PERFORMANCE DRIVERS & FUTURE GROWTH PROSPECTS OF THE LOGISTIC SERVICE PROVIDERS (3PL) IN THE INDIAN SURFACE LOGISTICS SECTOR

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Dedication

Dedication of this thesis is towards the collective effort and support of all those, who collaborated their unwavering love, sacrifices, and constant encouragement to shape my journey to the final submission. I would want to express my sincere appreciation to everyone who has helped me along the way my parents, teachers, relatives, friends, and well-wishers for their knowledge and patience. For believing in me and for the encouragement that kept me going when circumstances became tough, I am eternally grateful to my boss and my colleagues. Lastly, I dedicate this thesis to my own perseverance and consistency that I was able to follow with my discipline in all challenging scenarios.

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ABSTRACT

PERFORMANCE DRIVERS & FUTURE GROWTH PROSPECTS OF THE LOGISTIC SERVICE PROVIDERS (3PL) IN THE INDIAN SURFACE LOGISTICS

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This research studies the surface logistics business in India and attempts to decipher why 3PL works and how they can grow. Its goal is to forecast the future of the industry in light of the impacts of economic growth, globalization, and market circumstances by analysing the internal and external factors that influence the efficacy of LSPs. Both primary and secondary data are used for the research – online surveys of supply chain managers and transport professionals and secondary data from authentic Indian logistics data sets. It is found that the research results show that operational efficiency and technology implementation improve LSP's performance, but categorizing critical factors does not affect the outcome. Moreover, human resource management implementation is positively related to LSP's performance. A favourable correlation between LSPs' expectations for the future and policy shifts, technological advancements, and real-time data analytics was also found in the study. Given these results, it's clear that LSPs need to pay close attention to HRM, technology, and operations if they want to succeed. Findings from the study suggest actions to take in order to take advantage of these growth prospects, such as increasing digital technology use and strengthening supply chain and environmental resilience.

Thus, this study's findings provide light on the current state and potential future of India's surface logistics sector, which can help third-party logistics providers become more competitive and sustainable, which in turn can help India's economy grow.

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LIST OF ABBREVIATIONS

Abbreviations	Full Form
3PLs	Third-party logistics suppliers
SCM	Supply chain management
FDI	Foreign Direct Investment
LPI	Logistics Performance Index
EDI	Electronic Data Interchange
IT	Information Technology
ICDs	Inland Container Depots
CFS	Container Goods Stations
NVOCC	Non-Vessel Owning Cargo Carrier
DFCCIL	Dedicated Freight Corridor Corporation of India
ICT	Information and Communication Technology
LSPs	Logistics Service Providers
DROs	Disaster Relief Operations
AHP	Analytic Hierarchy Process
PLS	Partial Least Squares
TPL	Third-Party Logistics
CER	Corporate Environmental Reporting
DEA	Data Envelopment Analysis
BDA	Big Data Analytics
LCA	Life Cycle Assessment
LSCM	Large-Scale Computer Modelling
ANP	Analytic Network Process

TBL	Triple Bottom Line
CPS	Cyber Physical Systems
CPPS	Collaborative Production Planning Systems
DIC	Dairy Industry Challenge
FMCG	Fast-Moving Consumer Goods
ISM	Interpretive Structural Modelling

CHAPTER I:

INTRODUCTION

1.1 Background

The surface logistics sector in India is critical to the country's economy as it acts as a hub for the distribution of goods and services across the country. This industry, which encompasses tasks as varied as road transport, rail freight, and multimodal logistics, is crucial to the nation's economy. The importance of the industry is emphasized by the fact that India's large and varied physical terrain, ranging from the Himalayan foothills to the coastal plains, poses distinct logistical issues. It is the lifeblood that allows for the smooth exchange of goods and commodities both within a country and between countries. Since India's success is tied to this industry, it has enormous impact in the economic expansion, the effectiveness of the supply chain and the country's competitiveness in the world. For India to realize its goals of economic development and global integration, the country must invest heavily in studying, analyzing, and developing its surface logistics infrastructure (ARORA, 2023).

The Indian surface coordination division plays an imperative part; however, it is full of challenges. Wasteful aspects, delays, and higher costs have brought about within the past since the country's coordination framework seems not to keep up with the burgeoning request. These troubles have far-reaching results for businesses in each division, from generation and agribusiness to commerce at expansive and online. Maintaining India's financial development in the confront of globalization and rising shopper desires requires activity on three fronts (Chandra, Pankaj jain et al., 2007).

Third-party logistics suppliers (3PLs) incorporate a wide assortment of firms that give supply chain and coordination's administration for businesses in a assortment of segments. Their administrations within the field of Indian surface coordination's run from

capacity and shipping to stock administration and arrange preparation. 3PLs encourage the smooth stream of commodities by acting as middle people within the supply chain, consequently maximizing effectiveness and responsiveness (Rama, 2018).

This ponder was persuaded by the basic nature of understanding the essential variables influencing the proficiency of Calculated Benefit Suppliers in India's surface coordination industry. The effectiveness, viability, and supportability of the division can be made strides by recognizing these drivers and their interaction and after that creating methodologies and arrangements to address them. In expansion, a well-functioning coordination industry is basic as India endeavours to get to be around the world fabricating and exchanging middle.

Academic: The study of Logistics Service Providers' performance drivers and future growth prospects in the Indian surface logistics sector is highly significant for the improvement of knowledge and industrial practice. First and foremost, by illuminating the critical elements impacting the logistics sector's performance, it seeks to increase the sector's competitiveness. With this knowledge, industry participants—manufacturers, merchants, logistics providers, and legislators—can optimize their plans and processes. By optimizing logistics procedures, reducing costs, and enhancing service quality, businesses may strengthen their position as a market competitor using this expertise. The crucial problem of India's inefficient supply networks is another main area of study attention. Enhancement of supply chain efficiency can be achieved through logistics performance optimization in different industries. It is possible to increase profits, lower the cost of inventory, and shorten lead times. Businesses in India have faced difficulties satisfying domestic market needs due to recurring disruptions in the supply chain, escalating the importance of this issue to a critical level.

1.2 Logistics

Supply chain management (SCM) and organizational logistics refer to a union of various concepts, standards, and practices from the more traditional territories of marketing, creation, bookkeeping, purchasing, and transportation as well as from the orders of connected science, hierarchical conduct, and financial aspects. Associations have traditionally considered logistics tasks to be crucial. This paper aims to provide concepts, guidelines, and practices that are necessary for superior organizational logistics practice. It focuses on crucial administrative chores like organizing, sorting, and managing in addition to a crossroads of related transportation, stock, and area systems, which are at the heart of a successful logistical plan and choices that must be made as part of making decisions.

The content's body has incorporated modern trends that have an impact on SCM and enterprise logistics' reach and consistency. First, attention is made to inventory network administration and logistics in a general context to represent the expanding internationalization and globalization of the organization as a whole. Furthermore, it illustrates the tendency towards administration-arranged economies by industrialized nations by showing how logistics principles and standards apply to both administration-creating and item-delivering firms. Thirdly, consideration is given to the integrated administration of store network exercises (Caridi & Cigolini, 2002).

Historically, the products that individuals needed to live on were either not available where they needed to live or were not open when they needed to consume them. At specific times, supplies of food and other items were widely dispersed and just as readily available. Earlier people groupings may either devour products at their immediate location or arrange them in a preferred location and store them for later utilization. However, because there were no universally developed transportation and capacity

frameworks, the creation of products was limited to what a person could physically move, and the capacity of decomposable objects was only practical for a short period of time. Individuals were often required by this limited development stockpiling framework to live close to the sources of creation and to devour a relatively narrow range of products. In fact, use and generation still occur just within a very small geographical area in a few territories around the world today. In any event, there are striking examples in the developing nations of Asia, Australia, South America, and Africa, where the bulk of the population lives in small, autonomous communities and the great majority of the merchandise required by the residents is produced in the immediate area. A few products are brought in from various zones. As a result, the standard of living and the effectiveness of creativity are generally low. In this kind of economy, a well-designed and modest logistics framework would facilitate commerce in products with other domestic territories or even the world (Zehtabchi et al., 2011).

Topographic partitioning of use and creation began as logistics frameworks improved. Regions would hold significant power over those goods that could be produced most effectively. Overproduction might be financially transferred to other developing (or consuming) regions, and required merchandise that was not required privately was produced abroad. This trading process follows the relative favourable position guideline. When applied to global markets, the same rule makes clear the aberrant state of universal commerce that occurs in the modern world. Effective logistics frameworks enable world organizations to take advantage of the fact that terrains and the people that inhabit them are not as profitable. Logistics is the very quintessence of exchange. It adds to a higher monetary way of life for every one of us. To the individual firm working in an abnormal state economy, great administration of logistics exercises is basic. Markets are regularly national or universal in degree, though creation may be

amassed at moderately few focuses. Logistics exercises give the scaffold in the middle of creation and business sector areas that are isolated by time and separation. Viable administration of these exercises is a significant worry of this Program(Barreto et al., 2017).

Orientation and Development of Logistics Industry

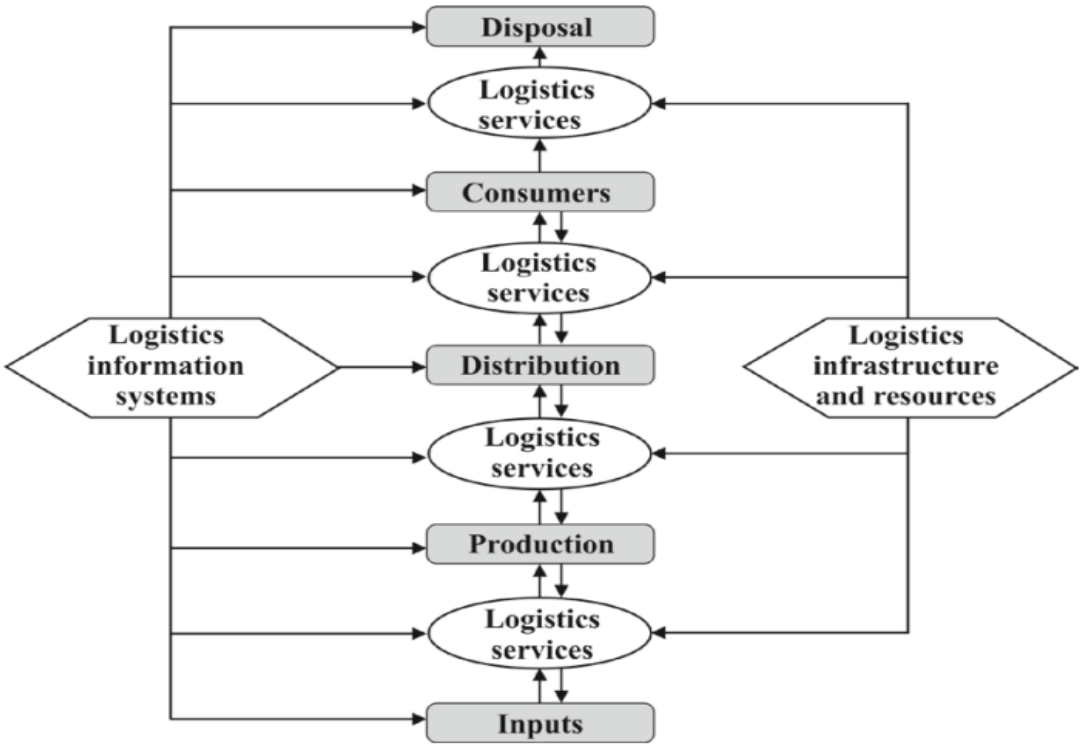

Figure 1.1: Orientation of Logistics System (Source: BTRE, 2001)

Logistics was at first a military exercise, about getting munitions and soldiers on the battlefront in time for fight, though it's currently viewed as a fundamental component of the contemporary manufacturing procedure. The primary history of the development of this is, the downturn of America in the 1951's triggered the market to pit value on goods circulations. The articulation, logistics, was initially created with regards to armed force errands in the late 18 and also mid-19 and this discharged the armed force logistics of World War II. The possible cause of the expression is from Greek logistics, signifying

‘having calculating skill'. BTRE, (2001) Military definitions basically incorporate the source, quartering and development of warriors in a set. Furthermore, today, a determination of researches was shot and additionally made logistics utilizes from military interests to business exercises. Logistics was not an academic issue unlit 1960s. The major part of it like inventory and transportation costs was included in economics that time till the mid-1980s. Undertaking logistics wasn't an academic issue until the 1960s. According to the American experience, the logistics are timeline in 4 stages as in Figure 1.2.

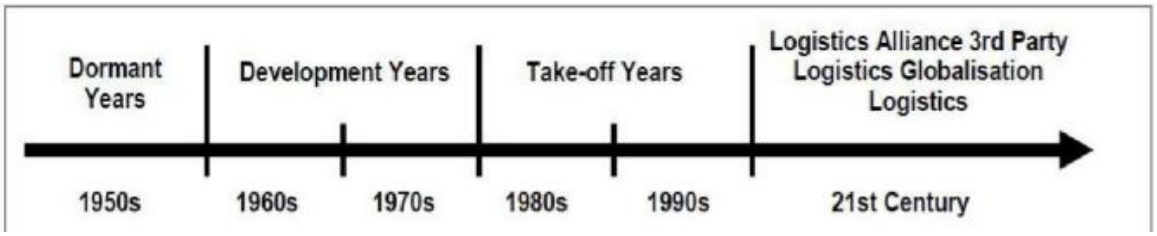

Figure 1.2: Logistics Historical Development (Source: BTRE, 2001)

Before 1950, logistics was treated as a lethargic issue. Not taking it as an essential concern and the business logistics used to be seen as a "necessary evil" in this specific period. In the 1960s and 1970s, applying perfect concepts of innovation an organization was a tendency. Drucker (2001), trusted Logistics and initiated the procedure of physical circulation of the product and presumed as the most achievable area of American organizations yet also likely the most disregarded area. Lewis' investigation as referred to in Chang, 1998. Finally, in 1966 gives significance of air transportation for physical distribution was utilization of the "total price concept" which suggests the idea of exchange off among transportation and stock. From the 1970s onwards, a developing number of programming applications and furthermore examinations of logistics showed up.

Due to increase in oil prices in 1974 the contribution of logistics services on the enterprises increased. The demand of logistics planning increased due to competition of third world places, strain on higher stagflation, development of transportation management and slow development of the market. Because of this new area of logistics like third-party logistics developed. Logistical flow is a crucial element for competitiveness and business activities. Nevertheless, to control and run a big organization is cost-consuming and non-economical. Thus, the alliance of overseas companies might save working costs and time.

Logistics Management

The logistics management is about the arrangement and the control of the movement of the raw materials, the components and the finished products. If all of purchasing, inventory, and transportation are managed functionally, then it is called logistics. Within logistics is the management of the pre-production, in-production, and post-production channels. Coordination is a technique to deliberately control the procurement, development, and capacity of materials, parts, and wrapped up stock (and related information streams) by means of the organization and its promoting channel in arrange to improve both show and future advantage by among the reasonable fulfillment of requests (Gattorna et al., 1991). Logistics is critical to the operation of the entire company. Every stage of the process is covered, beginning when a good or service needs to be produced and going all the way through production, storage of finished goods, distribution to customers, management of incoming raw materials, and after-sales support (Alqahtani, 2014). Nearly identical concepts exist in strategy and logistics. Logistics is more than just an operational approach. It is a means of uniting and coordinating all organizational operations that have an impact on the procedure from the time the product (or service) is conceived to the point at which the customer is reached. Managing a

company's goods and services effectively and efficiently is the responsibility of logistics operations, which ultimately strive to reduce costs, enhance customer satisfaction, and provide a competitive edge (Barczak et al., 2019).

In arrange for the le coordination's framework to be more successful, the cutting-edge coordination's concept proposes that all divisions collaborate and all person useful ranges work at sub-optimal rates, as opposed to each department working independently and trying to maximize their own unique set of logistics activities. The integrated systems-based approach that forms the basis of the logistics concept implies an understanding of the interconnectedness of the elements of the whole, wherein actions affecting one may have an effect on the others. Therefore, every action must consider how it will affect the company's objectives and all of its constituent pieces. To optimize efficiency, the organization could be viewed as several interdependent subsystems that need to be merged in some way. The company must be concerned with the stream of data and materials over the entire trade handle, from crude assets to wrapped-up things arriving at the customer's area, from concept to utilization (D. A. Adeitan et al., 2021).

1.3 Logistics Performance Management

For a country to be competitive, its logistics must be in good working order for both internal and international shipping. The transit operation controls the entire production process. Supply chains, the transfer of raw materials from producers to consumers, and the final flow of finished goods from factories to stores are all part of logistics, which relies on a number of strategic partnerships and the development of logistics services to thrive. Generally, management and physical restrictions are costly obstacles to the flow of foreign trade and product. Fighting with these obstacles, there will be loss of monetary goodness. By the means of an estimate by Ferrentino et al. shows that there will be increase in countries GDP i.e. 4.9per cent which is 6 times

higher. This was all because of the improvement of global management as well as communication structure.

The level of foreign direct investment (FDI) in a particularly desirable domain throughout this trend is an excellent signal of its appeal. It is well acknowledged that transportation systems are a significant determining element when it comes to office territory decisions. The productivity and worth structure of individual firms were greatly impacted by transport infrastructure. Precise scientific studies demonstrate that foreign direct investment is interested in places wherever transportation strategies have an inclination to be additionally prosperous. A sustained headway implies policymakers even also non-public stakeholders to use comprehensive reforms. Keeping in mind the top goal to maneuver product to advance faithfully and effectively, countries have to be compelled to decrease exchanging bills and embrace trade policies, during this method up trade aggressiveness. Regularly fantastic physical network doesn't compensate for terrible service conveyance. Infrastructure advancement is vital in ensuring access and network to trade and transportation gateways. But countries are additionally profitable with specific sorts of infrastructure. ICT infrastructure quality, especially, has increased chop-chop across the world. On the opposite hand, rail infrastructure conjures up traditional discontent. It might be construed then as practical.

Perfection can't be supplanted with brilliant real physical equipment' without anyone else's input. Unwavering quality of businesses is a key issue for traders as well as logistics providers similarly and consistency of supply chains has turned out to be increasingly indispensable. Compelling outskirt crossing is indispensable in dispensing with preventable late and pretty consistent in leeway tasks. Organizations among apropos government agencies will assume a significant part in their initiatives, similar to the importance to expose best practices in robotization & risk management. Based on the

“World Bank’s Logistics Performance Index (LPI)”, practice organizations are probably going to get substantial LPI ratings contrasted with some other similar companies- like sanitary as well as phytosanitary management organizations and companies implementing the standard. logistics performance is obviously linked with the unwavering quality of the consistency and supply chain accessibility. Supply chains are starting to be more and more mind-boggling, as they every now and again span numerous countries. Long-haul commitments and comprehensive reforms from policymakers as well as private stakeholders will be fundamental to coordinate the evolving scene. Supply chain sustainability worries amongst shippers & logistics service providers seem to create consistent with a multifaceted nature. Governments will need to spin out extensive haul approach improvements that allow the market to stay focused while they adjust adapting to new needs.

The nature of services is working logistics effectiveness, especially in a rising more extravagant economy. Now, the change in services like outsider logistics providers, transportation as well as forwarding is still a multifaceted strategy district. In logistics-benevolent countries, shippers presently assign a significant part of the logistics like transportation and warehousing operations - to outsider suppliers. Or maybe, the logistics service users mostly focus on their centralized business while outsourcing supply chain problems of adjusting their sourcing and yield to advertise requests. Supply chains have turned out to be increasingly intricate, and there aren't any simple gains promptly accessible to policymakers. Many centre & high wage countries have perceived a developing interest in constant strategy actions to deal with the multifaceted design in their trade of theirs as well as logistics preconditions. Low-hanging natural product for considerably more propelled nations is to get is not precise. The necessary reforms include lots of stakeholders and are usually slow to execute. In addition, they're usually

dedicated thanks to administration weaknesses or perhaps absence of political progression. Beneficial reforms also rely upon comprehensive, correct information including data sharing among stakeholders. To sum up, nations which have viably released broad modifications have consolidated administrative change with incentives, between organization coordination and investment getting ready for operators (Forslund, 2014)

1.4 Logistics Performance Index (LPI), The Concept

The "Connecting to Compete" study, which is also known as the "World Bank's LPI" report, offers what is probably the most extensive worldwide comparison tool for determining trade and transportation to support national responsiveness. Knowing the parts of the industry as well as logistics performance is ready to assist nations to enhance their freight transport effectiveness and furthermore decide the areas of their strength and weakness in comparison to competitors. The "Associating with Compete article continues to be imprinted in 2007, 2010, 2012, 2014 as well as 2016.

The LPI has two key components: The International LPI, which compares 166 nations, and the Domestic LPI, which gives insight into domestic international logistics problems. The International LPI examines 6 dimensions which record likely the most basic areas of a nation's trade logistics proficiency, wherein each factor is positioned on a 5-point Likert scale (Prastyabudi et al., 2020).

- **Customs:** how well the customs clearance process works
- **Infrastructure:** the standard of the industrial setup and the infrastructure connected to transportation; International Shipments: the ease of organizing reasonably priced shipments

- **Logistics Competence:** the calibre and expertise of logistics services
- **Tracking and tracking:** the capacity to follow shipments;
- **Timeliness:** the regularity with which goods arrive at the destination on schedule and within expectations

Figure 1.3: To Relate the 6 LPI Indicators to Policy Action (Source: World Bank Report)

1.5 Business Logistic Definition

Enterprise logistics is moderately new area of incorporated administration study in correlation with the conventional domains of account, advertising, & production. As noted earlier, logistics exercises have been completed by people for a long time. Organizations additionally have constantly occupied with move store (transportation-stock) exercises. The field's novelty results from the idea of composed administration of the related exercises, as opposed to the authentic routine of overseeing them independently, and the idea that logistics increases the value of items or administrations that are vital to consumer loyalty and deals. Despite the fact that coordinated logistics administration has not been for the most part polished up to this point, the thought of coordinated administration can be followed back to no less than 1844. In Jules Dupuit's

work, a French creator, the thought of trading one cost for another (calculated costs for stock costs) was clear within the assurance in center of road and water transport:

The primary reading material to recommend the advantages of coordinated logistics administration showed up around 1961, to some degree clarifying why a by and large acknowledged meaning of business logistics is as yet developing. In this way, it is useful to examine a number of definitions for the expansion & substance of the subject. A word reference meaning of the term coordination is:

“The Department of military science doing with procuring, keeping up, and transporting fabric, work constrain, and workplaces."

This definition puts the military setting on coordination. This portrayal misses the pith of commerce coordination association to the extent that business goals and operations diverge from military ones. The Council of Logistics Management defined the field as a specialized relationship of logistics chiefs, educators, and professionals who came together in 1962 to continue preparing and growing the interchange of ideas. This definition may reflect a dominating representation of the field. According to Wikipedia, "Logistics is that a few parcels of the generation organize get ready that orchestrates, executes, and controls the capable, compelling stream and capacity of merchandise, organizations, and related information from the reason of root to the point of use with a particular conclusion objective to meet clients' necessities." (Anca, 2019).

Based on the idea that thing streams ought to be seen from the minute at which they exist as crude materials to the point at which they are eventually arranged, this definition is outstanding. Logistics is in like manner stressed with the flood of organizations and likewise physical items, a locale of creating an open entryway for advancement. It furthermore prescribes that logistics is a strategy, inducing that it solidifies each one of the exercises that have influence on making things and organization

accessible to clients when and where they wish to induce them. In any case, the definition suggests that coordination could be a supply's piece chain process, not the whole strategy (Samal, 2019).

Concept of Logistics Mix

The study, planning, and control of product availability that is suitable for the demands of the market and the company's resources are the focus of logistics management (Qadir & Ali, 2017).

Customers want items to be physically accessible, but they too need them to be in great condition, the fitting estimate, the correct unit, and the correct time. In order to achieve these goals, the manager must first individually and then collectively coordinate the seven primary decision-making domains that comprise the so-called "Logistics Mix". These seven components include (Abu Bakar et al., 2014):

1. **Inventory:** Logistics management revolves around effective inventory control. How much inventory should be kept, where it should be kept, in what amounts, and how often it should be restocked are some of the key questions in inventory management. Stock levels are a major factor in determining the costs associated with keeping inventory on hand as well as directly impacting the quality of customer service that may be provided. If sales don't meet expectations, keeping stock comes with a price, requires working capital, and may expire or become outdated. Determining a stock level at which the advantages for customer service balance the associated expenses is therefore the management responsibility.

2. **Facilities:** Storage space is required to retain inventory. Management of warehouses must take into account the number, location, size, and unique facilities needed by the products.
3. **Communications:** A logistics management framework that works well permits for the arrangement of great client benefit at a sensible taken a toll. The utilize of communication advances in arrange preparing, billing, demand forecasting, and other processes improves productivity and effectiveness at both the operational and planning phases of the logistics management process.
4. **Unitization:** This is often a reference to the beginning pack sizes of the products and the accumulation of these packs into bigger unit sizes. The use of communication technologies in order processing, billing, demand forecasting, and other processes improves productivity and effectiveness at both the operational and planning phases of the logistics management process.
5. **Transport:** The most crucial issues in logistics management are those relating to transportation. The key choices include issues like what mode or modes of transport we ought to use, whether to own or rent vehicles, how often deliveries should be made to various consumers, and how these deliveries should be organised.
6. **Materials Management:** No product can be produced or delivered to the right standards if inbound purchases, transportation, and storage are not managed effectively.
7. **Production Scheduling:** Inventory management and responsiveness in product scheduling are now more important than ever thanks to notions like "just-in-time." Inventory management may be significantly impacted by this activity.

Logistics Process

According to the Basu, (2013), Transportation of products, services, and data from "the point of origin" to "the point of consumption" is what logistics is all about. It's all about satisfying customer demands. When production and consumption of a product are located in different locations, physical flows are generated. It is demonstrated that the physical logistics flows associated with materials, work-in-progress, and final products are part of the logistics process in a manufacturing organization, which includes home textile firms in Figure 1.4 below: -

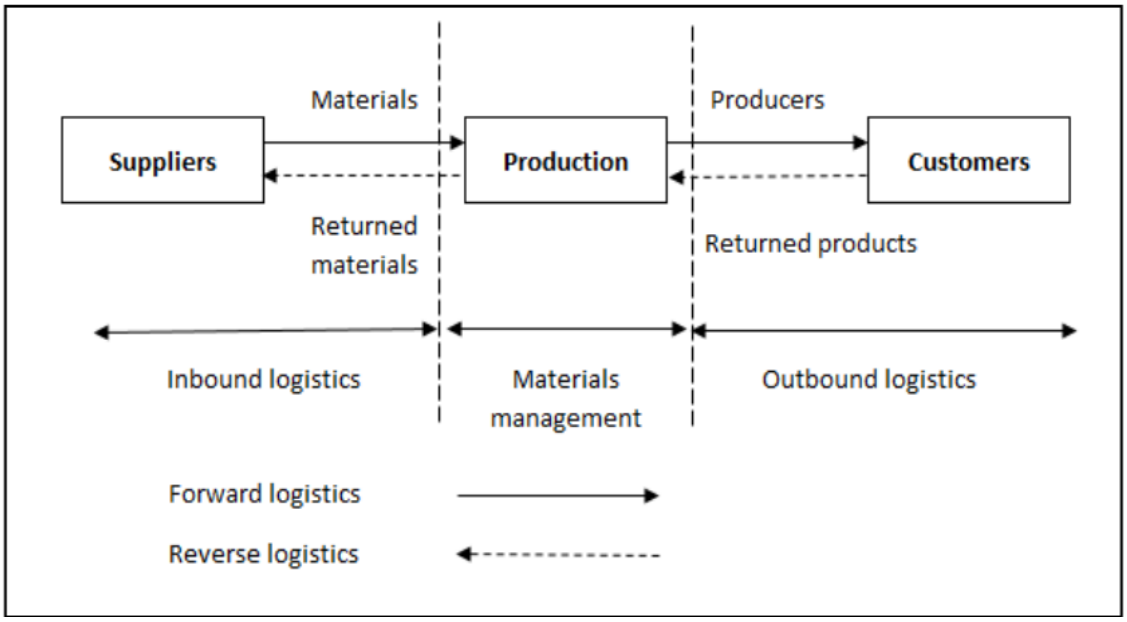

Figure 1.4: Logistics Processes in Manufacturing Industries

As can be seen, the logistic process comprises both inbound and outbound activities. Inbound activities refer to activities related to bringing goods into the organization and outbound logistics refers to taking them out of the organization. Additionally, there is a distinction between "forward logistics," referring to logistical activity involved from suppliers towards customers, and "reverse logistics," referring to movement in the other way. The fact that logistics is in charge of satisfying the needs and preferences of both the company's external customers and other functional areas within the company

accounts for this wide range of operations (internal customers) (Anca, 2019). Policymakers, businesses, and industry are paying close attention to the logistics process in India's textile and garment sector, which includes all inbound and outgoing parts of the manufacturing and service supply chain. Point out that In order to effectively compete, "the role of managing this infrastructure" (logistics management regimen) has frequently been overlooked (Dewangan et al., 2015).

Global Logistics Market

For many people, logistics is only the transfer of goods from one location to another. It is a trillion-dollar sector for business, and staying ahead of the competition might be crucial.

The global logistics sector encompasses a wide range of complex freight and cargo-related transportation industries, such as shipping, warehousing, courier services, and road, rail, and air freight.

According to research from C and M Research's January 2014 Global Logistic Industry Outlook, the total value of the global logistic market was around US $4 trillion in 2013, which is almost 10% of the world's gross domestic product. There has been an annual growth rate of 7% in the transport sector worldwide since 2011, and in 2016, it is projected to generate $3.8 trillion in revenue in the US. Over 42% of the global transport services sector is currently accounted for by the US. In the coming years, it is expected that emerging economies like China and India will have a bigger impact on global logistics.

By comparing the value added at each level of the textile value chain, we find that the garment/home textile to retail stage adds more than twice the value of any other step in the chain. Considering this, effective logistics becomes critical in providing for the

last-mile distribution. Keeping the supply and distribution channels full requires efforts to ensure strong ties and seamless movement so that the company is able to maximize the supply chain in the “surplus” (i.e. the difference between the value of a product and the cost of all supply chain activities involved in bringing the product to the market) to its advantage (Chopra, 2020).

1.6 Indian Logistics Industry

In India, the logistics sector has recently gained prominence. The Indian economy's steady high growth, which has resulted in a notable increase in goods transportation throughout the nation, is one of the main causes of this.

The IBEF Report (2013) estimates that the Indian logistics sector was worth US$130 billion in 2012–2013. It is projected that the industry will develop at a rate of about 12% per year and reach US $200 billion in revenue by 2020, thanks to strong expansion in important manufacturing sectors and a stable economy. The government's "Make in India" campaign is anticipated to increase manufacturing output as well, and the establishment of key logistical hubs would help this effort greatly.

At present the annual logistic cost present in India is estimated at 13% - 14% of GDP and is higher than in the developed countries and the BRICS member countries. In the former it is estimated at 7-8% of GDP and in the latter it is around 9-10%. (IFTRT 2012).

India has highly high transportation costs among logistic operations because of a number of variables, including a high rate of damage, poor road infrastructure leading to

low average speed, hefty chess and tolls, and a lack of effective alternatives to roads for long hauls (Y. Wang, 2022).

In a day, a car travels 250–400 kilometers on Indian highways at an average speed of 20–25 km/h. The distance travelled might be far greater in wealthy nations—roughly 700 to 800 kilometer's every day. As a result, automobiles in India travel only 80,000 to 100,000 kilometer's a year, compared to up to 400,000 kilometer's in the USA (Y. Wang, 2022).

In addition to transportation, additional components of logistics costs in India usually comprise inventory management, warehousing, and other value-added services including packing, administration, and losses connected to damage. The distribution of expenses across different heads is concerning when it comes to logistics costs in India (Deloitte, 2012). The remaining "others" group accounts for 34% of the logistics cost, primarily as a result of inadequate interconnectivity and a lack of operational sophistication (KPMG, 2010). The "others" category makes up 10% to 15% of the total in nations like the United States and China, respectively.

There are several small and medium-sized businesses dispersed throughout various regional pockets, asset kinds, and services in the highly fragmented Indian logistics sector. Very few, if any, players are able to offer their clients full end-to-end services (KPMG Report 2010). The top 10 listed players have only a 2% market share, with rest of the players constituting 98% of the transportation and logistics sector (IBEF Report, 2013). In outsourced warehousing, 92% of the players are from the unorganized sector.

India is placed 54th out of 160 nations in the World Bank's Report on Trade Logistics in the Global Economy (Connecting to Compete 2014). The ranking is based on a holistic evaluation of logistic performance. India's ranking has slipped from 47th in

2007 to this position. However, aggregation of the results across the four editions of (LPI 2007, 2010, 2012, 2014) positions India at the 48th rank, which is lower than India's 39th position in 2007. The table in Appendix C gives the details.

India is placed 54th out of 160 nations in the World Bank's Report on Trade Logistics in the Global Economy (Arvis et al., 2014). The ranking is based on a holistic evaluation of logistic performance. Compared to 2007, India's position has dropped from the 47th rank. However, aggregation of the results across the four editions of LPI (Martí et al., 2014) positions India at the 48th rank, which is lower than India's 39th position in 2007. Table at Appendix C gives the details.

In the case of textiles, a novel feature of the industry profile is that while the raw material like cotton is grown in large parts of Western India like Gujarat, and Maharashtra, the users of cotton i.e. the spinning industry is in the South in Tamil Nadu. Further due to pollution control norms, the bulk of the fabrics woven in Southern India are sent to western India, mainly, Gujarat and some parts of North India and brought back.

As goods pass through the "farm to fashion" supply chains, the logistics cost in India gets accentuated for the industry due to an unfavourable modal mix with a majority share held by road freight which is both costly and inefficient (KPMG, 2010). The share of Railways in Logistics has been coming down in comparison to Roadways, thereby increasing costs, as transportation by the latter mode costs four times per km than the former.

Coastal shipping and inland waterways, the cheapest mode of transportation, have not got the required attention despite the fact that it costs around 10-15% of road freight. Another feature of the Indian logistics system is that manufacturing companies have a

legacy of in-house setups. These have historically been perceived as a support function but have also contributed to cost-inefficiencies (KPMG, 2010; Deloitte, 2008).

Obstacles in the Indian Logistics Industry

A key cause of the major growth constraints that the Indian logistics sector is facing is infrastructure. There have been persistent irritants related to infrastructure, such as bad road conditions, limited connection, inadequate capacity for seaports and air travel, and a lack of development of alternatives to railways, such as inland water transport and domestic aviation. The Indian logistics sector has significantly higher costs per transaction than industrialized markets because of infrastructural limitations.

Over 65 percent of all commodities moved in India are transported by road, making it a significant mode of transportation for goods. The inability of logistics operations to run smoothly has been severely hampered by the poor infrastructure. Limited and congested highways, subpar road conditions, and forty percent of settlements without access to all-weather streets extremely disable the proficiency of the transport framework.

One of the main obstacles is the terrible state of the roads in India, which is perhaps one of the least connected places on earth. A significant infrastructural constraint is the lack of access to ports, warehouses, and logistics hubs via roads and trains. Within the nation, moving products is dangerous and prone to delays. Since sea routes account for the majority of Indian trade, the current port infrastructure is unable to manage trade flows efficiently. Major ports are currently overloaded, and infrastructural improvements are happening very slowly. A container ship can be turned around in Shanghai's ports in eight hours, while it takes three days in Mumbai. Mini metropolises and small towns have very little, if any, air cargo handling infrastructure.

The logistics sector has been denied access to more affordable and effective modes of transport due to the railways' inability to increase their freight-carrying capacity and efficiency. India has a large number of comprehensive inland canal systems that can serve as a backup mode of transportation but have been overlooked. There's a high requirement for discussing cargo centres since the development of discussed cargo as well as the modernization of the air terminal framework.

The Indian government has begun to take notice of the issues facing the logistics sector and has launched a number of infrastructural projects to help ease their suffering. Plans are being made for projects like the construction of inland waterways and rail freight lines, which will foster the growth of alternate transportation options. Building new roads and renovating existing ones are only a few of the key projects being undertaken to upgrade the rural infrastructure. The objective is to put through the larger part of residences with all-weather streets. An unused harbour and significant holder taking care of offices are arranged. None of these, all things considered, are presently adequate to fulfil the economy's rising requests.

An efficient and economical means of moving commodities depends on having a high-quality infrastructure. The difficulty lies in integrating the many forms of transport into a seamless network at the lowest possible cost. Building state-of-the-art infrastructure, such as modern integrated logistics hubs and freight corridors at key locations across the country, will enable more efficient logistics operations. It is essential to address infrastructural bottlenecks and build new projects with future growth requirements in mind in order to assist the Indian logistics sector in overcoming the issue and becoming globally competitive (IIFT, 2022).

- **Rail Transport shortcomings:**

Rail is a very dependable, safe, secure, and environmentally friendly form of transportation. Roads account for a considerably larger share of goods transportation than Indian Railways, even though the latter has the second-largest train network globally. India's transportation cost per tonne per kilometer is over three times more than China's when compared to nations like the USA, Russia, and China. With their high bulk product flows, dense network of long-distance freight lines, and favourable commercial characteristics, the railways have the ability to significantly reduce freight costs. Large commodities like as steel and cement have been redirected to the road sector due to inadequate customer service, sluggish network development, and outdated rail infrastructure in the freight segment. Indian Railways' share of the overall freight traffic has been steadily declining. The government has made some efforts to increase the Rolling Stock, but it has also placed a strong emphasis on improving the utilization of the existing ones. IT can be used to improve the utilization of existing inventory, as is well recognized. India has not experienced this. The Central and Zonal computer systems are being improved through a pilot project. The project is still in its early phases of execution, nevertheless. The reality that cargo trains go at a normal speed of 25 km/h on the same tracks as traveller trains causes major delays in transportation. Of course, there are plenty of other challenges, just as the utilize of wagons and multimodal transportation. Furthermore, the public-private partnership (PPP) model has proven to be more successful; yet, because of its high barrier to entry, it is only available to a select group of significant participants. Nonetheless, the government has been aggressively pursuing measures to increase connection and recapture market share in the goods industry. Increasing wagon use alone has allowed the Railways to significantly lower freight costs. In order to develop Dedicated Freight Corridors, the Ministry of Railways established the Dedicated Freight Corridor Corporation of India (DFCCIL) as a Special

Purpose Vehicle. In the first phase (Mangla et al., 2019), Two of these corridors, the Western and Eastern DFCs, will be constructed over a distance of 2800 route kilometers by DFCCIL. It is expected that this will stimulate the growth of industrial corridors and logistic parks along its route. Goods trains are expected to move at about 100 km/h along the dedicated East-West line that is being proposed. The logistics industry will benefit if Indian Railways is able to implement its plans for quicker freight trains, modernized rolling stock, better signaling and communication, more container terminals, and rationalization of cargo estimating to expel mutilations. will pick up essentially and work more proficiently. In order to face the enormous difficulties of the future, the railways will need to be restructured and become more corporate.

- **Clipped Aviation Logistics:**

The flying industry in India is one of the fastest-growing within the world and has seen significant change as of late. Thanks to their full service and low-cost offerings, private airlines hold a dominant 75 percent market share in domestic aviation. Fast growth is also being experienced by the aviation industry's air freight sector, which is one of the key drivers of the nation's economic expansion. Trade and the economy at large will benefit greatly from a robust and active aviation logistics network. Air freight only makes up a minor portion of India's freight industry because it is significantly more expensive than freight by road and rail. There aren't many cargo airlines, and the ones that have tried haven't succeeded. The need for services is increasing, particularly air freight, as seen by the 25% rise in domestic air cargo traffic in 2009–2010. With an estimated 27 million tonnes valued at $200 billion, India still only makes up a pitiful 3% of the global air freight business. There are many obstacles in the nation's aircraft logistics system. One of the main issues the sector faces is inadequate infrastructure structure. India's second-tier cities are largely underdeveloped or devoid of services, and the majority of the nation's

aviation traffic is concentrated in a small number of airports. Poor facilities for handling cargo at airports across the nation are another big problem. Lower cost efficiencies are the result of additional problems like restrictions on the movement of commodities between states, difficulty moving air freight between gateway airports and second-tier cities, and the size of operations. Demand will be the primary force behind the growth in air freight, and infrastructure will act as an enabler. The construction, design, and distribution of infrastructure can avoid a lot of the obstacles that the domestic air freight industry faces. Volume growth would attract larger investments. The government can help by increasing the capacity of airports in tier-II and tier-III cities and streamlining the processes using electronic data interchange (EDI) in order to minimize paperwork and speed up transactions. All airports' cargo handling infrastructure has to be improved; hence action must be taken. A lot of interesting things are happening, such as the tier II city of Nagpur, Maharashtra, becoming a hub for air cargo, and the rise of low-cost and cargo carriers due to regulatory relaxation. The fetched of discuss cargo is expected to drop within the another a long time, opening up modern financial openings for India's second-tier cities that are right now being associated to the discussed organize. Since a few aircraft have arranged to dispatch full-fledged cargo operations, it is expected that these cargo carriers will too move to tier-II and tier-III goals. A few coordination’s companies indeed need to buy them possess flying machine. All of these are encouraging for aviation logistics, and growth will be accelerated as long as the demand for air freight keeps progressively increasing and attracts more new competitors.

1.7 Impact of Logistics on Customer Service

Customer service is the process of determining a customer's needs and meeting those needs with specialized, reasonably priced goods and services. Customer service management, which is the capacity of a company to be proactive in responding to shifting

client requirements, benefits greatly from flexibility in routine logistics. The efficacy and flexibility of a company's supply, production, and distribution logistics management largely determine its ability to provide accurate customer service. The following are some customer service domains where logistics management has an effect.

1. **Price Offered:** It clarifies how the taking a toll of coordination’s along the supply chain and the quality of supplemental calculated administrations a producer can give might influence their capacity to command premium rates and/or offer competitive costs.
2. **Quality Product:** How well output is packaged, kept, and transported, as well as the quality of incoming inputs, have a major impact on the final products that a factory produces.
3. **Product Variety:** Consumers anticipate a range of features and products to meet their specific needs. This calls for a logistics system that can deliver the necessary raw materials and completed goods when needed without incurring excessive costs.
4. **Fill Rates:** It can be explained as requiring an effective logistics system to provide a suitable level of completeness for regular and emergency shipments without raising costs.
5. **Cycle Time:** It takes great coordination to diminish the length of time it takes to create an item from concept to showcase and to abbreviate the arranged cycle taking after dispatch.
6. **Order Information:** When placing an order, customers want accurate information about inventory availability, estimated shipping dates, and estimated delivery dates. The efficiency of the logistics network plays a major role in the capacity to send correct data into these regions.

7. **Delivery Frequency:** Consumers want frequent shipments these days, and a manufacturer's logistics system's capacity to fulfil this demand without going over budget is crucial.

1.8 Vital Issues and Recent Trends in Logistics Management.

- **Flexibility in Logistics Management**

Given the increasing customization and variety of products available in the market, being agile in reacting to client needs can give you a significant competitive advantage (Reichhart & Holweg, 2007). Businesses claim that in order to respond to rapidly evolving markets where customers require a wide run of items and administrations, they must be responsive and adaptable. To compete in an progressively dubious environment, businesses must view flexibility from the perspective of their supply chain, not just their equipment or processes, in order to adapt design, production, and delivery to changing consumer needs.

The adaptable logistics system helps the company handle a wide range of products with more efficiency and responsiveness. The flexibility of a company's logistic system makes a difference it adjust quickly and proficiently to changing client needs for inbound and active merchandise, bolster, and administrations. By creating flexible logistics systems that allow for swift restocking of incoming resources and prompt delivery of completed goods to clients, businesses may increase customer satisfaction. Logistics should be set up to support cost-effective and customer-responsive operations in order to increase customer satisfaction(Chen et al., 2021).

- **Information Technology in Logistics Management**

As a means to improve logistics competitiveness, many authors have promoted information technology. One of the few productivity tools, information technology (IT),

is becoming more capable and having a lower cost. It is stated that successful logistics implementation and adoption of IT are necessary prerequisites.

The logistics system transforms commodities into products, creating value for customers, to support management decision-making. Data is transformed into products via the information system. Information can be used for decision-making, which improves logistical effectiveness, efficiency, and adaptability. At the operational level in logistics, information technology applications are becoming more and more significant. The entry of 13 effective microcomputers and modern program applications has impelled a critical discourse about how information may be provided to those who utilize them in a simple and reasonable way. Another recurring subject in the literature is the use of information as a substitute for inventory. The advantages of cheap cost, high speed, and accurate data transfer give rise to the notion. In the context of warehousing, where information is a substitute for inventory, Stock (1990) looks at the effective "marriage" of computers, communications systems, and data frameworks (Van Der Ham et al., 2020).

The application of data innovation is invaluable for Porter's three common methodologies: taken a toll administration, item separation, and particular showcasing. The importance of information systems in logistics operations is demonstrated by the advantages of implementing one, including cost reduction, value addition maximization, and control/flexibility augmentation. It was found that a company's ability and ambition to invest in cutting-edge information technologies determines the performance of its logistics operation. the analysis of the connections between integration, data, and customer reaction. They found that improved contact and information flow with supply chain partners results in increased responsiveness and information. The following benefits of information system development for logistics companies are: It improves the ability to convey intricate messages. It leads to organizational structures with greater

information. It lowers market transaction costs. Another benefit is the standardization of data and visuals that decision makers who control physical product flow can use (Yoordijk, 2000).

A logistics information system's concept can be likened to a pyramid, given the way transactions move inside an organization from suppliers to customers. Planning for operations and management is done using data from market transactions. The logistics management information system is crucial to determining how logistics will proceed. The capacity to handle complicated processes has increased due to the information system's ability to conduct transactions, monitor operations, and carry out intricate analysis (Schary & Coakley, 1991).

The transaction cost economics perspective on the application of information systems in logistics transactions is offered. It has been noted that information systems have the effect of reducing costs and increasing information transmission capacity. They expanded this viewpoint by pointing out that the improvement of data innovation is more profitable to outside exchanges with providers and clients.

Real-time information is made possible by sophisticated information technology, such the Internet, and allows for exact order information and flexible logistics. Flexible logistics systems require close coordination between the many organizational units involved in the manufacturing and distribution of a product because of the information interchange afforded by these systems. Information flow serves as a supplement to material flow in these situations because it serves as a substitute for inventory. A supply chain's ability to reduce inventory, meet customer demands faster, and save money on accelerating production and shipping depends on the synchronization of many information flow types, including capacity, demand, inventory, and scheduling. Thus,

enhancing customer service and expanding logistics flexibility need to making cost-effective information technology investments (Q. Zhang et al., 2005).

1.9 The Evolution of e-Commerce Logistics

E-trade logistics, which have grown significantly in the last several years or in the neighbourhood, refers to the most recent major driver of advancement in physical dispersion systems and logistics in industrialized countries. The majority of shippers, particularly multi-channel shippers, are still in the early stages of figuring out what this would entail for their circulation system bases as e-business continues to grow. Now let's examine how logistics have evolved. This advancement has undergone various general stages and considerable changes over time, as follows, from the perspective of appropriation property:

1. During the 1970s, direct transports from suppliers or wholesalers supplied supplies to the majority of retail establishments.
2. In the 1980s, retailers began to plan their shop movements using new allocation centres that they could control.
3. In the 1990s, overall sourcing (for non-sustenance items) boomed, with different retailers making import centres to obtain and modify essentially containerised imports.
4. Starting in 2000, e-exchange started to expand quickly, with unadulterated play (web only) retailers leading the way in the development of e-fulfilment transport infrastructures.

