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Logistics in Gujarat

A study of the Textile and Diamond Industry

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Abstract

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This study focused on the logistics operations of Gujarat's textile and diamond industries, two of the most important sectors for the state's economy and international trade. These industries depend heavily on strong logistics systems, especially in transportation, warehousing, and supply chain management, to run smoothly and stay competitive in the global market. The study recommends that logistics must be optimized through AI, automation, and sustainable initiatives to keep Gujarat at number one in the textile and diamond industries. Enhancing logistics efficiency will improve Gujarat's global market position while boosting long-term economic benefits. A qualitative research method was used, including an interview with a logistics expert in Gujarat, along with an analysis of related studies and reports. The results show that while Gujarat has a solid logistics setup with good infrastructure and growing use of technology, there are still problems like traffic congestion, limited storage space, and slow digital systems. The study aimed to improve roads and digital solutions, and update logistics policies to reduce the cost of logistics. Gujarat can make its textile and diamond industries even stronger and more competitive in the long run.

Keywords: logistics, Gujarat, textile Industry, diamond industry, supply chain, transportation, AI, blockchain, sustainability

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Glossary

DMIC – Delhi Mumbai Industrial Corridor

FCI – Fixed Capital Investment

FTWZs – Free Trade Warehousing Zones

GDP – Gross Domestic Product

IoT – Internet of Things

JIT – Just-in-Time

QCOs – Quality Control Orders

1 Introduction

1.1 Background of Study

In India and the diamond and textile sectors, Gujarat is a leading hub that contributes specifically to the state's income. The textile sector is centered in Ahmedabad and Surat, and it plays a significant role in exporting and employment, accounting for a substantial share of Gujarat's textile production in India. Although the diamond industry, which is mainly based in Surat, produces rough diamonds worldwide, nearly 90%, making it a complex area to trade globally.

These industries are extremely growth and competitive dependent upon efficient logistics (Abu Sied, 2024). The textile industry depends on a large network of supply chains starting from procurement of raw materials, production, warehousing, and distribution. Similarly, the diamond industry relies on precise logistics that ensure that raw and polished stones are safely and on time transported from domestic markets across to international markets. Nevertheless, these industries face several logistical challenges, including limited infrastructure, high transportation costs, supply chain inefficiencies, and delayed deliveries, which can undermine the overall efficiency of the industries.

The key is to combine today’s logistics solutions by involving real-time tracking, automation, and an enhanced supply chain system. Gujarat’s textile and diamond industries can enhance their operational efficiency and, at the same time, increase their global competitiveness by optimizing transportation networks, improving warehousing facilities, and adopting digital innovations (Abu Sied, 2024).

The objective of this study is to analyse the logistics framework in the textile and diamond industries of Gujarat, identify the challenges and opportunities that may be introduced for instituting resultant measures to facilitate sustainable growth,

decrease costs and more effectively improve the supply chain of the textile and diamond industries of Gujarat.

1.2 Overview of Study

The diamond and textile industries are the most significant industries and economic contributors of Gujarat in India, which play an important role in trade globally. These sectors require effective logistics, including production, raw material procurement, and final distribution, to keep operations efficient (Adamashvili, Zhizhilashvili and Tricase, 2024). However, sectors face numerous problems, including inefficiencies in the supply chain, a lack of infrastructure, and high transportation costs, which impact the competitiveness and growth of industries.

The aim of this study is to closely look into the process of logistics in Gujarat's textile and diamond sector in transportation, warehousing, and supply chain management. This study examines the limitations of logistical problems on costs, delivery and effective timelines, which makes an incursion into how innovations and technology help in enhancing the logistics operations.

The study aims to identify the areas of improvement in the current logistics infrastructure to enhance competitiveness and sustainability. Research will also be conducted to determine how the issues in mask production can be overcome with the utilization of more advanced logistics solutions, like automation, digital tracking, and an optimized supply chain solution (Adamashvili, Zhizhilashvili and Tricase, 2024).

This study finally brings this out to enable the improvements in logistics efficiency in Gujarat's textile and diamond industries, thereby attaining cost reduction, optimizing the operational efficiency, as well as giving room for better placement in the domestic and international markets.

1.3 Problem Statement

The diamond and textile industries are the fortitude of Gujarat's income, integrating with exporting, employment, and overall growth of the economy. Besides their great importance, these sectors face problems in disrupting supply chains, efficiency, global competitiveness, and cost-effectiveness, leading to a decrease in profitability, delays, and an increase in operational costs (Agrawal et al., 2023). Moreover, based on convoluted methods of logistics and insufficient integration of technology, it worsens these problems and makes it more complex for organizations to simply optimise and meet the demands of a growing market.

For example, the diamond industry, which processes over 90 % of rough diamonds of the world, relies on secure, precise and time-sensitive logistics to transport value goods in a secure and precise manner. Similarly, the fashion industry also relies on a highly sophisticated supply chain network for sourcing raw materials, production, and distribution. Disruption in logistic operations is that which impacts the competitiveness and business functions.

These challenges can only be addressed through an analysis of the faulty logistical setup, the negative effects of the problem, and the role played by modern logistical solutions (Adamashvili et al., 2024). This work attempts to analyse the issues of logistics operations of Gujarat's textile and diamond industries and examines appropriate ways of managing the supply chain to minimise cost, reduce operation activities and increase global competitiveness.

1.4 Research Aim, Objectives, and Questions

Aim

The study aims to examine Logistics in the Gujarat diamond and textiles industries, assessing transportation, supply chain, and challenges to improve effectiveness, enhance competitiveness in key areas, and reduce costs.

Objectives

- To analyze the current logistical infrastructure supporting the textile and diamond industries in Gujarat, including transportation, warehousing, and supply chain networks.
- To evaluate the impact of logistical challenges on the efficiency, cost, and delivery timelines within the textile and diamond sectors.
- To assess the role of technology and innovation in optimizing logistics operations for the textile and diamond industries in Gujarat.
- To identify opportunities for improvement in logistics management to enhance competitiveness and sustainability in Gujarat's textile and diamond industries.

Research Questions

- What is the impact of existing infrastructure on the efficiency and cost-effectiveness of the textile and diamond industries in Gujarat?
- Why has the growth and competitiveness of Gujarat’s textile and diamond industries been slowed by what are arguably the key logistical challenges?

1.5 Rationale of Study

The effectiveness of it affect directly in terms of sustainability and profitability of sectors, which makes it complex factors for Gujarat diamond and textile sectors. Because these sectors are growing continuously, the demand in well formatted system of logistics is increasing significantly to meet the international and domestic needs. Besides, these expired practices in logistics and transportation have become inconsistent, with limited availability in adopting new technology, which affects the efficiency of operations (Agrawal et al., 2023).

This study needs to fill this gap between existing logistical challenges and the ways and means by which to improve productivity. The study examines new innovative ideas in logistics, such as improved infrastructure of transport, digital tracking, and automated supply chain management, to identify what the industry actually demands.

Studying the logistics landscape of Gujarat's textile and diamond industries will enable key stakeholders to make informed decisions that can make supply networks more efficient, reduce costs, and stay competitive in the global market for survival and future growth (Davis, 2024).

1.6 Scope of Study

The study examines the warehousing system, assessing transportation networks, the Gujarat textiles and diamond industries, and supply chain management in terms of logistics structure. It also evaluates the current operation of logistics and examines the complex problems that affect the cost, productivity, and competitiveness in the market.

This research looks at the use of modern and traditional logistics practices, digital innovations, automation, and technology-driven solutions in supply chain optimization (Dhonde & Patel, 2020). In addition, it considers regulatory policies, infrastructure development, and industry-specific logistical requirements to provide a complete picture of the sector's requirements.

The study has been limited to Gujarat and specifically to the areas, where textile and diamond businesses are more concentrated in areas as Surat and Ahmedabad. By providing practical solutions that would enable improvements to logistics efficiency, increase competitiveness and sustain growth, the findings contribute (George, 2024). Industry stakeholders, policymakers, and businesses seeking to improve their logistical operations will utilize the study's insights.

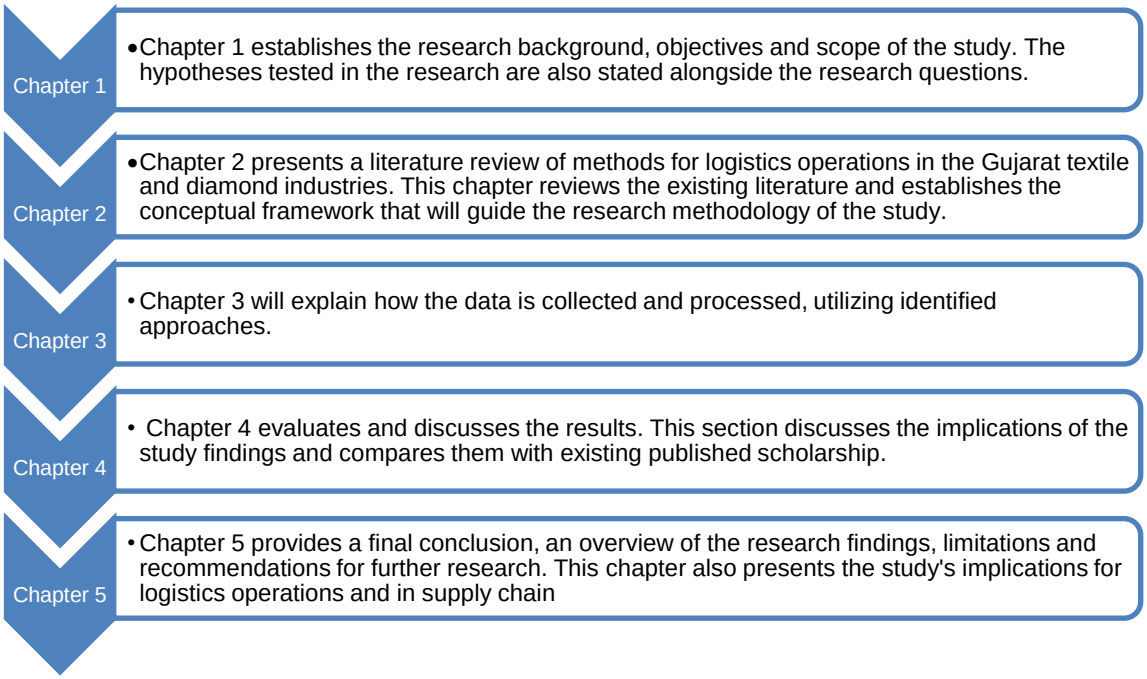

Figure 1 Dissertation Structure

2 Literature review

2.1 Current Logistical Infrastructure.

Gujarat, located on the western coast of India, has a critical role in the textile and diamond business, beating most second by its greatly equipped logistical infrastructure. These sectors have developed infrastructure of such things as transportation networks in the form of individual supply chains, warehouse facilities and combined supply chain systems, to facilitate their operational efficiency and global competitiveness.

Prime associates (2022:1) notes that Gujarat's strategic placement has enabled the development of a very comprehensive transportation network in Gujarat, which ensures an integral link for the network of Gujarat's industrial strength. It has a network with an extensive flow of roads, railways, ports, and airports to help the goods move without any barriers. Significantly, warehouses have emerged as modern warehouses while the state has embraced change in line with evolving logistics needs.

Horizon Industrial Parks (2022:1) states that national and state highways are included in the state's road infrastructure, connecting major industrial centers and enabling rapid movement of raw materials and finished products. Gujarat's rail network caters to its extensive road network and transportation of bulk goods at all times of the day and night as an alternate and efficient mode of transportation. Rail and road networks are integrated to provide flexibility and reliability in the supply chain while serving the diversified demands of the textile.

