

ANALYSIS OF INDIA'S PROSPECTS FOR DEVELOPING A CAR CARRIER INDUSTRY

Submitted to the School of Maritime Management, Indian Maritime University in partial fulfilment for the award of degree in MBA International Transportation and Logistics Management

**Submitted
By
KISHOR. N
Reg. No. 2103305023**

Under the supervision of
Dr. B. SWAMINATHAN
Associate Professor & Head



INDIAN MARITIME UNIVERSITY
(A Central University, Government of India)

**SCHOOL OF MARITIME MANAGEMENT
CHENNAI CAMPUS
MAY 2023**

DECLARATION

I, **Kishor. N (Reg. No. 2103305023)**, student of School of Maritime Management, Indian Maritime University –Chennai Campus, hereby declare that this Project report titled **Analysis of India's Prospects for Developing a Car Carrier Industry** submitted in partial fulfilment of the requirement for the degree of Master of Business (MBA) in International Transportation and Logistics Management is my original work carried under the guidance of my project guide. It has not formed the basis for the award of any Degree/Diploma of any University/Institution. The information submitted is true and original to the best of my knowledge.



Kishor N
(Reg. No. 2103305023)

Place: Chennai

Date: 5 May 2023

CERTIFICATE

This is to certify that the project report entitled '**Analysis of India's Prospects for Developing a Car Carrier Industry**' submitted to the School of Maritime Management, Indian Maritime University, Chennai Campus., in partial fulfilment for the award of the degree of Master of Business Administration (MBA) in International Transportation and Logistics Management, is a record of work carried out entirely by **Kishor. N**, Reg. No. **2103305023**.



Dr. B. Swaminathan
Project Guide

External
Examiner:


16/5/23

Place: Chennai

Date: 11/05/2023

ACKNOWLEDGEMENTS

This Endeavor would have been incomplete without proper assistance and guidance; hence I would like to thank and express my gratitude to all those people who have helped me in the completion of this project directly or indirectly.

I'd like to express my gratitude to **Dr. B. Swaminathan, Associate Professor, Head School of Maritime Management, India Maritime University**, for recommending this study topic. I owe him a great debt of gratitude for his patient advice and support throughout my studies. His encouragement and inspiration, as well as his faith in my potential, enabled me to accomplish what I have so far.

I'd want to express my gratitude, Indian Maritime University, Chennai Campus, and all Professors in the Department of SMM for providing me with all of the resources I needed to complete my research and project work.

Finally, I thank all the non-teaching staff and fellows of the university my cordial regards to the employees of the organization for their kind cooperation throughout the period.

ABSTRACT

This dissertation is a study of India's prospects for developing the car carrier Industry. Unquestionably India's expanding automobile industry, advantageous location, and accessibility to trained labor make it a country with tremendous potential for the development of a car carrier industry. The nation presently ranks among the top automakers in the world and has a sizable domestic auto market. It is clear India is a desirable location for automobile carrier services due to its placement on important shipping lanes between Asia, Europe, and the Middle East.

The Car carrier industry as a whole is investigated, as well as the role of the automobile and automotive industries. However, there are also discussions on the challenges, including infrastructure constraints, regulatory issues, competition from established car carrier players, and competition from automobile manufacturers all around the world. This has led to research on the idea of India's prospects for developing a car carrier industry.

An overview of the current initiatives being made to boost manufacturing and exports in the sector. The transportation of automobiles is a critical component of the industry and the use of Roro vessels for car transportation is playing a vital role in developing India as a leading car carrier industry.

In order to better safeguard the car carrier industry, the government has taken several measures by developing dedicated infrastructure, simplifying regulations, promoting international collaboration, etc.

In the final chapter, conclusions are drawn and some recommendations are offered. The limitations that can impede the growth of the industry are identified, as are the shortcomings.

TABLE OF CONTENT

DECLARATION.....	2
CERTIFICATE.....	3
ACKNOWLEDGEMENTS	4
ABSTRACT.....	5
CHAPTER I INTRODUCTION	8
1.1 Background	8
1.2 Scope of the Study	10
1.3 Objectives of the Study.....	11
1.4 Significance of Car Carrying Industry over World Trade.	12
1.5 Global Prospects of the Car Carrier Industry.....	18
1.6 Limitations of the Study.....	18
1.7 Structure of the Report.....	19
CHAPTER II LITERATURE REVIEW	20
CHAPTER III AUTOMOTIVE INDUSTRY IN INDIA-PROFILE	28
3.1 India’s Automotive Industry	28
3.2 India’s Car Export and Import	30
3.3 India’s Car Carrier Fleet	34
3.4 Difficulties and Challenges in India’s Car Carrier Industry	36
CHAPTER IV ANALYSIS OF GROWTH RATE AND PROSPECTS OF INDIA	41
4.1 Defining the Global Automotive Industry of India.....	41
4.2 Global Sea-Born Car Trade	46
4.3 India’s Pure Car Carrier Fleet	47
4.4 Cooperation mode between major Global manufacturers and Car Carrier companies in India	51
4.5 Containerised Car Transportation	52
4.6 SWOT Analysis	54
CHAPTER V CONCLUSIONS AND RECOMMENDATIONS.....	58
5.1 Conclusion.	64
5.2 Recommendations.....	65
BIBLIOGRAPHY	66

Table of Figures

Figure 1.1 Global Car Carrier Market	13
Figure 1.2 Global Vehicle Manufacturers	15
Figure 1.3 Roro Vessel	17
Figure 3.1 Voume of India's Export of Vehicles	31
Figure 4.1 Global Automobile Production.....	42
Figure 4.2 Top 20 PCC owned Fleet and their Capacity till 2021	49

List of Tables

Table 3.1	33
Table 3.2	39
Table 4.1	43

CHAPTER I

INTRODUCTION

1.1. Background of the Study

India has emerged as a major player in the global automobile industry over the past few decades. The country's automotive industry has seen a remarkable growth trajectory and is now the fifth largest in the world. With a growing economy, a young demographic, and a large consumer base, India's prospects for becoming a car-carrying industry are bright. One of the primary factors driving India's automotive industry is the country's growing middle class. As more people enter the middle class, they have greater disposable income and are more likely to purchase a car. According to a report by the Society of Indian Automobile Manufacturers (SIAM), India's middle class is expected to grow to 250 million by 2025, up from 50 million in 2007.

This means that the demand for cars in India is likely to continue to increase in the coming years. In addition to the growing middle class, India has a large and relatively young population. With a median age of just 27, India's population is one of the youngest in the world. This means that there is a large pool of potential car buyers who are just entering the workforce and have yet to purchase their first car.

Another factor that is driving India's automotive industry is the country's focus on manufacturing. The Indian government has implemented a number of policies to encourage manufacturing in the country, including the Make in India initiative. This has led to the establishment of a number of automotive manufacturing plants in India and has attracted foreign investment from companies such as Toyota, Ford, and General Motors. India's automotive industry is also benefiting from a number of technological advancements.

The country is home to a number of innovative startups that are developing new technologies and products, such as electric cars and autonomous vehicles. These startups are helping to drive innovation in the industry and are positioning India as a leader in automotive technology. However, there are also some challenges that India's automotive industry will need to overcome in order to become a car-carrying industry. One of the biggest challenges is the country's

infrastructure. India's roads and highways are often congested and in poor condition, which makes it difficult to transport cars across the country. Additionally, the country's public transportation system is not well developed, which means that many people rely on cars as their primary mode of transportation. Another challenge facing the Indian automotive industry is the country's complex regulatory environment. India has a number of regulations in place that govern the production and sale of cars, and these regulations can be difficult to navigate for both domestic and foreign manufacturers. Despite these challenges, India's prospects for becoming a car-carrying industry are strong. With a growing economy, a young demographic, and a large consumer base, the country is well-positioned to continue to grow its automotive industry in the coming years.

India's prospects for developing a car carrier industry are significant for several reasons:

- India is the fourth-largest automobile market globally, with a rapidly growing demand for vehicles. The production of passenger cars in India is expected to reach 13.4 million units by 2026. This growth in the automobile industry presents significant opportunities for the development of a car carrier industry
- India has a cost advantage in terms of labor and infrastructure, which can help the country develop a competitive car carrier industry. The availability of cheap labor and relatively low-cost infrastructure can help Indian companies offer competitive rates for car transportation services.
- India's strategic location between Asia and the Middle East makes it an ideal hub for car transportation services. It can serve as a trans-shipment point for cars traveling between different regions, providing significant opportunities for the development of the car carrier industry.
- The Indian government has been taking steps to support the development of the automobile industry, including the establishment of dedicated automotive industrial zones and financial incentives for automobile manufacturers. Such support can help the development of the car carrier industry as well.

- The development of the car carrier industry can help reduce carbon emissions by optimizing the transportation of vehicles, which would be more efficient than individual car transportation. This would be a significant
- contribution towards India's commitment to reducing carbon emissions as part of its climate change goals.

1.2 Scope of the Study

India has the potential to become a significant player in the global car carrier industry. The country has a large and growing automobile industry, which is expected to become the third-largest in the world by 2025, according to a report by McKinsey. This growth is expected to be driven by increasing domestic demand, rising income levels, and favourable government policies.

The Indian government has also taken several initiatives to promote the growth of the automobile industry, which has a positive impact on the car carrier industry. For instance, the government's "Make in India" campaign aims to boost the manufacturing sector, including automobiles and encourages foreign investment in the country. Additionally, the government's National Electric Mobility Mission Plan aims to promote the use of electric vehicles, which could potentially increase the demand for car carriers.

India also has a large and growing port infrastructure, which is critical for the car carrier industry. The country has 13 major ports and several minor ports, with plans to develop several new ports in the coming years. The government has also taken several initiatives to improve port efficiency and reduce turnaround times, which can help to attract more car carrier operators to the country.

Moreover, India's geographical location provides a strategic advantage for the car carrier industry, as it is located between the major automobile markets of Asia, Europe, and Africa. This makes India an ideal hub for car carrier operations, providing access to a large market for automobile manufacturers and traders

India has significant potential to become a major player in the global car carrier industry, driven by its large and growing automobile industry, favourable government policies, growing port infrastructure, and strategic location. However, to fully realize this potential, the country will need to continue to invest in its port infrastructure, improve efficiency, and adopt advanced technologies to meet the demands of the industry.

1.3 Objectives of the Study.

India has several objectives to become a leading car carrier industry in the world, some of which include:

- To Increase the production of automobiles that India aims to increase the production of automobiles to cater to both the domestic and international markets. With the growing demand for automobiles globally, India intends to take advantage of this trend and increase its market share.
- To Improving the infrastructure is one of the most important things India is focusing on right now. India is focusing on improving its road and rail infrastructure to provide a seamless and efficient transportation system for cars. This will help in reducing transportation costs and improving delivery times.
- To highlight the importance of investing in new technologies that can help improve the performance and efficiency of cars with the intention to reduce emission and improving fuel efficiency, making Indian cars more attractive to the global market.
- To Promote the export India is looking to increase its export of cars to other countries. This will require building partnerships with other countries, promoting Indian cars through exhibitions and trade fairs, and creating a favorable regulatory environment.
- To Develop skilled manpower that India is focusing on developing a skilled workforce that can help design, manufacture, and service cars. This will require investment in training and education to create a pool of qualified professionals.

- To Improve the ease of doing business where India is taking steps to improve the ease of doing business in the country. This includes streamlining regulatory processes, reducing bureaucracy, and improving the overall business environment.

1.4 Significance of Car Carrying Industry over World Trade.

The car-carrying industry, also known as the automobile transport industry, is significant for world trade in several ways:

- The car-carrying industry is responsible for transporting millions of vehicles around the world each year, making it easier for car manufacturers to reach international markets and customers. Without this industry, it would be much more difficult and costly to move vehicles across borders, which would have a negative impact on global trade
- The car-carrying industry is a critical part of the global automotive industry supply chain. It allows car manufacturers to transport their products quickly and efficiently, which in turn supports the growth and competitiveness of the industry.
- The car-carrying industry provides employment opportunities for millions of people around the world, from truck drivers and mechanics to logistics coordinators and support staff. This industry plays a significant role in creating and sustaining jobs in both developed and developing countries.
- The car-carrying industry contributes to economic growth by facilitating international trade and supporting the automotive industry and generates billions of dollars in revenue each year, which has a positive impact on the global economy.
- The car carrier industry in India has witnessed significant growth in recent years due to several factors such as an increase in automobile production, rising domestic demand for cars, and the growth of the e-commerce industry.

India's prospects for developing a car carrier industry are significant, and the industry can play a vital role in the growth of the country's automobile sector, contributing to its economic development and sustainability goals.

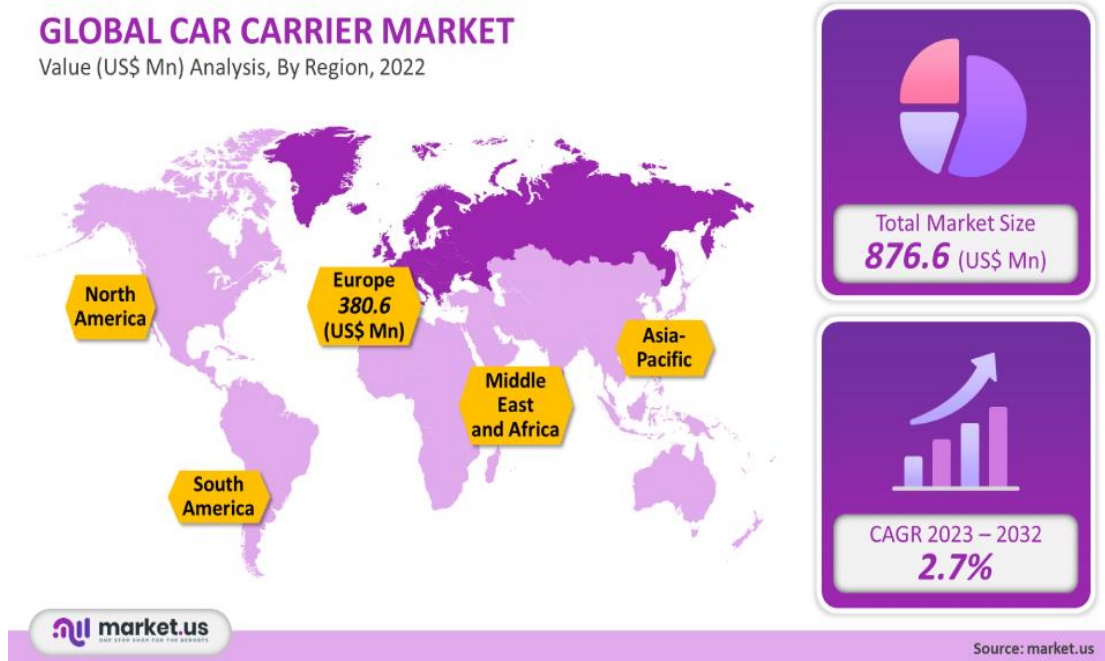


Figure 1.1: Global Car Carrier Market

Source: Market.us

1.4.1 Growth and Prospects of Car Carriers in India in Recent Years

Growth and prospects of the car carrier industry in India in recent years and policies of international bodies and the Indian government impacting India it.

