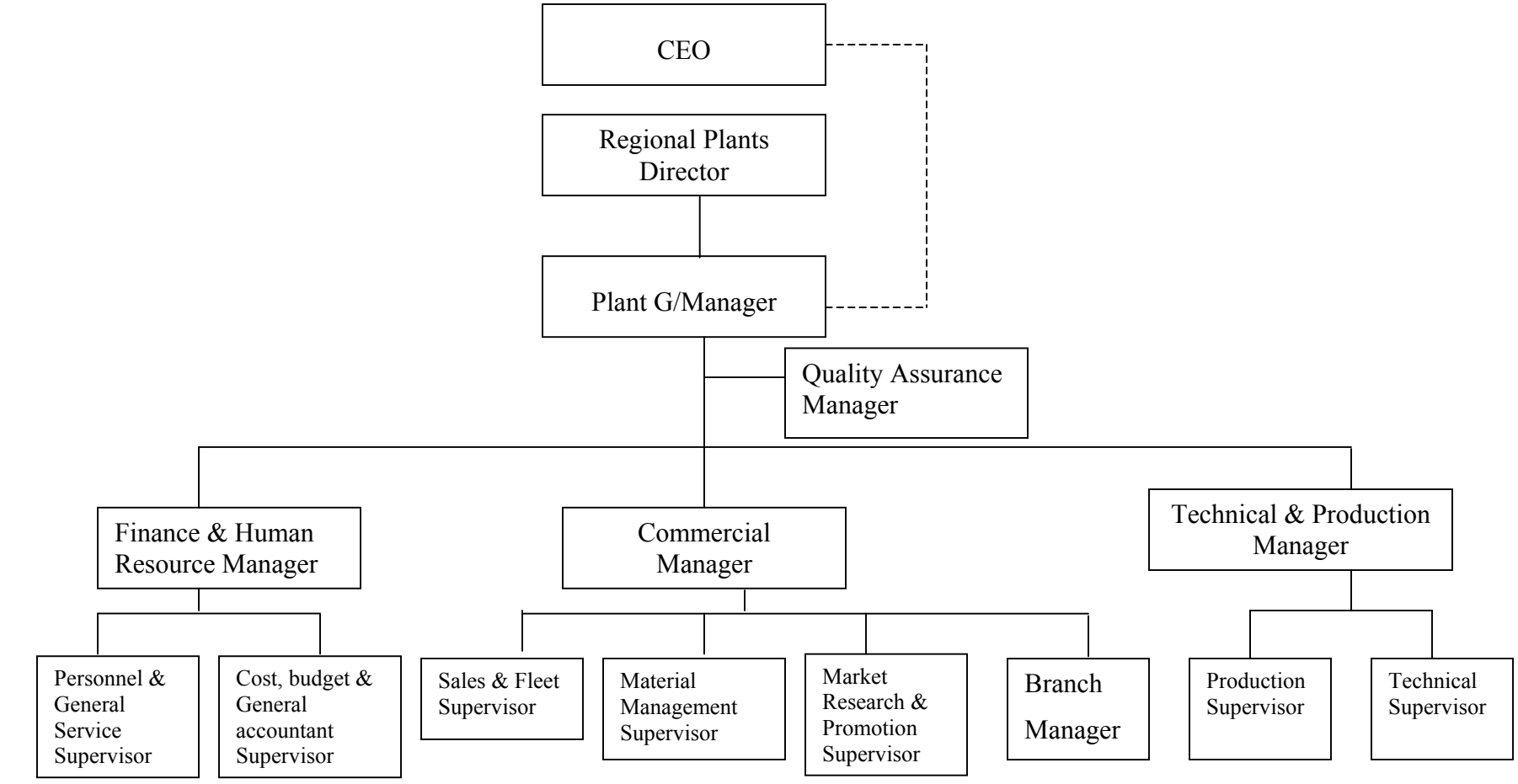
MOHA SOFT DRINKS INDUSTRY S.C GONDAR PEPSI PLANT ORGANIZATION STRUCTURE



MOHA SOFT DRINKS INDUSTRY S.C NEFAS SILK PEPSI PLANT ORGANIZATIONAL STRUCTURE



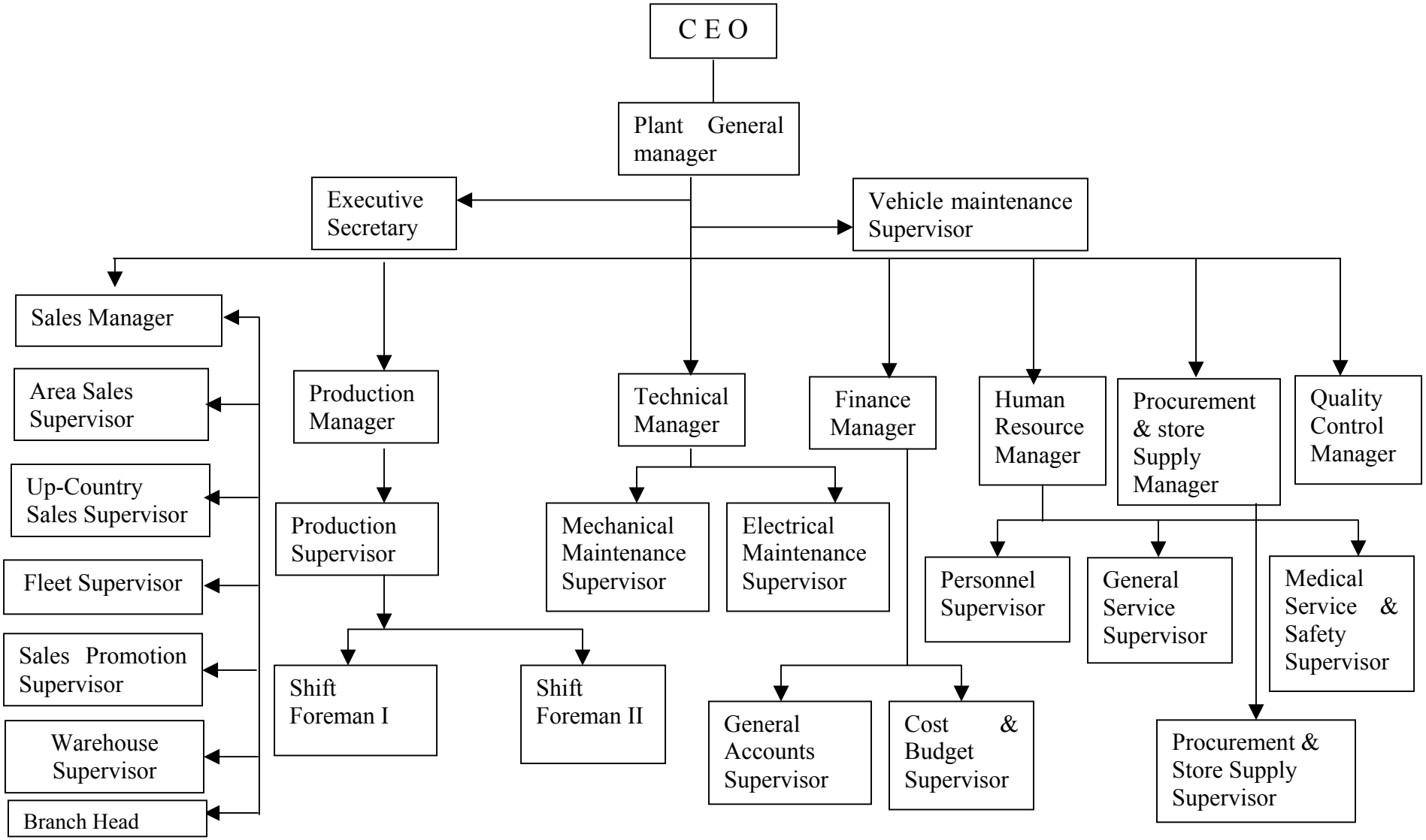
MOHA SOFT DRINKS INDUSTRY S.C BURE Pepsi & KOOL WATER PLANT ORGANIZATION STRUCTURE