E-Commerce Logistics in Developed Markets

Online retail has grown more in developed nations based on products like design, electronics, and information and communication technology (ICT) than on food. E-business logistics models have sparked a wave of new interest in four specific types of

logistics capacities, where previously purchased goods were regularly circulated through a mail, package, or cargo system:

1. Mega e-satisfaction concentrates on the supply and item-level selection of merchandise. These offices are staffed by a logistics administration supplier or the merchant.
2. Parcel centre locations and sortation centres that organise orders based on postal codes or zip codes in order to deliver them to the appropriate package delivery location for final delivery to the customer's residence or designated collection point.
3. Parcel delivery centres that manage the customer's "last mile" delivery

A well-managed development process whereby the shopping wicker container interface is facilitated by an API, web xml, or other relationship with a transportation organization structure. This allows clients to receive a cautious cost quote for the delivery of larger items that are better suited for modes of transportation other than truckloads. These logistics development elements, such as a TMS, must satisfy near the shopping crate for improved organization;

1. Ability to sort out and track shipment regardless of what mode
2. Online status and documentation for solicitations
3. Online dispatch documentation and receipt, such as a load receipt and bill of filling
4. Parts auto overhaul
5. The existing ERP or SCM structure is seamlessly integrated.
6. Online alerts for important information via relevant or flexible
7. Information structures elaborate on historical data analysis, transportation history, and other topics.

These kinds of e-business logistics systems, considering the aforementioned considerations, ensure that shippers, customers, and 3PL management providers receive the following benefits:

1. Improved correspondence
2. Transparency in the production network
3. Improved consumer loyalty
4. Cost diminishment
5. Improvement in productivity
6. On-time conveyance

In this evolving arrangement, we'll go deeper into the benefits of establishing a successful e-logistics business and structure. But, these are the most important factors to take into account while attempting to set up a system (Vasić et al., 2021).

1.10 The Third-Party Logistics

This idea has to do with the transport service provider, who is viewed differently from the manufacturer and the customer as a third party. Goods and services are transferred from source to manufacturer and manufacturer to final customer. The logistics (third party) supplier supports the supply chain through four primary links.

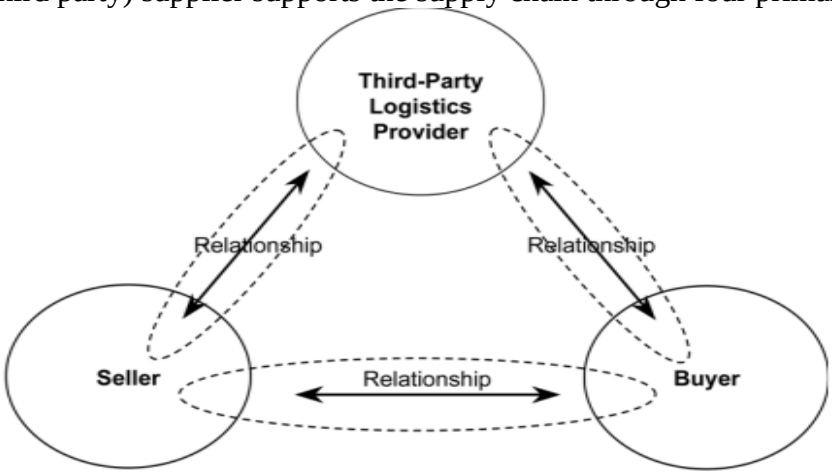

Figure 1.5: Third-party logistics provides

1. **Inbound logistics:** All methods and procedures involved in shipping goods inbound from a supplier's facilities to a buyer's are included in inbound logistics.
2. **Intraorganizational transportation:** These companies use this connection to transport goods and products to and from warehouse storage facilities as well as between production sites within the same organization.
3. **Outbound logistics:** connectivity between a company and its various end users, or clients. The transportation department manages outbound product shipments, while suppliers arrange the transfer of inbound items. The industry delegated this task to third-party logistics once the transportation sector did.
4. **Recovery and recycling:** Suppliers' recovery and recycling of commodities and outdated products from consumers make up the fourth link.

Logistics Functions

Logistics refers to the process by which a company's supply chain moves things from one location to another. Improving the effectiveness of the organization's supply chain depends on the efficient management of this process, which comprises several functions. In logistics, these are the primary functions:

The Services Provided by Logistics Contracting

1. **Fundamental Service Providers:**
    a) Management of warehouses.
    b) Fulfilling orders.
    c) Order completion.
    d) Choosing a transport provider.
2. **Providers of Value-Added Services:**
    a) Order and shipment consolidation.

b) Customs for import and export.

c) Information systems for logistics.

d) Fleet operations and management.

e) Installing and assembling the product.

3. Logistics Integrators:

a) Total accountability for important supply chain functions.

b) Policies for replenishing and filling orders.

c) Returns of merchandise.

d) Restocking customer's inventory with spare parts.

e) Issues with the Third-Party Logistics Market's Growth

The expansion of the third-party logistics market in India is impeded by some operational and regulatory challenges. The main issue mentioned here.

a) The field of third-party logistics is fairly young.

b) Outsourcing logistics is regarded as a weak point in the Indian economy.

c) A significant barrier to the growth of the third-party logistics sector is the ignorance and mistrust of Indian shippers.

d) Subpar facilities.

e) Vigorous rivalry from global businesses.

f) The business of logistics outsourcing has high expenses and little profits.

g) High tax rates.

India's Potential for the Third-Party Logistics Market

a) The potential of this industry has drawn the attention of numerous multinational corporations.

b) Major Indian express freight and carrier companies have begun to engage in logistics operations.

c) Businesses are progressively realising the advantages of using third-party logistics services.
d) A quicker pace of GDP growth in India.
e) The construction of infrastructure has been a priority for the Indian government.

Benefits of Third-Party Logistics Function

A corporation can lower financial risks by saving money on capital investments thanks to logistics outsourcing activities. The big logistics investment, such as physical conveyance channels or data systems, regularly needs a tall and light sump fetched, which involves budgetary chance. It is an advantage of using third-party logistics. Additional advantages are listed below.

1. Let the business concentrate on its core competencies and competitive advantages.
2. Transferring assets to outside logistics companies.
3. No outlay of funds for outside logistical providers.
4. Resource not available internally.
5. Reduce and manage operational expenses.
6. Get rid of the labor issue.

1.11 Role of 3PL Service Providers

In terms of offering "end-to-end" logistical solutions, the role of 3PL service providers is still in its infancy in India. India's logistic service sector is still developing, according to a study undertaken by IIFT (2012). Currently, inland container depots (ICDs), trucking, shipping, forwarding, brokerage, container goods stations (CFS), and other associated activities are contracted out to a core service provider. Transactional,

operational, and repetitive activities are typically the ones that are outsourced most frequently in accordance with global trends (Foundation, 2014).

The evolving nature of India's logistic service industry is shown in figure 1.6.

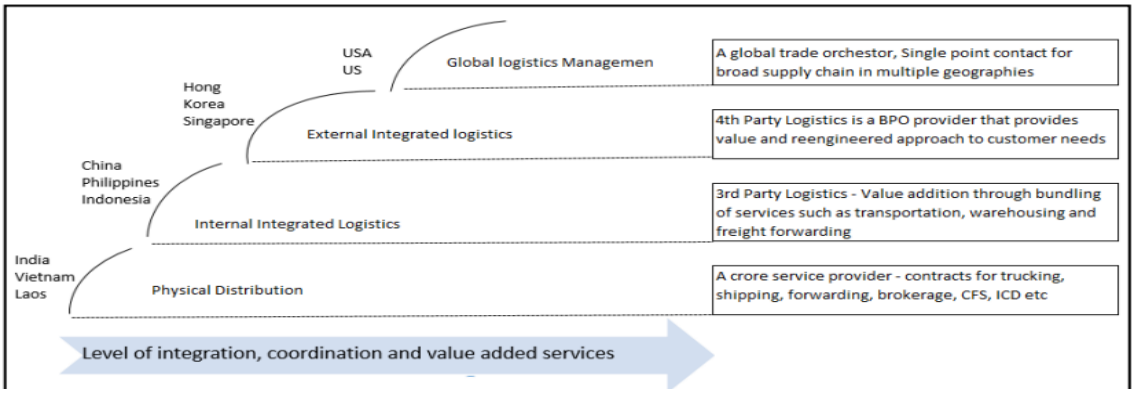

Figure 1.6: Evolving Nature of India's Logistic Service Industry

In its Report on Logistics, the former Planning Commission of India (2007) highlighted the key constraints in the transportation infrastructure and poor logistic management, which cause transaction delays and high transaction costs and hurt India's manufacturing competitiveness. In light of this, economists Deloitte (2012) think that increasing the efficiency of logistics performance through cost-cutting and increasing service levels will pay off in many ways, especially in terms of boosting trade flows within a nation by enhancing its economy's intrinsic competitiveness. "The logistics and SCM in the Indian textile and clothing industry is relatively less oriented in both backward and forward linkages," per a 2008 EXIM Bank Study. This is one of the causes of the Indian textile and apparel industry's lengthy lead times and protracted delivery schedules. To execute orders on time and at a low cost of transaction, the Indian industry must successfully invest in supply chain and logistics management (Sahay & Mohan, 2006).

Types of 3PL Providers

1. **Transportation Based**

- Services include a wide range of logistics options in addition to transportation. Leveraged 3PLs utilise other companies' assets.
- Only parent company assets are used by non-leveraged 3PLs.
- Among them are UPS Logistics, FedEx Logistics, UPS Logistics, Schneider Logistics, and Ryder. Based on Warehouse/Distribution
- A lot of them have prior distribution and/or warehouse expertise.
- A few examples are IBM, DSC Logistics, Caterpillar Logistics, USCO, and Excel.

2. **Forwarder Based**
    - Highly autonomous intermediaries playing the role of forwarders.
    - Companies that don't own assets but offer a variety of logistics services.
    - AEI, Kuehne & Nagle, Fritz, Circle, C. H. Robinson, and Hub Group are a few instances.
3. **Financial Based**
    - Provide tools for cost accounting and control, freight payment and auditing, inventory management, booking, tracking, tracing, and monitoring.
    - Examples include GE Information Services, FleetBoston, CTC, and Cass Information Systems.
4. **Information Based**
    - This segment of the Internet-based business-to-business electronic markets for transportation and logistics services has shown notable expansion and advancement.
    - **Examples:** Transplace, Nistevo (Wanke et al., 2007).

Categories of 3 PL Providers

The simplest type of 3PL provider is the standard 3PL supplier. They would carry out the most fundamental logistics tasks, such as distribution, warehousing, and pick and pack (business). For the most part, these companies are not primarily focused on the 3PL position.

1) **Service providers:** Modern value-added services like cross-docking, customized packaging, tracking and tracing, or a unique security system will be provided by these 3PLs to their clients. These kinds of tasks can be handled by a 3PL supplier that places a significant emphasis on economies of scale and scope in addition to having a solid IT base.
2) **Customer adapters:** these 3PL providers step in at the client's request and essentially take over total command of the business's logistics operations. The 3PL supplier does not provide new services, but they do significantly improve logistics. This type of 3PL service has a very limited clientele.

The customer developers represent the pinnacle of a 3PL provider's capabilities in terms of operations and procedures. When a 3PL provider fully integrates with a customer and assumes control of their whole logistics operation, this happens. Although these suppliers won't have many clients, they will work closely with them on complex projects (Marasco, 2008).

1.12 3PL Pyramid

The necessity for transportation companies to provide their clients with additional services led to the development of the 3PL idea. In essence, 3PL refers to the practice of contracting out transport and logistics tasks to third-party companies that are neither consignees nor consignors. Typically, many tasks are outsourced, such as transportation,

warehousing, and storage. The development of information technologies in the 1990s coincided with the deregulation of the freight transport business, which gave rise to 3PL. The PL Pyramid (8) below, which shows a shift in functions from 1PL to 5PL in terms of transportation and logistics services, could be characterized as such.

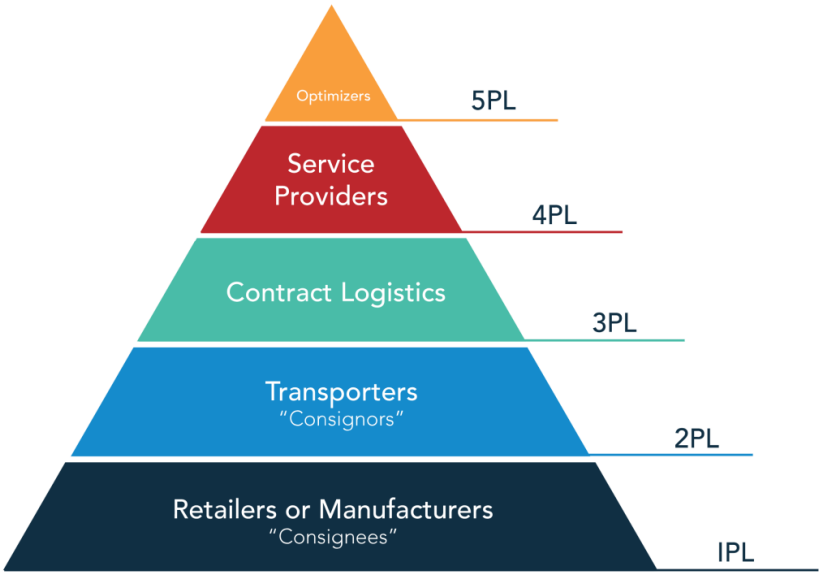

Figure 1.7: 3PL Pyramid

Primarily, 1PLs are small businesses that do most of their buying and selling in one location. A second-party logistics provider (or "2PL") handles just one or a few tasks throughout the supply chain. Common examples of 2PLs in the commodities industry include transportation companies and warehouse operators. The manufacturer's logistics border widens in tandem with the global expansion of the firm. They have poor returns, high asset intensities, and low entry barriers. As the demand for one-stop solutions has grown, many 2PLs have transformed into 3PLs by combining their operations and acquiring new logistics skills. Possession of assets may or may not be relevant. Companies that work in contract logistics or freight forwarding are typically referred to as 3PLs, which is a more generic phrase. Rather than offering a cheap, non-differentiated transportation service, its value addition is based on knowledge and experience, and it

manages all or most of a client's supply chain logistics duties. 3PLs frequently have limited assets and high returns. The coordination 4PL supplier serves as a sort of point of contact or coordination integrator for the manufacturer's coordination outsourcing needs. They are mindful of arranging with different 2PL and 3PL sellers in expansion to organizing and overseeing such end-to-end arrangements. The producer may also advantage of high-value counselling administrations from the 4PL supplier due to its broad information on the supply chain, solid coordination, and IT capabilities. The majority of 2PL businesses want to become 3PLs in order to maximize returns. Even though 2PLs may have outsourced the majority of their capacity needs, 3PLs still possess some assets, such as a small fleet of vehicles to handle last-minute requests or significant distribution centres in prime locations. Because of this, 3PLs focus more on logistics solutions and are less asset-intensive. They do this by looking for the optimal combination of assets from capacity providers (i.e., 2PLs). Companies become more counter-cyclical as a result of their logistics management competence; the harder the cycle, the more supply chain optimization is required. Furthermore, 3PLs are closer to the customer's operations the more integrated their service is.

The proximity of the 3PL provider to the customer turns them from suppliers into partners, making them indispensable. Compared to a 2PL, a customer is less likely to switch 3PL providers. There are instances where 3PL and 4PL services are similar. Due to the fact that 4PL companies charge advisory fees, this market is more lucrative. Currently, 3PL businesses are attempting to transform into 4PL businesses in order to provide their linked clients with higher levels of customer satisfaction. Value-added services include application solutions, financial services, order tracking and tracing, logistics consultancy, information technology integration, planning, and transport planning provided by 4PL, an extension of 3PL. We might conclude that the growth of

3PLs served as the foundation for 4PL. However, the goal of each of these tasks is to improve the customer relationship. A 3PL business's function is to transport the items from the consigner to the consignee on behalf of the logistics company and its consigners. In order to be a 4PL service provider, 3PLs must find ways to forge close bonds with their suppliers in addition to performing the aforementioned supporting function. There is also a fresh take on the logistics idea, which could be referred to as 5PL. The 5PL arrangements centre on advertising total coordination arrangements for the full supply chain. Supply chain administration, or SCM, is the integration of the exercises related to the stream and change of merchandise within the particular coordination systems through progressed supply chain connections based on a shared collaborative execution estimation system. SCM is done to gain a competitive edge and to obtain close, cooperative, and well-coordinated network relationships (Ballou, 2004).

1.13 Growth of 3PL Industry in India

In India, the 3PL industry started to require off within the late 1980s and early 1990s. Worldwide coordination’s heavyweights driven the advertise to supply these services to the Indian auxiliaries of multinational enterprises within the car, electronic, and fast-moving buyer products businesses. Following the lead of their parent companies, Indian subsidiaries of multinational corporations operating in various industries started to contract out a portion of their logistics duties to these specialized service providers. Although small in the early years, the liberalization of trade and legislation began to propel the Indian 3PL industry's growth around 2000. By the year 2010, there were about 1200 participants in this industry. Three main tiers comprise the Indian 3PL industry: National Major 3PL companies that operate across the country, Territorial 3PL companies that are well-established in one or two districts, and Little Farther 3PL companies.

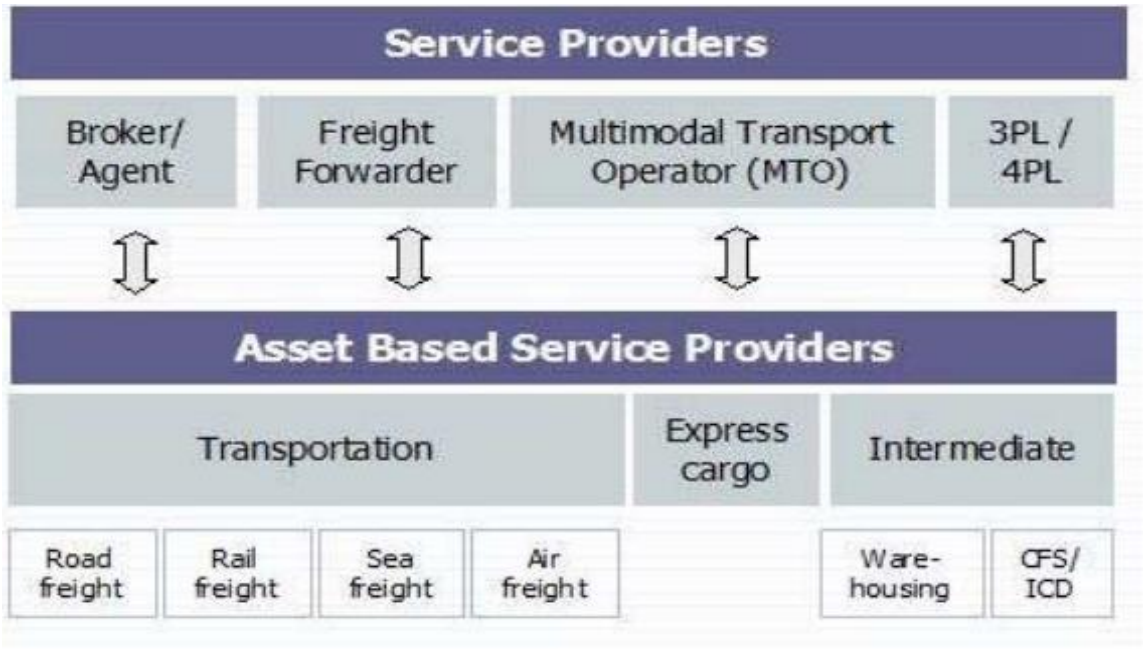

Figure 1.8: India's Logistics Landscape

1.14 Evolution of 3PL providers in India

Trade has been the prime driver of human development. The oldest and most vital occupations in history are those that facilitate trade and the movement of cargo. The majority method for moving cargo from one nation to another is now by sea. Some cities became important trading hubs because of their excellent harbors. There were established policies and processes that controlled the movement of cargo both inward and abroad. To collect cargo tax at entrance ports, the Treasury Department was present (Fernando et al., 2023).

The work of handling cargo became more and more professional as trading activities increased. The cargo professionals who made cargo movement easier turned into essential players in international trade, going so far as to collect customs duties. By the late 1700s, the name "Muccadam" had come to describe the trained workers who guided the unskilled laborers in handling the clearance and shipping of cargo at the

harbor. Three types of individuals who were subject to Customs regulations handled the customs clearance of cargo at ports in the early 1900s. The earliest known category was Dalals. The documents have to be prepared and processed at customs by them. Muccadams were responsible for the actual physical handling of cargo, as was already mentioned. The Sea Customs Act of 1878 permitted Clearing Agents to function as both Muccadams and Dalals, making them the third type. In addition, they were authorized to sign customs paperwork on the merchants' behalf. The Ocean Traditions Act was passed, to begin with, taken after by the Indian Flying Machine Act and the Arrive Traditions Act in 1924.

Clearing specialists were bridging the hole between traditions, ports, and vendors by the 1930s. After freedom, the government put moment limits input, which made life troublesome for Custom House Specialists. Within the 1960s, the Unused Traditions House Specialists Permitting Rules were created. The licensing authorities believed that agents who handled goods valued at crores of rupees, including customs revenue, ought to be held more accountable. Dalals, Muccadams, and Clearing Agents' distinct identities were suggested to be combined into a single category known as "Custom House Agent" in the new rules. Clearing agents gradually lost their identity as a result of the licensing laws changing, and they began referring to themselves as "Custom House Agents."

Custom House Agents assessed the volume of trade policies related to import and export, whereas importers and exporters focused solely on the products they directly dealt with. The Traditions Obligation Tax and Exim Arrangement were vital archives for specialists to ended up commonplace with. It was suggested by the Parliamentary Customs Reorganization Committee that Customs Law be taught to Custom House Agents and their employees. Page 21 This resulted in the Custom Agents Licensing Regulation Act introducing strict examination standards for agents. In addition to their

usual duties as Custom House Agents, agents had taken on the responsibility of delivering freight from the site of manufacture to the final location of consumption by the early 1970s. Document issuance and processing from the cargo's point of origin to its destination started to become routine over time. The clients desired a single contract covering all modes of transportation. Sixteen years after Malcolm McLean's containerization concept revolutionized the fundamentals of cargo transport, containers were first adopted in India in 1973.

Cargo booking agents and cargo transporters were becoming more like custom house agents. They developed into a significant source of cargo for the global transportation network. Considering their power over the cargo, the agents influenced a number of aspects, including the insistence on cautious and efficient handling and appropriate scheduling at the most reasonable cost. In India, containerization was starting to take hold by early 1980. Consolidating cargo was first done by Custom House Agents for a single buyer who was sourcing from several vendors. They started out as buyers' consolidators by offering these new services to importers in other nations.

The range of services performed by Custom House Agents increased by a factor of two as a result of the first ICD opening at Pragati Maidan in 1983 and the government's five-year plans to build new ports and ICDs. Customers began pressuring agents to open offices in locations where containers were transferred. In order to service their cargo, the agent was also required by the global customers to have an abroad partner. Custom House Agents now have additional obligations in addition to their usual duties, thanks to the emergence of various agency roles at shipping lines, road lines, ICDs, CFSs, etc (Karia, 2022).

By the conclusion of 2004, the cargo industry had seen the development and extension of an unused lesson of cargo intermediates as a result of the continuous

changes in international cargo transportation by air and sea. These new breeds became involved in warehousing, distribution, transportation, and customs clearance, among other facets of cargo handling. A new set of Agents, now termed 3PL operators, started to emerge as a result of this, revolutionizing the Custom House Agents trade. Still, they went on with their main business, which was cargo clearance through customs.

The Trade began to distinguish between these two types of Custom House Agents and required that Agents enhance the value of their services. New tariffs were established as a result of the increase in container traffic in addition to cargo freight. These increased fees disrupted the operations of Custom House Agents, who acted as middlemen between the carrier and the EXIM trade.

With India's economic boom beginning in the early 2000s, Transportation of goods from a manufacturer's factory to the port, processing customs formalities, arranging transportation to the destination port, and door-to-door delivery from the port of cargo to the ultimate recipient of the cargo are now the four steps in the cargo moving and transporting process. This process was made easier by the use of containers and a novel technique for workshop stuffing and destuffing goods at places distant from seaports. Non-Vessel Owning Cargo Carrier (NVOCC), an American term, has become a catch-all for these new cargo carriers (Winkelhaus & Grosse, 2020).

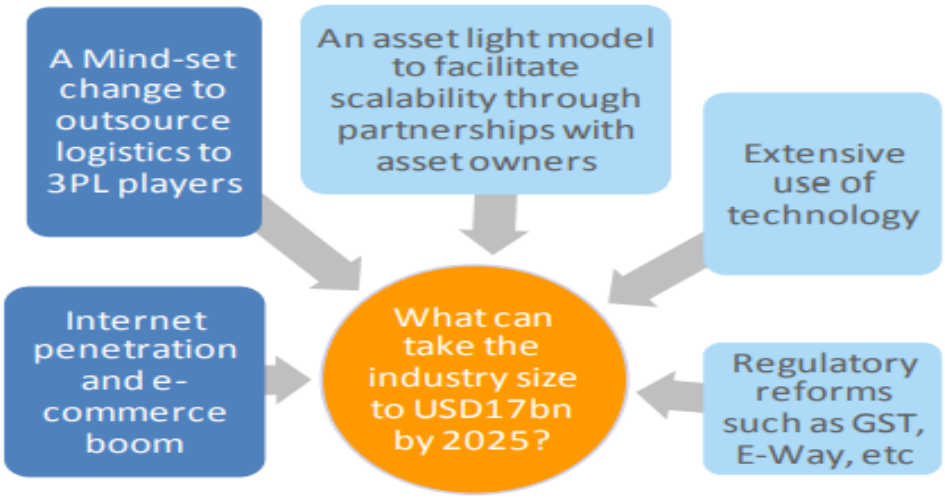

Figure 1.9: Key demand drivers & enablers for 3PL

Key players

For packages up to 35 kg in weight, Speed Post, the express division of India Post, the government of India, offers both local and international shipping options. It is without a doubt the market leader in the domestic express sector and has the greatest pin code coverage in India.

It is crucial to identify players with knowledge of the corresponding parts in accordance with the industry classification of surface express and air express.

In comparison to its rivals, Blue Dart Express, a global leader in air express cargo, employs a distinct business strategy. Blue Dart operates a very capital-intensive business strategy and possesses six aircraft that it utilizes to carry out air cargo transportation. For last-mile delivery, it oversees a vast network of partners for Surface Express. Blue Dart, a DHL group firm, has long been known to the public for its punctual delivery services.

One of the most reputable pan-Indian players in the surface express business is TCI Express, which was separated from its parent corporation, TCI - Trans Port Corporation of India. Although it operates in the air express market as well, surface

express—more especially, B2B business—is its primary focus. Surface Express's B2B deliveries to small and medium-sized businesses account for half of its income. TCI Express has had remarkable growth in the last few years by utilizing the relationship that TCI has fostered over the last 20 years. In order to serve its customers, it uses a hybrid business model in which it rents some trucks and owns others.

Similar to TCI Express, GATI is a surface express company that specializes in providing time-sensitive delivery services. It also serves the e-commerce sector and has been expanding that business by taking advantage of India's rapidly expanding e-commerce market.

The express sector is dominated by DHL, UPS, and FedEx, all of whom have been extending their footprint in developing nations. With the newest technological advancements in their service offerings, they have a strong presence in India, providing pick-up and delivery services at reasonable prices.

The captive logistics division of Amazon India, ATS, has been rapidly growing its footprint in India. In order to accommodate peak loads and increased demands from tier II and III cities, it has been increasing its storage capacity by increasing its presence in 13 states through the creation of fulfilment centers (now 67), which are managed by delivery service partners, and providing timely deliveries to customers. For its parent business Flipkart in India, eKart has similarly been providing express shipping services. Ekart's partnerships with external clients have allowed it to lower Flipkart's shipping costs. It now serves more than 7,000 pin codes throughout all of India (Fernando et al., 2023).

Outsourcing and Evolution of 3PL

In the Council of SCM Professionals Glossary, "A firm [that] provides multiple logistics services for customers" is characterized as a third-party logistics (3PL) organisation. The provider should "bundle," or combine, these services. The Supply

Chain Administration Board has determined Experts (2017), 3PLs' fundamental administrations incorporate transportation, warehousing, cross-docking, stock control, bundling, and cargo sending. Bartolacci et al. (2012) have noted that 3PL facilitates the linkage between the product's production site and its consumption location. An economy's foundation is provided by 3PL services, which make it easier for other commercial sectors to transport goods and services in an efficient and cost-effective manner. The notes that by offering time and location utility, 3PL businesses greatly boost an organization's competitiveness and create value. The major goal of global 3PL service providers is to provide additional design flexibility in addition to typical low-cost, high-quality, reliable goods. With the introduction of the just-in-time method, manufacturing efficiency rose and supply chain cycle time fell (Lummus & Vokurka, 1999) According to manufacturing research, corporations aim for mass production opportunities with minimal production costs, which explains why emerging economies are becoming manufacturing hubs for Western-based organizations. As a result, the 3PL industry has expanded in both industrialized and developing countries. The study revealed the potential for work-in-progress inventories to lower production costs while improving quality, as well as the advantages of working with both internal and external groups.

1.15 Performance management of 3PL service providers' and service users

What constitutes an organization's "performance" in carrying out its primary functions and producing revenue is the character and quality of those operations. Venkatraman and Ramanujam, (1986) defined operational and financial success as the two main dimensions of business performance. The success of a firm in providing consumers with high-quality, timely, and responsive service is correlated with its operational performance. According to some academics, the proposed operational performance can be separated into two primary dimensions: The efficiency of services

and expenses (Huo et al., 2008). Price and cost are associated to cost performance, whereas SERVQUAL factors—response, tangibility, empathy, and assurance—are related to service performance.

a. **Tangibility:** The physical attributes of buildings, machinery, and employees.
b. **Reliability:** The ability of the service provider to fulfil service commitments accurately and reliably.
c. **Responsiveness:** The ability of the service provider to assist clients and offer timely assistance.
d. **Assurance:** The expertise, civility, and capacity to inspire confidence in service provider staff members.
e. **Empathy:** The ability of the service provider to respond to each unique service user with compassion and attention.

1.16 Problem Statement

Considering its significance to the Indian economy, the surface coordination industry is hampered from achieving its full potential due to a number of issues (Mathews, 2023). Wastefulness and destitute development within the segment can be credited to an assortment of issues, including inadequate framework, insulant utilized mechanical progress, and a nonappearance of subsidizing (KPMG, 2007). In addition, the advent of third-party logistics (3PLs) adds complexity by requiring seamless communication across the supply chain, addressing a variety of client requirements, and outsourcing logistics operations. The vast array of third-party logistics services that are accessible, from shipping and storage to value-added choices like packaging and order fulfilment, exacerbates these challenges. In addition, third-party logistics providers are essential to enhancing logistics processes, cutting expenses, and providing businesses with a competitive advantage. Their ability to streamline processes, alter supply chain

dynamics, and quickly adjust to shifts in customer demand is what makes them so important to the industry (Cleo, 2023). The reason for this investigation is to bridge an information crevice within the Indian surface coordination industry by finding, measuring, and making sense of the sector's execution setbacks. This sector's destitute execution is the result of a complex interaction of inside and outside strengths. This ponders points to do more than fair draw consideration to issues; it is too extreme to propose a long-term arrangement of activity. Its objective is to layout approaches and conceivable outcomes that will permit the industry to reach its full potential whereas to assembly the changing needs of an energetic economy. This ponders points to bridge crevices in our understanding of India's huge and changed landscape's calculated issues. It gives brilliantly arrangements to logistics segment issues to form the Indian coordination's industry more proficient, competitive, and feasible. The Research Questions for this Research are as follows:

- **RQ1:** When it comes to India's surface logistics industry, what are the most important internal and external performance drivers of Logistics Service Providers or third-party logistics (3PL)?
- **RQ2:** How will factors like economic growth, globalization, and rising market dynamics affect the Logistic Service Provider of India's surface logistics business in the next years, and what are the trends and prospects for this sector?
- **RQ3:** In light of these trends, what recommendations can be made to improve the effectiveness, competitiveness, and sustainability of third-party logistics (3PL) in India's surface logistics sector?

1.17 Research Purpose and Objectives

Understanding the performance determinants and future growth potential in the Indian surface logistics sector is central to this study's overarching objective. The

objective of this study is to enhance India's economic growth and competitiveness by offering valuable insights that can optimize the sector's efficiency, effectiveness, and sustainability through meticulous analysis and strategic evaluation. The following are the research's objectives:

- To identify and classify the most important internal and external drivers of Logistic Service Providers affecting the efficiency of India's surface logistics industry.
- Examining the current scenario & state of operational excellence for LSPs in the existing Indian surface logistics industry, including strengths & weaknesses in existing practices.
- Assessing the impact of digital technology, government policies, environmental sustainability, and supply chain resilience on operational excellence in LSP
- Investigating how human resource management & skill development play a role in achieving operational excellence in LSPs.
- To analyze and predict the forthcoming growth of logistics service Providers in India's surface logistics industry.
- To make strategic recommendations for taking advantage of growth prospects, depending on the findings.

1.18 Research Hypotheses

1. **Null Hypothesis (H01):** Operational efficiency and technology adoption do not significantly impact the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.
    - **Alternative Hypothesis (H1):** Operational efficiency and technology adoption have a significant positive impact on the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.

2. **Null Hypothesis (H02):** There is no significant impact of Classifying Important Drivers on the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.
    - **Alternative Hypothesis (H2):** There is a significant impact of Classifying Important Drivers on the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.
3. **Null Hypothesis (H03):** There is no significant association between the performance of Logistics Service Providers and their company size and experience.
    - **Alternative Hypothesis (H3):** There is a significant association between the performance of Logistics Service Providers and their company size and experience.
4. **Null Hypothesis (H04):** There is no significant association between the future prospects of Logistics Service Providers and anticipated changes in government policies.
    - **Alternative Hypothesis (H4):** There is a significant association between the future prospects of Logistics Service Providers and anticipated changes in government policies.
5. **Null Hypothesis (H05):** There is no significant association between the future prospects of Logistics Service Providers and the integration of technology & real-time data analytics.
    - **Alternative Hypothesis (H5):** There is a significant association between the future prospects of Logistics Service Providers and the integration of technology & real-time data analytics.

6. **Null Hypothesis (H06):** There is no significant relationship between the identified factors and future growth prospects of LSPs in Indian surface logistics sector
    - **Alternative Hypothesis (H6):** There is a significant relationship between the identified factors and the future growth prospects of LSPs in the Indian surface logistics sector.

CHAPTER II:

REVIEW OF LITERATURE

2.1 Internal and External Performance Drivers

Logistic Service Providers (LSPs)

Abbasi & Nilsson (2016) investigated various themes and challenges associated with the development of environmentally sustainable logistical activities. This research used an exploratory approach using a cross-sectional design. The study focuses on ten case studies of logistics service providers (LSPs), the majority of which are headquartered in Scandinavia. By analyzing current and upcoming efforts in the development of ecologically friendly logistical operations, the results emphasize the major issues. In addition, four other types of hurdles have been recognized: technical and regulatory issues, network inequality, corporate difficulties, and consumer preferences. Clearly, a comprehensive strategy is required, which must incorporate the input of LSPs and product proprietors in the analysis and design of future logistics configurations. The proposed generic and integrated model emerges from a concurrent engineering framework with three dimensions and offers novel avenues for further research. Enhancing the relationship between LSPs and their clients in order to develop more sustainable logistical solutions requires additional study.

This research conducted by Busse & Wallenburg (2011) were to accomplish the goal of laying a firm groundwork for future research on logistics service providers' (LSPs') innovation management practices. The study's premise was reinforced through conceptual debates and a content analysis of the present literature. Further investigation is warranted regarding innovation as it pertains specifically to LSPs. Although the current corpus of knowledge regarding innovation management by LSPs is considerable, it lacks

coherence. A more comprehensive understanding of the innovative systems and processes employed by LSPs necessitates further investigation.

Schmoltzi & Marcus Wallenburg (2011) wanted to offer a thorough examination of the reasons, organization, and performance characteristics of collaborative partnerships among logistics service providers (LSPs). They distinguish between the many forms of logistical cooperation that make up the logistics landscape using an analytical categorization approach. Managers of German LSPs provided information about horizontal LSP cooperation. A variety of unit and multi-variate statistical methods were applied to the analysis of a dataset comprising 6,081 parties and 226 cooperatives. Of all LSPs, 57% use horizontal collaboration with other LSPs as one of their organizational types. The primary drivers of cooperation are the objectives of the external market. There are six clear-cut types of cooperation. Their disclosure highlights the prevalence of multi-lateral and multinational networks mostly established via commercial contracts. Partners with comparable market skills and good functional integration are strongly preferred. Although these cooperation's are inherently complicated, their performance is commendable, with a failure rate of less than 19 percent. This makes them far more stable than cooperation's inside industrial sectors.

Centobelli et al. (2017) did a comprehensive examination of the environmental sustainability problem in the LSP market in order to assess the literature's progress and offer pertinent research subjects for additional study. Two scholarly databases were used to conduct the review of the literature, which covers the years 1960–2014. The analysis reveals that certain research topics are still being overlooked, even in spite of the growing volume of publications on the topic. Specifically, the study indicates six significant gaps in the literature regarding green initiative categorization, green initiative effects on LSP performance, sustainability outcomes evaluation, factors driving green initiative

adoption, consumer viewpoint in sustainable supply chain, and green initiative supporting ICTs.

Colicchia et al. (2013) presented the results of an empirical study that aimed to fill this knowledge gap about the contract logistics industry's use of environmental measures. In addition, the article delves into the elements that encourage or discourage the implementation of environmental performance indicators. Through a thorough examination of existing literature, a comprehensive framework was created to pinpoint the various efforts made by companies in the logistics and transportation sectors to promote sustainable development. In recent decades, environmental preservation has garnered substantial interest from scholars and professionals alike. Operations that offer logistical services may have a major impact on lowering the supply chain's environmental impact. Although there is a growing corpus of study on these topics in the literature, LSPs have not been involved in many of these studies. After the method was applied to evaluate the environmental reporting of ten LSPs, three institutions were selected for in-depth interviews. This research analyses the environmental sustainability programs that well-known international LSPs have put in place and assesses the level of success that has been realized thus far.

Rossi et al. (2013) examined the state-of-the-art methods used by LSPs for eco-efficiency, together with the learning ability and systemic approach needed to attain eco-efficiency in supply chains. Their inquiry was based on the information gathered by using a systematic technique to determine the most perticutting-edgenent aspects for the analysis. Through in-depth interviews and case studies, they analyzed patterns and changing models while examining the phenomena under examination. Interest in sustainability has grown as more people look for economical, efficient solutions that are also safe for the environment. Creating solutions for an eco-friendly supply chain,

however, is sometimes hampered by enterprises' inability to control the whole supply chain; to get around this, they may need outside assistance from LSPs. Eco-efficiency, logistics innovation, and logistics service providers are three different but interconnected areas of study that are incorporated in this methodical study to enrich the existing knowledge database. As mentioned previously, LSPs have significant chances to start original eco-efficiency projects, nevertheless, the results of interviews reveal that there are numerous challenges that hamper such ambitious tasks.

Cichosz et al. (2020) sought to identify challenges and decides what organizational elements are crucial in the DT process and how these challenges must be managed in order to achieve efficient DT at LSPs. This investigation adopted the following research methodology: The study consisted of two phases; 50 students completed Stage One. Traditional and large LSPs are under pressure to digitally reinvent themselves as a result of the dramatic shifts in the logistics industry's competitive landscape brought about by the rapid expansion and improvement of digital technology. Due to the stagnation or slow furtherance in the DT progression in some LSPs, the first stage is therefore aimed at performing a literature review. Stage 2 focuses on data collected from nine international and global LSPs through the evaluation of several cases. Accordingly, based on the practice, this study defines DT and reveals eight success factors, five inhibitors, and associated leading practices of DT in the context of the logistics service sector. Various challenges are present in LSPs that are mainly caused due to less availability of resources and a complex logistics network. On the other hand, the degree of DT vision and the proper attitude of the leader, who is able to create the combination of a coherent DT vision and the corresponding organizational culture, can be considered as success factors of LSPs.

Bealt et al. (2016) investigated Leaving aside the most specific matters concerning the facilitators and inhibitors of cooperation between HOs and LSPs, this research aims to broaden understanding of the advantages and/or shortcomings of operations related to humanitarian disaster relief operations (DROs). In an effort to determine their status, players specify traits that impact cooperation. Methods from both quantitative and qualitative research were used in this study. In addition to the results of the online survey with the chosen participants, some analysis was also conducted. Data analysis was done, which involved several statistical tests and descriptive techniques, information visualization, and qualitative data analysis. Findings were double-checked by interviews and a follow-up survey with LSPs. Several DRO participants provide their perspectives in this publication, which also highlights challenges in HO/LSP collaboration. These challenges are detailed along with potential ways to overcome them.

Govindan & Chaudhuri (2016) found links between the dangers third-party logistics service providers (3PLs) encounter when a client of theirs employs DEMATEL. Fresh insights are produced by analyzing risks inside and across categories, as well as by creating threshold values to priorities hazards. The results indicate that the customer's distant relationship with the 3PLs significantly impacts other risks. It is evident that cooperative partnerships between 3PLs and their clients are necessary. Furthermore, the investigation indicates that 3PLs' internal procedures might need some improvement, namely in the areas of quality control, operational flexibility, and service coverage geographically.

Meidutė-Kavaliauskienė et al. (2014) looked at how satisfied customers are with logistics services, specifically focusing on how good they are. This activity is a component of the service business, characterized by the fact that the provision of a

service is driven by consumer demand and its acknowledgment is based on customer satisfaction. Logistics companies that want to stay ahead of the competition know that customer happiness is key to their success. If they fall short of consumer expectations, they risk losing market share to companies that put their clients' needs first. So, whether it's accepting orders, carrying them out, or solving problems, logistics firms must prioritize all aspects of customer service. Client faith that the chosen logistics provider understands their needs is critical. So, the study presents the results about the quality and satisfaction of logistic services from the perspective of the client.

Rajesh et al. (2012) examined the requirement for an inclusive array of financial and non-financial metrics that managers employ when making decisions concerning 3PL service providers. There exists a significant research void concerning the formulation of balanced scorecard (BSC) strategies that are specific to the 3PL service provider sector, despite the considerable deliberation in both academic and industry circles concerning the development of a BSC for this industry. To address this deficiency, this study proposes a comprehensive framework that incorporates tactics for all four of the balanced scorecard BSC perspectives, thereby harmonizing with the varied functions of 3PL service providers. The weights allocated to these strategies are established via Delphi analysis, thereby augmenting their practicality and pertinence. Furthermore, they explored the pragmatic execution of the suggested framework within a 3PL organization, providing significant contributions to the field of practical implementation and modification.

Third-Party Logistics (3PL)

This research conducted by Anderson et al. (2011), examined how organizations choose logistics service providers to meet different consumer needs. While supply chain partners are often selected by companies based on their distinct value propositions,

logistics service providers sometimes struggle to understand the disparities in the value that customers place on different service components. This research discusses this difficulty by identifying key elements impacting clients' logistics service provider selections. The study utilizes stated choice techniques to evaluate the comparative significance of seven service features. It gathers insights from a sample of 309 managers who are actively engaged in procuring logistics services in different sectors and countries. The results show that there are three distinct decision models and that customer preferences for logistics service characteristics, such pricing and delivery efficiency, vary significantly between the various customer groups that these models represent. The results have important strategic implications for third-party logistics providers. They provide a logical basis for establishing operational objectives, particularly when it comes to choosing which client groups to focus on.

In this study, Liu & Lyons (2011) sought to determine whether third-party logistics (3PL) firms in Taiwan and the United Kingdom provide comparable services and if so, whether this correlates with their level of competence. Based on the poll data, the study looks into what services 3PLs provide that are most important and how well they do their jobs. Notably, the results show how important managerial quality is compared to providing a lot of services. The study also shows that the variety of services 3PLs offer does not directly affect how well they do financially. Instead, 3PL companies that match their services to what their customers want are likely to have better financial results because their operations will be more efficient. There are also some links and differences between how logistics are done in the UK and Taiwan that were investigated.

In this study, Zacharia et al. (2011) examined how 3PLs function as orchestrators by gathering empirical information via scheduled interviews with business leaders connected to a well-known 3PL. The purpose of this study is to add to what is already

known about the strategic contributions made by third-party logistics providers to SCM. The main purpose of this research is to analyze how third-party logistics providers (3PLs) are currently functioning in the modern supply chain and how the increasing importance of connectivity and communication has expanded their role beyond that of traditional logistics service providers. Seven concepts which form the base of the theoretical model are determined under the direction of a substantiated synchronous investigation, which is based on the theoretical approaches of transaction costs economics, network theory, and the theory of resources.

Ekeskär & Rudberg (2016) looked into and assessed the consequences involved are those that the implementation of a third-party logistics (3PL) provider in a large construction project. Based on the context of the construction industry and focusing on TPL's role as the SCM enabler, the study identifies potential challenges and the push factors related to TPL usage. The data for this investigation is grounded on a review of literature and an exploratory case analysis of a large-scale hospital construction project in Sweden. In the current project, it has been assumed that the procurement and material management on-site has been devolved to a TPL provider by the client and the principal contractor. According to the study's results, there are benefits to building a good relationship between the construction site and the supply chain. Thus, the results indicate that the TPL solution leads to better management of site resources, lower costs, and overall increased organizational effectiveness. However, a significant concern arises: the research indicates that the involved stakeholders lack sufficient knowledge regarding SCM to effectively utilize the TPL.

Hofmann & Osterwalder (2017) investigated the impact of digitalization on 3PL business models. They examined the difficulties encountered by logistics service providers using an open-ended analytical approach that combines insights from

innovation and digitalization examine with Porter's five forces. Significant digital disruptions are posed by emerging technologies including 3D printing, platform-based business models, sharing economies, and driverless cars. According to their analysis, there are three significant changes in the competitive landscape for 3PLs. First and foremost, individuals who prioritize standard services may face significant declines in their market share. Furthermore, external competitors are now providing more management-related 3PL activities, which could potentially diminish the role of 3PLs to simply being forwarders. Finally, digitalization makes it easier for 3PL customers and suppliers to integrate into their own services. In addition to these challenges, Additionally, they investigate the possible prospects that emerge as a result of digitalization. All of the previously mentioned advantages include the ability to tailor standardized logistics services, the availability of cloud-hosted logistics services, the use of platform-based systems to enable asset and logistics infrastructure sharing, the concept of a "physical internet" as a transportation system, and the integration of 3D printing into well-established 3PL business models.