Horizon Industrial Parks (2022:1) emphasise that Gujarat witnessed the evolution of warehousing from conventional storage spaces to modern, fully equipped, sophisticated warehousing. It has been driven by a need to provide support for the state's booming industrial sectors, especially those in textiles and diamonds. State-of-the-art warehousing solutions are provided by strategically located industrial parks close to Ahmedabad, such as the ones (Gour & Singh, 2023).

These parks are aimed at manufacturing, logistics, and distribution activities, which is the infrastructure that people can work with very efficiently. These parks are convenient to industrial facilities due to their proximity to major transportation corridors.

Patil and Patil (2024:1) note that Surat is a diamond and textile hub, and top-tier warehousing facilities have contributed to supporting these available industries. Companies such as JN Logistics have integrated supply chain solutions, such as custom transportation and storage services, that are in line with the different business demands. Such facilities provide conditions that contribute to sufficient storage of goods and keeping them as optimal as possible to preserve their quality and worth (Patil & Patil, 2024:1).

Ashokbhai (2020:1) states that the connection of the supply chain networks in Gujarat is based on the synergy between the warehouse and the transportation. They are networks that are efficient, reliable, and able to respond to the dynamic requirements of global markets. The state takes various initiatives for the development of its logistics infrastructure, such as Free Trade Warehousing Zones (FTWZs), which were developed in Jamnagar, Magdalla. These zones are supposed to improve logistics infrastructure and facilitate cross-border trade, which will give businesses elbow room in international markets. The cold chain terminals are already integrated into Delhi Mumbai Industrial Corridor (DMIC) as the epitome of Gujarat's commitment towards such industries that can benefit from temperature-controlled logistics. This development is very encouraging, particularly in sectors such as textiles, where the quality of the fabric during transport and storage is critical.

Based on the viewpoint of Dhonde and Patel (2020:1), Gujarat's textile and diamond industries have highly benefited in the area of advanced logistical infrastructure, which has helped them improve their efficiency and competitiveness operationally. With the adoption of circular economy concepts in the textile sector, it has been possible to achieve efficient supply chain management. The use of such concepts within Surat's textile manufacturing

industry resulted in better resource utilisation and less waste. This approach also not only meets the sustainability plan but also provides cost savings and more profitability.

George (2024:01-16) notes that in the diamond industry, which has its hub in cities like Surat, the state has provided all help and logistical advancements to it. High-value items will be securely stored in specialized warehousing facilities, and timely delivery to global markets will be made through an efficient transportation network. It is this infrastructure that supports the industry's reputation as a quality provider of service and, in so doing, helps maintain its standing in the world sphere of competition.

Figure 2 Logistics Sector in India (Sharma, 2022:1)

Based on the above discussion, it has been critically analysed that the modern warehousing facilities, excellent transportation networks, and integrated supply chains built to serve as a support to textile and diamond industries make Gujarat a comprehensive logistical infrastructure that helps ensure adequate operational

efficiency and competitiveness of textile and diamond industries globally. As such, the state's strategic initiatives backed with continuous investments in logistics will sustain and augur well to this growth tempo in the next few years.

2.2 Impact of Logistical Challenges.

Maurya (2023:2428) emphasises that Gujarat is a region that has a strong face in the textile and diamond industries and has a bad experience due to the advent of logistics. Smooth transportation, warehousing, supply chain management, etc., are all dominating factors for the market of these industries at both local and international levels. Despite these, inefficiencies of logistics infrastructure, higher transportation costs, disruption to the supply chain, and regulatory hurdles put a dampener on the operation of these sectors, leading to a dent in their productivity and profitability.

Davis (2024:1) notes that transportation bottlenecks are one of the big logistical challenges in getting the stuff to Gujarat. Though roads, ports and railways have been built in the state, congestion problems are key transit points. Surat, the textile capital of India, experiences severe traffic congestion due to unplanned industrial freight movement. Although its manufacturing units are unreliable, and therefore produce irregularities in the products leading to obstruction of the implementation of just-in-time (JIT) strategies. Moreover, within exports, ports such as Mundra and Kandla, which are critical for exports, are found to have delays due to high cargo volume and the capacity to handle them. These bottlenecks are not only increasing transit time but also increasing fuel costs and operational expenses, negatively impacting the profitability of businesses.

Jaffrelot, C., (2019:211-233) says that the factor that causes higher costs and delayed deliveries in Gujarat’s textile and diamond sectors is warehousing inefficiencies. Having no modern, automated warehousing made storage undifferentiated, resulting in inventory management inefficiency, which leads to storage-related damages, misplaced goods, and longer lead times. For example, unpredictable demand patterns make textile manufacturers too often struggle

with stockpiling, thus threatening cash flow and working capital mismanagement. Lacking proper warehousing infrastructure in the diamond industry, where security and accuracy are of such importance, makes room for theft and mishandling and, thus, financial losses. Further, poor inventory tracking and poor ability of businesses to meet an urgent order combined lead to lost opportunities and thus lost sales.

Wheat *et al.* (2019:5940), a major challenge has arisen from the costs of transportation. Additionally, fuel prices are unstable and becoming increasingly costly for businesses due to high toll charges and the scarcity of skilled drivers. These costs flow through in Gujarat, where the textile and diamond industries rely on a steady flow of raw materials and timely distribution of finished products. The absorption of these costs by a large number of businesses results in higher prices incurred by end consumers. Then these exports from India become less competitive in the global market when it comes to textile and diamond exports. Additionally, there are inefficiencies in freight consolidation and poor coordination among transporters that lead to underutilized cargo space and contribute to the cost.

Based on the viewpoint of Su *et al.* (2023): pp.1026-1036, Other industries, such as textile and diamond, are also susceptible to supply chain disruptions due to global economic uncertainties, natural disasters as well as geopolitical factors. This shows the fragility of supply chains, as factories shut down, labor is in short supply, and trade is closed, resulting in long delays and increased logistics costs due to the COVID-19 pandemic. International trade sanctions on diamonds and difficulty in sourcing raw materials like cotton and synthetic fibers as a result of disruptions in global shipping put a strain on the diamond industry, while textile manufacturers found it challenging to procure raw materials. Additionally, such disruptions impact production schedules both in terms of monetary penalties as well as in vendor relations with the buyers.

Chang et al. (2020) state that logistics operations in such industries become more difficult because of regulatory and compliance issues. Customs procedures are

also quite inflexible, as documentation requirements and trade policies are different between the various regions. Additional attention is paid to the diamond industry, which is carried out in a very strictly regulated environment, with pressure over ethical sourcing and risks of money laundering. Port congestion causes longer transit times and increased storage costs for businesses, further creating financial strain on the businesses. Therefore, the simplification of trade regulations and adoption of digital customs clearance systems would lead to the improvement of logistics efficiency and, thus, the reduction of compliance-related delays.

Based on the above discussion, it has been critically analysed that the logistical problems from Gujarat's textiles and diamonds industries are very important for affecting operational efficiency, cost structures, and delivery of time. Institutional cost, supply chain disruption, transportation bottlenecks, cost increases, and regulatory hurdles create hurdles that are harmful to global competitiveness. Infrastructure development, digitalisation, and reforms of policy can address these issues and strengthen the resilience of these industries for future growth in a more competitive market. Gujarat will become a global leader in the textile and diamond sectors by overcoming the above logistical barriers.

2.3 Role of Technology and Innovation.

According to Textile Insights (2023:1), the textile and diamond industries are amongst the most important sectors of the economy of Gujarat, as well as sources of employment and export. Efficient logistics management and the uptake of digital technologies play a significant role in enhancing operations efficiency and global competitiveness within these sectors. In the context of the textile business, logistics basically enables an organization to work against the worldwide supply systems whilst catering to the needs of the clients. Effective transport not only lowers the cost of transporting goods but also the time within which goods are transported, which is crucial for survival in the market (Abu Sied, 2024: 8).

Similarly, gems and jewelry, especially the diamond business in Gujarat, often referred to as the world capital of diamond cutting and polishing, also depend on sound logistics to deliver delicate products on time (Diavon, 2023:1). Since most of the diamonds that are processed in Gujarat are sold in the global market, efficient supply chain management guarantees the maintainability of quality and timely delivery of the products, further enhancing the quality of the industry.

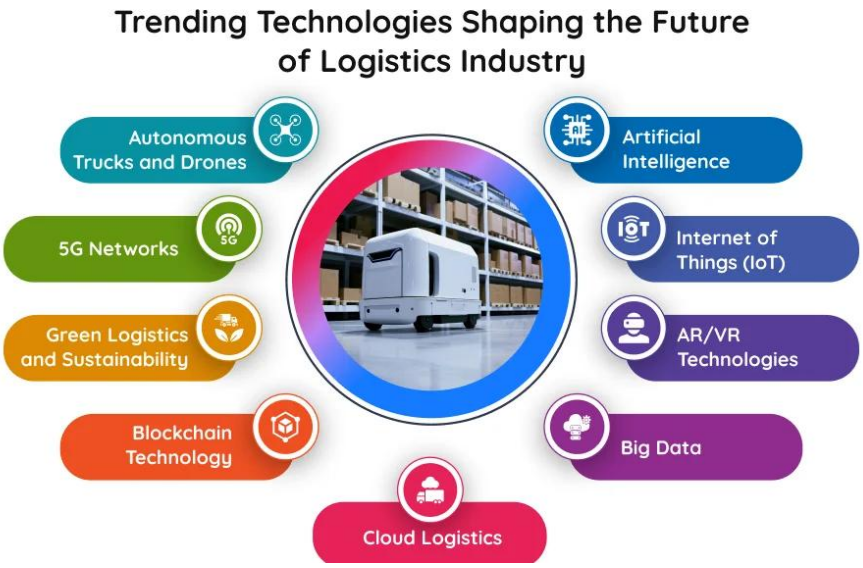

Figure 3 How Technology Is Redefining the Logistics Business Landscape (Patel, 2024:1)

According to Anderson (2025:1), today, digital technology can be considered one of the most influential trends in the sphere of logistics, and it significantly affects management processes. In the textile industry, new technologies like the Internet of Things, artificial intelligence, and big data analytics vastly aid the improvement of logistics. Companies are thus able to track shipments in real-time, and they are in a position to take measures to address various risks that are likely to affect shipments. Predictive analytics gives information about the level of demand that will occur within a given period, thus better stocking the inventory and avoiding cases of either overstocking or having no stock for particular products (Agrawal et al., 2023: 457). In warehouses and distributors, the application of automation technology has stepped up operations and enabled organizations to increase operations while simultaneously increasing efficiency.

From the viewpoint of Wang *et al.* (2022: 2), the diamond industry has also benefited from digital transformation in new approaches to its logistics or manufacturing. Technological development has led to better definitions of cutting and polishing through the use of Artificial intelligence tools, hence improving the quality of what is produced. Through information tracking technology, the flow of diamonds and other merchandise through different levels can be monitored by the involved stakeholders. These points have made Gujarat continue to be a hub for diamond-cutting centers and global competitiveness for intense world competitors.

From the viewpoint of Sparx, (2024), in the use of digital technologies in the logistics sector, some problems exist to date. The fragmentation has resulted in the fact that the costs of the Indian logistic companies were higher compared to the world's average. Logistics costs in India at the moment stand at nearly 14% of its gross domestic product and are much higher than the gross domestic product observed in developed nations, which ranges between 8% and 10%. This is because they show areas of inefficiency due to the absence of a single and integrated supply chain management system. Therefore, for Gujarat, responding to these challenges through specific investment in digitality and policy changes is overdue to enhance logistics operations further (Anderson, 2025).

