INSTITUTO SUPERIOR DE ENGENHARIA DO PORTO
MESTRADO EM ENGENHARIA MECÂNICA




MARKET STUDY ABOUT INDIAN SEA LOGISTICS AND ANALYSIS OF SEA SOLUTIONS BETWEEN THE COUNTRIES OF INDIA AND PORTUGAL

KALYANASUNDARAM IYYAPPAN
Outubro de 2017

POLITÉCNICO
DO PORTO

Instituto Superior de Engenharia do Porto

MARKET STUDY ABOUT INDIAN SEA LOGISTICS AND ANALYSIS OF SEA SOLUTIONS BETWEEN THE COUNTRIES OF INDIA AND PORTUGAL

Kalyanasundaram Iyyappan

2017

ISEP – School of Engineering
Masters in Mechanical engineering

POLITÉCNICO
DO PORTO

POLITÉCNICO
DO PORTO

Instituto Superior de Engenharia do Porto

MARKET STUDY ABOUT INDIAN SEA LOGISTICS AND ANALYSIS OF SEA SOLUTIONS BETWEEN THE COUNTRIES OF INDIA AND PORTUGAL

Kalyanasundaram Iyyappan

1150227

Dissertation presented to ISEP – School of Engineering to fulfill the requirements necessary to obtain a Master's degree in Mechanical Engineering, carried out under the guidance of Maria Teresa Ribeiro Pereira

2017
ISEP – School of Engineering
Masters in Mechanical Engineering

POLITÉCNICO
DO PORTO

POLITÉCNICO
DO PORTO

JURY

President
Francisco José Gomes da Silva, Professor Adjunto, Departamento de Engenharia Mecânica, Instituto Superior Engenharia do Porto

Supervisor
Maria Teresa Ribeiro Pereira, Professor Adjunto, Departamento de Engenharia Mecânica, Instituto Superior de Engenharia do Porto.

Second supervisor
Isabel Azeredo, General Manager, "K" Line (Portugal) S.A.

Examiner
Delfina Gabriela Garrido Ramos, Professor Adjunto, Escola Superior de Tecnologia do Instituto Politécnico do Cavado e do Ave

ACKNOWLEDGEMENTS

I would first like to thank my thesis advisor Maria Teresa Ribeiro Pereira at Instituto Superior de Engenharia do Porto. The door to her office was always open whenever I ran into a trouble spot or had a question about my research or writing. She consistently allowed this paper to be my own work, but steered me in the right direction whenever she thought I needed it.

I would also like to thank Isabel Azeredo, the General Manager at K Line Portugal for her constant support, suggestions and engagement through the learning process and formation of this dissertation.

I would like to acknowledge Mr. Franciso J.G. Silva the Co Ordinator of Mechanical Engineering at Isep for his ideas and guidance in allowing me to choose this title for my master dissertation.

Finally, I must express my very profound gratitude to my parents for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

KEYWORDS

Shipping, transportation, import, export, port, container, sea routes

ABSTRACT

This dissertation highlights the market research and internatonal trade of goods of India. It highlights the major import export goods traded by this country. India is an emerging country in this field and the statistics prove that international trade is flourishing and is expected to reach the peak in the coming years. Many Indian major ports are upgrading to handle this cargo traffic and deal with the trade relations. This dissertation mainly covers the import – export data relations of India with Portugal. The major goods exchanged between both the countries is explained. This also covers India's major shipping companies which cover parts of Europe. Different sea routes between India and Portugal are analyzed and an effective sea solution is provided. Different sources have been used for the formation of this dissertation such as statistical data from sources such as Government, research papers and K Line company's information. Data in international trade for the previous years is available and a collective information is presented in the form of graphs. As the trade in India is increasing, it becomes a good opportunity for K Line to operate a dedicated line between India and Portugal by following a transhipment route. Although Kline performed already an Asian-Europe line, with the following current transhipment ports of Rotterdam, London gateway, Singapore and Colombo. Regarding the market study of Indian sea logistics, trade between India and almost major European countries is increasing and the forecasts predicts that it will reach the maximum in the following years. Considering the possibility of K-line decided to operate between both countries, few suggestions in perspective of this view is proposed.

PALAVRAS CHAVE

Transporte marítmo, importar, exportar, contentores, rotas marítimas

RESUMO

Nesta dissertação destaca-se a pesquisa de mercado e o comércio internacional de bens da Índia. Destaca-se os principais bens de exportação de importação negociados por este país. A Índia é um país emergente neste campo e as estatísticas demonstram que o comércio internacional está a crescer e espera atingir o pico nos próximos anos. Muitos dos portos principais estão a atualizar-se para lidar com o tráfego de carga e lidar com as relações comerciais da Índia. Esta dissertação abrange principalmente as relações de dados de importação e exportação da Índia com Portugal. São explicados os principais bens trocados entre os dois países. Isso também cobre as principais companhias de navegação da Índia que cobrem partes da Europa. Diferentes rotas marítimas entre a Índia e Portugal são analisadas e uma solução eficaz do mar é fornecida. Foram utilizadas diferentes fontes para a realização desta dissertação, tais como dados estatísticos de fontes governamentais, documentos de pesquisa, e dados da empresa K Line. Os dados disponíveis de comércio internacional para os últimos anos foram tratados e apresentados, sendo a informação conjunta apresentada sob a forma de gráficos. A Índia apresenta crescimento nas trocas comerciais com a europa, face ao volume expectável, há uma boa oportunidade para a K Line operar uma linha da India para a Europe e proporcionar servico frequente entre estes países. Em relação ao estudo de Mercado da logística do mar indiano, o comércio entre a India e os princiapis paises importadores e exportadores apresenta um aumento continuado e as previsões prevéem que alcance o máximo para a capacidade instalada nos anos seguintes. A K-line tem uma linha que opera a Àsia. Os atuais portos de transporte transbordo de Kline incluem Roterdam, London gateway, Cingapura e Colombo para esta rota. Em relação ao estudo de mercado da logística do mar indiano, o comércio entre a Índia e quase todos os principais países europeus parceiros está aumentando e as previsões prevêem que ele alcance o máximo nos anos seguintes, dai o potencial da criação de uma linha Portugal e a India, e algumas sugestões em perspectiva dessa visão são propostas.

LIST OF SYMBOLS AND ABBREVIATIONS

List of abbreviations

Term	Designation
AI	All Inclusive
BAF	Bunker adjust factor applied by shipping lines to reflect fluctuations
CAF	Currency Adjustment Factor
CR	Container Rate
TEU	Twenty Foot Equivalent unit of measurement equivalent to one 20 foot shipping container
GT	Gross Tonnage
FEU	Forty Foot Equivalent
NT	Net Tonnage
PC	Per Container
THC	Terminal Handling Charge also known as container yard charge which is payable to a shipping line either for receiving a full container loads at the container terminal, and delivering it to the ship at the load port
Transit Time	Time for goods to be carried from one place to another
POL	Petroleum, Oil & Lubricants
FY	Fiscal Year
FDI	Foreign Direct Investment

List of units

Term	Designation
KT	Kilo Ton or Metric Ton = 1000 Kilograms or 2204.6 pounds

FIGURES INDEX

FIGURE 1 – MARKET FUNDAMENTALS FOR CONTAINER SHIPPING 27
FIGURE 2 - INDIA'S ECONOMIC GROWTH FORECAST 28
FIGURE 3 - OPERATING REVENUES OF K LINE 30
FIGURE 4 - TYPES OF DATA 38
FIGURE 5 - STEPS INVOLVED IN MARKET RESEARCH 39
FIGURE 6 - TRANSPORT OF BULK AND GENERAL CARGO 47
FIGURE 7 -INTERNATIONAL MARITIME PASSAGES 47
FIGURE 8 - PROCESS FOR SELECTION OF MONITORING DEVICES 51
FIGURE 9 - MAJOR PORTS OF INDIA 55
FIGURE 10 - TONNAGE AT MAJOR INDIAN PORTS 56
FIGURE 11 - TEU VOLUMES AT LARGEST INDIAN PORTS 56
FIGURE 12 - CARGO TRAFFIC AT MAJOR PORTS 57
FIGURE 13 - CARGO TRAFFIC HANDLED AT MAJOR PORTS 58
FIGURE 14 - CARGO TRAFFIC AT NON-MAJOR PORTS 59
FIGURE 15 - CARGO TRAFFIC HANDLED BY MAJOR AND NON MAJOR PORTS OF INDIA 61
FIGURE 16 - PERCENTAGE SHARE OF PORTS 62
FIGURE 17 - TRAFFIC HANDLED AT MAJOR PORTS 62
FIGURE 18 - EU-INDIA TRADE IN GOODS 70
FIGURE 19 - EU-INDIA TRADE IN SERVICES 71
FIGURE 20 - EU-INDIA FOREIGN DIRECT INVESTMENT 71
FIGURE 21 - EUROPEAN TRADE FLOWS AND BALANCES 72
FIGURE 22 - INDIA EXPORT AND IMPORT WITH PORTUGAL 75
FIGURE 23 - INDIA'S EXPORTS TO PORTUGAL 76
FIGURE 24 - INDIA IMPORTS FROM PORTUGAL 77
FIGURE 25 - K LINE ROUTE FROM LISBON TO CHENNAI 84

TABLES INDEX

TABLE 1 - CARGO TRAFFIC HANDLED BY MAJOR AND NON MAJOR PORTS OF INDIA (2001-2002 TO 2016-2017 UPTO SEPTEMBER 2016) 60
TABLE 2 - INDIA SERVICE TRADE DATA 67
TABLE 3 - TRADE EXCHANGE BETWEEN INDIA AND PORTUGAL 74
TABLE 4 - INDIAN EXPORT AND IMPORTS WITH PORTUGAL 75
TABLE 5 - SWOT ANALYSIS OF INDIA'S TRADE 78
TABLE 6 - CHIEF SHIPPING ROUTES OF THE WORLD 82

INDEX

1 INTRODUCTION 27

1.1 Scope 27

1.2 Objectives 27

1.3 Methodology 28

1.4 Company History synthesis 29

1.5 Dissertation Organisation 30

2 BIBLIOGRAPHIC WORK 35

2.1 Market Research Definitions 35

2.2 Qualitative and Quantitative market research 35

2.2.1 Qualitative research 35
2.2.2 Quantitative Research 36
2.2.3 Market Research Methods 36
2.2.4 Why do we do Market Research 36
2.2.5 Successful Market Research 37
2.2.6 The Importance of Market Research 38
2.2.7 Market Research Challenges 38
2.2.8 Steps for market research 39

2.3 Port Regulation 40

2.3.1 Port Regulation in Europe 41
2.3.2 Port Regulations in India 43

2.4 The importance of shipping 44

2.4.1 Freight market 45
2.4.2 Concept of Parcel Size Distribution 46
2.4.3 International Maritime Passages 47

2.5 Containers in shipping industry 50

3 INDIAN SHIPPING INDUSTRY AND MAJOR PORTS 54

3.1 Major Shipping Industries 54

3.2 Indian Ports 55

3.3 Port Traffic 62

3.4 Road Ahead for Indian Ports 63

3.5 Market study Of Indian Sea Logistics 64

3.5.1 Indian Exports 65

3.5.2 Indian Imports 65

3.5.3 India's top 10 International Trade Data 67

3.6 India's Trade Relation with Europe 69

3.7 Portugal trade with India 73

3.7.1 India Exports to Portugal 76

3.7.2 India's Import From Portugal 76

3.8 SWOT Analysis Of Indian Import Export 78

3.8.1 Strengths 78

3.8.2 Weakness 79

3.8.3 Opportunities 79

3.8.4 Threats 80

3.9 Sea Routes Between India and Portugal 81

3.9.1 Direct Vs Transhipment Services 81

3.9.2 Sea Routes between Portugal to India 82

3.9.3 Advantages and disadvantages of Direct & Trans-shipment 84

3.10 Highlights of K Line concerning Portugal and India trade 85

4 CONCLUSIONS AND PROPOSALS OF FUTURE WORKS 89

4.1 CONCLUSIONS 89

4.1.1 Market study of India 89

4.1.2 Effective sea route between Portugal and India 89

4.2 Proposals of Future Works 90

5 REFERENCES AND OTHER SOURCES OF INFORMATION 95

5.1 Websites 95

5.2 Research papers 95

6 ANNEXES 103

6.1 Cargo traffic handled by major and non-major ports of India 103

6.2 Cargo handled at major ports 105

6.3 Exports & Imports Trade data 111

6.4 India's top 10 imports for 2016-2017 112

6.5 India's top 10 exports for 2016-2017 113

6.6 India's trade with major countries 114

6.7 Top 10 major export companies of India 115

6.8 Key Figure's of India's trade relation with Europe 116

6.9 Total goods: EU trade flows and balance 117

6.10 Goods exported from India to Portugal 118

6.11 Goods Imported to India from Portugal 124

6.12 Sea Route from Leixoes to Indian Ports 134

6.13 Sea Routes from Lisbon to Indian Ports 138

6.14 Sea Routes from Sines to Indian Ports 141

INTRODUCTION

1.1 Scope

1.2 Objectives

1.3 Methodology

1.4 Company History synthesis

1.5 Dissertation Organisation

1 INTRODUCTION

1.1 Scope

The shipping industry is one of the oldest industries and in today's present day plays a major role in the modern society. Today, over 55000 cargo ships (International Chamber of Shipping, 2017) are active in the international trade. The shipping industry is the foundation for global commerce, transporting about 60 percent (World Shipping Council) of world trade in a cost effective and reliable manner. Often international exports are most transported by sea. The necessity for shipping bigger volumes of cargo with less time is of major demand and most attracted in the globalised economy, which has led to the construction of mega vessels which can carry huge amounts of goods at once.

