INDIAN MARITIME UNIVERSITY

# SCHOOL OF MARITME MANAGEMENT, KOCHI

**A Project Report on**

# A STUDY ON SUPPLY CHAIN MANAGEMENT IN TEMPERATURE SENSITIVE AND FAST MOVING COSNUMER GOODS (FMCG)


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# INDIAN MARITIME UNIVERSITY

(A Central University under Ministry of port, Shipping and Waterways)

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## CERTIFICATE

This is to certify that the Project titled "**A STUDY ON SUPPLY CHAIN MANAGEMENT IN TEMPERATURE SENSITIVE AND FAST MOVING COSNUMER GOODS (FMCG)**" submitted by Akshay Kumar P (Reg No. 2205305005) student of MBA (ITLM) is a Bonafede record of his project report and submitted to the School of Maritime Management, Indian Maritime University, Kochi campus, under the supervision of DR JAYAN P A, Faculty IMU, Kochi campus. It is also certifying that the above work has not previously formed or submitted for the award of any degree, diploma, associate ship, fellowship, or other similar titles, and it is an independent work done by the candidate.

**Dr. JAYAN P A**

# Declaration

I **AKSHAY KUMAR P**, Registration No: **2205305005**, student **of School of Maritime Management, Indian Maritime University, Kochi campus** pursuing **Master of Business Administration in International Transportation and Logistics Management**, hereby declare that this report **titled "A STUDY ON SUPPLY CHAIN MANAGEMENT IN TEMPERATURE SENSITIVE AND FAST MOVING COSNUMER GOODS (FMCG)"** has been prepared by me towards the partial fulfillment of the requirement for the award of degree of **"Master of Business Administration in International Transportation and Logistics Management"** under the guidance of **Dr. Jayan PA**, School of Maritime Management, Indian Maritime University, Kochi Campus. I also declare that this project report is my original work and has not been copied from any other report previously submitted for the award of any Degree, Fellowship, or other in the similar title.

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**AKSHAY KUMAR P**

## ABSTRACT

This study investigates thee role supply chain management (SCM) practices within the Fast-Moving Consumer Goods (FMCG) industry. Given the industry's competitive and dynamic nature, efficient supply chain operations are essential for meeting consumer demands, reducing costs, and gaining a competitive edge. The research examines various SCM components like procurement, production, inventory management, transportation, and distribution to evaluate their impact on overall supply chain performance in the FMCG sector. To achieve this, a mixed-methods approach is employed, combining qualitative and quantitative techniques. Primary data is collected through interviews and surveys with industry professionals, while secondary data from academic journals, industry reports, and case studies are analyzed. The study assesses factors influencing SCM effectiveness, such as demand forecasting, supplier management, production planning, order fulfillment, and customer service, using key performance indicators (KPIs) like on-time delivery and cost efficiency. The findings aim to enrich the understanding of FMCG supply chain management, identifying critical success factors and areas for improvement. These insights will help FMCG companies enhance their supply chain strategies, optimize operations, and gain a competitive advantage. The research outcomes are relevant not only to the FMCG sector but also to supply chain practitioners and academics across various industries seeking to improve SCM.

# GLOSSARY

- Inventory Management: The practice of overseeing and controlling the flow of goods from manufacturers to warehouses and ultimately to retailers to ensure adequate stock levels without excessive inventory.
- Retail Execution: The implementation of strategies and tactics at the retail level to maximize sales and ensure product availability.
- Shelf Space Optimization: The strategic allocation and arrangement of products on store shelves to maximize visibility, accessibility, and sales.
- Promotion Planning: The development and execution of promotional campaigns and activities to increase product sales.
- Supply Chain Visibility: The ability to track and monitor the movement of goods throughout the supply chain in real-time.
- Lead Time: The time it takes for an order to be fulfilled from the moment it is placed until it is received by the customer.
- Out of Stock (OOS): When a product is not available for purchase in a store or online due to insufficient inventory.
- Just-in-Time (JIT) Inventory: Inventory management strategy where goods are received only as they are needed in the production process, minimizing storage costs and reducing the risk of obsolescence.
- Order Fulfillment: The process of receiving, processing, and delivering customer orders.
- Supply Chain Network: The interconnected system of organizations, resources, and activities involved in producing and delivering goods to consumers.
- Supply Chain Risk Management: The process of identifying, assessing, and mitigating potential risks and disruptions within the supply chain.
- Reverse Logistics: The process of managing the return of goods from customers to the manufacturer or retailer, including product recalls, repairs, and recycling.
- Warehouse Management System (WMS): Software and processes used to manage and control warehouse operations, including receiving, picking, packing, and shipping of goods.

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# CHAPTER 1

# INTRODUCTION

## 1.1 Introduction

The study on supply chain management in the Temperature sensitive and Fast-Moving Consumer Goods(FMCG) sector is a critical area of research that aims to understand the impact of supply chain management practices on the performance of companies operating in this sector. Fast-paced environments, strong consumer demand, and the requirement for prompt delivery of items to retailers and final customers define fast-moving consumer goods (FMCG) companies. Effective supply chain management can make a significant difference in obtaining a competitive edge and establishing sustainable growth in this competitive environment.

The primary objective of this study is to examine how various aspects of supply chain management, such as procurement, inventory management, logistics, and distribution, influence the overall performance and profitability of Temperature sensitive an FMCG companies. By assessing the performance of these practices, the study looks for areas that require improvement and suggests techniques that may improve customer satisfaction and operational efficiency.

Supply chain management plays a pivotal role in both the Fast-Moving Consumer Goods (FMCG) industry and the handling of temperature-sensitive products. In the FMCG sector, effective supply chain management involves accurate demand forecasting to handle volatile demand patterns and optimize inventory levels to prevent stockouts or excess inventory. Distribution networks are carefully designed to facilitate swift and cost-effective product delivery, necessitating decisions on transportation modes, warehouse locations, and distribution strategies.

Temperatur-sensitive products like perishable foods and pharmaceuticals, cold chain management is paramount. For maintaining specific temperature ranges during storage and shipping, specialized handling is used throughout the supply chain. Monitoring temperatures in real-time makes it easier to spot and handle temperature variations that can damage the quality of a product. Packaging solutions are carefully developed to offer sufficient thermal protection and insulation. To ensure product availability, quality, and safety while maximizing costs and satisfying customer expectations, supply chain management is crucial for both FMCG companies and temperature-sensitive products. From perishable foods to pharmaceuticals and cosmetics, ensuring the integrity of these products throughout the supply chain is paramount to maintain their quality, safety, and shelf life. The intersection of supply

chain management and temperature sensitivity presents unique challenges and opportunities for FMCG companies, requiring a delicate balance of technological innovation, logistical expertise, and regulatory compliance.

## 1.2 Evolution of supply chain management in Temparture sensitive and FMCG

The management of supply chains for temperature-sensitive Fast-Moving Consumer Goods (FMCG) represents a critical aspect of the industry's evolution. Over time, advancements in technology, logistics strategies, and regulatory frameworks have transformed how FMCG companies handle and distribute temperature-sensitive products. This essay explores the historical progression of supply chain management within the context of temperature-sensitive FMCG products.In the early days of the FMCG industry, managing the supply chain for temperature-sensitive products posed significant challenges. Limited refrigeration technology and transportation infrastructure restricted the geographical reach of these products. Local production and distribution networks were the norm, with companies relying on iceboxes and insulated containers to maintain product quality over short distances.

The development of refrigeration technology in the late 19th and early 20th centuries revolutionized supply chain management for temperature-sensitive FMCG products. Refrigerated trucks, trains, and warehouses enabled companies to transport perishable goods over longer distances, expanding market reach and globalization. This period marked the beginning of a more integrated and complex supply chain network.As refrigeration technology improved, so did packaging and logistics strategies. Insulated packaging, vacuum sealing, and temperature monitoring devices became standard practices to preserve product freshness during transportation and storage. FMCG companies invested in sophisticated logistics systems to optimize cold chain management, ensuring that temperature-sensitive products maintained their quality from production to consumption.

The emergence of regulatory standards played a crucial role in shaping supply chain management practices for temperature-sensitive FMCG products. Regulatory bodies established guidelines for handling, storage, and transportation to ensure product safety and quality. Compliance with these standards became a priority for FMCG companies, leading to investments in quality assurance measures and robust documentation throughout the supply chain.

Changing consumer preferences and the rise of e-commerce further transformed supply chain management for temperature-sensitive FMCG products. Consumers increasingly demanded fresher

and higher-quality products, driving companies to enhance cold chain logistics and transparency. The growth of e-commerce introduced new challenges in last-mile delivery and customer experience, prompting FMCG companies to innovate in packaging and delivery methods.In recent years, technology has played an increasingly significant role in supply chain management for temperature-sensitive FMCG products. Advanced sensors, data analytics, and artificial intelligence have enabled companies to monitor temperature conditions in real-time, predict supply chain disruptions, and optimize inventory management. These data-driven solutions have improved efficiency, reduced waste, and enhanced overall product quality.

The evolution of supply chain management in temperature-sensitive FMCG products reflects a journey of innovation and adaptation driven by technological advancements, regulatory requirements, and consumer expectations. From the early challenges of refrigeration to the era of data-driven logistics, FMCG companies have continually pushed the boundaries to ensure the integrity and freshness of their products. Looking ahead, the industry will continue to leverage technology and best practices to meet the evolving demands of consumers in an increasingly globalized marketplace.

## 1.3 Importance of the study

The study on supply chain management in the Temperature sensitive and Fast moving consumer goods sector holds significant importance in today's dynamic business environment. Temperature sensitive and FMCG companies operate in a highly competitive market where customer demands are constantly evolving. Efficient supply chain management is crucial for these companies to meet consumer expectations, maintain market share, and achieve sustainable growth.

## 1.4 Scope of the study

The scope of studying supply chain management in temperature-sensitive and fast-moving consumer goods (FMCG) is multifaceted, encompassing diverse aspects crucial for the efficient and effective movement of products from suppliers to consumers. This includes the design and optimization of supply chain networks, encompassing decisions related to supplier selection, warehouse locations, and distribution strategies. Inventory management strategies play a pivotal role, involving the balancing act of ensuring sufficient stock levels to meet consumer demand while minimizing the risk of stockouts and product spoilage. Transportation and logistics considerations are paramount, encompassing the selection of transportation modes, routes, and carriers, with a focus on maintaining the integrity of temperature-sensitive goods throughout the journey. Cold chain management emerges as a critical

area, involving the implementation of temperature-controlled storage and transportation solutions to prevent product degradation. Technological innovations such as IoT sensors and blockchain are explored to enhance visibility and traceability throughout the supply chain.

## 1.5 Objective of the study

- To examine the impact of supply chain management on the performance of temperature sensitive and fast moving consumer goods (FMCG).
- To identify the critical success factors of effective supply chain management in the temperature sensitive and FMCG industry.
- To analyze the challenges and best practices in implementing supply chain management strategies in temperature sensitive and FMCG companies.
- To make recommendations for improving supply chain management in the temperature sensitive and FMCG industry to enhance competitiveness and profitability.

## 1.6 Conceptual Framework

The conceptual framework for evaluating the effectiveness of supply chain management in the Fast-Moving Consumer Goods (FMCG) sector involves several key components. it is crucial to consider the various stages of the supply chain, including procurement, production, distribution, and customer fulfillment. Each stage should be examined in terms of efficiency, cost- effectiveness, and responsiveness to customer demand.

the framework should encompass the key performance indicators (KPIs) that are relevant to the FMCG sector, such as on-time delivery, order fill rate, inventory turnover, and lead time. These KPIs help assess the overall performance of the supply chain and highlight areas that require improvement. Additionally, the conceptual framework should consider the role of technologyand automation in supply chain management. This includes evaluating the use of advanced analytics, forecasting models, and real-time tracking systems to optimize inventory management,reduce stock outs, and enhance overall efficiency.

Furthermore, the framework should account for collaboration and coordination among supply chain partners, including suppliers, manufacturers, distributors, and retailers. Effective communication and information sharing among these stakeholders can lead to improved demand planning, reduced lead times, and better overall supply chain performance. the framework shouldalso consider external factors that may impact the effectiveness of supply chain management in the FMCG sector. These factors include market dynamics, regulatory requirements, environmental sustainability, and risk management

strategies.