It has been critically analyzed from the above that logistics, as well as digitalization, play a very crucial part in the improvement of the textile and diamond industries in Gujarat. Even though it gives strategic operational and worldwide benefits of proceeding with IoT, AI, and predictive analysis, it sustains a restricted level of tackling the extendibility of these novelties and contours. The dynamics listed by the analysis are valid, such as high logistics costs and complex supply chain, but fail to explain how these issues can be addressed. Moreover, more emphasis on the positive logistics development concerning Gujarat could be enriched with problems and solutions related to sustainability or inclusion approaches that can be applied in the field of logistics to guarantee long-term stability.

2.4 Opportunities for Improvement in Logistics Management.

The diamond and textile industries of Gujrat are important contributors to the overall state's economy, particularly in terms of employment and exports. However, to increase sustainability and competitiveness, enhancements in logistics management are important. Effective logistics strategies can mitigate supply chain slack, improve sustainability, and reduce operational costs.

According to the report of fibre2fashion, (2024:1), one of the major problems the Gurjat textiles sector faces is the lack of sufficient storage facilities, leading to the high cost of warehouses. Various manufacturers have shifted to Maharashtra because of the best incentives and lower land prices. To resolve this issue, capital subsidies on Eligible Fixed Capital Investment (FCI) for constructing warehouses can be increased to encourage manufacturers to stay in Gujarat. Supply chain efficiency will also benefit from upgrading transportation infrastructure, such as roads, ports, and rail networks, to shorten transit times and costs. Surat is the entry point into the diamond industry, where it acts as a cutting and polishing hub. However, rough and polished diamonds facilitate transportation inefficiency. In the case of high-value shipments, it is possible to transport goods optimally by establishing specialized diamond (and other valuable) transport hubs with high-security logistics centers (fibre2fashion, 2024:1).

Similarly, Adamashvili, Zhizhilashvili, and Tricase (2024: 72), stated that for both industries, it is crucial to leverage technology to enhance logistics efficiency. Introducing digital tracking systems, blockchain for a transparent supply chain, and AI-based predictive analytics can help improve inventory and reduce wastage. Integrating real-time tracking of raw materials and finished goods can also avoid supply chain disruptions for the textiles. Digital platforms for shipping tracking for those diamonds can also reduce dependence on manual processes and leverage the optics of security (Adamashvili, Zhizhilashvili, and Tricase, 2024:72).

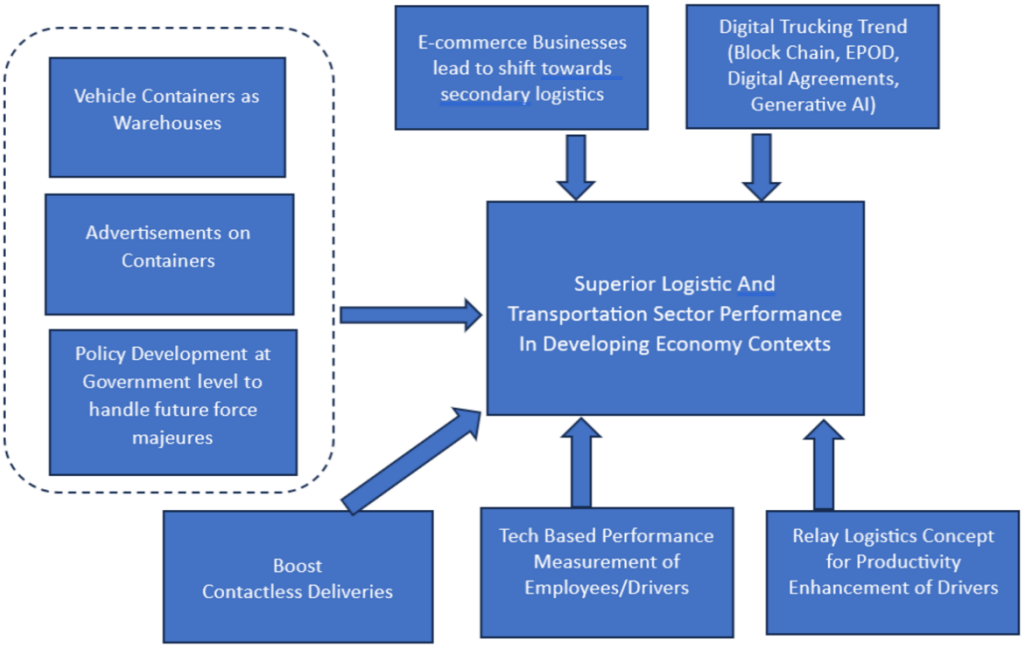

Figure 4 Sustainable Technology Strategies for Transportation and Logistics (Sumbal et al., 2023:15224)

According to Niinimäki et al. (2020:189-200), Efficient transportation in the form of raw materials, semi-finished products, and exports is critical to the textile industry. By developing multi-modal logistics hubs, which combine road, rail, air, and sea transport for optimal costs and reducing lead times, the development of multi-modal logistics hubs would be optimal. Since Gujarat has a good port network, improving rail and road connectivity between production clusters and ports can boost exports. Improving the efficiency of the diamond sector can be achieved by allowing smoother movement of imported diamonds in rough form and exported polished stones through the establishment of express routes and customs clearance hubs. The introduction of fast-track processing for the diamond industry will further enhance competitiveness, as it will reduce the time for bureaucratic delays in customs clearance (Niinimäki et al., 2020: 189-200).

Meanwhile, Reddy et al. (2024:1), said that in spite of the changes made to the textile policy, there is a paltry appreciation for any interest in solar and renewable energy. Such high energy costs have resulted in the relocation of manufacturers to other states. Green logistics like electric vehicle fleets for transportation and renewable energy-powered warehouses can be promoted by Gujarat, developing

a sustainable ecosystem for the textile and diamond industries. There should also be a strong focus on recycling and waste management related to logistics. As textile production is a significant waste producer, an efficient supply chain of waste recycling can minimize environmental effects. Likewise, processes for reducing material waste in the diamond industry and undertaking sustainable polishing techniques can also increase resource efficiency (Patel & Desai, 2012).

However, Ugrinov et al., (2024:72(2)), said that they must extend the focus to the skill development of logistics management with the introduction of the 2024 textile policy that comes with employment generation subsidies. Further capacity building can include training programs with supply chain optimization, warehousing, and digital logistics solutions. It can be done by encouraging partnerships between logistics firms, academic institutions, and industry bodies and building a talent pool that is skilled in meeting the requirements of these industries (Ugrinov et al., 2024: 72(2)).

According to Katal, Dahiya, and Choudhury (2023:1), local manufacturers are confronted with the introduction of Quality Control Orders (QCOs) in the textile industry. QCOs were intended to stem the flow of low-quality importation and they have also caused disruptions in the supply chain. Good queueing of inspection centers at major logistics hubs can lessen downtime and help them develop dedicated quality inspection centers. It can help the diamond sector build trust and efficiency within the supply chain by ensuring secure transportation and standardising quality assessment procedures at important transit points. India's textile and diamond exports are contingent on Gujarat, and these exports can be made less efficient due to logistics inefficiencies. To consolidate shipments, reduce costs, and increase efficiency, specialised export facilitation centers should be set up near production hubs. Further enhancing Gujarat's position in the global markets will be by partnering with international logistics providers to optimize export routes and freight costs (Katal, Dahiya, and Choudhury, 2023:1).

Overall, it has been critically analysed that for the state of Gujarat to continue to be competitive, it is important to improve logistics management among the textile

and diamond industries. Efficient investments in digitalisation, sustainability initiatives, skill development, quality control, and efforts in infrastructure can help the company reduce its costs and maintain long-term growth. Addressing these key logistical challenges will serve Gujarat well in consolidating a leading position in both industries and in crafting a more sustainable and competitive future.

2.5 Conceptual Framework

Figure 5 Conceptual Framework

The conceptual framework delineates the logistics of the infrastructure, transport, and supply chain networks in Gujarat, especially in the textile and diamond industries. It examines crucial logistics issues such as inefficiency and high cost, defines possibilities that can appear with the help of advanced technologies such as AI and IoT, and defines areas of further development to increase sustainability, effectiveness, and competitive advantage on the global level.

2.6 Literature gap

The literature gap from the above has been analyzed, and the logistics of the textile and diamond industries in Gujarat have been explained, explaining their

roles in the state's economy and international market. However, there are still some areas to consider the general concepts of transportation, warehouses, and supply chain management with new technological advancements such as AI and IoT. There is a scarcity of studies addressing the effects of those factors and their relation to efficiencies, costs, and delivery times. Similarly, a general approach to the contribution of innovation to the optimization of the indicated industries is proposed. Still, there is a lack of sectorial strategies for those industries mentioned above. In addition, the literature lacks information regarding the approaches for the improvement of sustainability and competitiveness concerning the management of logistics.

2.7 Chapter Summary

It has been concluded from the above that, logistics services for textile and diamond industries in Gujarat. Concerns about transport, stocks, and supply chains are discussed in the context of assessing operational performance to improve company competitiveness. It also reviews other issues, including cost, cost spiral, and timeframes for each service’s delivery chain in so far as they influence logistics. In addition, it also discusses the use of other such digital technologies such as artificial intelligence, the Internet of Things, and predictive analysis with regard to logistics and issues arising therein. Finally, the chapter provides suggestions, which include the need to incorporate sustainable practices and policies, as well as improving the logistics management systems in Gujarat for it to be more competitive in these industries on the global market.

3 Methodology

3.1 Overview

Research methodology includes a systematic plan and approach to do the research study. On the other hand, it includes the ways that one uses to gather, analyse and interpret data in line with the purpose of the research. The researcher uses a methodology that guides the researcher in choosing the appropriate method of data collection and analysis, maintaining study validity and reliability and a high standard of ethical practice. This is useful because the research is structured in such a way that the objectives are achieved effectively.

By defining a methodology well, the researcher knows what is valid to do and what to avoid. It remains focused, makes educated guesses, and knows that results will be meaningful and repeatable. For this study, the research methodology includes all forms of qualitative studies, such as interviews, to gather industry stakeholder points of view. The researcher can use a systematic methodology and, through it, effectively investigate logistics practices and challenges in the industry of Gujarat's textile and diamond industries (Ocaña-Fernández, & Fuster-Guillén, 2021). The research onion is a metaphorical model developed to describe researchers' decisions when designing their study in this or that layer. Informational included are stages including philosophy, approach, strategy, time horizon and data collection approach. In this study, the research onion helps structure the research approach to get a consistent methodological application by proposing the choice of qualitative methods, interview development and data analysis (García-Lázaro, & Reyes-de-Cózar, 2025).

3.2 Research Philosophy

Research methodology includes three types of philosophy such as interpretivism, positivism and realism (Alharahsheh, & Pius, 2020).

The interpretivism philosophy is adopted for the topic corresponding to Logistics in Gujarat: A Study of the Textile and Diamond Industry. Stakeholders in the logistics sector, namely manufacturers, transporters and distributors, have complex interactions in industrial sectors such as textiles and diamonds. Interpretivism is also critical to understanding these interactions, as they are dependent on subjective experiences and perceptions coupled with social contexts (Mustofa, 2023). The interpretivism model is different from positivism, which focuses on measuring only the facets provided by the definitions of objective measurements. The use of qualitative methods like interviews and observation allows the study to grasp the lived experiences, challenges as well as the choice faced by those involved in logistics. This approach is very important in understanding how human factors are factors that influence logistics practices, such as trust, relational, and local market dynamics, unlike using statistics to understand.

