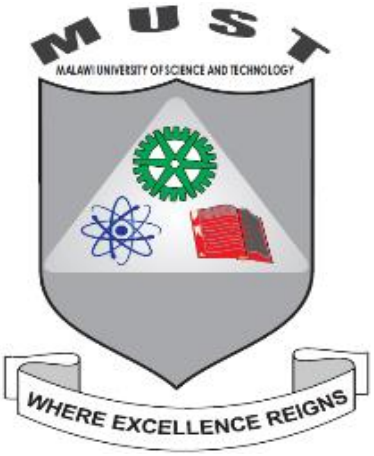


CHALLENGES IN SUPPLY CHAIN MANAGEMENT OF PETROLEUM PRODUCTS IN MALAWI

(A Case study of Oil Marketing Companies in Blantyre)

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Dissertation submitted to Ndata School of Climate and Earth Sciences of the Malawi University of Science and Technology in partial fulfilment of the requirements for the Bachelor of Science degree in Petroleum Resources (Oil and Gas)

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DISCLAIMER

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ABSTRACT

The complexities in oil marketing companies supply chains impose enormous challenges to the SCM. SCM in the oil marketing companies in Blantyre was studied in a qualitative and quantitative survey that covered 5 oil marketing companies in Blantyre, with the purposes of identifying the challenges facing the SCM in oil marketing companies and determining the extent to which the oil marketing companies in Blantyre are adopting best practices to manage challenges in their supply chain. The findings show that challenges facing supply chain management in the oil marketing companies in Blantyre occur in one or more of the supply chains components; transportation, storage facilities, supplier problems and fuel losses.

In an effort to manage their supply chain and reduce costs, oil marketing companies are outsourcing their logistics functions to third-party logistics companies to managing their supply chains. Oil companies also engage in E-procurement, close partnership with suppliers, close partnership with consumers and the use of external consultants.

The researcher recommends that there is need for oil marketing companies in Blantyre to adapt to the changing of consumer preferences and market dynamics by diversifying into electric vehicle related products and services. The study also recommends that oil companies should improve their storage capacities to meet customer demands. They should also partner with NOCMA to receive their fuels by rail from Mozambique thereby reducing their road transportation costs.

They also need to develop customer relationship management, supplier relationship management and engage in closer cooperation with other companies, government and regional players. Further, oil marketing companies in Blantyre need to invest in IT systems.

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ACRONYMS/ABBREVIATIONS

SCM : Supply chain management

SC : Supply chain

PIL : Petroleum importers limited

NOCMA: National oil company of Malawi

OMC : Oil Marketing Companies

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1. CHAPTER 1: GENERAL INTRODUCTION

1.1. Background

The management of petroleum products in oil marketing companies is a complex and crucial task that involves various processes, from procurement to distribution(Wawuda & Mungai, n.d.). These companies play a vital role in ensuring a consistent supply of petroleum products to meet the energy needs of individuals, industries, and nations. However, this task is not without its challenges, which can have far-reaching consequences for both the companies and the consumers(Fahad, 2013).

As the world's dependence on petroleum products continues, the effective management of oil marketing companies supply chain becomes increasingly critical(Lisitsa et al., n.d.). This research therefore, aims to contribute valuable insights into the challenges faced by oil marketing companies in this regard, with the ultimate goal of improving the reliability and resilience of petroleum product supply chains. Through a crucial analysis of these challenges, this study offers recommendations and strategies for mitigating them, promoting more efficient and sustainable supply chain management practices in the oil marketing sector of Malawi.

1.1.1. Supply Chain

According to (Lisitsa et al., n.d.) supply chain consists of all stages involved directly or indirectly, in fulfilling a customer request. A supply chain includes the manufacturers, suppliers, transporters, warehouses, retailers, and customers.

1.1.1.1. Supply Chain Management

(Chima, 2007) defines Supply chain management in the petroleum industry as a complex and essential function that encompasses the entire lifecycle of petroleum products, from exploration and extraction to refining, distribution, and consumption. The activities of this industry demand effective

coordination, planning, and execution to ensure a seamless flow of resources and products

1.2. The oil Marketing companies in Malawi

The oil industry is usually divided into three major components: upstream, midstream and downstream. Midstream operations are usually included in the downstream category. The first part covers the exploration, production and transportation of crude oil and gas to the point of transformation into final products (mainly refineries). The downstream activities deal with the processing of crude oil in refineries, the distribution and the marketing activities of all the oil derived products(Sahin & Robinson, 2002)

Malawi operates in the downstream petroleum sector since it does not have known oil and gas reserves due to lack of proper investment and expertise in the country(Malawi's troubled oil sector: licenses, contracts and their implications, 2017). As such, Malawi imports 100% of its petroleum products from Tanzania and Mozambique. The National oil company of Malawi (NOCMA) and Petroleum importers Limited are the main stakeholders that regulate importation activities.

According to (MERA & NSO, 2020), NOCMA which is a government owned parastatal was mandated in 2012 by the Malawi government to conduct exploration activities as well as managing the countries strategic fuel reserves (SFR's). However, the exploration activities have proven to be dormant due to lack of expertise in the country. NOCMA imports 55% of the total fuel imports while PIL imports 45%.

The duties of OMC vary from country to country. However, the OMCs in Malawi are responsible for storing and managing of finished products at various storage facilities, such as, depots, and service stations. They are also responsible in transporting petroleum products from main national depots such as NOCMA to storage facilities and distribution points such as service stations and airports. Lastly, the OMCs are also responsible for marketing of petroleum products to wholesalers

and retailers. This includes operating retail gas stations, as well as selling bulk fuel to commercial and industrial customers such as airlines, shipping companies, and trucking companies.

Some of the OMCs operating in Malawi include Energem, Total Energies, PUMA, Mount MERU and many others.

1.3. Problem statement

The supply chain management of petroleum products plays a vital role in ensuring the availability, distribution, and reliability of energy resources, which are essential for sustaining economic growth and daily life in Malawi. Oil marketing companies in Malawi are tasked with the responsibility of efficiently managing the supply chain, especially the distribution and marketing of finished petroleum products. However, the industry faces numerous challenges that hinder its ability to maintain a seamless flow of products resulting in potential disruptions, economic inefficiencies, and environmental concerns.