By considering these components, the conceptual framework provides a comprehensive approach to evaluating and enhancing the effectiveness of supply chain management in the FMCG sector. It allows for a systematic analysis of key factors and enables organizations to identify areas for improvement and implement targeted strategies to optimize their supply chain operations.

# CHAPTER 2

# REVIEW OF LITERATURE

- (Dehning, 2007)This paper examines the financial benefits of information technology investments around newly adopted IT-based supply chain management (SCM) systems by 123 manufacturing firms over the period 1994–2000. We form hypotheses using the value chain to specify the expected financial impact of SCM systems. By examining the change in financial performance pre- and post-adoption controlling for industry median changes in performance, we find that SCM systems increase gross margin, inventory turnover, market share, return on sales, and reduce selling, general, and administrative expenses. We also provide a model showing how process improvements around supply chain initiatives combine to improve overall performance. Finally, we show that contextual effects such as firms in the high-tech industry and the scope of the supply chain implementation have dramatic effects on the overall financial performance resulting from supply chain implementations.
- (Panayides, 2006) The derived demand for maritime transport has evolved from a demand for the possession of goods to an integrated demand for the possession of goods that have been added value, timely, reliably and cost-efficiently. This has given rise to the concept of maritime logistics, which represents the theme of the special issue of *Maritime Economics and Logistics*. This paper discusses the evolution of the maritime logistics concept, reviews the contributions in maritime logistics made by the best papers on the topic presented at the International Association of Maritime Economists (IAME) 2005 Conference and highlights areas for further research.
- (Kellner, 2013)Distribution network design is about recommending long-term network structures in an environment where logistic variables like transportation costs or retailer order sizes dynamically change over time. The challenge for management is to recommend an optimal network configuration that will allow for longer term optimal results despite of environmental turbulences. This paper studies the robustness of cost-optimized FMCG (fast-moving consumer goods) distribution networks. It aims at observing the impact of changing variables/conditions on optimized logistic structures in terms of the optimal number and geographical locations of existing distribution centers. Five variables have been identified as relevant to the network structure. A case study approach is applied to study the robustness of an existing, typical, and optimized FMCG network. First, distribution network data of a German manufacturer of FMCG are recorded and analyzed. A quantitative model is set up to

reflect the actual cost structure. Second, a cost optimal network configuration is determined as a benchmark for further analysis. Third, the variables investigated are altered to represent changes, both isolated (ceteris paribus) and in combination (scenario analysis). Each one of the variables investigated proves to be fundamentally able to suggest a change of the optimal network structure. However, the scenario analysis indicates that the expected changes will by and large compensate each other, leaving the network in near optimal condition over an extended period of time.

- (Oey, 2018)Warehouse is a crucial part of firms' logistic system and plays an important role in delivering products from manufacturers to end consumers. Lean principles originatedfrom manufacturing practice can be adapted to warehouse environment to enhance its productivity. The study was based on a multinational fast-moving consumer goods in Indonesia which relied on small and medium enterprises (SME) as their intermediaries to distribute its products throughout Indonesia. Lean warehousing techniques were used as a practical tool to introduce a good and efficient warehouse practice for its distributors. As a standardized framework for its distributors, the company introduced three stages for lean warehouse implementation, i.e., 'create stability', 'create flow', and 'make flow' in the warehouse. Implementation was done for the first two stages in one pilot distributor, resulting to 26% increase in picking productivity and a more balanced warehre ouse operation. Result will be used asa baseline and show-case for further implementations to the rest of its distributors.
- (Colicchia, 2017)Combining efficiency, effectiveness and sustainability is crucial for companies to succeed in today’s context of fierce competition. This paper investigates how intermodal transport can be adopted for managing supply chains according to a Lean and Green approach. A scenario-based estimation tool was developed to quantify the potential demand for intermodal transport. The tool was applied to the Italian Fast Moving Consumer Goods (FMCG) supply chain. Following, a single longitudinal case study on an FMCG company (Procter & Gamble) was carried out to investigate the enabling factors for the adoption of intermodal transport. Our results show that it is possible to shift demand from road to rail: a number of pathways for action were identified that related to planning and management, assets, train services, collaboration, legal issues and incentive schemes. Also, a collaborative business model for making the modal shift possible was presented. This paper is original because it offers an investigation of Lean and Green Supply Chain Management through intermodal transport by adopting a supply chain perspective and providing a bridging link between academic studies and field evidence.

- (Kayikci, 2018)Today, most enterprises are undergoing a digitization process with the fourth industrial revolution, named industry 4.0. The focus of the digital transformation lies mainly on production, therefore the terms such as “Factory of the Future” or “Smart Factory” are used similar with this concept. However, there are many reasons for considering the impact of digitalization in logistics and the importance of supply chain for industry 4.0. The key promises of this concept are enabling real-time full-transparency from suppliers to customers, small lot sizes, multiple product variants, connected processes and decentralized, autonomous management. These benefits cannot be achieved by production alone, but only along the entire supply chain. Moreover, logistics should gain a greater vision to fulfill the requirements of industry 4.0 as sustainably as possible in terms of using appropriate technologies and enhancing vertical and horizontal integration among the supply chain partners. In this respect, this study highlights the benefits of the digitization of logistics process and examines the sustainability impact of digitization in logistics. The study is pursued as a single case study within the FMCG companies and their transport service providers in Turkey and it is based on a qualitative method and on connected semi-structured interviews.
- (Jacobs, 2019)Literature provides evidence of how the fast-moving consumer goods (FMCG) industry has become a strategically important contributor to economic growth and competitiveness globally. However, this industry in South Africa faces consistent challenges that demand immediate attention and solutions. A potential area of intervention relates to how leadership practices can be applied to improve the quality and performance of FMCG supply chains in South Africa. This study examined the link between transactional leadership, supply chain quality (SCQ) and business performance in the FMCG industry within Gauteng province, South Africa. The research followed a quantitative approach in which data were collected through a survey targeting managers and professional employees of the FMCG industry in the Gauteng province. The collected data were analysed through descriptive statistics, exploratory factor

analysis, Pearson correlations and regression analysis. Two transactional leadership styles, namely contingent reward and management by expectation (active), were statistically significant in influencing SCQ. Passive-avoidant leadership did not predict SCQ. Supply chain quality was statistically significant in influencing both financial and non-financial business performance.The transactional leadership style is an important driver of SCQ within the FMCG industry. Supply chain quality is essential in stimulating optimum business performance within the FMCG industry.

- (Srivastava, 2007)There is a growing need for integrating environmentally sound choices into supply-chain management research and practice. Perusal of the literature shows that a broad frame of reference for green supply-chain management (GrSCM) is not adequately developed. Regulatory bodies that formulate regulations to meet societal and ecological concerns to facilitate growth of business and economy also suffer from its absence. A succinct classification to help academicians, researchers and practitioners in understanding integrated GrSCM from a wider perspective is needed. Further, sufficient literature is available to warrant such classification. This paper takes an integrated and fresh look into the area of GrSCM. The literature on GrSCM is covered exhaustively from its conceptualization, primarily taking a 'reverse logistics angle'. Using the rich body of available literature, including earlier reviews that had relatively limited perspectives, the literature on GrSCM is classified on the basis of the problem context in supply chain's major influential areas. It is also classified on the basis of methodology and approach adopted. Various mathematical tools/techniques used in literature *vis-à-vis* the contexts of GrSCM are mapped. A timeline indicating relevant papers is also provided as a ready reference. Finally, the findings and interpretations are summarized, and the main research issues and opportunities are highlighted.
- (Colicchia, Lean and green supply chain management through intermodal transport: insights from the fast moving consumer goods industry,

2017)Combining efficiency, effectiveness and sustainability is crucial for companies to succeed in today's context of fierce competition. This paper investigates how intermodal transport can be adopted for managing supply chains according to a Lean and Green approach. A scenario-based estimation tool was developed to quantify the potential demand for intermodal transport. The tool was applied to the Italian Fast Moving Consumer Goods (FMCG) supply chain. Following, a single longitudinal case study on an FMCG company (Procter & Gamble) was carried out to investigate the enabling factors for the adoption of intermodal transport. Our results show that it is possible to shift demand from road to rail: a number of pathways for action were identified that related to planning and management, assets, train services, collaboration, legal issues and incentive schemes. Also, a collaborative business model for making the modal shift possible was presented. This paper is original because it offers an investigation of Lean and Green Supply Chain Management through intermodal transport by adopting a supply chain perspective and providing a bridging link between academic studies and field evidence.

- (Yang, 2017) With the intensification of global warming and the levy of energy tax, more industries are paying attention to energy saving and reduction of carbon footprint. For the food industry, energy cost in the supply chain of perishable food is quite high because of cold-chain transport and storage. Therefore, the efficacies of cold chain management and inventory control are the key factors that increase the efficiency of food supply chain and make it more ecological. This research analyzes the degradation process of perishable food and determines the optimal temperature of the cold chain as well as the optimal price to maximize the channel profit. We prove that there is an optimal price with a certain temperature and develop an efficient search algorithm to find the optimal temperature. We also perform sensitivity analyses to test which parameters affect the channel profit significantly. Numerical experiments are conducted to illustrate the proposed models.

- (Aung, 2014)Compared to most product supply chains, food supply chains are often more complex and more difficult to manage because the food product is perishable and has a short shelf life. A cold chain or temperature-controlled supply chain provides the essential facilities and methods required to maintain the quality and quantity of foods. Since foods can be time and temperature sensitive in nature, they need to be properly taken care of in terms of harvesting, preparation, packaging, transportation and handling – in other words, throughout the entire chain. Temperature is the most important factor in prolonging or maintaining the shelf life of perishables. Refrigeration is one of most widely used methods to date to slow the bacteria growth that leads to food deterioration. The proper control and management of temperature is crucial in delivering perishables to consumers and ensuring that those perishables are in good condition and safe to eat. This paper addresses the methods used to improve the ability to define an optimal target temperature for multi-commodity refrigerated storage. Simulation results support the fact that the presented methods provide more accurate results compared to the conventional method. In addition, an experiment with a Wireless Sensor Network (WSN) was conducted. As a result, the sensor-based methods for real time quality monitoring and assessment that consider product metabolism and Euclidean distance cost depending on temperature changes are found to be superior to the traditional visual assessment method.
- (Nozari, 2022)In today's competitive world, supply chain management is one of the fundamental issues facing businesses that affects all an organization's activities to produce products and provide services needed by customers. The technological revolution in supply chain logistics is experiencing a significant wave of new innovations and challenges. Despite the current fast digital technologies, customers expect the ordering and delivery process to be faster, and as a result, this has made it easier and more efficient for organizations looking to implement new technologies. "Artificial Intelligence of Things (AIoT)", which means using the Internet of Things to perform intelligent tasks with the help of

artificial intelligence integration, is one of these expected innovations that can turn a complex supply chain into an integrated process. AIoT innovations such as data sensors and RFID (radio detection technology), with the power of artificial intelligence analysis, provide information to implement features such as tracking and instant alerts to improve decision making. Such data can become vital information to help improve operations and tasks. However, the same evolving technology with the presence of the Internet and the huge amount of data can pose many challenges for the supply chain and the factors involved. In this study, by conducting a literature review and interviewing experts active in FMCG industries as an available case study, the most important challenges facing the AIoT-powered supply chain were extracted. By examining these challenges using nonlinear quantitative analysis, the importance of these challenges was examined and their causal relationships were identified. The results showed that cybersecurity and a lack of proper infrastructure are the most important challenges facing the AIoT-based supply chain.

# CHAPTER 3

# THEORETICAL FRAMEWORK

## 3.1 LOGISTICS INDUSTRY

Logistics is a part of supply chain management that deals with the efficient forward and reverse flow of goods, services, and related information from the point of origin to the point of consumption according to the needs of customers, Logistics management is a component that holds the supply chain together. The resources managed in logistics may include tangible goods such as materials, equipment, and supplies, as well as food and other consumable items. In military logistics, it is concerned with maintaining army supply lines with food, armaments, ammunitions, and spare parts apart from the transportation of troops themselves. Meanwhile, civil logistics deals with the acquisition, movement, and storage of raw materials, semi-finished goods, and finished goods. For organizations that provide services such as garbage collection, mail deliveries, public utilities, and after-sales services, logistical problems also need to be addressed.