The car carrier industry in India has witnessed significant growth in recent years due to several factors such as an increase in automobile production, rising domestic demand for cars, and the growth of the e-commerce industry. According to a report by Research And Markets, the Indian car carrier market was valued at USD 250 million in 2020 and is expected to grow at a CAGR of around 5% during the forecast period of 2021-2026. This growth can be attributed to the increasing demand for cars, the expansion of the automobile industry, and the increasing investments in infrastructure development.

The Indian government has also taken several initiatives to promote the growth of the automobile industry, which has a positive impact on the car carrier industry. For instance, the government's "Make in India" campaign aims to boost the manufacturing sector, including automobiles and encourages foreign investment in the country. Additionally, the government's National Electric Mobility Mission Plan aims to promote the use of electric vehicles, which could potentially increase the demand for car carriers.

International bodies such as the International Maritime Organization (IMO) and the World Trade Organization (WTO) also play a significant role in shaping the policies and regulations impacting the car carrier industry in India. The IMO's regulations regarding the reduction of greenhouse gas emissions from shipping have led to the adoption of cleaner technologies and practices in the industry. The WTO's regulations regarding trade barriers and tariffs also impact the export and import of automobiles, which has a direct impact on the demand for car carriers.

The car carrier industry in India is poised for significant growth in the coming years, driven by factors such as increasing automobile production and domestic demand, government initiatives to promote the automobile industry, and international regulations impacting the industry.

Some of the Key Trends are as follows:

- The demand for car transportation services in India has been increasing rapidly, driven by the growth of the automobile industry. The production of passenger cars in India is expected to reach 13.4 million units by 2026, which presents significant opportunities for the car carrier industry.
- Car carrier companies in India have diversified their services beyond traditional car transportation to offer value-added services such as warehousing, customs clearance, and pre-delivery inspection. This diversification has helped companies differentiate themselves and increase their market share.
- Car carrier companies in India are increasingly adopting technology to improve their operations and provide better customer service. For example, some companies have introduced GPS-enabled tracking systems that allow customers to track the status of their vehicles in real-time.

- The Indian government has taken steps to support the development of the automobile and logistics sectors, which has had a positive impact on the car carrier industry. The government's focus on building infrastructure, such as dedicated freight corridors and logistics parks, has improved the efficiency of transportation and logistics in India.
- The Indian government has set a target of having all new cars sold in the country be electric by 2030. This shift towards electric vehicles will have an impact on the car carrier industry, as companies will need to adapt their operations to accommodate the unique requirements of transporting electric vehicles.

1.4.2 Growth and Prospects of Automotive Industry in Recent Years

- **Electric Vehicles:** The shift towards electric vehicles has been one of the most significant trends in the automotive industry. Governments worldwide have set targets for phasing out petrol and diesel vehicles, and automakers are investing heavily in the development of electric vehicles. The production of electric vehicles has been growing rapidly, and the global electric vehicle market is expected to grow at a CAGR of 29.7% between 2021-2028.
- **Autonomous Vehicles:** Another significant trend in the automotive industry is the development of autonomous vehicles. Autonomous vehicles have the potential to transform the way we travel and transport goods, and automakers are investing heavily in their development. The global autonomous vehicle market is expected to grow at a CAGR of 63.1% between 2021-2028.
- **Connected Cars:** The development of connected cars, which can communicate with other cars and the surrounding infrastructure, has also been a significant trend in the automotive

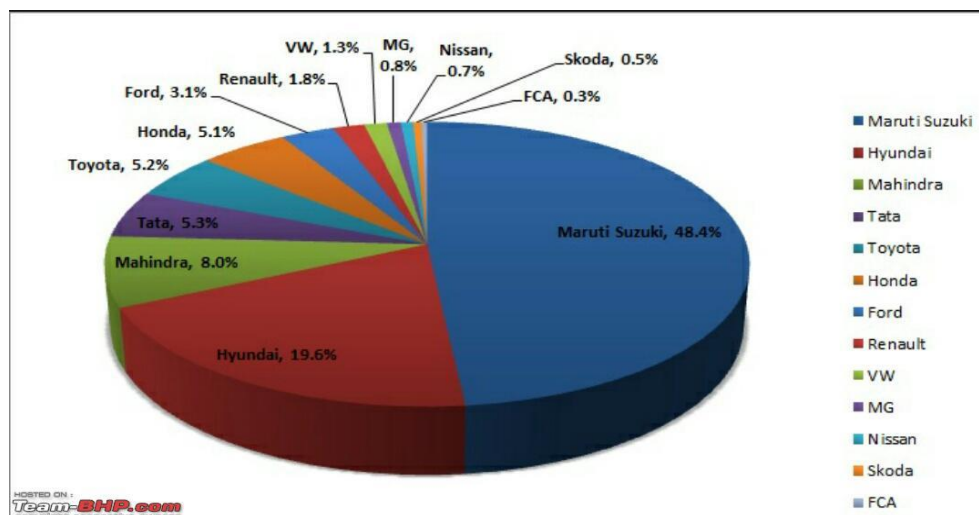


Figure 1.2 Global Vehicle Manufacturers

Source: cdn.motor1.com

industry. Connected cars offer various benefits such as improved safety, traffic management, and infotainment. The global connected car market is expected to grow at a CAGR of 25.2% between 2021-2028.

- **Government Support:** Governments worldwide are taking steps to support the development of the automotive industry. For example, many governments are providing financial incentives for the purchase of electric vehicles, investing in charging infrastructure, and supporting research and development in the industry.
- **Digitalization:** The automotive industry is increasingly becoming digitalized, with automakers and suppliers adopting digital technologies to improve their operations and customer experience. Digitalization has the potential to improve efficiency, reduce costs, and create new business models in the industry.

the automotive industry has shown significant growth in recent years, and there are promising prospects for the future. The industry is likely to continue to benefit from the growth of electric and autonomous vehicles, government support, and digitalization. However, challenges such as increasing competition, changing consumer behavior, and environmental concerns will need to be addressed to ensure the industry's long-term sustainability.

1.4.3 Growth and Prospects of Roro Vessels in Recent Years

Roll-on/roll-off (Roro) vessels are ships designed to carry wheeled cargo such as cars, trucks, trailers, and other heavy equipment. Roro vessels have shown significant growth in recent years, driven by various factors. Here are some of the key factors.

- **Increasing Demand:** The demand for Roro vessels has been increasing worldwide, driven by the growth of international trade and the need for efficient transportation of wheeled cargo. According to a recent report by Research and Markets, the global Roro shipping market is expected to grow at a CAGR of 5.6% between 2020-2025.
- **Expansion of Roro Ports:** Ports worldwide are expanding their Roro facilities to accommodate the increasing demand for Roro services. For example, the Port of Rotterdam

has recently invested in new Roro facilities to accommodate larger vessels and increase capacity.

- The emergence of New Markets: The growth of international trade has led to the emergence of new markets for Roro vessels. For example, there is significant demand for Roro services in Africa, where many countries are investing in infrastructure development and the expansion of their automotive industries.
- Adoption of Technology: Roro shipping companies are increasingly adopting technology to improve their operations and provide better customer service. For example, some companies have introduced GPS-enabled tracking systems that allow customers to track the status of their cargo in real time.



Figure 1.3: Roro Vessel

Source: Marine insight

- Governments worldwide are taking steps to support the development of the shipping industry, which has a positive impact on the Roro sector. For example, some governments are investing in building new port facilities and improving transport infrastructure to support international trade.

1.5 Global Prospects of the Car Carrier Industry

The global prospects for the car carrier industry are quite promising, given the significant growth in the global automotive industry and the increasing demand for automobile transportation worldwide. The car carrier industry is a crucial component of the automotive supply chain, enabling the efficient and safe transport of vehicles from manufacturers to dealerships and customers.

According to a report by Research And Markets, the global car carrier market was valued at USD 11.63 billion in 2020 and is expected to grow at a CAGR of around 4.5% during the forecast period of 2021-2026. This growth can be attributed to factors such as increasing automobile production, expanding trade routes, and the growth of the e-commerce industry, which has led to the increasing demand for vehicle transportation.

Moreover, technological advancements in the car carrier industry are also contributing to its growth. The adoption of cleaner and more efficient technologies, such as hybrid and electric-powered car carriers, is expected to reduce emissions and lower operating costs, leading to increased demand for such carriers.

In addition, global policies and regulations aimed at reducing greenhouse gas emissions from the shipping industry, such as those introduced by the International Maritime Organization (IMO), are driving the adoption of cleaner technologies and practices in the car carrier industry.

the outlook for the global car carrier industry is positive, with significant growth potential in the coming years. However, the industry must continue to innovate and adapt to new market conditions and changing customer demands to remain competitive and sustain its growth trajectory.

1.6 Limitations of the Study

Given the big and expanding automobile industry in India, the country has a lot of potential for growth in the car carrier industry. In the auto carrier sector, vehicles are transported on specialized ships that can be quickly loaded and unloaded at ports. It would be economically advantageous for India to establish such a sector, as it would increase exports, lower

transportation costs, and create jobs. However, there are several limitations to studying India's Prospects for developing a car carrier industry.

- The absence of detailed information about India's transportation needs for the automobile industry is one of the key drawbacks. Because of this, it is challenging to gauge the market's potential and demand for car carrier services.
- India's port infrastructure has historically experienced serious issues with connectivity, efficiency, and capacity. As specialized infrastructure and equipment are required to manage the transport of vehicles, these difficulties may limit the capacity to build a car carrier sector.
- Other forms of transport, like the well-established road and rail in India, could pose a serious threat to carriers. These transportation options can provide clients with more flexibility and convenience, making it difficult for the vehicle carrier sector to take off.
- The automobile carrier sector is governed by a number of laws, including environmental and safety criteria. The ability for the industry to flourish in India may be constrained by the need for major expenditures to comply with these rules.
- Last but not least, geopolitical elements like trade regulations and the state of the world economy could have an impact on India's chances of creating a car carrier business. Changes in these variables may have an impact on the demand for car carrier services and raise concerns about the future of the sector

1.7 Structure of the Report

- Introduction and Background of the Study, Scope of the Study, Objective of the Study, Significance of the Study, Global Prospects of the Study.

CHAPTER II LITERATURE REVIEW

India's growth as a vehicle carrier business has been significantly influenced by the automotive and automobile industries. With a vast network of highways, railways, and ports that enable the circulation of vehicles around the nation and to other countries in the world, India is currently one of the top car carriers in the world. A sizable and expanding middle class, rising levels of urbanization, and rising income levels have all contributed to the expansion of the automobile sector in India. Demand for vehicle carriers has grown as more individuals have the means to buy cars. This has resulted in large expenditures being made in infrastructure, such as the construction of new ports, new roadways, and expanded old railways. The Indian Railways, which runs a massive network of railroads that transport vehicles all over the nation, is one of the major stakeholders in the car carrier industry in India. To meet the growing demand for car transportation, the railways have also made investments in the creation of specialized terminals and wagons. In addition, the development of the automobile carrier business has been significantly aided by India's ports. The nation has a number of significant ports, including those in Mumbai, Chennai, and Kolkata, which handle considerable amounts of imports and exports of automobiles. To accommodate the increasing demand for auto traffic, some ports have also made investments in specialized infrastructure. In addition to making infrastructural investments, the automotive and vehicle industries have helped the car carrier market expand by implementing new technologies and procedures to simplify the manufacture and delivery of automobiles. This has enhanced effectiveness and decreased prices, making it simpler and more affordable to ship automobiles around the world and throughout India. All things considered, the automotive and auto industries have significantly shaped the car carrier industry in India, encouraging investments in technology and infrastructure and allowing the nation to become a prominent player in the global vehicle transportation market. Some important research works undertaken in recent years which are very closely connected with the present study are reviewed.

- **John Humphrey & Olga Memedovic (2003):** The study has been conducted on the basis of the Global automotive industry value chain and what prospects for upgrading by developing countries, The study begins with a map of the developments in the global auto industry in the 1990s, demonstrating how emerging countries, rather than the Triad regions

(North America, the European Union, and Japan), were primarily responsible for the rapid expansion in sales and production between 1990 and 1997. However, the downturn that followed was severe and protracted for some of these markets. Regional integration was caused by the rise of regional manufacturing systems. This opened doors for industrial modernization in developing nations connected to one of the Triad zones, where a sizable portion of production is still carried out. The following section of the essay discusses how the dynamic between suppliers and assemblers has evolved. The ability of local producers in developing nations to source components is constrained by an increasing tendency for employing the same suppliers in several places (follow sourcing). Nevertheless, there are opportunities in second-tier sourcing where a global reach is not necessary. The study demonstrates how by expanding their domestic markets, developing nations can boost their chances of being incorporated into the global value chains of multinational automakers. In order to expand into new markets, it emphasizes the value of supporting networks of small businesses in emerging nations.