The primary problem in the context of this research is to identify and comprehensively analyse the key challenges affecting the supply chain management of petroleum products in oil marketing companies operating in Malawi. These challenges encompass various aspects of the supply chain, including transportation, storage, distribution, fuel losses and supplier challenges. Understanding these challenges is crucial for devising effective strategies to enhance the reliability and sustainability of petroleum product supply in the country.

In order to achieve efficient distribution for activities of the oil marketing companies in Malawi, the organizations need to recognize and understand the challenges affecting their distribution. This study therefore, ought to answer the following questions; what are the supply chain management challenges in the oil marketing companies in Malawi? And, to what extent are the oil marketing companies in Malawi adopting best practices to manage the challenges affecting distribution?

1.4. Main Objective

Assessment of the challenges in supply chain management of petroleum products in oil marketing companies and finding best practices adopted by OMC's in managing the challenges

1.5. Specific objectives

1. To identify and examine the key challenges in supply chain management and how they affect supply of petroleum products in Blantyre
2. To know the effectiveness of current practices in eradicating the challenges

1.6. Research questions

1. What are the challenges in Supply Chain Management of petroleum products?
2. What are the causes of these challenges in Malawi?
3. How can these challenges be improved?

1.7. Significance of study

While this study may be of value to any person interested in highlighting the challenges facing the oil marketing companies in Malawi, it's hoped that the study findings will specifically benefit the following groups:

The oil marketing companies in Malawi

The study will go a long way into providing information on the challenges of supply chain management in the oil marketing companies in Malawi considering that Malawi is affected by real issues which include challenging logistical problems and poor road networks. The kind of challenges that may be experienced by third world countries may by far differ from those experienced by the western countries. It's in this light that this research is going to be of great significance to the oil marketing companies and oil industry players.

It's hoped that the study will be useful to the policy makers and the management of organizations in addressing the challenges in organizations and the industry so as to guard against the danger of affecting the performance of the organizations. The findings and the recommendations of the study shall also be useful to managers. From now hence, they will not rely on expert judgement, personal experiences or traditions, but rather base their methods, decisions and actions on concrete knowledge of issues of challenges of supply chain management in the oil industry supported by study findings.

1.7.1. Academics

The study is expected to contribute to the existing literature in the field of challenges affecting supply chain management in the oil industry. It's also hoped that the study will form the basis for further research in the area of challenges in the supply chain management.

This research topic has immediate practical relevance as it deals with issues affecting the daily lives of people and businesses in Malawi. Academic research that addresses real-world challenges is more likely to have a direct impact on industry practices and policy-making.

2. CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

In this chapter the related theoretical concepts and research are reviewed. This determines key areas for optimization of the oil downstream supply chain management challenges in oil marketing companies which forms a basis for the further empirical study and for linking the theory to the practice.

To dive deeper into the challenges of supply chain management in the petroleum industry, this research draws upon a comprehensive review of relevant literature and empirical research. It considers insights from reputable sources, including academic journals, industry reports, and governmental publications, to provide a well-rounded perspective on the subject matter.

2.1.1. Petroleum industry Supply chain

The supply chain in the petroleum industry refers to the network of activities, processes, and entities involved in the extraction, production, transportation, refining, distribution, and marketing of petroleum products from raw materials (crude oil) to end consumers. It encompasses all the steps required to deliver petroleum products to the market efficiently, reliably, and in compliance with regulations.

The downstream petroleum sector plays a critical role in delivering refined products to consumers, industries, and various end-users. The importance of a well-managed supply chain ensures the timely and consistent availability of products such as gasoline, diesel, jet fuel, and various petrochemicals. This contributes to the functioning of economies by enabling smooth transportation, supporting industrial processes, and providing energy for households. As highlighted by Manuj and Mentzer (2008), an effective downstream supply chain not only enhances operational efficiency but also positively impacts customer satisfaction, inventory management, and overall profitability. This outlines the importance of a well-managed supply chain in the downstream petroleum sector, where its role extends

beyond the mere delivery of products to actively shaping economic activities and societal well-being.

The supply chain is an important element of the business community and is very vital and necessary for the smooth flow of goods from the manufacturer to the end consumer. It is as a consequence necessary that supply chain management managers incorporate planning and use appropriate strategies to make sure that raw materials, work in progress and finished goods reach where they are needed at the right time and in good quality.

2.2. supply chain management

Supply chain management is one of the most essential aspects of conducting business. Many people outside of the direct community (in research and industry) do not realize this because an ordinary consumer often experiences only its effects. Supply chain management has evolved from originally being understood as only logistics to a complex multifunctional corporate undertaking that ranges from procurement and demand forecasting to distribution and after-sales service. Supply chain management is such a vast topic that as a result people often give it a different definition based on their own personal experience. (Lu & Swaminathan, 2015).

Other individuals have defined supply chain management as a network or chain of facilities and distribution options that execute the process of the obtainment of products, the transformation of these products into intermediate and finished goods, and the distribution of these finished goods to customers(Lu & Swaminathan, 2015). It is also defined as a science that involves the integration and flows of the three components in the supply chain pipeline that is: products, information and finance starting from the suppliers' supplier and ending with the ultimate consumer or the customers' customer(Challenges Facing Supply Chain Management in the Oil and Gas Industry in Libya (NOC), n.d.).

2.3. Supply chain management in petroleum industry

(Chima, 2007) defines Supply chain management in the petroleum industry as a complex and essential function that encompasses the entire lifecycle of petroleum products, from exploration and extraction to refining, distribution, and consumption. The activities of this industry demand effective coordination, planning, and execution to ensure a seamless flow of resources and products. As emphasized by (Al-Husain et al., 2006), the petroleum supply chain management involves numerous stakeholders, diverse processes, and a global network of suppliers and customers. Supply chain management optimizes these interactions, enabling timely deliveries, minimizing inventory costs, and mitigating risks associated with factors such as geopolitical instability and demand fluctuations. In an era of increasing focus on sustainability and efficiency, the petroleum industry's supply chain management practices play a vital role in balancing economic, environmental, and social considerations to ensure the reliable supply of energy resources to the global population.

The oil industry is a good example of an industry that uses supply chain management activities to add value to crude oil and come up with a diversified range of products that can be used by various consumers in a wide range of industries. The level of investment and capital required to run activities in the oil industry is quite high and it then becomes necessary for careful planning to be incorporated so that goods and services can flow from the oil rigs to gas refilling points in various towns around the world.