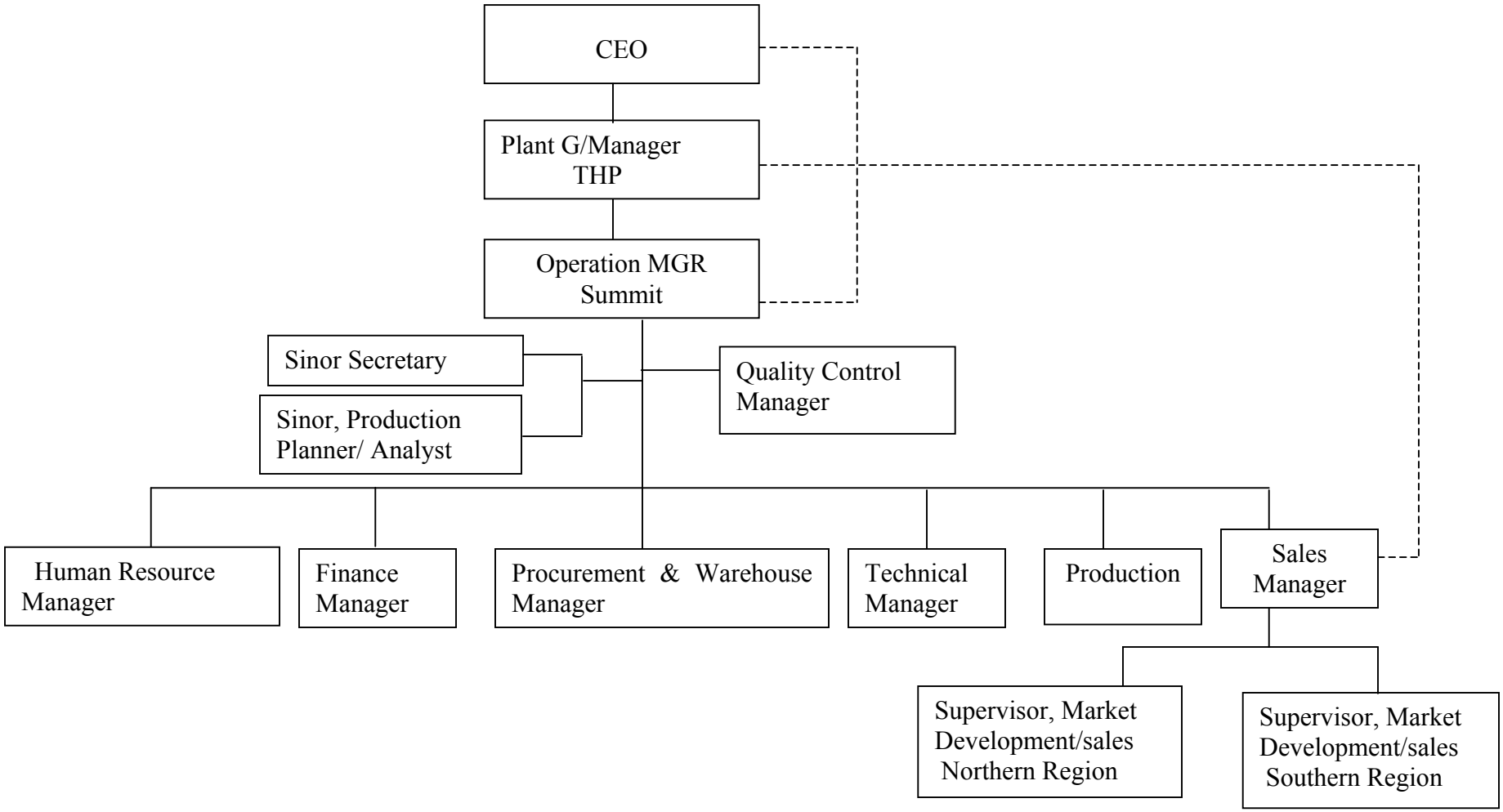
Initiated by _____ Concurred by _____ Approved by _____