- **Mahipat Ranavat &Rajnish Tiwari (2010):** The study is based on the influence of government policies on industry development in the case of India's Automotive Industry. From its infancy at the time of India's independence in 1947 to its current vibrant state, the automobile industry in India has come a long way. In contrast to the industry's output of only 4,000 vehicles in 1950, it reached the milestone of 10 million vehicles in 2006. Today's sector manufactures a vast variety of cars and auto parts to serve both domestic and international markets. Demand on the one hand and government interventions the latter of which had a significant impact—on the industry's development on the other. It has been determined that the development of the automobile sector in India took place in four stages. The key policies in the first (1947–1965) and second (1966–1979) phases were those that dealt with industry regulation, protection, and indigenization. These rules on the one hand helped India develop a domestic automobile sector, but on the other side, they resulted in subpar industry performance. The policy on the loosening of the means of acquiring technology was the one that was singled out as being the most significant during the third period (1980–1990). The industry's dynamics were altered by the entry of international competition. Finally, the liberalisation of foreign investment in the fourth phase (1991 and later) had a huge impact on the Indian automobile sector as it is now. This study charts the development of the automobile sector from its inception to the present while highlighting

significant government initiatives in India. The study examines the impact of significant policies on the growth of the sector.

- **Shinde Govind P. & Dubey Manisha (2011)** The study has been conducted considering the segments such as passenger vehicles, commercial vehicles, utility vehicles, two and three-wheeler vehicles of key player performance and also analyze SWOT analysis and key factors influencing the growth of Automobile industry. The report depicts data for the Indian automobile industry from 2005 to 2010. The study was carried out taking into account the passenger, commercial, utility, multi-purpose, two-wheeler, and three-wheeler segments. The present and future are clearly explained in each part and Market developments and trends in the Indian auto industry. The approach is taken to determine market share and trends in the Indian auto sector. In order to produce an objective market study, the research considers both historical and present economic and, more precisely, industry trends. The Indian automobile industry has experienced rapid expansion despite the global economic recession. The automobile industry in India has a promising future due to the country's growing middle class and rising standards of living. Although the sales growth rate for the industry is rising, there are still gaps in the automobile sector that the automobile industry must take into account in order to close.

- **DR Nishi Sharma (2011):** The study is based on the financial performance of the passenger and commercial vehicle segment of the automobile industry in terms of four financial parameters namely liquidity, profitability, leverage, and managerial efficiency analysis for the period of a decade from 2001-202 to 2010-2011. The recent recession had a devastating effect on the financial performance of several businesses globally. The majority of them produced poor outcomes since they were unable to deal with market fluctuations. Only an industry capable of making the most use of an organization's assets and liabilities could persevere in treacherous market conditions. In this context, the Indian auto sector demonstrated its suitability for meeting the demands of an unstable market. It has been one of the most powerful engines of the Indian economy over the last few decades. However, the market experienced some unfavorable changes in the most recent year 2010–2011, which had a significant negative impact on the performance of many organizations.

- **Dawar Varun (2012):** This Study is to examine the impact of different basic corporate policy variables, such as dividend, debit, and capital spending on the stock prices of Indian automakers. According to the study, capital structure is not related to stock prices, although

dividend and investment policies are. The study empirically determines how much corporate policy decisions (such as dividend, investment, and financing decisions) support stock prices in the Indian stock market. The findings of this study suggest that fundamental corporate financial factors are crucial for stock pricing in the Indian auto industry. The analysis confirms the signaling effect of dividend policy and the value significance of dividend and investment policy by arguing that earnings dispersed as dividends have a stronger influence on company value than earnings maintained inside the firm. According to the study, investment and dividend policies are value-relevant and can help signal market information that isn't covered in accounting publications. However, the study falls short of demonstrating the capital structure's value relevance in the Indian auto industry.

- **Murlidhar, A. Lok Hande & Rana Vishal S. (2013):** In this study, the author attempts to assess the output, domestic sales, production, and profit after tax of the Hyundai Motor Company. Pie charts and bar graphs are used in this context to display firm performance over time. One of the main forces boosting the nation's economic expansion is the automobile industry. It has developed a respectable market share in India's four-wheeler businesses, which are essential to certain economic sectors. The five-year study period was from 2009–2010 to 2013–2014, and the key information was gathered from the annual reports of two corporations (Honda and Toyota). It seems safe to say that the financial management practices used by Honda and Toyota are sound.

- **Dr. Pushpalata Chouksey & Ms. Rakhi Hotwani (2013):** The study looks at Bajaj Auto Ltd.'s liquidity position during the previous ten years and it includes a thorough examination of the company's working capital, the determination of liquidity ratios, and a discussion of the findings and recommendations. It aims to investigate several aspects of the company's liquidity condition in light of fundamental liquidity principles.

- **Shende Vikram (2014):** This study will be useful for figuring out customer expectations and market offerings for new and existing Indian auto manufacturing enterprises. The goal of the study is to identify the variables that affect consumer behavior for a certain automotive category. The most profitable sector of the economy now is the automobile industry. The key factors influencing high-volume car segments are the rise in disposable

income in both the rural and urban sectors as well as the accessibility of simple financing. With a number of new competitors entering the market and major international brands preparing to enter the Indian market, the rivalry is intensifying. Finding out the client expectations and their market offerings would be made easier for the existing and new vehicle manufacturing enterprises in India thanks to this research. Numerous domestic and international manufacturers have an impact on the Indian automotive industry. In this essay, consumer behavior research on the subject of car customers is analyzed, the marketer will be more successful in the marketplace with a thorough understanding of consumer purchasing behavior. The study of all categories of the Indian automobile market revealed that buyers' priorities differed depending on the segment, with disposable income serving as the primary motivator. Customers prioritize value for money, safety, and comfort while driving, whereas perceived quality is largely influenced by brand image. For this study, the purchase decision process and its interactions with behavior parameters were examined across all car segments, including small & hatchback, sedan class, SUV & MUV, and luxury car segments. This research was conducted using a methodology that involved reading research papers in the passenger car segment. This study's goal is to identify the variables that affect consumers' choices for a certain car segment. The goal of this article is to synthesize results and recommendations in order to improve the current sales stagnation situation and foster future demand for the automotive industry.

- **Sujeet Kumar Yadhav, Mrudala Sahay (2015):** The study is based on Automobile Industry Growth in India and its impact on air pollution. India currently ranks sixth in the world for motor vehicle manufacture, with a 38.3 billion USD annual revenue, or little under 8% of India's GDP. In terms of employment, this industry employs 19 million people. The Indian economy is largely driven by the automobile sector, but as the number of automobiles has increased, there has also been an immense strain on the environment, leading to air pollution. Numerous health issues, including respiratory and cardiovascular conditions, are brought on by air pollution. The concentrations of hazardous carcinogens like Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂), as well as particulate matter like PM_{2.5} and PM₁₀, have increased to worrying levels. A linear correlation technique is used to investigate the association between the expansion of the automobile industry and air pollution in India using secondary data from various sources. This essay examines the expansion of the automobile industry in India and how it has affected air pollution.

- **Dr.K. Jothi & Ms. P Kalaivani (2015):** The study is based on the financial performance of Honda and Toyota Automobile company. One of the main forces boosting the nation's economic expansion is the automobile industry. It has developed a respectable market share in India's four-wheeler businesses, which are essential to certain economic sectors. The five-year study period was from 2009–2010 to 2013–2014, and the key information was gathered from the annual reports of two corporations (Honda and Toyota). It seems safe to say that the financial management practices used by Honda and Toyota are sound.

- **Navleen Kaur & Jasmindeep Kaur (2016):** In the current study, which spans the eleven-year period from 2003–2004 to 2013–2014, it is attempted to identify the factors that affect the profitability of the Indian automotive industry by selecting a representative sample of all the companies that produce commercial, three-wheeled, two-wheeled, and passenger vehicles. The return on assets ratio is regressed against firm-specific factors, such as financial leverage, size, the tangibility of assets, growth, liquidity, inventory turnover ratio, debt-equity ratio, debtors turnover ratio, total assets turnover ratio, average payment period, and cash liquidity of the firm, in order to achieve the study's objectives. First, multiple regression analysis and correlation analysis are used to pinpoint the variables influencing the sample firms' profitability. The stepwise regression analysis has also been used to identify the main causes of the variation in the profitability of the sample firms. It was discovered that the average payment period, growth of the firm, inventory turnover ratio, debt-equity ratio, and firm's liquidity condition all had a major impact on the profitability of the Indian vehicle sector.

- **Deepak Mathivathanan, Devika Kannan & A.Noorul Haq (2018) :** The study is based on the sustainable supply chain management practices in Indian Automotive Industry. The automobile industry has a significant impact on society and the environment as one of the main manufacturing industries. Automobiles enable millions of people to travel and generate employment, but they also pose a threat to the environment. The automotive sector is now required to take into account its environmental and social implications in addition to its economic status due to consumer pressure, government laws, and stakeholder expectations for a competitive edge. Many companies in the automotive industry have adopted Sustainable Supply Chain Management (SSCM) procedures as a result of these pressures. SSCM practises are certain procedures that are included into the conventional

supply chain and assist a sector in transitioning to a sustainable supply chain. Businesses find it challenging to pinpoint the best practices and understand how they interact. Sadly, neither from an Indian perspective nor in the context of the automotive industry has any previous research examined the interrelated influences among these practices. With a focus on the automobile industry, the current study seeks to provide a deeper understanding of the associated influences among SSCM practices. This study increases the likelihood that SSCM practices will be successfully implemented in the automobile industry by giving industrial managers a framework for understanding how different practices interact.

- **Dr. Anoop Pandey, Dr. Sanjay Manocha & Dr. Pankaj Saini (2020):** The study is based on the Automobile Revolution and the future of Electric Cars in India. The beginning of the end for traditional motor vehicles is the arrival of electric automobiles. The necessity to decrease engine pollution emissions and reliance on expensive fuels are the primary drivers for converting to electric vehicles. The number of electric vehicles on the road worldwide by the end of 2016 had surpassed two million. A number of variables, including technological advancement, an increase in traction battery storage capacity in conjunction with decreased costs, and an expansion in public and government charging infrastructure, have contributed to the growing adoption of electric vehicles. Incentives. Batteries for electric vehicles (BEVs) and plug-in hybrid electric cars (PHEVs) are the two EV technologies that are now leading the way. This document provides an overview of the various EV technologies, outlining their features, restrictions, and difficulties in wide-scale adoption as alternatives to conventional automobiles. Electric vehicles have received a lot of attention in this new period from sellers, purchasers, and researchers as an environmentally friendly mode of transportation, which has led to a number of comprehensive and in-depth investigations. There are numerous opinions regarding electric car infrastructure, battery use, and charging stations. The challenges and benefits that the world would encounter with the full adoption of electric vehicles are considered in this document. The study did a good job of succinctly introducing various aspects of electric vehicles, such as studies of governmental policies, charging strategies, important techniques, charging impacts, and solutions to associated issues. A succinct report on the key details surrounding the introduction of electric vehicles has been developed in light of the discussions on the current state of electric vehicles.

- **Paul Jayender & Goutham Kumar (2021):** The study basically focuses on the Intelligent ERP for SCM agility and Graph theory technique for adaptation in Automotive Industry in India. The focus right now is on the ERP's ability to adapt to Big Data Analytics, including techniques like machine learning and predictive analysis, in the supply chain of the Indian automotive sector by proactively addressing manufacturing/business needs. In this paper, empirical data will be used to identify the factors that help supply chain management in the automotive industry stay flexible. A literature review will also be used to understand how SCM can stay flexible when Big Data Analytics and ERP are integrated. Determine the difficulties in putting interoperability into practise and provide a method based on graph theory for future research, IT, and supply chain managers to take into consideration.

- **A.G. Olabi & Mohammad Ali Abdelkareem (2021):** The study focuses on the fuel cell application in the automotive industry and future perspective. The largest contributor to total global emissions worldwide continues to be the automobile industry. This developing problem is mostly linked to the country's heavy reliance on fossil fuels as its main energy source. This analysis examines the present state of fuel cell use in the automotive industry as well as the scientific advancements made since the automotive industry's infancy. Also carefully considered are the technologies' potential in the future. The development and commercialization of these technologies are hindered by a number of factors, and potential solutions to this issue are also given. In conclusion, this study aims to investigate pragmatic approaches that might be used to lower fuel cell costs generally and their potential integration in the automotive industry.

- **Aulia Windyandari & Eko Julianto Sasono (2022):** The study focuses on the Ultimate strength analysis of Roro passenger ship. Since roro passenger ships must have a ramp door because they have unique requirements for handling freight with the roll-on-roll-off loading and unloading mechanism. To ensure the level of safety and dependability of the ship construction, it is crucial to do the ultimate strength analysis while taking both local and global loads into account. The goal of this study is to employ the non-linear finite element approach to investigate the structural reaction and ultimate strength of the roro passenger ship.

CHAPTER III

AUTOMOTIVE INDUSTRY IN INDIA- PROFILE

3.1 India's Automotive Industry

The automotive sector in India is one of the largest in the world, and it has grown significantly in recent years. The sector encompasses a wide range of vehicles, including cars, motorbikes, commercial vehicles, and three-wheelers, and it is vital to the country's economy. India is home to some of the world's largest automakers, including Tata Motors, Mahindra & Mahindra, Maruti Suzuki, and Bajaj Auto. The industry contributes significantly to the GDP of the country and employs millions of people. Many initiatives have been launched by the Indian government in recent years to support the expansion of the automotive industry, such as the Automotive Mission Plan 2016-2026, which intends to make India a preferred destination for automotive manufacturing and R&D. To boost the adoption of electric vehicles in the country, the government has also launched the Faster Adoption and Manufacture of Electric Vehicles (FAME) scheme. However, the industry has recently faced difficulties as a result of the COVID-19 epidemic, supply chain disruptions, and increased material prices. Notwithstanding these obstacles, India's automotive sector is predicted to continue growing in the next years, driven by rising earnings, urbanization, and increased demand for personal transportation.