It allows researchers to understand people who influence a logistics operation in terms of their socio-economic factors, cultural forces, and commercial conduct. With this philosophy, the study is able to offer a more contextualized knowledge about logistics practices, adding significant contributions to industry stakeholders and policymakers (Adil, Khan, and Ahmad, 2024).

3.3 Research Approach

There are three types of approaches: Inductive, deductive, and abductive. The second method is the Inductive approach, which means that it develops theories from particular considerations, from the specific to the general Mohajan, 2018). The researcher chooses the inductive approach due to interviews as its primary data collection method. The inductive approach facilitates the research by establishing a theoretical framework for the study since the case aims to study logistics practices without the established theoretical framework.

The data produced by the study comes from interviews with industry stakeholders, which can be used for the identification of emerging themes and patterns in the data. In this context, the inductive approach is necessary for the

development of the theory on real world basis. The study can achieve this by giving some of the context-specific factors that forces, such as logistical challenges, operational strategy, and industry-specific practice, are not accurately described in the existing theory (McGowan, Powell, and French, 2020). Additionally, logistics in Gujarat textile and diamond industries are dynamic and dependent on the location, which requires a ground-up insight building. The inductive approach gives the research of the subjective experience of logistics operators transporters and business owners a deeper understanding of the sector. The reality of the industry is respected by this bottom-up method because the findings will not be molded to fit the pre-existing models; they are in accordance with the industry and the market. Therefore, the inductive approach is fundamental for this study since it enables the investigation of new ideas and produces industry-specific knowledge in order to provide a sense of the better and more genuine meaning of logistics in Gujarat (McGowan, Powell, and French, 2020).

3.4 Research design

There are three types of research design such as exploratory, experimental, and descriptive. The descriptive research design consists of observing and describing such things as characteristics, behaviors, and even phenomena. It can be descriptive or quantitative (Doyle et al., 2020). The research selected a *descriptive design* to provide detailed characteristics and practices of the logistics sector. Because logistics operations, challenges, and experiences are in-depth topics to be explored, matching this design guarantees that only through interviews can this research be achieved. The descriptive approach is important because it will allow the researcher to identify and represent the current logistics practices in Gujarat's textile and diamond industries. The study uses interviews to obtain firsthand accounts from industry participants, which make for rich qualitative data. The descriptive design shows the operational process, how transportation is done, and how these industries are distributed. The objective behind the descriptive design is to paint the current logistics picture, which makes it a perfect choice for discussing industry-specific matters (Taherdoost, 2022). For this study, the research design must be descriptive in nature as it helps to

give a systematic presentation of these qualitative insights to achieve a holistic understanding of logistics practices, challenges and sector-specific dynamics (Ghanad, 2023).

3.5 Research Strategy

For this research strategy, a single participant, based on the qualitative, *face-to-face interview* with a set of 10 questions for a structured interview. The logic of this approach would be to gather first-hand insights into how logistics is practised in Gujarat's textile and diamond industries. Through a one-on-one interview, the researcher can delve into the participant's accurate experiences, opinions, and knowledge deeply and have them at the same time (Dursun, 2023). Using these structured questions helps to make it consistent and similar, allowing the researcher to go over the particular parts of logistics such as operational difficulties, delivery methods, supply chain control, and there are some unique issues that are thrown into the industry. It is also the face-to-face that enables this interaction with the participant, clarification of the responses that the participant gives, as well as the observation of the nonverbal cues that the participant gives that give additional context to the participant's answer (Dursun, 2023). Finally, the detailed responses from the face-to-face interview would have added enough to the knowledge we have about logistics operations from the sectors of textiles and diamonds in Gujarat, giving us valuable qualitative data that we can use in our research analysis.

3.6 Sampling Method

There are two type of sampling method such as probability sampling and non-probability sampling. The study used *non-probabilistic sampling* because it is qualitative and based on a single face-to-face interview. Since the study attempts to obtain deeply insightful information from one specific industry participant, non-probabilistic sampling is the most appropriate sampling method. This gives the researcher an opportunity to select a person of direct experience and expertise in the logistics of the textile and diamond industries, which then makes the data very relevant and insightful (Howarth et al., 2024). Since the study is aimed at

obtaining industry-specific knowledge and not generalisable findings, the non-random selection of the participants is required. The researcher can choose an interviewee with first-hand experience to interview in an attempt to obtain an in-depth perspective on logistical practices, operational challenges, and industry dynamics (Jouaville, Paul, and Almas, 2021). That is why using non-probabilistic sampling is crucial, as it allows the researcher to get meaningful experience-based insights from a knowledgeable industry stakeholder to form a rich and context-rich understanding of the logistics practice (Sartori, 2024).

3.7 Research method

There are two types of research methods such as qualitative and quantitative. (Mohajan, 2018). The researcher uses a qualitative method since it is best fitted to obtaining detailed and experience-based information from the participants. In order to conduct research based on a *qualitative approach* and thus to examine the respondents' own experiences, understandings, and problems with regard to logistics practices holistically, this research is based on the face-to-face interview. This method is needed to collect rich, descriptive data that reflects the complexities and nuances of logistics in Gujarat’s textile and diamond industries.

The qualitative method is enabled with open-ended responses, which enable the participant generally to furnish detailed information, discuss some points in detail and give real-life examples. Such depth of insight is necessary for comprehending all that is involved in understanding logistics operations as being a product of industry-specific strategies, transportation practice and supply chain challenges on the one hand and subjectively on the other (Phillips, Tichavakunda, and Sedaghat, 2024). Hence, the qualitative method is necessary, as it gives the researcher the opportunity to draw a picture of what is actually occurring in the scenarios mentioned, to generate detailed and context-rich insights, and to add to the overall understanding of logistics practice with knowledge that might not be revealed by analysis of the quantitative data alone (Basias, and Pollalis, 2018).

3.8 Data collection

There are two types of data collection methods such as primary and secondary. The researcher chose to use the *primary data collection method* in the context of the study because it adopted 1 face-to-face interview with only one participant using ten semi-structured questions. This is necessary as it enables research through firsthand and first-hand gained based on the experience of an individual who is actively involved in the logistics sector. Research captures the real-world, real-time current information about the participant's unique perspectives and their industry experience by collecting the primary data (Mazhar et al., 2021). Semi-structured questions are used so the researcher can explore a predetermined topic but leave gaps in questions to give the participant to elaborate on relevant issues. It is crucial to this adaptability in order to document logistics practices, obstacles, and strategies in detail and with nuance. Primary data, on the other hand, is different from secondary data, which could give you generalized or outdated information about the textile or diamond industries of Gujarat.

Furthermore, the use of the face-to-face interview format raises the degree of accuracy in data as the researcher can seek clarifications, notice the nonverbal cues, and learn the deeper meaning of the respondents' responses. Primary data collection is an essential part of this study because it directly gives such specific and unique views related to the research aims. This allows the researcher to acquire industry-specific knowledge and help achieve a specific and dependable listing of logistics practices in Gujarat (Newman & Gough, 2020).

3.9 Data analysis

There are three types of data analysis such as content, thematic content and descriptive statistical analysis. Thematic content analysis is a specific content analysis that identifies, analyses and reports patterns (themes) in qualitative data. This makes it possible for researchers to study how the themes arise from the data (Kim, & So, 2022). The study employs *thematic content analysis* as the data gathered by means of the interview with one participant is qualitative, which fits best to the purpose of analysis. This technique is necessary because it permits

the researcher to systematize and analyze what turns up during the participant's answers to the semi-structured questions. In cases where knowledge of the meaning and the context of data is vital, thematic content analysis is especially useful because it creates an opportunity for intense investigation of the data participant's experience and their understanding (Mody *et al*., 2021).

As the research involves only one interview, the thematic content analysis allows the researcher to divide the detailed qualitative data into manageable and meaningful themes, to have a coherent structure of the findings. Once responses are categorized, the researcher can bring out the essential elements of logistics practices, problems, and solutions in Gujarat's textile and diamond industries. This preserves the grounded nature of the study by staying with the participant's own experiences and views, providing us with rich and contextual insights. In addition, thematic content analysis is flexible, which enables the search for new themes that may not have been foreseen at the beginning of the research (Snyder, 2019).

3.10 Ethical consideration

While conducting research, there are a number of ethical issues to be taken care of so that the research is carried out responsibly and gracefully with participants. First among these is informed consent. Participants should recognize the nature of the study, its objectives, and use of their data. It guarantees that the people will agree to participate on a voluntary basis without deception.

There must also be confidentiality and anonymity. This should protect the personal information or other characteristics about the participants and anonymize any such information collected unless participant consent is given to disclose identity. This protects the privacy of our person and prevents harm from disclosure of our personal or sensitive data.

In addition, participant autonomy should be respected. Anyone taking part in the study should be allowed to withdraw at any time without any negative side effects. This serves to be voluntary, and it imparts an assurance to individuals that they

would not be compelled to give data that they aren't okay sharing. There are a few issues involving ethical concerns, from avoidance of harm to lastly. The interview process should not result in psychological, emotional, or physical distress for participants. By abiding by ethical principles like informed consent, confidentiality, autonomy, and minimum harm, the research can be conducted in a manner that informs and respects the participants involved.

4 Findings

4.1 Introduction

The objective of this chapter is to present the findings obtained through thematic analysis of a qualitative interview with a logistics manager working in Gujarat's textile and diamond industries. The use of thematic analysis as the best method to analysis the data of interview, because it provides systematic ways to identify, examine and interpret patterns (theme) in the participant's response. Through careful coding of the transcript the themes that arose are reflective of the lived experiences and operational realities of Gujarat's logistics landscape. The interview then resulted in these themes being categorized and refined so the most important and recurring issues discussed by the interview were captured (Mariwala, 2021). Finally, the final themes closely match the research objects and are established in regards to the structure of the literature review. Particularly, they discuss the existing logistical infrastructure, problems encountered, technology pioneered, and how it can be optimized. For this, thematic structure allows a fairly direct comparison of primary insights to second research, deepening and increasing the value and relevance of the findings.

4.2 Findings and analysis

4.2.1 Theme 1: Current Logistical Infrastructure

The first major theme that was observed out of the interview was the pre-existing logistical infrastructure catering to the textile and diamond industries of Gujarat. The participant brought to light that by virtue of its existing logistics system — a conglomerate transportation system of ports, roads, railways, and airports — Gujarat has become the central point. The interviewee says that "With its 1,600 kilometres coastline, Gujarat provides a large network of ports, 42 of which help the import and export operation go smoothly." This line of thinking backs the findings in literature like Prime associates (2022) that emphasises about strategic location and immense transport connectivity as the key factor in the strength of Gujarat's industry.

Further the participant elaborated the role of the road and rail network explaining that industrial cities such as Surat, Ahmedabad and Rajkot are well connected and goods get transported in time. This is in accordance with Horizon Industrial Parks (2022) that Gujarat's infrastructure facilitates smooth flow of raw material and finished products along the production and distribution points. Key to this was to integrate rail and road systems.

One of the important logistical infrastructures of Gujarat is its warehousing capacity. Speaking about Gujarat's role in India's industrial framework, the interviewee remarked that "the modern warehousing infrastructure coupled with the industrial parks has added value to the state's future." Infrastructure design in line with current business needs has migrated from conventional warehouses to sophisticated, strategically located warehouses that are close to the key industrial zones. The work of Patil and Patil (2024) also observes the formation of integrated warehousing and supply chain solutions like the case of Surat.