Logistics deals with movements of materials or products from one facility to another (e.g. from the production facility to assembly plants to distribution centers); it does not deal with the material flow within the production or assembly plants (e.g. production planning or single- machine scheduling). Logistics occupies a significant amount of the operational cost of an organization or country. For example, logistical costs of organizations in the United States incurred about 11% of United States national gross domestic product (GDP) in 1997. Such a situation is also similar for the countries in the European Union (EU) where logistics incurred 8.8to 11.5% of the national GDP in 1993. The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in all logistics fields.

A professional working in the field of logistics management is called a logistician. Logistics has become an integral and growing part of the global economy as its worldwide applications enable businesses to mark their presence in the global market. The sector makes it possible for

Companies to store and transport resources such as equipment, inventory, food, and materials to the desired destination. It helps organizations create added value, save money, deliver a better customer experience, and improve brand standards. Currently, many companies around the worldare looking for strategic logistics management to lower their transport expenses. The manufacturing sector leads the

global market share, as logistics help to improve efficiencies and production rates, cut costs, and boost customer satisfaction.

The logistics industry for temperature-sensitive products, known as cold chain logistics, is pivotal for ensuring the quality and integrity of goods requiring specific temperature conditions. This sector, essential in pharmaceuticals, food and beverage, chemicals, and biotechnology, meticulously manages transportation, storage, and handling. Specialized refrigerated trucks, containers, and air cargo units maintain precise temperatures during transit. Warehouses equipped with refrigeration units store products, while advanced tracking technologies monitor conditions, providing real-time alerts for deviations. Specialized packaging materials protect goods from temperature fluctuations. Regulatory compliance, enforced by authorities like the FDA, ensures safety and efficacy. Robust risk management strategies mitigate potential disruptions. In essence, cold chain logistics demands specialized infrastructure, advanced technology, and strict adherence to regulations to safeguard product quality throughout the supply chain.

## 3.2 FMCG INDUSTRY

The FMCG (Fast-Moving Consumer Goods) industry is a crucial sector in the global economy, encompassing a wide range of products that are consumed on a daily basis. It includes goods such as food and beverages, personal care products, household items, and packaged goods. The FMCG industry plays a vital role in meeting the everyday needs and desires of consumers worldwide.

One of the defining characteristics of the FMCG industry is its fast-paced nature. The products inthis sector have a short shelf life and high consumer demand, necessitating quick turnover and rapid production. This industry thrives on mass production, distribution, and sales, relying on efficient supply chains and distribution networks to ensure timely delivery to retailers and ultimately to the end consumers.

The FMCG industry is highly competitive, with numerous global and local players vying for market share. Established multinational corporations, as well as small and medium-sized enterprises, operate in this sector. These companies invest heavily in research and developmentto innovate and introduce new products to capture consumer attention and maintain a competitive edge. Branding and marketing strategies play a significant role in attracting and retaining customers in this industry, with advertising campaigns and promotions being key drivers of sales.

In recent years, the FMCG industry has witnessed significant shifts in consumer preferences and behavior. Consumers are becoming more health-conscious and environmentally aware, demanding products that are organic, sustainable, and ethically sourced. This trend has led to a rise in the

production and consumption of organic food and beverages, cruelty-free personal care products, and eco-friendly household items. Companies in the FMCG sector are adapting to these changing consumer preferences by developing and promoting products that align with these values.

The FMCG industry has also been impacted by technological advancements. E-commerce platforms and online retailing have gained popularity, providing consumers with convenient and accessible shopping experiences. This shift in consumer behavior has prompted FMCG companies to invest in digital marketing, online sales channels, and logistics capabilities to tap into the growing e-commerce market. Additionally, technologies such as artificial intelligence and data analytics are being utilized to enhance supply chain management, optimize inventory levels, and personalize marketing strategies.

The FMCG industry is a significant contributor to national economies and employment generation. It is characterized by a vast network of suppliers, manufacturers, distributors, and retailers, creating a substantial number of jobs globally. Moreover, the industry's growth and expansion have a ripple effect on related sectors such as packaging, transportation, advertising, and retail.

However, the FMCG industry also faces challenges. Fluctuating commodity prices, inflation, and geopolitical uncertainties can impact input costs and supply chain operations. Strict regulations related to product safety, labeling, and advertising further add to the complexities faced by FMCG companies. Moreover, the industry's heavy reliance on natural resources raises concerns about sustainability and environmental impact, necessitating a shift towards greener practices.

## 3.3 Understanding Fast-Moving Consumer Goods (FMCG)

Consumer goods are products purchased for consumption by the average consumer. They are divided into three categories: durable, nondurable, and services. Durable goods have a shelf life of three years or more, while nondurable goods have a shelf life of less than three years. Fast- moving consumer goods are the largest segment of consumer goods. They fall into the nondurable category, as they are consumed immediately and have a short shelf life.

Nearly everyone uses fast-moving consumer goods (FMCG) daily. They are the small-scale consumer purchases we make at the produce stand, grocery store, supermarket, or warehouse outlet. Examples include milk, gum, fruit and vegetables, toilet paper, soda, beer, and over-the- counter drugs like aspirin .FMCGs account for more than half of all consumer spending but tend to be low-involvement purchases. Consumers are more likely to show off a durable good such as a new car or beautifully designed smart phone than a new energy drink they picked up for $2.50 at the convenience store.

## 3.4 Temperature sensitive product industry

The temperature-sensitive industry refers to those fields in which the integrity and efficacy of products depend on the maintenance of particular temperature conditions. Perishable foods, chemicals, vaccines, pharmaceuticals, biotechnology goods, and some electronics are all part of this business. To maintain these goods' quality, safety, and effectiveness, it is imperative that they be handled, stored, and transported within the necessary temperature range. The temperature-sensitive business relies heavily on cold chain logistics, customized packaging, strict monitoring systems, and regulatory compliance to preserve the integrity of these delicate items along the supply chain.

## 3.5 Innovative ideas implemented in Temprature sensitive and FMCG Industry

### 3.5.1 Time Temperature Indicators

TTIs are devices that track a product's temperature over time. To make sure that food, pharmaceutical, and medical products have been transported and stored at the proper temperature, they are frequently utilized. Usually, a tiny label is affixed to the product packaging as part of TTIs. A chemical substance on the label reacts to temperature exposure by changing color or form.

### 3.5.2 Biodegradable Insulation

Biodegradable insulation is helping the logistics sector embrace a more environmentally friendly future. These sustainable substitutes for conventional materials like Styrofoam have similar insulating qualities, but they break down far more quickly and have less of an adverse effect on the environment. Common possibilities include wood wool, a lightweight and efficient loose-fill insulation manufactured from lumber industry leftovers, hemp insulation made from renewable hemp fibers, and mushroom packing made from moldable structures found in mushrooms. Another loose-fill option is recycled cotton wool from textiles. It is possible to use straw, a widely available agricultural byproduct, for temperature-controlled, short-distance transportation. Sustainable logistics are becoming more feasible with the development of biodegradable insulating solutions, even though the best option depends on aspects including distance, cost, and temperature needs.

### 3.5.3 Active Packaging

Active Active packaging is essential to the supply chain because it provides more than simply product protection. By interacting with the product, this creative packaging enhances its quality, increases its shelf life, and even offers useful condition information. Active packaging provides a number of advantages along the supply chain by releasing advantageous substances like antioxidants and absorbing undesirable factors like moisture or oxygen. This can provide real-time condition

monitoring, which can drastically cut down on food waste, enhance product quality, and guarantee consumer safety. Even though active packaging may be more expensive than traditional solutions, many organizations find it to be a worthwhile investment due to its ability to improve product quality, eliminate losses, and streamline the supply chain.

### 3.5.4 Blockchain Technology

Blockchain technology is revolutionizing the way Fast-Moving Consumer Goods (FMCG) and temperature-sensitive products are managed throughout the supply chain. This innovative system creates a secure, shared record of every step a product takes, from manufacturing to reaching store shelves. The transparency enhance various benefits like enhancing traceability, improved food safety, reduced streamlined logistics.

### 3.5.5 Route Optimization

In the supply chain of temperature-sensitive goods and fast-moving consumer goods (FMCG), route optimization is revolutionary. In order to combat inefficiencies, it designs the most efficient delivery routes and reduce costs and emission,improve on time delivery.

### 3.5.6 Cold Chain Logistics

In the fast-paced world of FMCG (Fast-Moving Consumer Goods) and temperature-sensitive products, imagine a lifeline ensuring their quality, safety, and timely arrival. That's precisely the role of cold chain logistics. It's a meticulously crafted system managing storage and transportation of these products throughout the supply chain. From specialized warehouses and refrigerated trucks to constant temperature monitoring, cold chain logistics ensures everything arrives fresh and perfect.

### 3.5.7 Predictive Maintenance

Sensors on machinery and storage facilities can predict potential failures and allow for preventive maintenance, reducing downtime and product spoilage. The use of predictive maintenance (PdM) in supply chains for FMCG and temperature-sensitive goods is revolutionizing. PdM guarantees product quality (freshness, efficacy) via early identification of equipment problems and environmental management by using real-time sensor data and machine learning. This results in more efficient operations, less waste, and lower costs thanks to better maintenance plans. Furthermore, PdM's continuous data recording feature makes it easier for businesses like pharmaceuticals to comply with

requirements. All things considered, PdM gives supply chains for FMCG and temperature-sensitive products access to data for increased quality, productivity, and competitive advantage.

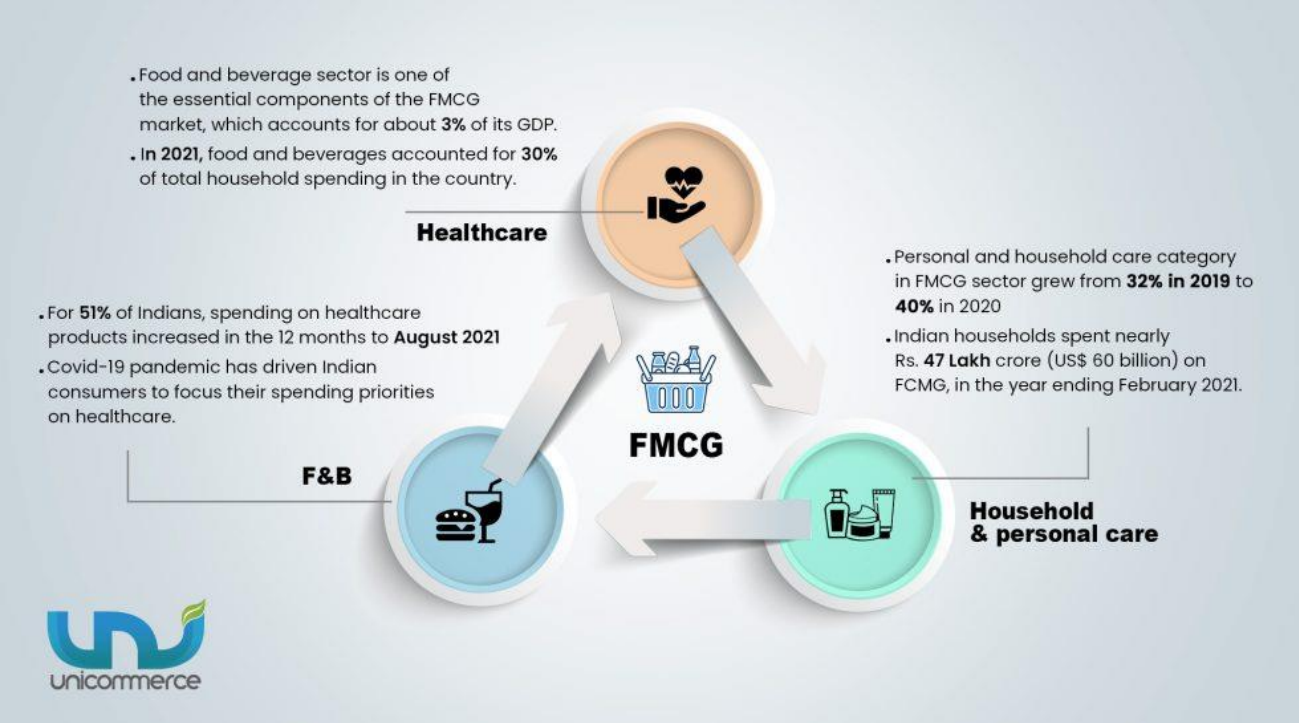
### 3.5.8 3D Printing for Spare Parts

This can help overcome logistical challenges in remote areas by enabling on-demand printing of spare parts for refrigeration units. The supply chains for FMCG and temperature-sensitive products are disrupted by 3D printing since it makes it possible to manufacture spare parts on demand at production facilities or warehouses. Large inventories are removed, lead times are shortened, and there is less downtime for vital equipment. In addition, compared to traditional production, 3D printing minimizes waste and enables customization of parts for particular requirements. But in order for adoption to be more widespread, issues including part complexity, material restrictions, and standardization need to be addressed. All things considered, 3D printing has enormous potential to transform supply chains in various industries, fostering effectiveness, flexibility, and sustainability.