In a study done by (Barua, 2012) he argues that petroleum industry is connected by the major supply chain links as shown below:

Exploration → Production → Refining → Marketing → Consumer

The links represent the interface between companies and materials that flow through the supply-chain. The supply chain links in the petroleum industry forms a network that moves crude oil from reservoirs to end consumers. Beginning with upstream activities, exploration and drilling companies extract crude oil from underground

reserves. This raw material then moves through the midstream phase, involving its transportation via pipelines, ships, rail, or trucks, facilitated by storage facilities for interim containment. The refining link transforms crude oil into valuable products such as gasoline, diesel, and petrochemicals. Downstream activities encompass distribution, marketing, and retailing of these refined products, ensuring they reach consumers through gas stations and retail outlets (Charles & Director, 2013).

In the oil and gas industry, almost all significant and important operations are planned in advance. The goal of supply-chain management is to provide maximum customer service at the lowest possible cost. In the industry supply-chain link, exploration operations create value through seismic analysis and identifying prospects. Production operations become the customers that use the output of exploration. In like manner, refining is the customer of production while marketing is the customer of refining and the consumer of refined products such as gasoline is the ultimate customer(Chima, 2007).

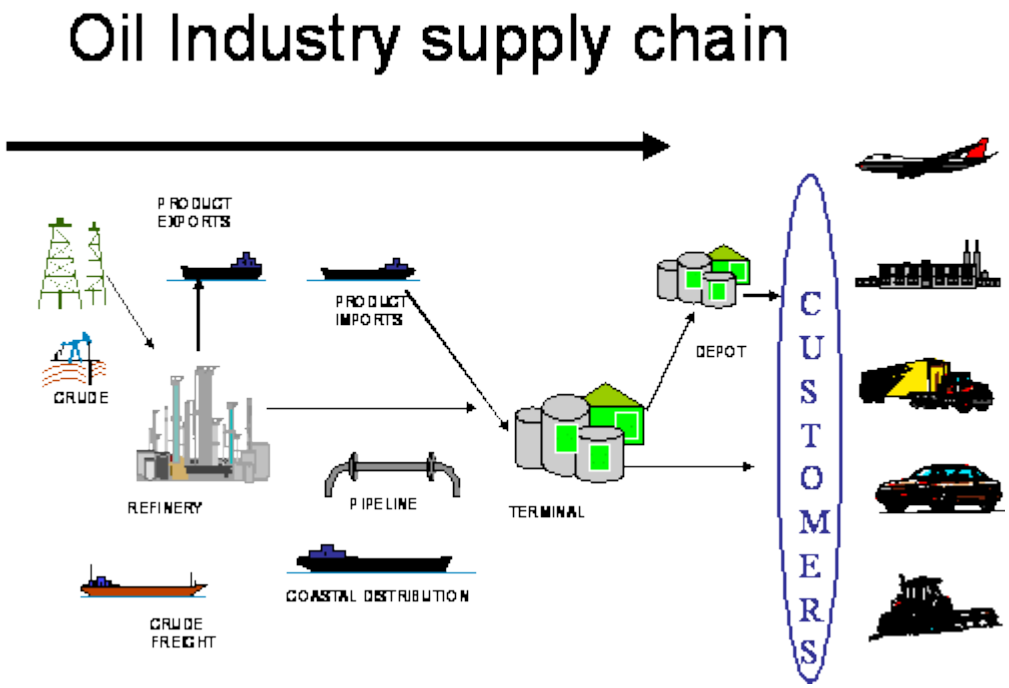


Figure 1: **Simple model of supply chain activities that take place in the oil industries.**

To assess challenges in a supply chain management context, companies must not only identify direct challenges to their operations but also the challenges to all other entities as well as those challenges caused by the linkages between the organizations. One of the weaknesses of a supply-chain is that each company is likely to act in its best interests to optimize its profit. The goal of satisfying the ultimate customer is easily lost and opportunities that could arise from some coordination of decisions across stages of the supply-chain could also be lost. If suppliers could be made more reliable, there would be less need for inventories of raw materials, quality inspection systems, rework, and other non-value-adding activities, resulting in lean production(Chima, 2007).

Supply-chain management requires an oil and gas company to integrate its decisions with those made within its chain of customers and suppliers. This process involves relationship management by the company. Both customer relations and supplier relations are key to effective coordination of supply-chains. Often, the interaction between suppliers and their customers are adversarial in nature, based on a negotiated contract that spells out all the terms and conditions by which all parties are required to comply. Instead, a firm can create long-term strategic relationships with their suppliers. In most cases, it is a collaboration process between the oil and gas operating company and its suppliers(Fahad, 2013).

2.4. Global supply chain in the oil marketing companies

The oil marketing companies are involved in a global supply chain that includes domestic and international transportation, ordering and inventory, visibility and control, materials handling, import or export facilitation and information technology. Thus, the oil marketing companies offer a classic model for implementing supply chain management techniques.(Rehman Khan & Yu, 2019).

The top world oil producers are Saudi Arabia, Russia, the United States, Iran, Mexico, China, Canada, United Arab Emirates, Venezuela, Norway, Kuwait, Nigeria, Brazil, Kazakhstan and Iraq. The Organization of the Petroleum Exporting Countries (OPEC) controls major crude oil by setting production quotas. The values are added by processing and chemically changing the crude oil, which is called refining. The greater

economic rewards can be gained only with well-integrated global oil supply chain management. While the separation of supply chain activities among different companies enables specialisation and economies of scale, many important issues and problems need to be resolved for successful supply chain operations – the main purpose of supply chain management(Kinyashi, 2014).

2.5. The oil marketing companies and supply chain management structure

SCM encompasses a set of interdependent companies that work closely together to manage the flow of goods and services along with the value-added chain of oil and petrochemical products, in order to realize superior customer value at the lowest possible costs(Al-Husain et al., 2006).

In a research done by (Frazelle, 2003), it states that The supply chain includes not only the processor and the suppliers but also the transporters, warehouses, retailers, and even the customers themselves.

According to Hussain et al. 2006, the downstream petroleum supply chain can be characterized as a global supply-driven structure with the following main actors: Suppliers of crude oil: as a natural resource the crude oil is located in certain areas of the world that are far from main consuming countries, mostly the Organisation for Economic Co-operation and Development (OECD) members. An important part of the crude oil supply and reserves is concentrated in the hands of a cartel: Organization of Petroleum Exporting Countries (OPEC) Thousand million barrels. Refiners: with plants located all over the world and closer to final consumers.