Besides air connectivity, the diamond industry also stressed the need for it. This has helped fast track the transfer of bulky high value goods such as diamonds and it has done via international markets so that the goods can be quickly and securely transported. George (2024) backs this up by stating that air freight and secure warehousing for diamonds are part of specialized logistics arrangements that make the diamond sector in Gujarat globally competitive.

4.2.2 Theme 2: Logistical Challenges and Their Impacts

Secondly, the logistical challenges present impede the simplicity of operation in the textile and diamond industries of Gujarat. The region relies on a large logistical base, but the interview highlighted some challenges in transportation, warehousing, and supply chain stability (George, 2024). The participant also stressed the issue of road congestion and railway delays, which were one of the most broached issues. In fact, as he explained, delays from road congestion and lumpen railway schedules have a major impact on delivery timelines for time-critical or perishable textile products. This is consistent with the literature,

especially Davis (2024), who noted that industrial freight congestion in cities like Surat leads to delays in shipment and inefficient movement of freight.

The interviewee also brings up the storage related issues by stating that “Although modern warehouses are available, inventory storage costs and space for storage are not feasible for storing efficiently.” This is in consistent with Jaffrelot (2019) who mentioned that warehouse inefficiencies such as poor automation and high operational cost makes lead times long, and increases inventory mismanagement. These inefficiencies pose barriers to efficiently meeting orders within a short time frame and healthy cash flows in textile industries in which demand changes rapidly.

Another major challenge was supply chain disruptions. According to the participant, sourcing raw materials can be unpredictable, resulting in production delays and additional operational costs. Such findings concur well with Su et al. (2023), who endeavored to expound on the fragility of global supply chains to external shocks, in particular economic uncertainty and geopolitical shocks that were unmistakable during the COVID-19 pandemic.

In the diamond sector with turbulence in demand from international, shipping schedules have been acutely affected. Not only this, it makes it difficult to plan for logistics, but it also can jeopardize long-term client relationships. Ultimately, it would have to agree, however, that delays in international shipments can ruin client relationships and hurt business reputation, said the interviewee. This is supported in the literature and Maurya (2023) mentions reputational risks as a major concern facing exporters in Gujarat’s high-value goods industries.

4.2.3 Theme 3: Role of Technology and Innovation

The third key theme deriving from the interview was the use of increased technology and innovation, which is influencing the operations in the textiles and diamonds industries in Gujarat (Bhatt et al., 2019). The technology interviewee attested that advancements in technology have become essential in maintaining efficiency, reducing costs, and ensuring transparency in the supply chain.

Among the principal of the main technologies discussed was real-time shipment tracking, employed with GPS and RFID systems. “GPS tracking and RFID systems aid in real time shipment monitoring, preventing loss and reducing the time delays.” said the participant. This echoes that of Anderson (2025), who noted that while the Internet of Things (IoT) and tracking technologies have proven so useful in terms of increasing visibility and responsiveness in logistics.

Another area of innovation is automation within warehouses. “Automation in warehouses mitigates some human errors on inventory management”, says the interviewee. Agrawal et al. (2023) noted that predictive analytics and automated resource management can be used to manage inventory control and meet the changing market need. Such technologies in the adoption in Gujarat’s textile industry help in decreasing excess inventory costs and increasing the quick turnaround.

Technological upgrades are also occurring in the diamond industry, one that trades in such high-value items. It was observed that AI based demand forecasting tools are used for supply chain planning to optimize the demand. They assist in anticipating market demand, scheduling of production and reducing process waste. This indeed matches Wang et al. (2022), indicating that AI tools are transforming logistics as they are enablers of smarter forecasting and pro-make decisions.

During the interview the use of blockchain technology to enhance the transparency and traceability in the diamond industry was a significant innovation that was mentioned. 'Larger-sized companies will adopt blockchain technology in order to track the origins of raw material and to verify it is from an ethical source,' the participant said. This also supports the literature from Chang et al. (2020) who identify blockchain’s contribution to how trust can be preserved in instances where strict ethical compliance is necessary, for example in diamond industries.

4.2.4 Theme 4: Opportunities for Improvement

The last theme is found in the interview, through which the opportunities to develop logistics efficiency and sustainability in Gujarat's textile and diamond industries are identified. Although the participant acknowledged the state's powerful infrastructure and technological progress, he underlined certain strategic areas aiming to further reinforce the competitive power (Sandesh, 2023).

Improving road infrastructure and expansion of railways were considered a key recommendation. "Gujarat, which needs to improve efficiency, requires better road infrastructure and expanded railway networks to reduce congestion and reduce delivery time was the found in the interviewee," said the interviewee. As literature from fibre2fashion (2024) states, the high costs of transportation and insufficient storage have led some manufacturers to consider relocating their operations outside of Gujarat. If there are bottlenecks to addressing these issues with infrastructure upgrades, these industries can be retained and the operational delays can be reduced.

Furthermore, the participant also stressed the necessity of sustainability of logistics operations, indicating the investments in ecologically friendly transportation like electric trucks and ecological use packaging. Reddy et al. (2024) propose transitioning to green logistics by means of electric vehicle fleets and warehouses powered by renewable sources, all of which align well. The act of reducing environmental impacts also brings in environmentally conscious foreign partners.

The interviewee, however, suggested that government incentives will be required to encourage AI and automation in the logistics industry to increase technological integration. According to him, such initiatives could lead to productivity and innovation in the sector. For instance, Adamashvili et al. (2024) back this up by mentioning how AI-based predictive analytics and blockchain can help to reduce

wastage and ensure transparency in a chain as complex as textiles and diamonds.

4.3 Chapter summary

This chapter is based on a thematic analysis of an interview with the logistics manager from the Gujarat, who deals with the textile and diamond industries. It identifies four key themes. However, the findings uncovered that Gujarat is hampered by issues pertaining to road congestion, high storage costs and supply chain disruption against very strong multimodal transport systems, modern warehousing and international connectivity. One of the things this interview brought out was how these advanced technologies like the GPS tracking, RFID, AI forecasting, ERP and blockchain are being used to make logistics more efficient as for the purpose of transparency. Though lack of infrastructure expansion, sustainability practices and complete scale digitalization remain. Practical call for improvement is drawn from the participant's recommendations, such as better transport infrastructure, government incentives for tech adoption and forming of collaborative logistics networks.

5 Analysis

5.1 Theme 1: Current Logistical Infrastructure

Gujarat's wholesale and retail trade in logistics comes with a large and good road network, which includes National as well as State Highways. Such roads link major industrial centres, like Ahmedabad and Surat, to the major ports of Mundra and Kandla to enable smooth movement of both domestic and international cargo. Due to its importance in reducing transport time and reliability of the logistics chain, Prime associates (2022) says Gujarat's road network has been highly important. In support of this is a strong railway system, which provides bulk products with a cost-effective and alternative mode of transportation. This way of multimodal integration of road transport and rail allows supplying both textile and diamond businesses with increased freedom in the supply chain, according to Horizon Industrial Parks (2022).

Even the state's warehousing capabilities have been greatly improved. With the influx of large warehouses featuring sophisticated inventory management systems, temperature-controlled environments, etc., traditional storage facilities have been superseded by other competitors. In particular, these are vital to ensure the preservation of the quality of textiles or the protection of high-value diamonds. Several of these warehouses are housed in industrial parks near Ahmedabad and Surat, where these three logistics support services are all taken care of under one roof. For instance, Patil and Patil (2024) also point out that companies such as JN Logistics have developed specialized hubs in integrated supply chains aimed at serving the textiles and diamond industries, making it easier for them from transportation to storage and various logistic processes.

Finally, these findings are validated from the participants' perspectives within the industry community.

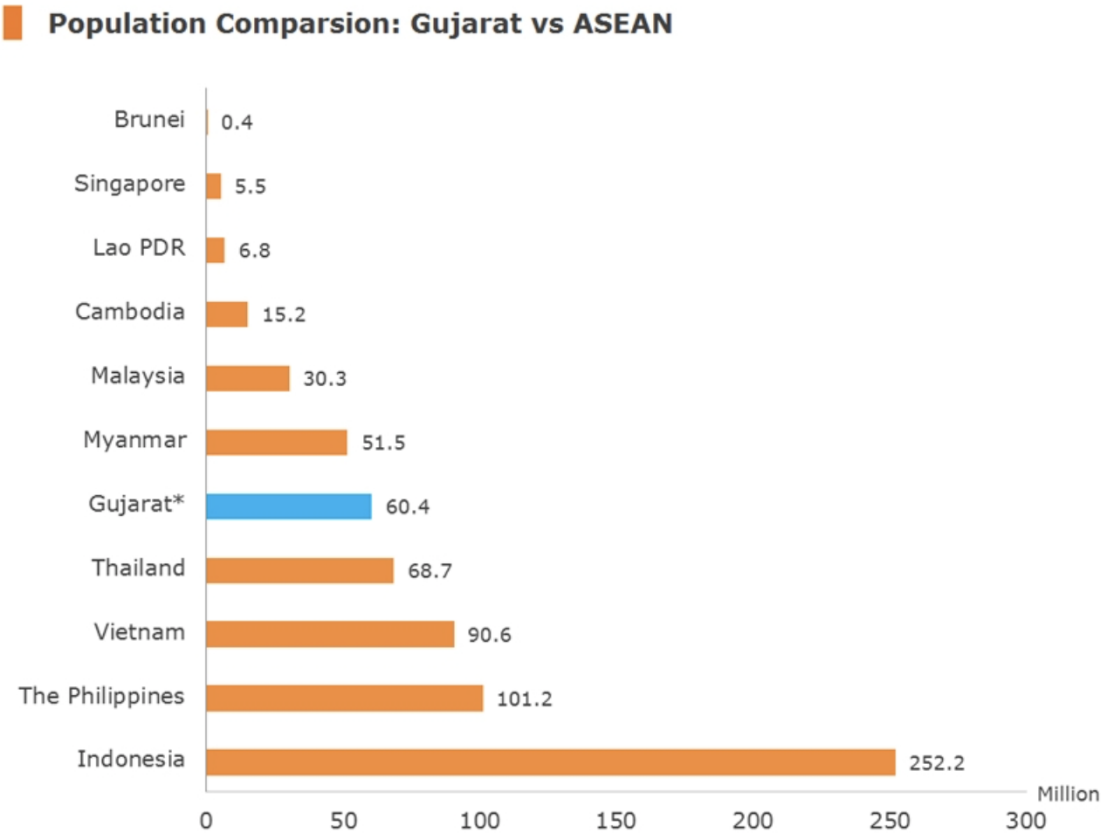

Figure 6 Production of Gujrat compare to other countries (HKTDC, 2025:1)

As per above Fig.6 with a population of over 60 million, Gujarat makes up half of Maharashtra's total population and only 5% of India's. If Gujarat were considered a nation, its population would be comparable to that of Thailand, ranking higher than nations like Myanmar, Malaysia, and Cambodia but lower than competitors with alternative manufacturing bases like Indonesia, the Philippines, and Vietnam in ASEAN. Gujarat has an excellent supply of youthful industrial workers since over half of its population is between the ages of 15 and 40.

Manufacturing units located alongside the major roads are made readily accessible, and their logistics are greatly enhanced, which is one reason why Gujarat's road network is, for the most part, elevated," A Logistics manager interviewed said during the study. Proximity to highways and industrial clusters was reported to have aided warehouse operators in meeting their JIT inventory demands easily. Furthermore, they complemented modern warehousing systems' contribution in reducing inventory loss, improved storage space

utilization, and high-quality product storage. On the other hand, cutting-edge logistics facilities are provided to urban centres Such as Surat, whereas usage of old infrastructure and manual handling processes continue in semi-urban and rural areas.