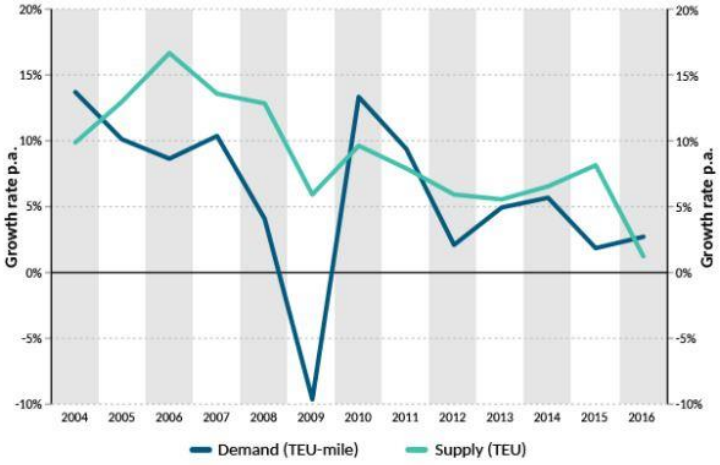

Figure 1 – Market fundamentals for container shipping

Source: Bimco, Clarksons- Container shipping report 2017

It can be observed from the above graph that, the demand for container shipping grew by around 2.7% in 2016 from a negative value of -10% during the period of 2009 and the peak of around 13% in 2010. The supply for containers however did not attain a negative value as there is constant trade of goods. The highest supply was during the period of 2006 with a value of 17% but it was only 2% during 2016. With the rising demand for global trade in these days, service providers should make use of this opportunity and increase their revenues.

1.2 Objectives

The main aim of this thesis is to understand the market of India consisting of Import and Export of goods to the global market. India is a country of increasing international trade and trade relations with different countries is strengthening. This paper describes the list of goods traded by different countries and trade relation with Portugal is given a

major importance of study. Secondly, existing sea routes between the two countries is analyzed and an effective sea solution is provided in terms of less cost and less duration.

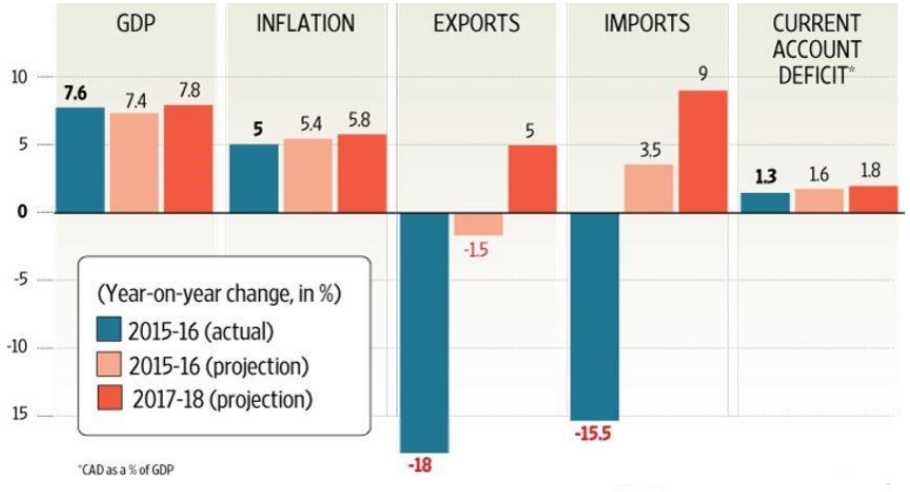

Figure 2 - India's Economic Growth Forecast

Source: Asian Development Outlook, 2016

As per the report from the Asian Development Outlook, India's trade deficit was 1.3% in actual for the period of 2015-2016 against 1.6% which was projected for the same period, however it says that it will stand at 1.8% for the period of 2017-2018 which is a projected value. According to this data, India will stay much ahead in imports for 2017-2018 with a value of 9% against -15.5% for 2015-2016 which is the actual value. Concerning exports sector, the value will rise from -18% to 5% from 2015-2016 to 2017-2018 respectively. The projected value for the same is -1.5% during 2015-2016.
There will be a slight variation in the Gross Domestic Product from 2015-2016 to 2017-2018 ranging from 7.6% to 7.8% respectively but the projected value for the period of 2015-2016 was 7.4%. This data clearly proves that the import export is increasing in India.

1.3 Methodology

The main aim of this dissertation is to understand deeply the market trend of Indian global trade and to analyse an effective sea route between the countries of India and Portugal. To achieve this, several datas on the international trade has been acquired from the Government of India, Ministry of Chamber and Commerce. Information has also been obtained from the company – K Line on the goods they deal with India. Research papers on the trend in global trade is studied and presented in the bibliographic section. Datas for the past years is sourced from third party sources and Government official websites and graphical representations are made. For the effective

routings, datas are taken from the company's offical website and the pricing for the same is obtained through mail from the respective departments of the service provider.

1.4 Company History synthesis

Kawasaki Kisen Kaisha, Ltd. Also referred to as "K" Line, is one of the largest Japanese transportation companies which owns and controls large cargo ships, including dry cargo ships (bulk carriers), container ships, container terminals, liquefied natural gas carriers, ro-ro ships and tankers.

It is the sixteenth largest container transportation and shipping company in the world. "K" Line (Europe) Ltd is the European subsidiary of global Japanese Shipping and logistics company, Kawasaki Kishen Kaisha, Ltd, known as "K" Line. Headquartered in London, UK, "K" Line (Europe) Ltd is responsible for all business activities in Europe, the Mediterranean and North Africa.

With a network of owned offices and well established agents across the region, "K" Line (Europe) Ltd is committed to providing safe, cost effective and environmentallu friendly shipping services for all types of cargo.

As an integrated logistics company grown from shipping business, the "K" Line Group contributes to society so that people live well and prosperously. The aim includes becoming an important infrastructure for global society, and to be the best partner with customers by providing the high-quality logistics services based on customer first policy. The company recognizes the following to respond to business environmental change.

- Maximize strengths to ensure competitiveness
- Transform business portfolio to reduce influence from market volatility
- Achieve growth by technological and business model innovation

The company's operating revenues consolidated during the Fiscal year 2016, was ¥1030.2 billion and the company suffered a loss of ¥52.4 billion due to historical fall in the containership and dry bulk carriers as well as in the difficult conditions of the car carrier market. In the containership segment, the market conditions reached the lowest point at the beginning of 2016 which caused the earnings to deteriorate by ¥38 millions. The total number of vessels in operation (consolidated) was 575 during the same year & the number of employees working was 8097 people. The "K" Line group promotes proactive initiatives as a group of companies to contribute to the realization of a better society by working to resolve issues in each of the areas that it has identified as a material such as building a management structure that emphasizes social responsibility which include methods and steps that improve corporate value by consistently implementing initiatives for the realization of its corporate principles and vision. It manages the impact of business activities in a way such that it promotes business.

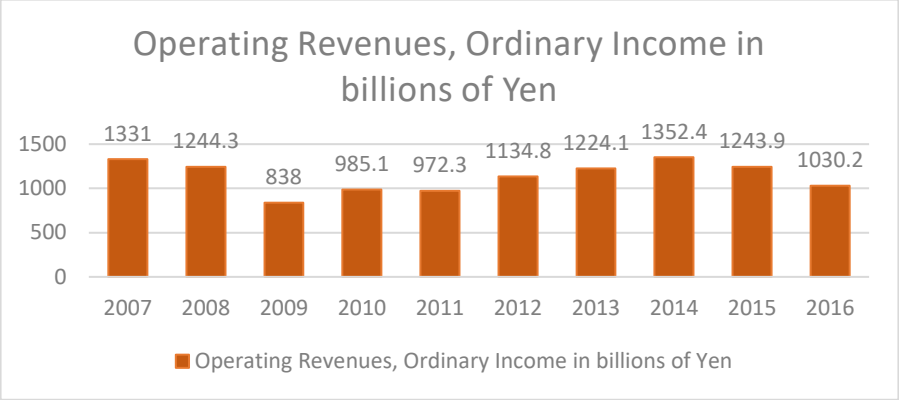

Figure 3 - Operating Revenues Of K Line

1.5 Dissertation Organisation

Regarding the presentation of this dissertation, it is been divided into six parts namely:

Chapter 1 presents the Introduction, scope of this thesis, the different methedologies used in the formation of the practical work such as data acquisition from the company, Government sources and other research papers which enables to compare the results and use it for comparison between different countries and the total trade done between them. This section also includes the company history synthesis, their formation and nature of business which is currently operated.

Chapter 2 involves the bibliographic work in which history of the international trade is discussed, formation of ports and the regulations imposed on it by respective Government. This section also discusses the history of sea route between India and Portugal. Supply chain management for containers is presented and a technology which enables it to monitoring is also presented.

Chapter 3 is the major framework on the practical section which explains the shipping companies of India which ship to Europe, major Indian ports and the cargo traffic and port traffic handled by them and a summary in the form of Porters Five force Analysis is presented. In the next section, a market study of Indian sea logistics which is the major topic of this dissertation is presented. Import Export data is summarised and major trade between India and Portugal is given a major importance. India's major trade relations such as top 10 international trade data, top 10 imports and exports for the period of 2016-2017 and India's major export companies is discussed. A SWOT analysis for the Indian Export Import is summarised. In the last section of this chapter, sea routes between India and Portugal is presented and comparison between direct and trans-shipment is given.

Chapter 4 gives the conclusions of the market study of India and an effective sea route between Portugal and India is discussed. Market study of India is deeply discussed

between India and Portugal and a conclusion for the future is summarised and for the analysis of sea route an effective sea solution is provided. Also, suggestions for future work is presented.

Chapter 5 presents the references from which information and datas for the bibliographic work and practical work is taken. Different sources include research papers, websites and third party sources from which information is sourced.

Chapter 6 is the annexure part which summarises the data for the practical section of chapter 3, and a detailed review of the data is presented in this section.

BIBLIOGRAPHIC WORK

2.1 Market Research Definitions

2.2 Qualitative and Quantitative market research

- 2.2.1 Qualitative research
- 2.2.2 Quantitative Research
- 2.2.3 Market Research Methods
- 2.2.4 Why do we do Market Research
- 2.2.5 Successful Market Research
- 2.2.6 The Importance of Market Research
- 2.2.7 Market Research Challenges
- 2.2.8 Steps for market research

2.3 Port Regulation

- 2.3.1 Port Regulation in Europe
- 2.3.2 Port Regulations in India

2.4 The importance of shipping

- 2.4.1 Freight market
- 2.4.2 Concept of Parcel Size Distribution
- 2.4.3 International Maritime Passages

2.5 Containers in shipping industry

2 BIBLIOGRAPHIC WORK

2.1 Market Research Definitions

Market research can be defined as the process of gathering, analyzing and interpreting information about a market, about a product or service to be offered, needs of business's target market, and the particular competitors in competition. (Gupta & Benedett, 2007). This research provides data which will help in solving market challenges that business will likely face and this is considered as an integral part of the business planning process. Strategies such as market segmentation which includes identification of specific groups within a market and product differentiation such as creation of identity for a product or service that seperates it from the competitors cannot be developed without market research (Nevo, 2001). The process of assessing the feasibility of a new product or service includes techniques such as surveys, product testing and focus groups.