The main reason for this fact is the economies of scale of transporting crude oil in big supertankers versus transporting the final product in smaller lots, and the strategic value of the refining assets. This latter fact makes governments prefer having some of the refinery operations in their territories. Consumers: as stated before they are divided into small consumers (e.g., car owners buying gasoline) and wholesale consumers (e.g., power stations using heavy oil, petrochemicals plants receiving feedstock).These actors are involved in the main activities that configure the downstream supply chain(Chima & Hills, 2007).

2.6. Global challenges of supply chain management in OMC's

The global landscape of oil marketing companies is directly connected with a complex and dynamic supply chain network. These companies play a vital role in meeting the world's ever-growing appetite for energy resources, and as such, their supply chain management practices are subjected to a multitude of global challenges.

As the modern world becomes increasingly reliant on fossil fuels, the efficient and uninterrupted flow of oil products is of significant importance. This part, therefore, looks at the global challenges that oil marketing companies face in managing their supply chains, examining how these challenges impact not only the companies themselves but also the global energy landscape and the broader socioeconomic fabric.

In the following sections, the paper will dive into specific challenges, including but not limited to, environmental sustainability, technological disruptions, and regulatory complexities, offering a comprehensive analysis of each dimension and providing insights into potential avenues for mitigation and adaptation. This paper therefore aims at equipping stakeholders, researchers, and policymakers with a real understanding of the global challenges shaping the supply chain management practices of oil marketing companies.

2.6.1. Complex regulations

Global regulatory complexities can pose significant challenges to the supply chain management of oil marketing companies. These complexities can arise from a variety of sources, including government regulations and environmental standards.

Government regulatory frameworks of different countries have varying regulations governing the oil and gas industry, such as import/export rules, quality standards,

safety requirements, and taxation. This diversity complicates supply chain operations as companies must adhere to multiple sets of rules. Again, harsh environmental regulations often require oil marketing companies to meet emission standards, implement sustainable practices, and transition towards cleaner energy sources. Compliance can be costly and require substantial adjustments to supply chains (Barua,2007).

However, this challenge can be minimized by adopting Supply chain visibility practices by Implementing advanced supply chain management technologies to enhance visibility into the supply chain. This can help track compliance and identify potential issues in real-time(Al-Husain et al., 2006).

2.6.2. Technological disruptions

Technological disruptions can pose several challenges to the supply chain management of oil marketing companies globally. In the case of the rapid pace of technological change, it could be difficult for these companies to keep up and adapt their operations accordingly. Integrating new technologies into existing supply chain systems can be costly and complex, requiring substantial investments in infrastructure and workforce training(Bimha et al., 2020).

Another challenge comes in the form of cybersecurity threats as supply chains become more digital and interconnected. Oil marketing companies are susceptible to cyberattacks that can disrupt operations, compromise sensitive data, and threaten the security of the supply chain(Wiig & Chr. Michelsens institutt. Development Studies and Human Rights., 2001).

Staying updated on industry-specific regulations related to technology and cybersecurity could help reduce the risks associated with cybersecurity threats to the oil marketing companies. By implementing these mitigation measures, oil marketing companies can enhance their resilience to technological disruptions and ensure the uninterrupted flow of products through their supply chains.

2.6.3. Lack of Adequate Infrastructural Development

The oil supply chain is a complex network that involves the exploration, extraction, refinement, transportation, and distribution of oil and its various products, such as gasoline, diesel, and jet fuel. Insufficient infrastructure can disrupt the supply at various points, leading to inefficiencies, delays, and increased costs(Wawuda & Mungai, n.d.).

2.6.3.1. Transportation structures

Oil and its products are often transported via pipelines, ships, trucks, and railways. Insufficient or outdated transportation infrastructure can result in congestion, delays, and higher transportation costs. For instance, aging pipelines may be prone to leaks or ruptures, causing supply disruptions and environmental damage(Chima, 2007)

2.6.3.2. Storage Facilities

Adequate storage facilities are crucial for maintaining a stable supply chain. Lack of proper storage infrastructure can lead to capacity constraints, especially during periods of excess production or unexpected supply disruptions. This can result in wasted production or shortages in the market(Ehinomen & Adeleke, 2012).

2.6.3.3. Distribution and Retail

Once oil products are refined, they must be distributed to end-users through a network of distribution centres, terminals, and retail outlets. Insufficient infrastructure in these areas can hamper the efficient distribution of oil products, leading to localized shortages and price volatility(Challenges Facing Supply Chain Management in the Oil and Gas Industry in Libya(NOC), n.d.).

2.7. Best practices in supply chain management in oil marketing companies

Data flow diagram (DFD) was developed by Hull in 2001 to improve supply chain information flow reliability of the Alaskan North Slope Oil supply chain. The study showed that using the DFD helped to realize the importance of the relationship

between scheduling and dispatching (synchronization). By using the DFD to examine the information flow, overall supply chain efficiency was improved and distortion, which is greatly related to supply chain structure, was greatly reduced. Moreover, the generic DFD developed offers a template for modelling any supply chain or logistics activity, whether it is a push, pull, or a hybrid push/pull system(Baughman, 1980).

In an effort to manage their supply chain and reduce costs, oil and petrochemical companies are outsourcing their logistics functions. Outsourcing takes place when an organization transfers the ownership of a business process to a supplier reliant on the services of third-party logistics companies for managing their supply chains(Rehman Khan & Yu, 2019). Companies in the petroleum industry, however, took the outsourcing idea one step further and found that one way of outsourcing their logistics functions is to ally and collaborate with competitors. This form of collaboration is referred to as a systematic cooperative reciprocal barter also called swaps or exchanges of supplies, assets, market share, or even the entire business among competitors(Baughman, 1980)

However, despite the significant advantages this practice has generated for companies, a defined model for making such decisions does not exist. The subject has barely received any attention in the operations management literature. Currently, no specific method has been adopted to determine when companies should attempt to make swap decisions. An interview with supply chain directors in two international petrochemical companies that have been involved in swapping with their competitors for the past few years revealed that the only methods used are judgmental methods and spreadsheets. Although judgmental approaches may improve accuracy in many decision-making problems, they should not be the only methods employed. The use of only such approaches cannot guarantee an optimal solution(Barua, n.d.).