3.1.1 History of India's Automotive Industry

The automotive industry in India stretches back to the early 1900s when the first car was introduced into the nation. Yet, the business did not begin to take shape until the 1940s and 1950s. Hindustan Motors Limited (HML) was founded in Kolkata in 1942 and began producing cars under license from the British business Morris Motors. Several more automobile manufacturers in India were established in the 1950s, including Premier Automobiles Limited (PAL), which began manufacturing the Fiat 1100 under a license from Italy's Fiat. In addition, the government established Hindustan Machine Tools (HMT) to manufacture tractors and other farm equipment.

Many initiatives were implemented by the Indian government in the 1960s to promote the growth of the indigenous automotive sector. These programmes included the formation of the

Automotive Research Association of India (ARAI) and the National Institute of Industrial Engineering Training (NITIE).

In the 1970s, foreign automakers such as Suzuki entered the Indian market, forming a joint venture with the Indian government to manufacture compact automobiles. Several major multinational automakers, including Hyundai, General Motors, and Ford, established manufacturing operations in India during the 1980s and 1990s. Since then, India's automotive sector has grown substantially, and it is currently one of the world's largest. Nowadays, India is a major supplier of automotive components and automobiles, contributing significantly to the country's GDP and employing millions of people.

3.1.2 Current Developments of India's Automotive Industry

Since then, India's automotive sector has grown substantially, and it is currently one of the world's largest. Nowadays, India is a major supplier of automotive components and automobiles, contributing significantly to the country's GDP and employing millions of people. Some of the key development in the industry are as follows:

- Electric Vehicles (EVs) - The Indian government is actively encouraging the use of EVs in order to minimize pollution and reliance on fossil fuels. By 2030, the government hopes to have 30% of all vehicles on the road electric. As a result, several automakers have introduced electric vehicles in India, with many more promising to do so soon.
- Autonomous Vehicle - India is also investing in the development of self-driving cars. The country's manufacturers and technology firms are working on creating self-driving vehicle technology, and the government has undertaken many efforts to help them along.
- Connected Vehicle: India is also working on connected vehicles, which employ internet connectivity to give drivers with real-time information and services. This technology is likely to play a big role in increasing road safety and driving enjoyment.

- **Manufacturing-** To decrease costs and enhance efficiency, India's automobile sector is likewise focusing on local manufacturing and production. The government has established a number of efforts to assist local manufacturing, including the Make in India program, which supports the production of vehicles and automotive components in India.
- **Export-** The automobile sector in India is also a significant exporter of vehicles and components. The government is aiming to strengthen the country's export capacity by encouraging the construction of export-oriented manufacturing facilities and offering export incentives.

3.1.3 The Scale of India's Automotive Industry

India has one of the world's major automotive industries. The Indian automotive sector produced 26.3 million vehicles in the fiscal year 2020-21, according to the Society of Indian Automobile Manufacturers (SIAM), comprising passenger vehicles, commercial vehicles, two-wheelers, and three-wheelers.

With approximately 21 million units sold in fiscal year 2020-21, India is also one of the world's major markets for two-wheelers. The country is a significant producer and exporter of tiny automobiles and has established itself as a global powerhouse for compact car production. Numerous foreign automakers, including Suzuki, Hyundai, Honda, Ford, and General Motors, have established manufacturing operations in India.

The automotive industry is a substantial contribution to the Indian economy, accounting for approximately 7% of the country's GDP and directly and indirectly employing over 35 million people. The Indian government has developed a number of regulations and measures to help the automobile industry grow, including the National Electric Mobility Mission Plan and the Automotive Mission Plan 2016-26.

3.2 India's Car Export and Import

India is a major player in the global automotive sector, exporting and importing vehicles. India's vehicle exports have increased in recent years, and the country has become a prominent exporter of tiny and compact cars to various markets across the world.

For the fiscal year 2020-21, India exported 4.49 lakh passenger vehicles, including automobiles, utility vehicles, and vans, worth USD 4.89 billion. South America, Europe, Africa, and Asia are the top export destinations for Indian automotive.

India, on the other hand, imports cars from other nations, primarily luxury and premium vehicles from manufacturers such as Mercedes-Benz, BMW, Audi, and Jaguar Land Rover. During the fiscal year 2020-21, India imported 1.25 lakh passenger automobiles worth USD 2.44 billion.

3.2.1 The Volume of India’s Car Import and Export

According to figures from the Ministry of Trade and Industry, the following is India's car exports and imports in the fiscal year 2020-21 (April 2020 to March 2021):

- In 2020-21 India’s Car Export was also impacted by the COVID-19 pandemic, with the country exporting 277,044 passenger vehicles.
- In 2020-21 India’s Car Import was also impacted by the COVID-19 pandemic, with the country importing 147,994 passenger vehicles.

3.2.2 India’s Automotive Products Export and Import Value

According to data from the Ministry of Trade and Industry, the following are the export and import values of Indian automobile items until 2020:

- The COVID-19 epidemic influenced India's automotive product exports in 2020-21, with
- the country exporting \$9.4 billion in automotive items.

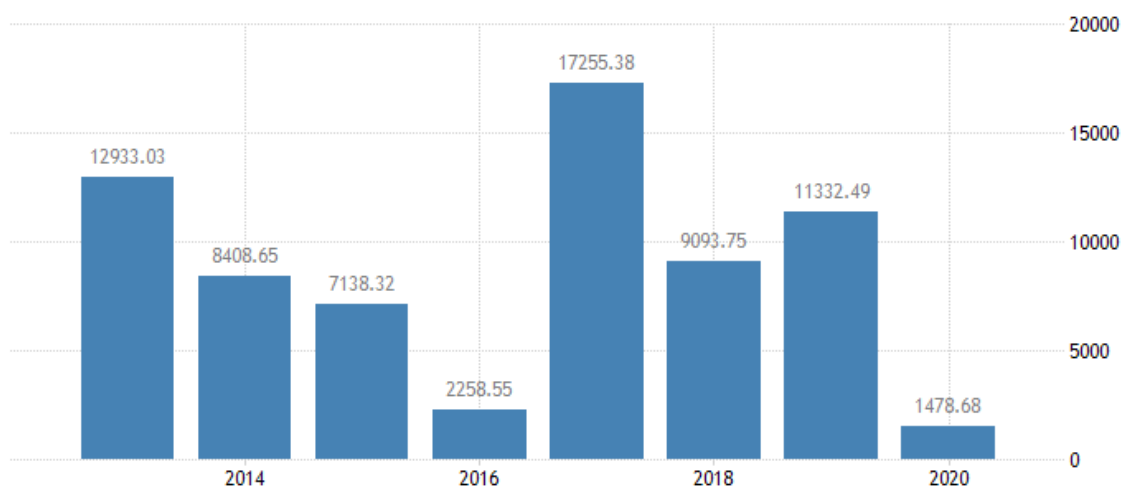


Figure 3.1: Volume of India’s Export of Vehicles

Source: Trading economics

- The COVID-19 pandemic also had an impact on India's automotive product imports in 2020-21, with the country importing \$10.9 billion in automotive products.

The COVID-19 pandemic had a substantial impact on India's automotive product exports and imports in 2020-21, with both volumes decreasing dramatically compared to previous years. Nonetheless, the industry is likely to rebound in the future years as a result of increased demand and government attempts to stimulate domestic manufacture and exports.

3.2.3 Objective Markets of Export

The automotive carrier industry in India exports to a number of target areas across the world. The following are some of India's important export markets for the vehicle carrier industry:

- Europe: With several European countries importing cars and other vehicles from India, Europe is one of the main markets for India's car carrier sector. Germany, the United Kingdom, France, Italy, and Spain are the largest European markets.
- Middle East: With multiple nations in the region importing cars and other vehicles from India, the Middle East is another key market for India's car carrier business. The Middle East's biggest markets are the United Arab Emirates, Saudi Arabia, and Qatar.
- Africa: India's car carrier sector also exports to numerous African countries, which are rising as key automobile markets. Africa's biggest markets include South Africa, Egypt, Algeria, and Nigeria.
- South America: India's automobile sector exports to various South American countries, including Brazil, Argentina, and Chile.
- Southeast Asia: India's vehicle carrier business also sells to Southeast Asian countries such as Thailand, Indonesia, and Vietnam.

3.2.4 India's Major Car Export Manufacturers

Hyundai Motor India leads the list of passenger vehicle exporters from April to March 2021, a position it has kept for the second year in a row. In FY21, the company recorded shipments of 1,04,342 units, a 38.6 percent decrease from the previous year's total of 1,69,861 units. Yet, export market share climbed just modestly from 25.7 percent to 25.8 percent year on year.

Table 3.1: India's top Export Car Manufacturers

No	Cars	FY 2021	FY 2020	Diff	% YoY
1	Hyundai	1,04,342	1,69,861	-65,519	-38.57
2	Maruti	94,938	1,00,294	-5,356	-5.34
3	Ford	46,064	1,31,476	-85,412	-64.96
4	Kia	40,440	21,461	18,979	88.43
5	Nissan	32,390	73,4793	-47,089	-59.25
6	VW	31,089	55,617	-24,528	-44.10
7	GM	28,619	54,863	-26,244	-47.84
8	Renault	9,420	15,872	-6,452	-40.65
9	Mahindra	6,748	11,465	-4,717	-41.14
10	Honda	5,151	3,745	1,406	37.54
11	Jeep	4,084	3,734	350	9.37
12	Tata	775	2,340	-1,565	-66.88
13	Isuzu	285	98	187	190.82
14	Toyota	43	14-771	-11,728	-99.63
15	Skoda	12	4	8	200.00
16	MG	0	0	0	-
-	Total	4,04,400	6,62,080	2,57,680	-38.92

Source: OEM Exports FY 21

Maruti Suzuki India Limited, the domestic market leader, was ranked second on the export list, just 9,404 units behind the top exporter. Exports fell 5.3 percent from April to March 20 to 94,938 units in FY21, but market share climbed significantly from 15.1 percent to 23.5 percent, an 8.3 percent rise year on year. Maruti Suzuki reached a historic milestone of 2 million PV exports on February 27th, 2021, when the S-Presso, Swift, and Vitara Brezza were exported to South Africa from Gujarat's Mundra Port. The Maruti Suzuki Jimny also made its way to the South American markets of Peru and Colombia.

Ford India ranked third, with a 65 percent decline in revenue due mostly to the COVID-19 pandemic. The corporation, which led this segment in FY19, fell to third place in the previous year as shipments fell to 46,064 units in FY21, down from 1,31,476 units in FY20. Market

share fell from 19.9 percent in FY20 to 11.4 percent in the previous year. Because the business has closed its operations in Brazil, some demand for the EcoSport may be diverted to Ford India. The EcoSport is one of India's most exported vehicles.

5,624 units lagging Ford India was ranked fourth, followed by Kia Motors India, with exports increasing by 88.4 percent. Kia shipped 40,440 vehicles in FY21, up from 21,461 in FY20. Market share climbed from 3.2 percent in FY20 to 10% in the previous year. Kia sells the Seltos and Sonet SUVs in 70 countries, including Saudi Arabia, Latin America, South Africa, and Asia

Nissan ranked fifth with 32,390 units exported, a 59.2 percent decrease from 79,479 units exported in FY20. VW India came in sixth place with 31,089 units exported in FY21, a 44.1 percent decrease year on year, while GM India reported shipments of 28,619 units, a 47.8 percent decrease year on year. General Motors has closed the Talegaon facility. The corporation decided to close the plant since there was no demand for the vehicle built there in export markets.

3.3 India's Car Carrier Fleet

The vehicle carrier fleet in India is made up of both owned and chartered vessels operated by several shipping companies. As of March 2021, India had 22 car carriers with a total capacity of roughly 26,000 automobiles, according to the Directorate General of Shipping. The number of vessels and their capacity, however, may vary based on market demand and other reasons.

Some of the major shipping companies operating car carriers include

- **Shipping Corporation of India:** Shipping Corporation of India is a state-owned shipping corporation that maintains a fleet of car carriers for the transportation of automobiles and other vehicles. In addition, the company offers chartering, ship management, and agency services.

- Hoegh Autoliners: Hoegh Autoliners is a shipping firm based in Norway that specialized in the transportation of autos and other rolling freight. The company maintains a fleet of automobile carriers that travel to and from India on a regular basis.
- Mitsui O.S.K. Lines: Mitsui O.S.K. Lines is a Japanese shipping firm that owns and runs a fleet of car carriers used to transport automobiles and other vehicles. In India, the corporation also offers additional shipping and logistical services.
- K-Line: K-Line is a Japanese shipping firm that owns and runs a fleet of car carriers that transport autos and other rolling freight. Regular services to and from India are provided by the corporation, as well as other shipping and logistical services.
- NYK Line, WWL, Eukor, and ACL are some of the other well-known shipping companies that operate automobile carriers in India.

3.3.1 Development of India's Car Carrier Fleet

Over the last few years, India has steadily expanded its car carrier fleet. The car carrier fleet is comprised of vessels that transport automobiles and other vehicles from one area to another, generally across international waterways. One of the primary drivers of this expansion has been the rising demand for automobiles in India, which has resulted in an increase in vehicle import and export. The government has also taken initiatives to foster the growth of India's automotive industry, which has increased demand for car carriers.

Several Indian shipping companies have invested in the acquisition and development of automobile carriers to accommodate this demand. Shipping Corporation of India, Great Eastern Shipping Company, and Hyundai Glovis India are among the prominent companies in this market.

The Indian government has taken initiatives to strengthen the infrastructure surrounding the country's ports in addition to growing the car carrier fleet. This includes the establishment of specialized car terminals as well as the deployment of specialist vehicle handling equipment.

3.3.2 India's Car Carrier Fleet Growth

Throughout the last few years, India's automobile carrier fleet has increased dramatically. According to industry forecasts, the number of automobile carriers in India has expanded from roughly 30 vessels in 2013 to more than 80 vessels by 2021. Its expansion can be ascribed to a variety of factors, including rising automobile demand in India, the expansion of the automotive sector, and the government's emphasis on upgrading the country's infrastructure and logistics capacities.