This study conducted by Leuschner et al. (2014), Using a meta-analysis to objectively review the empirical literature and thoroughly investigate relevant topics, the authors of this study present a comprehensive review of the increasing interest in 3PL during the past 20 years. Thus, based on research of 54 samples obtained from 69 Peer-Reviewed Scientific Journals, containing 9386 observations, transaction cost economics and the resource-based technique for constructing the structural model are proposed. This model looks at the complex interactions between logistical customer service, social governance framework, and business performance. In addition to this, the study finds and analyses more connections, which helps us understand the different results found in

previous research. The study not only shows important results from the meta-analysis, but it also shows how future 3PL research should go based on those findings.

This study conducted by Gürcan et al. (2016) aimed to tackle logistics supplier selection decision for a firm based in Istanbul with the consideration of the struggle that arises from modern globalization. In particular, the increase in the rate of technological advancement has brightened the IT industry and has created a world of opportunities in terms of market situation, goals, and options. This is because in the current world economy business organizations are compelled to focus on their areas of competence. The research builds a model for choosing 3PLs using the Analytic Hierarchy Process (AHP), a well-established method in decision-making. This method takes into account both quantitative and qualitative aspects. By evaluating the outcomes of the AHP study, suggestions for the selection of the 3PL provider may be made, simplifying the otherwise complex task of finding a logistics service provider in the international market.

The main goal of Shi et al. (2016) looking at Third-Party Purchase (3PP), a newly-recognized value-added service, and its providers are the focus of this research. An introduction outlining the goals of the specific 3PP service model under investigation is the first section of the study. Thus, the conceptual model is incorporated in order to operate and elaborate on the value propositions regard to 3PP, and it is constructed out of many ideas. Drawing on survey data from 245 Chinese 3PL suppliers, this paper employs structural equation modelling to analyze the propositions. They show that variables like transaction quantity, order frequency, and variability significantly affect the third-party logistics service from the perspective of 3PL service providers. Crucially, there isn't any discernible relationship with asset specificity. Also, the study established that 3PL services are associated with benefits accruing to the 3PL supplier and the perceived value to the client. The significance of 3PP as a novel value-added service that benefits both

parties is highlighted in this study, which adds insightful information to the body of knowledge already in existence. It challenges the traditional emphasis on using transaction cost analysis to assess core 3PL services.

Regarding services provided by Third-Party Logistics (3PL), Yeung et al. (2012) looked at the intricate relationships between competitive advantage, logistics outsourcing, and business success. In order to strengthen organizations' capabilities, this research investigates the strategic route of logistics outsourcing as a mediating component in the strategy–performance nexus. A comprehensive research model is constructed in this study, which is grounded in the outsourcing-competitive advantage performance paradigm and the firm's Resource-Based View (RBV). The concept is investigated by structural equation modelling and data respectively on 150 exporters from the Pearl River Delta area of China and Hong Kong. The results confirm that competitiveness of the exporters and exporters' performance in exports, basic and enhanced capabilities of the 3PL providers and the extent of strategic inclination of exporters towards these providers are positively interrelated. The research also identifies that exporters' competitiveness and the upgraded competency of 3PL providers serve as strong moderators, thus substantiating the RBV-based theoretical model analytically.

Hofenk et al. (2011) conducted a study to examine its original propositions on how relational and contractual parameters relate to the performance of logistics outsourcing agreements. It is actually an emerging field of disciplinary research interest as well as technology implementation. As part of the study on 3PL consumer-supplier interactions, the paper explores the relevance of normally established attributes including commitment as well as trust alongside with the formality of the contract. To back up the study's conclusions, the researchers used Partial Least Squares (PLS) route modelling. In the 3PL category, both suppliers and customers are given questionnaires. This study

reveals that the relationships between commitment and trust respectively, and between these commitments and contract formality, are beneficial to the effectiveness of customer-provider and LSP cooperation. In terms of the level of thoroughness of attained bargains, there are rather significant differences. however The model, which makes use of PLS route modelling, accounts for 60% of the variation in relationship efficacy for customers and 59% of the variance for LSPs. The research comes to the conclusion that successful supply chain cooperation requires striking a balance between "hard" contractual factors and "soft" relational characteristics. The study's theoretical and managerial ramifications are emphasized in the abstract.

In order to improve supply chain efficiency, Giri & Sarker (2017) conducted an analysis to find out which method can be implemented to align the monopolistic producer, a TPLSP and numerous independent merchants. In the current SCM scenario where the speed and flexibility of response to market change have become critical parameters, Third-Party Logistics or TPL has become vital notch big because it enables a business to outsource all or part of its logistical functions. The primary objective of the study is to analyze potential disruptions in production at the origin, and flexibility of the retail demand considering the high sensitivity of the latter to retail pricing. The study proposes a paradigm that includes buyback and revenue-sharing contracts and is deliberately intended to manage the decentralized supply chain. Strategic choices by relevant parties to boost profitability are considered. A numerical analysis shows that production interruptions and TPL services affect supply chain performance. The study also examines how repurchase and revenue-sharing arrangements might reduce disruptions, depending on disruption likelihood.

This research was carried out by Ha (2013) with the intention of examining the criteria, variables, and their relative relevance that impact the international logistics

industry's third-party logistics decisions made by shippers. This study used the Analytic Hierarchy Process (AHP) technique to suggest how third-party logistics might improve certain aspects and operations. The questionnaires were delivered to the shippers that are into international logistics business with the aim of finding out the factors that dictate their choice of 3PL providers. Previous studies were reviewed and materials pertaining to the ever-changing logistics industry environment were also collected and analyzed. By iteratively choosing and categorizing candidate factors using prior research data, the Delphi approach was used to produce attribute factors. The following insights are revealed by the analysis results: They found that logistic service was more important than logistic cost in conflicts. When we compared logistic cost to corporate capability, logistic cost was considered more important. This comprehensive evaluation found that logistic service factors like order accuracy, consistency of service, shipping damage and reimbursement degree of promise fulfilment, transportation quality and problem-solving skills were very important.

Mothilal et al. (2012) presented new viewpoints and specified crucial success factors with different impacts on financial and operational performance measures. Specifically, they found that the customer relationships component had a significant influence on the operational metrics of customer happiness and on-time delivery performance, as well as the financial indicator of profit growth. In a similar vein, the operational metrics of customer happiness and profit growth were enhanced by the critical success element of highly qualified logistics personnel. Breadth of service was a critical success element that had a substantial impact on revenue growth as a financial metric but had no effect on any operational metric. In order to assist us in comprehending the data's trends, they also performed a contingency analysis on these correlations in relation to the scale of the companies involved. Having a good connection with 3PLs was

essential, regardless of the size of the company. Thus, because their recommendations address the context in which the efficiency of the essential success variables competes for its impact on the operational and financial capabilities of the Indian Rupee 3PL organization, their findings contribute to academic theory and managerial practice.

J. P. Rodrigue (2012) examined the location of production, distribution, and consumption in global supply networks. Geographical factors are crucial to sourcing methods, yet supply chain managers and academics typically neglect them. This geography reveals patterns critical to understanding outsourcing, especially in distribution networks that sustain the production-consumption divide, the study notes. According to the article, SCM has major components that handle geographical dispersion. Third-party logistics providers are studied to see how global processes affect regional structures. The study finds clustering trends at airport terminals and cross border ports of entry for North American 3PLs, depending on gateway and supply chain type. These businesses are very flexible, and changes in the locations they choose are thought to reflect adjustments to their supply chain and outsourcing procedures. With a focus on third-party logistics providers, this study aims to decipher the intricate spatial relationships seen in international supply chain networks.

Janné & Rudberg (2022) looked at how third-party logistics (TPL) agreements affect building projects in metropolitan areas. Despite the growing occurrence of TPL in the industry, concerns continue to linger. The research explores the practical implications of implementing a logistics agreement in the construction industry, including anticipated advantages, concerns, and effects on cost components. This study examines a large-scale construction project in Sweden to determine the favourable impacts of a TPL arrangement on project performance and logistics performance. According to the research, achieving these advantages will necessitate resolving a number of issues, the

most important of which is the need to consolidate supply chain members in order to raise the level of SCM maturity. Thus, the impact of legal standard is evident and stresses on the importance of creating awareness among the supply chain members to follow legal compliance as well as the need for better communication to support the use of TPL.

Performance determinants

This study conducted by Begonja et al. (2016), set in order to identify the differences in the impact of SI on the development of innovation and revenues of the SMEs that implement SI in the Adriatic region. Moreover, a comparison was made between these SMEs and those that have not implemented social innovation or engaged in any form of innovation. This study was a component of a larger body of work on innovation in the Adriatic Region that is being done under the EU-funded PACINNO project. According to the findings, social innovators believe that their company performance surpasses that of their rivals and they are exporting a much greater amount than other companies. making an empirical contribution to the Adriatic Region's understudied topic of social innovation. The present investigation provides measurable data. Additionally, policymakers and other relevant stakeholders may find the findings useful as a guide, especially with regard to social innovation.

The main goal of this research conducted by Almatrooshi et al. (2016) is to create a system that will help leaders make decisions. Using a method called “methodical examination” the study looks at all the available research on what factors affect the success of organizations. The overview compiles empirical evidence relevant to the subject matter of the investigation. The framework that was developed integrates studies to demonstrate how leadership qualities are influenced by cognitive, emotional, and social skills, and how this impacts the performance of the organisation and its workforce.

Braam et al. (2016) examine the connection between external assurance, diverse company environmental performance measures, and voluntary corporate environmental reporting (CER) procedures in his research. There is a rising tendency for corporations to provide environmental information in sustainability or environmental reports, since the environmental effect of enterprises is being scrutinized more and more. Using metrics including water use, trash output, and greenhouse gas emissions, this study examines a cross-section of Dutch businesses from 2009 to 2011. Companies' environmental reports, with or without outside verification, are differentiated in the research. The results demonstrate how important and successive roles that water usage, greenhouse gas emissions, and outside assurance play in explaining variance in the amount and kind of CER. The results therefore support the postulation that perceived credibility has a strong impact on a company's decision to disclose environmental information. Descriptive data, however, reveal that business mostly give a distorted picture of their environmental impact. In order to drive firms to improve their environmental performance accountability, the study's conclusion recommends that obligatory sustainability reporting requirements be added to voluntary CER and that strong enforcement measures be put in place.

Drawing on the results of a supply chain's performance after implementing blockchain technology. this study by Fosso Wamba et al. (2020) conducted to meet the need for information concerning the applicability of blockchain technology in logistics and SCM. Since there are few theoretical works on blockchain technology, Given the novelty of blockchain technology, this study aims to fill a knowledge vacuum about its characteristics, the simplicity of integration, and the ways in which the supply chain might reap its benefits. By utilizing existing data on technology adoption, supply chain efficacy, and emergent blockchain research, this study constructs and evaluates a model

that is applicable to both India and the United States. By highlighting the possibility for supply chain practitioners to provide input on how blockchain applications might improve supply chain performance, the survey successfully confirms the model's efficacy. Information sharing and pressure from trading partners are, without a doubt, the two most significant factors influencing blockchain technology adoption. Conversely, supply chain efficiency is greatly affected by blockchain transparency. Since there isn't enough data to conclude that the industry variable matters for the outcomes, the study's last recommendation challenges that conclusion. By giving academics, a proven model to follow, the study enhances SCM-blockchain theory and has major management and theoretical implications.

Costa et al. (2015) examined the relationships among learning outcomes, student interactions, and teacher competencies, as well as the direct and indirect implications these relationships have on high school students' academic success. In 1986, a representative sample of secondary education school pupils from the central area of Portugal were studied using a quantitative research approach. The structural model analysis revealed that instructors' evaluated abilities had a significant and favourable influence on learning performance and student-student relations. Additionally, studies based on practical data have shown that interactions between students have a major and favourable impact on learning performance, which in turn affects academic attainment. The created model offers helpful insights on how communication functions in the classroom and how student participation in academic activities increases overall academic accomplishment.

This research was carried out by Palaniappan (2017) to ascertain the impact that certain board features have on the financial results of Indian manufacturing enterprises. Employing a multiple regression theory model to explain the amount of variability, the

research aims to investigate the relationships between board activity, dual leadership, board independence, board size and performance effectiveness of organizations out of which accounting based and market-based performance are two criteria used for financial performance. For this study, all the 275 firms that were listed on the NSE and had financial data available for the year 2011-2015 were used to provide data. Based on the findings of the study, it can be concluded that the relationship between board of directors' diversity and enterprise performance is in a negative direction. Financial measures that were employed in testing the hypothesis, Tobin's Q, ROA, and ROE all have significant negative correlation with the size of the board. A correlation between corporate governance systems (such as an independent board of directors and regular board meetings) and ROE and ROA is also demonstrated by the results. Therefore, the complicated relationship between board composition and financial performance of Indian manufacturing enterprises is finally explained by this study.

Supply Chain Efficiency

In order to overcome the difficulties in evaluating the efficacy of a supply chain, Liang et al. (2006) conducted this study. Due to some reasons below, there lack of a reliable performance measurement system, which is critical in managing the supply chain This has been due to two major factors the presence of several measures defining the efficiency of chain members; and disagreements between the members concerning particulars measures. The DEA is thus restricted in its ability to directly evaluate the efficiency of a supply chain as it employs intermediate metrics linking the chain's members that expands the MIC's limitations. To facilitate the mission of quantifying and describing the efficiency in the supply chain of the selected organizations, this research provides several DEA-based approaches that allows the inclusion of intermediate measures in the assessment. The presented models examined collaborative and

hierarchical organisational structures within the framework of a supply chain involving a vendor and a client. When evaluating a leader-follower relationship, information about the leader's performance is used to determine the follower's effectiveness after the leader's performance has been assessed. By summing together, the average efficiency ratings of the provider and the customer, the cooperative structure seeks to optimize joint efficiency. This evaluation process takes into account both parties involved in the supply chain simultaneously. The purpose of these innovative models of supply chain efficacy is to address and resolve them through the use of non-linear programming problems. The findings of the study indicate that these non-linear programmes based on DEA can be conceptualized as problems of parametric linear programming, where heuristic methods yield the most optimal solutions.

Janvier-James (2011) further explained the concepts of supply chains and SCM. A comprehensive examination including definition, theoretical questioning, practical concerns, and measurement analysis is included in the research. Major findings of the study are revealed via a thorough analysis of carefully selected, peer-reviewed academic literature. Different viewpoints and a lack of consensus on the exact definitions of supply chain and SCM characterized this yet surprisingly young field. The use of theoretical conceptual tools in research is acknowledged, and the scope is broad with a focus on the industrial sector. The findings indicate that a theoretical approach may significantly advance the field, particularly in identifying the length of supply networks. The literature evaluation of this research offers important insights for SCM organizations and scholars alike, using jargon often used in academic dissertations.

Haralambides & Gujar (2012) conducted studies on the environmental impact of Indian dry ports. These ports serve as a vital link between seaports and the heartland of North India for the consolidation and distribution of goods. Sadly, because of rail and

vehicle traffic, dry ports add to air pollution even though they are essential to transportation. The current approaches to assessing port efficiency, including data envelopment analysis (DEA), have not been able to adequately take into consideration and account for the financial implications of transport externalities. In an effort to shed light on this matter, this study compares and provides a novel eco-DEA model with classic DEA models. This innovative model simultaneously assesses the beneficial (like CO2 emissions) and undesired (like CO2 emissions) effects of port service production. The results of a review of dry port efficiency in India's North Capital Region show that adding environmental elements significantly alters efficiency assessments. The technique that has been proposed may be readily extended to other industrial sectors that face environmental challenges. This offers a comprehensive plan for reducing the negative economic effects of externalities related to transportation.

Scholten et al. (2014) intended this study to establish a connection between operationally based catastrophe avoidance techniques and strategic supply chain resilience capabilities. Therefore, by integrating the current information into a consistent and thorough theoretical framework, the research hopes to improve our comprehension of the supply chain resilience construct. This study relies of a combination of qualitative research techniques for carrying out a case study on a cooperative organisation located in a developed country. Here, the official working at the agency is under investigation of the collaboration, coordination, communication, and cooperation mechanisms that are in place in the agency. It highlights the importance of these techniques in enhancing the overall supply chain continuity and crisis response efficacy. Results from this study suggest that empirical data analysis can lead to the presentation of a unified paradigm for supply chain resilience. Additionally, this framework clarifies how the stages of disaster management align with the acquisition of critical components needed to build SC

preparedness. According to the study, strengthening supply networks is a critical step in advancing the application of mitigation strategies.

Through a survey of 67 production facilities, the aim of this research by Thun & Hoenig (2011) made an effort to guarantee that the German car industry's supply chain risk management strategy evaluations are impartial. Preliminary evaluation of the overall degree of supply network vulnerability and examination of some essential supply chain risk elements constitute the first stages of the analysis. The next step is to classify the risks in the supply chain according to their likelihood and potential impact after assessing their type and nature. They are then summarized in a probability impact matrix that distinguishes risks as internal and external. A specific attention is paid to the analysis of the existing examples of supply chain risk management tools. Companies are ranked according to how well they manage supply chain risk, which can range from minimal to highly implemented. By classifying the facilities according to characteristics shared by the supply chain risk management tool, cluster analysis can be utilized to differentiate between proactive and reactive approaches. Organizations having high adoption rates improved supply chain performance, as demonstrated in this article. Additionally, it illustrates how distinct groups outperform one another on various metrics. Proactive managers of supply chain risk, for instance, excel at maintaining safety inventories and ensuring flexibility, whereas reactive managers are more adept at mitigating the bullwhip effect and exhibiting resilience in the face of disruptions.

The principal objective of this empirical investigation, undertaken by J. Hong et al. (2018), This study investigates the possible connections between dynamic capabilities theory and sustainable SCM. Despite this, and given that dynamic capabilities theory is still relatively immature, applied professionals and researchers have now come to acknowledge the value of the theory. The goals of this study are to determine what role

SSCM plays in improving company performance, supply chain (SC) dynamic capabilities, and overall SC performance. This analysis takes into account issues related to the economy, society, and the environment in order to reach its aims. This leads us to apply structural equation modelling to the data of 209 Chinese manufacturing businesses. The findings reveal that the SSCM techniques have a positive impact on enhancing the dynamic capabilities of the SC and the corporate performance in all perspectives; the social, environmental, and economic aspects. While the social and economic performance of the SC appears to be quite stable and unaffected by the SC's dynamic capacities, the environmental performance of the organisation is quite different. Research demonstrates that sustainable SCM techniques are positively correlated with organizational performance, but this correlation is moderated by the supply chain's dynamic capacities. In light of the above, it is clear that enterprises must prioritize developing their supply chains' dynamic capacities and implement effective SSCM strategies if they want to achieve sustainable long-term performance. This is especially true for supply chains originating in developing nations.

Operational Excellence

The primary motivation behind Bag et al. (2020) Gaining In particular, the research set out to learn how operations managers may use big data analytics (BDA) to promote sustainability in their supply chains. Managing the manufacturing and delivery of goods and service is the task of operations management which is imperative organizational function in today’s society wherein the challenges introduced by big data must be addressed. This research seeks to evaluate the impact of BDA capability as an operation excellence tool squarely within the mining industry. To this end, 520 usable responses from mining executives in South Africa were used for analysis, from which the response rate was estimated at 47%. The research employs the concept of dynamic

capacity as its method of analysis. Theoretical model applied within this investigation and combined with PLS-SEM shows that new green product development and social efficiency of sustainable supply chains are heavily reliant on big data management. Furthermore, this study discovers a good correlation between environmentally sustainable supply chain performance, staff training, and high data analytics talent capabilities, albeit with little impact. If you want your supply chain business to thrive and expand in the long run, you must understand the interplay between supply chain performance, learning performance, and all the other factors related to innovation. Innovation in the supply chain also acts as a moderating component, which is an important one in this equation. In addition, the current study's findings suggest that managers can increase mining SSn efficiency by concentrating on the two-way techniques we've already covered and by pursuing BDA competencies.

This research set out to achieve operational excellence in sustainable reverse supply chain/logistics by providing a thorough roadmap Dev et al. (2020). Many parts of Industry 4 are detailed in the academic articles that follow this section of the article. I4.0 and the ReSOLVE framework for a circular economy (CE) are what this term alludes to. Therefore, this study identifies and clarifies the connection between Industry 4 using the case-based paradigm. With CE ranging from 0 to CE, we may examine the environmental and economic impacts of the reverse logistics system, with a particular emphasis on the timely delivery of environmentally friendly items to consumers and the real-time sharing of relevant data. The Virtual world and its usefulness in the framework of Industry 4. On the basis of the analysis of 0, this paper presents the investigation of a reverse logistics framework that includes additive manufacturing along with family-based dispatching rules for remanufacturing, inventory, and production planning policies. An essential objective of the remanufacturing model is to assess the balance between the

availability of environmentally friendly transportation and the time required for setup. This study employs the Taguchi experimental design methodology to examine the compromises between economic and environmental performance in order to propose the most effective configurations for family-based dispatching and information-sharing principles. The findings underscore the criticality of considering the expenses associated with processes that have a social impact, including collection costs and the influence of the end-user market on product returns. The results of this study suggest that in order to create environmentally friendly reverse logistics systems, a dynamic decision-making framework should include I4.0 and CE.

Carvalho et al. (2019) sought to contribute to what is already known about operational excellence theory as it pertains to a rapidly evolving corporate context. Hence, the study argues that while operational excellence programming is widely employed for raising performance, the permanency of the impact cannot be proven. Besides the strategic use of OG as a process of implementing change, OG is marketed as the source of frameworks and tools that will help individuals within organizations manage change. In harmony with a proposition established from the literature, the study posits that other research is needed to unravel more the associations between the organizational culture, agility, and operational excellence. Thus, there will be a possibility to build long-term operational excellence initiatives more easily. The research also reveals the concerns with regards to the ability of organizations to exhibit flexible behaviour and cultural adaptability to constant change, besides the conventional consideration of cultural fit. Thus, the main goal is to create the framework for the long-term continuation of operational excellence. This will thus allow organizations to succeed by gaining the organizational agility skills and coming up with a culture that will be flexible. Thus, the study also develops research questions, which aim to extend

knowledge to the relationships and integration between organizational culture, organizational flexibility, and operational excellence.

While doing this study, Usman et al. (2018) underscore the significance of taking into account key components to ensure that supply chain quality management operates efficiently within the context of academic business operations. Designed to furnish an all-encompassing SC quality management framework that is appropriate for commercial operations within academic environments. The study examines the academic supply chain using a case study approach. It focuses on key stakeholders such as career development centres, head of study programmes, quality inspection centres, and centres for new student admission. Using NVivo 11 Pro software and open, axial, and selective coding, the study groups identified important characteristics via thorough discussions and analysis of academic process articles. The results draw attention to important factors that must be taken into account for supply chain quality management to operate efficiently within the parameters of academic business procedures. This study presents a paradigm for SC quality management. This model gives major insights for integrating SCM and overall quality management into the operational academic processes of study programmes in higher education, and it is supported by crucial aspects that have been uncovered. The study's conclusions may find use in a variety of service industries, particularly in those where there is a high level of interaction between clients and service providers.

Life Cycle Assessment (LCA) is a popular tool for gauging a product or service's effect on the environment, and A. Zhang et al. (2020) aimed to find solutions for the issues related to obtaining reliable data for it in this study. It operates at different levels of the extended supply chain whose vaguer measurement procedures pose a major challenge when it comes to tracking input and output all along the various stages of the supply

chain process. The primary objective of the project is to apply Blockchain technology to eliminate this challenge in green SM. Thus, possibilities in using blockchain technology, IoT, big data analysis, and visualization may be applied to enhance organizational supply chain sustainability and increased LCA quality. The study proposes a system architecture that integrates big data analytics and visualization with Blockchain, IoT, and other technologies smoothly. It also offers a thorough methodology for implementing Blockchain-based Life Cycle Assessments. Experts in Blockchain applications were consulted in order to confirm the suggested architecture and framework. The research continues by analysing the system's implementation costs and discussing potential issues and fixes. This provides important information for managers and legislators who are considering sustainable SCM.

The fundamental goal of Chan et al. (2017) With a focus on the fashion sector specifically, the study aimed to address the pressing need to adapt to markets and consumers. From a resource-based perspective, the study looks at the key elements that contribute to supply chain agility and its implications on operations and strategy. The literature analysis of the study aims at supporting the notion than manufacturing flexibility and strategic flexibility, the two components of organizational flexibility needs to be achieved in order to facilitate supply chain agility. This paper posits that supply chain agility, manufacturing flexibility, and strategic flexibility are all there major determinants of organizational outcomes. The theoretical framework derived from these discussions is tested via a study involving 141 clothing manufacturers. Modelling using structural equations is used to examine the data. The results clearly show that both manufacturing and strategic adaptability have a favourable impact on SC agility. Unlike manufacturing flexibility, which has no effect on firm performance, it is essential to recognize that strategic flexibility has a major and direct influence on it. Furthermore,

given its crucial role in tying the company's strategy and production flexibilities to its performance, Therefore, the significance of a flexible supply chain is evident. This research adds to what is already known in the field of SCM on supply chain agility as it pertains to the apparel manufacturing sector.

Schmidt et al. (2017) found out the impact of supply chain position (SCP) on GSCM practices and the performance outcomes that follow. Stakeholder theory and the contingency "natural resource-based approach" are combined in a conceptual paradigm that recognizes the increasing significance of corporate environmentalism in the SC. By putting these hypotheses to the test using primary and secondary data from 284 organisations across a range of industries, the research uncovers the SC Position Paradox. This paradox suggests that when a corporation moves closer to the end user in the supply chain, its GSCM procedures get more sophisticated. However, the performance advantages associated with these approaches decrease with proximity to the end user. The research claims that a mismatch between several GSCM practice categories and the performance implications that flow from them is the main cause of this conflict. Thus, the study adds to the current body of literature by shedding light on the "GSCM practice-performance relationship" with the help of SCP and expanding our understanding of this relationship. Executives enrolled in SCM courses who are keen on diversifying their GSCM toolkit will find the results quite useful.

The primary aim of this study conducted by Punniyamoorthy et al. (2013) aimed to prove that the aforementioned instrument was accurate and dependable when used to assess risk in similar business domains. The study set out to aid businesses in the specified industries in locating and integrating optimal risk sources into a variety of risk management strategies. Its purpose was also to present senior managers with an understanding of how to focus on various risk indicators in a proper manner. The

research employed a methodical process comprised of the domain and dimension definition of the construction, the generation of initial items, refining the items with the help of professionals, validation of the items' construct validity and reliability, and assessment of content validity of the scale. By applying the structural equation modelling as a higher-order measuring technique to identify many risk components, it concluded the above results. This process gave way to a credible method in terms of assessing the general risk within the supply chain. Empirical testing was used to confirm the instrument's reliability and robustness. Several elements that contribute to supply chain risk were highlighted by the risk construction rating.

2.2 Economic Growth and Globalization

Economic Impact on Logistics

Khan et al. (2020) looked at possible connections between the ASEAN member nations' logistical performance criteria, public health spending, renewable energy, and ecological sustainability. After the collection of secondary data from the World Bank website, suitability of structural equation modelling was evaluated in order to examine the hypotheses. Consequently, this paper's findings indicate that incorporating renewable energy in the logistics chain contributes to the overall firm's environmental performance and reduces emissions. Of interest here is that a negative correlation was established between the spending on public health conditions and the performance in the environmental area. This finding implies that the promotion of environmental sustainability could potentially foster economic expansion and enhance the well-being of the general population. It has been shown that in low-efficiency and low-labour

productivity environments, economic activity slows down as a result of higher public health expenses and subpar environmental performance. Thankfully, the incorporation of renewable energy into logistics has enhanced environmental sustainability, elevated the status of the country, and created new export opportunities in environmentally aware nations—all of which have led to long-term economic success. Policymakers and decision-makers may find it easier to plan investments that result in long-term economic growth with the use of the research's insights.

Munim & Schramm (2018) examined the behavior of the seaborne trade and the Gross Domestic Product in 91 countries with seaports. The study also looked into the attitudes concerning the quality of the port infrastructure and the benchmark logistics performance. To address these and other similar issues, voiced by the legislators, investors, and the public, on the costs and returns of improving the quality of port facilities, it was designed. The method utilized in the research, Structural Equation Model (SEM), provided rich empirical evidence proving the extent of the economic implications arose from calibre of port facilities as well as efficiency in logistics. To find out the extent of difference in the observed associations, a multigroup SEM analysis was conducted in which nations were categorized into developed and developing countries. The results pointed out that the object nations' port structures are required to possess continuous quality enhancement processes. This is so because relative embankment quality results into higher logistical efficiency thus triggering higher trade by sea and consequently economic development. As emerging nations advanced economically, however, the power of this relationship waned.

Holguín-Veras et al. (2013) aimed to facilitate the modelling of post-disaster humanitarian logistics using welfare economic notions. According to the report, including these ideas is essential for creating delivery strategies that put the welfare of the largest

number of affected people first. The best aim function for these models, according to the study, should be social costs, which include both deprivation and logistic costs. The loss of opportunity to acquire goods or services that are necessary to improve an individual's quality and prolong their life is quantifiable and it's commonly referred to as the "privation cost." In the same manner, consistent with the study's purpose, the study rummaged on a researcher mindset premised on the incorporation of deprivation costs into post-disaster humanitarian logistic models. It accomplished this by thoroughly examining the philosophy and economic literature, ensuring a solid basis for estimation. Furthermore, a number of methods for accounting for human discomfort were examined, including weight factors or penalties, consequences for delivery delays, equitable limits, and unmet expectations. The study assessed the effects of estimating mistakes and carried out a comprehensive examination of the consequences of these procedures. In the last parts, numerical experiments were carried out to demonstrate the relative effects of using the proxy approaches recommended in the body of current research. Finally, based on the research carried out, the study considered the major findings and interesting opinions that were provided.

Globalization Trends

Kovacs et al. (2016) did research with the aim of discussing and analysing the potential and active logistic trends and challenges which emerged due to the intensification of market globalization processes, the growth of competitive environment at the international level, the application of new technologies, approaches, and business models. Specifically, the issue examined where different and a rapidly shifting market environment and clients' needs influenced the efficiency of the logistics systems. The study analyzed and assessed numerous trends including shifts in the consumers' preferences, production requirements, formation of supply chain, alterations in inventory

techniques, evolution of transportation-related processes, and the fluctuation in the logistics service industry. Last non-codified construct, the research introduced the concept of Industry 4. 0, in relation to its huge potential of drastically overhauling the firms' manufacturing and distribution activities in response to the evolving market conditions.

Akyelken & Keller (2014) examined how globalization is causing supply lines to change. The research sought to address a knowledge vacuum by analyzing the relationship between substantial changes to industrial and operational systems, extended travel routes, and heightened emissions associated with transportation. Prior research on the connection between sustainability and the delivery of goods has mostly focused on the subject from a macroeconomic and political standpoint, neglecting the ways in which small-scale economic actors—especially enterprises and private sector companies—are influenced and interconnected with one another. The research made the argument that failing to take into account the larger institutional frameworks and company conduct in connection to goods transport impedes a more thorough understanding of goods governance in the age of globalization. To circumvent this constraint, the research recommended illuminating the distribution networks of novel manufacturing and logistics techniques and their ramifications for the flow of commodities through the lens of institutional economic geography. The argument was substantiated by an exhaustive examination of the implications of European manufacturing and logistics practices on worldwide output.

A research on the condition of the global transport and logistics services industry and infrastructure was carried out by Azimov (2017) with the intention of providing an overview. The study focused on how the efficiency of transportation and logistics infrastructure must adapt to changing demands, taking into account the growing

interdependence of the world economy. The author conducted a comprehensive analysis of the existing condition, fundamental nature, and organizational framework of global transportation and logistics infrastructure entities, providing insight into their dynamics. The research also looked at important tendencies in the logistics and transport infrastructure's recent growth, particularly in the areas of rail, container, and port expansion. The author also looked at the reasons for market change by assessing the current environment and organization of the global transport and logistics services industry, which the author described spatially and in terms of goods.

Aiming to handle the fast changes in the world economy, Bujak (2014) performed research to the dynamic areas of logistics and supply chain. In the considered survey, the modern supply chains described as dynamic, with priorities on integration, time and the accomplishment of various activities over large distances to meet customers' demands. The primary concern of the study was to identify the futuristic technologies and solutions that the supply chain might use to achieve the aforementioned goals. The capacity to understand and properly apply these novelties turns into critical factors for reaching success within the contemporary and forthcoming market conditions. Key milestones of the study included the identification of tendencies of the present demands for supply chain, accurate logistical tasks within the network, development of creative organizational culture, and alignment of the problem-solving methodologies to enable proper functioning of the supply chain at the epochal level. The research recognized the fact that logistics and the extended supply chain relationships are not without competition which has posed major tasks to rearrange, consolidate as well as enhance the whole logistics, and make certain changes to positions of components, plan and implement transport moves, and control stocks. When it comes to the reconsideration of logistics and supply chain reorganization, the concept of the so-called value chain derived from

strategic management was taken into account as the objective was to obtain competitive advantage. In this research, concern was made to outline these challenges with regards to both, past and future requirements and then draw from this understanding the provision of a new, dynamic supply chain which meets the requirements of the standards.

Candemir & Çelebi (2017) examined economic growth as a change looked at as a process in which an economy evolves from small stock figures of savings and investments to bigger numbers. From a researcher's perspective, economic development was seen to be an alteration in the structure of the economy, entailing adjustments to the composition and ratios of various sectors. The study recognized the unevenness of economic development and highlighted the significance of strategic imbalances in development policies. Adopting a researcher's mindset, the study examined various sectors, with a particular emphasis on transportation, logistics, and commodity-producing industries that have strong connections to these critical sectors. Inter-industrial analysis served as the foundation for the approach used for sector selection and analysis. The study acknowledged the importance of examining spillover effects between certain sectors and emphasized the difficulties in putting the model into practice because of methodological issues and a dearth of relevant data. The study sought to identify the domain of the sectors being examined and to describe the data needed for next model-based studies in order to learn from this experience.

Nguyen (2020) examined the effects of science, technology, and globalization on the competitiveness of manufacturing companies when analyzing the impact of logistical operations. The research examined the action plan put forth by the Vietnamese government until 2025, which aimed to enhance competitiveness and advance logistics services. Vietnam is acknowledged as a Southeast Asian nation possessing substantial potential for the advancement of logistics and infrastructure development. The study

acknowledged the significance of human resources within the dynamic logistics industry and provided suggestions for enhancing them. Furthermore, the report provided a comprehensive analysis of the prevailing state of human resources in the logistics service sector of Vietnam, investigating the underlying factors contributing to any limitations. The research comprehensively assessed the present condition of personnel in the logistics sector and proposed suggestions to enhance the human capital with the aim of fortifying Vietnam's competitiveness in the worldwide service industry.

In order to deliver research findings on global logistics scenarios in 2025, von der Gracht & Darkow (2013) dedicated his career to researching and analyzing potential new prospects within the logistics industry to help build a system that benefits society, the environment, and businesses alike. The study was a part of a multi-disciplinary conference on foresight where jointly with scholars, managers, and politicians from all over the world, 216 key figures from 16 countries shared strategies and directives on logistics' future role for the enhancement of the world advancement Through a real-time Delphi survey, participants shared their opinions on the future. Subsequently, the findings were deliberated upon in futures seminars employing the World Cafe's approach to collective discourse. The authors developed 20 primary Delphi forecasts for global logistics in 2025 by combining extensive desk research, scenario analysis, expert seminars, and creative workshops. Experts were working on assessing the projections' possibility, importance, and favourability and provided detailed explanations for their conclusions utilizing the Delphi online platform. It was highlighted that critical topics were envisaged by Delphi scenario and these were concentrated on such sectors as the world healthcare, energy, supplies, urban mining, water transportation, and education. Moreover, the study examined occurrences such as epidemic, warfare, and scarcity of materials, which would impact the import/export of goods.

In reaction to the global economic crisis, Cillo & Pradella (2018) conducted a research with the view to undertaking an analysis of the spike in strike activities in the Italian logistics sector that began from the year 2008. This development was critical. Mainly, this study aimed at assessing how such strikes would revitalize the labour movement. The globalization of production process together with the consequences of migration for the reconstruction of the working class was the discussion that was based on the analysis of the changes. In keeping with the analysis of the simulation results the paper has offered; Italy underwent a severe form of deindustrialization during the period of the crisis. This was exacerbated by the invading of legal immigration measures together with pathetic deregulation, neo-liberal restructuring and austerity measures resulting in racially orientated employment relations. At the same time that deindustrialization took place, the cop logistics industry developed and as Just in Time production methods evolved workers could actively negotiate during the production phase. The subject research proved to be fruitful in terms of identifying the state of employment and drawing the outlines of the primary characteristics of the challenges associated with the logistics business. It is worth mentioning that logistics workers, who are primarily immigrants, showcased their influence by organizing blockades and strikes, which led to more favourable agreements with major logistics companies. The study suggests that the challenges faced by workers in the logistics sector could inspire workers in other industries, potentially leading to a global reorganization of social classes.

Adeitan et al. (2023) investigated how globalization has affected Nigerian logistics management. The shipping and logistics system is profoundly influenced by globalization, which consequently has a substantial effect on global logistic service providers. The data was gathered via a meticulously crafted survey that was disseminated among industry experts operating within the logistics sector of Nigeria. The data

collection process was analyzed through the application of factor analysis, mean item scores, and percentages. The identification and highlighting of globalization's effects on logistics management as admitting proficient logistics experts and enhanced availability of new and efficient information as worth recording were equally considered. One of the most valuable assets that logistics operators, organizations, and other sectors have in this age of globalization is the information they collect, and this reasoning highlighted the management value of that data.

In this study, Le (2021) set out to analyze the dynamics among Vietnam's 97 main trading partners, logistics performance and agricultural exports within the framework of the country's participation in regional trade agreements (RTAs). Since logistics performance affects agricultural export competitiveness, this study aimed to determine if, in this age of globalization, more access to markets for food and agricultural products has resulted from the growth of regional trade agreements. The study used the "Trade Gravity Model" and used both static and dynamic panel data estimate techniques to tackle issues associated with zero trade and endogeneity. The results validated the interdependent correlation among globalization, logistics and food supply. Regional trade agreements (RTAs) have been significant in influencing globalization and logistics strategies, collaborating to ensure the stability and variety of food supply via imports. The study emphasized the need of a cohesive framework in policy design, with a focus on long-term and sustainable growth. This objective can be realized through the strengthening of the interdependencies among globalization, logistics, agriculture, and the worldwide food supply.

Li et al. (2022) investigated the difficulties in regulating the transportation sector while taking into account assessments of logistics performance on a global and regional scale. The study also looked at the economic effects of global interoperability,

specifically in terms of optimizing logistical processes that include transportation and legal aspects, in accordance with the Russian Federation's Transport Development Strategy until 2030. The objective of the study was to methodically arrange legal, economic, and social data with the intention of establishing a comprehensive transport communication system. An examination of legal regulations pertaining to the transportation system revealed challenges within the supply chain, such as insufficient policy coordination and an absence of digitalization. As a result, there was little transparency in legal proceedings and service quality was below industry average. The study's findings indicated that cost-effectiveness can perhaps be improved by incorporating international standards into transportation communications. A significant scientific accomplishment of this research was the development of a practical tool intended to optimize the efficiency of the transport infrastructure amidst the forces of globalization, while considering the distinctive characteristics of each country's economy.

Market Dynamics

Sandberg & Abrahamsson (2011) examined how two Swedish companies that were used as case studies used logistics strategically to establish a long-lasting competitive advantage. Using a resource-based view of the organisation (RBV) paradigm, the researchers investigated the relationship between the development of operational and dynamic logistical capacity and the establishment of sustainable competitive advantage. Studies have indicated that reliable logistical operations and locally created, high-performing IT systems are the foundations of long-term economic advantage. This operational competence was preserved by five dynamic capabilities: the strategic connections to other businesses in the supply chain, manager’s control, learning abilities, integration of functions, and presence of managers with appropriate skills and wealth of experience.

Through interviews with the CEO and other top management members of Korea Express (KX), P. Hong & Vonderembse (2011) conducted a research that was meant to assess the global logistics business regarding the various strategies and challenges. In the course of this study, KX had been one of the leading multinational logistics companies in Asia hence providing solutions to the increasing dynamics of international business. The study examined the growing need for prompt, precise, and protected data in the context of transporting various products across worldwide SC and distribution channels. The research shed light on KX's attempts to adjust to these new trends, which are focused on global logistic platforms, by expanding its reach to foreign markets like China and Japan in addition to national and regional ones. Key leaders discussed their experiences guiding KX through this transformational era and offered their thoughts on critical areas of global logistics strategy.

Tako & Robinson (2012) examined the research of the possibilities of developing decision support systems with help of the discrete event simulation (DES) and system dynamics (SD) in the large-scale computer modelling (LSCM). The first reason for conducting the research was to discover the kinds and magnitude of barriers that each strategic model contains because SD is believed to be implemented at the strategic level, while DES is applied at the operational/tactical level. All 127 articles of scientific literature published from 1996 to 2006 were considered in order to discover how often and in which settings DES and SD are applied to modelling for DSS in LSCM. By and large, the bullwhip effect was basically solved with SD, while the results revealed that, with marginal exception, DES was used more often in supply chain modelling. To classify the LSCM issues primarily on the basis of the most commonly used modelling technique, four categories – the DES domain, the SD domain, the common domain, and the less common domain were defined. Also, it was observed that the application of both

SD and DES was not influenced by the decision-making at the tactical, operative, or strategic level. Therefore, the results are significant in adding to the existing literature on the roles that SD and DES play as decision-support tools to LSCM.

Nobari et al. (2019) carried out studies so as to establish a bi-objective model for the dynamic, integrated ND architecture of a closed-loop competitive supply chain that has been just built. Some specific aspects were examined concerning different longer time intervals, included into the planning horizon, while every time interval was presupposed to contain a number of lesser intervals, and this, with the view towards emphasizing the problem of dynamism and integration. This study delves into the intricacies of this complex relationship by proposing a framework that conceptualizes competition between two rival supply chains across forward and reverse logistics. In terms of advance logistics, pricing is the primary determinant of competitiveness. In reverse logistics, incentive purchasing prices assume greater significance as a means to expand market share. Regarding the calculation of the selling and incentive purchasing prices in the forward/logistics and reverse logistics chains during the competitive phase, a theoretical background coupled with game theory and literature research was applied in this study. A novel and complex network-based model was therefore created and extended using Pareto-based imperialist competitive algorithm known as the multi-objective technique. Thus, in order to test and quantify the research work and to get a clear picture about the proposed model and the resolution approach, a numerical assessment was done to determine the efficiency and competency of the work.

Logistics Industry Trends

To examine the history of transportation and logistics problems as well as the ways that operational research (OR) has helped to resolve them, Grazia Speranza (2018) undertook a research. The study focused on the period which preceded the appearance of

computers and operations research (OR), stressing on initial efforts to solve transportation and logistics issues. Thus, OR through creating the optimization models has played a major role in improving the performance of transport systems and empowering companies to address the complicated logistic issues in a highly effective manner. The paper analyzed the development of OR in the context of the logistics and transportation industry sector as well as technological development.

In order to understand the possible effects of the newly emerged Blockchain technology, which allows decentralized, or rather immutable storage of information transit and supply logistics, Hackius & Petersen (2017) conducted this study. Specifically, the aim of this research study was to establish how Blockchain technology could revolutionize the payment system in the supply chain industry more particularly in light of Fintech. This was because it was on the ascendency in other sectors of the economy. Online survey was used to gather people's viewpoints about the feasibility, risks and strengths, applications, and trends of Blockchain technology in the context of supply chain and logistics operations. As for the attitudes acquired by the participants and their mood toward the technology and its benefits, the data was mostly positive. However, it was established that participants' judgments were influenced by factors like the hierarchical level, experience in Blockchain, and the industrial sector of their organizations. To create more enthusiasm for Blockchain in the business that is comparatively more conservative, specifically, logistics, the research highlighted the need to study this concept carry out use case studies and compare its solidity to the current IT systems more rigorously.

Future Prospects

With an emphasis on developments in radiation oncology, Bibault et al. (2016) research aimed at discovering the ways of managing heterogeneity to support its

inclusion into the concept of precision medicine. The amount of data that needs to be managed had increased in terms of volumes and variety; this include CT scan, Dosimetry, and imaging. EHRs in this case facilitated the creation of phenotypic profiles for the large groups thus making correlations possible. The review also looked at several approaches of creating extensive radiation oncology forecast models with focus on modern machine learning tools such as support vector machines, deep learning, and artificial neural networks. This work provided valuable knowledge regarding the current advances in data fusion and analytics technique used in the constantly developing area of radiation oncology precision medicine.

Abdulrahman et al. (2014) undertook this research with an aim of focussing on the emergence and significance of the reverse logistics (RL) function on the global spectrum, owing to the enhanced consciousness regarding stock precede and environmental degradation. Some of the challenges was the leaders' resistance to the use of RL and other resistance that emanated from some of the stakeholders in the organization. Governmental authorities set of environmental regulations included a set of measures, whereas academics proposed the certain measures based on the specifics of individual nations. In any case, it remains true that developing nations have failed to benefit from RL as they could. As a major part of the research, it was possible to also develop the RL theoretical framework and recognize practical challenges in China's textile and clothing, electronics, plastics, steel and construction, and study-based industries. Financial was the inability to obtain start-up cash and funds for return observing systems, policies did not have legal backing, and no fiscal policies in support of the initiative, management was not committed to the RL lacked RL experts, and lacked infrastructures. The study also included the analysis of the effect of ownership on RL frameworks; further, there were similarities as well as variations between the domestic

and international companies. Both the conclusion and recommendations derived from the research are useful to give details on obstacles related to the use of RL in Chinese manufacturing companies.

Xiong et al. (2019) intended to discover cheap and durable strategies for addressing the tons of food waste created by supply chains of food products locally and around the globe. Scientists have for long been informing the public and the government that the conventional ways of waste disposal such as burning and dumping in the landfills pollute the environment, affect the economy negatively, and are socially irresponsible. The highlighted plan is less sustainable because it does not focus on transforming the discarded food into chemically valuable products. Some products that can be generated from food waste and potentially belong to the consumer chemical group are acids and sugars while solvents and antioxidant materials are mere examples of specialty chemicals. There has been a realization that the discharge and dumping of wastes which has been through landfilling and incineration serves to harm society, economy, and environment. The study presents a more realistic model by stressing on the transformation of food waste into chemically useful products. These have proved to have immense possibilities in nutrition recycling as well as in other industries. This evaluation discussed the state-of-the-art technology in the treatment of food waste singly the physical, chemical, and biological procedures. The idea was to enhance production of useful chemical compounds and make further recycling of waste into commercial goods less expensive for making higher capacities for effective use in the economy in the future. The paper provides a systematic literature review and analysis on the issues and potentials of chems produced from food waste. It also delivers some new information about the contemporary situation in recycling and repurposing food waste.

2.3 Recommendations for Improvement

Logistics Sector Sustainability

Piecyk & Björklund (2015) examined the content of the CSR reports that LSPs have declared and to examine the factors that determine the amount and depth of reporting. The intent of the study was to establish the extent of CSR reports' treatment on specific and specific social and environmental issues. Furthermore, it aimed at examining disparities in-CSR indicator implementation based on compliance with official reporting guidelines, firm size, headquarter country of origin, and business ownership. A large amount of research was conducted in the literature review area of specific focus on the corporate social responsibility practices and policies by the logistics sector. Having developed a list of freelancers for the study, the research aimed at establishing a large sample of 350 LSPs using cross-sectional data available from the rankings of the leading global players in the logistics market. Of all the indicators distinguished by LSPs, two determinants of factor analysis were deemed crucial by the research: the adoption of a structured reporting framework and the scale of an organization was ascertained as a main driver of the industry's level of CSR reporting.