Plant Manager HRD Head Quarter

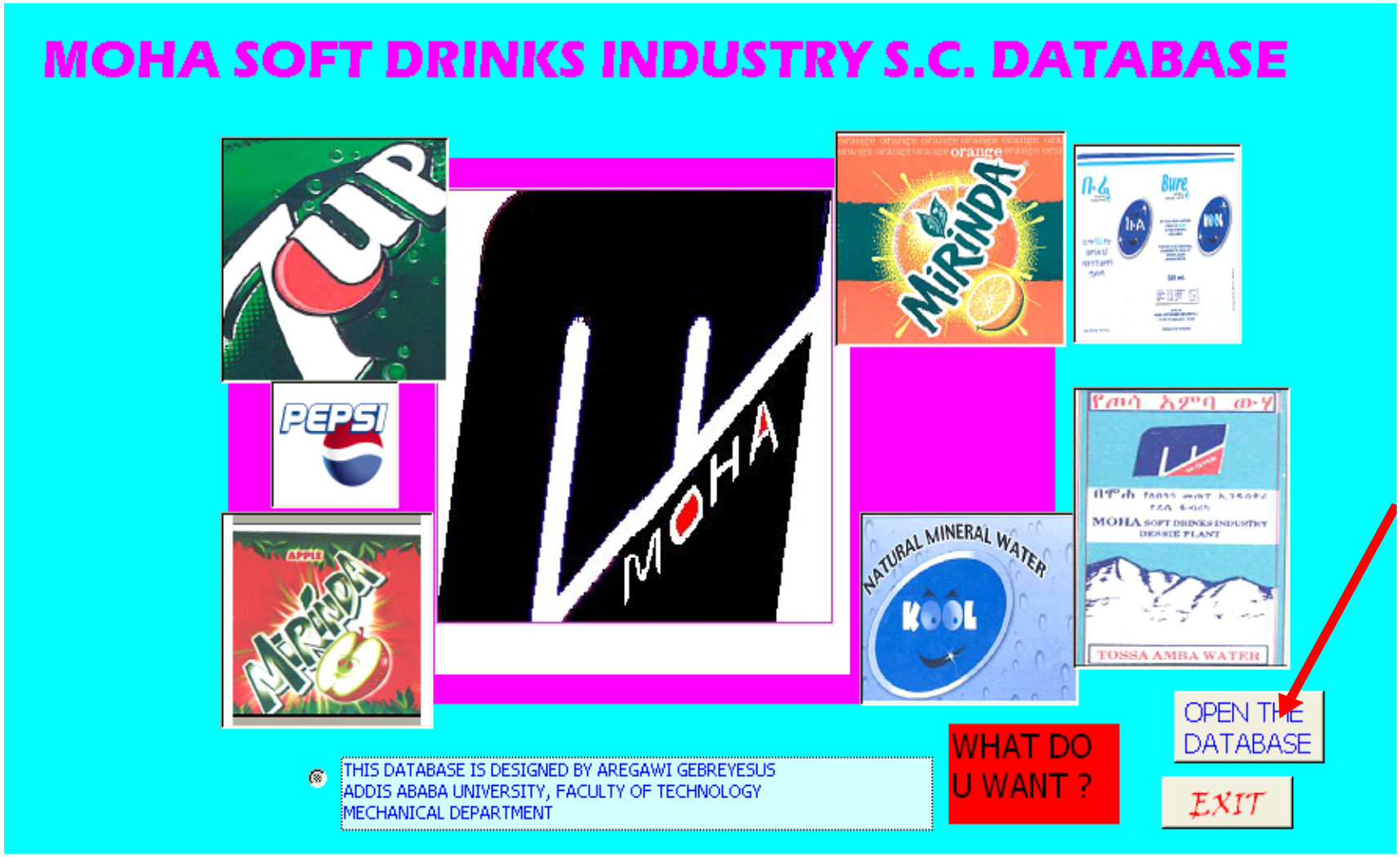
MOHA SOFT DRINKS INDUSTRY S.C THP ORGANIZATIONAL STRUCTURE



MOHA SOFT DRINKS INDUSTRY S.C TRANSITIONAL ORGANIZATIONAL STRUCTURE SUMMIT BEVERAGE



Appendix 7: Overview of the Data Base for MOHA SISC & East Africa Bottling S. C.