Maritime corporations in India, Great Eastern Shipping Company, and Hyundai Glovis India have been in the forefront of this expansion, investing in the acquisition and construction of new car carriers.

Furthermore, the Indian government has launched a number of programs to aid in the expansion of the vehicle carrier fleet. They include the construction of dedicated vehicle terminals at key ports, the installation of specialist handling equipment, and the enactment of regulations to stimulate investment in the sector.

Overall, India's vehicle carrier fleet is likely to expand in the next years, owing to the country's expanding economy and growing involvement in global trade.

3.4 Difficulties and Challenges in India's Car Carrier Industry

While India's vehicle carrier industry has grown rapidly in recent years, there are various issues and concerns that must be solved to assure the sector's long-term development. Among these difficulties are as follows:

- **Infrastructure:** One of the most significant issues confronting India's car carrier business is a lack of suitable infrastructure. Several of India's ports and terminals are ill-equipped to handle the increasing volume of automobiles imported and exported, causing delays and congestion.
- **Regulatory environment:** India's regulatory environment can be complex and unpredictable, making long-term planning and investment challenging for shipping

enterprises. This might lead to insecurity and discourage investment in the car carrier industry.

- **Competition:** With an expanding number of automobile carriers operating in India, market competition is heating up. This puts pressure on shipping companies to reduce their pricing, making it difficult for new players to enter the market.
- **Skilled labor:** The vehicle carrier sector necessitates specific skills and knowledge, such as vessel operations and logistics management. Recruiting and maintaining competent labor can be difficult for organizations in the area.
- **Concerns about the environment:** The automobile carrier sector is also being scrutinized for its environmental impact. Shipping businesses are being urged to minimize their carbon footprint and incorporate more sustainable procedures, which can be costly and difficult to execute.

Therefore, addressing these difficulties will be crucial for India's car carrier industry's long-term growth and development. To overcome these difficulties and ensure the sector's long-term viability, the government and industry players will need to collaborate.

3.4.1 The Proportion of Ro-Ro Shipping

In comparison to other key worldwide players in the business, India's share of Roro shipping is quite tiny. The transportation of wheeled cargo, such as cars, trucks, and trailers, aboard specialized vessels that allow for easy loading and unloading, is referred to as Roro shipping. According to industry figures, India only represents a minor percentage of the worldwide Roro shipping sector. In 2019, India's total Roro throughput was anticipated to be around 2.5 million metric tonnes, compared to the United States' over 30 million metric tonnes and Japan's over 20 million metric tonnes.

The Indian government, on the other hand, has recognized the potential of Roro shipping as a form of transportation for both internal and international trade and has taken steps to encourage its development. The government, for example, has initiated the "Sagarmala" program, which aims to modernize India's port infrastructure and improve connectivity between ports and hinterland regions. This program calls for the construction of Roro terminals at key ports as

well as the promotion of coastal shipping as a means of decreasing traffic congestion and pollution.

Furthermore, some Indian maritime corporations, like the Adani Group and Shreyas Shipping and Logistics Ltd, are investing in Roro vessels and infrastructure. Given the government's assistance and industry investment, India's share of Roro shipping is likely to grow in the coming years, albeit it may take some time to catch up to other big global players.

Some of the car manufacturers who are known to use Roro transportation include:

- Toyota: Toyota is one of the world's leading car manufacturers and is well-known for using Roro shipping to move its autos. The corporation has a dedicated auto carrier fleet that transports vehicles from its plants to markets worldwide.
- Hyundai: Hyundai is a large automaker that uses Roro transportation for its vehicles. To deliver its cars by water, the company has a collaboration with Glovis, a worldwide logistics company.
- BMW: BMW is a luxury automaker that also uses Roro transportation for its vehicles. The corporation has a dedicated car carrier fleet that transports its autos from its plants to markets worldwide.
- Ford: Ford is an American automobile manufacturer that ships its autos via Roro transportation. To deliver its vehicles by water, the company has cooperation with Wallenius Wilhelmsen Logistics, a multinational logistics organization.

The following are the top 10 Automobile manufacturers in India.

Maruti Suzuki India Pvt. Ltd, Hyundai Motor India Ltd, Tata Motors Limited, Mahindra and Mahindra Limited Honda Vehicles India Private Limited, Toyota Kirloskar Motor Pvt Ltd, Ford India Private Limited, Renault India Private Limited, Kia Motors India Private Limited, MG Motor India Private Limited.

These rankings should be noted because they are based on sales volume and market share in the Indian vehicle sector. These firms produce a variety of vehicles, including automobiles, commercial vehicles, and two-wheelers.

Table 3.2: India's Top Automobile Manufacturers.

Rank	OEM	Oct'22	Oct'21	Growth (%)
1	Maruti Suzuki	1,40,337	1,08,991	28.8
2	Hyundai	48,001	37,021	29.7
3	Tata	45,220	33,926	33.3
4	Mahindra	32,226	20,034	60.9
5	Kia	23,323	16,331	42.8
6	Toyota	13,143	12,440	5.7
7	Honda	9,543	8,108	17.7
8	Renault	7,778	8,910	-12.7
9	MG	4,367	2,863	52.5
10	Volkswagen	3,510	3,077	14.1

Source: Trading economics

3.4.2 Challenges that India Faced in Harmoniously Developing with the Demand for the Country's Car Exports.

Car carrier businesses in India have experienced numerous obstacles in keeping up with the country's car export demand. Some of the causes behind this are as follows:

- Because of Insufficient Infrastructure, India's ports and terminals have not kept up with the country's growing car exports. Congestion and delays in automobile shipment have resulted from a lack of enough infrastructure and equipment to handle the increasing volume of vehicles, which can have a negative influence on car carrier businesses' operations.
- Inconsistent Policies, the regulatory environment in India can be complex and unpredictable, causing automobile carrier businesses to be apprehensive. Policy and regulatory changes can disrupt the regular flow of car exports, resulting in operational inefficiencies and higher expenses for car carrier businesses.

- Cost Pressures in order to remain competitive, automobile carriers must decrease costs and increase operating efficiency. Unfortunately, transportation and logistics costs are considerable in India, making it difficult for car carrier companies to provide competitive pricing for their services.
- Concerns about the environment, The global push to reduce carbon emissions has put pressure on the transportation industry, especially the vehicle carrier sector, to adopt more sustainable methods. Yet, the expense of integrating environmentally friendly technologies and practices might be prohibitively expensive, posing difficulties for Indian automobile carrier companies.
- The growth of India's automobile export business may be constrained by trade restrictions including tariffs and non-tariff barriers, which may make it more difficult for India to export its cars to some regions.
- Indian automakers may find it challenging to sell their products to some areas due to regulatory difficulties such as import limitations and levies on imported vehicles
- Currency exchange rate fluctuations may affect how competitive Indian car exports are in international markets. A stronger Indian rupee can increase the cost of exports, while a weaker rupee might cut into exporters' profit margins.
- The success of the export of automobiles depends on effective logistics management. However, India has struggled to manage logistics because of the industry's fragmentation, a lack of cooperation among various stakeholders, and a lack of funding for technology and systems.

Overall, the obstacles confronting Indian car carrier companies in developing in tandem with the need for automobile exports are complicated and multidimensional. To address these challenges, the government, private sector, and other stakeholders will need to work together to invest in infrastructure, promote consistent policies, and implement sustainable practises in order to create a more conducive environment for the car carrier industry to grow and develop

CHAPTER IV

ANALYSIS OF GROWTH RATE AND PROSPECTS OF INDIA

4.1 Defining the Global Automotive Industry of India

The Indian automobile sector has gone a long way since the 1950s when yearly car manufacturing was limited to 40 thousand units. The three biggest manufacturers - Hindustan Motors, Premier Automobiles, and Standard Motors - dominated the early stages of production. In the early phases, most expertise in the automotive industry was gained by trial and error. Over the years, the country has grown to become an important player in the global automotive industry, ranking third in the Asia-Pacific region in 2021

Over the last few decades, India's automotive industry has grown rapidly, with the country emerging as a major player in the global automotive market. The industry has been a vital driver of the country's economic growth, employing millions of people and greatly contributing to the country's GDP. India produced a total of 22.93 million cars between April 2021 and March 2022, including passenger vehicles, commercial vehicles, three-wheelers, two-wheelers, and quadricycles. India has established itself as the world's largest tractor manufacturer, second-largest bus maker, and third-largest heavy vehicle manufacturer. Currently, the automobile industry accounts for 7.1% of India's GDP and 49% of its manufacturing GDP.

4.1.1 Global Automobile Production

The development of the automotive industry is one of the most important emblems of a country's industrialization. Previously, the global automotive industry was concentrated in developed countries such as North America, Western Europe, Japan, and South Korea. Korea prior to the globalization of manufacturing.

Global car production patterns changed dramatically during the process of international industry transfer. The output of the four traditional automobile-producing countries, the United States, Japan, Germany, and France

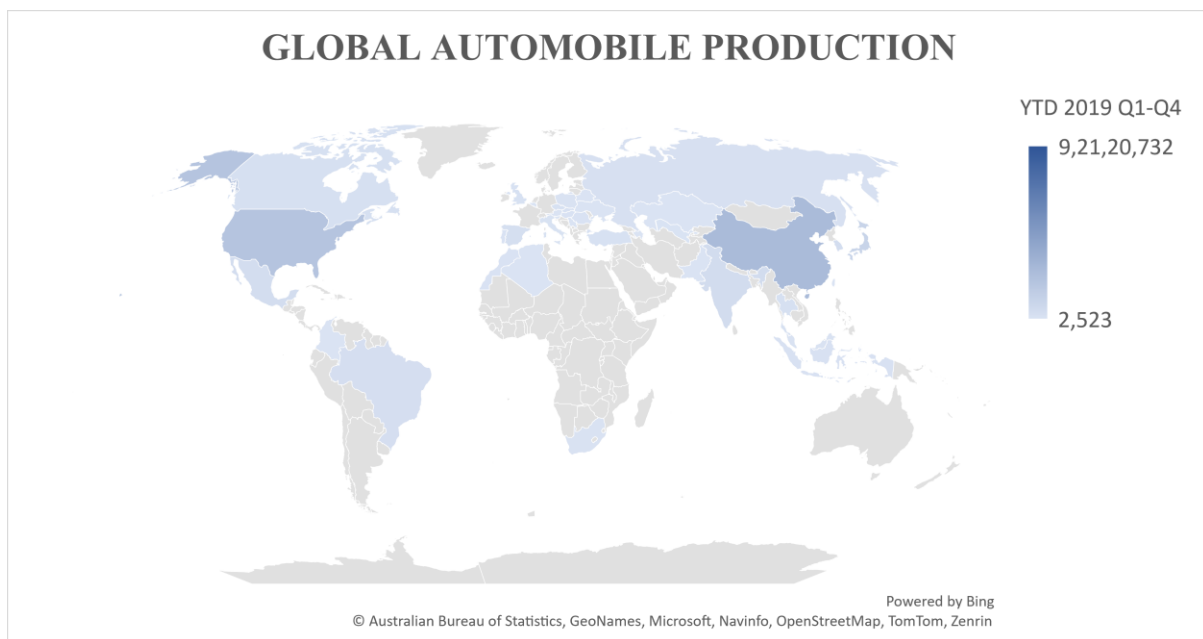


Figure 4.1 Global Automobile Production.

Source Australian Bureau of Statistics

4.1.2 Changes in Global Automobile Production Distribution

As the country's automotive industry expands, India's proportion of global automobile production has gradually increased in recent years. However, India's share remains small in comparison to other major auto-producing countries such as China, the United States, Japan, and Germany. Here are some changes in India's global automobile production distribution in recent years:

- According to the International Organization of Motor Vehicle Manufacturers (OICA), India's share in global automobile production was 3.7% in 2020, which was an increase from 3.3% in 2019.
- India's passenger vehicle production reached 3.6 million units in FY 2020-21, which was a decline of about 2.2% compared to the previous year due to the COVID-19 pandemic. However, the country's commercial vehicle production increased by about 8% during the same period.
- India is currently the fifth largest producer of commercial vehicles in the world, with a share of about 5% in global production, according to a report by the Society of Indian Automobile Manufacturers (SIAM).

- India's automobile exports have also been increasing in recent years, with a growth rate of about 17% in FY 2020-21. The country exported around 4.5 lakh passenger vehicles and 2.8 lakh commercial vehicles during the same period.
- The Indian government has set a target to increase the country's automobile production to 100 million units by 2025, which includes a focus on electric vehicles. The government has also announced several policy initiatives and incentives to promote the adoption of electric vehicles in the country. In the previous century, the car industry was a glamorous enterprise in industrialized nations. developed to developing countries, which fuel the rapid economic growth of the largest developing nations. From the end of the 20th century, when the per capita GDP of these countries steadily increased to 3,000 U.S. dollars and the capacity of consumption grew in accordance, the traditional auto manufacturing countries of the world actively started to shift their assembly lines to the emerging nation

Table 4.1 Major Global Automobile Production Car Carrier Countries

COUNTRY REGION	CARS	COMMERCIAL VEHICLES	TOTAL	% CHANGE
UKRAINE	1490	0	1490	-82%
SERBIA	4358	140	4498	-79%
SLOVENIA	68130	0	68130	-29%
FINLAND	73044	0	73044	-15%
KAZAKHSTAN	103345	9195	112540	22%
AUSTRIA	107500	0	107500	-21%
TAIWAN	191409	69854	261263	-2%
BELGIUM	232100	44454	276554	6%
POLAND	255100	228740	483840	10%
PORTUGAL	256018	66386	322404	11%
ARGENTINA	257505	279388	536893	24%
CANADA	289371	939364	1228735	10%
SOUTH AFRICA	309423	246466	555889	11%
UZBEKISTAN	328118	5451	333569	38%
MOROCCO	404742	60122	464864	15%
HUNGARY	441729	0	441729	6%
RUSSIA	448897	159563	608460	-61%
ITALY	473194	323200	796394	0%
ROMANIA	509465	0	509465	21%
THAILAND	594057	1289458	1883515	12%
MALAYSIA	650190	52085	702275	46%
MEXICO	658001	2851071	3509072	10%
UNITED KINGDOM	775014	101600	876614	-6%
TURKEY	810889	541759	1352648	6%
SLOVAKIA	1000000	0	1000000	-3%

Source: Oica.Statistics

- In the previous century, the car industry was a glamorous enterprise in industrialized nations. developed to developing countries, which fuel the rapid economic growth of the largest developing nations. From the end of the 20th century, when the per capita GDP of these countries steadily increased to 3,000 U.S. dollars and the capacity of consumption

grew in accordance, the traditional auto manufacturing countries of the world actively started to shift their assembly lines to emerging nations.