The regions of Jamnagar and Magdalla also have Free Trade Warehousing Zones (FTWZs) which further enhanced the capabilities of Gujarat's logistics. The customs-related incentives, streamlined regulatory procedures, and storage facilities suited for the international market are offered by these international zones for trading globally. The positioning of cold chain terminals in such FTWZs (footnote:40) reflects Gujarat's continued efforts in creating the same high-value, According to (Ashokbhai, 2020), temperature-sensitive movements, which are critical for sectors such as textiles, wherein fabric preservation is a must.

5.2 Theme 2: Impact of Logistical Challenges

Transportation congestion is one of the most critical challenges defined based on both literature and participant feedback. Underregualted freight movement and poorly planned transport routes make Surat a major hub of textile production, a very congested place with high road traffic. According to Davis (2024), it causes frequent delays for inbound raw materials as well as outbound shipments, which in turn causes production schedule and delivery commitment delays. Results show that participants confirm that this irregularity is a barrier to the effectiveness of what other textile manufacturers use to reduce holding costs and improve responsiveness, just-in-time (JIT) inventory systems.

Port delays worsen this. Exporting of textiles and diamonds is a core part of Gujarat’s ports, Mundra and Kandla, in particular. Nevertheless, the large cargo works may exceed capacity for handling, resulting in backlogs and longer turnarounds. Delaying any one of the processes mentioned above, as discussed by Maurya (2023), directly leads to higher fuel consumption, demurrage charges, as well as missed export deadlines, all of which are directly linked to the profitability of the firm. However, several logistics managers said they got shipment backlogs during peak seasons such as during the festives when there

were shipment problems and explosions that caused issues to shipment relationships and payment of additional penalties.

Efficiencies like warehousing are also still an issue of concern. Modern facilities exist in urban centres, and small towns and outskirts have less advanced storage systems. Jaffrelot (2019) also mentioned that outdated and manually operated warehouses are problematic because they suffer from poor inventory management, misplaced goods, long lead times, etc. In the diamond industry, warehousing that is either too adequate or too inadequate can result in product damage, theft and financial loss. Many warehouse operators admitted that tracking systems among cubicles resulted in shipment delays and customer complaints when stock was mismanaged due to no proper system of tracking.

The second challenge is the high and fluctuating cost of transportation. As discussed in Wheat et al. (2019), rising fuel prices, toll charges and driver shortages tend to increase logistics expenses. This is a problem, especially for Gujarat's industrious export-dependent industries that depend on timely delivery and cost efficiency to stay competitive. These costs may be passed on by the participants to the end consumer, who finds Gujarat's exports less attractive in the international markets, according to the participants. Logistics is also affected by global uncertainties and regulatory hurdles.

Aspect	Details
Technological Advancements	The International Institute of Diamond Grading and Research (IIDGR) in Surat, owned by De Beers, operates a state-of-the-art facility spread over 27,000 sq ft. Established in 2014 with a $16 million investment, it employs 94 gemologists and utilizes advanced technologies like AMS-2, capable of processing up to 3,600 stones per hour (The Economic Times, 2017).
Labor Force	The diamond industry in Surat employs approximately 1 million people. However, there is a notable gender disparity,

	with women comprising only about 10% of the workforce in certain facilities, reflecting broader societal norms.
Economic Challenges	The industry has faced multiple challenges, including fluctuations in excise rates, demonetization, the introduction of GST, and currency exchange variations. These factors have contributed to a slowdown, prompting some workers to transition to other sectors like textiles.
Market Dynamics	Surat's diamond market has experienced periods of inactivity, with reports indicating deserted trading areas and a shift of younger individuals towards the textile industry (The Economic Times, 2017).
Global Positioning	Despite domestic challenges, Surat continues to play a crucial role in the global diamond supply chain, cutting and finishing a significant portion of the world's polished diamonds.

Table 1 Key Aspects of Surat's Diamond Industry: Technological Advancements, Labour Dynamics, Economic Challenges, and Global Role (The Economic Times, 2017)

5.3 Theme 3: Role of Technology and Innovation

In the evolving landscape of logistics, technology and innovation have become central to driving efficiency, enhancing transparency, and improving global competitiveness. For industries in Gujarat that are involved in the production and trade of textiles, as well as diamonds, the use of analytic and digital tools in operations is creating significant changes in the flow of operations from one channel to the other. Data and information collected from field surveys and interviews inform a tentative view that large-scale manufacturers and logistics companies in Ahmedabad and Surat are gradually shifting toward adopting more technology integration into supply chain operations. Again, real-time tracking of goods through the Internet of Things is now common as the flow of the goods from raw material to the finished products passes through the warehouse to the customers or even the final export destination. Such real-time visibility is

especially necessary for businesses such as textiles that require high standards of quality and prompt delivery. According to Abu Sied (2024), various smart systems on transportation and inventory have made it possible for businesses to cut frequencies in transport, resulting in low transportation costs.

One industry that has benefited from this is the textile industry. Systems that employ data from the past as well as data from the present have now been applied to demand forecasting, inventory control and route optimization in order to minimize wastage and shorten delivery time. Agrawal et al. (2023) explain that predictive analytics in inventory management means a more flexible supply chain for textile firms can be prepared to change their scale due to market fluctuation. This proved that with such systems in monetary handling, businesses have been able to avoid problems such as stock-outs and overstocking, hence increasing the efficiency of the resources.

In the diamond industry, there are cases of applying blockchain to track the product and control the transportation. Due to the high value and the sensitive nature of diamonds, there is a need to have a system that will enable stakeholders in the marketing of the diamonds to ensure that each diamond has undergone a certain operational cycle before it is sold to the customer. As for proofs, Wang et al. (2022) and Diavon (2023) prove that through the use of blockchain, trust and security in logistics have been enhanced, allowing Gujarat to maintain a status of being the world's leading hub in diamond cutting and polishing. According to the participant in the study, digital tracking for high-value consignments became efficient in terms of reducing theft or loss of products and time taken in customs procedures and insurance claims.

Several shortcomings and drawbacks should be highlighted. As will be seen, one of the key discussion points highlighted by the participants is the issue of technology disparity within the logistics platform. While access to such tools by large firms may be within their reach due to their ability to invest in technology, SMEs face high costs as well as technical barriers to implementing the tools. The discussion of Sparx (2024), defined India's logistics sector is still highly

segregated, and it leads to the increase, which still makes logistics cost share equal to 13.9 % of the gross domestic product of the country more than the world level. Some of the field interviews highlighted the fact that the majority of SMEs continue to use obsolete methods of inventory tracking, which hinders them from expanding their businesses or even competing internationally.

However, the level of digitalization in Gujarat still requires better connectionists across all entities from the manufacturing links. Presently, various data systems are isolated and integrated systems are not compatible, thereby not being able to share information concerning the movements of products. According to Anderson (2025), to achieve a corrected and efficient supply chain, there is a need to develop a common supply chain platform to facilitate transparency in dealing with the suppliers, transporters, and warehouse operators. Participants endorsed the opinion that integrated systems lead to excessive paperwork and poor response time in the supply chain.

5.4 Theme 4: Opportunities for Improvement in Logistics Management

While an advanced logistics framework supports Gujarat's textile and diamond industries, multiple areas still present substantial opportunities for improvement. These are some of the changes needed to put Gujarat on the higher pedestal of global competitiveness and sustainability. On the ways to improve Industry 4.0 for the industry's future, infrastructure, logistics management policy and support, skill development, inclusive of digital integration, and environmental sustainability in some necessary elements to the modern and sustainable industry development. The failure in the infrastructure development domain is one of the most evident problems that can be traced in both participants' interviews and secondary sources. Whereas places like Ahmedabad and Surat have executive ware houses and concrete developments besides having good road and rail networks, most semi-urban and rural markets largely lack such necessities. As analysed by Fibre2Fashion (2024), this has led to the relocation of many textile manufacturers to other states, such as Maharashtra, where the incentives are favorable, and the cost of land is cheaper. Several respondents argued that

except for the issue of the high cost of land and a lack of adequate warehouse space, primarily in areas outside industrial areas, small-scale manufacturers are unable to expand their operations immensely. In eliminating this, the government should consider addressing these maladies as follows; Increasing capital subsidies on FCI for the development of warehouses; Ensure fair distribution of infrastructure investment across the regions.

Another of the key points of relevance is the enhancement of the services concerning transport infrastructures and means. There are still multifaceted delivery challenges in Gujarat that include but are not limited to traffic congestion, poor road infrastructure, and the absence of proper integration of road, rail, and even public transport. Thus, discussion to Niinimäki et al. (2020), there is a need to have equipment that would enable transport through modes of transport such as road, rail, sea, and air to establish a central hub; this would enable a reduction of cost and the time taken for transits. Indeed, given that Gujarat has a coastline and a large network of ports, such a strategy would be advantageous. This will enhance exports from the supply clusters to the ports. Adopting new links linking production clusters to the ports will ease the exports, particularly for sensitive products such as textiles and diamonds. According to the respondents, one of the ways through which time was being wasted by players in the corresponding supply chain segment was in traffic: it was proposed that establishing smart traffic controls and digital freight booking outlets could help in cutting time wastage here and improving the overall efficiency of goods circulation.

Transport is also important for the diamond industry since such shipments have a high value and need to be protected during the process of passing through customs. Delays due to manual inspections and limited customs infrastructure increase risk and cost. In this regard, there is a need to open up express routes and dedicated clearance channels to facilitate fast-track processing of the commodities that are considered to have high value. Catal, Dahiya, and Choudhury (2023) recommend that a centre maybe be established at the principal logistics hub node of this country to accredit quality check-ups and certification so that there may be some level of standardization and regional

downtime may be kept at the lowest level; and confidence in such goods imported from this country may be promoted among international buyers. The above findings were supported by the interview with the exporters, who argued that such reforms could help reduce the bureaucratic process and take less time to complete the order.

Sustainability is another dimension that can be considered to have great potential for further development. At present, the textile transport in Gujarat is a large consumer of fossil fuel resources, causing pollution and is very costly for logistics movement. From the discussion of Reddy et al. (2024) and Patel and Desai (2012), there is a need for a shift from the use of fossil fuels. Namely, the following measures have been identified: the installation of solar panels to power warehouses, the utilization of electric delivery vehicles, and the energy-saving construction of buildings. Some of the observations made by the participants included poor incentives or awareness for encouraging green logistics practices. By applying the carbon tax exemptions for a sustainable business and enhancing the pollution control norms, the industries may be forced to adopt sustainable materials. In the textile industry, manufacturing incurs huge wastage; so developing an efficient waste recycling supply chain would encourage the circular economy approach and minimize landfill use. Likewise, in the diamond industry, on promotes better ways to polish and cut the diamond without wasting much of the stone.

Overall, Gujarat is one of the top three states that account for over half of the nation's exports. Gujarat was exporting about 4.5 Lakh crore a year until 2021. But in the most recent fiscal year, 2021–2022, Gujarat exports reached 5.16 lakh crore in the first half of the year (April–October 21), an almost 118% rise over the same time the year before. According to recent sources, Gujarat's exports doubled by the end of the fiscal year, reaching 8.37 lakh crores until February 2022 (Surat diamond bourse, 2022). This number is currently regarded as a standard. Petroleum, diamonds, ceramics, cotton yarn, vegetable fats, textiles, oil seeds, equipment, engineering goods, and brass components are Gujarat's top exports. Since Gujarat is a manufacturing powerhouse and the world market

opened up after the epidemic, the state was able to produce and export at the greatest levels conceivable (Surat diamond bourse, 2022).