## 3.6 FMCG INDUSTRY IN INDIA

Fast-moving consumer goods (FMCG) sector is India's fourth-largest sector. Consumer-oriented growth and increased prices, particularly for essential products, fueled the growth of the Fast-Moving Consumer Goods (FMCG) industry in India.

The FMCG sector achieved a milestone of US$ 56.8 billion by December 2022. Forecasts indicate that the total revenue of the FMCG market is expected to experience a Compound Annual Growth Rate (CAGR) of 27.9% from 2021 to 2027, eventually reaching a value of approximately US$ 615.87 billion. In 2022, the urban sector accounted for 65% of the overall annual FMCG sales, while rural India contributed over 35%.




Household and personal care products make up 50% of the industry's sales, healthcare claims 31-32%, and food and beverage products account for the remaining 18-19%, which makes it evident that these sectors play a pivotal role in shaping the nation's economic landscape. Within this ever-expanding and dynamic industry, the warehouse serves as the beating heart that connects manufacturers, distributors, retailers, and, ultimately, the end consumers, ensuring seamless e-commerce operations.

## 3.7 Supply chain Management(SCM)

Supply chain management (SCM) is management of the flow of goods, data, and finances related to a product or service, from the procurement of raw materials to the delivery of the product at its final destination.

**Key factors involved in SCM**

- **Planning**
- **Finance**
- **Transportation**
- **Warehousing**
- **Information**
- **Inventory management**

## Temperature level for storing various product

| Category | Temperature level | Product |
|---|---|---|
| Frozen Foods | -18°C to -24°C (-0.4°F to -11.2°F) | Frozen meats, vegetables, ready meals, ice cream |
| Refrigerated Foods | 0°C to 4°C (32°F to 39.2°F) | Dairy products (milk, cheese, yogurt), fresh meats, deli items, and certain fruits and vegetables. |
| Room Temperature Goods | 20°C to 25°C (68°F to 77°F) | Canned goods, snacks, cereals, pasta, beverages |
| Chilled Products | 5°C to 8°C (41°F to 46.4°F) | Chilled beverages, certain sauces, and some bakery |

**Challenges**

- FMCG is relatively less capital-intensive, but demands immense skills and expenditure on branding and distribution.
- Industries dealing with temperature-sensitive products often require specialized infrastructure, such as refrigerated warehouses, cold storage facilities, or temperature-controlled transportation.
- Inflation restricts the industry's growth; many companies in the sector thrive under inflationary pressures.
- Seasonal variations and unpredictable weather events can disrupt temperature-sensitive supply chains, leading to delays, shortages, and increased risks of temperature excursions.
- Sudden fluctuations in temperature, pose a significant risk to temperature-sensitive products. Mitigating this risk requires continuous monitoring systems, contingency plans, and rapid response protocols.

# CHAPTER 4

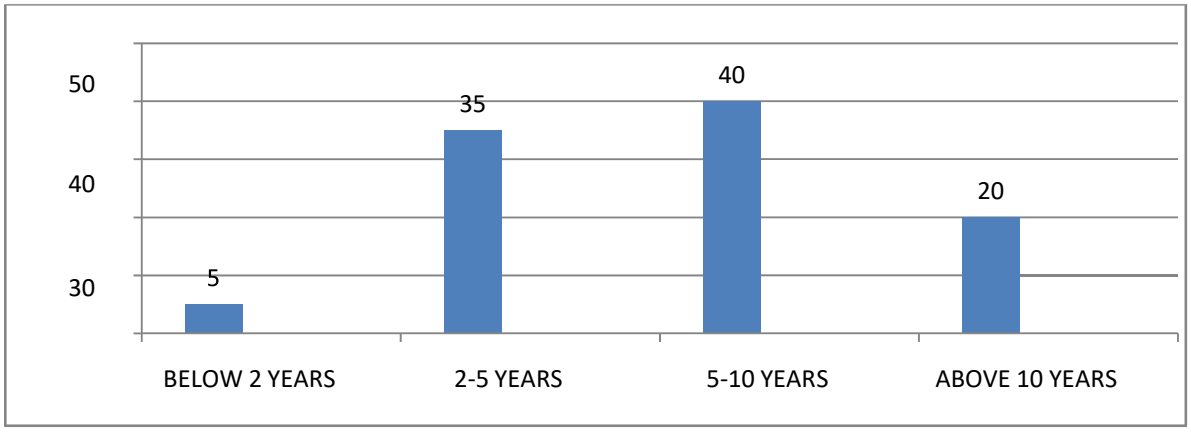
# DATA ANALYSIS AND INTREPRETATION

**TABLE 4.1 SHOWING THE AGE OF BUSINESS IN FMCG TRADE**

| PARTICULAR | NO.OF RESPONDENTS | PERCENTAGE OF RESPONDENTS |
|---|---|---|
| BELOW 2 YEARS | 1 | 5 |
| 2-5 YEARS | 7 | 35 |
| 5-10 YEARS | 8 | 40 |
| ABOVE 10 YEARS | 4 | 20 |
| Total | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.1 SHOWING THE AGE OF BUSINESS IN FMCG TRADE**



**Interpretation**

From the above chart and table, we understand that Here 40percent of the wholesalers belongs to 5-10 years age of business in FMCG 35percent of the suppliers belongs to 2-5 years age of business in FMCG, 20 percent of the suppliers belongs to above 10 years age of business in FMCG,5 percent of the suppliers belongs to below 2 years age of business in FMCG.

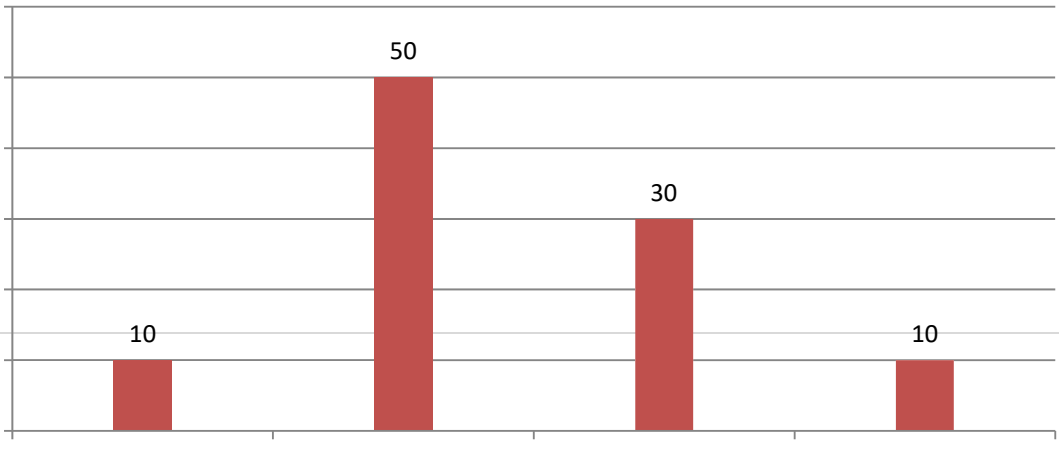
This given an indicate that majority of the suppliers are supplying FMCG goods from more than 5-10 years.

**TABLE 4.2 SHOWING THE CATEGORY THAT BELONG IN THE SUPPLY CHAIN OF FMCG**

| PARTICULAR | NO.OF RESPONDENTS | PERCENTAGE OF RESPONDENT |
|---|---|---|
| DISTRIBUTOR | 2 | 10 |
| WHOLESALERS | 10 | 50 |
| AGENT | 6 | 30 |
| RETAILERS | 2 | 10 |
| TOTAL | 20 | 100 |

SOURCE:PRIMARY DATA

**CHART 4.2 SHOWING THE CATEGORY THAT BELONG IN THE SUPPLY CHAIN OF FMCG**




**Interpretation**

From the above chart and table we understand It is observed that 50 percentage of the suppliers are wholesalers,30 percentage of the suppliers are agent 10 percentage of the suppliers are distributor, ,10 percentagerespondents are retailers.

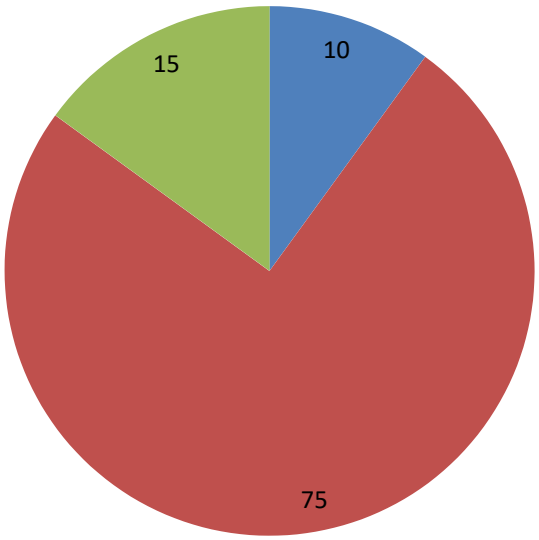
This given an indication that 50 percentage of there are wholesalers of FMCG

**TABLE 4.3 SHOWING THE DEALING TYPE OF PRODUCT AND COMPANY**

| **PARTICULAR** | **NO.OF RESPONDENTS** | **PERCENTGE OF RESPONDENTS** |
|---|---|---|
| SINGLE PRODUCT | 2 | 10 |
| MULTIPLE PRODUCT OF SINGLE COMPANY | 15 | 75 |
| MULTIPLE PRODUCT OF MULTIPLE COMPANY | 3 | 15 |
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.3 SHOWING THE DEALING TYPE OF PRODUCT AND COMPANY**




**Interpretation**

From the above chart and table, we understand that 75 percentage of suppliers dealing with the multiple products of the single company ,15 percentage of suppliers deals with the multiple products of the multiple company,10 percentage suppliers deal with the single product.

We can understand that 75 percentage of the suppliers deal with the multiple products of single Company.