With an emphasis on the Austrian transport and logistics industry, Oberhofer & Dieplinger (2014) attempted to ascertain the ways in which businesses are integrating sustainability into their broader business plans. The study's objective was to identify and evaluate the several variables affecting how companies in this sector behave environmentally. It was emphasized how crucial the economic impact is in influencing environmental management decisions. This study analyzed various aspects concerning distinctiveness of sectors that influence the behavior toward the environment. Some of the identified field studies applied case-based research methodology in assessing particular practices and the overall environmental performance of organizations. Secondary data analysis and expert interview were used in this methodology. By the

examination of specific environments, the analyzed work explained how set rules pull the performance of corporations in the sphere of transportation and logistics. Thus, those circumstances which were considered resulted in its drawing broad conclusions. Moreover, recommendations as to how the level of government support may be enhanced for extending assistance to the logistics and transportation companies to embrace sustainability as a corporate strategy were also incorporated into the study. Thus, the results give interesting information on the environmental factors to be considered in the plans of the companies in the transport and logistics industry.

Dey et al. (2011) examined how sustainability measures are now being incorporated into the SCM paradigm. Finding ways to make things better, offering suggestions, and sparking more research on sustainable logistics activities were all goals of the study. Through embracing concepts when developing a comprehensive understanding of literature, the analysis on the necessity of applying sustainability in the operations of the supply chain system was undertaken. Thus, investigating various facets of the logistics function and discovering possible areas of sustainability initiatives' application, the study referred to the literature. Some suggestions were made to help corporations implement sustainability in the concerned aspect of Shell's supply chain. To achieve this, researchers need to explain the huge impact of logistics within the institution as far as sustainability initiatives are concerned. It should be noted that this work is directly linked to the significant expenses and the possibility of working out the potential sources of unused resources, thus also leading to a reduction in the carbon footprint.

The aim of this research, carried out by Evangelista et al. (2017) was to address current misunderstandings regarding the implementation of environmental sustainability by third parties logistics service companies (3PLs). While an increasing number of third-party logistics providers (3PLs) have realized that environmental sustainability is a part

of logistics strategies, little is known about how those tactical initiatives are implemented. The research adopted a keen examination of several cases whereby an emphasis was placed on mid-cap third-party logistics companies located in Italy and the United Kingdom. Exploring the structure, actions, and factors that affect such organizations was the aim of the study. As for the environmental strategies, it is only possible to underline the general mainstream that sustainability must be considered as the primary concern, although the specifics of the implementation varied in different cases. Literature review of previous works on third-party logistics providers' (PPLs') green initiatives were analyzed as overall, with emphasis on large global players, and conducted on a national level. Nevertheless, this study has provided new knowledge to this branch of the research. Besides, the study offered important real-life recommendations for managers of medium-sized 3PLs concerning the strategic positioning of their organizations. It emphasized the criticality of these companies in the 3PL industry for increasing market value and revenue.

Barykin et al. (2021) discussed the difficulties presented by the growing trend of digital logistics platform development in the context of increasingly interconnected international trade. Using cloud services, geolocation, high-speed mobile networks, machine-to-machine (M2M) communication, information technologies, and international standards were prioritized in order to increase the effectiveness of logistics management systems. The study's main focus was on how important it is to continue using sustainable solutions when logistical operations are disrupted. Transportation difficulties and market volatility could potentially be the cause of these disruptions. The study approached the problem of determining the stability criteria for mathematical model-derived solutions with the scrupulousness of an astute researcher. The study centred on the discrete and continuous transfer of material flows within intricately organized networks. The

analysis's findings about the stability of differential system solutions—which are used to simulate transmission processes in network media—were covered in the study. It looked at differential-difference systems' initial boundary value problems and evolutionary equations in an effort to solve logistical issues related to discrete and quasi-continuous transportation. An assessment of a logistic operator's performance was made employing the integral functional. To cover transportation processes by numbers, it was allowed to use a huge spectrum of integrable functions and to focus on media with complicated internal rheology.

Competitiveness Enhancement

Puertas et al. (2014) sought to determine, over a certain period, influence or changes in exports from the European Union logistics, and the advances made by certain Members. In order to obtain gravity equations to use in the study, other indicators such as a representative variable such as the LPI were used and components thereof. To deal with the possible sample selection bias a Hearken two-stage model was used in the study. The calculations done with the help of the two-stage Heckman model and gravity models were pointing to the fact that all the countries which were exporting goods were actually more logistics-dependent than the importing countries in both in 2005 and 2010. This finding reflects that the focus of this research is also on exporting nation's perception. When analyzing the change in emphasis of the LPI's components, Tracking and Competence have been identified as the elements that have recently increased in importance. This is in line with attempts by European nations to find new outlets of exports in the global market and the shrinkage in call for local products.

Kherbach & Mocan (2016) investigated how graduating SMEs in Romania position logistics within their operations. Logistics' impact on the evolution of market unity was amplified by the changes brought about by globalization and the expansion of

the world economy. As a result, logistics and supply chains are strategic tools for gaining an edge in the marketplace, which in turn increases economic efficiency and boosts market share. Perhaps, the research analyzed how SMEs enhanced the structures of logistics with regards to their improvements. Before anything else, it cited prior research showing that developing nations' ability to manage their supply chains and trade logistics is critical to their ability to compete on a global scale. In response to shortages, small and medium-sized enterprises (SMEs) increased their focus on logistics expertise in an effort to improve their decision-making abilities. In the context of the subject, the study centered on Romania's economy aimed to position itself as a part of new-generation markets in Europe and globally, thereby going beyond the sequential integration processes. The study will provide understanding into why such deeds need to be encouraged as the directions of the present business environment enables proficient organizational aspects deliver more business opportunities for these firms through understanding the role of logistics as a strategic vector for SMEs.

Cosimato & Troisi (2015) described how logistics organizations responded to nouveau problems of ecology in the globalized society, with regard to economic and ecological recompense criteria for sustainable development. Therefore, components of the logistics industry supported their massive-scale activity with technological and organizational advancements in order to maintain and/or strengthen their competitive position against the backdrop of an ever-growing attention on environmental issues. The study consisted of an analysis of how green technologies in logistics may transform companies into innovative competitors who focus on protecting the environment. Researchers set out to determine whether there was a correlation between GSCM procedures and the financial and competitive success of businesses. Using a conceptual framework and the research topics, the authors investigated relevant questions through

the DHL case study. This research elucidated the impact of innovation on the sustainability of SCM, drawing attention to the growing movement towards greener methods. Logistics innovation based on new green technology is the subject of this research. The study used the DHL instance to optimistically prove the role of sustainable SCM. Efficient use of resources and a focus on quality, dependability, performance, and energy efficiency were the goals of this approach, which highlighted the role of environmental regulations in accomplishing both economic and ecological goals.

Bajec et al. (2015) assessed how much standardization can actually be observed at the current state and what additional potential improvements regarding productivity and competitiveness of Slovenian LSPs can be expected. Also awaiting clarification was the question of interaction between legal enforcement and the increase in concern for the environment. The approach used in the study was abductive, and the analyses used both quantitative methods and statistics on a limited number of cases. The $\chi 2$ test was implemented in order to examine the hypotheses. Despite many improvements described, the work failed to identify the direct correlation between productivity/competitiveness improvements and the application of the Quality Standards. Furthermore, the findings also dismissed any noticeable effect of ISO 14001 quality standard implementation on the increased trend in environmental preservation expenses. Thus, the results present new knowledge that is useful for understanding the relationships in the Slovenian logistics service providers' community concerning standard adoption, competition, operational efficiency, and environmental issues.

Operational Efficiency Strategies

Leitner et al. (2011) researched the strategies of business networking, particularly concerning logistics cooperation, which assist organizations to perform effectively and sustainably in the most unforgivable conditions on more competitive markets. Instead,

horizontal logistics collaboration among shippers was singled out as a strategic and efficient approach for managing cost considerations that underlined analyses of this concept in the book that was devoted to its theoretical analysis and characteristics of structures. The study also presented a wide-ranging framework that brings into account numerous factors and aspects that affect collaboration. This framework is useful to determine the proper types of cooperation. Special attention has been paid to the identification of the cooperative logistics models and definition of the specific characteristics of collaboration models; these issues are viewed as the foundation to the construction of goal-adequate cooperation models. The case studies showed the potential of the form of horizontal logistics collaboration and further analysis of the case studies proved that the established structural elements are in fact realized during actual operations.

Orji et al. (2020) focused on the development of a TOE model geared at offering a theoretical foundation marked by Technology, Organisation, and Environment attributes. Based on this, the creation of this framework aimed at outlining the basic elements essential for implementing blockchain technology in the freight transport sector. The study therefore applied the Analytic Network Process (ANP) in determining the relative order of these characteristics. The following are the major factors that are found to be critical success factors that are connected with infrastructure, government, and easily accessible blockchain solutions all of which have strong impact on the use of blockchain technology in freight logistics. The recommendations derived from these concepts can benefit Governments, shipping and logistics firms and blockchain companies. It equips them to tactfully position themselves for the impending rise and effective implementation of blockchain technology in their organizations and hence, increases their organizations' competitiveness levels.

Reverse logistics in the Indian electronics industry was examined by Agrawal & Singh (2019) alternatives were evaluated via the lens of the Triple Bottom Line (TBL), a framework that prioritizes monetary, ecological, and social outcomes. Subsequently the hypotheses postulated based on disposition choices and performance of TBL were tested through administration of a survey in the 700 organizations of the electronics industry of India. It also made 208 responses available for analysis after applying rigorous statistical tests in order to confirm the questionnaire's reliability and validity. To investigate the study's research ideas, the study employed partial least squares route modelling, a subcategory of structural equation modelling. The measurement model revealed that the data met the adequate level of suitability for the modeling. In the assessment of the relationships between TBL performance and disposition decisions' effectiveness, it was identified that a set of positive coefficients existed with the aid of partial least squares path modelling.

Nagy et al. (2018) carried out a survey to discover how the Hungarian companies viewed on the industry 4. 0 trend, how some companies applied IoT solutions for improving the company's processes, and what key challenges they experienced while doing so. The application of the dual technique involved the administration of an online questionnaire and 43 evaluable responses were obtained from the manufacturing and logistics services organizations. In addition, four interviews with manufacturing organizations were conducted, and the results provided a better understanding of the application, important issues, and developmental phases of IoT applications. The studied research emphasized the significant and beneficial role of prompt information exchanging in an organization's general performance with reference to the correct analysis tools and procedures. It was established that businesses applying Big Data technologies, Cyber Physical Systems (CPS), and Collaborative Production Planning Systems (CPPS) had

better profitability and competitive performance, supply chain services increased the level, and the partner's processes became adjusted. Indeed, the study has also established that such factors as productivity improvement, scale economies, and effective methods of production may lead to economic sustainability. The statistics also revealed that organizations have also begun to allocate spend on digital growth.

The objective of this research endeavour, conducted by Mangla et al. (2019), examined the relationship of distribution concerns with OE focus regarding the probability of improving green growth and sustainability of the business GSCs. Applying matrix method and graph theory the study was carried out using four Indian dairy product-based organizations. The identification of the above challenges began with the literature review as well as consulting the authorities' views. By using the social networks represented by a graph structure and the kind of matrix method, one is able to identify the largest constraint. Specifically, it identified the greatest importance of addressing the cold chain issues in a bid to address the challenges of logistics and distribution issues hence reduced wastage, minimizing financial losses, and the fact that environmental issues had to be incorporated. Besides the ranking and analysis of these challenges, the study developed an industry-specific index – namely, Dairy Industry Challenge Index (DIC). From this index, it is possible to derive relevant information concerning the manner through which supply chain network and logistics could intimate business sustainable. This study's findings should be valuable to policymakers and managers who work in the areas related to the interactions between operational procedures, CMS, and human aspects of agro-based dairy industries' supply chain and logistics. Said research may be useful for dairy companies functioning in developing states because it elaborates on the patterns that affect supply chains and logistics.

2.4 Digital Technology and Government Policies

Digital Transformation in Logistics

Kayikci (2018) investigated digitalization and its scope as it relates to logistics in the context of Industry 4.0, also known as the fourth industrial revolution. The Smart Factory and the Factory of the Future are two ideas that started the digitalization drive's debate. These ideas have prompted transport companies to focus on logistics' effects on the supply chain and on Industry 4.0. Variety of products possible, linked processes, decentralized and self-steered management, and total real-time visibility throughout the supply chain are just some of the significant positives of this new implementation. Of course, following the concerns identified in the report, Industry 4.0 goes beyond production, and for an individual to profit from it, they need to have SCM knowledge. The above analysis of trends and challenges leads to the following realization of Industry 4. 0's value is in performance logistics therefore technology is key and supply chain organizations are strongly urged to vertically and horizontally integrate. The purpose of this exploratory study was to analyze one occurrence in the fast-moving consumer goods (FMCG) industry of Turkey's transport service providers sector. The research method used was a qualitative one, involving linked semi-structured interviews. Therefore, this study set out to highlight the benefits of digitalization in logistics while also evaluating the impacts of digitization on sustainability.

Maslarić et al. (2016) aimed to address the changing landscape of human activities and humanity in today's world. This transition is driven by advancements in technology, social and economic conditions, and climate. This transition has initiated a new age in the manufacturing sector, often known as sector 4.0. It is characterized by the organization of production processes that depend on autonomous communication between technology and devices along the value chain. Decision-makers were presented with a choice of accustoming to this kind of eventuality which consequently gave rise to

future requirements in the form of information systems, physical infrastructure as well as several technologies to support economic call. Therefore, with respect to the developments of Industry 4. 0, the logistics system witnessed considerable transformation after the occurrence of the following breakthroughs. 0. Such as the Physical Internet which is an opportunity to discuss the restructuring of business models, value creation mechanisms, and supply chain fundamentals belonging to the international logistics system. Therefore, at the same time, one might derive that further studies are needed in order to encompass the topic in question. Thus, the goal of this research was set as the deliberate analysis of the entries from the PI field along with pinpointing the main challenges that are connected to this suggested model of logistics within the context of Industry 4. 0. Such difficulties encompass technological, societal, and business dilemmas.

Heilig et al. (2017) examined how digitization has affected the maritime industry, pushing it above its traditional boundaries and creating new opportunities for increased sustainability, efficiency, and productivity in logistics. Particular focus was given to the idea of "smart ports," which make greater use of information technology to manage and plan both within and outside of ports. The study provided a brief on the most current digital transformations taking place in ports in the contemporary society. It admitted that investments in technologies and collaborations which make information more shareable and manageable are the foundation of digitalization. This framework is based on the concepts of coordination and cooperation as cost and benefit distribution was examined from the perspectives of intra-, inter-, and meta-organizational levels. for new economic conditions, as revealed by this research, the possible use of this framework for the development of methodologies and tools enabling strategic decisions of seaport’s digitalization.

In this study conducted by Reinartz et al. (2019), the emphasis was made on the transition of the consumer from the stationary stores consumer to the new and progressing worlds of online shopping, m-commerce, and smart shopping. The research examined the digitization process that caused a disruption in the conventional function of physical retailers as the primary interface with consumers, with an emphasis on value creation. A framework has been developed to uncover five additional sources of value creation, providing insights into the changing dynamics of competition in this critical domain. Based on the data, traditional brick-and-mortar stores are still an important consideration for consumers who use a variety of channels when making purchases. However, this role is dependent on the significance of the new ways in which value is created in different purchase scenarios. Nevertheless, the growing prominence of branded-product platforms, such as linked devices and online shopping platforms, has been seen as a factor that is transferring this power to new participants. The research highlighted the need of the parties engaged in this complex rivalry to acknowledge these changes and proactively strategize their positions within the developing eco-systems in order to maintain competitiveness.

Matarazzo et al. (2021) looked at how sectors in Made in Italy specifically SMEs are applying digital transformation in their operations so as to value their clients. More precisely, the primary research question stemmed from this context and aimed at improving the overall understanding of the process through which dynamic capabilities can augment and support digital transformations, especially in regard to SMEs. In this regard, a content analysis was done on six small and medium Italian firm operating in the sectors of furniture design, fashion and gastronomes. The research technique used in this study was to look at a spectrum of cases. The survey findings indicated that the firm's business model creativity of the sample set of small and medium-sized firms (SMEs) was

affected by digital technologies. This meant new methods of realizing and delivering value to the different customer segments as well as came up strategies for goods and services flow. In the study, the accents were made on the priorities that, in the opinion of the author, are critical for the digitalization of enterprises, namely, sensing and learning. The research yielded practical implications for the managers of Made in Italy SMEs, regarding the opportunities and challenges related to their digital transition, as well as for the theoretic contributions to the digital transition and the organizational capabilities.

Government Policies in Logistics

The research carried out by Sharma et al. (2011) concerning reverse logistics (RL), which comprises the processes related to handling and processing of unwanted items. Collecting, classifying, and recycling used items, components, and materials are all part of this category of operations. A competitive tool for organizations to satisfy clients and produce revenues, Reinforcement Learning (RL) has recently gained a lot of attention. This study was aimed at identifying the barriers to RL implementation because a proper reverse distribution system plays a critical role in raising competitiveness and ROI levels. The interrelationships between these obstacles, which have interdependent impacts, were considered holistically rather than in isolation. In particular, the study employed Interpretive Structural Modelling (ISM) to identify the relative importance of external factors influencing each driven barrier and the underlying driving difficulties of other barriers.

Khan, Sharif, et al. (2019) investigated has investigated correlations between green logistics indices and social, environmental, and economic difficulties with special reference to developing Asian countries. The research hypothesis of this study was tested using FMOLS Model and DOLS Model techniques in order to get rid of the endogeneity and serial correlation problems. Additionally, the findings equation shows that trade

openness has high and positive coefficients with manufacturing value-added per capita income, customs clearing process efficiency (LPI2), service quality (LPI4), and trade and transport infrastructure quality (LPI5). In contrast, studies show that as the number and complexity of supply chain operations grow, there is a corresponding decrease in air pollution, carbon emissions, warming, and climate change. also, very thick haze, excessive rains, and water pollution are all detrimental to human health. As derived from the findings, slow economic growth and environmental Sustainability is a core result of terrorism, natural catastrophes, and faulty trade and Logistics infrastructure.

Khan, Jian, et al. (2019) sought to know the hierarchical association between multiple social, environmental, and economical factors of the SAARC nations with green logistics operations. Most estimators used in the study included feasible generalized least squares, and GMM to deal with heteroscedasticity, serial correlation, and heterogeneity. Results showed a direct relationship between increased use of fossil fuels and negative consequences on environmental and social sustainability, underscoring the significance of fossil fuel usage in logistical processes. Numerous variables, including political unrest in SAARC countries, carbon emissions, healthcare expenditures, and the usage of fossil fuels, were found to be strongly inversely correlated with the standard of logistical services and transportation infrastructure. Conversely, research has demonstrated that enhanced information exchange among supply chain participants and the implementation of streamlined customs processes are linked to increased trade prospects and reduced carbon emissions, both of which are beneficial for environmental sustainability. Moreover, studies have shown that using green energy sources and practices lessens negative effects on the sustainability of the environment and society. Better financial outcomes and logistical operations follow, as indicated by indicators such as GDP per capita, trade openness, and more opportunities for exporting outside. Regarding the

benefits of environmentally friendly supply chains and logistics to social development, economic expansion, and environmental sustainability, this study provides practitioners and policymakers with important new information.

Technology Adoption in 3PL

Mathauer & Hofmann (2019) determined the ways in which different methods of gaining access to technology impact the effective incorporation of technical advancements, especially as they pertain to LSPs and third-party logistics providers (3PLs). The purpose of the study was to help increase both managerial and theoretical understanding of the factors that influence rate of technological adoption. During the research, the researcher was able to disseminate findings in the state of the art, and thereby perform a systematic analysis of LSPs' technology integration. According to absorptive capacity and innovation diffusion theory (IDT), this study employed an exploratory case study approach to analyze 10 technological initiatives from 7 distinctive LSPs. The study established that the extent to which people could acquire technology in terms of make, buy, and partner influence the process of integration significantly. This was in regard to how users in the organization embraced the technology, effectiveness of the process, rate at which it was done, and the cost incurred in the process respectively. Also, it was found that such factors as social, environment, firm, and technology significantly affect the above relationship. Therefore, the participants' beliefs and views presented in the study are valuable to managers and researchers interested in understanding and promoting the use of new technologies in the logistics industry.

With the objective of assessing the application of lean principles within the Third-Party Logistics (TPL) sector, Sumantri (2019) conducted an investigation therefore using the fourteen principles which are an outcome of the Toyota Way. The study set out to accomplish the following precise goals: As the main objective of this study is to assess

the extent to which the Lean concept has been adopted by the third-party logistics companies in East Java, Indonesia. Overall, the distribution, transportation, and logistics facilitation impact improvement was the key focus. Eighty managers from third-party logistics companies in East Java, Indonesia, were polled. Data was collected by a questionnaire and evaluated using conventional statistical methods. Based on the results, principle 3 (the utilization of draw systems) received the highest rating for implementation, indicating the presence of streamlined planning processes that prioritize customer requirements. Principle 8, on the other hand (utilizing dependable technologies), performed less well. Using lean concepts successfully, Third-Party Logistics in the East Java Province achieved a slightly above-average score in the survey. The third-party logistics industry has also adopted lean principles in its transportation, logistics, and distribution processes.

Carrus & Pinna (2011) initiated an investigation utilizing the fourteen principles that are derived from the Toyota Way. Thus, the main purpose of this study was to assess the implementation of lean principles in Third Party Logistics firms in East Java, Indonesia. Improving the efficiency in those above-mentioned logistic, distribution and transport processes remained the broad strategic goal. In the Indonesian region of East Java, eighty managers of third-party logistics companies were surveyed. Data was collected via a questionnaire and subsequently analyzed using conventional statistical tests. Based on the results, principle 3 (the utilization of draw systems) received the highest rating for implementation, indicating the presence of streamlined planning processes that prioritize customer requirements. Principle 8, on the other hand (utilizing dependable technologies), performed less well. Third-Party Logistics in the East Java Province utilized lean concepts successfully, respondents' scores are slightly above average level, according to the survey. Because of this discovery, lean implementation

has been initiated in the third-party logistics sector, specifically in the areas of distribution, transport, and logistics.

2.5 Environmental Sustainability and Supply Chain Resilience

Sustainable Logistics Practices

The industrial revolution has led to widespread production and the use of additional raw materials, which has caused landfills and environmental integrity to be disturbed. In contrast to developing countries, industrialized nations have a more established understanding of RL. A few impediments continue to place RL implementation in its nascent phase. Therefore, Waqas et al. (2021) aimed to determine the obstacles to RL implementation, evaluate their impact on the adoption of RL practices, and determine whether or not they have an impact on firm performance by reviewing pertinent literature. The data were gathered from relevant government agencies and manufacturing workforces; subsequently, the information was analyzed through the application of structural equation modelling. The effect of RL barriers on the performance of sustainable enterprises was proven by the creation of a novel structural model that linked all of the research's elements. According to the study, financial and economic considerations, barriers to knowledge and expertise, infrastructure and technology, and infrastructure and technology are significant impediments to the implementation of reinforcement learning approaches. Implementation of RL practices leads to improvement of both environmental and economic performance of the organisation. Additionally, research showed that those implementing RL barriers were an intermediary between RL barriers and business performance.

Alagarsamy et al. (2021) aimed to identify green consumption and production patterns. Furthermore, the study sought to determine how these factors affected the purchasing intents and habits of Bangalore's eco-aware millennials, also known as "green

customers." The study focused on how environmentally conscious consumers' attitudes and behaviours are affected by food goods' pre-purchase sustainable logistics. The planned behaviour and social cognition theories comprise the present study's theoretical framework. 284 people who live close to the coverage region responded to an online poll. The hypotheses were tested through structural equation modelling on confirmed factor analysis. The findings of this study found that consumer perception about sustainable food logistics and green consumption principles do affect. whether direct or indirect, on their inclination to purchase environmentally friendly products and their conscientiousness regarding food items. Finding new multidimensional constructs that may be used to assess Indian consumers' opinions of sustainable food logistics practices within the context of green consumer attitudes was the main result of this study. Future researchers and managers will be able to understand how sustainable food logistics techniques can affect the attitudes of environmentally conscious consumers by utilizing these data. They will also help food production firms find new advancements, opportunities, and other advantages related to using sustainable food logistics techniques.

Mohan Kumar et al. (2015) investigated how logistics service providers in Malaysia employ eco-friendly practices and how these practices impact their performance, particularly in the road freight transportation sector. In Malaysia, the logistics sector was seen more as a critical industry for economic expansion and a focal point of the country's Third Industrial Master Plan (IMP3). It has proven to be beneficial to research how logistics service providers employ eco-friendly practices and how that impacts their performance, particularly in the field of road freight transportation. A conceptual framework that investigated the effect of environmentally friendly sustainable logistics practices on logistics performance was presented in the research study. Moreover, the framework can be implemented in many industries.

Green Logistics

Lai & Wong (2012) explored the implementation and impact of Green Logistics Management (GLM) among Chinese manufacturing exporters. Numerous enterprises were compelled to present their value chains—which commence with incoming logistics and progress through marketing, sales, operations, and ultimately services—as evidence of the profitability of their fundamental business operations. Through the implementation of green logistics management (GLM), Chinese manufacturing exporters have the potential to not only satisfy the growing global community's demands for resource conservation but also achieve commercially viable environmental performance. The exploration of the field of logistics management with special reference to environmental issues has greatly been enriched by the number of significant findings offered by this research. GLM parts described by the authors include partner-based practices, procedure-based practices, evaluation-based practices and general environmental management activities; they are the first four components of GLM. Moreover, they relate GLM to environmental/operational effectiveness with reference to developing nations. In addition, they outline the procedural and organizational factors that explain why export-oriented Chinese manufacturing firms implement GLM. Fourthly, they examine how environmental pressure influences the relationship between GLM and performance. Such conclusions are made based on the analysis of Chinese exporters of goods which are manufactured. The hypothesis that economic factors influenced the adoption of GLM was actually negated by facts. Of course, GLM does enhance the operating and environmental performance so it is possible to state that in the light of the regulation pressure relationship between GLM and performance is positive.

G. Zhang & Zhao (2012) examined the foundational aspects of ecologically sustainable packaging through the lens of green logistics administration. Additionally, they present a distinct managerial methodology as perceived by businesses and the two levels of government. Indirectly and directly, policies, regulations, taxes, institutional measures, and other approaches may all serve to promote the management of green packaging. The government may also standardize packaging, in addition to establishing specialized organizations to discover novel packaging materials and encouraging new investment in the development of environmentally friendly packaging materials. By devising and employing environmentally friendly packaging materials, as well as by utilizing container-based packaging to facilitate the recycling of packaging materials for suitable packaging, large-scale business units can reduce their consumption of packaging materials.

Supply Chain Resilience

Wieland & Durach (2021) advanced the theoretical understanding of supply chain resilience by providing a more precise definition and examining the concept through the lenses of social-ecological resilience and engineering resilience. More than ten years ago, other sectors started to ask about the equilibrium-focused definition of resilience. Resilience, they suggested, was a system’s capacity to adapt and change, and the ability of that system to ‘bounce back’ after an obstructive event. To their surprise, there is little relationship between these discussions and the literature on supply chain and operations management. This study intends to enhance readers' theoretical understanding of resilience by defining supply chain resilience more precisely and highlighting social-ecological resilience and engineering resilience as the two key approaches to resilience. They take these viewpoints into account and talk about them in relation to their systemic supply chain theory. Finding any connections or differences between these perspectives

and SCM was the goal of this investigation (SCM). Next, they make an effort to provide a more thorough description of resilience in SCM. As such, supply chain resilience is now understood to be more about change and adaptation than it is about stability.

Scholten & Schilder (2015) looked into how cooperation affects the robustness of supply networks. The research centres on collaborative actions and the fundamental mechanisms associated with transparency, promptness, and adaptability. An exploratory case study was conducted on eight buying-supplier interactions within the food processing industry. Supply chain resilience (and jointly created knowledge) can be enhanced by the implementation of specialist cooperation activities such cooperative link construction, information sharing, communication, and increased velocity and flexibility. The fundamental processes and interdependencies of the supply chain network's many components are recognized.

Gunasekaran et al. (2015) In particular, this study sheds light on the connection between supply chain ST and management tactics and problems as a result of GS activities. The primary goals of the inquiry are these: Instead of presenting the outcomes and developments stated in the literature, Explaining the complex nature of GS, employing a complexity theory lens to analyze it and assessing the supply chain's robustness in view of GS and complexity offering solutions form the first set of tasks. In order to assess the impact of GS complexity factors on supply chain resilience in relation to three outcomes, they develop a GS resilience framework that can be utilized in future studies: First, risk and innovation are antecedents with a direct relationship to the function; this is because innovative and risk-taking businesses are more likely to reap the benefits of sales promotions. According to the framework of the present studies, the following brief outline features the research articles published in this special issue. It

might help researchers and practitioners expand the knowledge regarding the correlation between complexity and GS resilience and proactive management practices.

Jain et al. (2017) The goals of this work were to develop and validate a hierarchy-based supply chain resilience (SCRES) model, elucidate how different facilitators interact with one another, elucidate the interactions among various facilitators of (SCRES), and empirically test the model. The participants of the study, the facilitators, were identified through a survey and the literature review. Using ISM, the interconnections' levels of enablers were investigated. These facilitators are also divided into other groups according to their degree of dependency and driving force. The route analytical model was tested and the hierarchical SCRES model was validated using structural equation modelling. The study offers empirical support for a framework that uses ISM to identify 13 important facilitators of resilient supply chain practices and to explain how they relate to one another. Moreover, the Matrix of Cross Impact Multiplications is incorporated into the classification process and is used in classification analysis according to the effectiveness and reliability of its drivers. The primary finding indicated that organizations might modify their strategic assets and boost their resilience by implementing the recommended methodology. This study also employed valid statistical tests in the analysis of the constructed model these include discriminant validity, convergent validity, and reliability. This paper proposes a clear model that gives a clear depiction of enablers and how they come together to create SCRES.

2.6 Human Resource Management and Skill Development

Human Capital in Logistics

Janczewska (2018) demonstrated While the current paper has described the methods of non-participant observation and the use of online management tools as research instruments in the field of study, it is necessary to outline the following

conclusions: Key objectives associated with the notion of process management knowledge, relate to the methodological area. Using the methodological idea or the examined group of firms, a set of norms was chosen, regarding which a comprehensive body of research in the area of management sciences has been consulted. The author of the study employed non-participant observation of forty master's degree holders in management; the participants' task was to build a foreseen individual study project. For these, they were able to obtain information that supported the viability of the recommended study methodology. As it can be seen, various problems that arise inside micro-enterprises while examining the share of human capital in the logistic knowledge management model can be recognized if the suggested study methodology is applied. This sets up the ground work for more queries to be made.

Lee & Lee (2016) aimed to provide fresh and authoritative enrolment rates for the long-term in different countries, education level indicators and human capital accumulation. To several countries, this study provides new numbers on the trends in the permanent enrolment ratios, literacy and post-EDUC else literacy, and human capital assets stock. It makes them capable of pulling together an all-inclusive record of prior enrolment ratios for 111 countries between 1820 and 1945 with the assistance of the latest census and the information about the formation of the oldest school in each of these countries available with them (Every 5 years). The developed dataset is further divided based on gender and education level. They develop a database that is consists of the total HC from 1870 to 2010, as well as the estimated education participation, which has been cross-sectioned by age and gender. They do this using the previously define enrolment ratios and the information on educational achievement for different age groups starting with the 1945 population census data. On average, the level of education and Human capital stock has improved over the last 200 years though confirming that despite closing

the GAP in average educational attainment, nations are continuing to do so at a slower rate based on the statistics mentioned above.

2.7 Indian Surface Logistics Industry

Indian Logistics Sector

Mangla et al. (2016) evaluated Here, the following research questions are formulated: What are the key success factors (CSFs) associated with RL practices in the Indian industrial sectors? And what kind of structural model can be suggested for this evaluation? The industry has adopted Reverse Logistics (RL) as a systematic management to control the effects of damaging and sustainable the execution of industrial business. Many industries want to incorporate RL activities into their operations, although they face issues, for example, a lack of resources and knowledge about this area. The proposed survey is designed to assess CSFs pertaining to the utilization of RL in the industrial segments of the Indian economy. In this work, a structural model is presented that assesses the CSFs in the context of RL adoption by means of the DEMATEL and the AHP. The DEMATEL method helps in categorizing the causal relationships between CSFs and on the other hand the AHP method helps in prioritizing them. According to the findings of this research, it could be suggested that the issue of global competitiveness should be considered as the highest priority factor in order to enhance the RL adoption rates in the business field. Concerns resulting from regulation, human resources organisation of systems, and costs are ranked as relative priorities of the remaining elements of the key components analysis using the AHP methods. Furthermore, the findings suggest that it is the organizational, regulatory, and global competitiveness and human resource factors that have a relationship with the influence group whereas the

economic and strategic factors are part of the cause group. Out of this framework, business analysts and supply chain managers will be in a position to develop effective short- and long-term decision-making strategies that will come handy when overseeing and RL implementation stages in supply chain situations.

Prakash & Barua (2016) developed and validated a hybrid model for evaluating and selecting reverse logistics partners (RLPs) in the context of Indian electronics companies. On account of environmental considerations, compliance with regulations, and social challenges, reverse logistics (RL) methods are gaining in popularity. Partners in reverse logistics are utilized by industries to carry out these tasks. Nevertheless, due to the multitude of interdependent components, selecting and assessing a reverse logistics associate is an essential decision that necessitates deliberation and intricacy. And this leads to the classification of this subject as a multi-criterion decision-making problem (MCDM). This paper seeks to find out and compare different reverse logistics partners so as to choose the most suitable one. This work presents research on ranking and evaluation of the selection criteria for the final decision of a reverse logistics partner using Fuzzy Analytical Hierarchy Process (FAHP) VIKOR. Finally, in the case of the Indian Electronics Company, the proposed framework is illustrated at work. Furthermore, a procedure known as sensitivity analysis is other carried out to confirm the effectiveness of the employment of the proposed approach. This research will help the electronics companies in India determine and evaluate the third-party RL partners in order to apply the RL techniques more effectively and efficiently.

Khatri et al. (2023) developed a conceptual framework of the variables impacting the decision to buy express logistics is the goal of this research. An organization's logistics play a critical role in defining its success. Therefore, it is essential to make an informed decision regarding the procurement of express logistics in order to ensure the

timely and accurate delivery of the desired products. The procurement of express logistics services is a complex undertaking that necessitates the evaluation of numerous factors. In addition to primary research, a panel of fourteen subject matter experts in the area of Indian logistics were involved in the study. A group of specialists includes professors, consultants, and senior managers who have in-depth knowledge of the topic. Interpretive Structural Modelling and Cross Impact Matrix Multiplication Applied to Classification (MICMAC) have been used to provide a conceptual foundation for logistics purchasing decision (ISM). The framework claims that information sharing, strategic alliance, the logistics service provider's (LSP) network reach, technology, and information sharing are the main factors influencing the decision process of buying logistics. The two key factors which still determine whether or not the logistics will hire are price and service quality.

Sarkar & Chouhan (2020) evaluate and model the spatiotemporal patterns of urban growth in Siliguri, a rapidly urbanizing metropolis in West Bengal, over the period from 1991 to 2017. Over the last 20 years, Siliguri, a West Bengali metropolis, has seen significant and quick urban extension. This massive urbanization causes issues for the efficient operation of urban utility services in enlarged regions and results in the loss of natural landscapes, agricultural lands, and forest cover. Particularly crucial for enhanced administration of dispersal zones are spatiotemporal evaluation and modelling of urban growth. In the current study, factors influencing the Siliguri metropolitan area's urban growth between 1991 and 2017 were determined by an analysis that combined stratified and random sampling with binary logistic regression. Thus, elevation, slope, distance to the forest, river, and agricultural area, property value, proximities to highways and rail, historic cities, medical facilities, educational institutions, utility services, built-up density, canal distance, and population density are the independent variables of this model.

According to this study, the town's built-up area has grown significantly during the last 20 years. The model's results clarify that, between 1991 and 2017, the most significant variables influencing urban development were elevation, land value, the vicinity of a major road, and the proximity of a medical facility and education centre. The model's interpolated probability map indicates that the majority of urban expansions will occur in the southwest, close to existing urban centres, and along key roadways. In the region, edge growth predominates over infill construction. The receiver operating characteristic area under curve is 0.88, indicating that the model is valid and the anticipated probability surface of urban expansion is accurate.

CHAPTER III:

METHODOLOGY

3.1 Overview of the Research Problem

Considering its importance to the Indian economy, several issues prevent the surface logistics industry from attaining its full potential (Mathews, 2023). Inefficiency and poor growth in the sector can be attributed to various problems, including insufficient infrastructure, insufficiently utilized technological advances, and an absence of funding (KPMG, 2007). Outsourcing logistics operations, dealing with diverse customer requirements, and ensuring efficient communication throughout the supply chain are all examples of how the entry of 3PLs adds complexity. The fact that there is a maze of third-party logistics providers offering everything from basic shipping and storage to advanced value-added services like packaging and order fulfilment just compounds the problem. Concurrently, 3PLs play a significant role in enhancing logistics operations, decreasing costs, and providing businesses with a competitive advantage. Their ability to streamline processes, respond quickly to changes in customer demand, and transform supply chain dynamics is directly proportional to their prominence in the market (Cleo, 2023). The focus of this research is to close a knowledge gap in the performance shortfalls of the Indian surface logistics industry by locating, measuring and making sense of the sector. Poor performance in this sector is due to an interplay of internal and external forces. This study aims to do more than draw attention to issues; it also intends to propose a long-term action plan. Its goal is to outline approaches and possibilities that

allow the industry to reach its full potential while meeting the changing needs of a dynamic economy. This study aims to bridge gaps in our understanding of India's large and varied landscape's logistical issues. In order to make the logistics industry in India more effective, competitive, and long-lasting, it offers smart answers to issues in the logistics sector.

3.2 Operationalization of Theoretical Constructs

The measurable and empirical variables that are characteristic of the Indian Surface Logistics milieu are used to operationalize the theoretical propositions regarding the antecedents of the 3PLs' performance and their future evolution (Sweeney, 2006). This process is important because, in most cases, the theoretical frameworks require operationalization so that they can be turned into subjects of investigation using various analytical procedures.

1. **Performance Drivers:**
    - **Infrastructure Quality:** Transportation structure is part of this construct and includes elements like the presence and quality of transportation, such as roads and railways, the state of warehousing, and the degree of technology, such as the track-and-trace system and information technology. These variables are useful for assessing the measures that shape the logistic operations framework.
    - **Technological Utilization:** This also includes the level to which the third-party logistics providers integrate complex technological devices such as IoT devices, automation systems and real-time controls into their operations to conduct business activities. These variables are useful in defining the providers' capacity to expand the use of technologies to improve client outcomes.

- **Financial Health:** This construct is measured by revenue growth rates, profit margins, and investment in transport infrastructure and technology. These variables contain information on 3PL providers' provable financial health and growth aptitude.

2. **Operational Efficiency:**
    - **Delivery Performance:** Therefore, instrumentation for performance calculation comprises the on-time delivery rate, the order fulfilment accuracy, and the number of delivery errors or delivery delays. These measures are vital to perform depending on the efficiency and dependability of the logistic activities.
    - **Cost Efficiency:** Indicators common in a parcel delivery firm’s environment, and they are such things as cost per shipment, total costs, and cost savings made. To better predict how efficient the supply chain services will be, these are important considerations.
    - **Customer Satisfaction:** This information will be obtained from customer satisfaction with the service level, attentiveness and issues handled by the firm. These variables depict the attainment of needs/expectations by 3PL providers to their clients.
3. **Human Resource Management:**
    - **Employee Engagement and Satisfaction:** The Variables contain employee income rates, job fulfilment, the survey results, and worker training and growth levels. These measures provide a vision of the human reserve plans and their influence on workforce constancy and efficiency.
    - **Talent Availability:** Measured by the accessibility of talented logistics professionals, employment success rates, and tasks in hiring specialized

capacity. These variables are crucial for assessing the size of 3PL earners to attract and recall capable personnel.

4. **Regulatory and Policy Impact:**
    - **Compliance Levels:** Measured by the amount to which 3PL earners adhere to national and international logistics regulations, including safety values and ecological policies. These variables designate the logistics firms' regulatory submission and operational legality.
    - **Impact of Government Policies:** This is evaluated through the industry response to the effect of current and predictable regulatory differences on logistics processes and growth projections. These variables provide a vision of the external policy environment moving the logistics sector.
5. **Market Dynamics:**
    - **Economic Indicators:** The Variables comprise GDP growth, inflation rates, and stages of foreign direct assets in the logistics sector. These events provide a macroeconomic context for considering market circumstances and growth chances.
    - **Globalization Effects:** Measured by the number of international trade events, companies with foreign logistics firms, and the effect of universal market trends on local operations. It is revealed that the extent of global integration and attractiveness of 3PL providers are predetermined by these variable quantities.
6. **Future Growth Prospects:**
    - **Innovation and Adaptability**: These are evaluated to contribute to the rate of invention adoption and also the flexibility in relation to the market oddments

& assets in research and growth. These variables point at future development opportunities and interest through a competitiveness ensued by innovation.

- **Scalability and Expansion**: The Variables that holds the potential to upgrade the scale of processes; diversify into new markets; increase the service efforts. These procedures are critical to evaluate the business development and strategic management skills of the 3PL providers (Sabelnikova & Khmeleva, 2018).

3.3 Research Purpose and Questions

Finding out what makes the Indian surface logistics sector tick and what the future holds for it is the primary goal of this study. Because it seeks to improve economic understanding in order to reach the proper standards that will increase efficiency, effectiveness, and sustainability, this study will help the multiplication sub-sector in India grow.

The Research Questions for this Research are as follows: The Research Questions for this Research are as follows:

- Considering the surface logistics industry of India, what are the most influential internal and external factors affecting the performance of Logistics Service Providers or third-party Logistics (3PL)?
- What role did the economic growth, globalization, and increasing market factors play in determining the Logistic Service Provider of India's surface logistics business of the subsequent years, and what are the trends and forecast of this area?
- On the basis of these trends, what suggestions can be provided for enhancing the effectiveness, competitive edge, and viability of third-party logistics (3PL) in the context of surface logistics in India?

3.4 Research Design

The research methodology that has been employed in regard to the performance indicators and future prospects of 3PLs in the Indian surface logistics industry involved the use of actual quantity with statistical analysis to come up with actual data (Rai et al., 2021). Data was gathered using both closed-ended questionnaires were administered on a selected sample of logistics companies and their customers. This comprises business operations, the consumer experience, an understanding of technology, value for the amount spent, and legislation. The process involving the calibration of the most significant performance indicators and the projection of future growth rates included regression tools and correlation analysis. In addition, secondary data in form of industry reports, government reports, and articles concerning the sector were gathered as backing to the primary data. Our goal in conducting this research is to identify the factors that influence the performance and growth of 3PL providers in India's surface logistics market. We will use observable variables and data triangulation techniques to provide educated suggestions. This method guarantees empirical results, which industry stakeholders can use to make more informed decisions (C.-N. Wang et al., 2023).

3.5 Population and Sample

The target population for this investigation includes all the logistics service providers offering surface logistics in India. These firms are multinational and regional, both large and small. These service providers in transport and logistics offer third-party logistics or 3PL service, transport, warehouse, distribution, freight forwarding and SCM services. Thus, for a practical and efficient study, the population must be followed by a sample Reddy *et al.*, (2022). This sample comprised leading core-logistics 3PL service providers who manage networks and transport large products. These mid-tier menu service providers offer highly specialized or target geography-oriented services, and

minnows and start-ups provide highly specialized services in specialized niches or limited geographical areas. The sample was selected using the Convenience sampling method; therefore, constituencies of the 3PL providers to get most of the categories of the providers and their geographical distribution. Self-generated questionnaires administered to logistics firms yielded quantitative research data. In contrast, interviews of the firm's senior managers, presidents, and senior officers, secondary research in books, magazines, journals, newspapers, surveys, balance sheets and income statements yielded qualitative research data. This study is a humble effort to elucidate the factors influencing the performance of the 3PL providers and the possible prospects of the surface logistics sector in India (Ngah & Ramayah, 2023).

The final sample size for this study was 300.

3.6 Participant Selection

- **Inclusion and exclusion Criteria**

Criteria	**Inclusion**	**Exclusion**
Type of Company	Logistics service providers (3PL)	Companies not offering logistics services
Size of Company	Small, medium, and large-sized companies	Non-logistics businesses
Operational Scope	Companies operating in the Indian surface logistics sector	Companies operating solely in other sectors
Years in Operation	Established companies with a track record in logistics	Newly formed start-ups
Geographic	Companies with operations across	Companies limited to

Presence	different regions of India	single or few regions
Service Offerings	Companies offering a range of 3PL services, such as transportation, warehousing, and distribution	Companies with limited or specialised services
Availability for Study	Willingness to participate in surveys, interviews, or provide data	Unwillingness to participate or respond
Expertise and Knowledge	Industry experts, analysts, and researchers with relevant experience	Individuals lacking expertise in logistics

3.7 Instrumentation

1. **Logistic Service Providers (LSP)**

Statements	**1**	**2**	**3**	**4**	**5**
The logistics service provider consistently meets delivery deadlines.					
The logistics service provider offers a variety of shipping options to meet our specific needs.					
The logistics service provider resolves issues and complaints efficiently.					
The logistics service provider demonstrates flexibility in adapting to changing requirements.					
The logistics service provider has effective customer support services.					

2. **Operational Efficiency and Technology**

Statements	**1**	**2**	**3**	**4**	**5**

LSPs leverage digital technology effectively to enhance operational efficiency.					
Adopting advanced tracking and monitoring systems has positively impacted the overall efficiency of logistics operations.					
LSPs in the Indian surface logistics sector effectively integrate technology with their SCM processes.					
The level of automation in the Indian surface logistics sector is sufficient to optimise processes and reduce manual errors.					
Integrating Internet of Things (IoT) devices has improved the visibility and traceability of goods in transit.					

3. Drivers Performance

Statements	**1**	**2**	**3**	**4**	**5**
The reliability of delivery timelines is crucial.					
Efficient inventory management is a key factor.					
Communication and responsiveness are important.					
Cost-effectiveness plays a significant role.					
The flexibility of logistics solutions is vital.					
Technology integration enhances overall performance.					
The accuracy of order fulfilment is essential.					
Compliance with regulations is a priority.					
Sustainability practices are important.					
Continuous improvement initiatives are valued.					