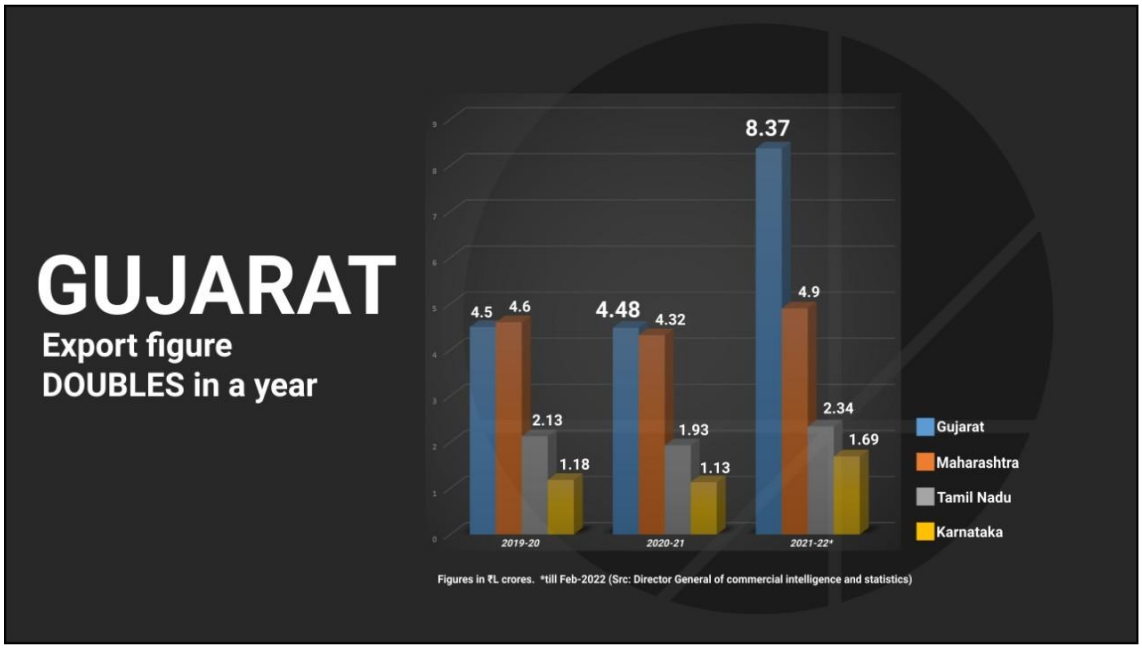

Figure 7 Gujarat export figure (Surat diamond bourse, 2022:1)

6 Conclusion and Recommendations

6.1 Conclusion

Gujarat's economic landscape, which sets the foundation for the textile and diamond industries, relies heavily on the logistics sector. These two sectors are not only pillars of the state’s economy but also account for a significant portion of India’s exports. Logistics plays a vital role in making raw materials available to various production units on time and in moving finished goods efficiently to domestic and international markets, ensuring that supply chains are not disrupted. These findings suggest areas for improvement, along with future scope, in the logistics aspects of such rapidly developing industries.

Gujarat has a rich and long history of the textile industry spanning centuries. The cities of Surat, Ahmedabad, and others have grown to become major textile manufacturing centres, creating premium textile products for both national and international markets. Logistics is a crucial aspect of the industry, playing a vital role in the supply chain, from sourcing raw materials such as cotton and synthetic fiber to the distribution of finished products to customers. Manufacturers can meet market demands at a lower cost with the help of efficient transportation networks, warehousing, and supply chain management systems. Overall efficiency is affected by logistical problems, including transportation delays, infrastructure bottlenecks and supply chain disruptions.

Likewise, the diamond industry of Gujarat is renowned worldwide for its expertise in cutting and polishing, and is also centred in Surat. Logistics was a major consideration in the city’s success, as it took a large slice of the world’s diamond trade. Logistics are well-organized between the process of transferring raw diamonds from mining countries to Surat and the export of polished diamonds to international markets. Go-to-market strategies, including secure transportation, customs processes, and warehousing, play an important role in keeping diamonds flowing smoothly. Interruptions in logistics can cause delays, increase costs, and result in financial losses for many businesses.

Infrastructure is one of the major obstacles for both industries. Gujarat has good access to roads, rail, and ports , but should focus on developing certain areas. “The number of overstretched ports, congested highways, as well as delays in freight movement to and from ports, affect efficiencies for the supply chain. While the government has announced measures to upgrade the logistics infrastructure, including the development of dedicated freight corridors and smart logistics parks, there is a need to further facilitate the growth of these sectors.

In Gujarat’s textile and diamond industries, the changing face of logistics is increasingly being driven by technology. The integration of automation, artificial intelligence, and blockchain in supply chain management ensures end-to-end transparency, minimises human errors, and optimises efficiency. For example, digital tracking systems enable companies to track the flow of goods in real-time, reducing losses and delays. The advent of e-commerce has also impacted logistics in the textile sector, as many producers are now moving online and require quicker and more reliable delivery systems.

Government policies and trade regulations also influence logistics efficiency. The introduction of Goods and Services Tax (GST) measures, such as reducing state-level transport barriers, has provided smoother goods transit between states and fewer documentation formalities. Nonetheless, exporters still face challenges related to compliance with a wide range of regulations, customs procedures, and international trade policies. Policy reforms to ease these regulatory issues, along with the widespread adoption of digitalisation , can further improve logistics efficiency.

Managing costs is another critical part of logistics in these industries. The profit margins are affected by high transportation costs, fluctuating fuel prices, and warehousing expenses. To meet the demand, businesses must adopt cost-effective logistics strategies that include route optimisation, multimodal transport solutions, and investments in sustainable logistics practices. Green logistics,

such as utilizing electric vehicles and eco-friendly packaging, can reduce environmental impact while also improving efficiency.

Skills and expertise in the workforce also come into play in terms of logistics management. An efficient operation requires talented professionals familiar with supply chain optimisation, customs procedures, and international trade laws. There are three key reasons: educating the next generation, training the workforce, and investing in automation. With the continually improving infrastructure, technology, and support from the government, the future of logistics in Gujarat's textile and diamond industries appears promising. Smart logistics hubs, AI integration, and better trade policies will lead to faster and more competitive logistics. Yet there is work to be done: companies and policymakers must come together to address these needs and lay the groundwork for the next generation of innovative responses.

In summary, logistics plays a crucial role in HVAC companies in ensuring both short-term and long-term benefits. Although logistics efficiency has improved dramatically over the years, challenges remain. With the right investments in infrastructure, technology, workforce development, and sustainable practices, the state can enhance its status as a premier hub for textiles and diamonds. To ensure the sustainability and success of these industries in the future, the challenge lies in both market evolution and adapting logistics alternatives.

6.2 Recommendations

1. One of the key recommendations to improve logistics in the textile and diamond industry is enhancing the infrastructure. This dynamic state of Gujarat is also blessed with a strong infrastructure of roads, railways, and ports; however, further development is still required to minimise bottlenecks and transportation lags. The movement of goods can be significantly improved by expanding highways, modernising railway freight systems, and increasing the capacity of major ports, such as Mundra and Kandla. Furthermore, in the context of the 20-25 new specialist SEZs proposed,

including those for textiles and diamonds, these will be further developed with world-class logistics facilities to enhance export efficiency.

2. Logistics efficiency can be significantly improved through targeted government policies, regulatory reforms, infrastructure development, and the adoption of sustainable technologies. Although GST has simplified tax structures, business-friendly trade policy reforms are still a considerable distance away. This is crucial for enabling the quicker movement of goods, such as exports, and will be achieved through streamlined procedures and reduced bureaucratic red tape. Specific logistics facilitation centers focused on the textile and diamond industries to help companies efficiently tackle regulatory bottlenecks. Furthermore, provide investment in logistics infrastructure and technology, such as Green Logistics, where certain subsidies and incentives are given to both the industry and the end-user to promote a more environmentally conscious approach.
3. Additionally, there is cost management, which is another critical area. High logistics costs can affect a business's profit margin per unit. Hence, businesses must follow cost-effective strategies. Multimodal transport, combining road, rail, and sea transport, should be explored as it could reduce costs and the delivery time. Shared logistics services are also implemented by several small businesses to utilise a common transportation and warehousing facility, thereby minimising individual costs. Implementing sustainable logistics solutions, such as electric delivery vehicles and biocompatible packaging, is another way to lower costs in the long run, while also helping the environment.
4. A further salient recommendation is to upgrade the skills and proficiency of the workforce in logistics management. For any supply chain to work properly; however, a well-trained workforce is needed. This can be achieved through specialised training programs that educate workers on modern logistics technologies, supply chain management strategies, and global trade regulations. As logistics and international trade are booming fields in Gujarat, colleges and universities in the state can partner with industries to design professional courses that equip students with practical knowledge. As a result,

government officials can encourage companies to utilise training programs for employees, ensuring that logistics operations flow seamlessly.

5. E-commerce is becoming increasingly important, and its integration into logistics operations should be prioritised, particularly in the textile industry. As demand for online shopping continues to grow, textile manufacturers must establish robust logistics networks that facilitate swift and reliable deliveries. It will enhance delivery efficiency by establishing regional distribution centers and last-mile delivery hubs. Partnering with e-commerce platforms can also enable businesses to reach new customers in international markets and consolidate their market share, while improving customer satisfaction through enhanced delivery services.
6. Logistics safety is one of the main concerns within the diamond industry. Due to the high value nature of diamonds, the importance of safe and secure transportation cannot be overstressed. Implementation of these services will help ensure that collectibles are kept in secure, GPS-enabled transport vehicles, utilise biometric verification systems to handle shipments, and employ AI-powered fraud detection systems, among other measures. Allow industrial insurance for diamond logistics from businesses.
7. Public-private partnerships (PPPs) can significantly contribute to the development of logistics infrastructure and operations. Modernisation of the logistics landscape is key to the robust development of the textile and diamond sectors, which can only be achieved through a synergistic approach between the government and private players to develop logistics parks, cold storage facilities, and high-security transport systems for diamonds. Private-public partnerships (PPPs): PPPs can also assist with funding for large-scale logistics projects that may require a substantial investment. Only through collaboration can the government and enterprises expedite logistics development in Gujarat and enhance the competitiveness of industries globally.
8. The future of logistics in Gujarat, too, should focus on sustainability. They can not only help save the environment by reducing the carbon footprint of transportation and warehousing operations, but also improve the efficiency of business operations. Green supply chains, including electric trucks, solar-

powered warehouses, and biodegradable packaging materials, promote greener practices. There must be some reward programs targeting companies with the best logistics practices towards sustainability, which will lead to a sustainable future for all.

Appendix 2

References

Abu Sied. (2024). *A Study on Essential of Effective Transportation System for Supply Chain Efficiency, Cost Reduction and...* [online] ResearchGate. Available at: https://www.researchgate.net/publication/380373720_A_Study_on_Essential_of_Effective_Transportation_System_for_Supply_Chain_Efficiency_Cost_Reduction_and_Enhancing_Customer_Satisfaction.

Adamashvili, N., Zhizhilashvili, N. & Tricase, C. (2024). The integration of the internet of things, artificial intelligence, and blockchain technology for advancing the wine supply chain. *Computers*, *13*(3), p.72.

Adil, A., Khan, A. & Ahmad, P., (2024). Comparative Analysis of Positivism and Interpretivism in Social Science Research. Available at SSRN 5071639.