**TABLE 4.4 SHOWING THE REASONS TO BECOME CHANNEL MEMBERS FOR TEMPERATURE SENSITIVE AND FMCG DISTRIBUTION**

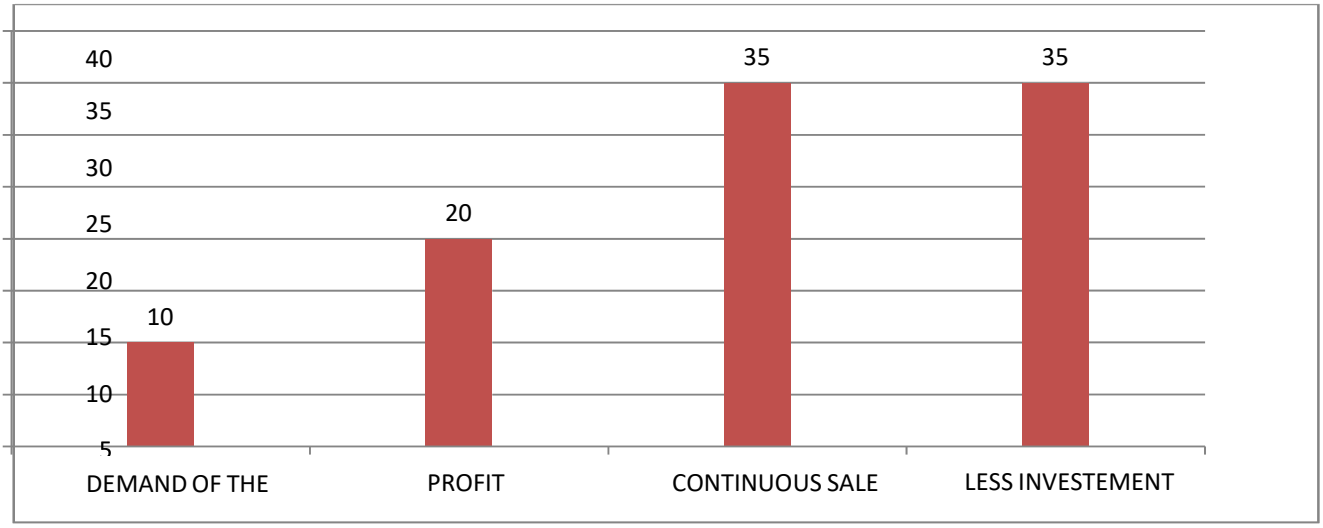
| **PARTICULAR** | **NO. OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| DEMAND OF THE PRODUCT | 2 | 10 |
| PROFIT | 4 | 20 |
| CONTINUOUS SALE | 7 | 35 |
| LESS INVESTEMENT | 7 | 35 |
| OTHERS | 0 | 0 |
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.4 SHOWING THE REASONS TO BECOME CHANNEL MEMBERS FOR**

**TEMPERATURE SENSITIVE AND FMCG DISTRIBUTION**

**FOR FMCG DISTRIBUTION**




**Interpretation**

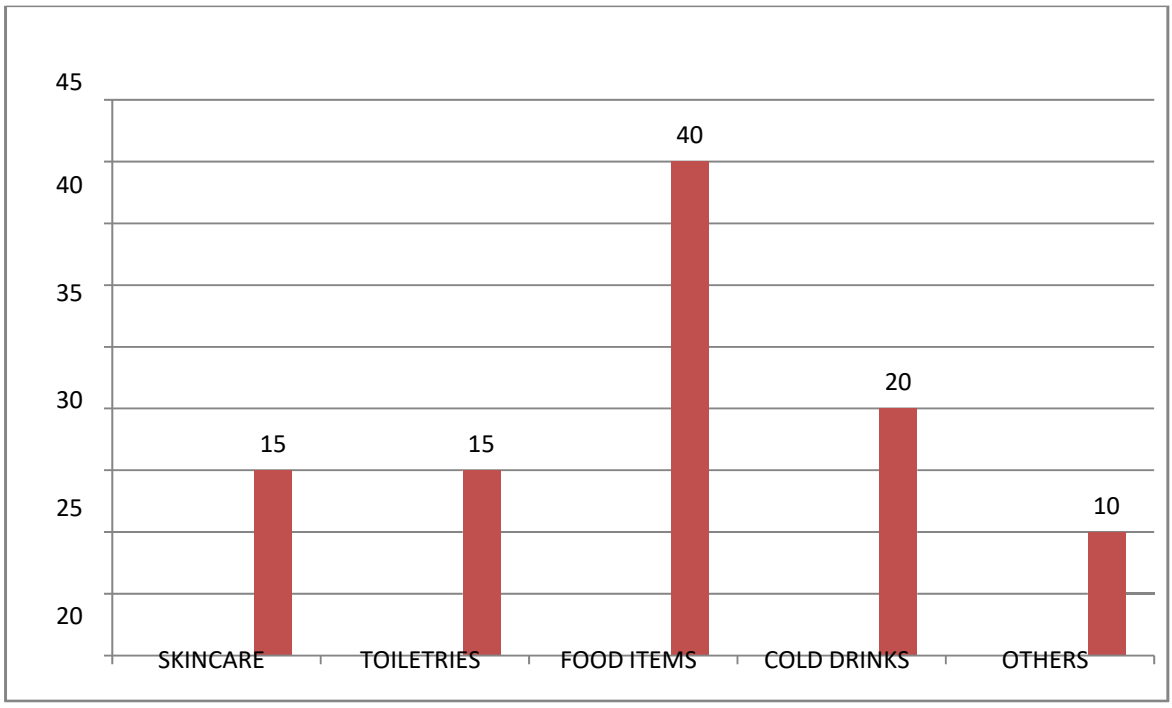
From the above chart and table we understand Here 35 percentage of the suppliers are become the channel member for FMCG distribution because of the reason for less investment, 35 percentage of the suppliers are become the channel member for FMCG distribution because of the reason for continuous sale, 20 percentageof the suppliers are become the channel member for FMCG distribution because of the reason for profit, 10 percentage of the suppliers are become the channel member for FMCG distribution because of the reason for demand of the product. This gives an indication that majority of the wholesalers are become channel members because of the reason of less investment and continuous sales.

**TABLE 4.5 SHOWING WHICH TYPE OF TEMPERATURE SENSITIVE OR FMCG DO THEY OFFER**

| **PARTICULAR** | **NO. OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| SKINCARE | 3 | 15 |
| TOILETRIES | 3 | 15 |
| FOOD ITEMS | 8 | 40 |
| COLD DRINKS | 4 | 20 |
| OTHERS | 2 | 10 |
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.5 SHOWING WHICH TYPE OF TEMPERATURE SENSITIVE AND FMCG DO THEY OFFER**




**Interpretation**

From the above chart and table indicate that 45 percentage of suppliers supply food items,20 percentage 20 percentage suppliers supply cold drinks,15 percentage suppliers supply skincare products,15 percentage suppliers supply toiletries.

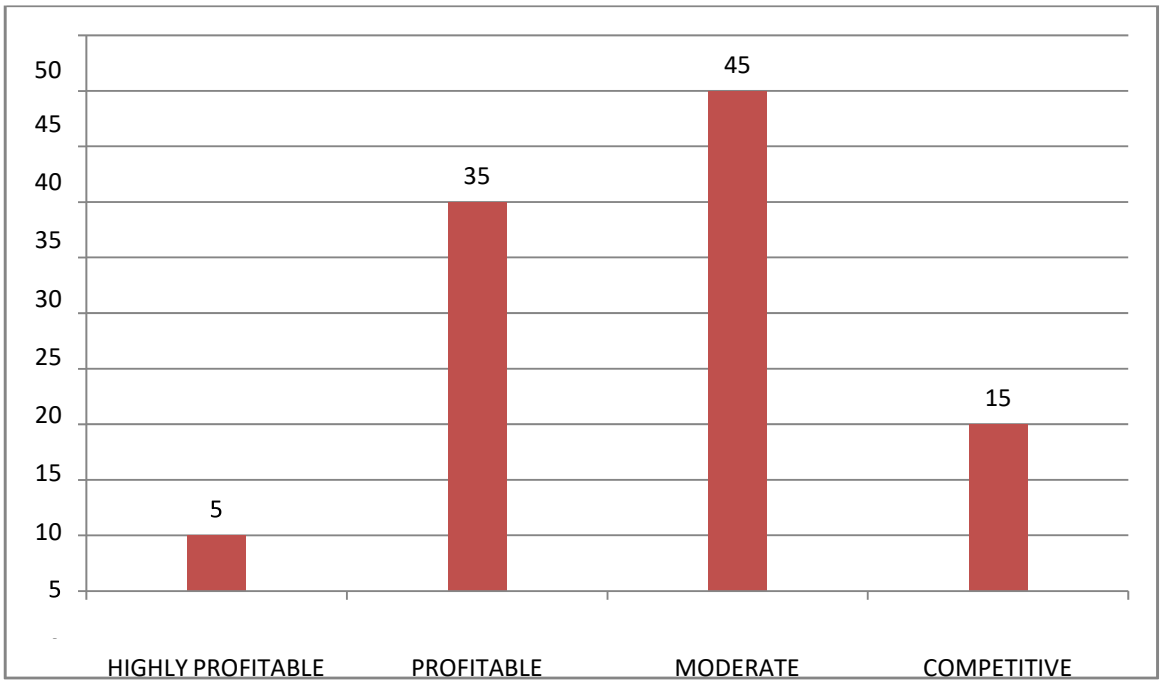
This given an indication that majority of the suppliers deal with food items supply to retail outlet.

**TABLE 4.6 SHOWING THE TODAYS MARKET FOR TEMPERATURE SENSITIVE AND FMCG ITEMS**

| **PARTICULAR** | **NO.OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| HIGHLY PROFITABLE | 1 | 5 |
| PROFITABLE | 7 | 35 |
| MODERATE | 9 | 45 |
| COMPETITIVE | 3 | 15 |
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

CHART 4.6 SHOWING THE TODAYS MARKET FOR TEMPERATURE SENSITIVE AND FMCG ITEMS




**Interpretation**

From the above chart and table indicate 45 percentage of suppliers are moderate,35 percentage suppliers are profitable,15 percentage of suppliers are competitive,5 percentage suppliers saying market arehighly profitable.

This given an indication that the majority of the suppliers are feels that today's market for temperature sensitive and FMCG Products are marketable.

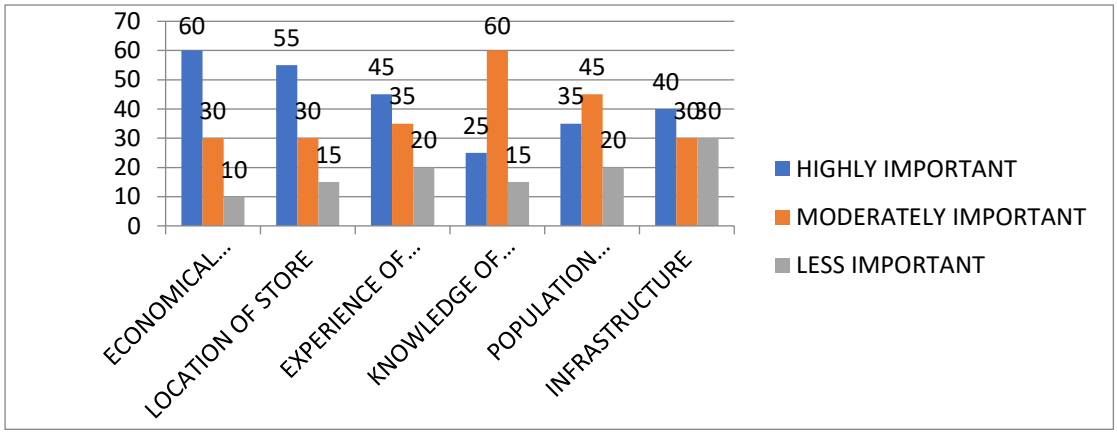
**TABLE 4.7 SHOWING THE PARAMETER THAT CONSIDER MORE IMPORTANT FOR GETTING A LINK IN THE TEMPERATURE SENSITIVE AND FMCG SUPPLY CHAIN**

| PARTICULAR | HIGHLY IMPORTANT | % | MODERATELY IMPORTANT | % | LESS IMORTENT | % | TOTAL PERCENTAGE |
|---|---|---|---|---|---|---|---|
| ECONOMICAL BACKGROUND | 12 | 60 | 6 | 30 | 2 | 10 | 100 |
| LOCATION OF STORE | 11 | 55 | 6 | 30 | 3 | 15 | 100 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| EXPERIENCE OF TRADE | 9 | 45 | 7 | 35 | 4 | 20 | 100 |
| KNOWLEDGE OF THE PRODUCT | 5 | 25 | 12 | 60 | 3 | 15 | 100 |
| POPULATION CITY/TOWN | 7 | 35 | 9 | 45 | 4 | 20 | 100 |
| INFRASTRUCTURE | 8 | 40 | 6 | 30 | 6 | 30 | 100 |

SOURCE:PRIMARY DATA

**CHART 4.7 SHOWING THE PARAMETER THAT CONSIDER MORE IMPORTANT FOR GETTING A LINK IN THE TEMPERATURE SENSITIVE AND FMCG SUPPLY CHAIN**




**Interpretation**

From the above table we can understand that nearly 60 percentage of the suppliers are giving highly important for economical background, 30 percentage of the suppliers giving moderatelyimportant for the economical background, 10 percentage of suppliers giving less importance for the economical background.

From the above table we can understand that 55 percentage of the suppliers are giving highly importance for the location of store, 30 percentage of suppliers are giving moderately important for the location of store,15 percentage of suppliers are giving less importance for the location of the store.

From the above table we can understand that 45percentage of the suppliers are giving highly importance for the experience of trade, 35percentage of suppliers are giving moderatelyimportant for the experience of trade,20 percentage of suppliers are ging less importance forthe location of the

store .