The area of market research allows a company or organization to discover the target market and competitors and the requirements and thoughts of consumers about the particular product and service before it becomes available to the public (Van Den & Joshi, 2007). This may be conducted either by the company or by a third-party company or organisation that specialises in market research. The market of market research is to acquire and the process of primary and secondary data information about customers attitude and behavior and the product demand (McDonald, 2002). The purpose of market research proposed by Van & Fok,(2009) is as follows: understanding of markets, identify changes in the market, improve market awareness, understand customer needs, reduce the risk and uncertainity, anticipate and forecast market trends and provide a strong basis for marketing decisions.

2.2 Qualitative and Quantitative market research

The difference between the primary and secondary research is the different sources of available market information which include the qualitative or quantitative methods.

2.2.1 Qualitative research

This research means 'quality' and does not include 'quality.' Qualitative research methods includes talking to a relatively few people in the target audience of interest. The purpose of qualitative research is to understand the depths and range of buying attitudes, project or forecast quantity. (Barabba & Zaltman, 1991). Popular qualitative market research includes focus group studies, interviews and observational techniques such as ethnography and popular in marketing research, photo-ethnography (Creswell, 2003). This refers to "market survey" method because it offers a way to measure the

market in terms of depth and range of buying perceptions and needs rather than quantity. The quality and validity of market surveys is judged by the design, interviewing surveys of the moderator or principal interviewer, and the interpretation of results by the market research consultant or analyst.

The Qualitative research is based on opinions, attitudes, beliefs, and intentions. This type of research deals with questions such as “Why”? “Would?”, or “How?”. Qualitative research aims to understand why customers approach in a certain way or how they respond to a new product or service. Given that these opinions are often obtained from small numbers of people or groups, the findings are not necessarily statistically valid. However, these data can highlight potential issues which can be explored in quantitative research. The common methods in this research include focus groups and interviews to collect the data. The data obtained may prove revealing and useful, but can prove costly and time- consuming to collect, particularly for a start-up or small business (Creswell, 2003).

2.2.2 Quantitative Research

This research method aims to gauge quantity. With the use of sampling strategies, quantitative market research methods seek to project results of a quantitative market survey to the marketplace. Popular quantitative market survey methods include online surveys, personal quantitative interviews, mail surveys, and telephonic surveys. “Hybrid” research refers to the combination of marketing research survey tools.(Bush.et.al, 2006). Normally, this is research based on larger samples for more statistically valid methods. Quantitative research is related with data and questions such as “how many?”, “how often”, “who?”, “when”? and “where?”.

2.2.3 Market Research Methods

There are two types of collecting data, primary data and secondary data. Secondary data are those which were previously collected for some other research purposes. This type of data is easily accessible, inexpensive, quickly obtainable and is used for the collection of primary data, for example, a population census. Hence, the examination of secondary data is a pre-requisite to the collection of primary data. However, due to the fact that secondary data was collected for some other purpose, their usefulness to the problem at hand may be limited. Primary data may be qualitative or quantitative in nature (Jarowski.et.al, 2000).

2.2.4 Why do we do Market Research

Market Research is important for every business, and cannot be a one-off activity. Successful businesses conduct research on a continual basis to keep pace with the market trends and to maintain a competitive edge. Regardless of whether starting or

expanding the business, market research is important in understanding the target market and increasing sales (Blind.et.al, 2009). Several issues need to highlight before a market research to be implemented. The issues are as follows:

- **Identify potential customers**
  This is the stage to identify who is going to use the product/service? How old are they? Are they male or female? Are they married, single or divorced? Do they have children? Where do they live? What is their level of education? (Barabba & Zaltman, 1991)

- **Understanding the existing customers**
  Why do customers choose this product or service over competitors? What do they value? Is it service, product quality or the prestige associated with consumption of the product/service? Who influences the buying decision? What sources do they refer?

- **Set Realistic targets**
  From information collected, realistic targets can be set for areas such as growth, sales and the introduction of new products or services.

- **Identify Business opportunities**
  The research data can identify new business opportunities and can open area in the un-serviced or under-serviced market. This can help to identify changing market trends in areas such as population shifts, increasing levels of education or leisure time which can help to bring new opportunities(Barabba & Gerald, 1991).

2.2.5 Successful Market Research

The market research helps to understand the market, customers, competitors and industry trends. High quality research reveals details such as current customers and will help target new customers (Balmer, 2001). For example, to operate organic produce market, it is important to find out if there is a demand for food grown without pesticides and whether customers can afford or willing to pay more. Market research involves two types of data which are shown in the figure below:

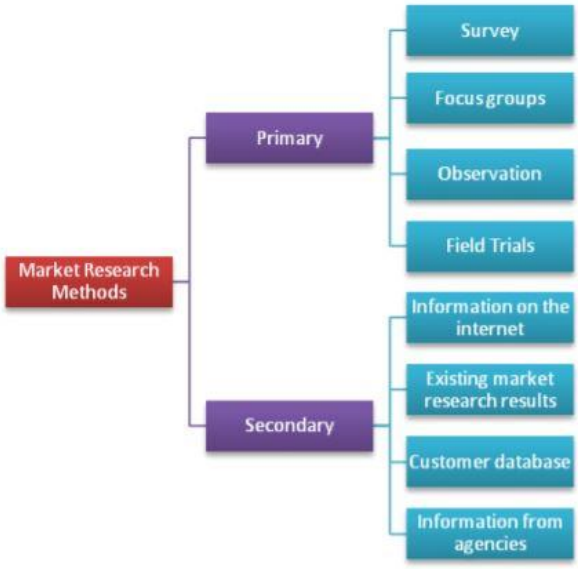

Figure 4 - Types of Data

Source : Balmer, 2001

2.2.6 The Importance of Market Research

Market Research focuses your marketing strategy on potential customers that want your product or service. Small and local businesses may find researching their market easier than large, nationwide businesses because the customer base is smaller. Timely information reduces business risks and helps sales and operation opportunities. An important phase is present where it is important to identify current challenges and potential problems in the current market, and a proper plan and strategy needs to be developed. This phase will help to understand the market, customers, competitors, and industry trends. The High-quality research will reveal details about the present customers and this will help the new operator to target the new customers.

2.2.7 Market Research Challenges

There are several challenges in conducting market research which is sourced from Dekeba & Alemayehu in 2003 which involves the following:

- Objectives unclear, leading to conflicting or unrealistic expectations. This often is due to imprecise or many goals.
- Consumer cannot easily express how they feel
- Sometimes data providers are not strategic advisors.
- Sample has quality issues are participants are not sufficiently qualified or authenticated or does not pay adequate attention or required sample size is not fulfilled.

- Instrument is poorly designed. Long, complicated questionnaire design confuses participants with awkward question sequences and poor answer options.
- Data analysis is conducted with more attention to techniques than results and either of the choices of analytics is poor or is misaligned with client needs.
- Poor matching of methodology and customer needs with the incorrect usage of qualitative or quantitative methods.
- Schedules slip significantly and the research is completed too late to support the intended decisions.
- Internal clients are unable to apply the research as originally intended; "action-ability" of research.
- Programming for online or telephone data collection is done hastily and questionnaire logic is not enforced or not approved by the client. The entire question is missing or answers are not properly presented.
- Research reports may contain shocking errors.
- Client-agency relationship is unproductive or strained which causes miscommunication and conflicts.

2.2.8 Steps for market research

The below diagram describes the appropriate steps for market research based on Creswell & John (2003).

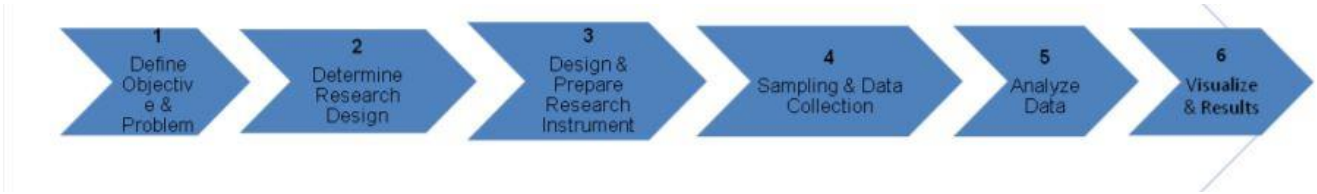

Figure 5 - Steps involved in market research

- **Define the objective & Problem**
  This is the most important step in the market research process which defines the goals of the project. The core of this step is to understand the root question that needs to be informed by market research. There is typically a key business problem or an opportunity that needs to be acted upon and there is a lack of information to make the decision comfortable and the job of a market researcher is to inform that decision with solid data. (Bakery & Thamer, 2006).

- **Determine Research Design**
  The second step is the objective of research and this involves type of research and duration to collect primary data. Proper research design need to be plan and this invloves survey, focus groups and other variables.

- **Design & Prepare Research Instrument**
  This step of market research process involves the use of appropriate research tool.

- **Data Collection**
  This is the important dimension step that wil invlove administering the research questions, and observations through the data collection and by recording questionnaires.

- **Analyze Data**
  The step that comes after the data has been collected is to analyze and this process may invlove the statistical tools cush as SPSS, SEM or Rasch technique.

- **Visualize Data and Communicate Results**
  The result of the finding will help an individual or industry to identify the possible solution to overcome any shortcoming before the product or service is introduced.

2.3 Port Regulation

The importance of logistics and trade infrastructure cannot be underestimated in the perspective of structural changes. Countries with reformed port management and with heavy investment in trade infrastrucutre, opened the logistics market to foreign investors to help gain a profitable global trade. China is a great example in which manufacturing growth and foreign direct investments went in par with large scale transport infrastructure investments, followed by Singapore, Korea, Japan and Taiwan. Upgrading of the logistics perfomance of a country cannot be reduced just to investment in physical infratsructure and the application of Information and communication technologies but also to regulatory and procedural issues regarding to to the areas in global shipping and international trade and the management of ports and related infrastructure. According to World Bank(2010), those countries with the logistics perfomance in a best manner experience 1 per cent growth in GDP and 2 per cent in trade as a result. Low income countries are exepmted due to the lack of financial methods to invest in infrastructure and regulatory procedures, but policies such as liberalized logistics services and port/terminal management and improved customs procedures can help in the difference. The factor which plays a major role is the commodities shipped. Large bulk volumes such as ore or crude oil which are being shipped on a point-to-point basis are much more dependent on global shifts in demand and price fluctuations, but containers specialised in merchandise (e.g. electronics components) is far more sensitive to reliability in delivery. However in some cases, maintanence of relatively high inventory costs to incur costs of rapid and reliable transportation is more economic.

With the active introduction of private participation, a need for the regulation in the provision of some services requires attention to prevent potential actions leading to inefficiencies due to local monopoly and this type is more likely to occur in small ports with captive traffic due to the inadequacy of competition within the port and the difficulties of competition between the ports. Hence, regulation of port activities becomes a key aspect in the new strategic trend but it is not necessary that it lies in the hands of port authorities themselves. A general practice is to introduce private participation in ports through contracts between the private and public entities (Trujilo L, Tovar B-The European Port Industry-An analysis of economic efficiency). The contracts present a wide variety which ranks from concessions (Building, Operation, and Transfer-BOT), in which the private firm is given temporarily the port for construction and operations. Thus, contract design and price regulations seem to be of much importance to introduce private participation in port activities to preserve the quality and in inducing efficiency.(Steenken et.al, 2004).