MOHA SOFT DRINK INDUTRY PLANTS

NEFAS SILK PEPSI PLANT

T/HAIMANOT PEPSI PLANT

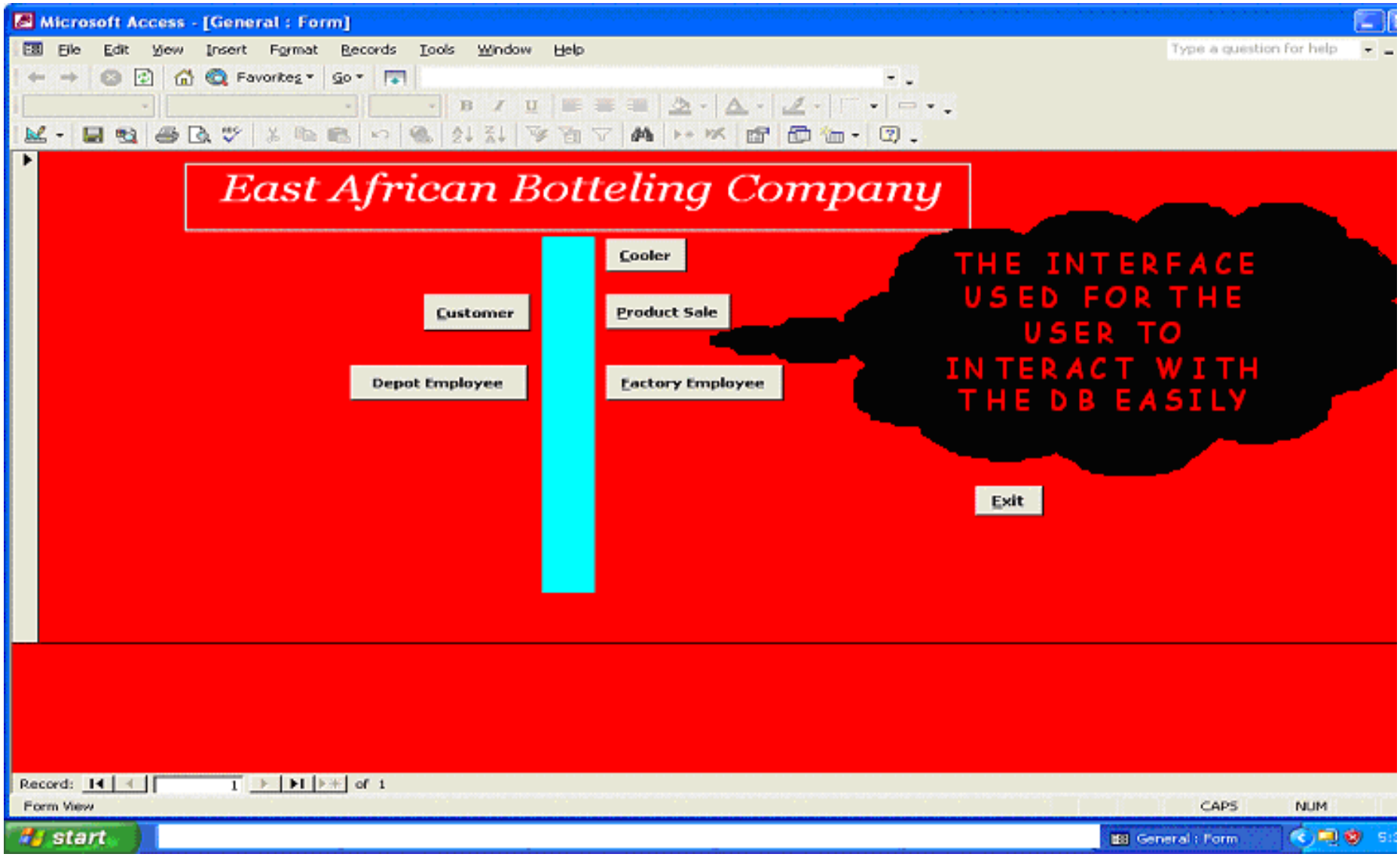
GONDAR PEPSI PLANT

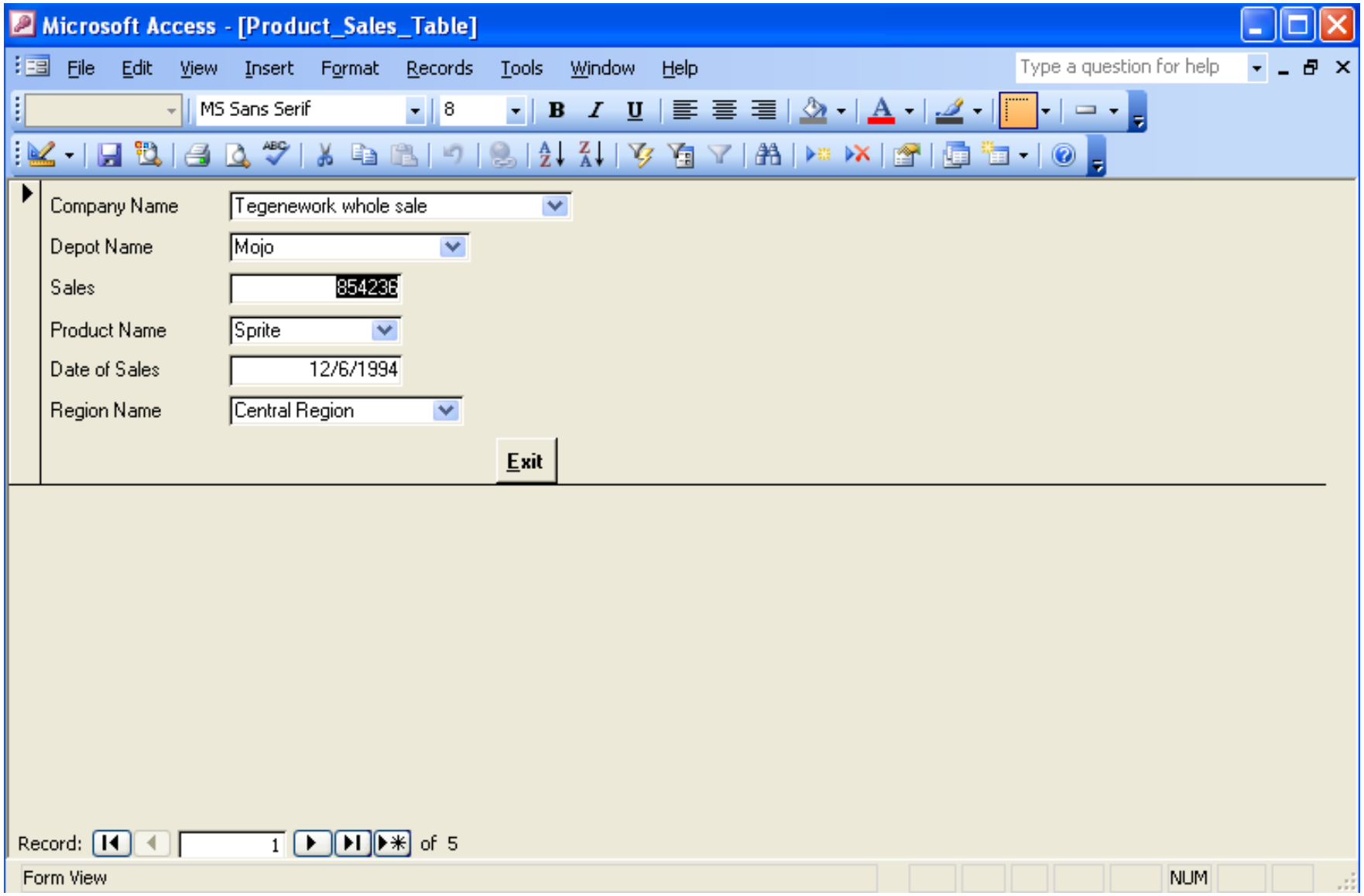
DESSIE PEPSI and TOSA AMBA WATER PLANT

BURE PEPSI and KOOL WATER PLANT

SUMMIT BEVERAGE PLANT

EXIT


Microsoft Access - [General : Form]
File Edit View Insert Format Records Tools Window Help
Type a question for help
Favorites Go
East African Botteling Company
Cooler
Customer
Product Sale
Depot Employee
Factory Employee
THE INTERFACE USED FOR THE USER TO INTERACT WITH THE DB EASILY
Exit
Record: 1 of 1
Form View
CAPS NUM
start
General : Form


Microsoft Access - [Product_Sales_Table]
File Edit View Insert Format Records Tools Window Help
Type a question for help
MS Sans Serif
8
Company Name
Tegenework whole sale
Depot Name
Mojo
Sales
854236
Product Name
Sprite
Date of Sales
12/6/1994
Region Name
Central Region
Exit
Record:
1
of 5
Form View
NUM

Appendix 8: Comparison between Nefas Silk Pepsi Plant and Dire-Dawa East African Bottling S.C. Coca-Cola Plant in number of distribution channel

	Pepsi cola		Coca Cola	
City/Town	No. of Kiosks	No of Depots	No. of Kiosks	No of Depots
1.Asebe Teferi	0	0	0	20 Kebele 01,02,03,04 Hirena Gelemso (4) Bedesa (3) Boke (3) Mechera (2) Meison Asebot, and Bordode Total =20
2.Harer	0	Shenkor=1 Shewaber=1 Arategna=1 Jijiga=1 Total =4	0	26
3.DireDawa	Stadium =1	Dechatu =1	0	21 increased to 36
4.Shashemene	1	Total =**13**	0	16
5.Wolaita	0	Araba Minch=1	0	6
6.Awasa	0	Awasa=1 Wondogenet=1	0	12
7.Nazareth	Asela Mazoria =1 Karmara Hotel =1 Arada=1 Total =3	Total =14	4	15
8.Asela	0	Mehal ketema	0	2
9. Eteya	0	1	0	2
10. Bokoji	0	1	0	2
11.Asosa	0	Police Station=1	0	2
12.Huruta	0	1	0	2
13.Wonji	0	1	0	2 Total=10
14.Dukem	0	MisrakBer Hotel=1	0	0
15.Debrezeit	0	Total =5	0	2
16.Mojjo	Meneheria=1	Total=3	0	3

Appendix 9: Survey Responses Summary to Circulated Questionnaires for Supply Chain Management System in the case study MOHA SISC.

Addis Ababa University
School of Graduate Studies
Faculty of Technology, Department of Mechanical Engineering
Graduate Program in Industrial Engineering

TITLE: MODEL DEVELOPMENT OF SUPPLY CHAIN MANAGEMENT SYSTEM FOR THE ETHIOPIAN SOFT DRINKS INDUSTRIES: A CASE STUDY ON MOHA SOFT DRINKS INDUSTRIES SH. Co.

By: Aregawi Gebreeyesus

E-mail: areg1990kid@yahoo.com

Mechanical Engineering (Industrial Engineering Stream) studies, 2004/6 April, 2006

SUPPLY CHAIN MANAGEMENT SYSTEM SURVEY IN MOHA SOFT DRINKS INDUSTRIES SH. CO.

Acknowledgement to the respondent

Hereby, I would like to express my gratitude for your dedicated cooperation. Had it not been your genuine cooperation of filling this questionnaire, it would have not been possible to conduct this thesis.

This questionnaire is conducted for the purpose of fundamental scientific research. Therefore, we assure you that the information obtained from this questionnaire will be kept confidential and will not be transferred to other parties for any other purpose. You may feel free to verify these statements from us personally. For other questions pertaining to this thesis, please contact the thesis advisor.

Yours Sincerely,

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

Your personal data (it is not necessary to write your name)

Position_____, Service or experience year_____, Qualification_____

Note: 1. Please, give your suggestion for the points that are applicable in the company.

2. Please, give short or brief answers for subjective questions.

3. If the space is not enough, you can write your answer on the back of the paper.

Total number of questionnaires distributed: 120

Number of respondants: 94 (78.3%)

Respondants service Years in the Plant: 1-5 Years= 16 , 6-10 Years=17, 11-15 Years=19, 16-20 Years=12, 20-25 Years=13, above 25 Years=14, unidentified = 3

Composition of Position: Mangers, Supervisors, Sales Route Coordinators, Engineers, senior chemists, Mechanic, Foreman and Branch managers, and General Managers.

Composition of Department: Human resource, Production, Technical Commercial, Sales & Marketing, Finance, Quality Control, CO_2 Plant.

Composition of Qualification: Accounting, Management, Procurement & Supply, Applied Chemistry, Marketing, Mechanical and Electrical Engineering.