From the above table we can understand that 25percentage of the suppliers are giving highly importance for the knowledge of the product, 60 percentage of suppliers are giving moderately important for the knowledge of the product, 50 percentage of suppliers are giving less importance for the knowledge of the product.

From the above table we can understand that 35percentage of the suppliers are giving highly importance for the population city/town, 45percentage of suppliers are giving moderately important for the population city/town, 20 percentage of suppliers are giving less importance for the population city/town.

From the above table we can understand that 40 percentages of the suppliers are giving highly importance for the infrastructure, 30 percentages of suppliers are giving moderately important for the infrastructure, 30 percentages of suppliers are giving less importance for the infrastructure.

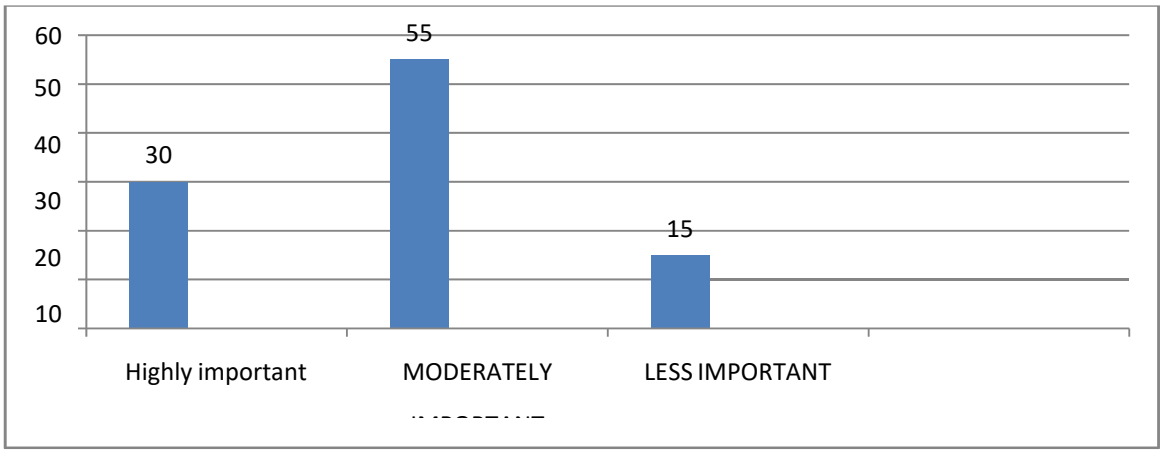
This given an indication that Majority of them giving highly importance to economical background, Moderately importance to the knowledge of the product, and less importance to the infrastructure.

**TABLE 4.8 SHOWING THE IMPORTANCE GIVEN BY THE SUPPLIER TO THE FEEDBACK IN PRODUCT IMPROVEMENT,PROMOTION STRATERGY**

| **PARTICULAR** | **NO.OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| HIGHLY IMPORTANT | 6 | 30 |
| MODERATELY IMPORTANT | 11 | 55 |
| LESS IMPORTANT | 3 | 15 |
| TOTAL | 20 | 100 |

SOURCE:PRIMARY DATA

**CHART 4.8 SHOWING THE IMPORTANCE GIVEN BY THE SUPPLIER TO THE FEEDBACK IN PRODUCT IMPROVEMENT,PROMOTION STRATERGY**.




**Interpretation**

From the above chart and table indicate that 55 percentage of the suppliers give highly important for the feedback in product improvement and promotion stratergy,30 percentage of the suppliers give highly important for the feedback in product improvement and promotional stratergy,15 percentage of suppliers are giving less important for the feedback in product improvement and promotional strategy.This gives an indication that 55 percentage of the respondents give moderately importance to the Feedback in product improvement, promotion strategy.

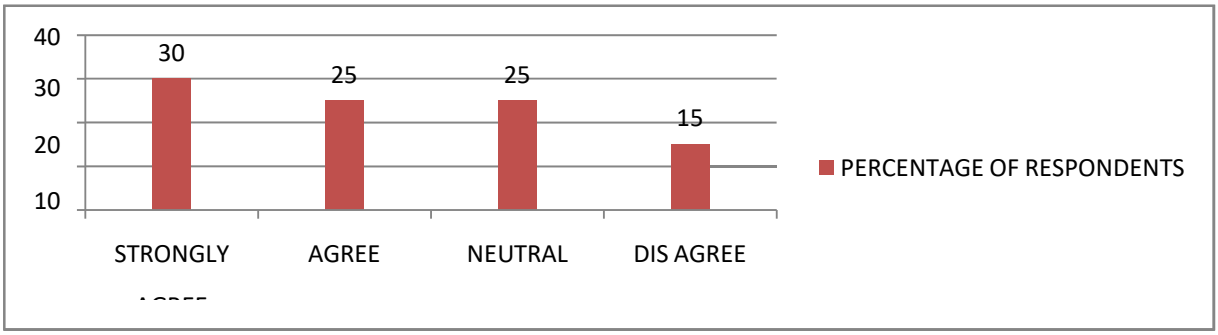
**TABLE 4.9 SHOWING THE CHANNEL MEMBERS PLAY AN IMPORTANT ROLE IN THE SUCESS OF TEMPERATURE SENSITIVE AND FMCG DISTRIBUTION**

| **PARTICULAR** | **NO.OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| STRONGLY AGREE | 6 | 30 |
| AGREE | 5 | 25 |
| NEUTRAL | 5 | 25 |
| DIS AGREE | 3 | 15 |
| STRONGLY DISAGREE | 1 | 5 |

| | | |
|---|---|---|
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.9 SHOWING THE CHANNEL MEMBERS PLAY AN IMPORTANT ROLEIN THE SUCESS OF TEMPERATURE SENSITIVE AND FMCG DISTRIBUTION**




**Interpretation**

From the above chart and table indicate that 30 percentage of the suppliers are strongly agree that channel members play an important role in the success of temperature sensitive and FMCG distribution,25 percentage of the suppliers agrees that strongly agrees that channel members play important role in the success of temperature sensitive and FMCG distribution,25 percentage of suppliers have neutral opinion that channel members play important role in the success of temperature sensitive and FMCG distribution,15 percentage of suppliers disagree thatthe channel members play important role in the success of temperature sensitive and FMCG Distribution.

This gives an indication that majority of them are strongly agrees that channel members playing an important role in the success of temperature sensitive an FMCG distribution.

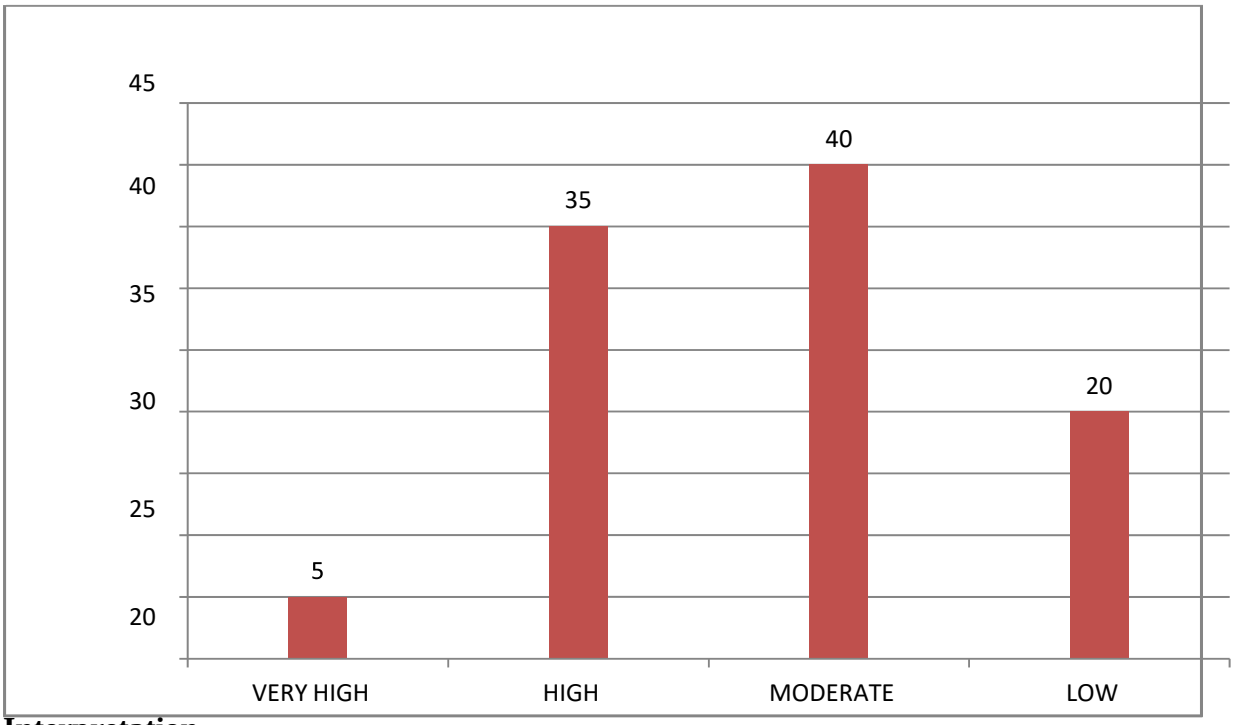
**TABLE 4.10 SHOWING THE PRICE OF THE TEMPERATURE SENSITIVE AND FMCG PRODUCT**

| **PARTICULAR** | **NO.OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| VERY HIGH | 1 | 5 |
| HIGH | 7 | 35 |
| MODERATE | 8 | 40 |
| LOW | 4 | 20 |

| | | |
|---|---|---|
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.10 SHOWING THE PRICE OF THE TEMPERATURE SENSITIVE AND FMCG PRODUCT**




**Interpretation**

From the above chart and table indicate that 40 percentage of the respondents are saying that price of the temperature sensitive and FMCG product is moderate,35 percentage of the respondents says that the price of the temperature sensitive and FMCG product is very high,20 percentage of respondents says that price of the temperature sensitive and FMCG products are low,5 percentage of the respondents says that price of the temperature sensitive and FMCG products are very high

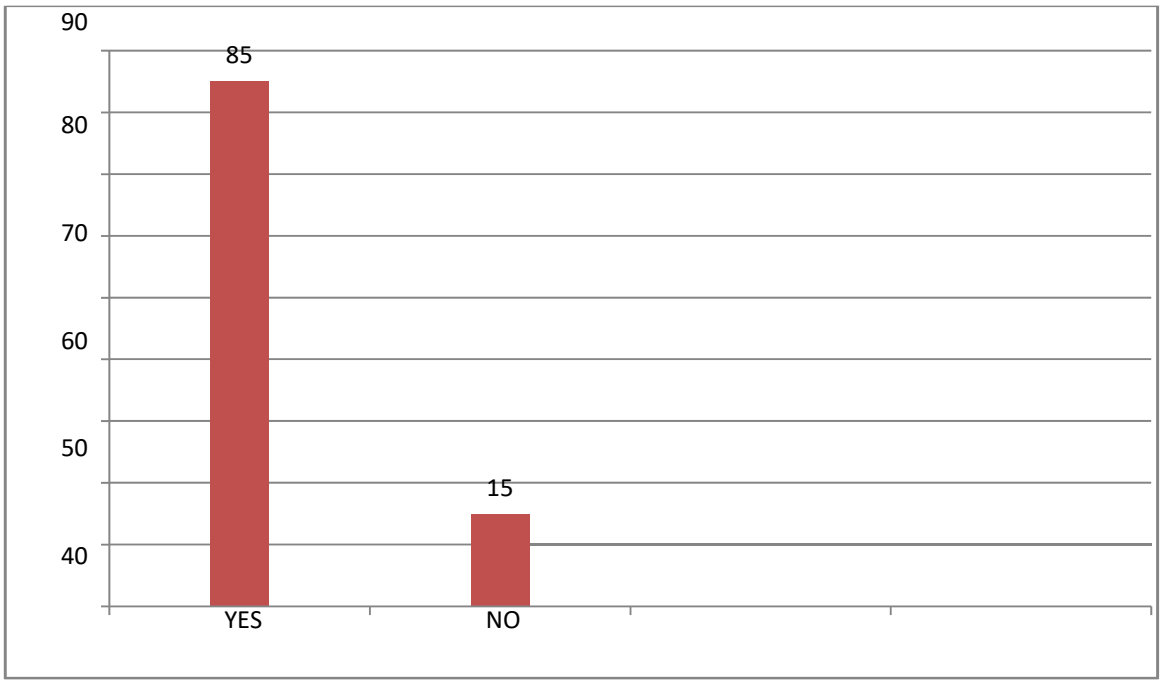
This gives an indication that majority of the suppliers are agrees that price of the temperature sensitive and FMCG product is Very high.