4. Human Resource Management

Statements	**1**	**2**	**3**	**4**	**5**
Current HR management strategies adequately address employee					

engagement and satisfaction within 3PL organisations in India.					
The scarcity of skilled talent in the Indian surface logistics sector makes recruiting and maintaining a capable workforce challenging for 3PLs.					
The current HR policies in the logistics sector adequately address diversity and inclusion issues within the workforce.					
The effectiveness of communication channels and feedback mechanisms within 3PLs contributes positively to employee satisfaction and performance.					
Implementing innovative HR strategies, such as flexible work arrangements, is essential for attracting and retaining top talent in the evolving logistics landscape.					

5. Anticipated Changes in Government Policies

Statements	**1**	**2**	**3**	**4**	**5**
The current regulatory landscape supports the long-term sustainability and profitability of 3PLs in the Indian logistics market.					
Current government policies positively impact the overall performance of 3PLs in the Indian surface logistics sector.					
Upcoming policy modifications will address key challenges faced by 3PLs, such as infrastructure constraints and regulatory hurdles.					
The government's role in fostering a conducive environment for foreign investments in the 3PL sector, leading to future growth.					

6. Integration of Technology & Real-Time Data Analytics

Statements	**1**	**2**	**3**	**4**	**5**
The current technology infrastructure supports seamless communication					

within the logistics network.					
Integration of technology has positively impacted customer satisfaction.					
Organizations regularly invest in updating and upgrading logistics technology.					
Employees feel comfortable using the integrated technology for logistics tasks.					
Real-time data analytics has helped in identifying and resolving issues promptly.					

7. Factors and Future Growth Prospects

Statements	**1**	**2**	**3**	**4**	**5**
The current regulatory framework poses significant obstacles to the effective implementation of technology-driven solutions in the Indian surface logistics sector.					
The high upfront costs associated with technology integration are a major barrier for 3PLs in the Indian logistics industry.					
Resistance to technological change among stakeholders within 3PL organisations impedes the successful integration of advanced technologies.					
The absence of a skilled workforce capable of managing and utilising advanced technologies is a significant challenge for India's future growth of technology-integrated 3PLs.					
The perceived risks associated with data security and privacy concerns hinder the willingness of 3PLs to fully embrace technology for real-time					

data analytics.					

3.8 Data Collection Procedures

Based on the above objectives of the current study for studying the performance profile and prospects of the involved 3PL providers in the Indian surface logistics sector, data collection mainly relied on the online survey method (Malik et al., 2024). The questionnaire was designed considering the factors obtained from the reviewed literature and professionals to ensure that the questionnaire covered all the factors. Convenience sampling was used in the study with the targeted female and male individuals within the working age bracket of 25-40 years and working in at least a managerial/professional capacity within the 3PL firms in India. The online survey was sent through email invitations and a list of contacts of professional healthcare providers who have emphasised measuring and analysing various performance aspects, strategies, and operational challenges that come with growth in these health-offering organisations (Santhanakrishnan, 2017). It was comprehensively formatted and contained a series of questionnaire items that sought to elicit discreet measures regarding the firm's revenue growth, increment in market share, use of technologically integrated services and overall service quality. Similarly, closed questions comprised confirmatory questions which sought quantitative data through a repetition of the respondent's earlier response, which, when used to ask the respondent about their experiences or opinions of a certain aspect of the sector, led the respondent to give extra information about the workings of the sector, thus provoking deeper insight into the operations and trends within the sector (Kara & İpekçi, 2021). Extreme caution was taken during data collection to ensure that the respondent's identity of the obtained responses was not revealed to arrive at figures that would do justice to the industry. This line of thinking wanted to provide the subsequent evaluation with a wealthy basing ground, which would map out the performance and

conceivable emergence trails of the respective 3PL providers in the Indian surface logistics (GM et al., 2024).

3.9 Data Analysis

1. **Statistical Package for the Social Sciences:** SPSS (Statistical Package for the Social Sciences) is a software tool used for statistical analysis. This softaware facilitate easy data and statistical analysis, performing of tests and displaying the results in a readily comprehensible manner. Here are the basic features of SPSS for data analysis concerning the findings related to the performance drivers and future growth potential of 3PL providers in the Indian surface logistics industry (Kara & İpekçi, 2021).

    - **Descriptive Statistics**: Frequency tables are one of the simplest statistical methods used when identifying the characteristics of a set of data. Using the SPSS, the author employed to compute and present mean, median mode, standard deviation, etc., They yield information on how the scores disperse around the mean, or the value that separates the scores into two halfs of the same size with a difference on one and the other side of the value. One of the measures of variability in the data that tells us how the data dispersed in the reality as opposed to in the theory is the standard deviation. Together, these facilitated the understanding of the overall distribution patterns of their data, and tweaking it according to the objectives of the research, as well as to contrast and emergence different aspects or elements of it. Data preprocessing was the initial step in exploratory data analysis (EDA) and hypothesis testing, which enabled the author to identify patterns, trends, and relationships (C. N. Wang et al., 2023).

- **Inferential Statistics:** Descriptive statistics was used for drawing conclusions, forecasts or estimates as well as making choices based on sample data from a population. Descriptive/statistical inferences can be easily differentiated from each other because the former allows the researchers to make conclusions and forecast some patterns and occurrence based on the gathered information (Reddy et al., 2022). Among the generally used tests in inference, the t-tests, analysis of variance (ANOVA), regression and correlation tests are examples of such tests which author has employed in this study. These tests allow one to determine whether the differences or relationships present in the sample statistics can be extrapolated to the entire population for the purposes of hypothesis testing or decision making.
- **Regression Analysis:** Regression analysis, on the other hand, is a strong inferential statistic used to linearly explore the dependent and independent variables(s). This helps to know how the dependent variable relates to any one of the independent variables while the others are kept constant (van der Ark, 2005). There are various categories of regression analysis: simple linear regression, multiple regression, and logistic regression, although they have unique analytical uses. For instance, in simple linear regression, the connection between two variables, where usually one of them is of the continuous type, is depicted by a straight line. Hypothesis testing and regression analysis are the most commonly utilised methodologies that enable analysts to identify the form and strength of relations between variables for prediction and forecasting (Subudhi et al., 2024).
- **Correlation Analysis:** Analysing the direction and degree of a relationship between two variables evaluated in more than two categories is the goal of

correlation analysis, another inferential statistical technique. The output of a correlation test is the correlation value labelled usually with the symbol ‘r’, which is always between -1 and 1. A score of 1 indicates that the two variables are positively related; that is, an increase in one variable will cause an increase in the other (Ohira, 2018). A figure of -1 means a negative perfect correlation whereby low levels of the other accompany the high levels of one variable. It ranges between -1 and 1 with 0, meaning the variables have no relationship. While correlation differs from regression analysis, correlation analysis indicates the strength of the relationship between the variables. Still, it does not necessarily mean that there is a cause-and-effect influence between the variables. Later on, one of the most important actions in correlation analysis is fundamental in determining and directing relationships in data toward further examination and research (Armstrong & Hilton, 2014).

- **Data Visualization**: While conducting data analysis and presenting the results, the perception of the result could be boosted by choosing the chart or graph based on tools. There are a variety of graphs in SPSS, such as Bar graphs, scatter /dot graphs and histograms, with all the graphs having different roles in conveying information (Aavarti & Kumbar, 2022). The bar graphs are suitable for portraying nominal scale data or the frequencies of the variables in a given study and enable the distinction of one group or category from another. The scatter plots help organise the data points to decide the relationship between two variables. Histograms, on the other hand, are graphs used to present continuous data in a manner that can be used to identify trends such as central tendency and variability within the specific data set. When applied in SPSS, such tools enable the researcher to facilitate data analysis,

communicate the results, and arrive at effective decisions (Akingbade & Olaide Wasiu, 2018).

3.10 Research Design Limitations

This study on identifying performance drivers and future growth potential of 3PL service providers in India's surface logistics industry has the following limitations in the research design. Further, the study might experience challenges relating to the accessibility and accuracy of quantitative data, given that logistics companies might hold limited and inconsistent data since they consider such data their trade secrets (Subudhi et al., 2024). Also, because of the industry's dynamic nature, mainly due to changes in technology and policies, the results generated may be stale shortly after the evaluation. Quantitative data may be restricted when it comes to the possible factors presented by the qualitative data, meaning that valuable information that could help to understand the context in which the sector operates could be lost. Furthermore, the focus is given specifically to the Indian surface logistics sector, therefore, it may encompass specific tendencies which are not necessarily general for the world logistics market. Finally, biases in the sampling strategy and, more critically, excluding nutrient or nascent logistics providers may mean that the firm only gets a restricted view of the logistics providers' sector performance betters and successes (Arun & Özmutlu, 2021).

3.11 Conclusion

The following conclusions can be drawn from an analysis of the variables that have affected surface logistics company performance and those that will likely affect third-party logistics providers' future growth prospects in the fastest-growing economic sector in the nation. The sector suffers various challenges, from poor infrastructure, low technology uptake, and poor funding. Thus, there are new opportunities to improve logistics efficiency, decrease costs and achieve competitive advantage using the 3PLs

service. Accordingly, the topics highlighted the importance of the quality of infrastructure, the degree of technological and financial performance, operational indicators, human resources, regulation, competition, and the prospects for further development as essential factors for shaping the sector's further evolution. The following areas for further work have been suggested: Digital evolutions have to be encouraged, regulatory environments should be built up to meet the growing industry needs, and human capital has to be developed and maintained in enough quality to address the industry's needs. Thus, systematically evaluating these factors makes it possible to provide efficient solutions to existing problems and encourage further industry development to create effective competitive advantages internationally. This study offers a basic map for the players to be in a position to address challenges and achieve positive change in the context of the Indian logistic environment.

CHAPTER IV:

RESULTS

4.1 Reliability

Table 4.1: Reliability Statistics

Cronbach's Alpha	N of Items
.962	39

Table 4.1 reveals that the 39-item survey or test instrument has an outstanding level of internal consistency and reliability with a Cronbach's Alpha rating of.962.

4.2 Frequency Analysis

Demographic Details of Respondents

Table 4.2: Gender

	Frequency	Percent
Male	171	57.0
Female	129	43.0
Total	300	100.0

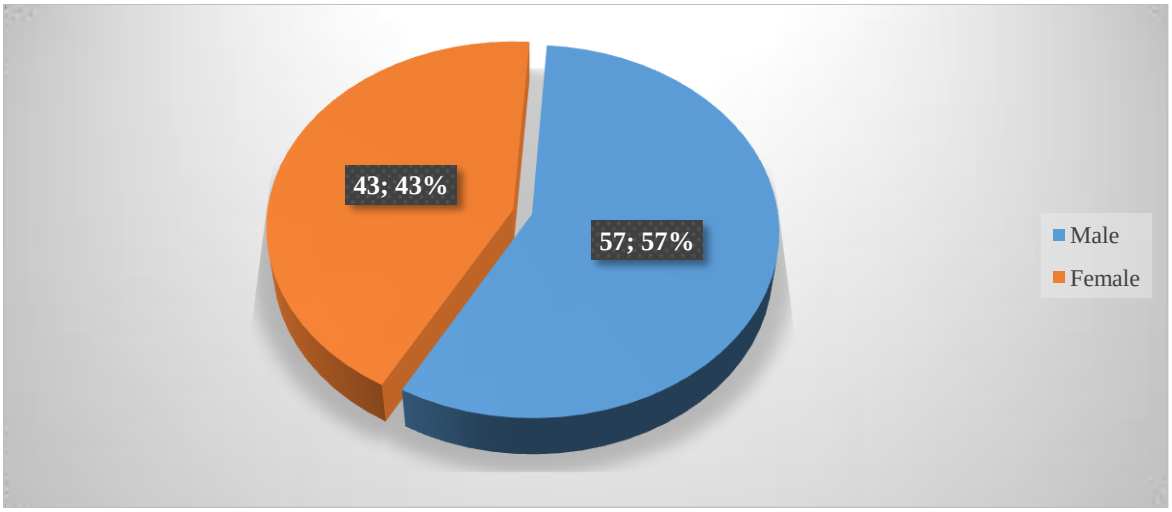

Figure 4.1: Gender

The above figure 4.1 shows the data on gender circulation. There are 171 males (57% of the total) and 129 females (43% of the total) out of 300 surveyed participants.

Table 4.3: Age

	Frequency	**Percent**
18 to 25 years	174	58.0
26 to 35 years	79	26.3
36 to 45 years	26	8.7
46 to 55 years	18	6.0
56 years and above	3	1.0
Total	300	100.0

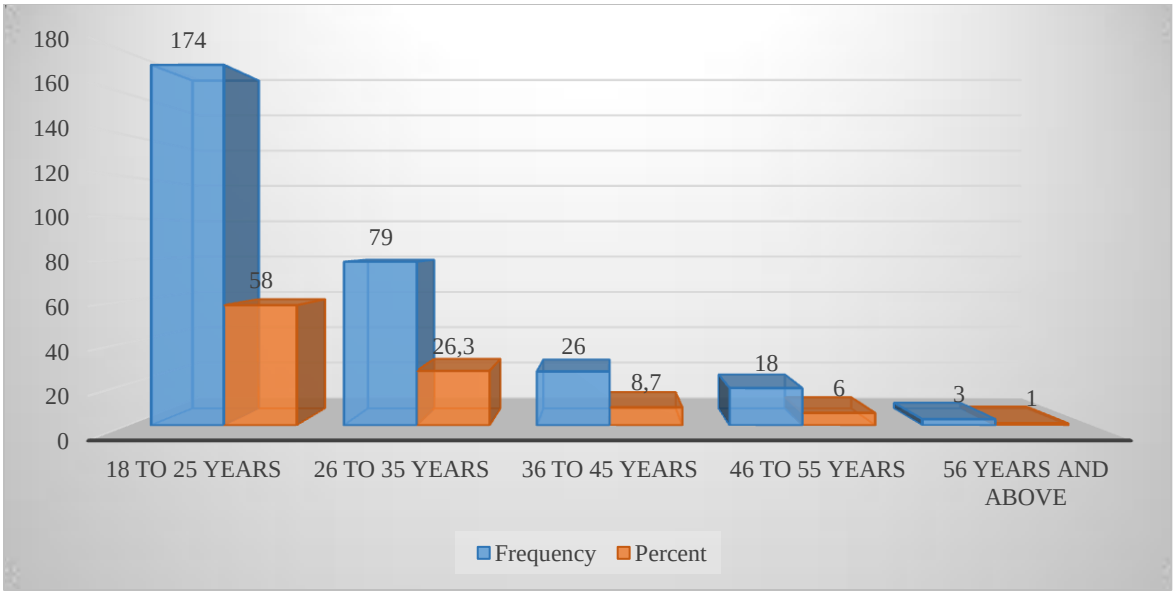

Figure 4.2: Age

The above Figure 4.2 shows the age distribution of respondents shows that the majority are between 18 to 25 years old, accounting for 58.0% of the sample. Those aged 26 to 35 years make up 26.3%, while 8.7% fall within the 36 to 45-year range. Respondents aged 46 to 55 years constitute 6.0%, and only 1.0% are 56 years and above. This indicates a predominantly younger demographic in the sample.

Table 4.4: Educational background

	Frequency	**Percent**
High School	6	2.0
Bachelor's Degree	128	42.7
Master's Degree	146	48.7
PhD	18	6.0
Other	2	.7
Total	300	100.0

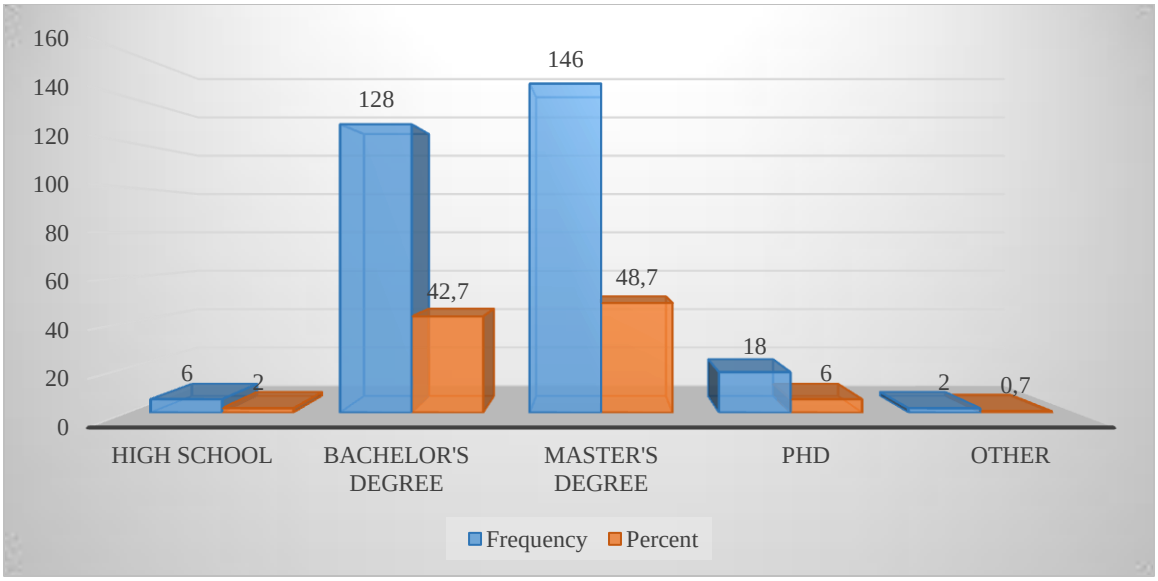

Figure 4.3: Educational background

In figure 4.3, we can see data regarding a group's educational background: Six people, or 2.0% of the total, have finished high school. With a Bachelor's degree, 128 people (42.7%) are qualified. A Master's degree has been obtained by 146 people, or 48.7 percent. Just 18 people, or 6.0%, have earned a doctorate. The "Other" qualifications group contains 2 people, or.7 percent of the total. Three hundred people were polled in all.

Table 4.5: Current Job Role

	Frequency	**Percent**
Supply Chain Manager	22	7.3
Logistics Expert	105	35.0
Transportation Professionals	21	7.0
Director of Logistics & Distribution	11	3.7
Other	141	47.0
Total	300	100.0

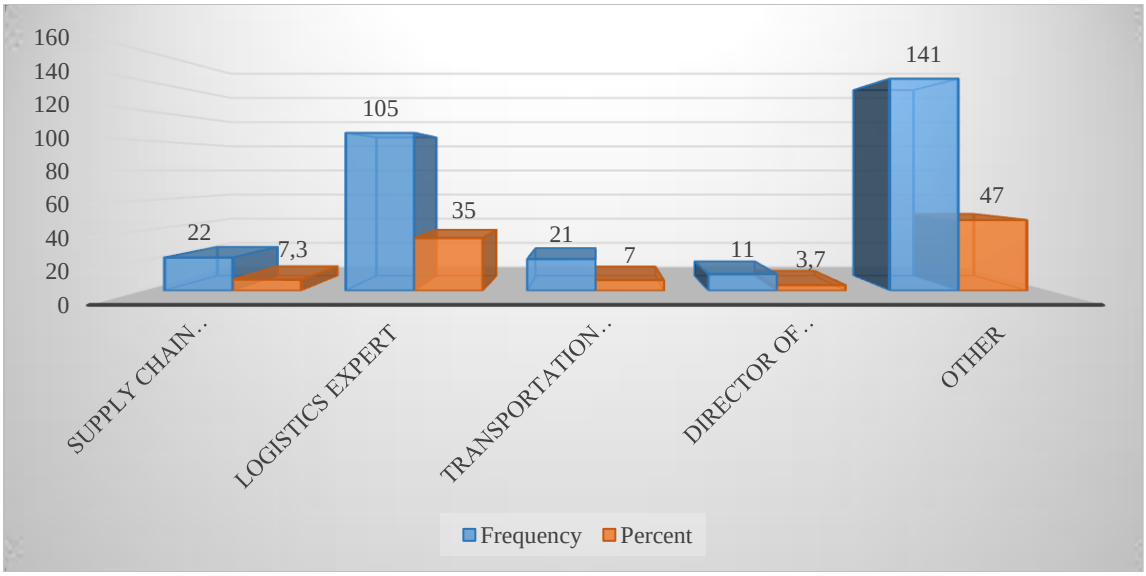

Figure 4.4: Current Job Role

The above Figure 4.4 represents the distribution of job roles among 300 individuals surveyed, 22 (7.3%) hold positions as Supply Chain Managers, 105 (35.0%) are identified as Logistics Experts, and 21 (7.0%) work in Transportation Authorities roles. There are 11 individuals (3.7%) serving as Directors of Logistics & Circulation. The largest category, comprising 141 individuals (47.0%), falls under "Other" job roles within this sector.

Table 4.6: Job Experience

	Frequency	**Percent**
Less than 1 year	155	51.7
1 to 3 years	65	21.7
3 to 5 years	26	8.7
5 to 10 years	20	6.7
More than 10 years	34	11.3
Total	300	100.0

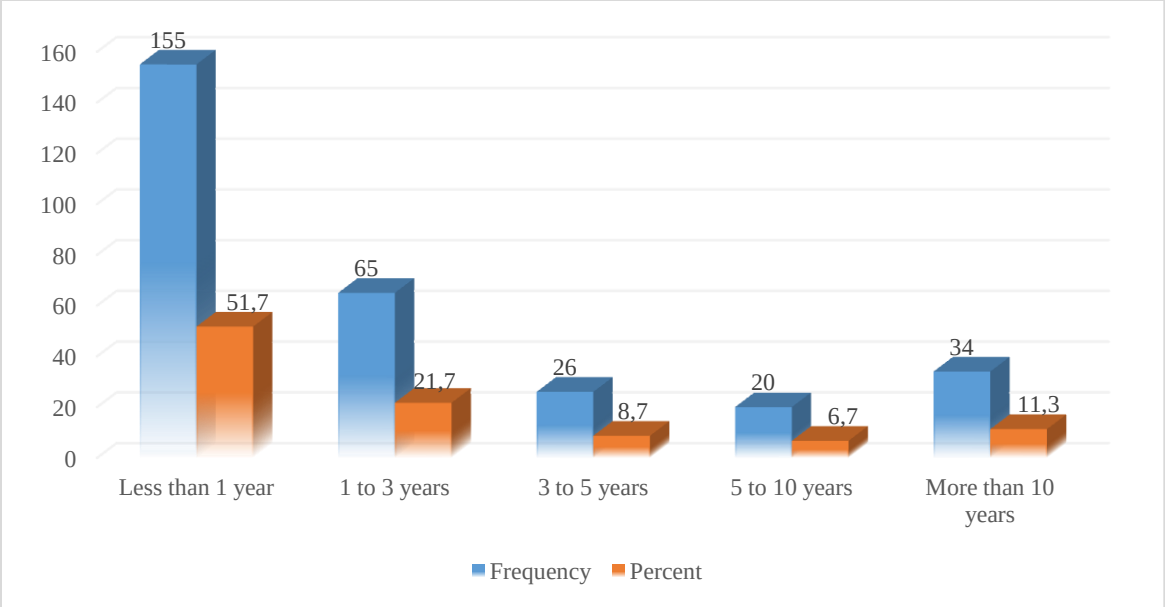

Figure 4.5: Job Experience

The above figure 4.5 summarizes the data related to years of experience of the surveyed participants. 155 individuals (51.7%) have less than 1 year of experience. 65 individuals (21.7%) have between 1 to 3 years of experience. 26 individuals (8.7%) have between 3 to 5 years of experience.20 individuals (6.7%) have between 5 to 10 years of experience. 4 individuals (11.3%) have more than 10 years of experience.

Table 4.7: Company Size

	Frequency	**Percent**
Microenterprise: 50–100 employees	108	36.0
Small business: 100–250 employees	103	34.3
Medium-sized company: 250–450 employees	48	16.0
Large company: 450 or more employees	41	13.7
Total	300	100.0

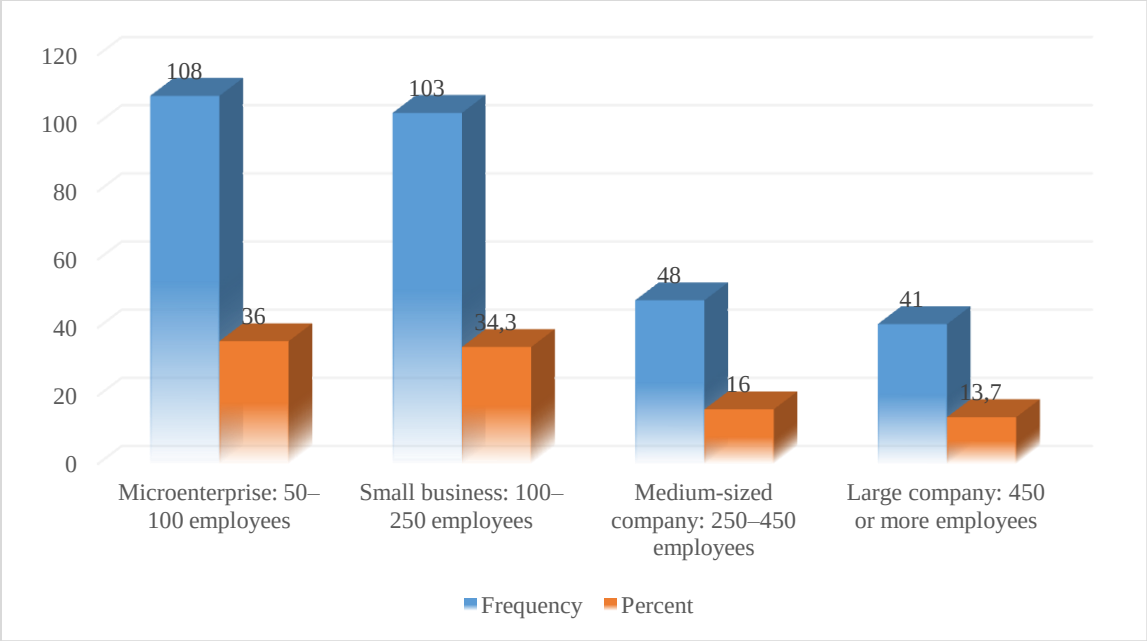

Figure 4.6: Company Size

The above figure 4.6 displays the details of the distribution of company sizes based on the number of employees:108 individuals (36.0%) work in microenterprises with 50–100 employees. 103 individuals (34.3%) are employed in minor businesses with 100–250 employees. 48 individuals (16.0%) are employed in medium-sized companies with 250–450 employees. 41 individuals (13.7%) work in large companies with 450 or more employees.

4.3 Logistics Service Provider

Table 4.8: Logistics Service Provider

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The logistics service provider consistently meets delivery deadlines.	Frequency	7	38	108	106	41
	Percent	2.3	12.7	36	35.3	13.7
The logistics service provider	Frequency	5	43	96	118	38

offers a variety of shipping options to meet our specific needs.	Percent	1.7	14.3	32	39.3	12.7
The logistics service provider resolves issues and complaints efficiently.	Frequency	10	34	102	108	46
	Percent	3.3	11.3	34	36	15.3
The logistics service provider demonstrates flexibility in adapting to changing requirements.	Frequency	8	36	105	107	44
	Percent	2.7	12	35	35.7	14.7
The logistics service provider has effective customer support services.	Frequency	7	33	101	101	58
	Percent	2.3	11	33.7	33.7	19.3

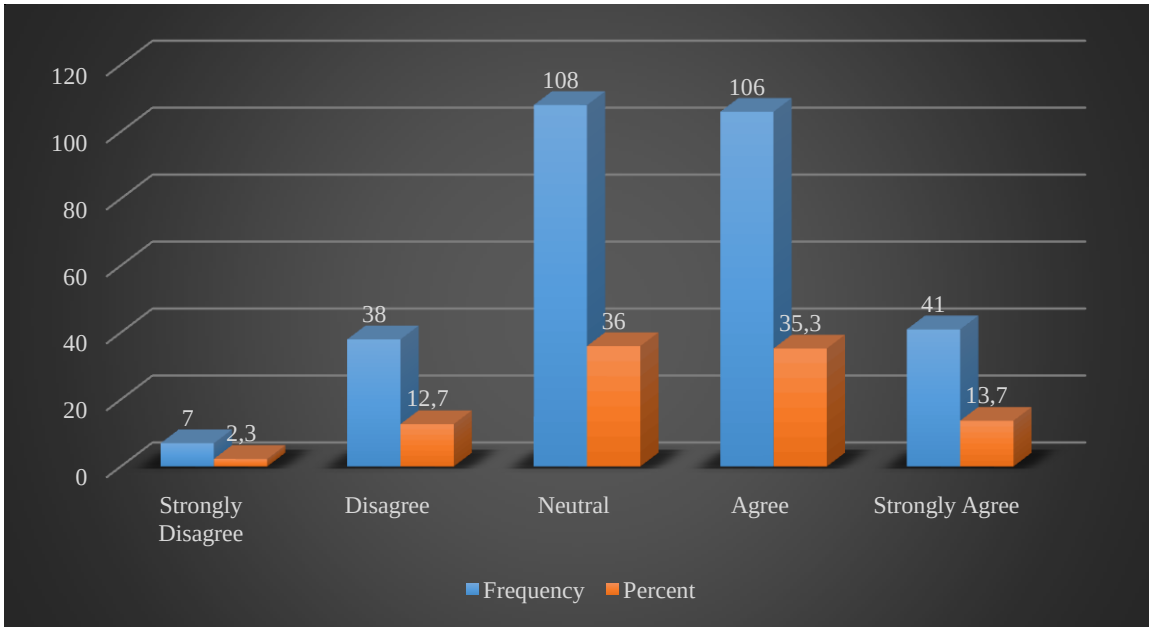

Figure 4.7: The logistics service provider consistently meets delivery deadlines.

The above figure 4.7 presents responses upon asked if the logistics service provider consistently meets delivery deadlines. Among 300 respondents, 7 (2.3%) strongly

disagree with the statement, while 38 (12.7%) disagree. A larger group of 108 defendants (36.0%) chose a neutral posture. On the other hand, 106 respondents (35.3%) agree with the statement, and 41 (13.7%) strongly agree. These percentages reflect variable degrees of agreement or discrepancy among the respondents regarding the survey topic.

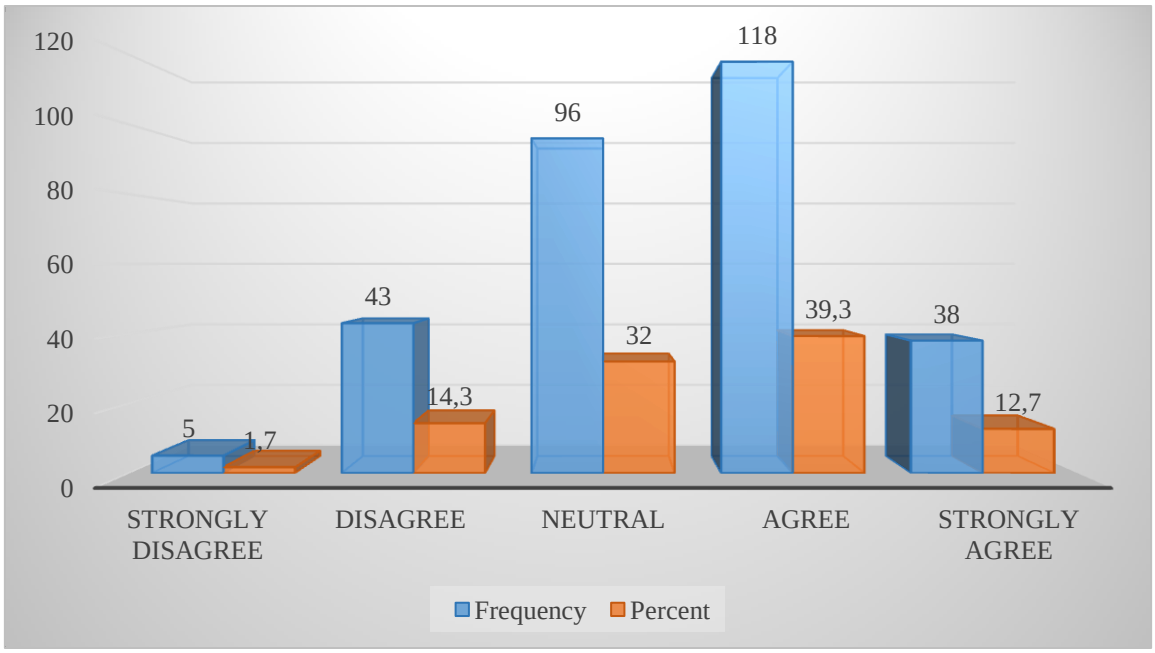

Figure 4.8: The logistics service provider offers a variety of shipping options to meet our specific needs.

The above figure 4.8 illustrates the distribution of responses upon asked if the logistics service provider offers a variety of shipping options to meet our specific needs. Among the respondents, 5 individuals (1.7%) strongly disagree with the statement, while 43 (14.3%) disagree. A noteworthy serving of 96 defendants (32.0%) expressed a neutral stance. Conversely, 118 respondents (39.3%) agree with the statement, and 38 (12.7%) strongly agree. These findings reflect a variety of sentiments ranging from disagreement to strong agreement, highlighting varying degrees of sentiment among the surveyed individuals regarding the topic at hand.

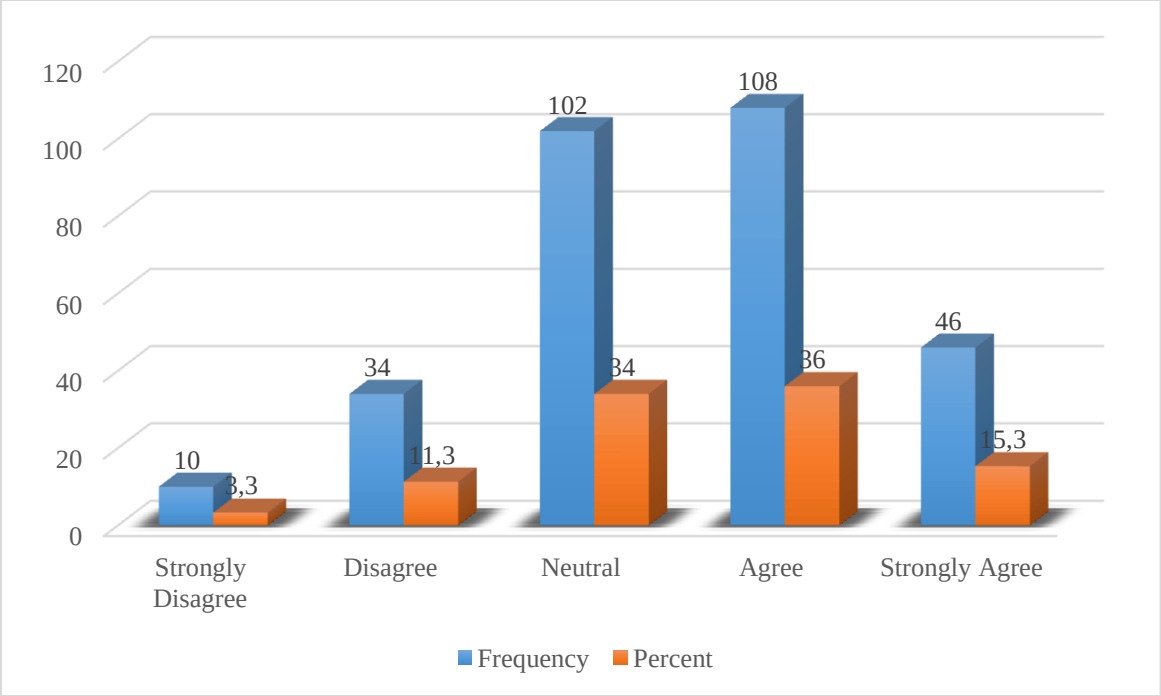

Figure 4.9: The logistics service provider resolves issues and complaints efficiently.

Participants were asked if the logistics service provider efficiently resolves difficulties and complaints, and their comments are shown in figure 4.9 above. With 36.0% agreeing and 15.3% strongly agreeing, for a total of 51.3%, the results demonstrate that the majority of respondents have a positive perspective. Some 34.0 percent are ambivalent, meaning they don't support the position either way. Conversely, a smaller segment of the population courier's negative sentiment, with 11.3% disagreeing and 3.3% strongly disagreeing, accounting for 14.6% of the respondents. Overall, the survey indicates a principally favorable attitude among the participants.

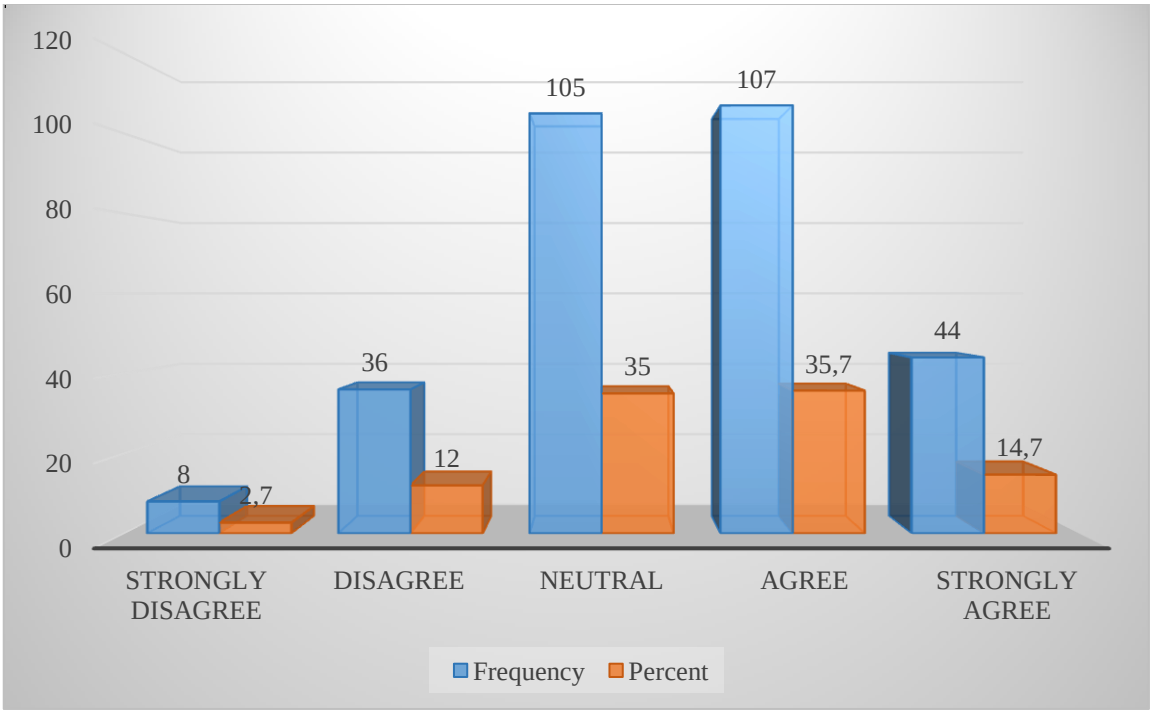

Figure 4.10: The logistics service provider demonstrates flexibility in adapting to changing requirements.

The above figure 4.10 survey represents the responses of the study participants upon asked if the logistics service provider demonstrates flexibility in adapting to changing requirements. The majority of defendants exhibit a positive attitude, with 35.7% agreeing and 14.7% strongly agreeing, totaling 50.4%. A significant portion remains neutral, containing 35.0% of the respondents. There is a smaller fraction that disagrees in dissimilarity; 12.0% disagree and 2.7% strongly disagree, making up 14.7% of the total. More than half of respondents are in agreement, according to these statistics, but a sizeable minority is either neutral or disagrees.

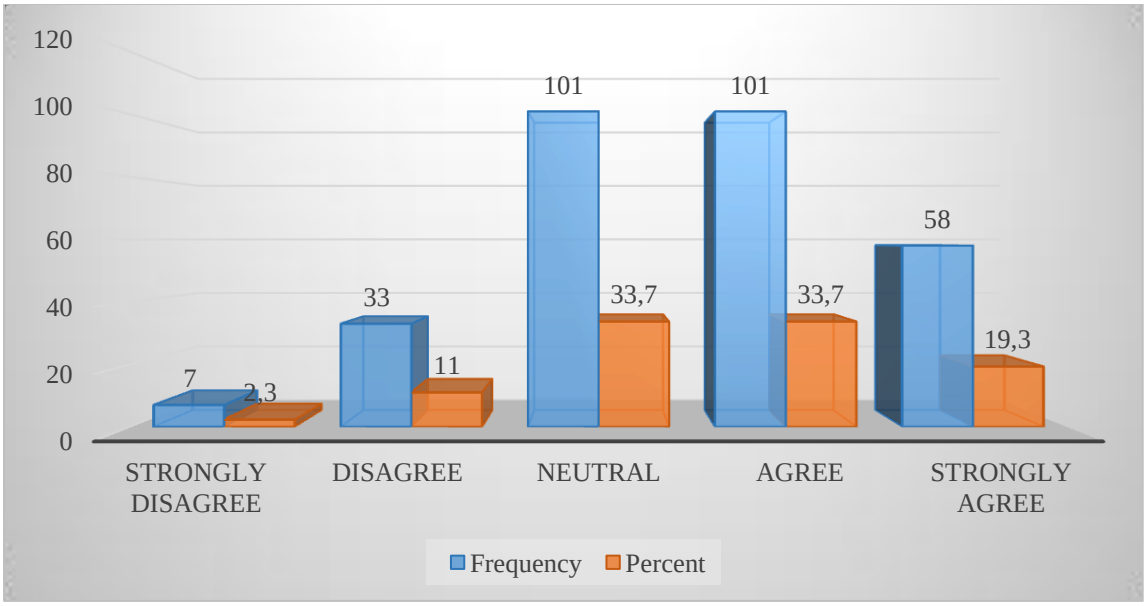

Figure 4.11: The logistics service provider has effective customer support services.

The above figure 4.11 represents the responses of the studied participants upon asked if the logistics service provider has effective customer support services. A sizeable percentage of respondents exhibit a positive bias; 33.7% agree and 19.3% strongly agree, totalling 53.0%. An equal 33.7% of respondents remain neutral. On the other hand, a smaller segment of the population is negative, with 11.0% disagreeing and 2.3% strongly disagreeing, together totaling 13.3%.

4.4 Operational Efficiency and Technology

Table 4.9: Operational Efficiency and Technology

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
LSPs leverage digital technology effectively to enhance operational efficiency.	Frequency	15	34	93	113	45
	Percent	5	11.3	31	37.7	15
The adoption of advanced tracking and monitoring	Frequency	6	39	81	114	60

systems has positively impacted the overall efficiency of logistics operations.	Percent	2	13	27	38	20
LSPs in the Indian surface logistics sector effectively integrate technology with their SCM processes.	Frequency	7	25	105	118	45
	Percent	2.3	8.3	35	39.3	15
The level of automation in the Indian surface logistics sector is sufficient to optimize processes and reduce manual errors.	Frequency	10	23	108	111	48
	Percent	3.3	7.7	36	37	16
The integration of Internet of Things (IoT) devices has improved the visibility and traceability of goods in transit.	Frequency	12	25	83	118	62
	Percent	4	8.3	27.7	39.3	20.7

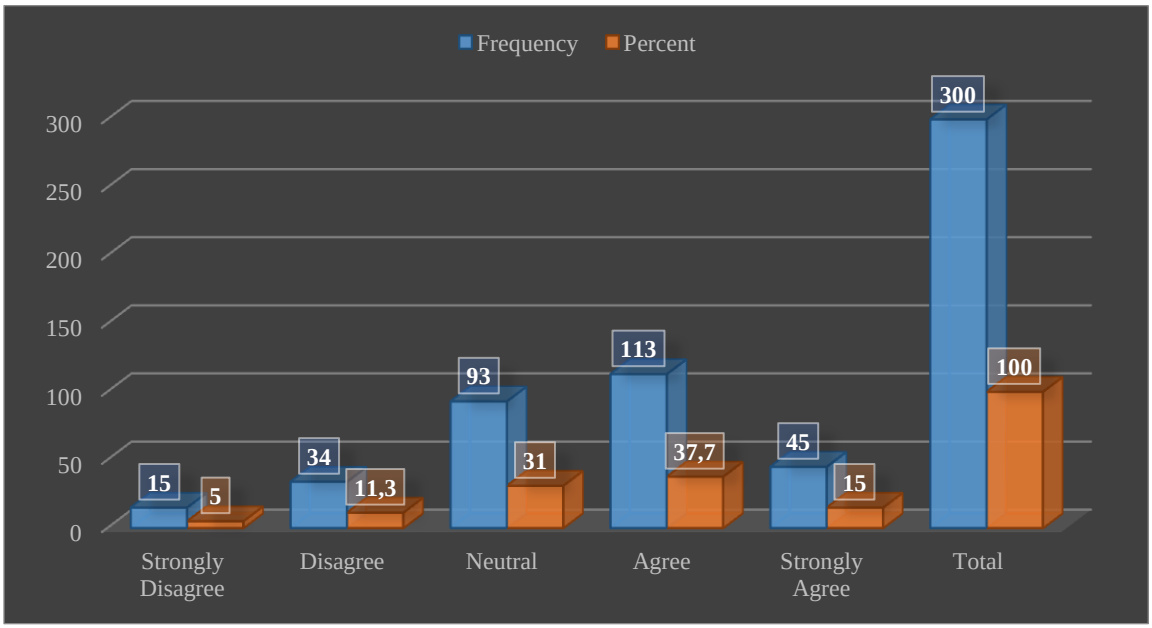

Figure 4.12: LSPs leverage digital technology effectively to enhance operational efficiency

The above figure 4.12 survey results from 300 respondents indicate their levels of agreement with a given statement. A substantial majority of the participants exhibit a positive response, with 37.7% agreeing and 15.0% strongly agreeing, summing up to 52.7%. A noteworthy proportion of respondents are neutral, accounting for 31.0%. On the contrary, a smaller segment expresses disagreement, with 11.3% disagreeing and 5.0% strongly disagreeing, together constituting 16.3%.

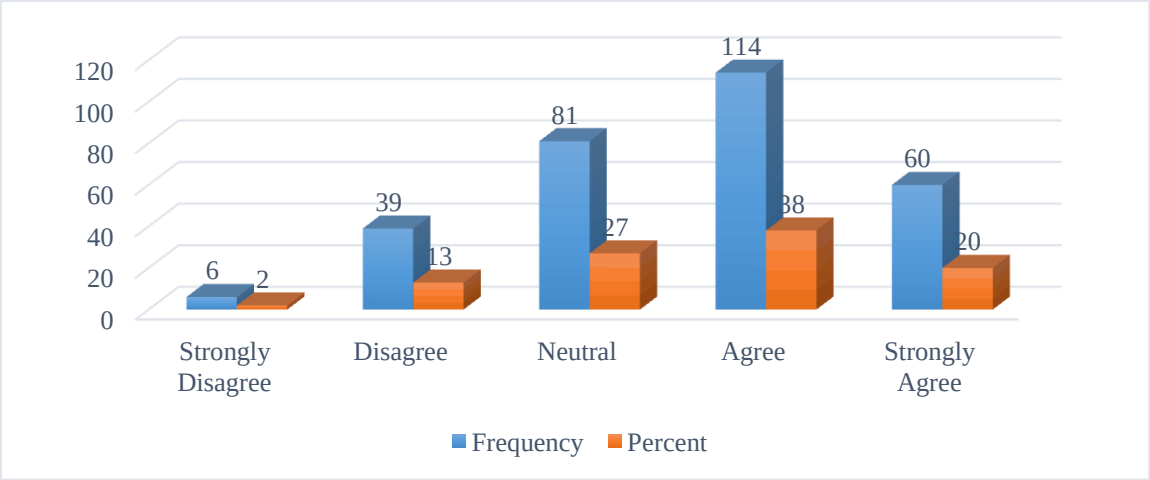

Figure 4.13: The adoption of advanced tracking and monitoring systems has positively impacted the overall efficiency of logistics operations.