2.8. Summary

More efficient and cost-effective supply chain management practices in the petroleum industry represent important factors for maintaining continuous supplies of crude oil, the reduction of lead times, and lowering of production and distribution costs. Due to the inflexibility involved in the petroleum industry's supply chain network, cost containment, visibility, globalization, Risk, information technology logistics, knowledge management and greening the supply chains are some of the challenges facing the SCM in the oil marketing companies as advanced by other researchers. Integrated process management, Information systems and information sharing, organizational restructuring, and cultural reorientation are equally important.

Despite the great challenges in the oil marketing companies supply chain management, best practices for improvements, management of challenges and cost savings do exist along the supply chain. One major area for improvement and cost savings lies in the logistics function. Companies in the petroleum industry have become increasingly reliant on the services of third-party logistics companies to manage their supply chains. Companies in the petroleum industry took the outsourcing idea a step further to collaborate with competitors and found shared solutions to their supply chain challenges.

3. CHAPTER 3: METHODOLOGY

This chapter focused on research design, population and presentation.

3.1. Research design

The researcher carried out a survey. The researcher made use of a predesigned questionnaire during the survey. The researcher provided respondents with a brief description of the research problem along with some key definitions. The questioning consisted of both open and closed ended questions.

3.2. The population

The study covered 5 oil marketing companies in Blantyre due to limited time and resources. Random sampling technique was used to select number of OMC's.

3.3. Data collection

Detailed structured questionnaires were designed to identify the way in which oil marketing companies in Blantyre manage their supply chain. Questionnaires were delivered physically and filled out on spot. Two managers with decision making power within the supply chain management department in each oil marketing company were eligible to respond to the survey questionnaires. The survey research method was chosen because it offers opportunity to study a phenomenon in its own natural settings where complex links and underlying meanings can be explored. It is also appropriate because knowledge of challenges facing supply chain management in the oil marketing companies in Malawi is limited.

The method helps to generate in depth information which may result in a superior level of understanding that allows the researcher to draw reasonable conclusion. Furthermore, it avoids the bias of asking different questions from different processors by using the same formulation for all the respondents, and it can be designed in advance to cover the areas of interest. The respondents were required to respond to the questions which were grouped into several sections addressing the research objectives. The questions focused on the knowledge towards supply chain management concept, inventory management, customer service, marketing, order processing, application of information technology and the challenges facing the oil marketing companies. The survey captured detailed information from the 6 oil marketing companies that the research covered. The data collected was both quantitative and qualitative. To compliment the primary data, secondary data was obtained through literature review of various international journals of supply chain management and production and operations management.

3.4. Data Analysis

In analysis of data, the researcher employed both descriptive and content analysis since information gathered was both quantitative and qualitative in nature. The analysis on competitive challenges involved breaking down the complex information into small units of manageable information as well as correlating small pieces of related information into a piece of information. For the best practices that would address the competitive challenges, Microsoft excel was applied in analysing the responses gathered during data collection. The research finding s were presented by the use of graphs, charts and tables for easier interpretation. The final report was then compiled using Microsoft Word after subjecting data into thorough analysis.

4. CHAPTER 4: DATA FINDINGS, ANALYSIS AND INTERPRETATION

4.1. Introduction

The data collected was analysed and interpreted along with the objectives of the study which were to establish the challenges facing SCM in oil marketing companies in Blantyre and to determine the extent to which the oil marketing companies in Blantyre are adopting best practices to manage challenges in their supply chain. Data was collected by the use of a questionnaire (in appendix) and the responses were adequate to warrant a significant analysis. The self-administered questionnaires were supplied to the purchasing managers, supply chain managers and operations managers from all the 5 oil marketing companies, with a view of arriving at a viable and concrete responses. These in many organisations are the personnel charged with manning supply chain management portfolio. The response rate was 80% since 4 of the 5 companies responded.

4.2. Demographic Information

This section concentrates on the demographic information of the respondent and the oil marketing company. This was important in determining the appropriateness of the respondents to the study.

4.2.1. Background of Respondents

The target population was 10 respondents; two from each of the 5 oil marketing companies listed in the appendix. 8 questionnaires were responded from the 4 oil companies. Of the 8 respondents, only 2 were supply chain managers. The rest were either purchasing managers or operations managers as shown in the table below:

Respondent position	Number of respondents
Supply chain manager	2

Operations manager	3
Purchasing manager	3

Table 1: Respondents to questionnaires

The position of the respondents clearly indicates that supply chain management may not have taken substantive roles in the oil marketing companies in Blantyre.

4.3. The concept of supply chain management

The researcher sought to find from respondents the understanding of the concept of supply chain management. While the study found no two responses alike among the purchasing managers, supply chain managers and operation managers, the study did find general agreement that supply chain management entails, at its minimum, a broad range of business functions and services including production, forecasting, logistics, marketing, sales, information technology, finance and customer satisfaction. This understanding encompasses the model of supply chain as advanced by (Knolmayer et al., 2002).

While the interviewed oil companies may have placed varying degrees of importance to the aspects of supply chain management cited above, none discounted the importance of each of those elements. In general, almost all companies conceptualized and defined supply chain management as a coherent set of approaches for efficiently integrating suppliers, manufactures, warehouse and distribution centres and retail establishments for the purpose of producing and distributing oil and its derivatives in the right quantities to the right locations and at the right time in order to minimize cost while meeting service level requirements.