**TABLE 4.11 SHOWING THAT THEY USE THIER OWN STORAGE PLACE**

| **PARTICULAR** | **NO OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| **YES** | **17** | **85** |
| **NO** | **3** | **15** |
| **TOTAL** | **20** | **100** |

SOURCE: PRIMARY DATA

**CHART 4.11 SHOWING THAT THEY USE THIER OWN STORAGE PLACE**




**Interpretation**

From the above chart and table indicate that 85 percentage of the respondents are using their own storageplace, 15 percentage of the respondents not using their own storage place.

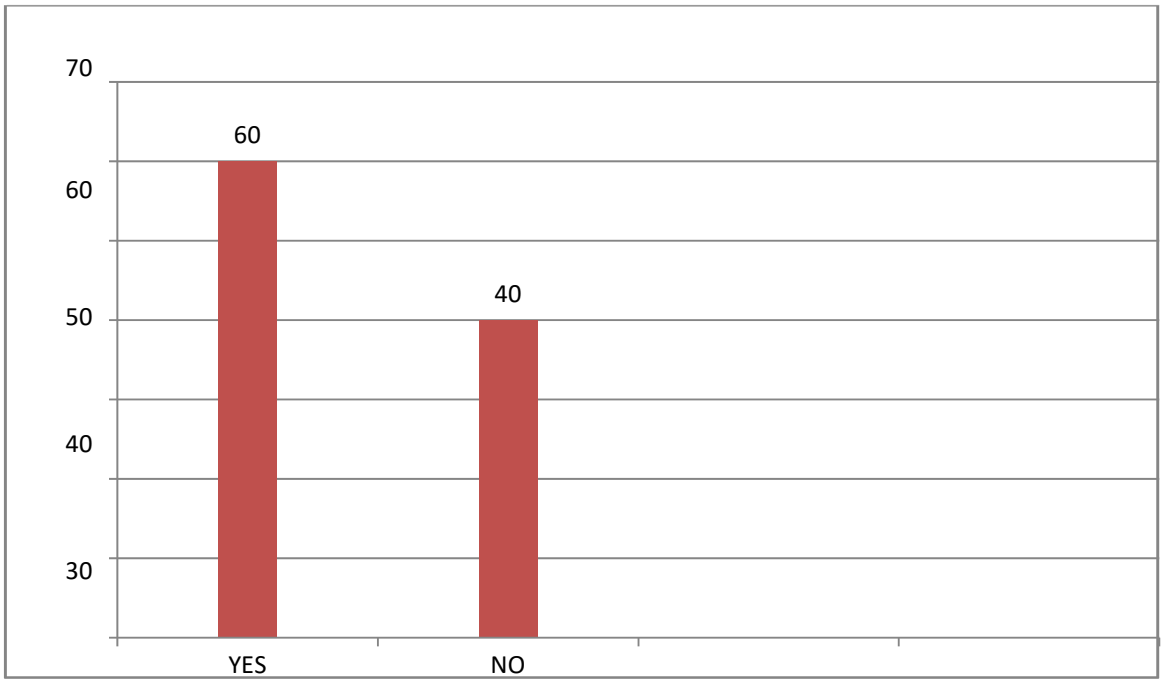
We can understand that 85 percentage of the suppliers are using their own warehouse.

**TABLE 4.12 SHOWING HAVE ANY PROBLEM ASSOCIATED WITH DELIVERY PROCESS**

| PARTICULAR | NO OF RESPONDENTS | PERCENTAGE OF RESPONDENTS |
|---|---|---|
| YES | 12 | 60 |
| NO | 8 | 40 |
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.12 SHOWING HAVE ANY PROBLEM ASSOCIATED WITH DELIVERY PROCESS**




**Interpretation**

From the above chart and table indicate that 60 percentage of the suppliers are having problem associated with delivery process, and 40 percentage of the suppliers not having problemassociated with delivery process.

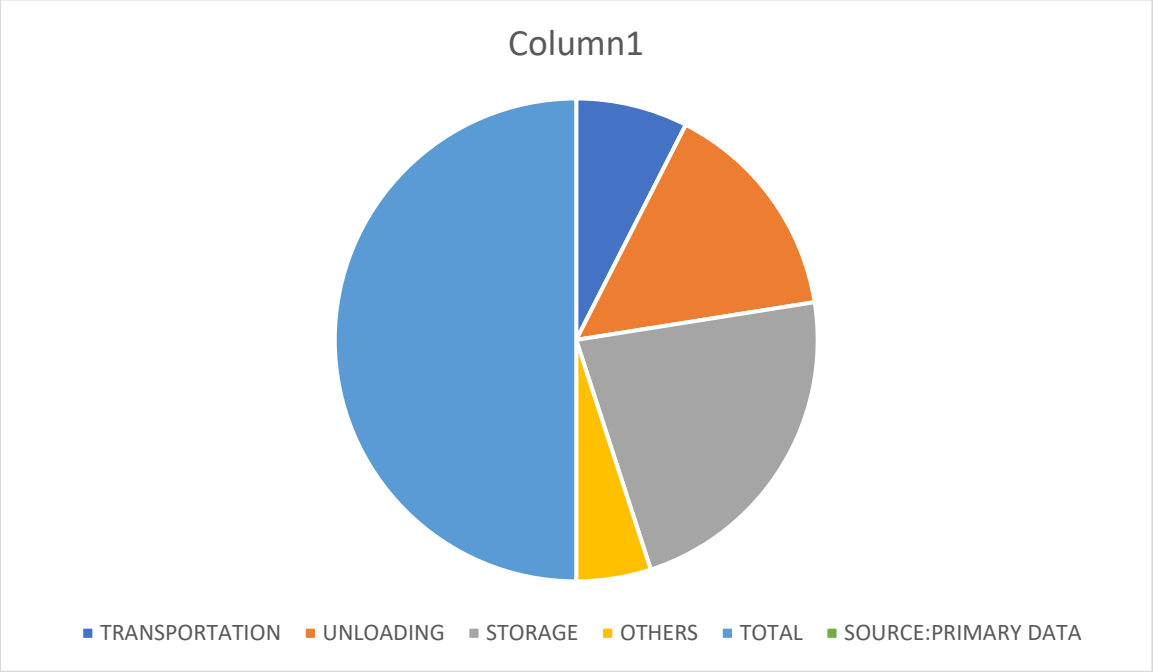
We can understand that majority of the suppliers are having problem associated with delivery process.

**TABLE 4.13 SHOWING THE PROBLEM IN THE DELIVERY PROCESS**

| PARTICULAR | NO OF RESPONDENTS | PERCENTAGE OF RESPONDENTS |
|---|---|---|
| TRANSPORTATION | 3 | 15 |
| UNLOADING | 6 | 30 |
| STORAGE | 9 | 45 |
| OTHERS | 2 | 10 |
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.13 SHOWING THE THE PROBLEM IN THE DELIVERY PROCESS**




**Interpretation**

Based on the above table and chart shows 45 percentage of the suppliers having the problem with storage place,30 percentage of suppliers having the problem with unloading,15 percentageof the suppliers having the problem with transportation,10 percentage of the suppliers are facing other problems in the delivery process. This we can understand that Majority of the suppliers facing storage problem in the delivery process.

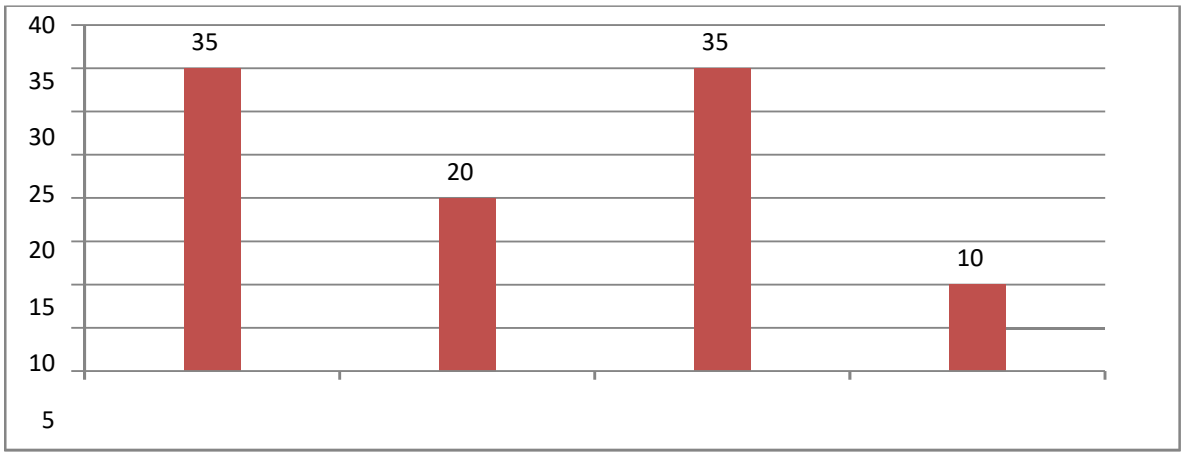
**TABLE 4.14 SHOWING THE FORM OF ADVERTISEMENT MORE SUITABLE FOR PROMOTING FMCG**

| PARTICULAR | NO OF RESPONDENTS | PERENTAGE OF RESPONDENTS |
|---|---|---|
| MEDIA&PRINT MEDIA | 7 | 35 |
| RADIO | 4 | 20 |
| MELAS&FAIRS | 7 | 35 |
| WALL PAINTING | 2 | 10 |
| OTHERS | 0 | 0 |

| | | |
|---|---|---|
| TOTAL | 20 | 100 |

SOURCE: PRIMARY DATA

**CHART 4.14 SHOWING THE FORM OF ADVERTISEMENT MORE SUITABLE FOR PROMOTING FMCG**




**Interpretation**

From the above table and chart 35 percentage of suppliers are choosing media&print media for the advertisement,35 percentage of suppliers are choosing melas&fairs for the advertisement,20 percentage suppliers using radio for the advertisement,10 percentage of the suppliers are using wall painting.This we can understand that majority of the suppliers are using media print and melas and fairs wall for promoting FMCG

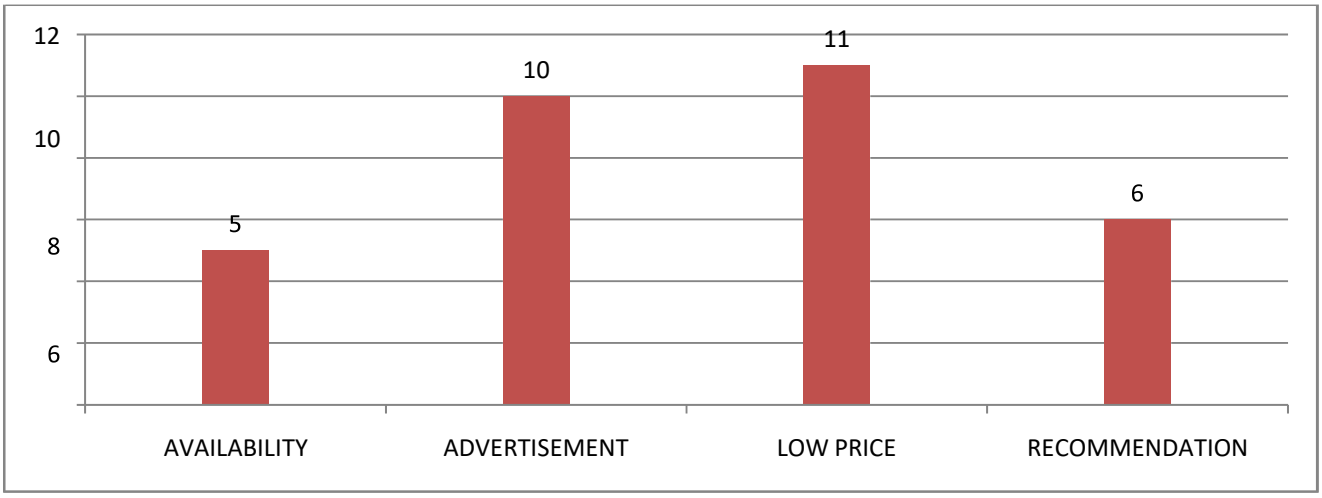
**TABLE 4.15 SHOWING THAT STRATERGY OR SCHEME DRAMATICALLYAFFECTS THE SALE OF PRODUCTS**

| **PARTICULAR** | **NO OF RESPONDENTS** | **PERCENTAGE OF RESPONDENTS** |
|---|---|---|
| **AVAILABILITY** | **1** | **5** |
| **ADVERTISEMENT** | **2** | **10** |
| **LOW PRICE** | **11** | **55** |
| **RECOMMENDATION** | **6** | **30** |
| **OTHERS** | **0** | **0** |

| | | |
|---|---|---|
| **TOTAL** | **20** | **100** |

SOURCE:PRIMARY DATA

**CHART 4.15 SHOWING THAT STRATERGY OR SCHEME DRAMATICALLYAFFECTS THE SALE OF PRODUCTS**




**Interpretation**

Based on the above table and s 11 percentage of the respondents says that low price affectsthe sale of products,10 percentage of the respondents says that advertisement affects the sale of product,6 percentage respondents says that recommendation affects the sale of products,5 percentage of respondents says that availability affects the sale of products. This give an indication that 55 percentage of the suppliers are agrees low price strategy affects the sale of products.