The above figure 4.13 survey results from 300 respondents illustrate their levels of agreement with the given statement. A majority of defendants display a positive stance, with 38.0% agreeing and 20.0% strongly agreeing, amounting to a combined 58.0%. A significant portion of the respondents, 27.0%, remain neutral. In contrast, a smaller fraction shows disagreement, with 13.0% disagreeing and 2.0% strongly disagreeing, together accounting for 15.0%. These results suggest that most respondents are inclined to agree with the statement, while a notable number are neutral, and a minority disagree.

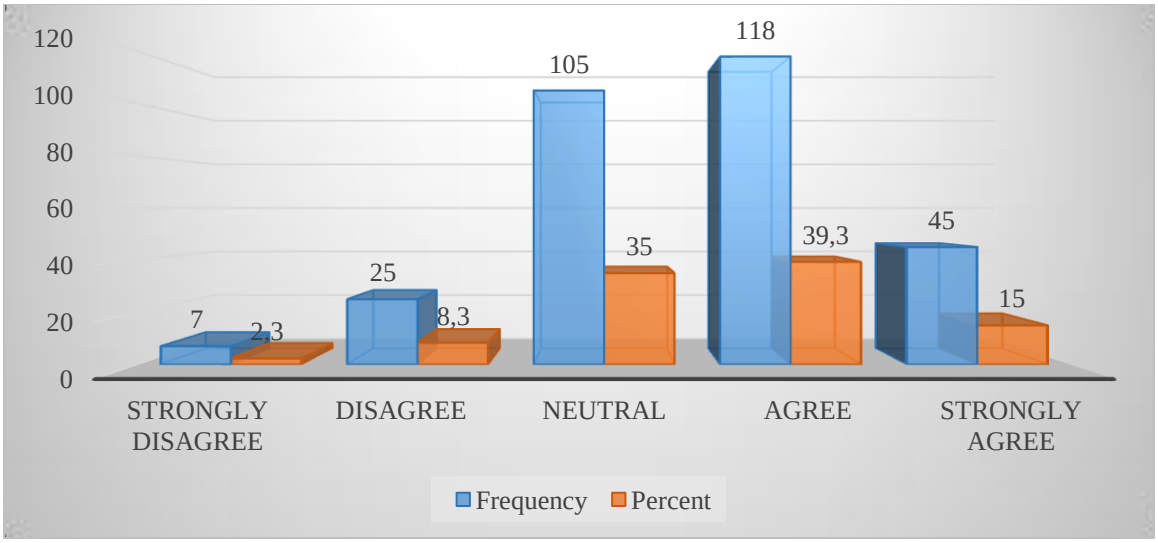

Figure 4.14: LSPs in the Indian surface logistics sector effectively integrate technology with their SCM processes.

The survey data from 300 respondents, depicted in Figure 4.14 above, indicate their levels of agreement with the supplied assertion. With 39.3% agreeing and 15.0% strongly agreeing, for a total of 54.3%, the results show that most respondents have a positive outlook. A sizeable percentage, 35.0 percent, is indifferent. However, a lesser percentage of the population takes issue with this, with 8.3% disapproving and 2.3% strongly disagreeing, totalling 10.6%.

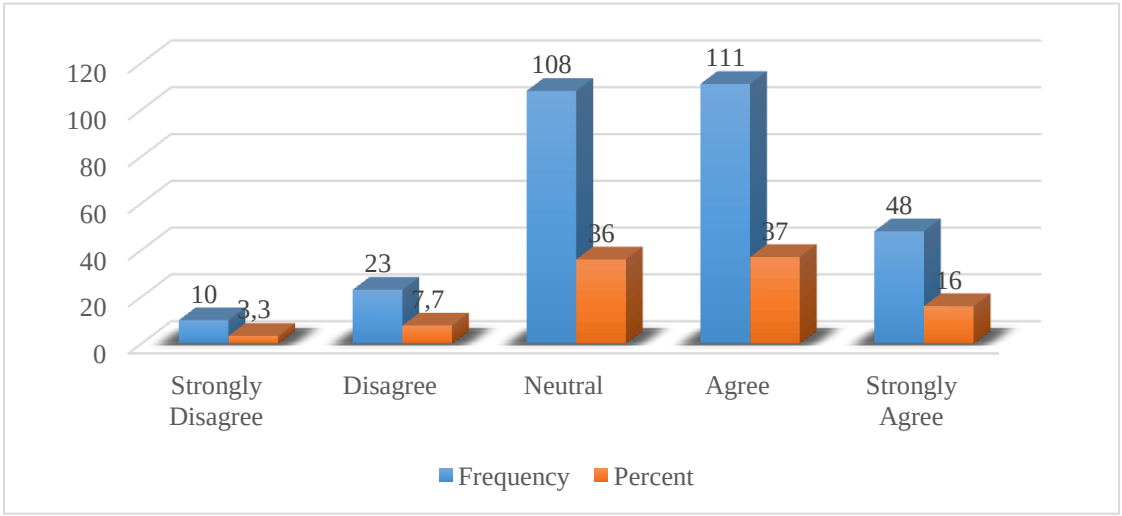

Figure 4.15: The level of automation in the Indian surface logistics sector is sufficient to optimize processes and reduce manual errors.

Results from a study asking 300 people to rate how much they agree with a statement are shown in figure 4.15. Nearly half of those who took the survey had a positive outlook; 37.0 percent agree and 16.0 percent strongly agree. With 36.0% of the total replies remaining neutral, there is a sizeable minority. In contrast, a smaller segment of the population shows disagreement, with 7.7% disagreeing and 3.3% strongly disagreeing, together totaling 11.0%.

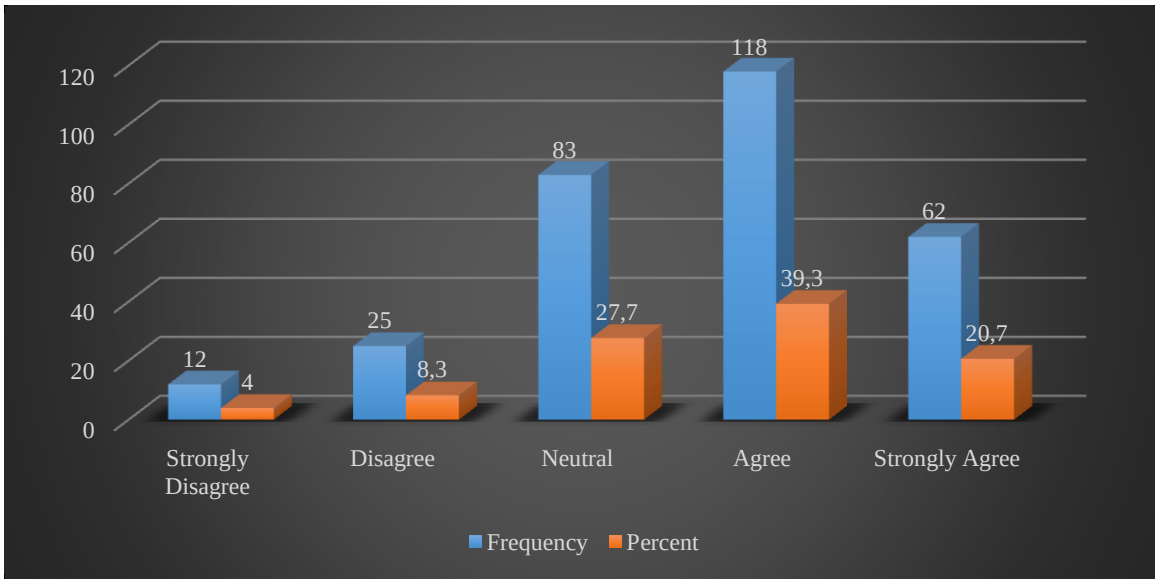

Figure 4.16: The integration of Internet of Things (IoT) devices has improved the visibility and traceability of goods in transit.

As represented in Figure 4.16, the percentage of people who agreed or disagreed that the statement is true was measured on the data collected from 300 participants. The majority, for a total of 60.0%, have a positive bias of 39.3% agreeing and 20.7% strongly agreeing. A significant portion, 27.7%, remains neutral. On the other hand, a smaller segment of the population disagrees, 8.3% disagree and 4.0% strongly disagree for a total of 12.3%.

4.5 Drivers Performance

Table 4.10: Drivers Performance

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

The reliability of delivery timelines is crucial.	Frequency	17	30	79	93	81
	Percent	5.7	10	26.3	31	27
Efficient inventory management is a key factor.	Frequency	5	28	83	108	76
	Percent	1.7	9.3	27.7	36	25.3
Communication and responsiveness are important.	Frequency	8	25	102	89	76
	Percent	2.7	8.3	34	29.7	25.3
Cost-effectiveness plays a significant role.	Frequency	5	33	75	100	87
	Percent	1.7	11	25	33.3	29
The flexibility of logistics solutions is vital.	Frequency	15	29	83	104	69
	Percent	5	9.7	27.7	34.7	23
Technology integration enhances overall performance.	Frequency	12	24	84	92	88
	Percent	4	8	28	30.7	29.3
The accuracy of order fulfillment is essential.	Frequency	11	28	87	89	85
	Percent	3.7	9.3	29	29.7	28.3
Compliance with regulations is a priority.	Frequency	12	31	80	93	84
	Percent	4	10.3	26.7	31	28
Sustainability practices are important.	Frequency	9	18	87	108	78
	Percent	3	6	29	36	26
Continuous improvement initiatives are valued.	Frequency	9	20	98	91	82
	Percent	3	6.7	32.7	30.3	27.3

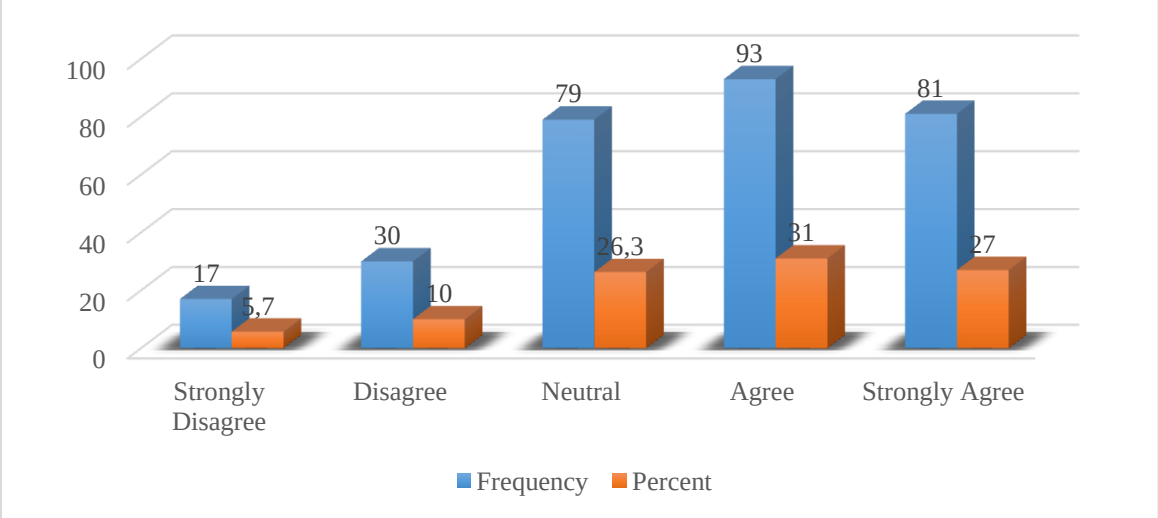

Figure 4.17: The reliability of delivery timelines is crucial.

The survey findings from 300 respondents are shown in figure 4.17, which shows their levels of agreement with the supplied statement. Of those who took the survey, 58.0% have a positive outlook, with 31.0% agreeing and 27.0% strongly agreeing. Some 26.3% of people who took the survey are still undecided. On the contrary, a smaller segment expresses disagreement, with 10.0% disagreeing and 5.7% strongly disagreeing, together establishing 15.7%. These results indicate that most respondents are inclined to agree with the statement, while a substantial minority remains neutral, and a smaller minority disagrees.

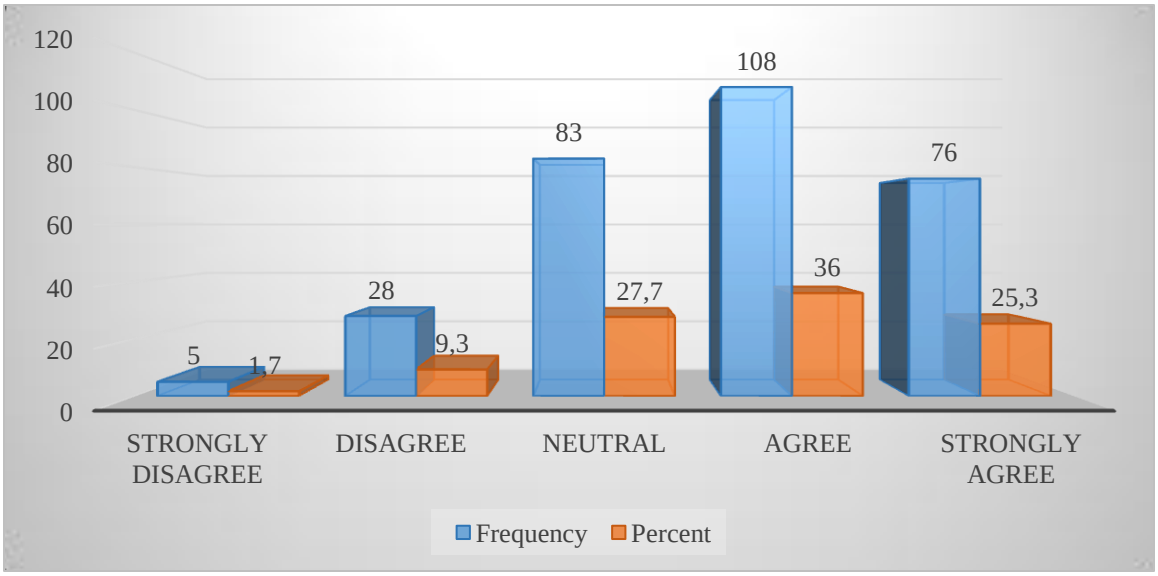

Figure 4.18: Efficient inventory management is a key factor.

The above figure 4.18 data presented shows responses to the given survey question, categorized by frequency and percentage of respondents selecting different levels of agreement. Strongly Disagree received 1.7% (5 respondents), while Disagree garnered 9.3% (28 respondents). The largest group, Neutral, comprised 27.7% (83 respondents), followed closely by Agree at 36.0% (108 respondents), and Strongly Agree at 25.3% (76 respondents). In total, 300 individuals contributed in the survey.

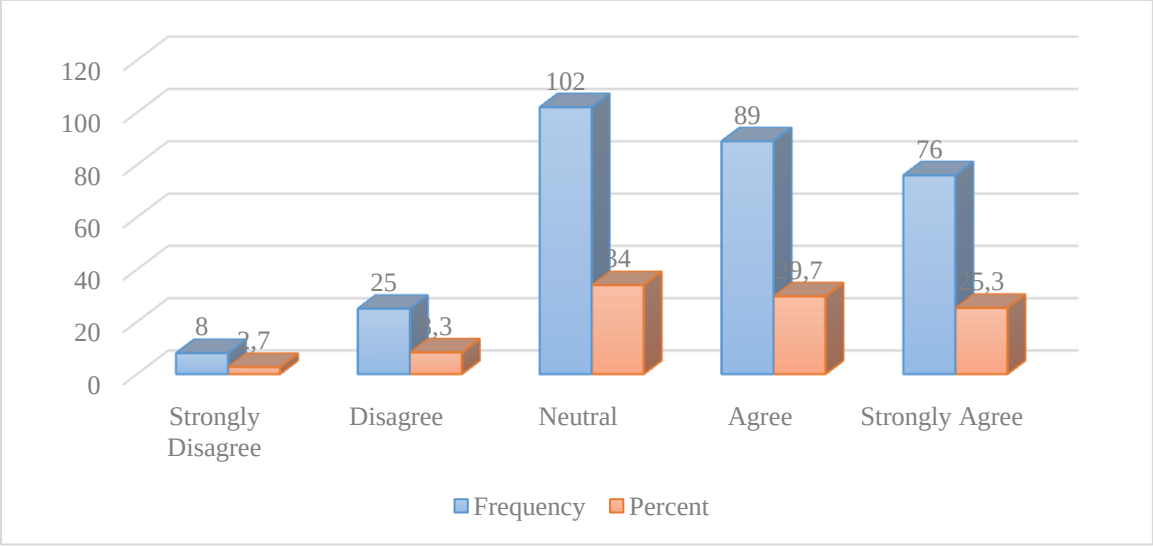

Figure 4.19: Communication and responsiveness are important.

The above figure 4.19 shows that the survey responses are categorized based on the frequency and percentage of respondents choosing different levels of agreement. Strongly Disagree received 2.7% (8 respondents), while Disagree accounted for 8.3% (25 respondents). The largest group, Neutral, constituted 34.0% (102 respondents), followed by Agree at 29.7% (89 respondents), and Strongly Agree at 25.3% (76 respondents).

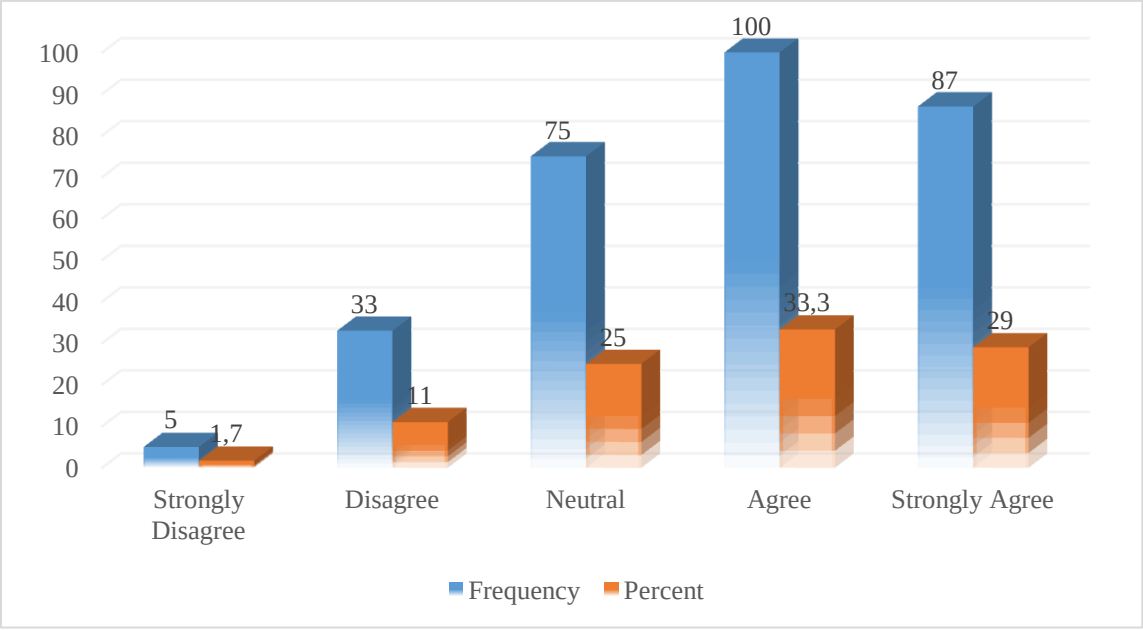

Figure 4.20: Cost-effectiveness plays a significant role.

The above figure 4.20 display the data from the survey indicates responses categorized by frequency and percentage of defendants across different levels of agreement. Strongly Disagree was chosen by 1.7% (5 respondents), while Disagree was selected by 11.0% (33 respondents). The Impartial option was favored by 25.0% (75 respondents), followed closely by Agree at 33.3% (100 respondents), and Strongly Agree at 29.0% (87 respondents).

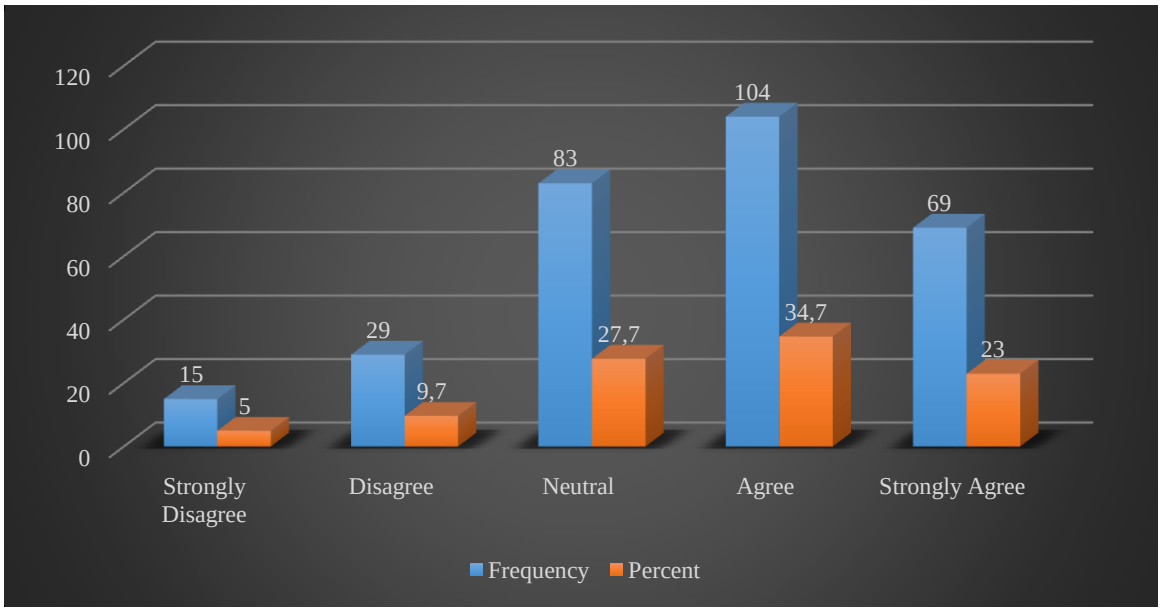

Figure 4.21: The flexibility of logistics solutions is vital

The above figure 4.21 display the survey data of illustrates responses categorized by frequency and percentage of respondents across various levels of agreement. Strongly Disagree was chosen by 5.0% (15 respondents), while Disagree received 9.7% (29 respondents). Neutral responses accounted for 27.7% (83 respondents), followed closely by Agree at 34.7% (104 respondents), and Strongly Agree at 23.0% (69 respondents). These findings depict a diverse variety of opinions, with a significant portion leaning towards agreement, balanced by significant illustrations in both neutral and disagreement categories.

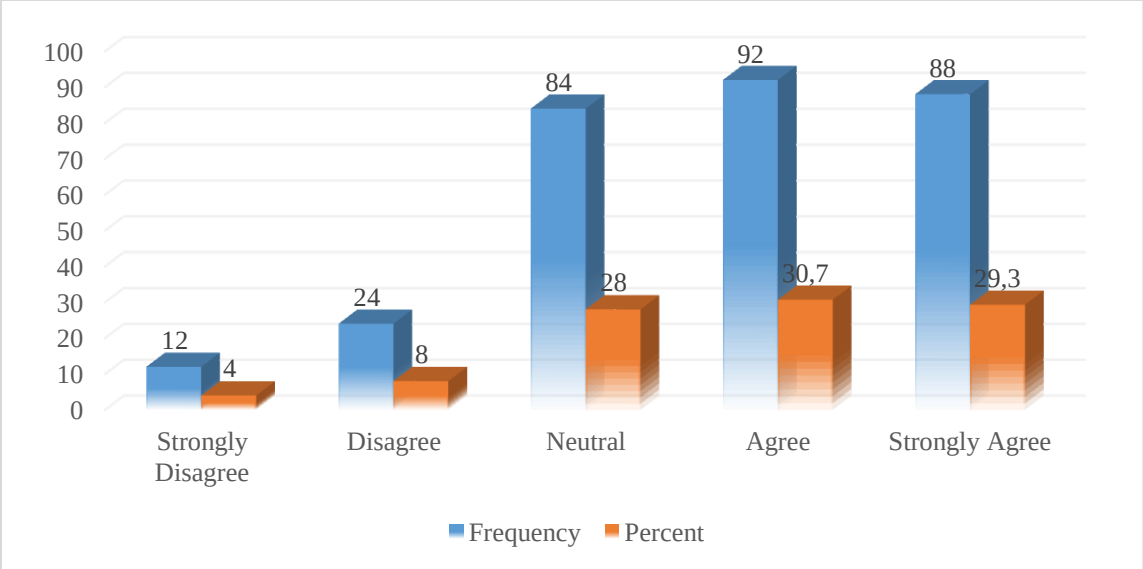

Figure 4.22: Technology integration enhances overall performance

Figure 4.22 shows the survey findings broken down by percentage of respondents and frequency of occurrence for each degree of agreement. Strongly Disagree was chosen by 4.0% (12 respondents), while Disagree received 8.0% (24 respondents). The Neutral category was selected by 28.0% (84 respondents), followed closely by Agree at 30.7% (92 respondents), and Strongly Agree at 29.3% (88 respondents).

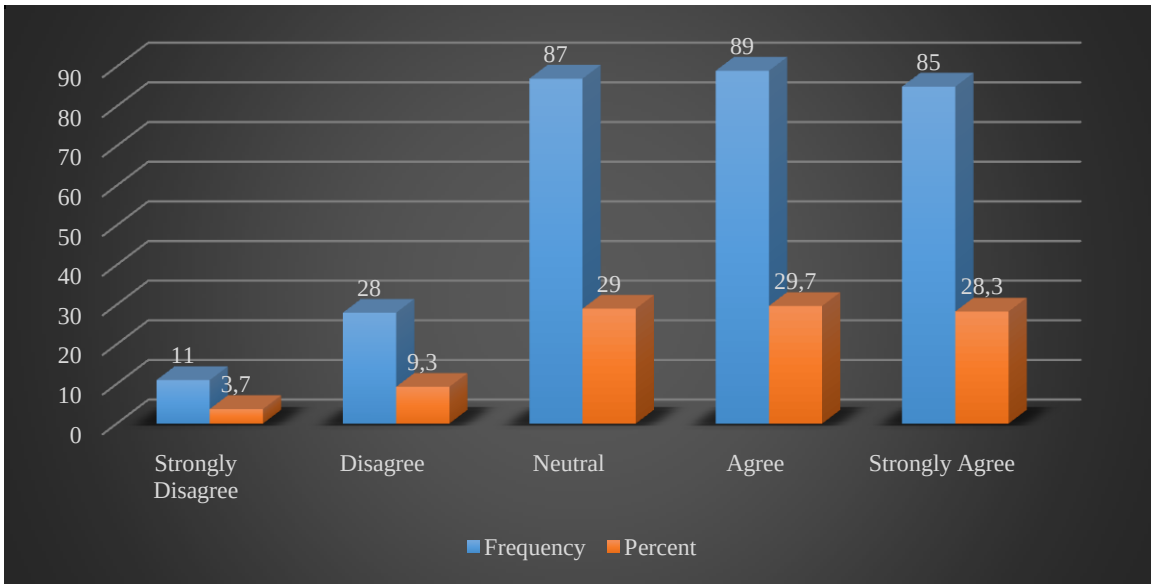

Figure 4.23: The accuracy of order fulfillment is essential

Figure 4.23 shows that the survey findings show that the respondents' opinions are fairly divided. A significant portion, nearly 30%, expressed neutrality, indicating neither agreement nor disagreement. Those who leaned towards agreement, including both "Agree" and "Strongly Agree," comprised about 58% of the total, suggesting a generally favorable disposition towards the subject matter. Conversely, approximately 13% of respondents expressed disagreement, with a small fraction (3.7%) strongly disagreeing.

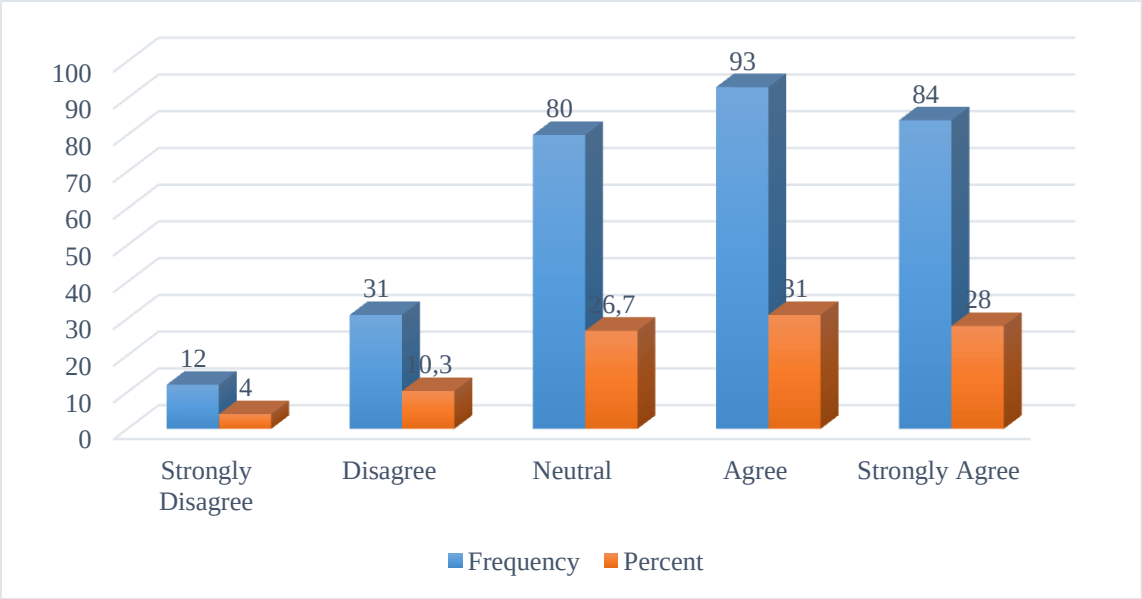

Figure 4.24: Compliance with regulations is a priority

Opinions are varied but typically positive, according to the survey data shown in figure 4.24. While 31% of respondents agreed and 28% strongly agreed, over 59% were leaning towards agreement. The fact that 26.7% of people who took the survey showed no clear bias either way is noteworthy. On the other hand, 14.3% of participants expressed disagreement, with 10.3% disagreeing and 4% strongly disagreeing. This suggests that while a majority view the subject favorably, a considerable minority remains neutral or negative.

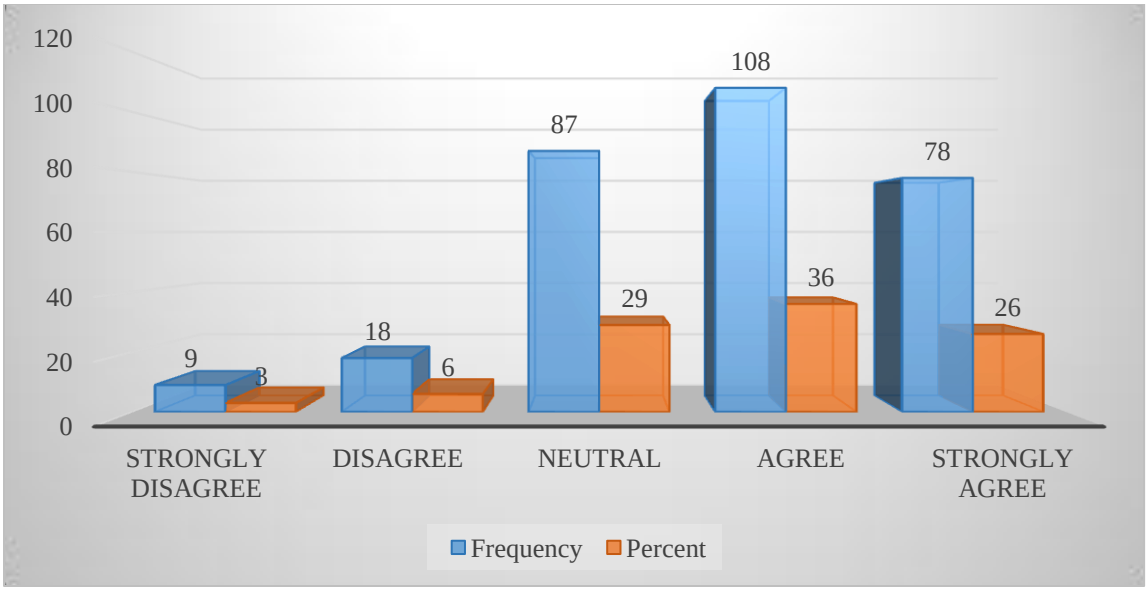

Figure 4.25: Sustainability practices are important

Figure 4.25 displays the survey findings, which show that most people were happy about it. With 36% in agreement and 26% in strong agreement, the statement in question has the support of 62% of the population. About a third don't have a strong opinion one way or the other. On the other hand, 3% of people who took the survey strongly disagree, while 6% disagree and 9% are unsure.

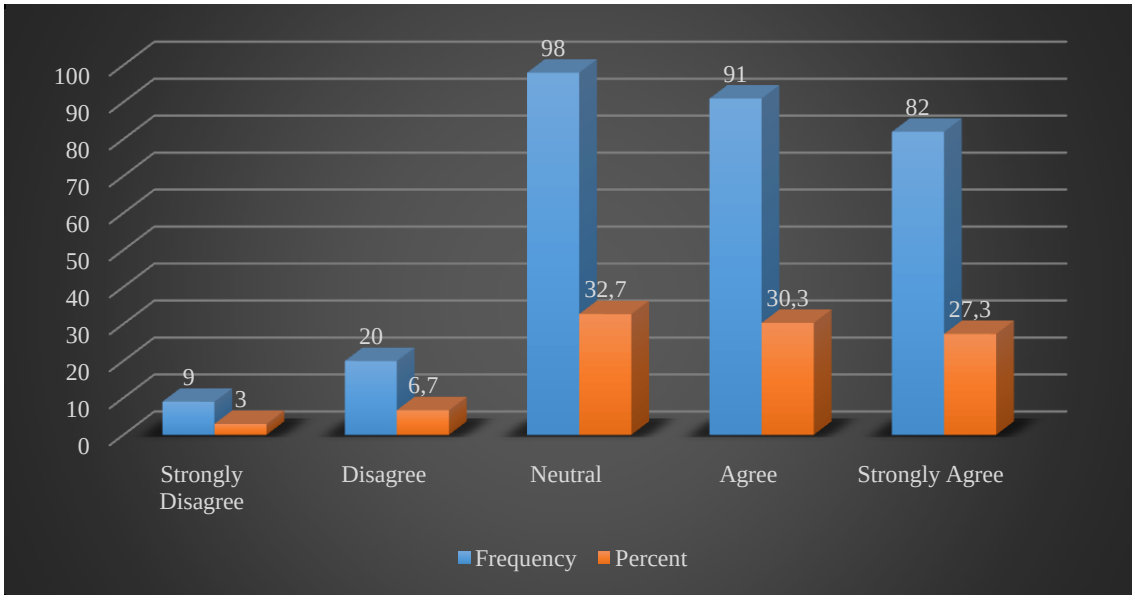

Figure 4.26: Continuous improvement initiatives are valued

Opinions are largely positive, with a significant share of neutrality, according to the poll results shown in figure 4.26. The statement has a level of agreement of about 57.6% among respondents, with 30.3% agreeing and 27.3% strongly agreeing. An overwhelming majority of respondents (32.7%) do not have a strong preference and are thus classified as neutral. In contrast, a smaller group, 9.7%, expresses disagreement, with 6.7% disagreeing and 3% strongly disagreeing.

4.6 Human Resources Management

Table 4.11: Human Resources Management

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The level of employee engagement and satisfaction within 3PL organizations in India is adequately addressed through current HR management strategies.	Frequency	18	40	104	92	46
	Percent	6	13.3	34.7	30.7	15.3
The scarcity of skilled talent in the Indian surface logistics sector poses a challenge for 3PLs in recruiting and maintaining a capable workforce.	Frequency	9	32	109	98	52
	Percent	3	10.7	36.3	32.7	17.3
The current HR policies in the logistics sector adequately address diversity and inclusion issues within the workforce.	Frequency	8	29	123	95	45
	Percent	2.7	9.7	41	31.7	15

The effectiveness of communication channels and feedback mechanisms within 3PLs contributes positively to employee satisfaction and performance.	Frequency	10	31	93	117	49
	Percent	3.3	10.3	31	39	16.3
The implementation of innovative HR strategies, such as flexible work arrangements, is essential for attracting and retaining top talent in the evolving logistics landscape.	Frequency	5	21	102	104	68
	Percent	1.7	7	34	34.7	22.7

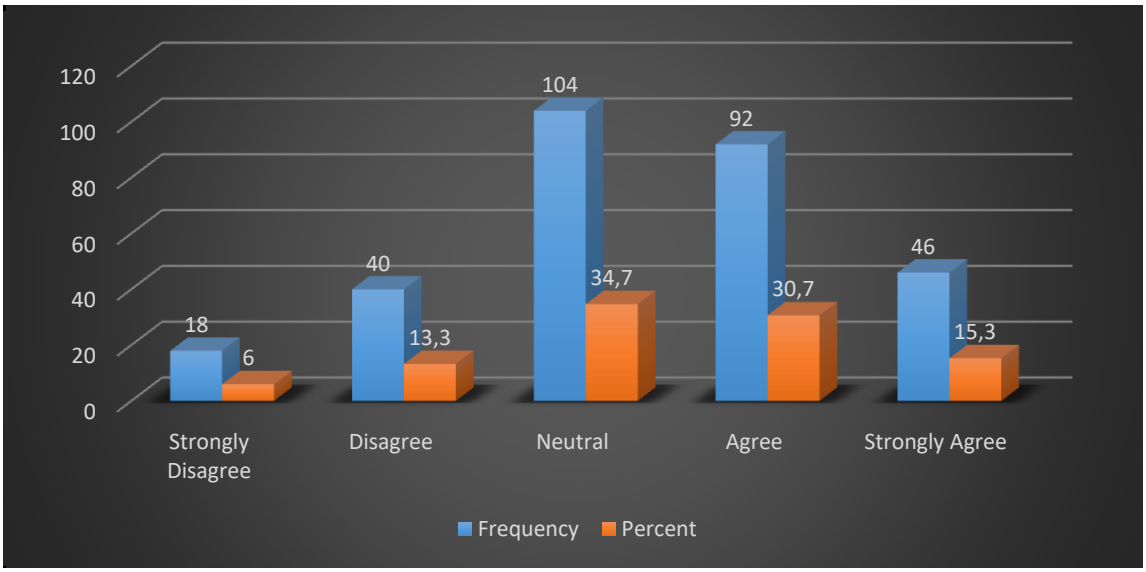

Figure 4.27: The level of employee engagement and satisfaction within 3PL organizations in India is adequately addressed through current HR management strategies

As is shown in Figure 4.27, the survey results are slightly different, but take on both agreement and neutrality. Some 34.7 percent of respondents are neutral, showing no strong stance. On the other hand, 46% of respondents are of the opinion that 30.7% agree

and 15.3% strongly agree. However, 19.3% disagree on the matter, while 13.3% disagree and 6% strongly disagree.

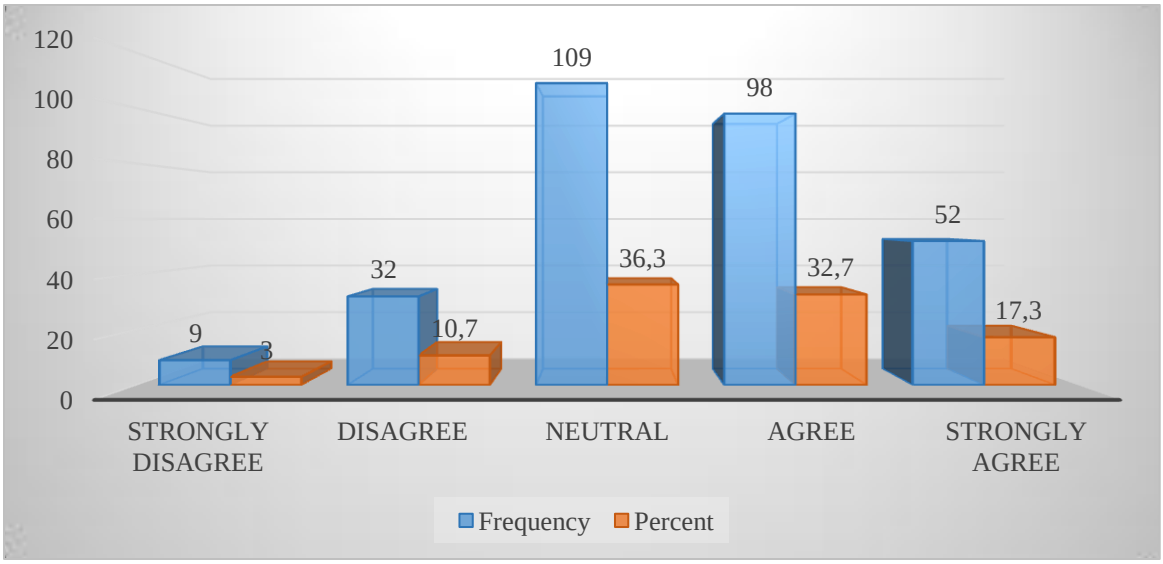

Figure 4.28: The scarcity of skilled talent in the Indian surface logistics sector poses a challenge for 3PLs in recruiting and maintaining a capable workforce

As can be seen in figure 4.28, most people have positive or neutral opinions. A sizeable percentage, 36.3%, hold no opinion. The survey's respondents agree with that, half of them in fact, 32.7 percent with 17.3 percent who were enthusiastic to agree. Of the total number of respondents, only 13.7 percent disagree, 10.7 percent disagree strongly and 3 percent are unsure.

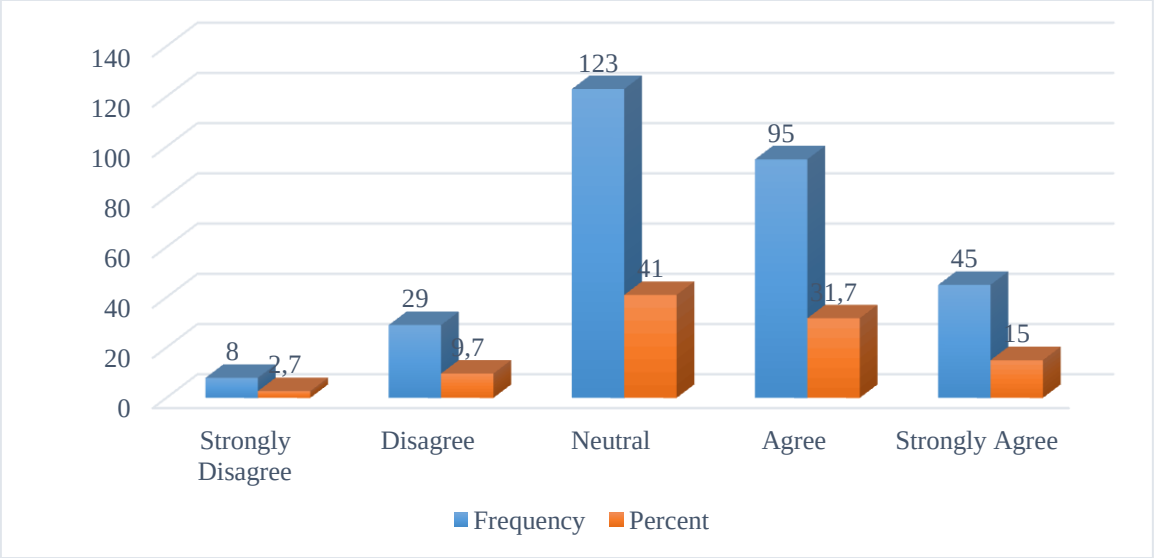

Figure 4.29: The current HR policies in the logistics sector adequately address diversity and inclusion issues within the workforce

The above figure 4.29 survey results show a predominantly neutral or positive sentiment among respondents. A significant portion, 41%, are neutral. Those who agree make up 46.7% of the respondents, with 31.7% agreeing and 15% strongly agreeing. Only 12.4% express disagreement, with 9.7% disagreeing and 2.7% strongly disagreeing.

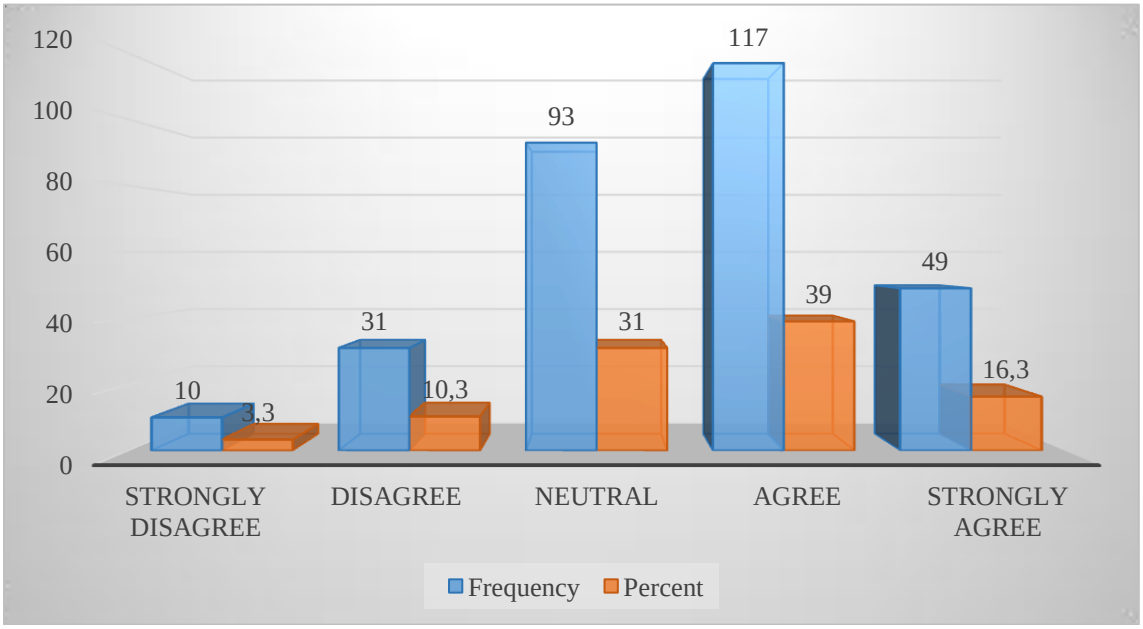

Figure 4.30: The effectiveness of communication channels and feedback mechanisms within 3PLs contributes positively to employee satisfaction and performance

The above figure 4.30 represents the distribution of responses indicates a predominant inclination towards agreement. Specifically, 39.0% of defendants chose "Agree," and an additional 16.3% selected "Strongly Agree," together forming the majority opinion. Meanwhile, 31.0% of respondents opted for "Neutral," suggesting a momentous serving withheld a definite stance. On the contrary, 10.3% chose "Disagree," and 3.3% selected "Strongly Disagree," reflecting a smaller proportion of rebellious views.