4.3.1. Existence of a separate SCM department

The research sought to establish if a separate supply chain management department existed in the oil marketing companies in Blantyre. There were 8 respondents as shown below:

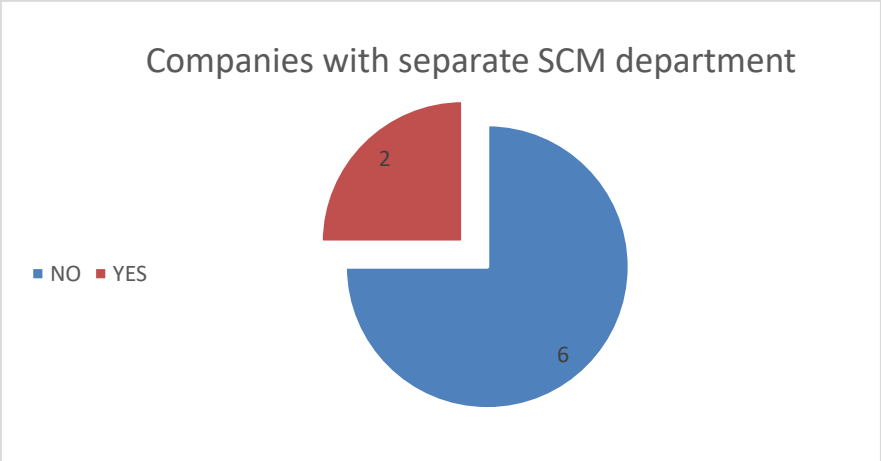


Figure 2: showing companies with separate SCM department

The supply chain management department is yet to find its full place in the oil marketing companies in Blantyre. The traditional purchasing and operations departments are dominant many structures of the oil marketing companies in Blantyre. It is a sad fact that the level of understanding in the field of supply chain management in most oil companies is minimal or not well balanced. Without effective supply chain management, a business that markets products or services cannot survive since the impact that supply chain management has on business performance and cost control is explicit.

4.4. Challenges experienced in managing SCM in oil marketing companies in Blantyre

The research sought to establish the challenges experienced by oil marketing companies in Blantyre in managing their supply chain. The table below gives a summary of the findings:

Number	Functional supply chain area	Challenges experienced by oil marketing companies

1	Transportation	-increase in transportation costs from importing countries - 70% of OMC's have limited number of road tankers - poor road networks due to disasters
2	Storage facilities	-limited storage to manage the ever-growing demand - old and outdated storage capacities causing fuel losses
3	Fuel losses	- Fuel is lost through pipe leaks - 90% of OMC's do not have skilled personnel to manage the losses
4	Supplier problems	-Fluctuating world oil prices -long lead times
5	Others	Customer shift to electric vehicles, knowledge management and government regulations

Table 2: challenges experienced by oil marketing companies in Blantyre

Due to the inflexibility involved in the petroleum industry's supply chain network, transportation of oil presents a great challenge. However, it is only one of several challenging factors. Transport costs are a natural barrier to trade. Effective rates of protection arising from transport costs are analysed relative to a situation where there are no transport costs. Bulk transportation in Malawi is handled between Railways and private trucks.

The other challenge was the insufficient storage capacities by the Oil marketing companies. These companies formed a consortium (PIL) which imports its fuels. On average, the country needs 60 million litters for monthly consumption but these companies only manage to get 35 million litters for monthly consumption which is not sufficient. The other amount is supplied by NOCMA.

Fuel loss is another challenge experienced by these companies. The results show that on average these companies lose 1.5% of the imported fuel monthly, which represents approximately 15% of fuel losses per year. This loss is due to equipment failure, high temperatures, evaporation as well as theft. It is important that these companies should employ skilled personnel to manage these losses.

Long lead times by suppliers also affects the supply of fuel in Blantyre. On average, fuel is supposed to be delivered within 3 weeks upon purchase but it can take up to a month and some weeks before delivery. These extended lead times increase the vulnerability of the supply chain to disruptions. Events such as natural disasters, geopolitical conflicts, or transportation issues can have a more significant impact on the availability of petroleum products when lead times are already lengthy.

Customer shift to electric vehicles is another challenge. As more people adopt electric vehicles, the demand for gasoline and diesel fuel, which are the primary products sold by oil marketing companies, will decrease. This can lead to a decline in their revenue and profits, as they rely heavily on the sale of fossil fuels. To address these challenges, oil marketing companies need to adapt to the changing landscape by diversifying their operations, investing in cleaner technologies, and developing new

revenue streams. Some companies are already taking steps to transition into broader energy providers rather than just fossil fuel suppliers to secure their position in the evolving energy market.

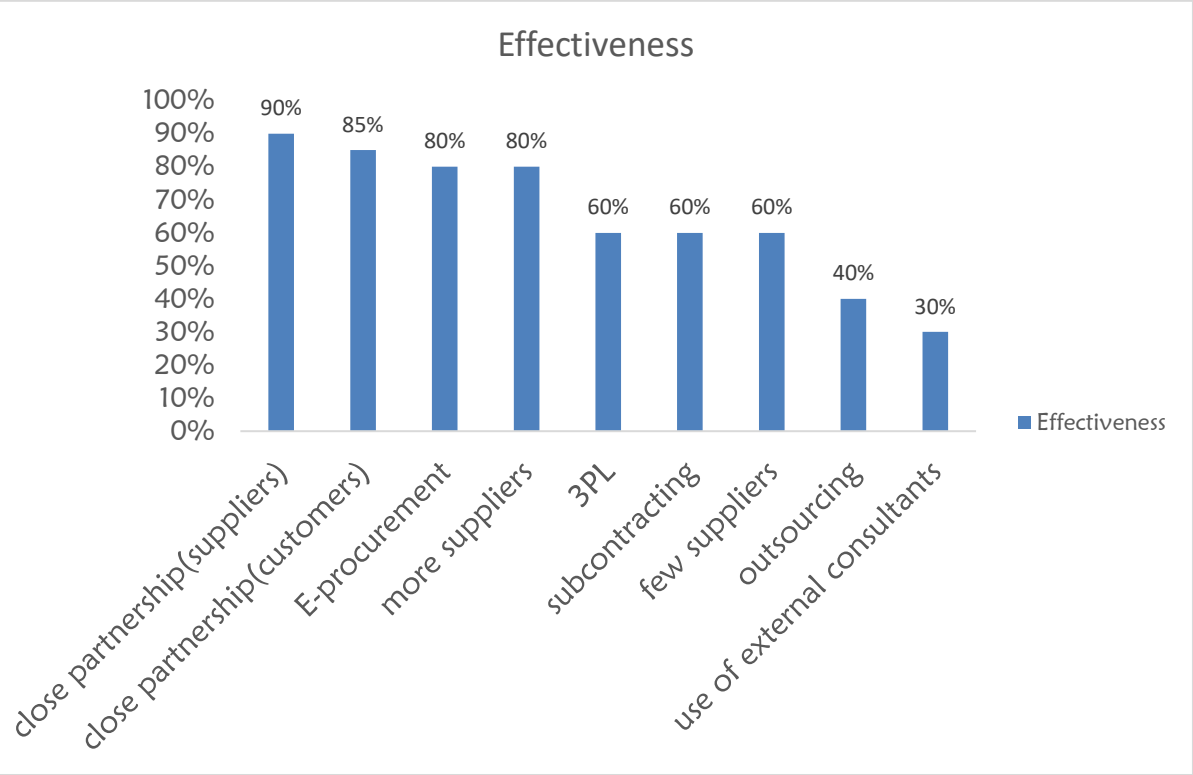
Other challenges advanced by respondents included the following; knowledge management: more and more firms regard it as an essential tool to their business planning, executing, monitoring and adjusting their operations.