Section 1 Background of the Plants and Awareness of SCM

	Excellent	Very good	Good	Fair	Poor	Omitted
1. What is the staffs' awareness about supply chain management in the plant?	2 (2%)	15(16%)	23(25%)	21(22%)	30(32%)	3(3%)
	Very high	High	Low	Very low	None	
2. To what extent is supply chain cost analysis method used in the plant?	6(6%)	9(10%)	18(19%)	23(24%)	27(29%)	11(12%)
3. To what extent is supply chain inventory method used in the plant?	8(8%)	10(11%)	11(12%)	19(20%)	20(21%)	26(28%)

4. Which divisions or departments are the most responsible for supply chain management?

Department	NSP		THP		Summit		Gondar		Dessie		Bure	
	Fqy	%	Fqy	%	Fqy	%	Fqy	%	Fqy	%	Fqy	%
All	8	32	6	28.6	4	25	5	41.7	5	55.6	2	18.2
Procurement, Production& Sales	11	44	8	38.1	8	50	3	25	2	22.2	3	27.2
Procurement, & Sales/Commercial	2	8	5	23.8	1	6.3	3	25	1	11.1	4	36.4
Procurement	4	16	2	9.5	3	18.7	1	8.3	1	11.1	2	18.2

5. What do you know about supply chain management? Explain briefly

- It is a system used to connect producer, distributor, supplier, and end user (customer) for mutual benefit.

- It is the systematic treatment/ control of the incoming & out going flow of materials.
- It is a system of management that increases the cooperation of different departments of the plants for increments of their productivity.
- It is a series linkage of the supplier, the organization and customers.

6. How do you define supply chain management based on the context of your plant?
   - It is the supply and distribution relation of our Plant (MOHA) with the suppliers, distributors and customers.
   - The forward and backward linkage of buying raw materials, producing soft drinks & delivering quality products to the consumer through standardizing every operating systems to achieve excellence.
7. Does your factory have an organizational structure?

   Yes = 87 (92.5%) No =0 (0%) No response =7 (7.5%)
8. Does your factory have a written or documented plant profile?

   Yes =59 (62.8%) No =10 (10.6%) No response =25(26.6%)
9. Does your Plant set its:

Response	Motto	Value	Mission	Vision	Objective
Yes	63/94=67%	59(62.8%)	66(70.2%)	70(74.5%)	89(94.7%)
No	5(5.3%)	7(7.4%)	5(5.3%)	7(7.4%)	1(1.1%)
No response	26(27.7%)	28(29.8%)	23(24.5%)	17(18.1%)	4(4.2%)

10. Where is the location of your plant?

Plant	NSP	THP	Summit	Gondar	Dessie	Bure
Location	A.A. Near Gotera	A.A. around Mercato	A.A near CMC	Around Pizza	Dawdo	Near Ambo tsebel

11. Does your plant use supply chain cost analysis method?

    Yes =3(3.2%) No=21(22.3%) No response=70(74.5%)
12. If your answer is **yes** for Q. 11, List the different costs within supply chain cost analysis method used?
    - Raw materials costs, Manufacturing costs and distribution expenses.
13. If your answer is **No** for Q. 11, what is your plant's cost analysis method?
    - FMAS (Fast moving, medium & slow moving) method

14. Does your plant identify the problems related to supply chain?

Yes = 37(39.4%) No = 29(30.8%) No response = 28(29.8%)

15. If your answer is **yes** for Q. 14,

a. What are they? Time of delivery, quantity, Interruption in production, Availability of raw materials on time, insufficient product.

b. Does your plant solve the identified supply chain related problems?

Yes =11(11.7%) No =26(27.7%)

c. If your answer is **yes** for **b**, describe how you solve the problems.

- Deposit sufficient raw materials, Maintenance of machinery.

d. If your answer is **No** for **b**, describe the reason(s).

- Distance location of source, loss of computation, and availability.

Section 2 Supply System Part

	Excellent	Very good	Good	Fair	Poor	Omitted
16.What is the staffs' awareness of inbound logistics & its value?	3(3%)	13(14%)	25(27%)	22(23%)	28(30%)	3(3%)
	Very high	High	Low	Very low	None	
17.To what extent does the plant measure the inbound logistics?	7(7%)	16(17%)	22(24%)	18(19%)	26(28%)	5(5%)

18. What are the direct raw materials used in your production processes?

- Sugar, concentrate (dry component &flavor of Pepsi, Mirinda Orange, Mirinda Apple, 7UP, Mirinda Tonic), CO_2 gas & water.

19. What are the indirect raw materials used in your production processes?

- Chemicals for water treatment, bottle washing, syrup preparation, cleaning & sanitation, and CO_2 manufacturing. The indirect materials are tabulated in table 7-1.

20. Has your plant a bounded (enclosed) warehouse?

Yes =2(2.1%) No = 85(90.4%) No response = 7(7.5%)

21. If your answer is **yes** for Q. 20, where is the location of the bounded warehouse and how far from the plant? Both of them (respondents) omitted.

22. Do you have foreign suppliers for raw materials?

Yes =73(77.7%) No =12(12.8%) Omitted =9(9.5%)

23. If your answer is **yes** for Q.22, what are the major foreign suppliers for direct raw materials?

Major Foreign Supplier	NSP	THP	Summit	Gondar	Dessie	Bure
Pepsi Cola International	√	√	√	√	X	√
United Arab Emirate	√	√	√	√	√	√
SAP International	√	√	√	√	√	√
Bolvines Chemical Limited	√	√	√	√	√	√
Norite	√	√	√	√	√	√

24. What are the major local suppliers of raw materials?

Major Local Supplier	NSP	THP	Summit	Gondar	Dessie	Bure
Ethiopian Sugar Industry Support Center (Wonji and Metehara Sugar Factory)	√	√	√	√	X	√
Nefas Silk CO_2 Plant	√	√	X	√	√	√
Municipality Water Supply	√	√	√	√	√	√
Ethiopian Crown Corks & Cans Factory	√	√	√	√	√	√
Summit Plastic Plant (SEPCO)	√	√	√	√	√	√
Summit Beverages Plant (PET product)	X	X	√	X	X	X
Awash Melksa Aluminum Sulphate & Sulpheric Acid S. C. (AMASSASC)	√	√	√	√	√	√
ABIJATA Soda Ash Enterprise	√	√	√	√	√	√

25. How much does it cost to transport one quintal or 100kg/km of major local raw materials from the sources to the plant?

Cost (Birr)	NSP	THP	Dessie	Bure	Gondar	Summit
Wonji Sugar Factory	7	7	-	32	60	7
NSP CO_2 Plant	-	1	28	25	50	1

26. What are the distances of major local suppliers of direct raw materials to your plant?

Distance(km)	NSP	THP	Dessie	Bure	Gondar	Summit
Wonji Sugar Factory	100km	110km	-	495km	845km	115km
NSP CO_2 Plant	-	10km	400km	395km	745km	15km

27. Which criterion is/are used by your plant for supplier selection:

	Long term contracting	Vendor location	Capacity allocation	Local regulation	Quality	Local market implication	Price	Tax implementation	Material cost	Others
Frequency	36	51	28	15	56	20	82	8	56	3
%	38.3	54.3	29.8	16	59.6	21.3	87.2	8.5	59.6	3.2

28. If you mark **others** for Q.27, please list the factor(s).

- In case of Tender the supplier with the list offer can be selected
- Approved supplier (by Pepsi Cola International)

29. Indicate the factors that should be considered for proper decision of the **inbound** logistics:

	Warehouse location	Warehouse size and capacity	contract carriers'	Local regulations	Number of carriers	Number of warehouse	Tax implementation	Others
Frequency	32	32	27	29	25	27	25	5
%	34	34	28.7	30.9	26.6	28.7	26.6	53

30. If you mark **others** for Q. 29, list all of them?

- Market Potential of the Area of accessibility of transport.