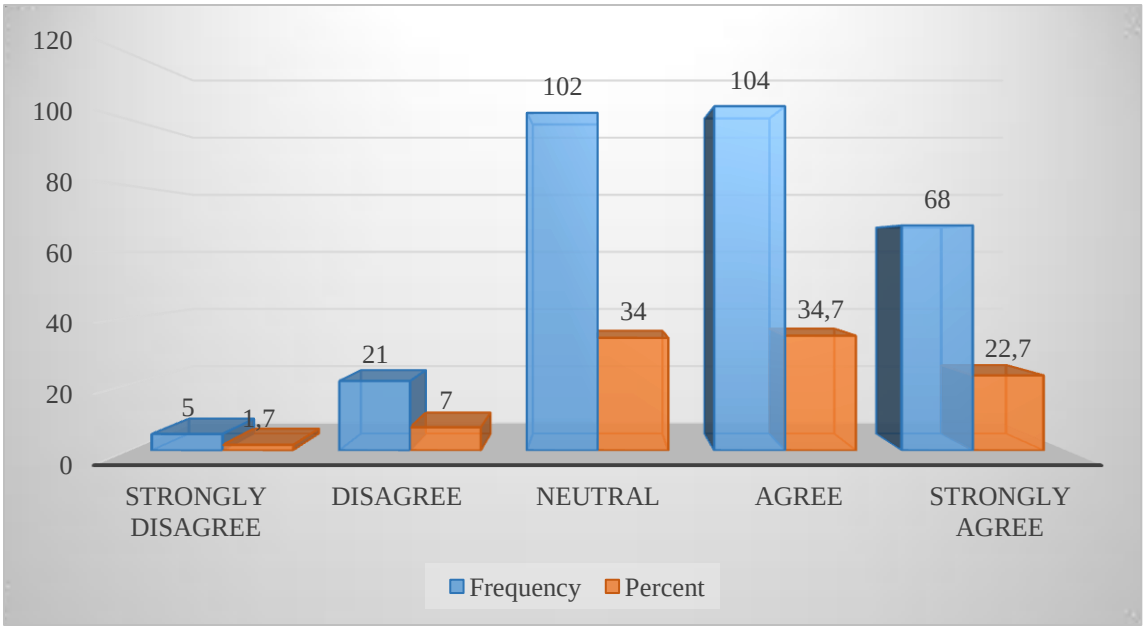

Figure 4.31: The implementation of innovative HR strategies, such as flexible work arrangements, is essential for attracting and retaining top talent in the evolving logistics landscape

A wide variety of viewpoints are shown in the data, as shown in figure 4.31. A substantial portion, 34.0%, selected "Neutral," suggesting a balanced viewpoint. However, the most prevalent responses were "Agreed" with 34.7% and "Strongly Agree" with 22.7%, collectively representing a majority leaning towards agreement. Conversely, 7.0% opted for "Disagree," and a minimal 1.7% chose "Strongly Disagree," signifying a smaller proportion of dissenting views.

4.7 Anticipated Changes in Government Policies

Table 4.12: Anticipated Changes in Government Policies

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Current regulatory landscape supports the long-term sustainability and profitability of 3PLs in the Indian logistics market.	Frequency	11	35	104	99	51
	Percent	3.7	11.7	34.7	33	17
Current government policies positively impact the overall performance of 3PLs in the Indian surface logistics sector.	Frequency	6	32	101	111	50
	Percent	2	10.7	33.7	37	16.7
Upcoming policy modifications will address key challenges faced by 3PLs, such as infrastructure constraints and regulatory hurdles.	Frequency	6	29	105	109	51
	Percent	2	9.7	35	36.3	17
The government's role in fostering a conducive environment for foreign investments in the 3PL sector, leading to future growth.	Frequency	7	29	116	97	51
	Percent	2.3	9.7	38.7	32.3	17

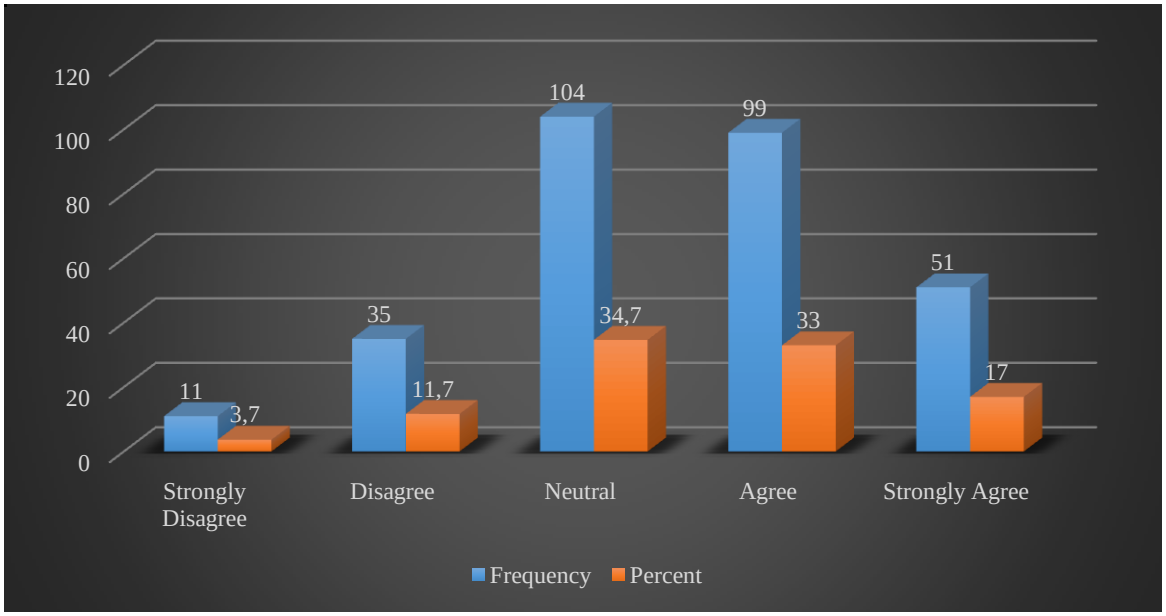

Figure 4.32: The current regulatory landscape supports the long-term sustainability and profitability of 3PLs in the Indian logistics market

The above Figure 4.32 displays the data opinions evenly spread across a spectrum. The largest group, comprising 34.7%, chose "Neutral," indicating a balanced viewpoint. "Agree" was selected by 33.0% of the participants, while "Strongly Agree" was selected by 17.0%, indicating that the majority favours agreement. In contrast, a lower percentage of rebellious assessments (11.7%) and 3.7% strongly disagreed (3.7%).

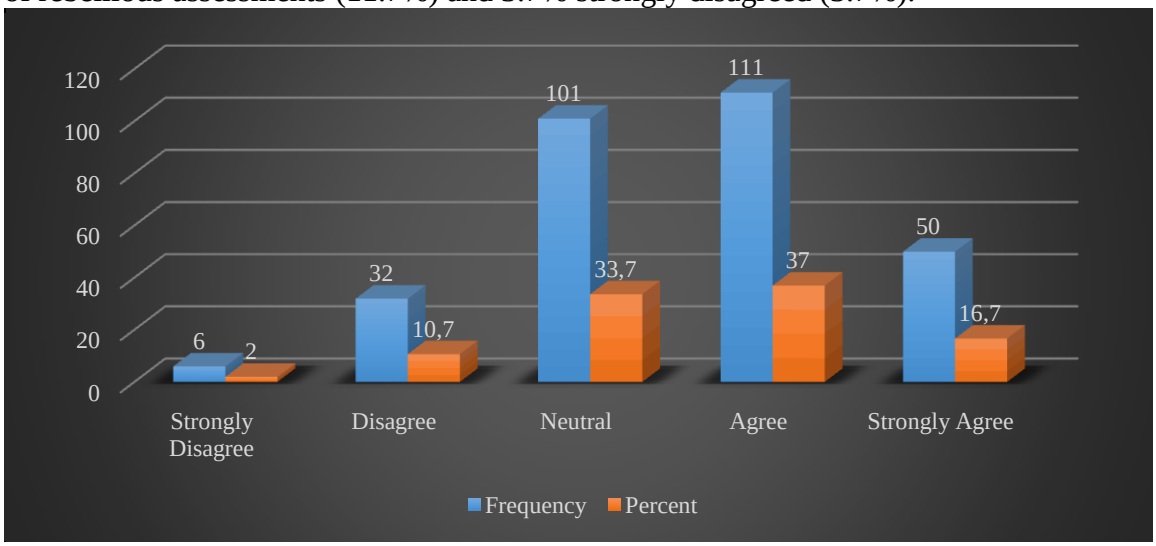

Figure 4.33: Current government policies positively impact the overall performance of 3PLs in the Indian surface logistics sector

The above figure 4.33 shows that opinions vary across a range of perceptions. The largest group, at 37.0%, expressed "Agree," indicating a favorable stance. Additionally, 16.7% strongly agreed, further contributing to a majority favoring agreement. Meanwhile, 33.7% chose "Neutral," suggesting a significant number withheld a definitive opinion. On the contrary, 10.7% disagreed and 2.0% strongly disagreed, representing a smaller proportion with negative views

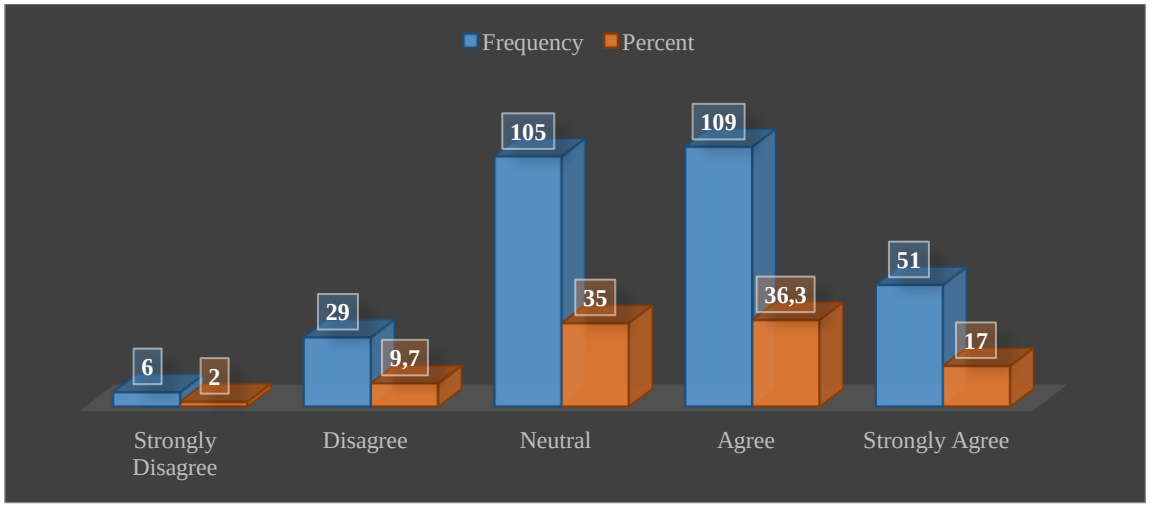

Figure 4.34: Upcoming policy modifications will address key challenges faced by 3PLs, such as infrastructure constraints and regulatory hurdles

The above figure 4.34 represents the largest group, comprising 35.0%, chose "Neutral," indicating a balanced viewpoint. "Agree" received 36.3%, while "Strongly Agree" garnered 17.0%, collectively showing a majority leaning towards agreement. Conversely, 9.7% disagreed and 2.0% strongly disagreed, representing a smaller proportion of dissenting views.

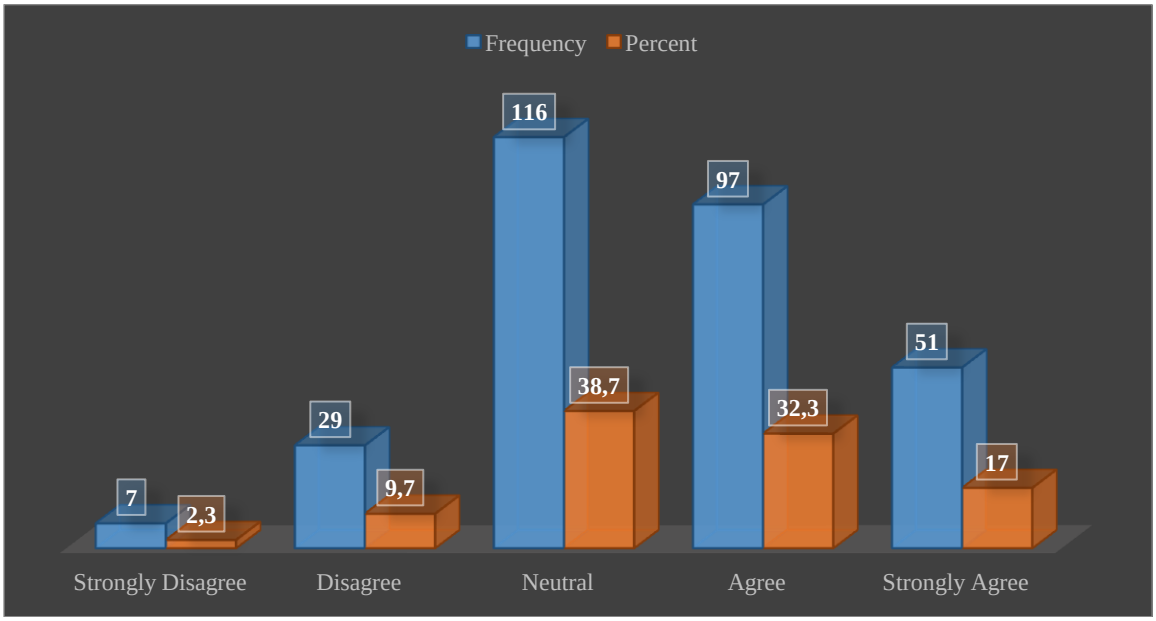

Figure 4.35: The government's role in fostering a conducive environment for foreign investments in the 3PL sector, leading to future growth

The above figure 4.35 shows the largest group comprising 38.7%, chose "Neutral," indicating a balanced perspective or uncertainty on the issue. Meanwhile, 32.3% expressed "Agree," and 17.0% chose "Strongly Agree," together forming a substantial majority in favor of the statement or question posed. However, a lesser minority of disagreeing opinions were reflected in the 9.7% who disagreed and 2.3% who strongly disagreed.

4.8 Integration of Technology & Real Time Data Analytics

Table 4.13: Integration of Technology & Real Time Data Analytics

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The current technology infrastructure supports seamless communication within the logistics network.	Frequency	15	30	104	111	40
	Percent	5	10	34.7	37	13.3
Integration of technology has positively impacted customer satisfaction.	Frequency	2	30	98	110	60
	Percent	0.7	10	32.7	36.7	20
Organizations regularly invests in updating and upgrading logistics	Frequency	4	27	106	115	48
	Percent	1.3	9	35.3	38.3	16

technology.						
Employees feel comfortable using the integrated technology for logistics tasks.	Frequency	7	21	106	112	54
	Percent	2.3	7	35.3	37.3	18
Real-time data analytics has helped in identifying and resolving issues promptly.	Frequency	6	29	87	115	63
	Percent	2	9.7	29	38.3	21

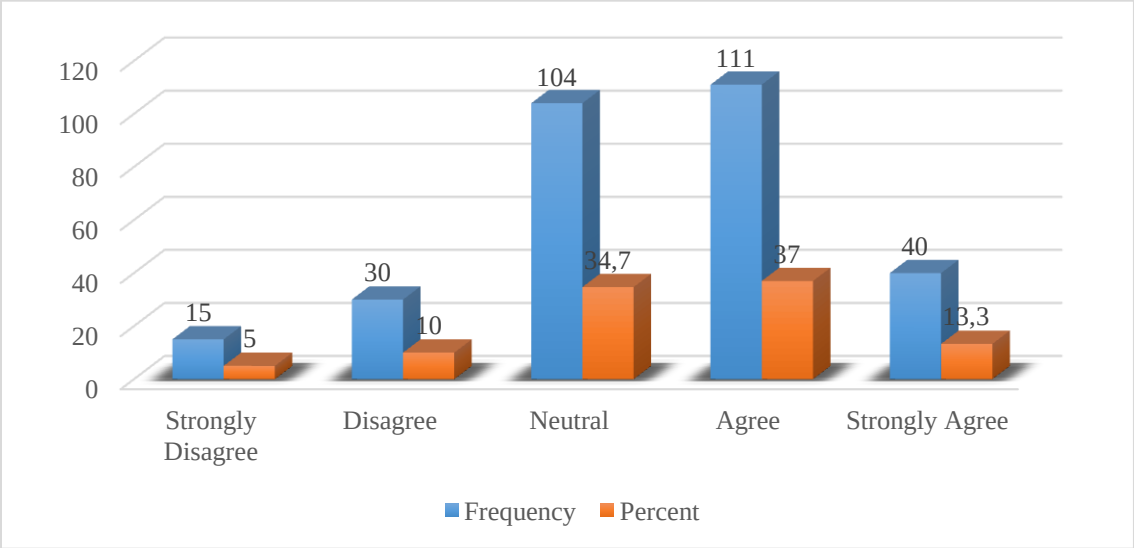

Figure 4.36: The current technology infrastructure supports seamless communication within the logistics network

The above figure 4.36 shows the opinions were distributed as follows: 37.0% agreed and 13.3% strongly agreed, totaling 50.3% with a positive view. Meanwhile, 10.0% disagreed and 5.0% strongly disagreed, making up 15.0% with a negative view. The remaining 34.7% were neutral.

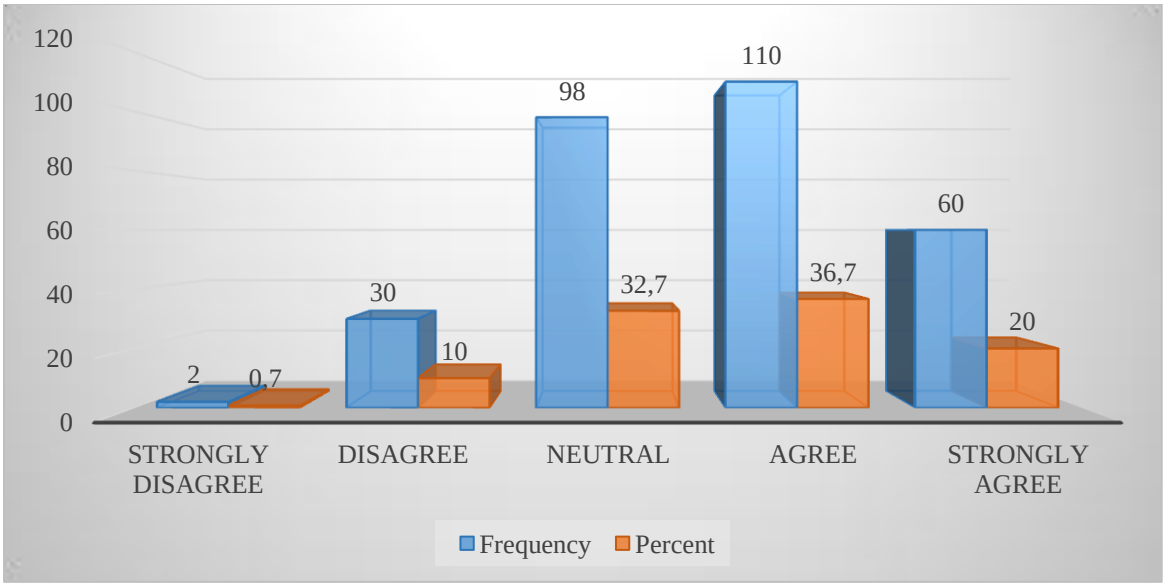

Figure 4.37: Integration of technology has positively impacted customer satisfaction

The above figure 4.37 displays how the integration of technology has had a positive effect on the customer satisfaction. The views are positive with 56.7% of the 36.7% agreed and 20.0% strongly agreed, making a total of 56.7%. However, 10.0% disagreed and 0.7% strongly disagreed, making up 10.7% with negative views. The remaining 32.7% were neutral.

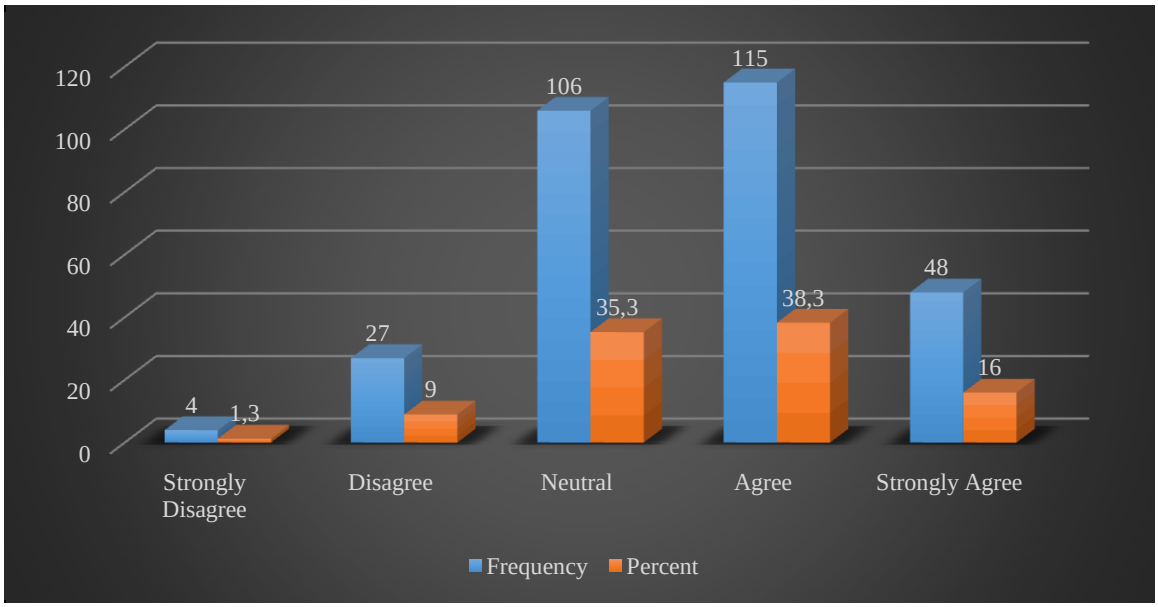

Figure 4.38: Organizations regularly invest in updating and upgrading logistics technology

The survey of 300 participants is shown in figure 4.38 above. Of those, 38.3% agreed and 16.0% strongly agreed, meaning that 54.3% had positive opinions. 10.3% had negative opinions, with 9.0% disagreeing and 1.3% severely disagreeing. The outstanding 35.3% were neutral. This shows that while a majority of defendants held positive opinions, a significant portion remained neutral, and a smaller group expressed negative sentiments.

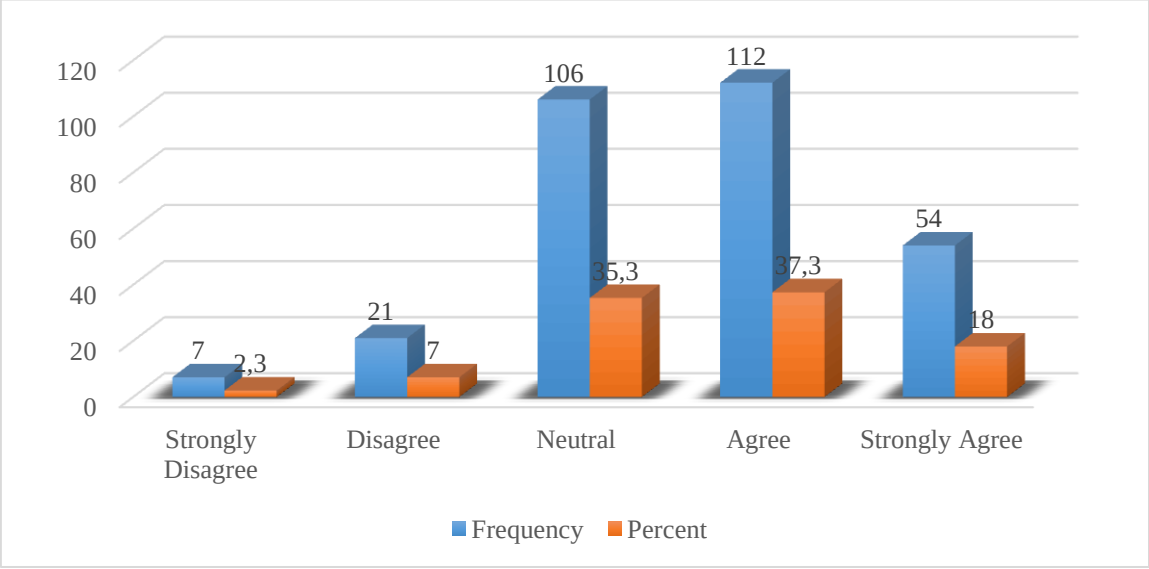

Figure 4.39: Employees feel comfortable using the integrated technology for logistics tasks

The above figure 4.40 displays the data of employees feel comfortable using the integrated technology for logistics tasks there are 55.3% had positive views (37.3% agree, 18.0% strongly agree), 9.3% had negative views (7.0% disagree, 2.3% strongly disagree), and 35.3% were neutral.

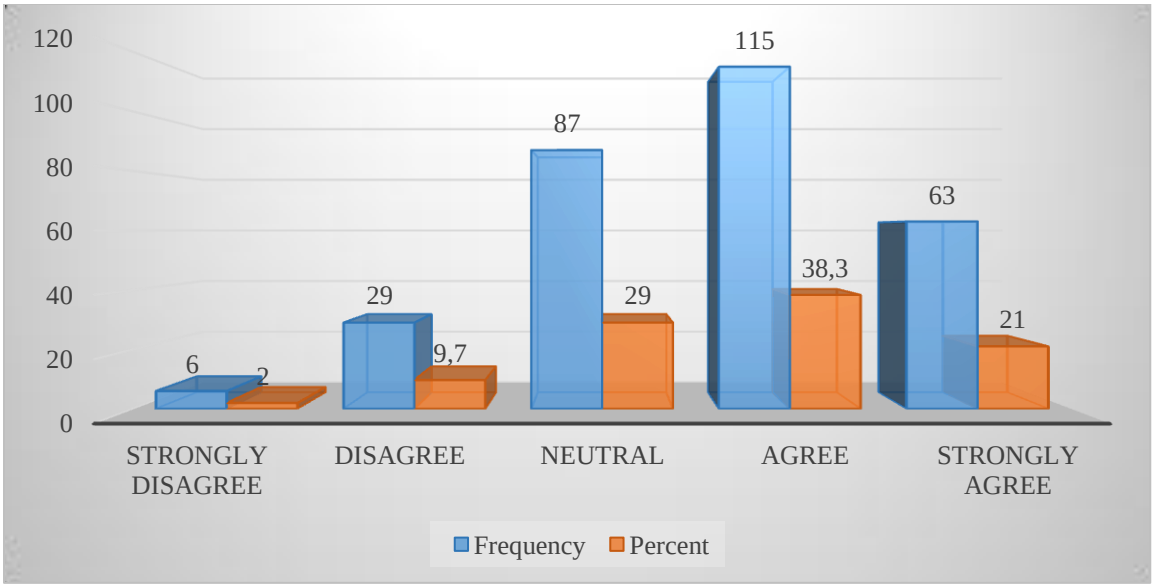

Figure 4.40: Real-time data analytics has helped in identifying and resolving issues promptly

The distribution of replies is as follows in figure 4.40 above: 59.3 percent had had good opinions, 38.3 percent agreeing and 21.0 percent strongly agreeing. On the other hand, 11.7% respondents had negative opinion in which 9.7% disagreed and 2.0% severely disagreed. The remaining 29.0% were neutral. These results indicate that there is a principal positive sentimentality among the contributors, along with a large proportion remaining neutral and a smaller proportion expressing negative opinions.

4.9 Factors and Future Growth Prospects

Table 4.14: Factors and Future Growth Prospects

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The current regulatory framework poses significant obstacles to the effective implementation of technology-driven solutions in the Indian	Frequency	9	24	117	102	48
	Percent	3	8	39	34	16

surface logistics sector.						
The high upfront costs associated with technology integration are a major barrier for 3PLs in the Indian logistics industry.	Frequency	8	24	101	115	52
	Percent	2.7	8	33.7	38.3	17.3
Resistance to technological change among stakeholders within 3PL organizations is impeding the successful integration of advanced technologies.	Frequency	9	24	109	110	48
	Percent	3	8	36.3	36.7	16
The absence of skilled workforce capable of managing and utilizing advanced technologies is a significant challenge for the future growth of technology-integrated 3PLs in India.	Frequency	8	31	94	118	49
	Percent	2.7	10.3	31.3	39.3	16.3
The perceived risks associated with data security and privacy concerns hinder the willingness of 3PLs to fully embrace technology for real-time data analytics.	Frequency	12	25	97	106	60
	Percent	4	8.3	32.3	35.3	20

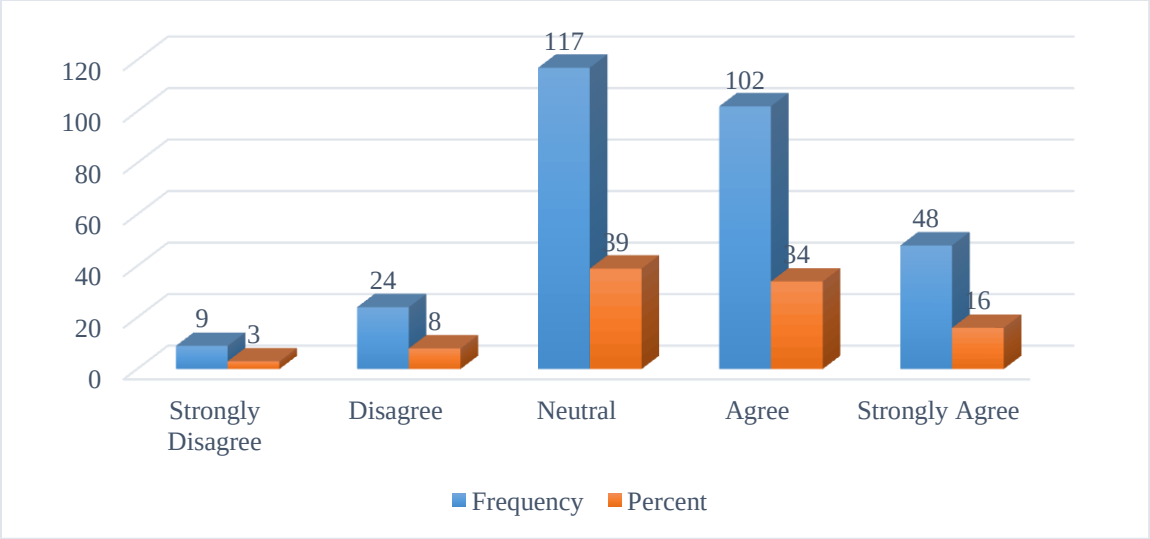

Figure 4.41: The current regulatory framework poses significant obstacles to the effective implementation of technology-driven solutions in the Indian surface logistics sector

The above figure 4.41 represent the data Out of 300 survey participants, 50.0% had positive views (34.0% agree, 16.0% strongly agree), 11.0% had negative views (8.0% disagree, 3.0% strongly disagree), and 39.0% were neutral.

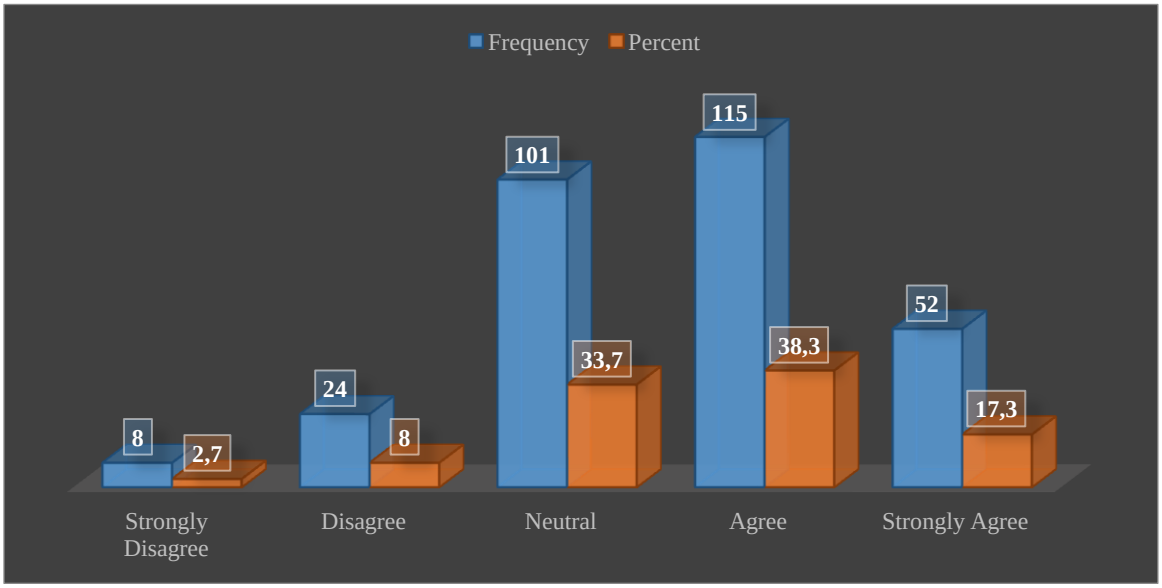

Figure 4.42: The high upfront costs associated with technology integration are a major barrier for 3PLs in the Indian logistics industry

The above figure 4.42 shows the data of illustrates responses from 300 individuals regarding their agreement with a statement or question. Responses were considered into five levels: "Strongly Disagree," with 8 defendants (2.7%); "Disagree," with 24 respondents (8.0%); "Neutral," with the highest count of 101 respondents (33.7%); "Agree," with 115 accused (38.3%); and "Strongly Agree," with 52 respondents (17.3%).

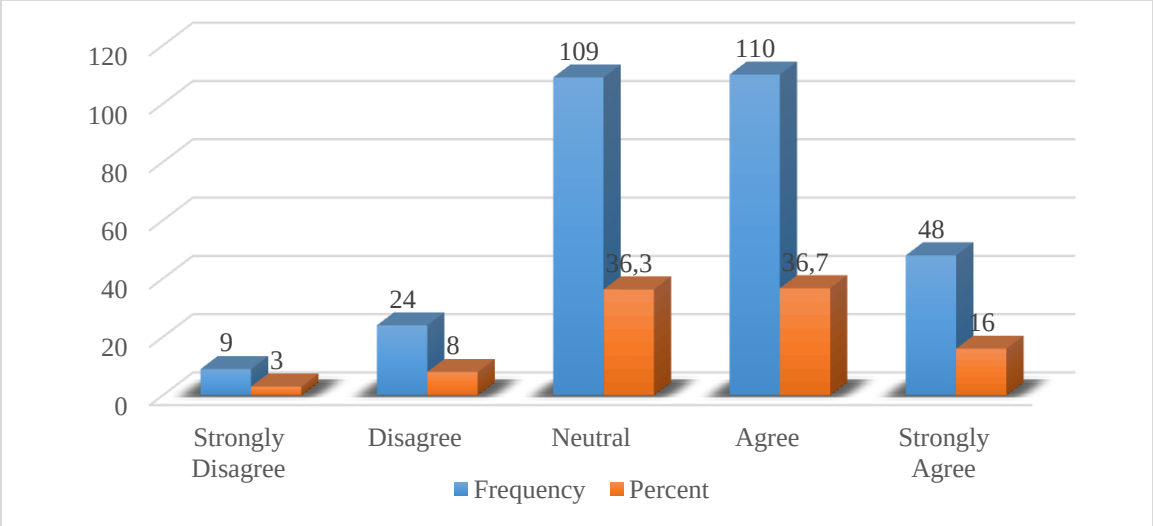

Figure 4.43: Resistance to technological change among stakeholders within 3PL organizations is impeding the successful integration of advanced technologies

The above figure 4.43 represents the data divided with 3% strongly disagreeing, 8% disagreeing, 36.3% neutral, 36.7% agreeing, and 16% strongly agreeing. The widely held leaned towards treaty or neutrality rather than disagreement.

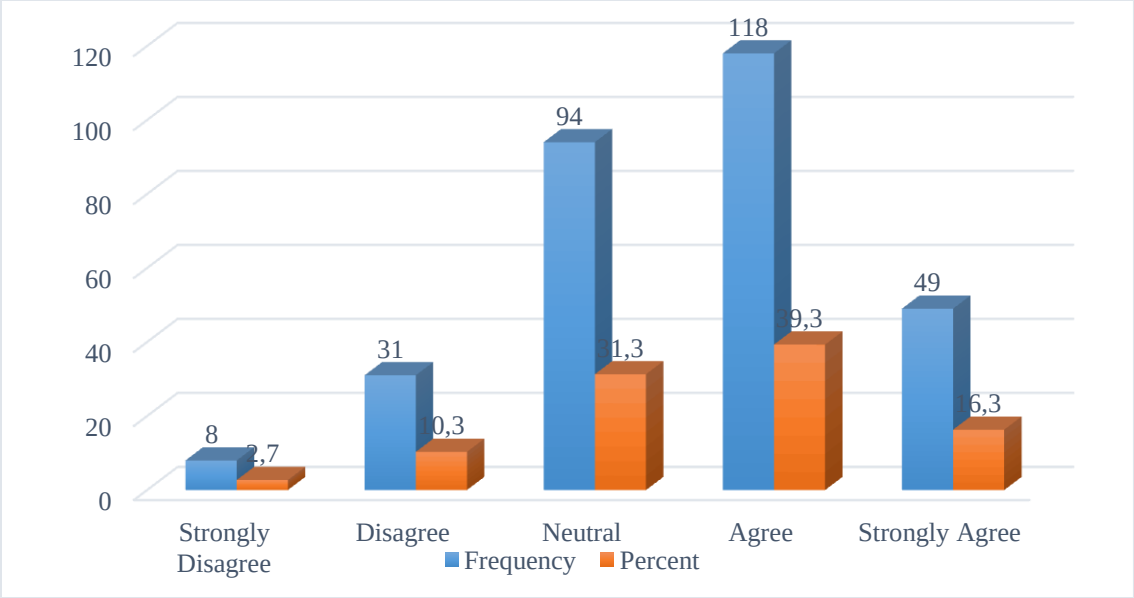

Figure 4.44: The absence of a skilled workforce capable of managing and utilizing advanced technologies is a significant challenge for the future growth of technology-integrated 3PLs in India

The above figure 4.44 represent their responses were characterized based on levels of agreement with a statement. Results indicated that 2.7% strongly disagreed, 10.3% disagreed, 31.3% neutral, 39.3% agreed, and 16.3 percent strongly agreed. The findings reveal a predominant trend towards agreement or detachment, suggesting general acceptance or inconsistency towards the statement under deliberation.

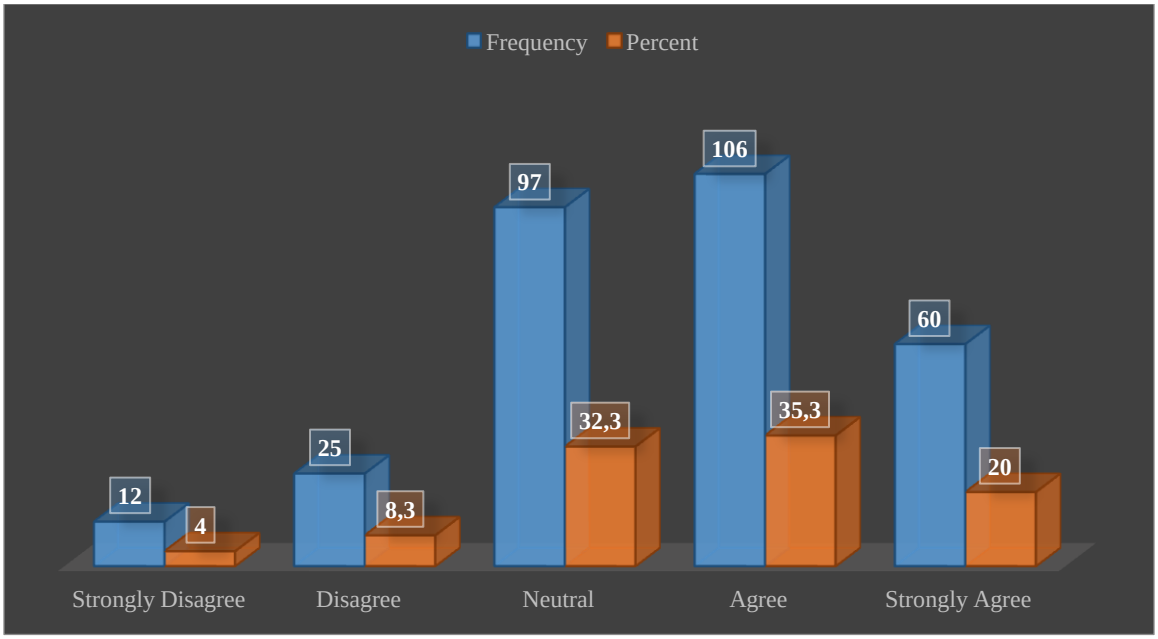

Figure 4.45: The perceived risks associated with data security and privacy concerns hinder the willingness of 3PLs to fully embrace technology for real-time data analytics

The above figure 4.45 shows the results that 4.0% strongly disagreed, 8.3% disagreed, 32.3% neutral, 35.3% agreed, and 20.0% strongly agreed. The data indicates a spectrum of opinions, with a notable portion leaning towards agreement and strong agreement, while a significant minority expressed disagreement or neutrality.

4.10 Descriptive Statistics

Table 4.15: Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Logistic Service Providers	300	4.00	1.00	5.00	3.8333	.76649	-.155	.141	-.216	.281

Operational Efficiency and Technology	300	4.00	1.00	5.00	3.8967	.76678	-.315	.141	-.007	.281
Drivers Performance	300	4.00	1.00	5.00	4.0800	.82210	-.477	.141	-.390	.281
Human Resource Management	300	4.00	1.00	5.00	3.8933	.80672	-.150	.141	-.559	.281
Anticipated Changes in Government Policies	300	4.00	1.00	5.00	3.8800	.79648	-.461	.141	.330	.281
Integration of Technology & Real Time Data Analytics	300	4.00	1.00	5.00	3.9267	.76806	-.231	.141	-.254	.281
Factors and Future Growth Prospects	300	4.00	1.00	5.00	3.9200	.82616	-.495	.141	.336	.281
Valid N (listwise)	300									

This table recapitulates data from a survey of 300 defendants across various factors. Each influence is rated on a scale from 1 to 5. Logistic Service Providers: Mean = 3.8333, Std. Deviation = 0.76649, Skewness = -0.155, Kurtosis = -0.216. Operational Efficiency and Technology: Mean = 3.8967, Std. Deviation = 0.76678, Skewness = -0.315, Kurtosis = -0.007. Drivers Performance: Mean = 4.0800, Std. Deviation = 0.82210, Skewness = -0.477, Kurtosis = -0.390. Human Resource Management: Mean = 3.8933, Std. Deviation = 0.80672, Skewness = -0.150, Kurtosis = -0.559. Anticipated Changes in Government Policies: Mean = 3.8800, Std. Deviation = 0.79648, Skewness = -0.461, Kurtosis = 0.330. Integration of Technology & Real Time Data Analytics: Mean = 3.9267, Std. Deviation = 0.76806, Skewness = -0.231, Kurtosis = -0.254. Factors and Future Growth Prospects: Mean = 3.9200, Std. Deviation = 0.82616, Skewness = -0.495, Kurtosis = 0.336

4.11 Hypothesis Testing

Hypothesis 1:

- **Null Hypothesis (H01):** Operational efficiency and technology adoption do not significantly impact the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.
- **Alternative Hypothesis (H1):** Operational efficiency and technology adoption have a significant positive impact on the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.

Table 4.16: Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	208.280			
Final	55.673	152.607	1	.000

This model fitting information compares two models. Baseline Fit of the Intercept Only Model This had a -2 Log Likelihood of 208.280. Final Model -2 Log Likelihood was 55.673 and the final model improved significantly. The final model is highly significant with a p value of .000 and a chi-square test of 152.607 on one degree of freedom and significantly better at data fit from the intercept only model.

Table 4.17: Goodness of Fit

	Chi-Square	df	Sig.
Pearson	85.227	15	.000
Deviance	20.770	15	.144

The Pearson Chi-Square is displayed in the data above. A substantial disparity between the observed and expected frequencies is shown by the test's statistic of 85.227 with 15 DF and a significant p-value of.000, which raises the possibility that the model may not match exactly. Deviance Chi-Square: This test produced a p-value of.144 and a statistic of 20.770 with 15 DF, which is not significant at standard levels (e.g., p >.05).

Table 4.18: Pseudo R-Square

Cox and Snell	.399
Nagelkerke	.445
McFadden	.225

The Pseudo R square values for a baseline model, Cox and Snell of 0.399, Nagelkerke of 0.445 and McFadden of 0.225, are in comparison to a baseline model, how well a logistic reversion model predicts changes in the dependent variable. They suggest moderate to good explanatory power and Nagelkerke's measure has the highest proportion of variance explained.

Table 4.19: Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	[LSP = 1.00]	1.114	1.184	.884	1	.347	-1.207	3.434
	[LSP = 2.00]	3.476	.705	24.346	1	.000	2.096	4.857
	[LSP = 3.00]	7.519	.740	103.258	1	.000	6.068	8.969
	[LSP = 4.00]	10.569	.864	149.518	1	.000	8.875	12.263
Location	OE_T	2.183	.195	125.210	1	.000	1.801	2.565
Link function: Logit.								

The logistic regression model's estimates of the aforementioned data parameters shed light on the correlation between the variables. Limit (LSP levels) With estimations ranging from 1.114 (LSP = 1.00) to 10.569 (LSP = 4.00), there is a considerable positive impact on the log-odds of the result for every level increase in Logistic Service Providers (LSP). This suggests a dependable increase in the likelihood of the outcome as LSP levels rise. Location (OE_T) Operational Efficiency and Technology (OE_T) also meaningfully impact the log-odds, with an estimate of 2.183. This demonstrates that the alternative hypothesis, according to which the performance of Logistics Service Providers (LSPs) in India's surface logistics sector is significantly improved by operational efficiency and technology adoption, is accepted.

Hypothesis 2:

- **Null Hypothesis (H02):** There is no significant impact of Classifying Important Drivers on the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.
- **Alternative Hypothesis (H2):** There is a significant impact of Classifying Important Drivers on the performance of Logistics Service Providers (LSPs) in India's surface logistics industry.

Table 4.20: Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	166.701			
Final	61.884	104.817	1	.000

The model fitting information comparing two models is shown by the data above. Only Intercept Model. The baseline is this model, which has a -2 Log Likelihood of 166.701. final model. The final model's -2 Log Likelihood of 61. 884 indicates a considerable improvement in fit. The completed model fits the data significantly better than the intercept-only model, as indicated by the Chi-Square test result of 104.817 with 1 DF and a p-value =.000.