During the same time period, production in North America, Europe, Japan, and South Korea decreased from 82.56% to 52.90%. The BRICS automotive sector has a promising future thanks to the relocation of the global automotive industry and the industrialization of developing nations (OICA). Competition rapidly turned its attention to developing markets outside of the countries where the founding automakers were based in order to gain new market shares.

Since newly industrialized nations typically enjoy a cost advantage, Automobile businesses tended to invest and operate internationally rather than engage in direct trade in these regions due to the existence of trade obstacles. Transnational investment and manufacturing transfer have increased in scope and speed. The automotive industry's migration allowed car companies to reduce production costs by utilizing inexpensive local labor and resources, while also satisfying the demand of expanding markets. North America, Europe, Japan, South Korea, 52.90% of the BRICS, 37.18% of Southeast Asia, Africa, and Middle America...North America, Europe, Japan, South Korea, 82.56% of the BRICS, 12.88% of Southeast Asia, Africa, and Middle America...²⁷ for enhancing national output, taxation, and employment. Under circumstances of mutual benefit, the global automotive industry quickly migrated on a large scale.

4.1.3 Global Automobile Sales

Benefiting from the expansion of the world economy, particularly the quick recovery of the economy in developed nations and the US following the financial crisis, automobile consumption made great strides and counterbalanced the decline in sales in Europe, causing global automobile sales to reach a new high.

4.1.4 Changes in the Global Automobile Sales Distribution

- The rise of China has emerged as the world's largest automobile market in recent years, with over 28 million vehicles sold in 2021. This has resulted in a shift in the global sales distribution towards Asia, with China accounting for a significant portion of the sales.

- Europe has seen a decline in automobile sales in recent years, with sales falling from over 19 million vehicles in 2017 to around 18.4 million vehicles in 2021, according to the European Automobile Manufacturers Association (ACEA). This can be attributed to factors such as changing consumer preferences, economic uncertainty, and regulatory pressures.
- The growth of India, that India has emerged as one of the fastest-growing automobile markets in the world, with over 3 million vehicles sold in 2021, according to the Society of Indian Automobile Manufacturers (SIAM). This can be attributed to factors such as a growing middle class, rising disposable incomes, and favorable government policies.
- The COVID-19 pandemic had a significant impact on global automobile sales in 2020, with a decline of about 15% compared to the previous year, according to the International Energy Agency (IEA). The pandemic has disrupted supply chains, affected consumer demand, and led to changes in consumer preferences.
- There has been a growing shift towards electric vehicles (EVs) in recent years, with sales of EVs increasing significantly in many countries. This can be attributed to factors such as environmental concerns, government incentives, and improvements in technology.

4.1.5 Changes in the Global Automotive Industry

Global car group mergers and restructuring have traditionally accompanied the growth of the automotive sector worldwide. The Australia-Japan 35 global automotive industry has been forced to significantly speed up the pace of industrial restructuring as a result of the pervasive excess of global capacity for producing automobiles as well as the industry's need to meet ever-stricter standards for safety, emission control, and energy efficiency. In industrialized nations, several automakers increased their competitiveness through growth, mergers, and acquisitions. The traditional resource allocation, competition patterns, and organizational structure of the automobile sector were drastically altered by the globalization of the industrial chain and international large-scale restructuring.

Every nation cannot produce high-quality, high-tech advanced vehicles because the automotive industry is a capital-intensive, technology-intensive, personnel-intensive, comprehensive, and high economic benefit industry. The level of e-economy in a nation directly affects how the automotive industry develop The promotion of international auto shipping and trade is caused by the unequal distribution of the automotive sector worldwide.

4.2 Global Sea-Born Car Trade

The term "global seaborne car trade" describes the movement of automobiles by sea between nations. As many cars are produced in one nation and then exported to other nations, this is a significant aspect of the global automotive industry.

Data from the United Nations Conference on Trade and Development (UNCTAD) show that over time, the worldwide seaborne traffic in automobiles has continuously increased. A total of 23 million cars were transported by sea in 2019, an increase of 3.6% from the year before.

The United States, China, and Germany are the top importers of cars by sea, while Japan, Germany, and the United States are the top exporters. Significant contributions to the seaborne auto trade are also made by nations like South Korea, Mexico, and Canada. Numerous elements, such as prevailing economic trends, shifting consumer preferences, and governmental policies, have an impact on the global seaborne auto trade. For instance, the COVID-19 epidemic has hampered the seaborne automobile sector by generating delays in shipping and supply chains.

4.2.1 Volume of Global Sea-Born Car Trade

According to data from the United Nations Conference on Trade and Development (UNCTAD), the global seaborne car trade has experienced fluctuations in recent years. Here are some recent statistics on the volume of global seaborne car trade:

- In 2019, the total number of cars shipped by sea reached 23 million, representing a 3.6% increase from the previous year.
- However, in 2020, the COVID-19 pandemic disrupted the global seaborne car trade, causing a significant decline in the number of cars shipped. According to UNCTAD, the total number of cars shipped by sea fell to 19.4 million in 2020, representing a 15.2% decrease from the previous year.
- The largest exporters of cars by sea are Japan, Germany, and the United States, while the largest importers are the United States, China, and Germany.
- South Korea, Mexico, and Canada are also significant players in the global seaborne car trade.

- The seaborne car trade is expected to recover in the coming years as the global economy recovers from the COVID-19 pandemic. However, uncertainty remains due to factors such as ongoing supply chain disruptions and changes in consumer behaviour. In the past four years, the seaborne auto trade has contributed to about one-fourth of all global auto sales; prior to the financial crisis, the proportion was closer to 30%. The global financial crisis caused exports to be limited. It is clear how the worldwide seaborne auto trade has been impacted by the economic downturn.

4.2.2 Main Sea Born Car Trade Shipping Routes

The main seaborne car trade shipping routes depend on the origin and destination of the cars being transported. However, there are some key routes that are commonly used in the global seaborne car trade: They are as follows:

- Asia to North America: This route involves the shipment of cars from countries such as Japan, South Korea, and China to ports on the west coast of the United States and Canada.
- Europe to North America: This route involves the shipment of cars from European countries such as Germany, the United Kingdom, and Italy to ports on the east coast of the United States and Canada.
- Europe to Asia: This route involves the shipment of cars from European countries to ports in Asia, including China, Japan, and South Korea.
- South America to Europe and Asia: This route involves the shipment of cars from South American countries such as Brazil and Argentina to ports in Europe and Asia.
- Australia to Asia: This route involves the shipment of cars from Australia to ports in Asia, including Japan, South Korea, and China.

These are just some of the main seaborne car trade shipping routes. The actual routes used by shipping companies can vary depending on factors such as distance, cost, and transit time.

4.3 India's Pure Car Carrier Fleet

India's pure car carrier fleet refers to the number of ships that are specifically designed to transport cars, trucks, and other vehicles by sea. According to data from the Directorate General of Shipping in India, as of March 2021, India had a total of 45 pure car carrier vessels in its fleet.

These ships are primarily used to transport vehicles from India to other countries, such as the United States, the United Kingdom, and Germany, as well as to import vehicles into India from other countries. India's pure car carrier fleet plays a significant role in the global seaborne car trade, helping to transport millions of vehicles around the world each year.

It's worth noting that the number of pure car carrier vessels in India's fleet can change over time as companies add or retire ships based on demand and other factors. Additionally, some shipping companies may operate car carriers that are not based in India but still transport vehicles to and from the country.

4.3.1 PCC Fleet Impacted by The Financial Crisis

The global financial crisis of 2008 had a significant impact on the pure car carrier (PCC) fleet, which transports vehicles by sea. The crisis led to a sharp drop in demand for cars and other vehicles, causing a ripple effect throughout the automotive supply chain, including the shipping industry. The impact on the PCC fleet was felt around the world, including in India.

During the financial crisis, many shipping companies that operated PCC vessels faced financial difficulties due to the decreased demand for car transportation. This led to a reduction in the number of ships in operation and also led to a decrease in freight rates, as shipping companies competed for the limited demand. As a result, many shipping companies had to sell off their vessels or scrap them in order to stay afloat.

The impact of the financial crisis on India's PCC fleet was significant, with many companies in the country facing financial difficulties due to the global downturn. This led to a reduction in the number of PCC vessels in India's fleet, as shipping companies had to cut costs and sell off their assets in order to stay afloat. However, the Indian government and shipping industry have taken steps to recover from the impact of the financial crisis and improve the country's PCC fleet, including through infrastructure investments and modernization efforts.

4.3.2 PCC Fleet and its Growth in India

Pure Car Carriers are specialized ships made for moving automobiles and other vehicles. The expansion of the car sector and the rising demand for effective vehicle transportation in India have been driving up demand for PCCs over the past few years. India is a significant producer and exporter of cars, and PCCs are essential in getting these automobiles to markets all over the world. Recent years have witnessed a major increase in PCC traffic at important ports like Mumbai, Chennai, and Kandla, with numerous shipping lines providing regular PCC services to and from these ports. The Indian government has also launched a number of programs to help the establishment of the PCC infrastructure and encourage the expansion of the car sector. For example, the government's "Make in India" program seeks to enhance exports and domestic manufacturing, both of which are likely to raise demand for PCCs.

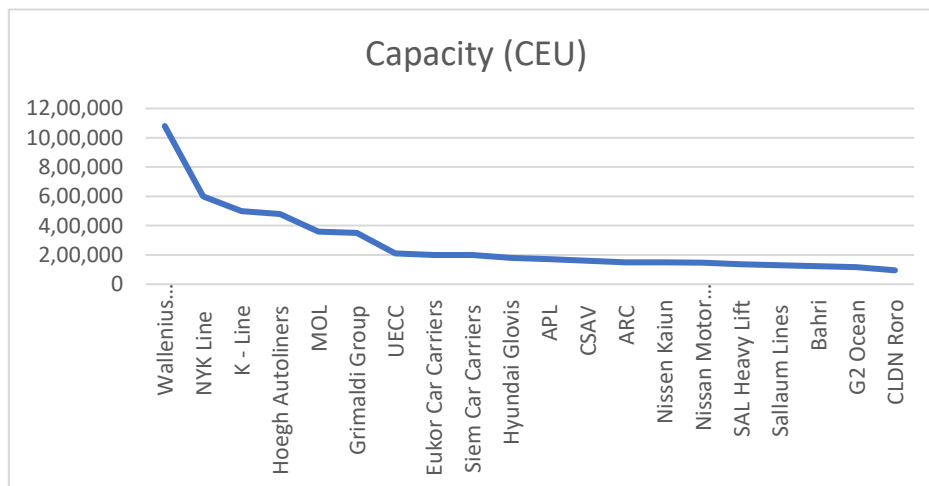


Figure: 4.2 Top 20 PCC owned Fleet and their Capacity till 2021

Source: Statista.com

Overall, it is anticipated that India's PCC sector would increase over the next few years thanks to the nation's expanding vehicle industry and growing emphasis on its logistics and transportation infrastructure.

4.3.3 Major Car Carrier Operators

Companies that specialize in moving cars from one place to another are known as car carrier operators in India. They often carry several cars at once from manufacturing facilities to dealerships or from dealerships to clients using specialized trucks and equipment. These companies offer a variety of services, such as pick-up and delivery, loading and unloading, and

safe car transportation. Additionally, they could provide value-added services like insurance, documentation, and car inspection. In India, car carrier companies are crucial to the automotive sector since they assist automakers and dealerships with the efficient and economical transportation of huge quantities of vehicles. To meet the needs of their customers, they must maintain a high level of customer service while adhering to all applicable laws, rules, and safety standards.

A number of significant vehicle carrier operators operate in India as a result of the country's expanding automobile export industry. Several of India's largest car-transport companies include:

- NYK Line India Pvt.Ltd
- Mitsui O.S.K. Lines (MOL) India Pvt. Ltd
- K-Line India Pvt.Ltd
- Hoegh Autoliners India Pvt.Ltd
- Wallenius Wilhelmsen Ocean India Pvt.Ltd
- Eukor Car Carriers India Pvt.Ltd
- GAC Shipping (India) Pvt.Ltd
- Autolink Logistics India Pvt.Ltd
- World Logistics Service (India) Pvt.Ltd
- NMT Shipping India Pvt.Ltd

These companies provide export and import car transportation services, and some of them also offer value-added services like customs clearance and warehousing. In India's domestic market, there are a number of additional local and regional vehicle carrier companies.

4.3.4 PCC Market Structure

There are three ways for car carrier operators to participate in the car carrier market, that is owners and operators):

- Major Operators:

Large car carriers operating control the majority of PCC capacity, either themselves or via subsidiary companies by owning or chartering vessels. The operators include the top three Japanese carriers NYK, MOL, and K- Line, along with other operators such as Wallenius

Wilhelmsen Logistics (jointly owned by Wallenius Lines and Wilh. Wilhelmsen), Eukor, Hyundai Glovis, Hoegh Autoliners and Grimaldi

➤ Smaller Operators

Abou Merhi and Sallaum Lines are two examples of minor operating firms that provide some car carrier services on emerging trades with considerably lower volumes than the main operators. These include services related to the developing trade in used vehicles from Europe to North Africa and transatlantic trade.