Section 3 Manufacturing System Part

31. What is the actual production capacity of your plant?

Plants name	NSP	THP	Summit	Dessie	Gondar	Bure
Actual capacity(Cases/hr)	934	850	600	115	240	400
Fqy(No. of correct respondent)	11(11/25)	12(12/21)	10(10/16)	3(3/9)	6(6/12)	4(4/11)

32. List the types of products your plant manufactures?

	Pepsi	Mirinda Orange	Mirinda Apple	Mirinda Tonic	7UP	Bure Kool Water	Tosa Carbonated Water	Kool Water		Soft drinks	
Pack Type	Glass	Glass	Glass	Glass	Glass	Glass	Glass	Pet	Keg	Keg	Pet
Frequency	91	87	81	64	72	11	9	16	14	15	16
%	97%	93%	86%	68 %	77%	100%	100%	100%	88%	94%	100%

33. Sketch the manufacturing process flow of soft drinks? You may use the back of this page.

- It is drawn using Auto-Cad and Word in sub-chapter 4.2.

34. How do you determine the production cost per bottle for each product (soft drinks)?

- Overhead cost + Labour cost + Raw material cost

Section 4 Distribution System Part

	Excellent	Very good	Good	Fair	Poor	Omitted
35.What is the staffs' awareness level of outbound logistics & its value?	8(8%)	11(12%)	25(27%)	20(21%)	27(29%)	3(3%)
	Very high	High	Low	Very low	None	Omitted
36. To what extent does the plant measure the outbound logistics?	13(14%)	16(17%)	15(16%)	20(21%)	25(27%)	5(5%)

37. List the types of services your plant provides to customers?

- Building cafeterias, shops, shelters, supplying Refrigerators, & repairing .
- Providing best Quality, Price, Quantity product with in required time, distribution, handling of their complain, and customer sales promotion.
- Sell & deliver soft drinks, Kool Water, Tossa Amba Water products such as Pepsi, Mirinda Orange, Mirinda Apple, Mirinda Tonic, 7 UP using different channels.
- Sell bottles and Crates to customers, and give bottles and crates to customers on loan

38. Does the plant have customer survey (analysis) mechanism?

Yes=40(42.6%) No=22(23.4%) No response=32(34%)

39. If your answer is **yes** for Q. 38, which types of customer survey is used by your plant?

- By making contact, direct observation, sampling survey, doing face to face communication ,sales route analysis,and Door to door survey

40. Describe the relationship between customers and suppliers in your plant?

- We have good contact with our suppliers, retailers (customers), and end users (55%)
- It had been very strong for many years. But now It is relatively weak (27%).
- I have no idea, I think it is very poor (18%)

41. Indicate which types of distribution channels are used by your plant:

	Branch warehouses	Truck routes	Depots	Kiosks	Sales agents	Others
Frequency	82	88	71	73	85	36
%	87.3	93.6	75.5	77.7	90.4	38.3

42. If you mark **others** for Q. 42, list them?

- Plant sales in the compound

43. Write the number of each distribution channels in your plant.

Range	Branch warehouses		Truck routes		Depots		Kiosks		Sales agents		Others (Plant sales)	
	Fqy	Range	Fqy	Range	Fqy	Range	Fqy	Range	Fqy	Range	Fqy	Range
NSP	23	6	24	28	22	62	23	49	22	25	13	1
THP	18	3	18	27	16	49	19	44	17	13	10	1
Dessie	5	2	7	6	4	0	6	13	4	2	5	1
Gondar	6	3	10	7	6	1	9	4	10	11	8	1
Bure	7	2	8	5	7	2	6	1	9	13	5	1
Summit	11	1	9	6	12	18	11	11	7	1	6	1

44. What is the market share of each of your distribution channel?

Distribution channel	NSP	THP	Summit	Gondar	Dessie
	%	%	%	%	%
Depots	14%	13.08 %	10.09	1.45%	0 %
Sales agent	22%	8.66 %	0.01	42 %	5.48 %
Branch warehouse	29%	14.17 %	32.08	18.55%	31.67 %
Door to door	30%	51.61 %	49.42	21.3%	41.36 %
Kiosks	4%	7.23 %	8.40	4.3%	8.38 %
Plant sales	1%	5.24 %	0	12.4%	13.1 %

45. How much does it cost to transport one pallet or crate of product from the plant to the nearest and the farthest branch warehouse?

Cost (Birr)per case(crate)	NSP	THP	Dessie	Bure	Gondar	Summit
Nearest branch warehouse	4.50	3.75	2.27	5.00	1.65	1.35
Farthest branch warehouse	5.50	4.85	5.60	8.00	4.15	1.35

46. Write the major areas (cities) of the plant's distribution of its product?

NSP		THP		SUMMIT		Gondar		Dessie	
Fqy	Town	Fqy	Town	Fqy	Town	Fqy	Town	Fqy	Town
18	A.A	17	A.A	11	A.A	6	Gondar	5	Dessie
14	Nazareth	12	Jimma	7	Debreberhan	6	Bahirdar	4	Mekele
8	Shashemene	8	Nekemet	8	Shewarobit	4	Dangla	4	Woldia
11	Awasa	9	Dejen	5	Sheno	5	Debertabor		

47. What is the percentage of internal market share in each major area (cities)?

NSP		THP		Summit		Gondar		Dessie	
Town	%	Town	%	Town	%	Town	%	Town	%
A.A	29	A.A	66.1	A.A	60	Gondar	25	Dessie	37
Nazareth	9	Jimma	7.2	Debreberhan	11.2	Bahirdar	15	Mekele	27
Shashemene	5	Nekemet	5.4	Shewarobit	3.6	Dangla	3	Woldia	5
Awasa	7	Dejen	1.5	Sheno	5.5	Debertabor	2		

48. Indicate the factors that should be considered for proper decision of the **outbound** logistics:

	Warehouse location	Warehouse size and capacity	Contract Carriers'	Local Regulations	Number of Carriers	Number of Warehouse	Tax Implementation	Others
Frequency	37	36	32	31	27	31	24	0
%	39.4	38.3	34	33	28.7	33	25.5	0

49. If you mark **others** for Q. 48, list all of them? They don't respond other method.

Appendix 10: The Structured Interview Questionnaires case of Nefas Silk Plant

Addis Ababa University
School of Graduate Studies
Faculty of Technology, Department of Mechanical Engineering
Graduate Program in Industrial Engineering

Structured interview Questionnaires

MODEL DEVELOPMENT OF SUPPLY CHAIN MANAGEMENT SYSTEM FOR THE ETHIOPIAN SOFT DRINKS INDUSTRIES: A CASE STUDY ON MOHA SOFT DRINKS INDUSTRIES SH. CO.