Table 4.21: Goodness of Fit

	Chi-Square	df	Sig.
Pearson	30.387	15	.011
Deviance	27.339	15	.026

A significant disparity between observed and expected frequencies is shown by the preceding goodness-of-fit statistics, which show a Pearson Chi-Square 30.387 with 15 DF and a p-value of.011, indicating that the model may not fit perfectly. A significant

change is also shown by the Deviance Chi-Square 27.339 with 15 DF and a p-value of.026, which is nearer the acceptable fit level.

Table 4.22: Pseudo R-Square

Cox and Snell	.295
Nagelkerke	.329
McFadden	.154

The logistic degradation model's descriptive power is indicated by the pseudo R-squared values in the preceding table. About 29.5% of the variation in the dependent variable is shown by the Cox and Snell R-Square of 0.295. After adjusting for a more accurate estimate, the model's Nagelkerke R-Square is 0.329, meaning it explains roughly 32.9% of the variability. The McFadden R-Square is 0.154, implying the model explains around 15.4% of the variance relative to a insignificant model.

Table 4.23: Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[LSP = 1.00]	-.252	1.170	.046	1	.829	-2.546	2.041
	[LSP = 2.00]	1.903	.673	7.996	1	.005	.584	3.223
	[LSP = 3.00]	5.613	.671	70.005	1	.000	4.298	6.927
	[LSP = 4.00]	8.352	.775	116.160	1	.000	6.833	9.871
Location	DP	1.595	.168	89.572	1	.000	1.264	1.925
Link function: Logit.								

The above table parameter estimates from the logistic deterioration model show effects of Logistic Service Providers (LSP) levels and Driver Performance (DP) on the log odds of the outcome. For the thresholds, the estimates are as follows: [LSP = 1.00] is -0.252 (Std. Error = 1.170, p = .829, 95% CI [-2.546, 2.041]), [LSP = 2.00] is 1.903 (Std. Error = .673, p = .005, 95% CI [0.584, 3.223]), [LSP = 3.00] is 5.613 (Std. Error = .671, p = .000, 95% CI [4.298, 6.927]), and [LSP = 4.00] is 8.352 (Std. Error = .775, p = .000, 95% CI [6.833, 9.871]). The location parameter for DP is 1.595 (Std. Error = .168, p = .000, 95% CI [1.264, 1.925]). According to these results, the performance of Logistics Service Providers (LSPs) in India's surface logistics sector is not significantly impacted by the classification of Important Drivers.

Hypothesis 3

- **Null Hypothesis (H03):** There is no significant association between the performance of Logistics Service Providers and their company size and experience.
- **Alternative Hypothesis (H3):** There is a significant association between the performance of Logistics Service Providers and their company size and experience.

Table 4.24: Correlations

			Logistic Service Providers	Human Resource Management
Spearman's rho	Logistic Service Providers	Correlation Coefficient	1.000	.508**
		Sig. (2-tailed)	.	.000
		N	300	300
	Human Resource Management	Correlation Coefficient	.508**	1.000

		Sig. (2-tailed)	.000	.
		N	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

With a correlation coefficient of 0.508 (p =.000), the aforementioned data from Spearman's rho correlation analysis demonstrates a substantial positive link between human resource management and logistic service providers. This indicates a moderate relationship, suggesting that higher scores in Logistic Service Providers are associated with higher scores in Human Resource Management, and vice versa.

Hypothesis 4

- **Null Hypothesis (H04):** There is no significant association between the prospects of Logistics Service Providers and anticipated changes in government policies.
- **Alternative Hypothesis (H4):** There is a significant association between the prospects of Logistics Service Providers and anticipated changes in government policies.

Table 4.25: correlations

			Logistic Service Providers	Anticipated Changes in Government Policies
Spearman's rho	Logistic Service Providers	Correlation Coefficient	1.000	.517**
		Sig. (2-tailed)	.	.000
		N	300	300
	Anticipated Changes in Government Policies	Correlation Coefficient	.517**	1.000
		Sig. (2-tailed)	.000	.
		N	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

The Spearman's rho correlation between two variables—Logistic Service Providers and Anticipated Changes in Government Policies—is displayed in the above table. The sample size for this analysis was 300 observations. A limited positive link is indicated by the statistically significant correlation coefficient of 0.517 between Logistic Service Providers and Appreciated Changes in Government Policies at the 0.01 level (2-tailed). These results demonstrate that the prospects of logistics service providers and expected changes in governmental regulations are significantly correlated.

Hypothesis 5

- **Null Hypothesis (H05):** There is no significant association between the prospects of Logistics Service Providers and the integration of technology & real-time data analytics.
- **Alternative Hypothesis (H5):** There is a significant association between the prospects of Logistics Service Providers and the integration of technology & real-time data analytics.

Table 4.26: Correlations

			Logistic Service Providers	Integration of Technology & Real Time Data Analytics
Spearman's rho	Logistic Service Providers	Correlation Coefficient	1.000	.541**
		Sig. (2-tailed)	.	.000
		N	300	300
	Integration of Technology & Real Time Data Analytics	Correlation Coefficient	.541**	1.000
		Sig. (2-tailed)	.000	.
		N	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

The above table data indicates Spearman's rho correlation between Logistic Service Providers and Integration of Technology & Real-Time Data Analytics. The correlation

coefficient of 0.541 is rather strong positive correlation between the variables that is statistically significant at the 0.01 level (2 tailed). This means that the more integrated with technology and analytics in real time, the more activity or involvement a logistic service provider is involved with. However, as such the correlation between logistics service providers and the incorporation of technology and real time data analytics is very high.

Hypothesis 6

- **Null Hypothesis (H06):** There is no significant relationship between the identified factors and future growth prospects of LSPs in the Indian surface logistics sector
- **Alternative Hypothesis (H6):** There is a significant relationship between the identified factors and the future growth prospects of LSPs in the Indian surface logistics sector.

Table 4.27: Correlations

			Logistic Service Providers	Factors and Future Growth Prospects
Spearman's rho	Logistic Service Providers	Correlation Coefficient	1.000	.556**
		Sig. (2-tailed)	.	.000
		N	300	300
	Factors and Future Growth Prospects	Correlation Coefficient	.556**	1.000
		Sig. (2-tailed)	.000	.

		N	300	300
**. Correlation is significant at the 0.01 level (2-tailed).				

The correlation coefficient between logistic service providers and factors and future growth prospects is displayed in the above table using Spearman's rho. At the 0.01 level (2-tailed), the correlation coefficient of 0.556 indicates a moderately positive connection that is statistically significant. This shows that the activity or selection of logistic service providers tends to expand along with improvements in factors and future growth prospects. This association is very significant and not the result of chance, as indicated by the consequent value (p-value) of 0.000. Thus, the parameters that have been discovered and the potential for future expansion of logistics service providers (LSPs) in the Indian surface logistics industry are significantly correlated.

4.12 Summary of Findings

The logistics sector in India, particularly surface logistics, is a vital component of the country's economy. Efficient logistics operations ensure smooth supply chains, timely delivery of goods, and overall economic growth. This study delves into the factors that significantly influence the performance and future growth prospects of Logistics Service Providers (LSPs) in India's surface logistics industry. The findings underscore the importance of operational efficiency, technology adoption, human resource management, government policies, and the integration of real-time data analytics in driving the success of LSPs.

Operational efficiency and technology adoption stand out as the most critical factors influencing the performance of LSPs. Operational efficiency alludes to logistics companies' capacities to minimize waste, optimize resources, and streamline processes to ensure timely delivery of services. Improving operational efficiency can result in substantial cost savings and higher service levels in an industry where time is a key

success factor. Adopting technology, on the other side, means incorporating cutting-edge tech systems and tools into logistics processes. Logistics service providers (LSPs) can gain real-time insight into their operations through technology such as "transport management systems" (TMS), "warehouse management systems" (WMS), and sophisticated tracking and tracing systems. They are able to react to market demands more quickly and make better selections as a result. The study indicates that LSPs that prioritize technology adoption tend to outperform those that rely on traditional methods, as both operational efficiency and customer happiness can be greatly enhanced via the use of technology.

The classification of important drivers within the logistics industry also plays a crucial role in LSP performance. Identifying and focusing on key operational drivers—such as transportation costs, delivery times, and customer service—can lead to better outcomes and improved service delivery. The study highlights the need for LSPs to conduct regular assessments of these drivers and implement strategies that address the most critical aspects of their operations. Understanding which drivers have the most significant impact on performance allows LSPs to better prioritize projects based on their expected return on investment and to distribute resources accordingly. For instance, reducing transportation costs through optimized routing and load planning can directly enhance profitability, while improving delivery times can boost customer satisfaction and loyalty.

Human resource management (HRM) is another important factor for the performance of LSPs. Better operational result is associated with effective HRM practices such as recruitment, training, employee engagement, and performance management. Logistics industry is a labor-intensive industry and therefore the presence of a skilled and motivated workforce is essential to achieve high productivity and quality

of service. The study reveals that the LSPs that have stronger HRM policies performed better overall and had more satisfied employees and less staff turnover. As staff members are trained and developed enough, they can go on to manage intricate logistics operations and adapt to new technologies. Additionally, it can help to make a healthy work atmosphere, as well as commend on staff members' successes, which can increase morale and improve performance.

Logistics industry in India is shaped by the government policies. The study shows that government policies changes have a big impact on LSP's performance. Improved performance is associated with positive expectations concerning policy changes like infrastructure development, regulatory reforms, and incentives for technology adoption. The government support can help to develop a favorable environment for logistics operations by relieving regulatory burdens, enhancing infrastructure and offering financial incentives for the investments in information technologies. As an example, projects such as the Goods and Services Tax (GST) and the establishment of specialized goods corridors have had a great impact on the logistics industry, leading to reduction of transit times and costs. The best LSPs are those that keep themselves up to date with policy changes and do engage with policymakers to take advantage of these opportunities. LSPs can increase their competitiveness and grow by aligning their strategies with government initiatives.

The integration of technology with real time data analytics shows to be very effective in improving LSP performance. Nowadays logistics providers need real time data collection and process, and action. LSPs have new degree of operational knowledge thanks to Artificial intelligence (AI), big data analytics and "Internet of Things" (IoT) devices. Real time data analytics can make logistics service providers pick more from the real time data of warehouses, supply networks and fleet. For example,

real time vehicle location, conditions of cargo and traffic conditions can be revealed by IoT sensors for optimizing the routes dynamically and proactively dealing with the issues. AI driven analytics can provide clues as to demand trends, how much you need in order to meet your demand, and when a disruption might become a problem. This study points out that the companies must adopt these technologies to remain competitive in the logistics industry. Real time data analytics leverages allow LSPs to provide customers with real time accurate and timely information, thereby improving operational efficiency, reducing costs and making the customer happy.

It is found that several factors in combination determine future growth prospects of LSPs. In order to drive the growth and success in the logistics industry, it requires a holistic approach that consists of technology adoption, human resource management, supportive government policies, operational efficiency and technology integration. The operational efficiency makes sure the providers of logistics satisfy the requirements of customers within the time frame or with low cost. Technology adoption and integration of real time data analytics give LSPs the ability to optimize their operations and respond quickly to the changes in the market. Skilled, motivated workforce is a guarantee provided by human resource management to the LSPs that they can handle the intricacies of the modern logistics operations. Supportive government policies create favourable business environment with reduction of operational barriers and encourage innovation. When focusing on the above key areas, LSPs can improve their performance and ensure a sustainable growth. The study focuses on the interrelationship between these factors, and that a full strategy to deal with all of these at once is needed to achieve long term success.

4.13 Conclusion

Finally, the report provides a summary of the key factors that influence the operations and potential expansion of Logistics Service Providers (LSPs) in surface logistics sector of India. The importance stated by the findings is that of operational efficiency, technology adoption, human resource management, supportive government policies and real time data analytics integration. Strategically focusing on these areas are the LSPs that are more likely to achieve superior performance and sustainable growth. LSPs can optimize their processes through operational efficiency and technology adoption to improve service delivery, and human resource management can be done effectively to have a skilled and motivated workforce. This fosters regulatory environment that helps reduce Regulatory Burden and promote Infrastructure Development and shaped more supportive Government policies. Moreover, real time data analytics enables LSPs to take advantage of the insights to optimize operations, improve customer satisfaction and save cost. To stay competitive and innovative, LSPs must pursue a holistic approach to integrate the factors mentioned here. However, LSPs have the advantage of being able to continue to constantly change as new technological advancements, regulatory changes and market trends emerge to make their business and grow. The interconnectedness of these drivers is emphasized by this study, and the need for simultaneous addressing of them to secure long term success in the Indian logistics industry is emphasized.

CHAPTER V:

DISCUSSION

5.1 Introduction

This study's discussion chapter presents the influence of factors in performance and also examines the possibility of third-party logistics (3PL) service providers to expand into the Indian surface logistics market. Thus, this study answers three major research questions: The first question is to identify critical internal and external performance factors that influence 3PL providers. It also goes further to explain how macroeconomic factors like economic growth, globalization and market changes are likely to affect the logistics industry in the future years and thus give insight into the future trends. Some of the specific recommendations made by the chapter regarding these trends are as follows, which will help the 3PL providers to improve their effectiveness, competitiveness and sustainability. In order to show the current situation and future prospects of the surface logistics business in India, the results of this study's analysis of the primary data collected from a structured questionnaire and the secondary data from industry reports are used.

The Cronbach's Alpha number indicates that the results show a high degree of internal consistency and reliability for the survey or test instrument utilized. This

provides confidence in the robustness of the data acquired by indicating that the survey or test items are measuring the intended constructs consistently (Cheah et al., 2018). According to the data on gender distribution, 57% of the sample as a whole is made up of men, and 43% is made up of women. This suggests that there was a minor male preponderance among the study's participants. The respondents' age distribution points to a primarily younger demographic. The most of them are in the 18–25 age range, with the 26–35 age range coming in second (Dowda et al., 2003). A lower percentage of responders are between the ages of 36 and 45, while those between the ages of 46 and 55 make up an even smaller fraction. The age group 56 years and older has the lowest representation. The assessed group's educational background reveals a wide range of academic accomplishments. Few people have graduated from high school, yet a large percentage have a bachelor's degree. Most hold a Master's degree, and a lesser percentage have completed a PhD. A minimum number of responders meet the requirements for "Other" categories. The spread of the sample's educational backgrounds is evident.

The respondents held a range of occupations, as seen by the distribution of work roles within the surveyed sector. A smaller percentage of people are Supply Chain Managers, and a higher percentage are Logistics Experts. A subset of the respondents has positions as Directors of Logistics & Circulation, while others are employed as Transportation Authorities. The majority of respondents had "Other" employment roles in the industry, which suggests that participants have a variety of tasks and responsibilities (Morrison, 1994). There is variation in the respondents' years of experience in a certain field, as indicated by the data. Less than a year's experience makes up the largest category, followed by one to three years. Three to five years' experience is held by a smaller percentage of people, and five to ten years' experience by

an even smaller fraction. Only a small percentage of responders have worked for more than ten years. This distribution shows that those with comparatively less experience in the field are more prevalent. A diverse landscape can be seen in the distribution of firm sizes based on staff count. The majority of people are employed by microenterprises, and a similar proportion work for small businesses. A smaller subset works for medium-sized businesses, while an even smaller subset is hired by major businesses. The variation in business sizes among the employers of the respondents is demonstrated by this distribution Brush and Chaganti, (1999).

5.2 Logistics Service Provider

The opinions expressed by survey participants on the logistics service provider's compliance with delivery deadlines are not all the same. A slightly bigger group disagrees with the statement, but a small number strongly disagrees. A sizable percentage of responders are apathetic. Conversely, a similar number concurs with the statement, and a smaller portion concurs strongly (Hamilton, 2000). A variety of viewpoints regarding the logistics service provider's dependability in fulfilling delivery deadlines are reflected in this distribution. A variety of opinions are revealed by the way the contributors answered the survey question (Zaller & Feldman, 1992). While a significantly greater group of respondents disagrees with the statement, a smaller number of respondents strongly disagree. A significant percentage of participants hold an indifferent position. On the other hand, a sizable portion concurs with the statement, while a smaller portion strongly concurs. These results demonstrate the range of opinions that respondents had about the subject matter. Such outcomes show that respondents' attitudes may include negative, neutral, or strong positive perceptions of the material in question. Concrete poll results indicated that the majority of the

respondents had a positive impression of the functioning of the logistics service provider on issues and concerns raised by them. 51. The majority of the respondents or 3% of the respondents agree or strongly agree with the statement. 34. 12 percent of respondents themselves describe their attitude as 'none of the above,' that is, they are neutral (M. Liu et al., 2015). Regarding poll 2, it is evident that the majority of the respondents have positive perceptions about the specific logistics service provider's capacity to address problems/ concerns. The perception respondents have about the ability of the logistics service provider to adapt to changes in requirements can therefore be seen in the logistic response where varying levels of agreement have been recorded. 50. Not even 1% of the respondents partially agree and none of the respondents agrees or strongly agree with the statement. 35. Thus, 0 % is a rather large portion that can be considered neutral. On the other hand, a much smaller proportion—14 percent—felt that the American church was moving in the right direction by attempting to become a more intergenerational church. 7%—expresses disagreement. Based on these results, although a larger percentage of the participants agreed with the sentiments, there was also a considerable number who did not or even disagreed on the aspect of flexibility, as perceived with the logistics service provider. As for the findings of the survey questionnaire, the authors identified variations in the kind of responses received from the respondents regarding the customer support services provided by the logistics service provider. 53. They are of the opinion that customer support services are not effective, hence; 0% of the respondents agree or strongly agree with this statement. 33. Thus, the same ratio of an essential part, which is 7%, remains neutral (Garcia, 2021). These results indicate divergent views concerning the degree of customer care offered by the logistics service provider.

5.3 Operational Efficiency and Technology

It is possible to identify various perspectives in the survey results concerning the successful adoption of digital technology by LSPs to enhance business productivity (Oláh et al., 2018). 52. Thus, the proposed statement is confirmed by 7% of respondents: 4% agree, and 3% strongly agree. A significant percentage of 31. 0% is neutral. On the other hand, 16 Still, the one-fifth of the agricultural land is in the hands of those with a large quantity of bikes: On the other hand, 16 About 3% of the respondents hold a small business view whereby they agree that local sourcing is an effective way to support this business. segment, disagree. These differences render the following results as the extent of views concerning the extent of logistics.

It is crucial for the service providers to meet the challenges and incorporate the digital technologies that positively affect system efficiency. Most of the responses of the study about the use of complex tracking and monitoring revealed that it was not sustainable.

The results also showed that the majority of the respondents from the 11 key clients had favourable opinions on integrated systems in logistics operations. The majority, or 58. 0%, concur or strongly all agree that these systems have made the processes more efficient. A sizable percentage, 27. 0%, have a neutral opinion. On the other hand, a smaller percentage was 15% The company's goals involve acting as an inspiration to consumers, growing its customer base as a branded company, and attaining profitability by increasing its capacity and coverage. This particular question, however, reveals that no respondent exercises a disagreement indicating it at 0%. These results suggest that despite the agreement that respondents share towards the view that the nature. Thus while the surveillance and monitoring technologies are positively beneficial, a large portion of people also appreciate their opposing or indifferent opinions (Jackson et al., 2004). The analyses demonstrated a variety of attitudes towards

the LSPs in the Indian surface logistics industry with the successful implementation of IT in their supply chain processes. 54. A three percent disagree or strongly disagree with the statement while 69% agree or strongly agree with the statement which is a sizable majority. A significant number, 35. 0%, is neutral. On the other hand, the responses indicating that females are in smaller size were much fewer at only 10 percent of the respondents. 6%—state that they disagree. The implication of these results is that while the respondent holds favorable perceptions of the logistics service providers' operation in the logistics supply chain through technology, a significant proportion of them remain indifferent or hold negative views about the situation. Concerning the level of automation in the Indian surface logistics, the interacting parties differed in their opinions according to the survey results. Preferably more than not, this means that most respondents feel that the current level of automation is sufficient to address issues on the procedure and reduction of human errors. Therefore it can be pointed out that there is not sufficient identification agreement or non-agreement as far as the literate responders are concerned (McGrath et al., 2010). Only a smaller percentage of the respondents expressed their disapproval by saying that the level of automation currently being practised may not be adequate to attain the maximum level of efficiency and zero-error condition in the flow of the products into and out of the logistical network. According to the findings, there is a divergence of view in terms of the percentage that the integration of IoT devices affects the levels of visibility and traceability of items in transit among the respondents across the survey. Polling the respondents and taking into consideration their views it is evident that a majority of them have voted that the integration of IoT has benefited the area of visibility and traceability. Even though a considerable number of responders does show some level of support with the two concepts, a considerable number of them have no opinion at all, and this means that there is no vehement support

or opposition. A minority, however, holds disagreement and thus has some doubt concerning the notion that IoT devices have enhanced some aspects of the logistics efficiently(Suwandi, 2022).

5.4 Drivers Performance

From survey outcomes indicated by the delivery timeline reliability, it is seen that different perception exists among the stakeholders. The statement seems to be dubbed well by many of the respondents as they place a lot of relevance on the reliability of the delivery timeline. In both cases, a fairly large number of participants combine a neutral position or express ambiguity (Spicer, 2015). A third think otherwise meaning there is disagreement or somewhat reluctance towards the reliability of delivery timing. In sum, these findings show the respondents' diverse expectations and the level of consensus in this critical facet of logistics management. The following is the synthesis of the findings on the importance' of responsiveness and communication; At the same time, a considerable percentage of respondents state their understanding by choosing the 'agree' or 'strongly agree' options in relation to the importance of these factors; nevertheless, many viewers display no opinion as well. A much smaller fraction of the respondents, however, dissents from this statement, suggesting some variation in the views regarding the aptness of the concept of responsiveness and the place of communication in the particular survey (Crow et al., 2002).

Different perspectives are depicted when looking at the aspect of cost-efficiency. Even while 45 percent somewhat agree and 51 percent somewhat disagree with the statement 'cost is very important to me,' a large percentage can still agree or strongly agree that cost-efficiency is vital. A large portion can also retain the overtones of impartiality or even a fair balance. On the other hand, a limited number of respondents stated that they had personally or had come across people affected by health problems

caused by the consumption of contaminated food. while asking the respondents, they opposed the statement with the aim of implying that there is a divergent opinion on how cost saving or cost efficiency is one of the major advantages in the given circumstance.

Opinions from people with different backgrounds were identified when considering the importance of flexibility in logistics solutions. A significant number of the respondents fell within the category of those who strongly agreed or agreed with the statement that flexibility is imperative. logistics solutions. However, a sizeable fraction also remain at the mid position which suggests that they are undecided or do not have strong faith in the market. ambiguity. On the other hand, however; a minority yet not a small proportion of participants have on the flexibility of the flow, different opinions of fixed beliefs concerning adaptability in the flow of logistical processes. These results show how each of the mentioned approaches reveal the spectrum of reactions of respondents on the importance of flexibility in logistics systems.

The results indicate various perspectives when ad/addressing the importance of flexibility in the structure of logistics solutions (Suwandi, 2022). The survey showed that a large number of respondents supported or strongly supported the proclamation that flexibility is necessary for effective logistics solutions. A considerable proportion also remain passive, meaning that they do not exhibit any clear bias. doubt or uncertainty: they should not be characterized by a lack of conviction/ambiguity. On the other hand, there is a minority of responders that have a completely different perception as to whom a terrorist may be different opinions exist in the industry concerning the importance of flexibility in managing logistic networks. These results show how respondents' views on the value of flexibility in solutions sold in the logistics field differed widely. Many perspectives are disclosed when discussing the relevance of order Amid the assessments and considerations that are being presented to illustrate the significance of order, several

opinions are disclosed fulfilment accuracy. Interestingly, Respondents with no view at all make up almost 30% of the respondents and this is iOS. doubt or lack of confidence; noun; Source(s): ‘Tentativeness is the direct antonym of assertiveness and can refer to a wavering or a doubt.’ Close to 58 percent of the respondents shared the above view. responded using a scale that ranged from “Disagree” to “Strongly agree” to the statement that “I have to find order.” The relevance of a high level of online order delivery accuracy is significant. On the other hand, 13% of respondents responded that they disagreed with it and a smaller percentage of people strongly disagreed with this, which means people were divided on the level of importance of order accuracy is in the meaning of the poll.

The results show that opinions concerning the relevance of regulations are rather ambiguous, yet speaking, they are positive. Most of the subjects are oriented positively on the regulation aspect. compliance proving the importance of conducting yourself by the standards prescribed and followed in a certain milieu. Nonetheless, a Still, a considerable portion of shares remain in the grey zone, which means that people are not entirely confident about their choice. On the other hand, a small percentage of the respondents disagree which shows that they have a different opinion. The modes reveal information about how much compliance with the regulations is significant when it comes to censuses. The majority of as per the poll conducted, the perception of the respondents was positive towards the importance of sustainability. practices. Sustainability is important, that is why the majority of the respondents agree or strongly agree with the statement. Still, a sizeable percentage is apathetic, indicating a lack of conviction on the subject. A smaller percentage of respondents, on the other hand, disagree, indicating different viewpoints regarding the importance of sustainable measures in the context of the poll. Discussions regarding the benefits of continuous

improvement programs typically show favourable views, balanced with a notable amount of neutrality. Numerous responders agree that continuous improvement is important, demonstrating their understanding of its advantages (Flynn et al., 1994). Still, a sizable fraction is neutral, indicating hesitancy or a lack of conviction. On the other hand, a smaller group disagrees, indicating different viewpoints regarding the perceived worth of CBI projects in the studied setting.

There are differing perspectives on the study results about employee engagement and satisfaction in 3PL companies in India. Many answers show a propensity for agreement, indicating that people view existing HR management techniques as effective in resolving these issues. But a large percentage stay indifferent, suggesting a lack of strong belief in either direction. On the other hand, a sizable minority voiced dissent, indicating varying opinions regarding how well-suited the present approaches are for encouraging worker involvement and contentment in 3PL companies.

5.5 Human Resources Management

The survey results shown the primarily show positive or neutral sentiments regarding the difficulty 3PLs experience in finding and retaining competent workers due to the lack of skilled manpower in the Indian surface logistics sector. A sizable percentage of respondents are undecided, indicating that they do not have strong opinions on the matter. In the meanwhile, a sizable majority concur or strongly concur that there is a problem with the lack of qualified talent. On the other hand, a smaller percentage disagree, reflecting differing opinions about how serious this issue is in the industry. which evaluate the effectiveness of current HR policies in addressing diversity and inclusion concerns within the logistics sector, show that respondents' opinions are variable but generally positive. A significant portion is indifferent, which points to the lack of a definitive opinion on these programmers’ effectiveness. The majority of the

respondents in this study have a positive impression of the present HR policies, which shows that there is a trend to improve on matters concerning the inclusion and diversity of workers. Some disagree, however, with the degree of satisfaction for the regulations concerning the sector's diversity and inclusion requirements. Also, on the aspect of disposition, the survey response indicated that respondents leaned more 'positive' when asked about the efficiency of 3PLs' channels Of communication and feedback mechanisms in terms of worker satisfaction and output where the majority of respondents selected 'Agree or 'Strongly agree', however, a portion of the respondents offered a neutral response were indecisive selecting the 'Neutral' button. In contrast, a lower percentage suggests a level of disagreement or strong disagreement, implying that these 3PL feedback systems and the communication technologies used are seen to be operating in a manner that the respondents do not entirely approve of.

It provides several viewpoints on the implementation of fresh HR strategies, including flexible work. Structures, as to how to lure and retain professionals in the dynamics of the logistics environment. A sizeable percentage of responders had a marginal view, that is they had a half-baked opinion or they were in doubt about whether the particular strategy was important or not. However, the vast majority of respondents indicated a certain feeling that is rather in agreement with these findings, meaning that they understand that all these strategies help to enhance the evaluation of the factors affecting the staffing strategies and human capital management in the logistics business. A smaller percent of respondents, on the other hand, hold the belief in other rights such as social rights. hand who poses opinions contrary to each other, showing varying degrees of skepticism regarding the achievements of some HR programmed.

As for the promotion of the sustainable business and profitability of 3PL companies in the Indian logistics market, numerous responses to the survey were stated

by the participants. Some percentages opted for the mid-point which may have implied that respondents were uncertain of the extent to which the regulatory structure is favourable to 3PLs or if they were ambivalent. In contrast, a clear majority painted a picture of agreement which suggested that where the regulation is concerned the majority believed that current regulation had a positive impact on the sustainability as well as profitability of the 3PLs. However, there were those with contrasting views, although in smaller number, who responded that there were restrictions or challenges facing the current regulatory framework in India concerning the 3PL businesses.

5.6 Anticipated Changes in Government Policies

From the record of the polls, it appears you requested details of peoples' perception regarding the impact of the current policies with regard to 3PLs' performance in the Indian surface logistics industry. If you want me I can help you in this case helping you to develop this data into a discourse that omits specific numeral data (Saleem et al., 2023). Which direction would you like for the next stop? It is necessary to note that relatively little attention has been paid to the examination of this phenomenon from a variety of approaches based on expected changes in the policy to deal with the major challenges facing 3PLs. in the survey data, the variation of views is demonstrated, with a rather large number of respondents being indifferent position. More than 60% of the respondents suggested that they partially or comprehensively agreed with the probable impact of these policy enhancements/outcomes of these policy enhancements. At the same time, a significantly lower percentage responded to material by other authors, which implies that there are different stances regarding the expected impact of these changes. In light of the above discussion about the role of the

government aimed at the formation of conditions necessary for the functioning of foreign companies, third-party logistics or 3PL industries and beliefs concerning the 3PL investments, there are perceived as different, based on the poll. A large part of the participants can be considered as having a neutral attitude, meaning that they are in the grey zone or are perceptive optimists with rounded perspectives (Collins, 2017). At the same time, the majority chose the corresponding option and stated that they agreed, to a certain extent. basically, most of the respondents, stretching across the four levels of analysis with special liners to strongly agreed, provided general support for the efforts being made by the government. encourage foreign investment. On the other hand, a smaller percentage expressed opinions tantamount to disagreement. differing perspective concerning possibly the government's impact on this segment of the economy future growth.

It was revealed that the views concerning the existing technological support aimed at enhancing internal communication within the framework of the logistics network are rather controversial. As far as participants' opinions is concerned, 50% had a positive attitude towards the statement, strongly agreeing or agreeing that they are effectively facilitated by the infrastructure. On the other hand, a lesser number stated that they have unfavourable perceptions, implying the current point of view, disagreement, or even extreme disagreement. A considerable number of respondents said they had no opinion they cared to express about the issue, which suggests that the respondents are somewhat fuzzy or uncertain about their stand.

5.7 Integration of Technology & Real-Time Data Analytics

Respondents' perspectives on how technology integration affects customer satisfaction differ, as seen by the data shown most people have a positive opinion of technology integration and believe it improves customer satisfaction. A minority, on the

other hand, has unfavourable opinions that suggest doubt or difficulties with the potential effects of technology. Furthermore, a sizable portion of respondents express no opinion, suggesting ambiguity or a lack of agreement regarding the degree to which technology influences customer pleasure in this particular situation. Respondents have differing opinions about the investments made by organizations in modernizing and advancing logistics technology. The majority of the opinions were positive, and they were recommending frequent investments into the technology updates. However, a substantial fraction of responders were undecided, implying that there was no conviction. However, some minorities expressed unfavourable opinions which could indicate some concerns or difficulties in making these investments. The data shows that employee views on how comfortable they are using integrated technology for logistical jobs were positive opinions from an overwhelming majority, which means that many workers are comfortable using the integrated technology. But a good portion remained undecided, indicating neither side was particularly strong. There was a smaller group who did not have good opinion, i.e., they felt uncomfortable or they had a problem when using the integrated technology for logistical activity.

The results reveal the positive acceptance of real time data analytics in solving problems in a fast manner. Most of the respondents gave positive opinions about real time data analytics, which helped them quickly overcome challenges. Nonetheless, a sizeable percentage of respondents expressed no view at all, thereby indicating ambiguity or lack of conviction. Some minority said unfavourable opinions, which indicated a certain degree of doubt or difficulty in the use of the real time data analytics to solve the problem.

5.8 Factors and Future Growth Prospects

There are differing views of the existing regulatory structure in the Indian surface logistics sector, based on the data presented a sizable segment of respondents voiced favourable opinions, indicating that the existing regulatory environment facilitates the successful use of technologically driven solutions. A sizeable minority, on the other hand, expressed unfavourable opinions, suggesting that there may be perceived barriers to putting such solutions into practice within the current regulatory framework. Furthermore, a sizable percentage of respondents expressed no opinion at all, indicating ambiguity or a lack of conviction on the influence of the regulatory framework on technology-driven logistics solutions. Views on how the high upfront costs of technology integration hinder 3PLs in the Indian logistics sector differ greatly, based on the data presented a sizable portion of respondents indicated strong agreement or agreement, proving that the high expenses are in fact a major impediment. On the other hand, a smaller but significant percentage disagreed or strongly disagreed with this statement, indicating different opinions regarding the degree of financial obstacles brought about by technology integration. Nonetheless, the majority of respondents had no opinion, indicating ambiguity or a lack of conviction on this matter. It is clear findings that stakeholders in 3PL organizations have differing perspectives about resistance to technological change. About a sizable percentage of respondents had neutral opinions, meaning they were neither strongly in favour of nor against the remark. The majority, on the other hand, tended to agree, either strongly agreeing or agreeing that resistance to technological change prevents sophisticated technology from being successfully integrated. On the other hand, a smaller but significant percentage disapproved of this claim. These results point to a complex environment where views within the 3PL sector about the significance of stakeholder resistance to technological change are varied.

There is disagreement over the difficulty of managing and deploying cutting-edge technologies in technology-integrated 3PLs in India due to a lack of experienced workers, as shown by the results presented in Both strong opinions in favours of and against the remark were not held by a sizable number of respondents, who expressed neutral views. The bulk, however, tended to concur, either agreeing or strongly agreeing that a skilled labour shortage is, in fact, a substantial obstacle to future growth. On the other hand, this claim was disputed by a smaller but significant proportion. According to these results, the landscape is complex and perspectives regarding the availability of qualified personnel to manage cutting-edge technology within 3PLs are varied (Durst & Evangelista, 2018).

Drawing from the survey findings pertaining to several aspects of logistics and technology integration. The data indicates that respondents had a generally moderate to high degree of agreement on a number of important points. O'Muircheartaigh, Krosnick and Helic, (2016) A positive perception is suggested by the mean scores of several factors, including logistic service providers, operational efficiency and technology, human resource management, anticipated changes in government policies, integration of technology & real-time data analytics, and future growth prospects. Skewness scores typically show a slight negative skew, indicating that responses are largely distributed in a balanced manner around the mean, with no notable outliers. Similar to platykurtic distributions, which suggest a modest concentration of responses around the central tendency without hefty tails, kurtosis values also indicate this. These results imply that respondents see these things constructively on the whole, with some differences in viewpoints.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

The aim of this study was to determine the growth and performance characteristics for surface logistics third-party logistics (3PL) organizations in India. In addition to defining important internal and external elements that affect Logistics Service Providers' (LSPs') efficacy, the study examines the effects of market trends, global shifts, and economic development on the industry going forward. Primary data is collected from the online surveys of the supply chain managers and the transportation professionals while the secondary data is collected from other standard and reliable

logistics data from India. The study shows that the operational efficiency that improves LSP performance is highly associated with technology adoption, while the classification of important drivers does not contribute to performance in a major way. One of the correlations that can be observed is that the higher the level of human resources management, the better the performance of LSPs, which proves that having qualified staff is crucial for success.

Furthermore, the study reveals how expectations of future LSPs' performance are strongly linked with the expectations of changes in government policies, technology adoption, and real-time data analysis. From the analysis, it can be concluded that for LSPs to harness growth opportunities, it is necessary to focus on digitalization, supply chain risk management, and sustainability. It also offers tactical recommendations to the 3PL providers to enhance their profitability and efficiency in India's surface logistics. This study aims to provide a comprehensive evaluation of the present status of the industry with an eye toward supporting India's economic growth and further development in the overall development of the nation's logistics network.

6.2 Implications

This research has threefold implication and provides useful information to all the stakeholders in the surface logistics industry of India. The strong link between operational efficiency technology adoption and LSP performance suggests that logistics companies will have to adopt new technologies and effective processes into the operations. This includes real time data processing, that can improve the operational flexibility and making decisions. LSPs can increase productivity as well as reduce expenses in these areas, thereby enhancing service quality and therefore client loyalty and satisfaction.

Furthermore, the results regarding the human resource management suggest that firms should focus on developing more advanced practices in this sphere. It includes training and skill development programs that will be able to train and develop the employees in such a way that they can perform the complex logistic functions. Additionally, the connection between government policies and LSPs' future is strong, which means that businesses should watch and reserve for policy changes. Therefore, the alignment of LSPs with governmental priorities such as infrastructure and sustainability become possible and brings opportunities for LSPs' development and cooperation. Finally, it is argued that technological progress, availability of skilled human resources, and ability to adjust proactively the policies would be the key success factors of 3PL providers in the future logistics environment in India.

6.3 Recommendations for Future Research

Some of the specific study topics that may aid in the future growth of the Indian surface logistics sector are listed below. First, the research's generalization to other logistics companies, such as SMEs, in addition to major corporations, may provide a deeper comprehension of the variables that affect performance at various business sizes. Furthermore, research on the effects of new technologies like artificial intelligence and blockchain in the context of logistics could reveal more about the subjects' potential for further improvement. It could also examine the impacts of international relations and trade on the logistics industry because these factors are gradually becoming determinants of the market. In addition, more longitudinal research on changes in LSP performance and growth over time consequent to government policies and technological developments would contribute more valuable insights into the dynamics of sustainability and strategic management over the long term. Furthermore, looking at how LSPs can address the expectations of the customers and changing market demands could

offer further insights into how LSPs can adapt and offer new services to the industry. Research of this nature would help in gaining a better insight into the factors that will define the logistics industry in India in the future and the steps that can be taken in this regard.

6.4 Conclusion

In conclusion, this research presents a comprehensive evaluation of the factors that influence 3PL providers' performance and their prospects for growth in India's surface logistics market. As shown by the analysis of the findings related to the effects of operational efficiency and technology adoption, both factors are critical for LSP performance, and improvements in these areas can increase efficiency, decrease costs, and improve service quality. The study establishes that although the categorization of performance drivers does not pertain to outcomes, implementing human resource management is crucial to operational performance, and therefore companies should direct efforts to build their human capital to meet the challenges of technology and operations. The study also finds that expectations of future prospects of LSPs are closely tied to the possible changes in government policies and technology adoption. As the logistics sector grows, LSPs need to continue observing changes in the regulatory environment and use emerging technologies, including real-time data analysis, to stay competitive. The findings presented herein present a number of strategic suggestions for the improvement of logistics organizations, which will help them become more effective competitive and become more sustainable with the help of digitalization, the use of skilled human capital, and cooperation with the government. In totality, this research offers worthy information to the logistics industry, offering a framework for future research and helping the industry player to take specific actions that will foster the

growth and sustainability of the industry in the ever-evolving context of the surface logistics industry in India.

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APPENDIX A:

DATASET

	A	B	C	D	E	F	G	H	I	J	K
1	Gender	Age	Educational backgroun	Current Job Role	Job Experience	Company Size	The logistics service p	The logistics service p	The logistics service p	The logistics service p	The logistics service p
2	1	3	3	5	4	1	3	4	3	3	4
3	1	4	3	1	5	4	4	4	4	5	5
4	2	2	3	5	2	4	3	3	4	3	3
5	2	3	3	5	4	4	4	4	4	3	4
6	2	2	2	5	5	4	5	5	5	5	5
7	2	4	4	2	5	1	4	4	3	3	4
8	1	4	3	5	5	3	3	4	2	2	2
9	2	3	3	5	1	1	4	2	3	3	3
10	1	3	2	5	5	1	4	4	4	4	5
11	2	4	4	5	5	4	4	4	4	4	4
12	2	3	3	5	5	4	4	4	3	2	4
13	2	3	2	5	4	4	3	3	3	2	3
14	2	3	3	5	1	1	3	2	5	2	4
15	1	4	2	5	5	1	5	5	5	5	5
16	1	4	5	3	5	1	4	5	4	5	4
17	1	2	3	5	4	4	4	4	4	4	4
18	1	4	3	2	5	4	4	4	4	4	4
19	2	2	3	5	4	4	4	3	4	4	4
20	2	3	3	4	4	1	4	4	2	2	2
21	1	4	2	3	2	1	3	3	3	3	1
22	1	3	3	5	5	2	4	4	5	5	5
23	1	4	3	5	5	1	4	4	3	3	4
24	2	1	3	5	2	3	5	5	5	5	5
25	1	3	2	5	5	4	3	4	4	4	3
26	1	3	3	5	5	2	3	4	3	2	3
27	1	2	3	5	3	4	3	5	5	4	5
28	1	4	3	5	5	4	3	2	2	2	2
29	2	2	3	5	2	2	3	3	3	2	2
30	1	4	3	5	5	1	3	4	4	4	3
31	1	5	2	5	5	4	3	2	4	3	4
32	2	2	3	1	2	2	3	3	3	3	3
33	1	3	3	5	5	4	2	2	3	3	3

	L	M	N	O	P	Q	R	S	T	U	V
1	LSPs leverage digital te	The adoption of advan	LSPs in the Indian surf	The level of automatior	The integration of Inter	The reliability of deliver	Efficient inventory man	Communication and rec	Cost-effectiveness pla	The flexibility of logistic	Technology integration
2	4	4	4	4	4	4	4	4	4	4	4
3	4	5	4	3	4	5	5	5	5	5	5
4	3	3	3	3	3	4	4	4	4	4	4
5	4	3	3	4	5	5	4	4	4	4	5
6	5	5	5	5	5	5	5	5	5	5	5
7	3	5	3	3	4	5	5	5	5	5	5
8	3	4	2	2	4	4	4	4	4	4	4
9	4	5	4	4	4	5	5	5	5	5	5
10	4	5	4	5	4	5	5	5	5	5	5
11	4	5	4	4	4	5	5	5	5	5	5
12	3	4	3	3	4	4	4	4	5	4	4
13	4	4	4	4	3	5	4	5	5	4	5
14	2	1	4	2	5	5	3	5	4	3	4
15	5	5	5	5	5	5	5	5	5	5	5
16	4	5	4	4	5	4	4	5	4	4	5
17	4	4	4	4	4	5	5	5	5	5	5
18	4	5	4	3	4	5	4	4	4	4	5
19	4	4	4	4	4	4	4	4	4	4	5
20	3	5	4	4	5	5	5	5	5	5	5
21	2	5	5	1	5	5	5	5	3	5	5
22	5	5	5	5	5	5	5	5	5	5	5
23	3	4	4	4	3	4	3	3	4	3	4
24	5	5	5	5	5	5	5	5	5	5	5
25	4	4	4	4	4	5	5	5	5	5	5
26	4	5	4	3	4	5	5	5	5	5	5
27	5	5	3	3	5	5	5	5	5	5	5
28	3	4	3	3	4	5	5	5	4	4	5
29	3	5	1	1	5	2	2	2	4	4	4
30	4	4	3	3	4	4	4	5	5	5	5
31	3	4	3	3	4	5	5	5	5	5	5
32	3	4	3	3	4	4	4	5	4	4	4
33	4	4	4	3	4	5	5	5	5	5	5

	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	The accuracy of order	Compliance with regul	Sustainability practices	Continuous improveme	The level of employee	The scarcity of skilled	The current HR policies	The effectiveness of c	The implementation of	Current regulatory lan	Current government po
2	4	4	4	4	4	4	4	4	4	4	4
3	5	5	4	5	4	5	4	4	5	4	5
4	4	4	4	4	3	3	3	3	3	3	3
5	5	5	4	4	4	4	3	4	4	4	3
6	5	5	5	5	5	5	5	5	5	5	5
7	5	5	5	5	5	4	3	5	5	5	5
8	4	4	4	4	2	4	4	4	4	2	2
9	5	5	4	5	3	4	2	4	4	3	3
10	5	5	5	5	4	5	5	5	5	5	5
11	5	5	5	5	3	3	2	2	2	2	5
12	4	4	4	4	2	4	3	3	4	3	3
13	5	5	5	5	3	3	3	3	3	3	3
14	3	3	3	3	4	4	3	3	4	4	4
15	5	5	5	5	3	4	4	4	3	4	4
16	4	5	4	3	4	5	4	4	3	4	4
17	5	5	5	5	4	4	4	4	4	4	4
18	5	4	4	5	4	5	4	4	4	3	3
19	5	5	5	5	4	5	4	4	4	4	4
20	5	5	5	5	4	4	4	5	5	3	4
21	5	4	5	5	3	5	2	1	5	3	2
22	5	5	5	5	5	5	5	5	5	5	5
23	3	2	3	3	3	2	3	3	3	3	4
24	5	5	4	4	4	4	5	4	5	4	4
25	5	5	5	5	3	4	3	3	4	3	4
26	5	5	4	4	3	4	2	2	4	3	3
27	5	5	4	5	3	5	3	3	3	4	5
28	4	5	5	4	3	4	3	3	4	3	3
29	4	4	4	3	3	2	2	4	4	4	4
30	5	5	5	5	4	4	4	4	4	4	4
31	5	5	5	5	3	3	3	5	5	3	3
32	5	5	5	4	3	3	3	3	4	3	4
33	5	5	4	5	5	5	3	5	5	5	5

	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR
1	Upcoming policy modifi	The government's role	The current technology	Integration of technolo	Organizations regularly	Employees feel comfor	Real-time data analytic	The current regulatory	The high upfront costs	Resistance to technolo	The absence of skilled
2	4	4	4	4	4	4	4	4	4	4	4
3	5	5	4	5	4	4	5	5	3	3	3
4	3	3	3	3	4	4	4	3	3	3	4
5	4	4	4	4	3	4	4	4	5	3	4
6	5	5	5	5	5	5	5	5	5	5	5
7	4	5	4	5	3	4	5	4	4	4	4
8	3	3	3	4	2	2	4	3	4	4	4
9	3	3	3	4	4	4	4	2	5	2	4
10	5	5	5	5	5	5	5	5	5	5	5
11	5	5	4	4	4	4	4	4	4	4	4
12	4	3	3	4	4	2	4	3	3	4	4
13	3	3	3	3	3	3	3	3	3	3	3
14	3	4	3	4	4	3	4	4	4	3	4
15	3	3	4	5	4	4	3	5	5	5	5
16	4	5	5	3	4	4	5	4	4	4	5
17	4	4	5	4	5	5	5	4	4	4	4
18	4	5	4	4	4	4	4	3	4	4	5
19	4	4	4	4	2	2	3	3	3	4	3
20	4	4	4	5	5	5	5	4	4	4	5
21	2	2	1	5	1	1	5	5	3	5	5
22	5	5	5	5	5	5	5	5	5	5	5
23	3	2	4	4	4	3	4	1	4	3	4
24	5	5	5	5	5	5	4	4	4	3	5
25	3	3	4	4	4	4	4	3	3	4	3
26	3	3	3	4	4	4	4	3	4	4	4
27	5	5	5	5	3	3	5	3	4	4	3
28	4	4	4	5	4	4	5	3	4	4	3
29	2	3	3	2	4	4	4	4	4	4	4
30	4	5	3	4	4	4	5	4	4	4	4
31	3	4	4	5	3	5	5	2	3	2	2
32	3	4	5	4	3	4	3	3	3	4	4
33	4	4	4	5	5	4	5	4	4	5	5