➤ Charter Owners

The owners hire out vessels through time charter agreements rather than running their PCC vessels themselves. Cido Shipping, Ray Shipping, and Zodiac Maritime Agency are significant charter owners.

4.4 Cooperation mode between major Global manufacturers and Car Carrier companies in India

Major global automobile manufacturers and car carrier companies cooperate with India through various modes. Some of the common modes of cooperation include are as follows.

- To develop vehicles for the domestic and international markets, major automakers from around the world have partnered with Indian automakers. For instance, Suzuki Motor Corporation and Maruti Suzuki India Ltd. have a strategic alliance to develop and export automobiles from India.
- With Indian auto exporters and manufacturers, vehicle carrier businesses have signed shipping agreements to transport automobiles to a number of international locations. These agreements guarantee the timely and dependable delivery of automobiles to diverse markets.
- In 2021, the Japanese car carrier operator Mitsui O.S.K. Lines (MOL) announced plans to invest in a new car terminal at the Port of Pipavav in Gujarat, India. This is just one example

of how some international automakers and car carriers have contributed to the development of infrastructure in India.

- To enhance their manufacturing procedures and product quality, certain international automakers have given some knowledge and technology to Indian automakers. This has made it easier for Indian automakers to compete on the world market and build vehicles that meet international requirements.
- The development of the auto export business has been facilitated by collaboration between the Indian government and major international automakers and carriers. This entails collaborating with governmental organizations to enhance logistics, trade obstacles, and infrastructure.

So it concludes by saying India's vehicle export business has grown and become more competitive on the international market because to the forms of cooperation between major worldwide automakers and car shipping corporations with India.

4.5 Containerised Car Transportation

Containerized car transportation has developed quickly in recent years with the container fleet growing to be the most important transportation mode and it seems that container vessels can transport various kinds of goods. The large-scale container vessels, worldwide container lines, and improved car packing technology in containers make it attractive for car transportation. Vehicles are loaded into normal shipping containers, which are typically 20 to 40 feet in length, for land or sea transportation. This method of shipping vehicles is known as containerized car transportation. A number of factors have contributed to the growing popularity of containerized car transportation in India.

4.5.1 Advantages of Container Vessels in Car Shipping

- Container transportation can increase turnover and reduce or even achieve zero inventories for automobile manufacturers. This model is fit for small-volume transportation from the factory to the objective market frequently according to the production.

- Container transportation can release the least logistics time. The finished vehicles do not need to be stocked in the yard in large volume waiting for carriers. When the time comes for build to order (BTO) of customers, just in time logistics is very important to improve customer satisfaction
- Container vessels have more liners, schedules and higher density than PCCs do.
- Door-to-door service is possible with container shipping, and there is no danger of touching the trucks during that time.
- The quality of transportation has significantly improved, along with the technology for putting vehicles into containers.
- The capacity of container ships is highly redundant, which results in very low freight. The container lines are therefore eager to capture the many and dependable consumers of vehicle manufacturers in order to make money.

4.5.2 Advantages of PCCs in Car Shipping in India

- Cars are secured and protected during transit because PCCs are made primarily to transport cars. As a result, it is less probable that while being transported, your car will get damaged or scratched.
- Compared to other automobile transportation strategies like employing a container or a roll-on/roll-off (Roro) vessel, PCCs are more economical. This is so that more vehicles may be transported at once and more space can be used more effectively. PCCs were designed specifically to move cars.
- PCCs frequently travel more quickly than other modes of transport like the road or the rail. This is so that delays brought on by traffic, blockages, or other transit difficulties are avoided since PCCs can sail directly to their destination.
- This is due to the fact that PCCs can sail directly to their destination, avoiding delays brought on by traffic, construction, or other transportation-related problems.

- Small hatchbacks to premium vehicles and SUVs may all be transported with PCCs. This makes PCCs a viable alternative for delivering cars in India because they can accept a variety of vehicle sizes and forms.

4.6 SWOT Analysis

Based on the above description and analysis of global and India's Automotive industry, car trade, and PCC fleet, the strengths and weaknesses that the car carrier industry possesses and opportunities and challenges the car carrier industry is confronting will be analyzed to present the advantages and disadvantages for development of India's Car Carrier industry panoramically.

4.6.1 Strength

- India has a large and growing automobile industry that provides strong demand for car carrier services and the country has a large coastline with several major ports, providing easy access to key international markets, the government has also initiated several policies and programs to improve logistics and transportation infrastructure, which could create opportunities for the car carrier industry. The country has a large and skilled workforce, providing the necessary labor for the development of a car carrier industry

4.6.1.1 India has a large and growing automobile industry, providing a strong demand for car carrier services.

One of the world's largest and fastest-growing auto markets is in India. Millions of people have jobs thanks to the industry, which makes a considerable economic contribution to the nation. By 2025, the Society of Indian Automobile Manufacturers (SIAM) predicts that India's automotive sector would overtake China as the third-largest in the world.

The rise of the automobile industry in India is being driven by the country's rising demand for personal vehicles. This is due to a rising middle class with higher disposable incomes, increased urbanization, and a growing preference for personal transportation. The International Energy Agency (IEA) predicts that the number of cars per 1,000 inhabitants in India would increase from 27 in 2017 to 80 in 2040.

India's expanding auto sector has increased demand for car carrier services to move autos from factories to dealerships and customers all over the nation. The requirement for exporting cars to other nations has an additional positive impact on this demand. By offering a dependable and effective means of transportation for vehicles, the car carrier business plays a crucial role in supporting the growth and expansion of the automotive industry.

4.6.1.2 The country has a large coastline with several major ports, providing easy access to key international markets.

India is a significant nautical nation due to its extensive 7,500-kilometer coastline and numerous ports. The nation is strategically located for trade and commerce thanks to its numerous large ports, which are well connected to important global markets. Jawaharlal Nehru Port Trust, Mumbai Port Trust, Kandla Port Trust, Chennai Port Trust, and Kolkata Port Trust are only a few of India's important ports. Direct access to numerous international markets, including Southeast Asia, Europe, and the Middle East, is made available via these ports.

The auto carrier sector can effectively transport vehicles to important international markets by utilizing India's enormous port infrastructure. The time and expense associated with shipping cars to foreign markets can be decreased by having the car carrier vessels dock at these ports and load or unload vehicles.

The Sagarmala project, which aims to strengthen the nation's coastal and interior waterways infrastructure, is one of many projects the Indian government has launched to upgrade the nation's port infrastructure. These measures have resulted in the construction of new ports and the expansion of existing ones, thus enhancing India's ports' connectivity to important global markets.

4.6.1.3 The government has initiated several policies and programs to improve logistics and transportation infrastructure, which could create opportunities for the car carrier industry.

The government of India has launched a number of projects to develop the nation's logistics and transportation infrastructure, which may present prospects for the car carrier sector. These programmes seek to improve the efficiency and competitiveness of the transportation sector while addressing the problems it is currently facing. Some of the key policies include:

- The National Automobile Policy, which was introduced by the government, intends to develop an internationally competitive Indian automobile industry. The strategy outlines actions to improve the logistics and transportation network for the car sector, such as the creation of specialised freight routes, logistics parks, and the application of technology to logistics management.
- In order to encourage industrialization driven by ports and boost the effectiveness of the nation's logistics, the Sagarmala project aims to strengthen India's coastal and inland waterway infrastructure. The project calls for the building of multimodal logistics parks and transport hubs, as well as the development of new ports and the upgrading of current ports.
- A national program for developing highways, the Bharatmala project intends to increase the country's road connectivity and lower transportation costs. The project involves building new highways as well as enlarging and updating existing ones.
- The Goods and Services Tax (GST) has streamlined the tax code and cut down on the time and expense associated with transporting goods across state lines. This has improved transportation and reduced costs, which is good for the automobile carrier sector.

4.6.1.4 The country has a large and skilled workforce, providing the necessary labor for the development of a car carrier industry.

India, which has a population of over 1.3 billion, has a sizable and varied labor force. With a median age of 27 years, the labor force in the nation is also very youthful, which offers a substantial advantage in terms of labor availability and productivity. India also has a long history of technical education, and it produces a lot of highly qualified personnel across a variety of industries. The ship crew, maintenance staff, loading and unloading workers, as well as administrative and managerial staff, are all needed in the car carrier sector. The growth of the car carrier sector can be supported by the skilled labor force that is present in India.

Additionally, the Indian government has put in place a number of programs to help its workforce enhance its abilities, such as the Skill India Mission, which intends to train over 400 million people in a variety of skills by 2022. The program offers individuals vocational training to improve their employability and skill sets, resulting in a workforce that is more productive and skilled. In order to lower labor costs and boost productivity, investors look for nations with

a sizable and skilled labor pool, which can also attract international investment in the car carrier sector.

4.6.2 Weaknesses.

- The industry needs substantial capital investment, which could be challenging to secure given the intense rivalry and regulatory constraints and for car carrier operators, the lack of standardized vehicle size in India may present logistical difficulties. The infrastructure of the nation is frequently insufficient, with weak road and rail connectivity to many ports, which may impede the development of the car carrier business. The infrastructure of the nation is frequently insufficient, with weak road and rail connectivity to many ports, which may impede the development of the car carrier business.

4.6.2.1 The industry needs substantial capital investment, which could be challenging to secure given the intense rivalry and regulatory constraints.

The industry of automobile carriers necessitates significant capital expenditures for the purpose of acquiring vessels, establishing infrastructure, and maintaining machinery. To remain competitive and provide customers with high-quality services, this investment is required. However, given the fierce competition and legal restrictions in the industry, getting the necessary capital investment might be difficult. However, there are a number of ways the sector can obtain the required capital investment:

- In order to split the cost of operations, including vessel acquisition, maintenance, and infrastructure development, carriers can work with other industry participants. This partnership may contribute to cost-cutting and improved productivity.
- To promote investment in the sector, the government may offer assistance in the form of tax breaks, financial aid, or other rewards. The government can also make it easier for people to get funding through P3s or other types of financing.
- Players in the market who have greater financial means can invest abroad, giving them access to the necessary capital investment. Additionally, new technology and experience from foreign investors can raise the competitiveness of the sector.

Greater financial resources allow market participants to invest abroad, giving them access to the required capital investment. Additionally, the sector may become more competitive thanks to new technology and experience from international investors.

4.6.2.2 For car carrier operators, the lack of standardized vehicle size in India may present logistical difficulties.

For car carrier operators, India's lack of standardised vehicle sizes can cause serious logistical challenges. It can be difficult to move autos effectively in India because different auto manufacturers' vehicles don't all have the same size.

To efficiently load and unload cars, car carrier operators need standardised vehicles. This helps them streamline their processes and cut expenses. It might be challenging to load and move automobiles in a uniform manner in India because each manufacturer makes them in a variety of sizes. There may be delays, inefficiencies, and increased expenses as a result of this lack of standardisation. Furthermore, it can be difficult to design and construct car carriers that can hold a variety of automobiles due to the lack of standardized vehicle sizes. Carriers must be built to accommodate a variety of vehicle sizes and shapes, which can add to their complexity and expense.

But measures are being taken to deal with this problem. To encourage standardization in the production of automobiles, including dimensions and other standards, the government developed the Automotive Industry Standards (AIS). All Indian automakers are required to follow the AIS norms, which contribute to some degree of standardization in the sizes of the manufactured automobiles.

Additionally, in order to handle automobiles of various sizes, some car carrier operators have begun to invest in specialized equipment such as movable ramps and hydraulic lifts. They can load and unload cars more quickly thanks to this equipment, which cuts down on delays and boosts overall operational effectiveness.

4.6.2.3 The infrastructure of the nation is frequently insufficient, with weak road and rail connectivity to many ports, which may impede the development of the car carrier business.

The infrastructure of the nation is a critical factor in the development of the car carrier business in India. Unfortunately, the infrastructure is frequently insufficient, with weak road and rail connectivity to many ports, which may impede the development of the car carrier business. Vehicle transportation requires effective connectivity between various forms of transportation, including road, rail, and sea travel.

However, many of the roads and railroads in India that lead to the ports are in disrepair, which causes delays, damages to vehicles, and raises the cost of transportation. Furthermore, inadequate infrastructure may cause traffic jams, which would further slow down vehicle movement.

Additionally, the lack of capacity at ports brought on by inadequate infrastructure might make it challenging for car carrier companies to carry vehicles effectively. Because ports have a limited capacity, delays in loading and unloading vehicles can lower the overall efficiency of the car carrier industry. But measures are being taken to deal with this problem. The creation of additional motorways, train lines, and port expansion are only a few of the initiatives the government has started to strengthen the transportation infrastructure. These programs seek to increase the efficiency of the transportation system overall, lower the cost of transportation, and increase the connection between various forms of transportation

4.6.2.4 The infrastructure of the nation is frequently insufficient, with weak road and rail connectivity to many ports, which may impede the development of the car carrier business.

Every industry, including the automobile carrier sector in India, is dependent on the infrastructure of a country to grow. Unfortunately, India's infrastructure is sometimes lacking, and there is poor rail and road connectivity to many ports, which could limit the growth of the car carrier industry. In addition, inadequate infrastructure may result in port capacity issues that make it challenging for car carrier operators to carry vehicles effectively. Due to delays in vehicle loading and unloading caused by ports' limited capacity, the car carrier industry as a whole operates less efficiently.

To strengthen the nation's transport system, the Indian government has undertaken a number of initiatives. These programmes involve building new motorways, connecting rail lines, and expanding ports. These initiatives seek to increase the efficiency of the transportation system as a whole, cut expenses associated with transportation, and increase connection between various forms of transportation.

4.6.3 Opportunities

India's increasing automotive sector and rising customer demand for personal vehicles are driving up demand for car carrier services in the nation and for vehicle carrier operators, the use of technology and digital solutions may help to simplify operations and lower costs. A greater emphasis on electric and hybrid vehicles may open up new business opportunities for India's car carrier industry

4.6.3.1 India's increasing automotive sector and rising customer demand for personal vehicles are driving up demand for car carrier services in the nation.