By: Aregawi Gebreeyesus

E-mail: areg1990kid@yahoo.com

Mechanical Engineering (Industrial Engineering Stream) studies, 2004/6 April, 2006

Part I: please answer the following questions clearly and carefully.

1. Date of interview: 5-12/07/98 E.C
2. Name of the Plant MOHA Soft drinks Industry S.C. Nefas Silk Pepsi Plant
3. Company Website: Not applicable
4. When was the plant established? April1957E.C
5. How much is your Plant's current capital (in Birr)? 69, 230,132.77
6. The total number of employees: Permanent =889, Contract =26, Temporary= Varied
7. Plant address: Addis Ababa, Kirkos Sub city, Kebele =06,Lafto House No.840
8. Plant Telephone/Fax: Tel.= 011-465-5211, Fax =01146-54844
9. Plant E-mail: moha NSP@ethionet.et

Part II: Personal Information and knowledge

1. Interviewee's current position: Quality Control Mgr, Finance Mgr.,Human Resource Mgr., Procurement & store Acting Mgr. and Production Mgr., Sales Mgr, & Technical Mgr.
2. Experience in year: 19, 25, 28, 23, 28,22,91/2 Years respectively
3. Qualification (s): B.Sc., B. A , B.A., College Diploma, Diploma +2ndEng., B.A., B. Sc
4. Field of Study: Chemistry, Accounting, Sociology & Social administration, Accounting, Industrial Chemistry +2 years Engineering, Marketing, Mechanical Engineer
5. Gender: Male, Male, Male, Female, Male, Male, Male

Guidelines for Interview

Human Resource Department

- Organization structure
- Human resources power by education level, sex, department, age group, etc…
- Interdepartmental relation (Internal customer relation)

Human Resource by Education Level of the Plant

Job type	Read & write		1-6 Grade		7-8 Grade		9-12 Grade		V. &Tec diploma		College diploma		Degree		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Human Resource	4	2	10	2	5	4	22	11	2	6	5	2	3	1	51	38	**89**
Finance	-	-	-	-	-	-	-	-	2	9	8	5	2	-	12	14	**26**
Production	-	28	18	34	36	52	47	73	1	1	1	-	-	1	103	189	**292**
Technical	1	-	4	1	1	-	9	1	12	4	2	2	2	-	31	8	**39**
Quality Control	-	-	-	-	-	-	2	-	-	-	-	-	5	-	7	-	**7**
Sales	12	-	75	-	47	3	98	10	14	-	8	1	2	-	156	14	**270**
Procurement &Stores (Supplies)	-	-	1	-	-	-	4	3	5	2	2	1	-	-	12	6	**18**
CO_2 Plant	-	-	1	-	2	1	3	-	9	-	2	-	-	-	17	1	**18**
Vehicle Maintenance	-	-	5	-	2	-	2	1	12	-	1	-	-	-	22	1	**23**
Branches	5	-	28	-	22	2	34	8	-	1	2	3	2	-	93	14	**107**
Total	**22**	**30**	**142**	**47**	**115**	**62**	**221**	**107**	**57**	**23**	**31**	**14**	**16**	**2**	**604**	**285**	**889**

Human Resource by Age Group of the Plant

Job type	19-27		28-32		33-37		38-42		43-47		48-52		Above 53		Total		Grand Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Human Resource	4	2	14	18	9	4	13	8	4	3	5	2	5	1	51	38	**89**
Finance	3	2	2	1	-	1	1	2	3	4	2	3	1	1	12	14	**26**
Production	32	6	27	46	12	54	7	32	11	21	12	27	2	3	103	189	**292**
Technical	3	1	5	4	6	2	7	-	3	1	4	-	3	-	31	8	**39**
Quality Control	-	-	-	-	-	-	4	-	3	-	-	-	-	-	7	-	**7**
Sales	56	4	83	5	41	1	26	1	28	3	18	-	4	-	256	14	**270**
Procurement &Stores (Supplies)	-	-	2	1	1	3	2	1	2	-	3	1	2	-	12	6	**18**
CO_2 Plant	5	-	1	-	3	-	1	-	2	-	4	1	1	-	17	1	**18**
Vehicle Maintenance	4	-	4	-	1	-	4	-	-	-	6	1	3	-	22	1	**23**
Branches	8	1	14	2	27	6	24	2	10	2	6	1	4	-	93	14	**107**
Total	**115**	**16**	**152**	**77**	**100**	**71**	**89**	**46**	**66**	**34**	**60**	**36**	**22**	**5**	**604**	**285**	**889**

1. What is the organizational structure of your Plant? It is drawn on appendix-6
2. What is the total area of your Plant in square meter? 18,636 m^2

Finance Department

- Inputs (direct and indirect raw materials, etc) and annual consumption
- Products costing
- Supply chain cost analysis
- What is your company's existing costing analysis? It is drawn on Figure 7-1

Direct, indirect and packing raw materials, cost and their sources for NSP

Direct Raw Materials	Cost for the year 2005	Source	Indirect Raw Materials	Source
Pepsi A	6,374,871.90	Foreign		
Pepsi B	1,566,334.85	Foreign		
Mirinda -1	9,968,077.13	Foreign		
Mirinda -01	3,293,351.81	Foreign		
Mirinda Apple flavour	339,782.51	Foreign		
Mirinda Apple Compoud	8,679.48	Foreign		
Sugar	21,551,097.68	Local/foreign		
CO_2	16,312,153.08	Local		
Water	157,502.86	Local		

Percentage by Volume and Cost of Products of Nefas Silk Plant Plants

Types of Product	Volume Produced Per Year (lt)	Percentage By Volume	Cost Of Product Produced Per Year [Birr]	Percentage By Cost
Pepsi	10,553,000	37 %	30,287,000	37 %
Mirinda	17,881,000	62 %	51,318,000	62 %
7UP	415,000	1%	1,191,000	1 %
Total	28,849,000	100%	82,796,000	100 %

1. What is your company's existing costing (Product cost) analysis?
   Production cost analysis, distribution cost analysis and administration cost analysis.
2. Supply Chain Cost Analysis Drivers (Parameters):they didn't use it till now.

Marketing and Sales Department

- Customer-supplier relationship
- Types of services
- Market share in Addis Ababa, Dessie, Gondar, Bure and Major Areas
- Percentage of products distribution
- Distribution channels

1. List & Number of Sales agents: 25 sales agents.
2. List & Number of Door to Door: 18 truck routes or sales out lates
3. List & Number of Depots: Total= 78, 28 are in Addis Ababa, Harer=4, DireDawa=1, Shashemene=13, Wolita=1, Awasa=2,Nazareth=14, Asela=1,Eteya=1, Bokoji=1, Asosa=1, Huruta=1, Wonji=1, Dukem=1, Debrezeit=5, Mojjo=3

4. List & Number of Kiosks: Total=49, 44 are in Addis Ababa, 1 in Diredawa,1in Shashemene, 3 in Nazareth and 1 in Mojjo.
5. Major internal market share of citys/towns & channels of NSP's product

Plant sales=1%, kiosks =4 %, Up country route sales= 1%, Up country depots =2%, Sales agents= 22% Depots= 12 %, and Addis Ababa route sales=29%.