There are cases in which regulation need not play a minor role only when the competition is feasible and it has advantages as an instrument to promote discipline on economic agents playing in the market. The traffic volume handled by the port plays a major factor for the competition and it will determine whether it is feasible and desirable. This has been analyzed in the Multilevel infrastructre of 1999, which established traffic threesholds in determination of the type of competition that is feasible. Even when there is no competition between the ports, it becomes necessary to regulate the prices that are subjected to possible competition between the ports. In this case, the role of regulator is reduced to a periodical control on prices to prevent potential co-orperation among competitors that provide similar service within the port or alternative port sites. General competition has increased within the port industry as a whole, but this does not have equal impact on all ports or activities. It depends on location, type, level, and structure of traffic served.

2.3.1 Port Regulation in Europe

In Europe, the strategic role of ports have been explicitly recognized by all members of the Union. Their economic relevance is based on the volume of goods moved i.e; 90% of the total imports and exports to and from the European Union and that maritime transport is in charge of 35% of the total commerce among the members and serving 200 million passednger per year (EU Commission, 1997). Also, it is likely that congestion in roads will be a forward drive in pushing land transport toward sea. The European Parliament reviewed a series of studies with the objective of regulation: the *Kapteyn, Seifriz* and *Seefeld* reports (*EU Parliament*, 1961, 1967, 1972). These reports suggests activities related with the potential development of common port policy. A report on European Ports (*EU Commission, 1977, 1985*) identified the main organisational differences, suggesting there are no substantial differences among the ports regarding services and the technological improvements.

Based upon a series of the previous reports (*EU Parliament, 1981, 1982, 1983; EU Commission, 1985*), the EU Commission released a updated document (*EU Commission, 1992*) that contained the main challenges to common transport policy which identified the need to consider a transport system at European scale and the need to establish basic elements for the developments of transeuropean networks. The report suggested that maritime cargo transport in Europe can be encouraged as a way to prevent land transport congestion and contribute a sustainble strategy that fulfills socio-economic goals with environmental care. Another research suggests the importance of a common port policy within the European market that was released by the parliament during 1993 (*EU Parliament, 1993*). The main aim of the study was to provide information on the criterias that guided the common policy. The main suggestion were very similar to those contained in the previous reports and only new topics that were related to the identification, selection and evaluation of projects that had common interest and safety procedures. It also contained suggestions that aimed at changes in law at a national level in order to eliminate the legal or factual conditions that led to the non-competitive practises against the articles 85 and 86 of the Rome treaty which had exclusive rights and other forms of dominant situations. The interest and efforts of the European Union to establish a transeuropean network is understood in articles 129 of the Union One, although infrastructure development is still the responsibilty of each member state. In the communication of the Commission (EU Commission 1992) the need of integrating ports in a Trans-European Network was mentioned.

During this period, the need to include geographical locations of ports was emphasised by the the Member states and the EU Parliament which would help in establishing the actual maritime transport network. This was later resolved by means of commitment of the EU Commission in a report during 1997 which identified a set of eligible ports with the approach of air transport with the transeuropean network. Finally, guidelines were approved on July, 1996. Later releases include the *Green Book on Ports and Maritime Infrastructure* which was released in 1997 by the EU Commission which focussed on the debate in efficiency, competitive rules and integration of ports on the multimodal European network. This book sets the regulation at European level in order to achieve a systematic liberalization of services in the main ports with the traffic from international vessels. After the release of book, a main debate which existed was centered around three aspects: ports within the transeuropean network, deregulation of port services and finance of ports and port infrastructure (EU Commission, 2001). With the recent regulation (Regulation (EU) 2017/352 of the European Parliament and the council of ministers) establishes a framework for the provision of port services and the common set of rules in the view of financial transparency of ports. The main aim of this regulation is to set the level in the investment sector, protect the ports against uncertainities and create more ways to efficient public and private investments. It also promotes the training and support of the European social issues between the port workers and the employees with training.

2.3.2 Port Regulations in India

India has a coastline of about 7517 Km (Indian ports Association), which gave rise to several sea ports. Considering the regulatory point of view, Indian ports have been classified into tw categories: major and minor ports. Minor ports, amounting to about 187, are always less regulated in comparison to the major ports. The major ports are governed by the policies of Ministry of Shipping, under the Indian Ports (IP) Act, 1908, and Major Port Trust (MPT) Act, 1963. Currently there are 12 major sea ports in India as said by the Ministry of Shipping. Ports cater to about 95% of India's international trade by volume and 77 by volume (Indian Ports Association) with the major ports dominating in terms of business volume which accounts to 75% of the cargo handled. In the recent times, minor ports have also been witnessing increase in traffic. Tariff competition among the operators in major ports is limited given that the tariffs are in regulation. Tariffs in major ports are regulated by the Tariff Authority of Major Ports (TAMP) which is a regulatory body established in 1997 with the terms of Major Ports Trust Act, 1963. The roles of TAMP include the regulation of both vessel related and cargo related tariffs and the regulation of rates for the lease of properties in favour of major port trusts and the private operators.

The 'cost plus' approach to tariff fixation adopted by the TAMP is criticised on the basis that it does not recognise and reward any efficiency improvements. However, the cost estimation may be difficult. India ports are also generally monitered and regulated by the Central and State Governments. The major Port Trusts, governed under the Major Ports Trust Act, 1963, and the Indian Ports Act, 1908 was established to administer all major ports except the Ennore port which was run by Ennore Port Limited. The reform process which was initiated by the 1990s, for the view of broader strategy of infrasturcture development involves the private sector participation due to the inadequacy of public resources.

The Maritime Agenda 2010, a initiative of the Central Government in which the country planned to spend about Rs.2770 billion in the maritime sector for the upcoming 10 years. The maritime Agenda forces the capacity increase to 3130 millions tonnes by 2019-20. Under the Major Port Trusts Act, 1963, each port is governed by a Board of Trustees who are nominated by the Central Government. In this act it states that the Board of Trustees are fully controlled by the Central Government and that they have to follow the policy decisions of the Central government. The policy decisions of the Central government their financial powers are fixed and that the rates are externally fixed by TAMP.

Many measures were taken in modernising the port such as the Vision 2000, the then Ministry of Surface transport aimed at fully privatising the ports and not only the port terminals. In 2009 the *Ministry of shipping formulated a National Mritime Development*

Programme (NMDP) which aims at various port capacities and the hinterland connectivity projects across the Major ports with estimated investments of about 58,000 crores (US$ 14.2 billion) (Indian ports Asscosiation-Regulation acts-Vision 2000) over the next decade. Another new model under the *Model Concession Agreement (MCA)* which was approved by the Union Government in January 2008. Under this regime, a port trust could directly approach the inter ministerial Public Private Partnership Appraisal Committee (PPP-AC) for the final project approval without having to acquire in the principle approval. By enabling this, the process would spped up by inviting bids for new projects. In success of TAMP, another proposal was formulated which was circulated within the ports community called the *draft Major Ports Regulatory Authority Act*, 2008 which had the major functions such as fixing the rates of port and terminal services that are provided by the port authorities and the private operators in the major ports. Recently the Major Ports Authority Bill of 2016 includes a provision to de regulate the pricings at major ports by chopping away the Tariff Authority for major ports, or TAMP which set prices at public Indian ports. This change would allow major ports to compete with the minor rivals, or private ports, which can adjust the prices demanding on demand.

2.4 The importance of shipping

Shipping is concerned with the transport of cargo between seaports by ships. For some, “shipping” means ships and seaborne businesses. For others it refers to any mode of transport that moves goods between two geographical points. Trends in the shipping business are moving towards the concept of economies of scale in operations, the development of network based management, and the adoption of technology to improve efficiency and effectiveness. The varied interpretations of shipping imply that the shipping business has become increasingly dynamic and complex. Shipping is one of the world’s most internationalized industries. It should not be viewed only from a narrow national perspective. Rather, it should be looked at from a broader view of world development, particularly in the international trade sector. This is fundamental to international trade as it provides a cost-effective means to transport large volumes of cargo around the world.

Shipping as a core element of economic development has a long history. Adam Smith, the father of economics, considered shipping as a source of low cost transport that could open up markets. Adam Smith (1986) mentioned that “as by means of water carriage a more extensive market is opened to every sort of industry... it is upon the sea-coast that industry of every kind naturally begins to subdivide and improve itself”. Water carriage facilitates specialization that enables products to be sold at low prices. The shipping business has been essential to the development of economic activities as business transactions and trade need ships to transport cargoes from the place of production to the place of consumption. The shipping business involves the physical transport of cargoes from an area of supply to an area of demand, together with the activities

required to support and facilitate the transport. A transport system involves three key components that are used for the movement of goods, with nodes linking them together (Steenbrick 1974):

1. Fixed infrastructure such as ports or terminals
2. Vehicles such as ships or barges using the fixed infrastructure to move cargoes
3. Organisational systems necessary to ensure that the vehicled and the fixed infrastructure are used effectively and efficiently.

2.4.1 Freight market

Although the shipping business is an economic sector, there are important subdivisions in the sea freight market. The sea freight market is linked with ships that can carry different types of cargoes. Generally, the freight market can be divided into the tramp market and the linear market.

- **Tramp Market**

  The purpose of tramp ships is to provide a convenient and economical means to transport goods that require cross ocean movement. One of the key characteristics of tramp shipping is to seek cargoes all over the world and provide flexibility in sea transport to satisfy the needs of world trade (Kendall and Buckley 2001). The tramp ship can be any vessel that does not have a fixed itinerary and mainly carries dry cargoes in bulk from one or more ports to one or more different ports. This mainly carries only one commodity at a time and usually carries cargoes from one shipper. In this market, cargoes are carried at freight rates, whereby the terms and conditions are negotiated usually on a case-by-case basis. They carry dry bulk cargoes that are used by many industries.

  Bulk cargoes can be classified into dry bulk and liquid bulk. Demand for the transport of liquid bulk by sea is served mainly by the sector of tanker shipping. Ships designed for the transport of liquid in bulk are called tankers. The main cargoes carried in tankers are liquid and gas. Ships designed to carry liquefied petroleum gas (LPG)/liquefied natural gas (LNG) are referred to as LPG carriers or LNG carriers. Tanker shipping was one of the forst types of shipping to make use of the concept to improve operations efficiency (Metaxas 1971). An example is the deployment of ultralarge crude carriers with a carrying capaity of over 300,000 deadweight tons.

- **Liner market**

  A main function of liner shipping is to satisfy the demand for regular transport under which cargoes are transported through regular routes and with regular

schedules. Liners operate according to a schedule of ports of loading and discharge, usually adhering to a published timetable with set conditions of carriage. They operate like trains of international seaborne trade, with cargoes made up of a large number of different consignments from different shippers. Liner cargo is mainly made up of manufactured or partly manufactured goods. The majority of liner cargo is carried in containers. Containerization seems to have become a must for ports, as the provision of container facilities is considered to be one of the pre requisited for success in the new shipping business environment (Notteboom, 2002).

Cargo liners are more expensive vessels than tramp ships because their building and operating costs are usually higher. For example, cargo liners usually deploy ships of speed higher than that of tramp ships. The full cellular container ships are seperated into compartments, which enable containers to be dropped in vertically between systems of container guides and to be stacked in holds. Furthermore, several tiers of containers can be carried on top of the hatch cover. Their accomodation is larger, with more facilities and comfort than tramp ships. As the cargoes transported by liners belong to many shippers, the administrative processes of cargo liners are far more complex. As a result, both the construction and the operational costs of liners are higher.

2.4.2 Concept of Parcel Size Distribution

To explain how the shipping business approaches the task of transporting cargoes, the concept of **P**arcel **S**ize **D**istribution (PSD) is useful. A “parcel” is an individual consignment of cargo for shipment. For a particular commodity trade, PSD describes the range of parcel sizes in which cargo is transported (Stopford 2004). PSD answers the question “which cargoes go in which ships?” Cargoes of similar sizes tend to use the same type of shipping service. For example, movement of bulk commodities such as iron ore and coal requires the use of bulk carriers since the cargo parcels are big enough to fill an entire ship. On the other hand, for movement of general cargoes such as radios and watches container liner shipping services are preferred since these cargoes are mainly small consigments, which are too small to fill a whole ship, and it is better to load them with other consigments on a ship for transport to fully utilize the shipping space and spread out the shipping cost. Hence, the PSD concept is useful for classifying cargoes into “bulk cargo” and “general cargo” to determine how cargoes are to be shipped.