# CHAPTER 5
# FINDINGS, SUGGESTIONS AND CONCLUSION

## FINDINGS

- The challenges faced by the this industry was lack of coordination in transportation and warehousing of this goods.
- There is so area in the sector have good potential for improving like implementing AI, Blockchain technology etc.
- Maintaining consistent temperature throughout the supply chain is critical for preserving the quality and integrity of temperature-sensitive FMCG products, such as perishable foods or pharmaceuticals.
- Complicated Regulatory compliance and legal formality are involved in this sector.

- Majority p e r c e n t a g e suppliers are giving highly importance for the location of the store for getting link in the FMCG supply chain.
- Majority Percentage of suppliers is giving moderately important for the knowledge of the product getting link in the FMCG supply chain.
- Majority Percentage of the suppliers is giving highly importance for the infrastructure getting link in the FMCG supply chain.
- Majority of the suppliers are giving moderately important for installment facility.
- Majority of the suppliers giving moderately importance for developing infrastructure.
- Most of the suppliers are giving highly importance for the feedback in productimprovement and promotional strategy.
- Majority percentage of the suppliers are satisfied with the sales effort of the company.
- Majority of the suppliers is the price of the FMCG product is very high.
- Majority of the suppliers are using their own storage place.
- Most of the suppliers having problem associated with delivery process.
- Most of the suppliers having the problem in the delivery process because of the problem with storage place.

## SUGGESTIONS

- Build culture of continuous improvement by regularly evaluating and optimizing temperature-sensitive supply chain processes.
- Implement efficient inventory management practices to minimize excess inventory and reduce the risk of product spoilage or obsolescence. This includes utilizing demand forecasting techniques and Just-In-Time inventory strategies.
- Implement temperature monitoring and control systems, IoT sensors, and data analytics to track and manage temperature-sensitive products in real-time.
- Focus on attracting and engaging with newer business in the FMCG sector. This can be done

through targeted marketing campaigns, networking events, or offering specialized support.

- Provide training and resources to enhance their product knowledge. This will help them promote and sell products more effectively, leading to increased sales and customer satisfaction.

## CONCLUSION

In the fast-moving consumer goods (FMCG) industry, supply chain management is essential to the seamless movement of goods from producers to retailers and, eventually, to customers. Taking into account a number of variables, it is possible to draw the conclusion that efficient supply chain management has shown to be quite advantageous in the FMCG industry.
A well-run supply chain contributes to lower expenses and more productivity. Through process simplification and inventory optimization, businesses can save waste, lower transportation expenses, and improve overall operational effectiveness. Better demand forecasting is made possible by an efficient supply chain, and this enhances inventory control and lowers carrying costs. Moreover, it helps with on-time delivery, avoiding stockouts and excess inventory—two things that may be expensive for FMCG businesses.

Better customer satisfaction and service are made possible through efficient supply chain management. Offering top-notch customer service is essential for acquiring and keeping clients in the fiercely competitive FMCG market. Stockouts are less likely when products are easily accessible on store shelves thanks to a well-managed supply chain. It also makes it possible for businesses to react swiftly to shifting consumer tastes or market demands, launching new items or variations on schedule. This promptness increases client loyalty and happiness.Moreover, supply chain management has a big impact on improving coordination and cooperation amongst different stakeholders. Many stakeholders are involved in the FMCG industry, including retailers, distributors, suppliers, manufacturers, and consumers. Good supply chain management encourages communication and cooperation between various parties, guaranteeing efficient information exchange, prompt order fulfillment, and well-organized operations. By working together, the supply chain network's relationships are strengthened, which improves performance and benefits all stakeholders.The FMCG industry places significant emphasis on the role that efficient supply chain management plays in promoting sustainability and social responsibility. Businesses can incorporate ethical sourcing and sustainable practices into their supply chain management procedures.This includes implementing environmentally friendly packaging, optimizing transportation routes to reduce carbon emissions, and ensuring fair labor practices throughout

thesupply chain. Such initiatives not only align with growing consumer demands for responsible consumption but also contribute to the long-term viability and reputation of FMCG companies.

In conclusion, effective supply chain management is highly effective in the FMCG sector. It brings numerous benefits, including cost reduction, enhanced efficiency, improved customer service, better collaboration, and sustainability.

## BIBLIOGRAPHY


Ashok Chopra, D. D. (2022). APPLICATION OF LEAN SIX SIGMA IN THE TRANSPORT SECTOR OF THE SUPPLY CHAIN OF A LEADING FMCG IN THE UAE. *Journal of Southwest Jiaotong University*, Vol 57, No 1 .

Bruce Dehning, V. J. (2007). The financial performance effects of IT-based supply chain management systems in manufacturing firms. *Journal of Operations Management*, 806-824.

Chinonso Kenneth Udokporo, A. A.-R. (2020). Impact of Lean, Agile and Green (LAG) on business competitiveness: An empirical study of fast moving consumer goods businesses. *Resources, Conservation and Recycling*, Vol 156.

Claudia Colicchia, A. C. (2017). Lean and green supply chain management through intermodal transport: insights from the fast moving consumer goods industry. *Production Planning & Control* , Volume 28, Issue 4.

Himanshu Arha, S. K. (2019). Understanding the Blockchain technology adoption in supply chains-Indian context. *International Journal of Production Research* , Vol 57 , Issue 7.

Horst Treiblmaier, K. M. (2020). The physical internet as a new supply chain paradigm: a systematic literature review and a comprehensive framework. *The International Journal of Logistics Management*, 0957-4093.

Jei-Zheng Wu, C. H. (2017). Key factors for truly sustainable supply chain management: An investigation of the coal industry in Indonesia. *The International Journal of Logistics Management* .

Juan Alexander Jiputra, Z. J. (2020). The Effect of Information Technology on Retailer Satisfaction Through Supply Chain Management Practices and Retailer-Distributor Relationship in Modern Retailer Surabaya. *International journal of business studies*, VOL. 3 NO. 2 .

Kayikci, Y. (2018). Sustainability impact of digitization in logistics. *Procedia Manufacturing*, Volume 21, Pages 782-789.

Kellner, F. (2007). Exploring the impact of urbanization on consumer goods distribution networks. *Journal of Asian Business and Economic Studies*.

Khare, A. (2007). RELATIONSHIP MARKETING TO INDIAN CONSUMERS THROUGH STRATEGIC SUPPLY CHAIN. *The International Journal of Applied Management and Technology*, vol 5, num 1.

Lorna Waithira Njuguna, D. J. (2021). INFLUENCE OF LOGISTICS MANAGEMENT SYSTEMS ON SUPPLY CHAIN PERFORMANCE OF FAST-MOVING CONSUMER GOODS MANUFACTURERS IN NAIROBI CITY COUNTY, KENYA. *International Research Journal of Business and Strategic Management*, Vol 2, No 2 .

Mafini, E. J. (2019). Transactional leadership, supply chain quality and business performance in the fast-moving consumer goods industry. *Journal of Transport and Supply Chain Management*, Vol. 13, No. 1.

Martin Njoroge Njeri, D. C. (2021). NFLUENCE OF SUPPLY CHAIN MANAGEMENT PRACTICES ON THE PERFORMANCE OF MANUFACTURING FIRMS IN NAIROBI CITY COUNTY, KENYA. *International Research Journal of Business and Strategic Management*, Vol 2, No 1 .

Matusiewicz, M. (2020). Logistics of the Future—Physical Internet and Its Practicality . *Transportation Journal*, 200-214.

Nofrimurti, E. O. (2017). Lean implementation in traditional distributor warehouse - a case study in an FMCG company in Indonesia. *International Journal of Process Management and Benchmarking*, Vol.8, NO 1.

Panayides, P. M. (2006). Maritime Logistics and Global Supply Chains: Towards a Research Agenda. *Maritime Economics & Logistics volume* , 3-18.

W. Niemann, T. K. (2016). Drivers and barriers of green supply chain management implementation in the Mozambican manufacturing industry. *Journal of Contemporary Management*, Vol. 13, No. 1.

Xiangfeng Chena, C. L. (2019). The role of supply chain finance in improving the competitive advantage of online retailing enterprises. *Electronic Commerce Research and Applications*, Volume 33.

## Websites

- Research gate- https://www.researchgate.net/publication/235256608_Fast_moving_consumer_goods_-_A_productivity_perspective_on_supply_chains
- Emarld - https://www.emerald.com/insight/content/doi/10.1108/IJLM-11-2019-0306/full/html
- Science – https://www.sciencedirect.com/science/article/abs/pii/S1478409216300267

## QUESTIONNAIRE

1. Name:

2. Place:

3. Age of business in FMCG trade

☐Below 2 years

☐2-5 years

☐ 5-10 year

☐ Above 10 years

4. Which category you belong in the supply chain of FMCG?

☐ Distributor

☐ Wholesaler

☐ Agent

☐ Retailer

5. Reason to become channel member for FMCG distribution?

☐ Demand of the product

☐ Profit

☐ Continuous sale

☐ Less investment

☐ others

6. Which type of FMCG do you offer?

☐ Skin care

☐ Toiletries

☐ Food items

☐ Cold drinks

☐ Others

7. What do you think about today's market for FMCG Items?

☐ Highly Profitable

☐ Profitable

☐ Moderate

☐ Competitive

8. What parameters that you consider more important for getting a link in the FMCG SupplyChain?

| Particulars | Highly important | Moderately Important | Less important |
|---|---|---|---|
| Economical Background | | | |
| Location of store | | | |
| Experience of trade | | | |

| | | | |
|---|---|---|---|
| Knowledge of the product | | | |
| Population city/town | | | |
| Infrastructure | | | |

9. Rate the importance given by the supplier to your feedback in product Improvement,promotion strategy and others .

☐ Highly important

☐ Moderately important

☐ Less distribution.

10. Do you agree channel members play an important role in the success of FMCG distribution?

☐ Strongly agree

☐ Agree

☐ Neutral

☐ Dis agree

☐ Strongly Dis agree

11. Rate the importance given by the supplier to your feedback in product Improvement,promotion strategy and others .

☐ Highly important

☐ Moderately important

☐ Less distribution.

12. Do you agree channel members play an important role in the success of FMCG distribution?

☐ Strongly agree

☐ Agree

☐ Neutral

☐ Dis agree

☐ Strongly Dis agree

13. What do you think about the price of the FMCG Product?

☐ Very High

☐ High

☐ Moderate

☐ Low

14. Are you using your own storage place?

☐ Yes

☐ No

15. Do you have any problem associated with delivery process?

☐ Yes

☐ No

If Yes, Please specify

☐ Transportation

☐ Unloading

☐ Storage

☐ Others

16. Which form of advertisement is most suitable for promoting FMCG?

☐ Media & Print media

☐ Radio

☐ Melas &Fairs

☐ Wall painting

☐ Others

17. Which strategy or scheme dramatically affects the sale of products?

☐ Availability ☐ Advertisement ☐ low price

☐ Recommendation ☐ Others