Agrawal, S., Ramanaiah Chintha, V., Narendra Pamadi, V., Aggarwal, A. & Goel, P. (2023). The Role of Predictive Analytics in Inventory Management. *Universal Research Reports*, 10(4), pp.456–472. doi:https://doi.org/10.36676/urr.v10.i4.1358.

Alharahsheh, H.H. & Pius, A. (2020). A review of key paradigms: Positivism VS interpretivism. Global academic journal of humanities and social sciences, 2(3), pp.39-43.

Anderson, M. (2025). Logistics in the Digital Era: Transformation Strategies Unveiled. Retrieved from www.invensis.net website: https://www.invensis.net/blog/digital-transformation-in-logistics

Ashokbhai, P.V. (2020). Development of supply chain model for improved productivity in capital and industrial goods manufacturing industry. *Unpublished doctoral dissertation]. Gujarat Technological University*.

Basias, N. & Pollalis, Y. (2018). Quantitative and qualitative research in business & technology: Justifying a suitable research methodology. Review of Integrative Business and Economics Research, 7, pp.91-105.

Chang, Y., Iakovou, E. & Shi, W. (2020). Blockchain in global supply chains and cross border trade: a critical synthesis of the state-of-the-art, challenges and opportunities. *International Journal of Production Research*, *58*(7), pp.2082-2099.

Appendix 2

Davis, R. (2024, November 12). JEC World 2025. Retrieved from Textileworld.com website: https://www.textileworld.com/textile-world/2024/11/sourcing-and-logistics-challenges-in-the-textile-value-chain-during-peak-season

Dhonde, B., & Patel, C. (2020). IMPLEMENTING CIRCULAR ECONOMY CONCEPTS FOR SUSTAINABLE URBAN FREIGHT TRANSPORT: CASE OF TEXTILE MANUFACTURING SUPPLY CHAIN. *Acta Logistica*, *7*(2), 131–143. https://doi.org/10.22306/al.v7i2.172

Diavon. (2023, February 21). Surat: the diamond cutting capital of the world. Retrieved from DIAVON website: https://diavon.de/en/blogs/wissen/surat-die-diamantschleiferhauptstadt-der-welt?srsltid=AfmBOopYv63x-Uo847Yq2JQ3kOxC_Z8miwffROOqm0hWQ6N2cyUV1VQ8

Doyle, L., McCabe, C., Keogh, B., Brady, A. & McCann, M. (2020). An overview of the qualitative descriptive design within nursing research. Journal of research in nursing, 25(5), pp.443-455.

Dursun, B. (2023). A qualitative research technique: Interview. Disiplinlerarası Eğitim Araştırmaları Dergisi, 7(14), pp.100-113.

fibre2fashion. (2024). *Gujarat's 2024 Textile Policy: Potential impact on the industry*. [online] Fibre2fashion.com. Available at: https://www.fibre2fashion.com/news/textile-news/gujarat-s-2024-textile-policy-potential-impact-on-the-industry-298810-newsdetails.htm

García-Lázaro, I. & Reyes-de-Cózar, S. (2025). Preservice teachers' reflective processes during field experiences: a systematic review from the ONION model framework. Reflective Practice, 26(1), pp.115-134.

George, A.S. (2024). Sustainable Sparkle: The Emergence and Impact of Lab-Grown Diamonds in India's Diamond Capital. *Partners Universal Innovative Research Publication*, *2*(2), pp.01-16.

Ghanad, A. (2023). An overview of quantitative research methods. International journal of multidisciplinary research and analysis, 6(08), pp.3794-3803.

Gour, A.A. & Singh, S.K. (2023). Solid waste management in India: a state-of-the-art review. *Environmental Engineering Research*, *28*(4).

Horizon Industrial Parks. (2022b). Industrial and Logistics Warehouse Park in Gujarat. Retrieved from Hiparks.com website: https://www.hiparks.com/gujarat

Appendix 2

Howarth, A., Cooke, S.J., Nguyen, V.M. & Hunt, L.M. (2024). Non-probabilistic surveys and sampling in the human dimensions of fisheries. Reviews in Fish Biology and Fisheries, 34(2), pp.597-622.

HKTDC (2025). *HKTDC Research*. [online] Hktdc.com. Available at: https://research.hktdc.com/en/article/Mzg3MzkwMjIw

Jaffrelot, C. (2019). Business-Friendly Gujarat Under Narendra Modi. *Business and politics in India*, pp.211-233.

Jouaville, L.S., Paul, T. & Almas, M.F. (2021). A review of the sampling methodology used in studies evaluating the effectiveness of risk minimisation measures in Europe. Pharmacoepidemiology and Drug Safety, 30(9), pp.1143-1152.

Katal, A., Dahiya, S. & Choudhury, T. (2023). Energy efficiency in cloud computing data centers: a survey on software technologies. *Cluster Computing*, *26*(3), pp.1845-1875.

Kim, H. & So, K.K.F. (2022). Two decades of customer experience research in hospitality and tourism: A bibliometric analysis and thematic content analysis. International Journal of Hospitality Management, 100, p.103082.

Maurya, B. (2023). Prevalence and prediction of occupational morbidities among male migrant workers in textile industries in Surat, India: a cross-sectional study. *International Journal of Community Medicine and Public Health*, *10*(7), p.2428.

Mazhar, S.A., Anjum, R., Anwar, A.I. & Khan, A.A. (2021). Methods of data collection: A fundamental tool of research. Journal of Integrated Community Health, 10(1), pp.6-10.

McGowan, L.J., Powell, R. & French, D.P. (2020). How can use of the Theoretical Domains Framework be optimized in qualitative research? A rapid systematic review. British Journal of Health Psychology, 25(3), pp.677-694.

Mody, M.A., Hanks, L. & Cheng, M. (2021). Sharing economy research in hospitality and tourism: a critical review using bibliometric analysis, content analysis and a quantitative systematic literature review. International Journal of Contemporary Hospitality Management, 33(5), pp.1711-1745.

Mohajan, H.K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of economic development, environment and people*, *7*(1), pp.23-48.

Mustofa, M. (2023). Epistemological Paradigms in Positivism, Interpretivism, and Action Research in Educational Research: A Literature Review. Journal of Office Administration: Education and Practice, 3(3), pp.214-224.

Newman, M. & Gough, D. (2020). Systematic reviews in educational research: Methodology, perspectives and application. *Systematic reviews in educational research: Methodology, perspectives and application*, pp.3-22.

Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T. & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, *1*(4), pp.189-200.

Ocaña-Fernández, Y. & Fuster-Guillén, D. (2021). The bibliographical review as a research methodology. Revista Tempos e Espaços em Educação, 14(33), pp.e15614-e15614.

Patel, R. & Desai, B.N. (2012). Some economic aspects of diamond industry in Gujarat. *Research Journal of Humanities and Social Sciences*, [online] 3(3), pp.356–362. Available at: https://rjhssonline.com/HTMLPaper.aspx?Journal=Research%20Journal%20of%20Humanities%20and%20Social%20Sciences;PID=2012-3-3-10

Patel, S. (2023, August 31). How Technology has Transformed the Logistics Industry? Retrieved from MindInventory website: https://www.mindinventory.com/blog/how-technology-transformed-the-logistics-industry/

Patil, S., & Patil, S. (2024, February 19). How to find top Warehouse in Surat? - Godamwale. Retrieved from Godamwale - website: https://godamwale.com/warehouse-in-surat

Phillips, K.M., Tichavakunda, A.A. and Sedaghat, A.R., (2024). Qualitative research methodology and applications: a primer for the otolaryngologist. *The Laryngoscope*, *134*(1), pp.27-31.

PRIME ASSOCIATES. (2022). WHY GUJARAT HAS BECOME A KEY WAREHOUSING HUB OF INDIA. Retrieved from Saladdesigns.com website: https://prime.saladdesigns.com/why-gujarat-has-become-a-key-warehousing-hub-of-india.html

Appendix 2

Reddy, V.J., Hariram, N.P., Maity, R., Ghazali, M.F. & Kumarasamy, S. (2024). Sustainable vehicles for decarbonizing the transport sector: a comparison of biofuel, electric, fuel cell and solar-powered vehicles. *World Electric Vehicle Journal*, *15*(3), p.93.

Sartori, J.T.D. (2024). Theory and Practice on Non-Probabilistic Data and Analysis: a bibliometric review. Foundations of Computing and Decision Sciences, 49.

Sharma, R. (2022, September 28). Logistics Sector in India and National Logistics Policy - Explained, pointwise. Retrieved April 4, 2025, from Free UPSC IAS Preparation Syllabus and Materials For Aspirants website: https://forumias.com/blog/logistics-sector-in-india-and-national-logistics-policy-explained-pointwise

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of business research, 104, pp.333-339.

Su, C.W., Wang, Y., Qin, M. & Lobonţ, O.R. (2023). Do precious metals hedge against global supply chain uncertainty?. *Borsa Istanbul Review*, *23*(5), pp.1026-1036.

Sumbal, M.S., Ahmed, W., Shahzeb, H. & Chan, F. (2023). Sustainable Technology Strategies for Transportation and Logistics Challenges: An Implementation Feasibility Study. *Sustainability*, [online] 15(21), p.15224

SURAT DIAMOND BOURSE. (2022). *Gujrat Exports double in the fiscal year 2021-22*. [online] Linkedin.com. Available at: https://www.linkedin.com/pulse/gujarat-exports-double-fiscal-year-2021-22-suratdiamondbourse

Taherdoost, H. (2022). What are different research approaches? Comprehensive review of qualitative, quantitative, and mixed method research, their applications, types, and limitations. Journal of Management Science & Engineering Research, 5(1), 53-63.

Textile Insights. (2023, July 10). An Efficient Supply Chain To Drive Growth In The Textile Value Chain - Textile Insights. Retrieved August 9, 2024, from Textile Insights - Delivering Inspiring Information website: https://textileinsights.in/an-efficient-supply-chain-to-drive-growth-in-the-textile-value-chain/

Appendix 2

The Economic Times (2017). *What is really going on behind Surat's high-tech, labour-intensive diamond industry?* [online] The Economic Times. Available at: https://economictimes.indiatimes.com/industry/cons-products/fashion-/-cosmetics-/-jewellery/what-is-really-going-on-behind-surats-high-tech-labour-intensive-diamond-industry/articleshow/60894467.cms?from=mdr

Ugrinov, S., Ćoćkalo, D., Bakator, M., Stanisavljev, S. & Zakin, M. (2024). DRIVING SUSTAINABLE INNOVATION IN THE TEXTILE INDUSTRY THROUGH CIRCULAR SUPPLY CHAIN MANAGEMENT. *Textile Industry/Tekstilna Industrija*, *72*(2).

University of North Carolina at Chapel Hill . (2023, December 8). Literature Reviews – The Writing Center • University of North Carolina at Chapel Hill. Retrieved from The Writing Center • University of North Carolina at Chapel Hill website: https://writingcenter.unc.edu/tips-and-tools/literature-reviews

Wang, X., Kumar, V., Kumari, A., & Kuzmin, E. (2022). Impact of Digital Technology on Supply Chain Efficiency in Manufacturing Industry. *Lecture Notes in Information Systems and Organisation*, *54*, 347–371. Researchgate. https://www.researchgate.net/publication/360113375_Impact_of_Digital_Technology_on_Supply_Chain_Efficiency_in_Manufacturing_Industry.

Wheat, P., Stead, A.D., Huang, Y. & Smith, A., (2019). Lowering transport costs and prices by competition: regulatory and institutional reforms in low income countries. *Sustainability*, *11*(21), p.5940.