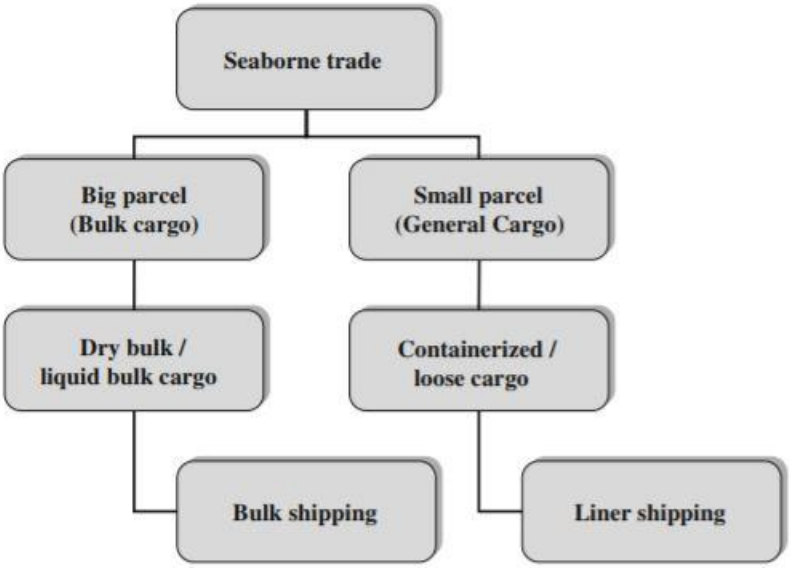

Figure 6 - Transport of bulk and general cargo

2.4.3 International Maritime Passages

With the discussion of international trade, it is essential to consider the world geographical pattern. The basic features of deat transport are constrained by the world's geography. International maritime routes are forced to pass through specific locations corresponding to passages, capes and straits. These routs are generally located between major economic zones, such as western Europe, North America, and East Asia.

Figure 7 -International maritime passages

- The Panama Canal

The Panama Canal is approximately 80km long between the Atlantic Ocean and the Pacific Ocean (Panama Canal Authority 2016). This waterway cuts through one of the narrowest saddles of the isthmus that joins North America and South America. The Panama Canal follows a system of locks-compartments with entrance and exit gates. The locks function as water lifts: they raise ships from the sea level (the Pacific or the Atlantic) to the level of Lake Gatun (26 m above sea level); ships then sail the channel through the Continental Divide. The Panama Canal handles about 12% of the Amercian International seaborne trade. In December 1999, the Panama Canal Authority. The same year, Hong Kong port operator Hutchison-Whampoa took operational control of the ports at both the Atlantic (Port of Colon) and the Pacific (Port of Panama City) sides of the Panama Canal with a 25-year lease. The company also became involved in the improvement of the rail line between the two ports to handle the growing amount of containerized traffic. This rail line is important as it offers an alternative the size limitations of the Panama Canal, which prevents large post Panamax container ships from going through.

- The Suez Canal

The Suez Canal is an artificial waterway in Egypt, connecting the Mediterranean Sea to the Gulf of Suez, and then to the Red Sea. The Suez Canal is 163 Km long, with a canal width of a minimum of 60 m (Suez Canal Authority 2008). The Suez Canal is extensively used by modern ships, as it the fastest crossing from the Atlantic Ocean to the Indian Ocean. Taxes paid by the vessels represent an important source of income to the Egyptian Government. The Suez Canal has no locks because the Mediterranean Sea and the Gulf of Suez have roughly the same water level. It acts as a shortcut for ships between both European and Amercian ports and ports located in southern Asia, eastern Africa, and Oceania.

- The Strait of Malacca

The Strait of Malacca is one of the most important strategic passages of the world because it supports the bulk of the maritime trade between Europe and Asia, which accounts for 50,000 ships per year (600 ships per day) (World Shipping Council, 2016). The Strait os Malacca forms the main ship passageway between the Indian Ocean and the Pacific ocean. It is about 800km in length, has an average width between 50 and 320km (2.5 km at it narrowest point), and a minimum channel depth of 23m. It represents the longest strait in the world used for international navigation.

- The Starit of Hormuz

  The Strait of Hormuz is a strategic link between the oil fields of the Persian Gulf and the Indian Ocean. It has a width of between 48 and 80m, but only 6km wide navigation channel (with two, 3-km wide channels, each exclusively used for inbound or outbound traffic respectively). It represents the most important strategic passage in the world for oil transport.

- The Strait of Magellan

  The Strait of Magellan is 530 km ling and 4-24 km wide. It is a navgable route immediately south of mainland South America. The strait is arguably the most important natural passage between the Pacific ocean and the Atlantic Ocean, but it is considered a difficult route to navigate because of the inhospitable climate and its narrow passage. This passage is a relatively narrow stretch of ocean seperating Cape Horn (the southern tip of South America) from Antartica, the waters of which are notoriously turbulent, unpredictable, and impede by icebergs and sea ice. With the construction of the Panama Canal in 1916, this passage lost its strategic importance.

- The Cape of Good Hope

  The Cape of Good Hope is located at the extreme southern tip of the African continent that seperates the Atlantic Ocean and the Indian Ocean. It got its name because it offers a maritime passage towards India and Asia, and is regarde as the hope of a fortune for those who pass it. Since the widening of the Suez Canal in the 1970s, the Cape of Good Hope has lost some if its strategic importance.

Improvements in international shipping by developing trade routes are one of the main features of globalization. Together with progress in trade liberalization in many countries, sea transport has become faster, more reliable, and cheaper. Lower transport costs lead to higher levels of foreign investment, a higher savings ratio, an increased volume of export, easier access to technology and knowledge, and a decline in unemployment. Analysing the components of transport costs is a complex issue. Demand for transport service is derived from trade, which is influenced by a number of factors that have an impact on the costs of transport. Generally, the cost of transport is essentially the price of a transport service and is determined by the supply and demand of that service. Lower transport costs would reduce the final product price and lead to an increase in trade volume. Furthermore, expanding trade volumes, in the long run, would reduce the unit cost of transport by allowing economies of scale and greater specialization in terms of efficiency, frequency, and reliability in shipping operations.

2.5 Containers in shipping industry

Container shipping is a shipping method that uses large intermodal containers that can be transferred between rail or truck and ship and never opened while in transit between ship and consignee (Levinson 2006). Malcolm McLean, a leader in the American trucking industry, designed the first standardized container and created Se-Land shipping in 1956 (ISBU 2010). Initial designs called for entire truck trailers to be loaded into ships. To save space and weight, the industry standard quickly evolved to load only the containers themselves, rather than containers attached to chassis (Levinson 2006). The U.S. container shipping industry began in 1956 when 58 containers were sailed from Newark to Houston aboard retrofitted tanker ship (Cudahy & Brian, 2007).

Shipping cargo in containers offers several key advantages to the industry. Studies have shown that at U.S. ports, container cargo can be moved nearly twenty times faster than break bulk cargo (goods that must be loaded individually; Herod 1998). Gains in efficiency have greatly reduced costs: loading oose cargo cost $5.85 per ton to load in 1956; when that same cargo was containerized, it cost $0.16 per ton (ISBU 2010). Containers that remain locked also create improved cargo security and reduce cargo breakage and contamination risks. Because of these increases in efficiency, the industry has experienced tremendous growth in recent decades.

Container capacity is often expressed in units of twenty-foot equivalent units (TEU). One TEU of containerised cargo capacity is equal to one standard 20ft* 8ft container (World Bank 2009). Container trans shipment traffic figures are generally a measure of container traffic moving from land to sea transport modes, and include both international and coastal journeys. A estimate states that there are approximately 100 million containers shipped each year (WSC 2016). Currently, one of the main size constraints facing container ships is the size of the locks in the Panama canal. Ships that are “Panamax” in size fit within the dimensions of the locks and have a capacity up to roughly 5,000 TEU. After the expansion of the Panama canal, it will be able to handle “Post-Panamax” container vessels up to capacities of 12,000 TEU (Payer 1999). Ships with capacity greater than 10,000 TEU are known as Ultra Large Container ships (ULC). The next size limitation that will emerge is tied to the depth of the Straits of Malacca, which link the Indian and Pacific oceans and are one of the busiest shipping lanes in the world. “Malaccamax” ship dimensions will be 470 m * 60m (Levinson 2006). As each generation of ship becomes larger, the taller the stacks of containers become. The physics of taller stacks require new innovations to adequately secure them.

With the increase in global trade, there becomes a major demand of containers to transport the goods in it. However, there is a concern that shipping containers may be used by terrorists as the delivery component for chemical, biological, radiological or nuclear weapon (ECMT, 2005). A disruption of operations in ports can become very expensive as the port security remains the primary importance for Europe both due to

the direct threats of life and property which can become the major economic damage which arises from the effects on the supply chains. Traceability and monitoring of cargo becomes the key elements for smarter logistics to support safe and secure freight transports (Rantasila et al., 2012). The process of providing real time information on the supply chain security incidents and decisions become the support tools for early detection and shorten the response times. (Gould et al., 2011). Two EU sponsored projects have already addressed the security of container transport: the SUPPORT project which addressed the security of ports, the CONTAIN project which aimed at the security of container supply chain.

Monitoring of the integrity and status of the containers can be performed by using different methods depending on the needs and interests of the stakeholders in the port and supply chain: the primary method is through non intrusive identification and detection technologies which includes the identification of driver, vehicle, container during the different processes in the port and also inspect the damage for the containers by the use of non-intrusive sensors. The use of identification technologies requires colloboration with other stakeholders, both for access to databases and the management of tags. Non intrusive detection technology come mainly under the responsibilty of Customs.

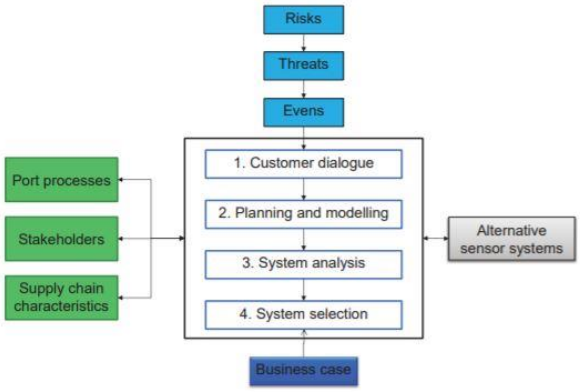

Figure 8 - Process for Selection of Monitoring devices

THESIS DEVELOPMENT

3.1 Major Shipping Industries

3.2 Indian Ports

3.3 Port Traffic

3.4 Road Ahead for Indian Ports

3.5 Market study Of Indian Sea Logistics

- 3.5.1 Indian Exports
- 3.5.2 Indian Imports
- 3.5.3 India's top 10 International Trade Data

3.6 India's Trade Relation with Europe

3.7 Portugal trade with India

- 3.7.1 India Exports to Portugal
- 3.7.2 India's Import From Portugal

3.8 SWOT Analysis Of Indian Import Export

- 3.8.1 Strengths
- 3.8.2 Weakness
- 3.8.3 Opportunities
- 3.8.4 Threats

3.9 Sea Routes Between India and Portugal

- 3.9.1 Direct Vs Transhipment Services
- 3.9.2 Sea Routes between Portugal to India
- 3.9.3 Advantages and disadvantages of Direct & Trans-shipment

3.10 Highlights of K Line concerning Portugal and India trade

3 Indian Shipping Industry and Major Ports

3.1 Major Shipping Industries

The Indian shipping Industry plays a crucial role in Indian economy. Major share of around 90% of the Nation's trade by volume is done by sea (Ministry of Shipping, India). India has been the largest merchant shipping fleet among the developing nations. The Indian Shipping Industry not only includes transportation of both national and international cargoes but also provides various other facilities such as ship building, ship repairing, lighthouse facilities, freight forwarding. There are as many as 50 shipping companies in the Indian industry, out of which 19 deal with coastal trade and 29 are engaged in overseas trade. The shipping industry governed by 3 seperate Acts such as The Merchant Shipping Act in 1958, The Inland Vessels Act in 1917 and The Coasting Vessels Act in 1838 has most of the vessesls registered under Merchant Shipping Act. Smaller barges and coastal vessels are governed by the other two acts. The total size of the industry is 515 vessels with a gross register tonnage of 7.06 million. The major ports are located at Calcutta/Haldia, Chennai, Cochin, Ennore, Jawaharlal Nehru Port at Nhava Sheva, Kandla, Mormugao, Mumbai, New Mangalore, Paradip, Tuticorn and Vishakhapatnam. The major routes are concerned with China and Singapore as the demand from them is very huge. Out of the 29 ship industries, 3 operate their lines to Europe which are as follows:

1. Zim World Freight Private Limited
   This company operates several vessel operators from Indian ports to Gulf, Europe, Far East, China and Indian Sub Continent. It is mainly concentrated on ocean freight forwarding. Zim operates a fleet of 80 vessels of which 2 travel to Rotterdam and one to Spain.(data obtained from website www.Zline.in)

2. Mercator Limited
   This is a Mumbai based International Organisation. This group diversifies business intrests in Coal, Container shipment, Oil & Gas. It operates only a single vessel to Rotterdam called Panamax which has a capacity of 69286 TEUs. (Data obtained from website www.mercator.in)

3. Great Eastern Shipping Company Limited
   This is India's Largest private sector Shipping Company which has experience and expertise for over 6 decades. The company has two main business: shipping and offshore. The shipping business is involved in transportation of cruse oil, petroleum products, gas and dry bulk commodities. This company operates 6 vessels to the Port of Spain, Germany.(data sourced from website www.greatship.com)

3.2 Indian Ports

Seaports in India are responsible for their varied range of economic activity and they account for 95% by volume and 70% by value of the country's international trade. the ports play a major role in the overall economic development of the country. India has a coastline spreading to 7516.6 Kilometres.(Indian Ports Association). India has 12 major ports which handle about 58% of seaborne traffic, which includes Kolkata, Visakhapatnam, Chennai, V.O.Chidambaranar (Tuticorin), Cochin, New Mangalore, Mormugao, Jawaharlal Nehru Port Trust (JNPT), Mumbai, Kandla, and Ennore. Of these, Ennore Port Limited is a company and the remaining 11 are port trusts, governed by the Major Port Trusts Act, 1963.

Under the Indian Ports Act, 1908, the Government has declared the Port Blair Port with its territorial jurisdiction over all ports of Andaman & Nicobar Islands as a major port with effective from 1 June 2010. All major provisions of the Major Port Trusts Act, 1963 has become applicable to the major port of Port Blair from 1 June 2010. India has around 200 Non Major ports, which handle about 42% of seaborne traffic.(Ministry of Shipping, India).

Figure 9 - Major Ports of India

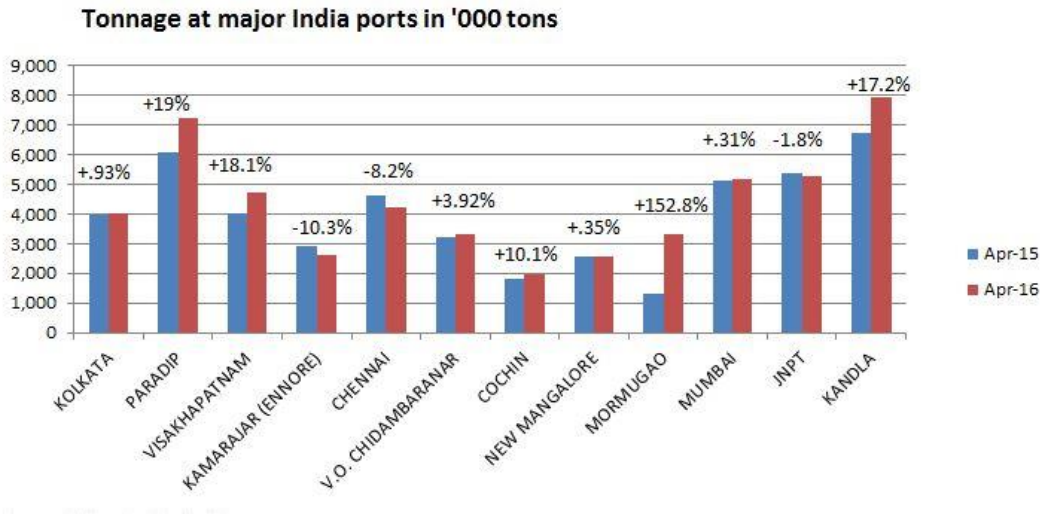

Figure 10 - Tonnage at major Indian Ports

Source: India Major Port Authorities, 2016

From the above graph, it can be observed that the total throughput of the cargo tonnage at major ports in the first fiscal month was up by nearly 10% year-over-year to 52.4 million tonnes from about 48 million tonnes in April 2015. From the list of ports stated above, Mormugao reported the highest gain in lifting volume, with a 153% year-over-year jump, to 3.3 million tonnes. Paradip experienced the second largest increase in traffic growth, with a 19% rise to 7.2 million tonnes, followed by Visakhapatnam which had 18.11% to 4.7 million tonnes, Kandla up by 17.2% to 8 million tonnes and Cochin up by 10.14% to 2 million tonnes.

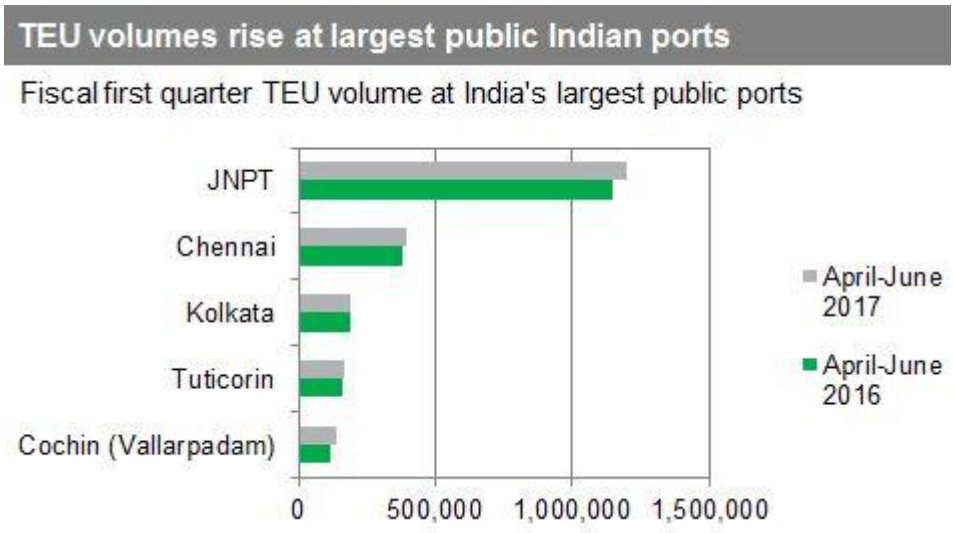

Figure 11 - TEU Volumes at largest Indian Ports

Source: Indian Ports Association, Monthly capacity at Major Ports

The above graph explains the TEU volumes at major Indian ports for the period of April-June 2016 & 2017. It can be said that Kolkata handled 188.000 TEU's, Tuticorn at 166,000

TEU's from 162,000 TEU's which gained a 2.5% increase from the previous year followed by Cochin which handled 136,000 TEU's and gained 13% increase from the previous year and Visakhapatnam was up by 3.4% and handled 90,000 TEU's.(datas sourced from Indian Ports Association).

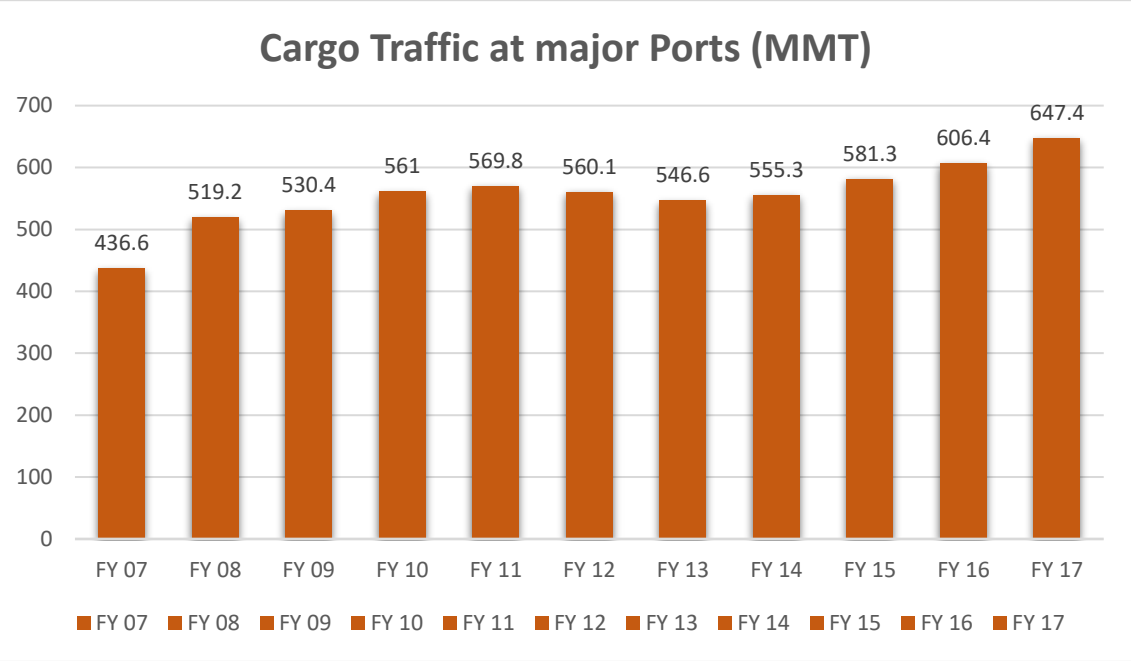

Figure 12 - Cargo traffic at major ports

Source: Deloitte, BMI, Financial Express

The above graph implies that cargo traffic stands at 647.43 MMT (Million Metric Tonnes) in Fiscal year 2017 and it has been growing at an Compund Annual Growth Rate of 4.02 per cent from the fiscal year 2007. Increasing trade is translating into higher demand for containerisation due to ther efficiency. During the year of 2016-2017, 12 major ports in India handled 647.43 million tonnes of cargo, which shows a growth of 6.79 per cent in comparison to the previous year.

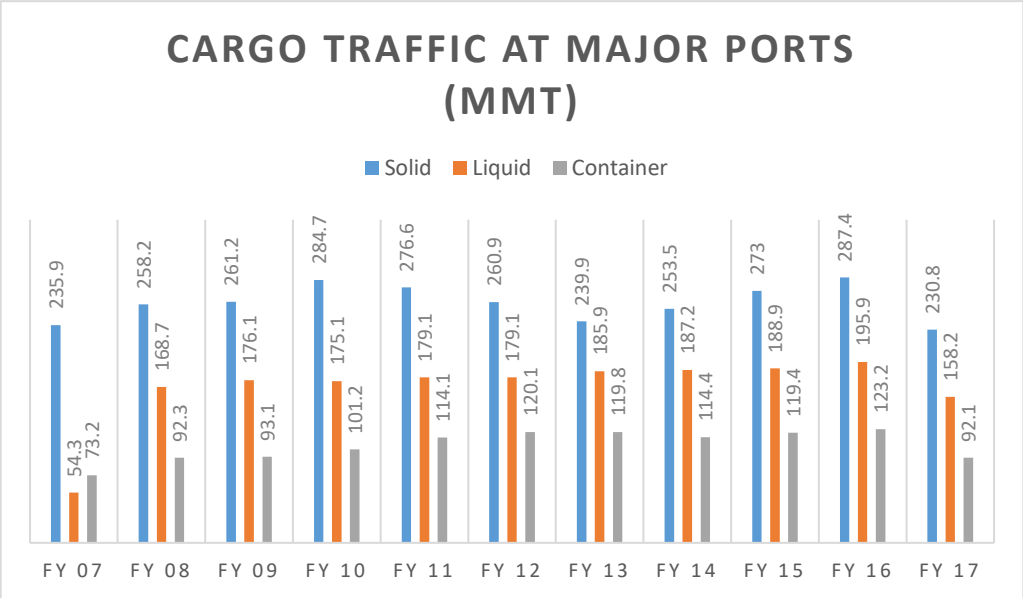

Figure 13 - Cargo Traffic Handled at major ports

Source: Indian Port Association; Tech Sci Research

In the above graph the details are as follows:

- Between Fiscal year 2007-2017, cargo traffic grew at Compund Annual growth rate of 0.38 per cent.
- Over Fiscal year 2007-2016, CAGR in the volume of different segments was as follows:
  I. Solid cargo was 2 percent
  II. Liquid cargo was 3.1 percent
  III. Container cargo stood at 6 per cent
- Cargo traffic for Fiscal year 2017 (till december 2016) for solid, liquid and container cargo was 230.8, 158.2 & 92.13 Million Metric Tonnes respectively.
- During April-October 2016, cargo traffic at 12 major ports in the country was reported at 370.04 Million Tonnes, showin a growth of 6.27 per cent over the same period suring the previous year.