Quality issues in the petroleum industry are closely related to infrastructure facilities, technological literacy and information technology and vary with amongst regulated and un-regulated firms. For instance, the poor-quality services at the importation, refinery and storage are blamed on infrastructure limitations and old technologies which affect distribution and supplies. Further, despite ad hoc quality surveillance or inspection exercises concerns about the quality of petroleum products (including adulterations) were identified as a major challenge of the petroleum sector. The study also found that they faced challenges in sourcing for products. The main challenge faced by oil marketing companies in sourcing and consumption of petroleum were identified as frequent shortages/inadequate supply and high prices or fluctuations in prices.

The performance of the domestic oil marketing companies heavily relies on global events and trends in international oil markets. These include the international oil prices, security related issues, pandemics like the COVID-19 and other economic performance indicators which also poses a great challenge in managing the supply chain. The strong links with external factors with multinationals playing leading roles in exportation, distribution and supply makes it even more challenging to effectively regulate the sector.

4.5. Current Practices adopted by Oil Marketing Companies in managing their Supply Chain

The research sought to find the effectiveness of the best practices the oil marketing companies had adopted in managing their supply chain. The bar graph below shows the results of the effectiveness



The practitioners advanced that the main effective practices in managing SC that oil marketing companies use in Blantyre was by close partnership with suppliers, close partnership with consumers and e-procurement, this may be because of the long distances between suppliers and the companies in Blantyre.

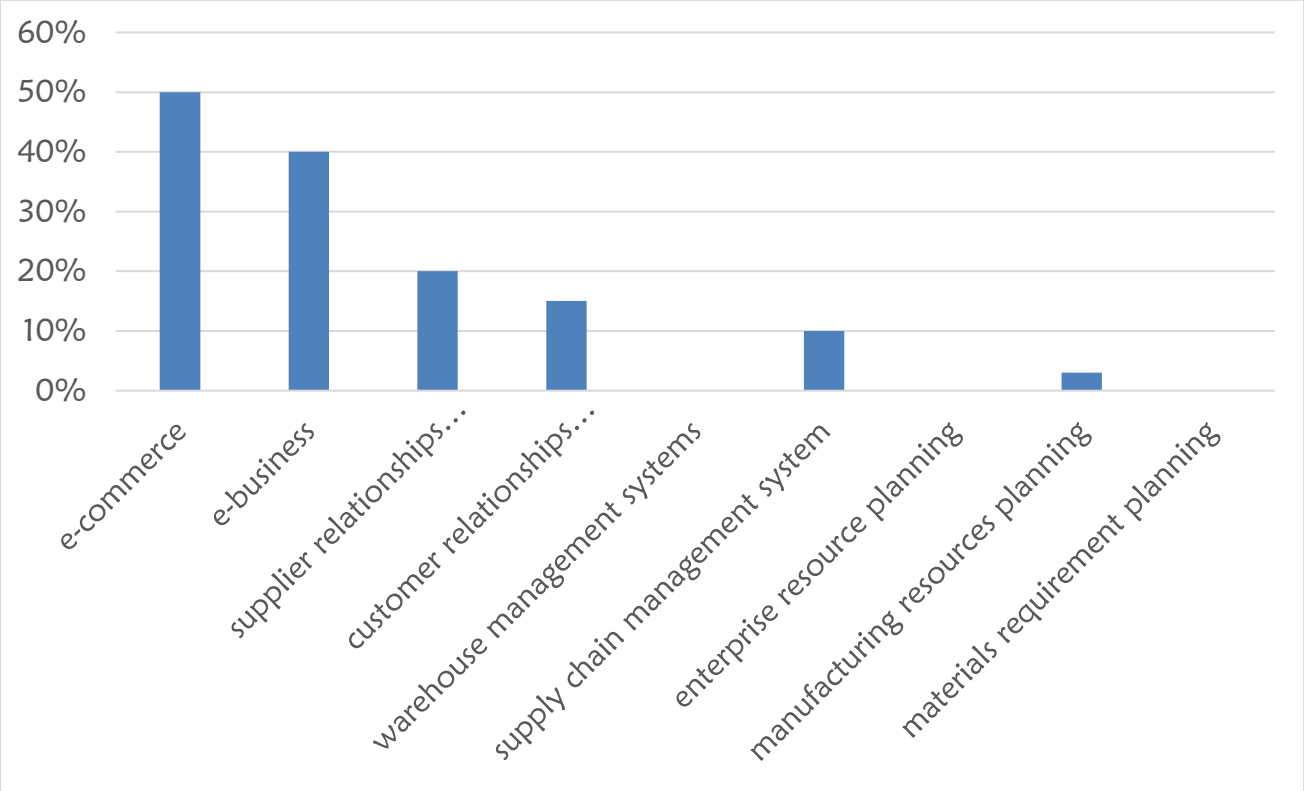
Close partnerships with suppliers facilitate improved communication, collaboration, and shared information, leading to a more reliable and responsive supply chain. This can help in better demand forecasting, reduced lead times, and supply chain cost optimization. Similarly, fostering strong relationships with customers allows for better understanding of their needs and preferences, which aids in aligning supply chain operations to meet customer demands efficiently. Additionally, e-procurement

systems enable streamlined procurement processes, efficient inventory management, and data-driven decision-making, ensuring a more cost-effective and agile supply chain. These practices collectively enhance the resilience, flexibility, and overall performance of oil marketing companies' supply chains, enabling them to adapt to market changes and provide superior customer service.

4.5.1. Systems currently in use in the Oil Marketing Companies in Blantyre

The research sought information on the systems currently available in the oil marketing companies in Kenya to support SCM. The findings were as shown on the graph below:

Systems currently in use



The respondents stated that most of the systems may not be in use in their organizations. This was probably because of limited knowledge on the system

operations. However, a few systems are in use, which are mainly custom-made to suit the design of the organizations' operations. Just In Time may not be very practical probably because of the distance involved between the suppliers and the oil marketing companies due to long lead times and the uncertainties involved in the supply channel.