India's auto industry has expanded quickly in recent years due to the country's expanding demand for personal vehicles. Customers want to transfer their cars throughout the nation effectively and safely, which has led to an increase in demand for car carrier services in India. The burgeoning middle class in India, which has been expanding rapidly in recent years, is one of the primary factors for this increased demand for personal vehicles. Indians are eager to own their own automobiles in greater numbers because of rising disposable incomes, which is driving up demand for car carrier services.

Furthermore, as part of its "Make in India" campaign, which aims to increase manufacturing in the nation, the Indian government has been encouraging the automobile industry. This has increased the production of vehicles and resulted in the construction of several new manufacturing facilities, which has raised the demand for car carrier services. These reasons would likely lead to an increase in demand for car carrier services in India over the ensuing years. Car carrier businesses in the nation can take advantage of this huge development potential by providing consumers with effective, affordable, and dependable transportation services.

4.6.3.2 For vehicle carrier operators, the use of technology and digital solutions may help to simplify operations and lower costs.

For vehicle carrier operators in India, utilizing technology and digital solutions has the potential to completely transform the game. Operators can streamline their processes, increase productivity, and cut costs by utilizing technology. Fleet management is one of the most important fields where technology may be applied. Operators may track the whereabouts and

motion of each vehicle in real time by putting GPS tracking devices in each of their vehicles. This can assist operators in route optimization, fuel efficiency, and delivery time improvement. Technology can also be utilized to schedule pick-ups, and deliveries, and to manage the complete network of vehicle carriers. This is possible because to a centralized software platform that gives operators the ability to oversee every aspect of their business from a single dashboard. This can increase efficiency and accuracy by lowering the amount of paperwork and manual labour required to manage a network of vehicle carriers.

4.6.3.3 A greater emphasis on electric and hybrid vehicles may open up new business opportunities for India's car carrier industry.

The country's car carrier business has a chance as a result of India's growing emphasis on electric and hybrid vehicles. The demand for transportation services to get these vehicles from manufacturing facilities to dealerships and customers is projected to rise as more and more consumers transition to electric and hybrid vehicles. It is also anticipated that transportation needs for electric and hybrid vehicles will differ from those for conventional gasoline-powered vehicles. Electric vehicles, for instance, would need specialized equipment for charging or might need to be transported in a way that prevents the battery from being discharged while in motion. Due to the specific requirements of electric and hybrid vehicles, there may be a need for specialized car carrier services.

In addition, the Indian government has announced a number of efforts, such as tax breaks and subsidies, to encourage the use of electric vehicles. These initiatives are probably going to increase the country's demand for electric cars, which will open up chances for the car carrier business. Additionally, there will probably be additional charging stations and battery-swapping facilities across the nation as electric vehicles become popular. This will necessitate the transportation of batteries, charging equipment, and other parts, opening up new business potential for the vehicle carrier sector.

4.6.4 Threats

- The car carrier industry is highly competitive, with several well-established players already operating in the market. The viability of the vehicle carrier sector in India may be impacted by external variables like shifts in fuel costs or the state of the world economy. The growth of the automobile carrier industry may encounter obstacles due to a lack of cooperation

between various public bodies and the private sector and the demand for car carrier services could be impacted by security threats and worries about theft or damage to vehicles while in transit.



4.6.4.1 The car carrier industry is highly competitive, with several well-established players already operating in the market.

India's vehicle carrier business is quite competitive, with a number of well-known players currently present. These companies have a substantial market share and established connections with dealerships, automakers, and other supply chain participants. In addition to already established businesses, prospective competitors must also contend with onerous regulatory requirements like those pertaining to licensing, safety, and environmental norms. For new operators, it may be challenging to enter the market and establish a footing due to these entry hurdles.

Car carrier operators need to be able to adjust to shifting market conditions and client needs as the automotive industry continues to change due to the advent of electric and hybrid automobiles as well as shifting consumer preferences. Long-term success is probably more likely for operators who can keep ahead of the curve and provide cutting-edge solutions to suit changing demands. With well-established businesses and strong regulatory restrictions, the car carrier sector in India is extremely competitive. Operators need to concentrate on efficiency, cost-effectiveness, customer service, and technology while also being able to adjust to shifting market conditions and client needs in order to compete in this sector.

4.6.4.2 The viability of the vehicle carrier sector in India may be impacted by external variables like shifts in fuel costs or the state of the world economy.

The sustainability of the vehicle carrier industry in India is reliant on a number of external factors, such as changes in the price of fuel or the health of the global economy. Like other industries, the vehicle carrier sector is subject to economic cycles, which can affect service demand and cost. For instance, customer demand for new cars may decline during a recession or economic slowdown, which will result in a decline in the need for vehicle carrier services.

Another important external factor that can affect the viability of the truck carrier sector is fuel prices. Given the extensive distances and high volume of vehicles involved in their operations,

fluctuations in gasoline prices can have a major influence on operational expenses for vehicle carrier companies. Numerous variables, such as the price of oil on the world market, geopolitical unrest, and environmental restrictions, can have an impact on fuel prices.

4.6.4.3 The growth of the automobile carrier industry may encounter obstacles due to a lack of cooperation between various public bodies and the private sector.

Due to a lack of coordination between various public entities and the private sector, the growth of the automotive carrier industry in India may face challenges. The Ministry of Road Transport and Highways, the Ministry of Shipping, and several state-level organizations in charge of managing the nation's ports and roads are just a few of the government organizations in charge of managing India's transport infrastructure. It may be difficult for private sector players in the automobile carrier sector to negotiate rules and obtain the required infrastructure due to the fragmentation of the regulatory landscape. Additionally, a lack of cooperation between various public authorities might result in infrastructure development delays and inefficiencies, which will impede the expansion of the motor carrier sector. For instance, a mismatch between the necessary infrastructure and the actual infrastructure available for automotive carrier operations may result from a lack of cooperation between the many government entities in charge of managing the road and port infrastructure.

In addition, there hasn't been much private sector involvement in infrastructure development; instead, government organizations handle the majority of infrastructure projects. Lack of private sector involvement may lead to a lack of innovation, accountability, and transparency in infrastructure construction, which would further impede the expansion of the automobile carrier industry.

The SWOT analysis concludes that there are opportunities and difficulties for the growth of the car carrier business in India. Although the nation's expanding automobile industry and extensive coastline offer a solid platform for expansion, the sector faces intense competition and regulatory obstacles that could make it challenging to gain traction. New entrants will need to concentrate on leveraging technology, forging solid alliances, and establishing a reputation for dependable and effective service if they want to compete in this industry.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion.

It is clear from the analysis that there are several elements that must be taken into account in relation to the Car carrier Industry and automotive industry. With the right approach and investment, India has the potential to become a leading player in the car carrier industry. According to the research's findings, the following conclusion is drawn.

- With the increasing demand for automobiles and the government's initiatives to boost manufacturing and exports in the sector, there is a growing need for efficient and cost-effective transportation solutions for cars.
- Roro vessels have been used successfully for vehicle transportation in other nations, and India's extensive coastline and ports make it easier to put this model into practice but the absence of specialized infrastructure, skilled labor, and an industry-specific regulatory framework are a few issues that must be resolved.
- The country's car carrier industry has a chance as a result of India's growing emphasis on electric and hybrid vehicles. It is also anticipated that transportation needs for electric and hybrid vehicles will differ from those for conventional gasoline-powered vehicles.
- India's automobile industry has grown significantly, becoming among the largest in the world. Several elements, including beneficial government policies, competent labor, and rising consumer demand, are responsible for the industry's development, Automotive industry also has the potential to contribute significantly to India's economic growth by generating employment opportunities and increasing exports.

The use of Roro vessels can be very important in accomplishing the development of a car carrier business in India, which has a lot of potentials. India may become a dominant force in the global car carrier market with the correct investments, infrastructure, and regulatory framework, fostering the expansion of the automotive industry and advancing the nation's overall economic development.

5.2 Recommendations

The development of the car carrier industry in India requires a collaborative effort between the government and the private sector. By implementing the below recommendations, India can overcome the challenges and realize the potential of the car carrier industry to drive economic growth and contribute to the country's overall development. Based on the analysis of India's prospects for developing a car carrier industry, the following recommendations are proposed.

- It is advised that the public and commercial sectors work together to create training programmes to develop skilled labour because the car carrier industry requires specialised skills and expertise. To provide the workforce with useful skills, these training programmes can be created in partnership with technical institutes and industry specialists.
- The growth of specialised infrastructure, including ports, berthing areas, and repair yards, can boost the productivity and efficiency of India's car carrier sector. Partnering with actors in the private sector or offering incentives to entice private investment are two ways to do this.
- The regulatory framework for the car carrier industry needs to be streamlined to enable ease of doing business and promote investments. The government should simplify regulations, reduce bureaucratic processes, and create a transparent and predictable environment for investors.
- To evaluate the potential for Roro boats in India, define the critical elements that must be taken into account for the industry's effective implementation, and calculate the industry's expenses and benefits, a thorough feasibility study should be carried out.
- India should explore opportunities to collaborate with other countries that have established car carrier industries to learn from best practices and experiences. This can help in developing India's car carrier industry and enhancing its competitiveness.

BIBLIOGRAPHY

Dawar, V. (n.d.). Determinants Of Share Prices In Indian Auto Industry. *International Journal of Computing and Business Research*.

Humphrey, J. (n.d.). The global automotive industry value chain: What Prospects for Upgrading by Developing Countries.

Jayender, P., & Kundu, G. K. (2021). Intelligent ERP for SCM agility and graph theory technique for adaptation in the automotive industry in India. *International Journal of Systems Assurance Engineering and Management*, 1–22. <https://doi.org/10.1007/S13198-021-01361-Y/METRICS>

Jothi, K., & Kalaivani, M. P. (2015). A Study on Financial Performance of Honda and Toyota Automobile Company a Comparative Analysis. *JPRSS) Journal of Progressive Research in Social Sciences*. www.scitecresearch.com

Kaur, N., & Kaur, J. (n.d.). Determinants of profitability of automobile industry in india. <http://www.publishingindia.com>

Kumar Yadav, S., & Sahay, M. (n.d.). A Study on Automobile Industry Growth in India and Its Impact on Air Pollution.

Lokhande, M. A., & Rana, V. S. (2013). Marketing Strategies of Indian Automobile Companies: A Case Study of Maruti Suzuki India Limited. *MKTG: Marketing Strategy & Planning (Topic)*. <https://doi.org/10.2139/SSRN.2719399>

Mathivathanan, D., Kannan, D., & Haq, A. N. (2018). Sustainable supply chain management practices in Indian automotive industry: A multi-stakeholder view. *Resources, Conservation and Recycling*, 128, 284–305. <https://doi.org/10.1016/j.resconrec.2017.01.003>

Olabi, A. G., Wilberforce, T., & Abdelkareem, M. A. (2021). Fuel cell application in the automotive industry and future perspective. *Energy*, 214, 118955. <https://doi.org/10.1016/J.Energy.2020.118955>

Pandey, A., Vidyapeeth, B., & Saini, P. (2020). A Study On An Automobile Revolution And Future Of Electric Cars In India. Article ID: IJM_11_03_012 *International Journal of Management(IJM)*,11(3),107–113.

<http://www.iaeme.com/IJM/index.asp107http://www.iaeme.com/ijm/issues.asp?JType=IJM&VType=11&IType=3JournalImpactFactor>

Ranawat, M., & Tiwari, R. (2009). Technology and Innovation Management Influence of Government Policies on Industry Development: The Case of India's Automotive Industry Influence of Government Policies on Industry Development: The Case of India's Automotive Industry. <http://ssrn.com/abstract=1583449www.globalinnovation.netElectroniccopyavailableat:https://ssrn.com/abstract=1583449Electroniccopyavailableat:http://ssrn.com/abstract=1583449>

Sharma, N. (2011). Financial Analysis Of Indian Automobile Industry. *International Journal of Research in Computer Application & Management*.

Shende, V. (2014). Analysis of Research in Consumer Behavior of Automobile Passenger Car Customer. *International Journal of Scientific and Research Publications*, 4(2). www.ijsrp.org

Shinde, G. P., & Dubey, M. (n.d.). 1 Associate Professor, IMSR, Bhartiya Vidyapeeth. In *Mumbai Asian Journal of Technology & Management Research* (Vol. 01).

Windyandari, A., Sasono, E. J., Said, S. D., & Zakki, A. F. (2022). Ultimate Strength Analysis of Roro Passenger Ship under Combined Global and Local Load Using Nonlinear Finite Element Method. *Trends in Sciences*, 19(9). <https://doi.org/10.48048/TIS.2022.3968>

Websites

[The Indian automotive industry: From resilience to resurgence? | McKinsey](#)

[Know About India's First Indigenously Manufactured Car - \(entrepreneurdossier.com\)](#)

[The future of the automobile industry in India | McKinsey](#)

[Automobile Industry, Indian Automobile Companies - IBEF](#)

[Around the World With 5,500 Cars - The New York Times \(nytimes.com\)](#)

[The future of the automobile industry in India | McKinsey](#)

[What are Ro-Ro Ships? \(marineinsight.com\)](#)

[Automotive industry in India - statistics & facts | Statista](#)

[History of Automobile Industry in India - Vehicle Mentor](#)

[Automotive industry in India - statistics & facts | Statista](#)

[Vehicle carriers – Risk from Lithium Ion \(Li-ion\) battery electric vehicles \(EVs\) - Standard Club \(standard-club.com\)](#)

[Top 10 Car Exporters FY2021 - Hyundai, Maruti, Ford, Kia, Nissan, VW \(rushlane.com\)](#)

[India Exports of Vehicles - 2022 Data - 2023 Forecast - 1996-2021 Historical - Chart \(tradingeconomics.com\)](#)

[Car Carrier Market Share, Size, Trends, Forecast 2023 | 2032](#)

[7 Trends Shaping the Future of the Automotive Industry \(relaycars.com\)](#)