Cargo traffic handled by India's major ports increased 5.56 per cent year on year to 113.63 million tonnes (MT) during April-May 2017. In terms of composition of cargo traffic, iron ore traffic volume rose 33.28 per cent to 9.96 MT, cooking coal grew 12.67 per cent to 9.30 MT, and fertiliser traffic went up 20.09 per cent to 1 MT during the period. The country's major ports handled a combined traffic volume of 647.43 million tonnes during April 2016-February 2017,registering an annual growth rate of 6.79 per cent, as againt a growth of 4.32 per cent in Fiscal Year 2015-2016. The major ports recorded in the highest ever capacity addition of 100.37 MT in 2016-17, thereby raising the total capacity to 1065 MT per annum, as against a capacity of 965.36 MT per annum in 2015-16.

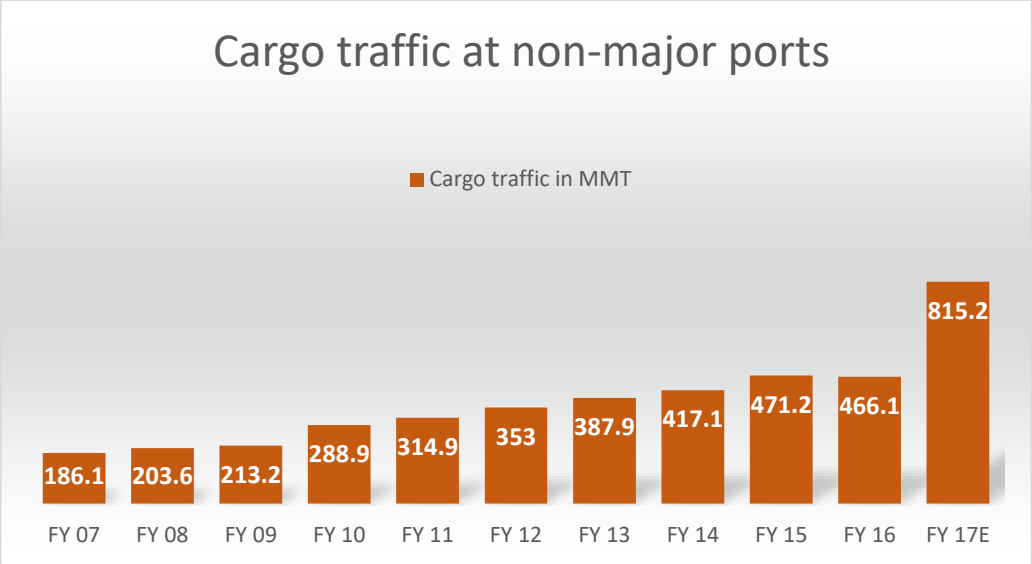

Figure 14 - Cargo Traffic at non-major ports

Source: Ministry of shipping, Tech Sci Research
E: Estimate
Unit: Metric Million Tonnes

From the above graph it is understood that cargo traffic stood at 466.1 MMT in Fiscal year 2016. Cargo traffic has expanded at a Compound Annual Growth Rate of 10.7 per cent during Fiscal Year 2007-2016 and is expected to grow annually at 15.9 per cent during Fiscal year 2007-2017 and it is expected to reach 815.2 MMT.

On comparing both the major and non major ports, the major ports have outperformed private ports by acheiving a growth 6.79 per cent in 2016-17, whereas the private ports recorded a traffic growth rate of only 4 per cent. The Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, reported that the Indian ports sector received FDI (Foreign Direct Investment) worth US$ 1.64 billion between April 2000 and March 2017. The country's 12 major ports saw the cargo traffic go up 4.13% to 221.95 million tonnes (MT) in April-July period of the ongoing fiscal, riding on the back of surge in demand, according to data from Indian Ports Association (IPA). These top ports, had handled 213.15 MT cargo in the period of the last fiscal. Increased demand from sectors like iron ore, pertoleum oil and lubricants (POL) and containers led to higher movement of cargo. Iron ore traffic volumes moved up 32.28% to 15.61 MT during April-July as against 11.80 MT in the same period during 2016, while those of POL rose 10.40% to 75.18 MT. Container traffic rose from 6.16% to 44.06 MT.

Cargo traffic Handled By Major and Non-Major Ports Of India		
(In Million Tonnes)		
Period	**Major Ports**	**Non Major Ports**
2001-2002	287.58	95.52
2002-2003	313.55	108.3
2003-2004	344.8	118.86
2004-2005	383.75	138.20
2005-2006	423.56	155.42
2006-2007	463.83	181.11
2007-2008	519.31	206.37
2008-2009	530.53	213.22
2009-2010	561.09	289.32
2010-2011	569.91	314.64
2011-2012	560.19	353.74
2012-2013	545.83	387.92
2013-2014	555.49 (1.8)	416.96 (7.5)
2014-2015	581.34 (4.7)	470.89 (12.9)
2015-2016 (P)	606.37 (4.3)	466.1 (1.0)
2016-2017 #	315.42 (5.2)	234.32 (4.9)

Table 1 - Cargo Traffic Handled by Major and Non Major Ports of India (2001-2002 to 2016-2017 upto September 2016)

Source: Ministry of Finance, Government of India (16944) & Ministry of Shipping, Government of India (ON283) & (ON1289)
Abbreviations: P-Provisional
Note: # -Upto September 2016
Figures in brackets indicate growth over previous year

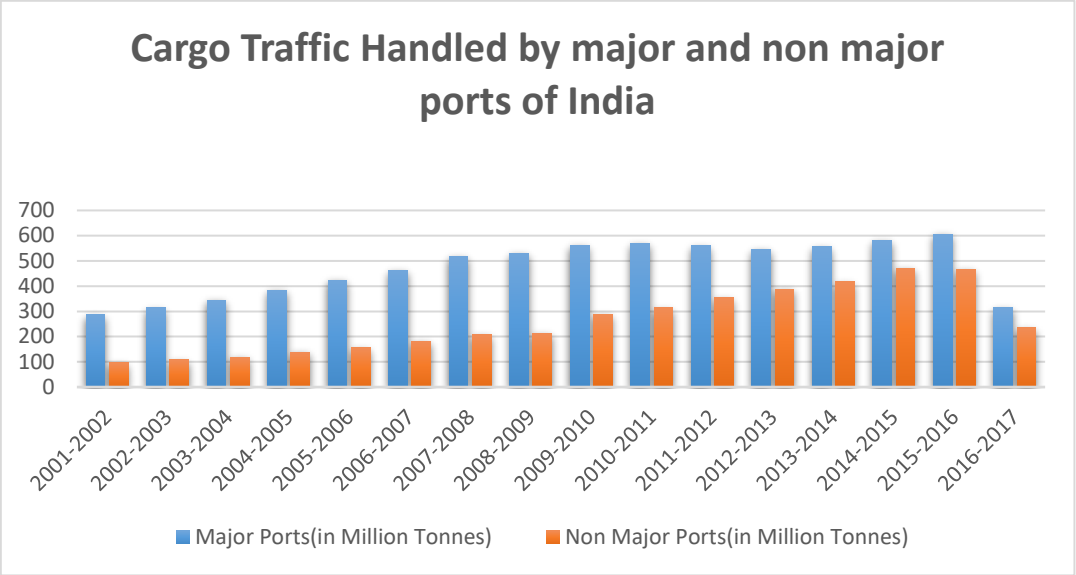

Figure 15 - Cargo traffic Handled by Major and Non major ports of India

Table 1 compares the cargo traffic handled between major and non major ports of India. The container traffic was at 287.88 and 95.52 million tonnes during the period of 2001-2002 for major and non major ports respectively. It steadily increased during the future years and the maximum was achieved during the period of 2015 -2016 for major ports for the container traffic of 606.37 million tonnes. For the non major ports the maximum container traffic was during the period of 2014-2015 which handled 470.89 million tonnes of cargo.

From Figure 16, it is understood that non major ports are evolving faster than major ports. It is clearly observed that non major ports are gaining high shares and major traffic has shifted from major ports to non-major ports. The contribution of non-major port's traffic rose to 43.5 per cent in FY16 from 28.6 per cent in FY07.

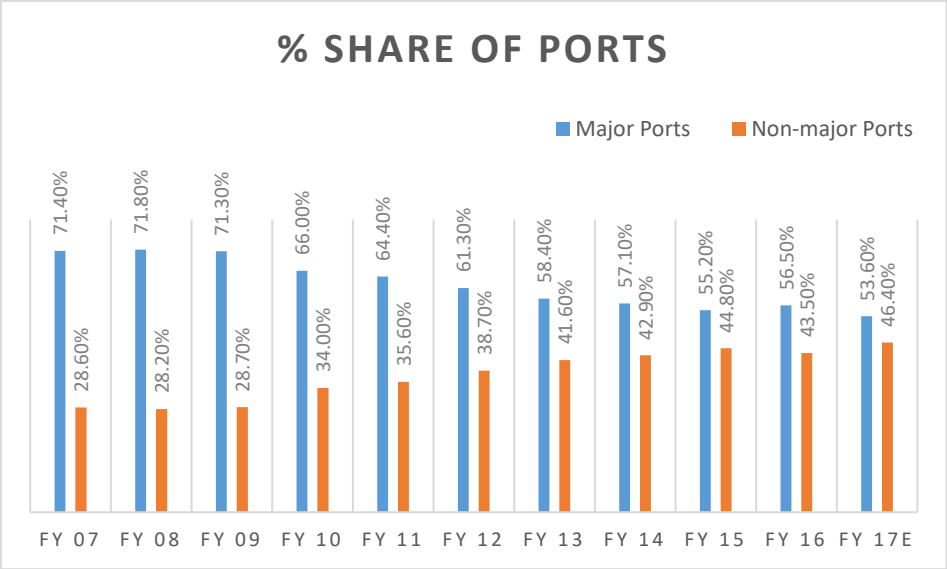

Figure 16 - Percentage share of ports

Source: Indian Ministry of Shipping, 2017

FY – Fiscal Year April – March

E – Estimate

3.3 Port Traffic

This section gives details and informations to the traffic held at the main ports of India. Detailed information on the type of cargo traffic it handles is explained. Also analysis is done in the form of Porters Five Force Analysis.

Annexure 6.1 describes traffic Handled at Major ports during April to August, 2017* vis-a-vis April to August,2016.

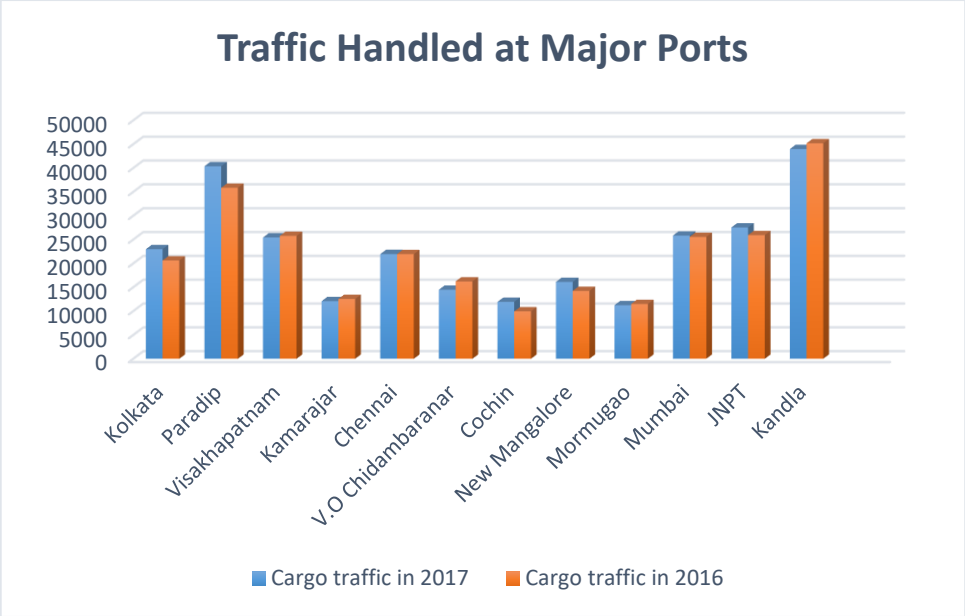

Figure 17 - Traffic Handled at major ports

From this annexure, it is evident that the cargo traffic is increasing for almost all the ports of India however, there are a few exceptions. Considering Visakhapatnam port the traffic fell by 327,000 Tonnes. In the case of V.O. Chidambaranar port, Cochin, New Mangalore, Jnpt & Kandla the traffic difference was about 1500,000 Tonnes. However, in comparison with the total traffic for the previous year it increased to 8653,000 tonnes which clearly shows cargo traffic is steadily increasing in almost all the major ports of India. A 3.26 percentage variation was observed against the previous year traffic.