Distribution City	Internal Market Share
Addis Ababa route	29%
Nazareth	9%
Shashemene	5%
Harar & Dire Dawa	3%
Asebeteferi	1%
Wolaita	4 %
Awassa	7%

Production Department

- Inputs (direct and indirect raw materials, etc) and annual consumption
- Manufacturing process flow
- Production capacity
- Product Costing
- Carbonation process, water process, bottled wash process, and others processes
- Types of products: Pepsi Cola, Mirinda Orange, and Mirinda Apple.

1.Manufacturing Process Flow about,

- Carbonation process flow. *To be continued at the back.* It is written on mfg topic.
- Water process flow. *To be continued at the back.*. It is written on mfg topic.
- Bottle washed process flow. *To be continued at the back.* It is written on mfg topic.
- Syrup process flow. *To be continued at the back*. It is written on mfg topic.
- Others process flow. *To be continued at the back*. There is other major process flow

2. What is the average consumption of **direct** raw materials per year in Kg or Liter?

S/No.	Direct materials	Annual Consumption
1	Pepsi Cola Concentrate	1,070 units
2	Mirinda Orange Concentrate	5,392 units
3	Mirinda Apple Concentrate	126 units
4	Mirinda Tonic Concentrate	---
5	7 UP Concentrate	----
6	Sugar (Sucrose)	35, 589.92 quintals
7	CO_2 Gas	319,419 kgs
8	Treated Water	157,503 m^3

3. What is the average consumption of **indirect** raw materials per year in Kg or Liter?

S/No.	Indirect materials	Annual Consumption
1	Crown corks (All brands)	692,550 gross
2	Hyflo Supercellite	11,415.7 kgs
3	Activated Carbon	2,161 kgs
4	Calcium Hypochloride (Chlorine)	1,689 kgs
5	Aluminum Sulphate	5,934.5 kgs
6	Hydrated lime	21,135.5kgs
7	Common Salt	49,100 kgs
8	P_3 Stabillion (Additive)	7,682.5 kgs
9	Caustic Soda (Flakes)	16,625 kgs
10	Caustic Soda (Liquid)	495,411 litres
11	Trisodium Phosphate	2,255 kgs
12	Chain Lubricants	14,458 litres
13	Hydrochloric Acid	1,332 litres
14	P_3 Descaler /discolor/?	210 litres
15	P_3 Ferisol	858 litres
16	Calcium Chloride	4,696 kgs

4. What is the Designed capacity of production? 25,000 bottles/hr/filler i.e. for the two fillers 50, 0000 bottles/hr or 2083 cases /hr.

5. What is the attainable capacity of production? 1027 cases/hr

S/No.	Indirect materials	Annual Consumption
1	Crown corks (All brands)	692,550 gross
2	Filter sheet (syrup)	--------
3	Hyflo Supercellite	11,415.7 kgs
4	Activated Carbon (water, Syrup)	(----, 2,161 kgs)
5	Calcium Hypochloride (Chlorine)	1,689 kgs
6	Aluminum Sulphate	5,934.5 kgs
7	Hydrated lime	21,135.5kgs
8	Common Salt	49,100 kgs
9	P_3 Stabillion (Additive)	7,682.5 kgs
10	Caustic Soda (Flakes)	16,625 kgs
11	Caustic Soda (Liquid)	495,411 litres
12	Trisodium Phosphate	2,255 kgs
13	Chain Lubricants	14,458 litres
17	Hydrochloric Acid	1,332 litres
18	P_3 Descaler /discolor/?	210 litres
19	P_3 Ferisol	858 litres
20	Calcium Chloride	4,696 kgs

Procurement, Store and Supply Department

- Local and foreign suppliers of inputs:

Locally from Wonji Factory (Sugar), Ethiopian Crown cork & Cans factory (Corks), Caustic Soda Factory, EDDC, water from Addis Ababa municipality supply authority

Foreign from Pepsi Cola International Co. i.e. Ireland (Concentrate & Flavor of Pepsi, 7UP & Mirinda), Sap International Co., and Bolvinus Chemical Limited

- Number & list of Branch Warehouse: There are six branch warehouses in NSP. These are Nazareth, Shashemene, Wolaita, Awassa, Harrzr, and Asbe Teferi

- Number & list of Bonded (enclosed) Warehouse: There is no bonded warehouse.

Quality Control Department

1. Types of products: Pepsi Cola, Mirinda Orange, and Mirinda Apple.
2. Lists of direct and indirect raw materials

   Direct raw materials:-Water, sugar, CO_2 gas, and concentrates.

   Indirect raw materials:- Caustic soda liquid, Hyflosupercell, Aluminium sulphate, Calcium Hypochloride, P_3 stabllion, Common salt, Chain lubricant and others
3. List the highest amount of raw materials consumed in your plant while producing soft drinks (which raw materials comprises the highest contents of the soft drinks?)

   Syrup (water, concentrates, sugar) is the highest content while CO_2 is next.

Technical Department

- Production capacity
- The cost of maintenance and down time due to machine breakage.
- Cause and effect for breakage of bottles, Crown corks and others

1. What is the Designed capacity of production? 2083 cases per hour

2. What is the attainable capacity of production? 1027 cases per hours

3.What are the causes and effects for breakage of bottles, Crown corks and others?

Workers negligence at the time uncasing and casing stages, improper set up of the bottle handling parts of all machines and low quality maintenance activity

4.What is the cost of maintenance and other related costs? Birr 2,486,761.42 for 2005

5.What is the cost of down time due to machine breakage? Birr 2,052,504.47 for 2005

Addis Ababa University
School of Graduate Studies
Faculty of Technology
Department of Mechanical Engineering

MODEL DEVELOPMENT OF SUPPLY CHAIN MANAGEMENT SISTEM FOR ETHIOPIAN SOFT DRINKS INDUSTRY

A CASE SIUDY ON
MOHA SOFT DRINKS INDUSTRY SHARE COMPANY

By
Argaw Gebreyesus

Advisor
DR.-Ing. Daniel Kitaw

This thesis is submitted to the School of Graduate Studies of Addis Ababa University in partial fulfillment of the Degree of Masters of Science in Mechanical Engineering (Industrial Engineering Stream)

Addis Ababa
June 2006

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
FACULTY OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

Model Development of Supply Chain Management System for the Ethiopian Soft Drinks Industries-A Case Study on MOHA Soft Drinks Industry Share Company

By

Aregawi Gebreeyesus

Approved by Board of Examiners:

Dr. -Ing. Demiss Alemu Chairman, Department Graduate Committee	Signature	20/06/06 Date
Dr. -Ing. Daniel Kitaw Advisor	Signature	29/06/06 Date
Dr. Chandra Internal Examiner	Signature	28/06/06 Date
Ato Gashaw Gebeyehu External Examiner	Signature	27/06/2006 Date

DECLARATION

I, the undersigned, hereby declare that the work which is being presented in this thesis entitled **"Model Development of Supply Chain Management System for the Ethiopian Soft Drinks Industries-A Case Study on MOHA Soft Drinks Industry Share Company"** is my original work carried out under the supervision of Dr.-Ing Daniel Kitaw. It has not been presented for a degree as a thesis in any other university and all sources of materials used for this thesis are duly acknowledged.

Amgeet Gebrezgiabiher
(Candidate)

Signature

Date

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

Dr.-Ing. Daniel Kitaw
(Thesis Advisor)

Signature

Date