E-business seems to gain popularity with the oil companies. This could be because of existent technology to conduct the same and the concept of cost saving. Supplier relationship management (SRM) is one other systems oil companies are using. This could be to provide a closer network with the source of the oil. The rest of the systems are dismally used currently in the oil marketing companies in Blantyre.

5. CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter gives summary of findings, discussions, conclusions and recommendations drawn. The objectives of the study were to establish the challenges facing supply chain management in the oil marketing companies in Blantyre and to determine the extent to which the oil marketing companies in Blantyre are adopting best practices to manage challenges in their supply chain.

5.2. Summary and Conclusions

In this section, the results of the study are summarised discussed and conclusion drawn in line with the research objectives.

One of the objectives of the study was to identify and examine the key challenges in supply chain management faced by Oil marketing companies in Blantyre. The results show that there is a large number of challenges facing the SCM which include challenges in transportation such as Increase in transportation costs from importing countries, limited number of road tankers by most OMC's, Poor Road networks due to disasters like recent cyclone Freddy which damaged a lot of roads in the city and Traffic congestions which lead to disruption in supply. On storage capacity the challenges include insufficient capacity of storage to meet the ever-growing demand as well as old and outdated storage tanks.

The other challenge was fuel losses. These losses occur at major stages like transportation, storage and retail distribution. The losses are mainly influenced by factors like theft, leakages as well as inaccurate measurements.

Another challenge is the supplier problems which mainly includes long lead times due the long distances involved in transporting the product. Fluctuating world oil prices is also a challenge posed by the suppliers to Oil Marketing Companies.

The other challenges were customer shift to electric vehicles, knowledge management and government regulations.

5.3. Conclusions

In the future, supply chains will get more complicated, covering the world and involving many suppliers, sellers, and logistics partners. It will be hard to figure out where the problems are because everyone depends on each other. For oil marketing companies, making their supply chain more efficient and cheaper is crucial to keep a steady supply of oil and reduce delivery times and costs. But in Blantyre, the oil industry's supply chain faces challenges due to its inflexibility.

Even though there are significant challenges in managing supply chains for oil marketing companies, there are opportunities for improvement and cost savings. One way to achieve this is by adopting best practices and using systems that support supply chain management. These companies are also turning to third-party logistics, outsourcing, and strategic planning to reduce the difficulties they face in Blantyre.

5.4. Recommendations

Given that the study found that oil companies need to improve their storage capacity and infrastructure in order to meet the changing needs of their customers, it is recommended that oil companies invest in state-of-the-art storage facilities. This investment should be a top priority for oil companies, as it will help them to strengthen their supply chains and ensure that they can reliably supply petroleum products to the market.

Oil marketing Companies in the petroleum industry need to take the outsourcing idea a step further to collaborate with competitors so as to find shared solutions to their supply chain management challenges. Oil marketing companies in Blantyre need to train their personnel so as to appreciate the concept of supply chain management

and the best practices and systems that will be significant in mitigating the challenges in their SCM.

The study also recommended that Oil companies in Blantyre need to adapt to changing consumer preferences and market dynamics by diversifying into electric vehicle (EV)-related products and services. This is a strategic move to align with global trends towards sustainable transportation and to cater to the shifting preferences of consumers who are adopting electric vehicles. They should also partner with National Oil Company of Malawi (NOCMA) to receive fuel by rail network from Mozambique so that they can reduce the road transportation costs.

OMCs should also Invest in IT systems since it is essential for modern businesses, especially in the area of supply chain management (SCM). IT systems can help businesses improve their internal operations by aiding in inventory management, product quality and expiration monitoring, market trend analysis, and information sharing. IT systems can also help businesses improve their external communications with other members of the supply chain by linking systems, which can eliminate the need for human intervention and lead to significant financial and operational efficiencies. It is therefore recommended that oil companies upgrade their IT systems to improve information interchange and supply chain visibility. This will also improve the oil pumps at pump stations, providing efficient and timely service to customers.

5.5. Limitations of the Study

The respondents had dismal understanding of the SCM systems currently in use in organizations. The understanding of the systems would help the respondents provide more informed responses towards the study. The respondents had high apathy towards filling of the questionnaires.

5.6. Suggested Area for Further study

This study explored challenges facing the SCM in oil marketing companies in Blantyre. There is need to look into effects of those challenges in the organizational performance in the oil marketing companies in Blantyre.

6. APPENDIX I LIST OF OIL MARKETING COMPANIES

Company
TOTAL energies
VIVO energies
Petroda
PUMA
Mount Meru
Engen
Energem

7. APPENDIX II QUESTIONNAIRE

I am a student of Malawi university of science and technology persuing a bachelor's degree in petroleum resources (oil and gas). The purpose of this Questionnaire is to seek

information on the Challenges Facing Supply Chain Management of petroleum products in the Oil Marketing Companies in Blantyre. The data collected shall purely be for academic purpose. Confidentiality is assured. For the research to yield valid results, it's

important that you respond to all questions as honestly and truthfully as possible. Thank you for your willingness to participate in this study

PART A: COMPANY PROFILE

1. Name of company

   _____

2. Address

   _____

3. Contact person

   _____

4. Position in company

   _____

PART B

1. What in your opinion does supply chain management entail?

2. Does your company have a separate supply chain management department?
   i. Yes ☐
   ii. No ☐

3. What challenges do you experience in managing your supply chain with regard to the following areas?
   i. Transportation
   ii. Government regulations or policies
   iii. Storage facilities
   iv. Technical knowhow
   v. Others(specify)

PART C

1. How do you manage your supply chain?
   i. Few suppliers ☐
   ii. Outsourcing ☐
   iii. Many suppliers ☐
   iv. E-procurement ☐
   v. Close partnership with suppliers ☐
   vi. Others (specify

   _____

   _____

2. What systems are currently in use in your company to manage your supply chain? ☐
   i. Customer relationship management
   ii. Supplier relationship management ☐
   iii. Just in time ☐
   iv. E-business ☐
   v. Others(specify)

   _____

   _____

3. How important are the following feature measures for supporting your company effort in SCM?

	Not important	important	Very important
More education eg qualification			

More funding and financial support			
Better infrastructure eg roads			
Increased cooperation between government and companies			

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