The highest cargo traffic was handled by Kandla port during both the years i.e., April to August 2017 and April to August 2016 and handled 43986,000 & 45193,000 tonnes respectively. It continues to retain its No.1 Position amongst Indian Major ports for the past nine years. To conclude for the least traffic handled, Kolkata handled only 6875,000 tonnes for April to August 2017 and 7094,000 tonnes during April to August 2016.

Annexure 6.2 describes the traffic held at major ports which shows a comparison for the period of April to August 2017 with April to August 2016. The main commodities along with the data which are transported are explained. On further observations, it can be understood that Kandla port handles major cargo traffic in its port. Even tough, it has reduced to about 120,000 Tonnes against the previous year it still manages to retain the position of the top port of India to handle cargo traffic. This port handles almost all the commodities in a greater quantity than other ports. Data from the above table reveals that Indian ports handled a major capacity of P.O.L (Crude products, LPG/LNG) which constitutes a major share for the ports during the period of April to August 2017. The least quantity goes to fertilizers during the period of April to August 2016 which handles a total of 2943,000 Tonnes. However, in close examination, container cargo traffic is steadily increasing and it is the second most traffic handled quantity which shows more containers are welcomed into the ports of India due to high demand of goods.

3.4 Road Ahead for Indian Ports

- Competitive Rivalry
  Increasing trade activities brought by rising imports of commodities like coal and crude (from Annexure 6.3) to generate high business and limit overall competition as most ports operate in specific geographies. In recent days private managed ports attracts the share of other ports which include ports like JNPT and Mumbai Port Trust which are usually handled by government agencies. However, the demand expected to be strong.(Indian Ports Association www.ipa.nic.in)

- Threat of New Entrants
  100 per cent FDI under automatic route and income tax exemption for a period of 10 years is attracting foreign investors but higher capital expenditure acts as a barrier. This is evident from the fact from the data observed from Indian Ports

Association that the Indian Minister for shipping, Road Transport and Highways, Mr Nitin Gadkari announced a massive investment in India's Ports as the Government is about to develop 10 coastal economic regions as part of the country's Sagarmala (string of ports) project. Adding this, it is also stated that around USD 18.6 billion investment is to allocated for the same.(Ministry of Shipping, TechSci Research)

- Substitute Products
  With the rising demand for port infrastructure due to the growing demands like crude, coal and containerisation, other products may suffer as the demand become less.

- Bargaining Power of Suppliers
  Due to the increase in demand of supply and considering capacities which are being added forward, it becomes the best time for several suppliers to quote their required cost and specified time.

- Bargaining power of customers
  As imports continue to remain strong which is lead by strong demand, the demanding power of customers also becomes high(refer data from annexure 6.2). Customers may bargain in terms of cost as there is abundance reserve of a particular stock due to frequent shipping.

As observed from the above data and information, it becomes wise to say that increasing investments and cargo traffic leads towards a healthy prospective for the Indian Ports Sector. Providers of services such as operation & maintenance (O&M), pilotage and harbouring will benefit from these investments. The capacity addition at ports is expected to grow at a CAGR of 5-6 percent till 2022, thereby additon of 275-325 MT of capacity. The Ministry of Shipping has set a target capacity of over 3,130 MMT by 2020, which will be driven mostly by the private sector while the non major ports are expected to generate over 50% of this capacity.

3.5 Market study Of Indian Sea Logistics

The lifeblood of a global market is trade. Imports and Exports play a major role as it helps grow national economies and expands the global market. Every country is blessed with certain advantages in resource and skills. For example, in the case of India it is rich in resource such as spices, fertile soil while other countries have shortages of these resources. Additionally, some countries have highly developed infrastructures, educational systems and capital markets that permit them to involve in complex manufacturing and technological innovations, while many countries do not.
Imports are important for businesses and individual consumers. The consumers benefit from the locally produced products with imported components along with products that

are imported into the country. Many times, imported products provide a better price and more choice to consumers, which help their standard of living. Countries prefer to be net exporters rather than net importers, even though importing is not a bad thing as it gives access to important resources and products. The more a country exports, the more domestic economic activity is increasing. More exports means more production, jobs and revenue. If a country becomes a net exporter, its gross domestic product increases, which is the total value of finished goods and services it produces in a given period of time.

3.5.1 Indian Exports

I. Merchandise trade

The positive growth achieved by exports for the previous year, exports during the month of July 2017 shows growth of 3.94 per cent in dollar terms valued at US$ 22543.80 million as compared to US$ 21689.57 million during July 2016. In the case of Rupee terms, India suffered a negative growth of 0.32 per cent as during July 2017, exports were valued at Rs.145308.10 crore on comparing with Rs.145770.39 crore during July 2016. During the period of July 2017, major commodity groups of export showing positive growth over the month of last year include Engineering goods (15.16%), Petroleum Products (20.27%), Organic & Inorganic Chemicals (20.67%), Cotton Yarn fabrics including handloom products (5.39%) and Marine products (30.53%). (data as per RBI's press release dated 14th August 2017)

The cumulative value of exports for the period of April-July 2017-18 was US$ 94756.13 million (Rs.610780.14 crore) as against US$ 87001.34 million (Rs.582731.37 crore) which implies registering a positive growth of 8.91 per cent in dollar terms and 4.81% in Rupee terms over the same period last year. Non-petroleum and Non Gems & Jewellery exports in July 2017 were valued at US$ 22543.80 million against US$ 21689.57 million in July 2016 corresponding to an increase of 6.93%. These goods are valued at US$ 94756.13 million for the period of April-July 2017-2018 as compared to US$ 87001.34 million for the corresponding period in 2016-17 with an increase of 9.05%.(data as per RBI's press release dated 14th August 2017).

3.5.2 Indian Imports

The country's imports during July 2017 were valued at US$ 33993.61 million (Rs 219108.89 crore) which is 15.42% higher in Dollar terms and 10.70% higher in Rupee terms over the import levels which is at US$ 29450.97 million (Rs. 197932.93 crore) in July 2016. The cumulative value of imports for the period of April-July 2017-18 is US$ 146256.71 million (Rs. 942740.00 crore) as against US$ 113996.75 million (Rs.763687.22

crore) achieveing a positive growth of 28.30% in Dollar terms and 23.45% in Rupee terms over the same period last year.

Major commodity list of imports which showed high growth in July 2017 in comparison to previous year of July 2016 were Petroleum, Crude & products (15.02%), Electronic goods (22.5%), Machinery, electrical & non-electrical appliances (7.34%), Perals, precious & semi precious stones (6.86%) and Gold (95.05%).

- Crude oil and Non-oil Imports
  Oil imports during the period of July 2017, were valued at US$ 7844.94 million achieving 15.02% higher than oil imports which were valued at US$ 6820.34 million in July 2016. Oil imports during April-July, 2017-2018 were valued at US$ 31022.43 million which was 20.87% higher than the oil imports of US$ 25666.96 million in the previous year.

  Non oil imports during July 2017 were estimated at US$ 26148.7 million which is 15.55% higher than non oil imports of US$ 22630.63 million in July 2016. Non-oil imports during April-July 2017-2018 were valued at US$ 115234.28 million which was 30.46% higher than the level of such imports which was valued at US$ 88329.79 million in April-July 2016-2017.

II. Trade in Services (June 2017, RBI press Release dated 14th August, 2017)

Exports (Receipts)
Exports during June 2017 were valued at US$ 13388 Million (Rs. 86276.29 Crore) registering a negative growth of 0.31% in dollar terms in comparion to positive growth of 4.08 % during May 2017.

Imports (Payments)
Imports during June 2017 were valued at US$ 7457 Million (Rs. 48055.15 Crore) registering a negative growth of 2.07 per cent in dollar terms as compared to positive growth of 5.44% during May 2017.

III. Trade Balance

Merchandise: The trade deficit for July 2017 was estimated at US$ 11449.81 million against the deficit of US$ 7761.40 million during July 2016.

Services: Trade Balances in services (i.e. net export of services) for June 2017 was estimated at US$ 5931 million.
Overall Trade Balance: Taking merchandise and services together, overall trade deficit for April-July 2017-2018 is estimated at US$ 34072.58 million as compared to US$ 10799.41 million during April-July 2016-2017. (service data refers to April-

June 2017-2018 as June 2017 is the latest data available as per RBI's press release dated 14th August 2017).

Annexure 6.3 explains the exports and imports of India for the period of 2016-2017. On close observation it is found that for Merchandise trade, the value of exports is steadily increasing and stands at 94756.13 US$ Millions for the period of April-July 2017-2018 as compared to 87001.34 US$ Millions during the same period last year. This is evident to show that the value of exports is increasing and will provide better trade opportunities between the two countries. The percentage of growth is almost double for the period of 2016-2017 and 2017-2018. On comparing the imports sector, it is found that for the period of July 2016-2017 and April-July 2017-2018, the value is increasing at a slow pace and the percentage of growth is also double as compared to exports. The table clearly denotes that both imports and exports is increasing and India will prove a healthy relationship between its trading countries.

Exports & Imports (Services) (June 2017) (Provisional)	US$ Million	Rs.Crore
Exports (Receipts)	13388	86276.29
Imports (Payments)	7457	48055.15
Trade Balance	5931	38221.14

Table 2 - India Service trade data

Source: Reserve Bank of India dated 14 August 2017

Service trade data for the month of June 2017 is explained in the above table. Exports play a major role as compared to imports in this month and it is to be noted that value of exports is nearly double compared to imports.

3.5.3 India's top 10 International Trade Data

- Imports

India imported goods accounting to US$ 356.7 billion from around the globe in 2016, which is 33.9% higher on comparing with 2009 but down by -8.7% from 2015-2016. India's top 10 imports accounted for 74.3% of the overall value of its products purchases from other countries and is explained in Annexure 6.4. The country's import represent 2.2% of total global imports which totaled $16.473 trillion one year earlier in 2015. Around 58.2% of India's total imports by value in 2016 was purchased from Asian countries. Trade with Europe supplied to 17.5% while North America and Africa constituted 7.3% individually. On referring India's population of 1.267 billion people, its total value of imports of $356.7 billion in 2016 compares to roughly $280 in yearly

product demand from every person in the country. Close observations from the table suggest that Imported plastics and plastic articles had the fastest growing increase in value among the top 10 import categories up by 121.9% for the 7 year period starting from 2009. Vegetable or animal fats, oils and waxes comes in the second place to 112.3%. Iron or steel was the laggard among the import list holding a 2.9% modest uptick.

Research Sources:
The World Factbook, *Country profiles*, Central Intelligence Agency. Accessed on June 9, 2017
Trade Map, International Trade Centre. Accessed on June 9, 2017
Source: World Economic Outlook Database, 2016

- Exports

India exported US$ 261 billion worth goods around the globe in 2016 which is 47.7% higher than 2009 which was the period of Great recession. However it went down by 1.3% during the period of 2015-2016 and is explained in Annexure 6.5. The total value of the 10 exports accounted for 59.4% of the overall value of its total shipments. India's total Gross Domestic Product valued to $8.721 trillion as of October 2016. Hence, exports accounted for about 3% of total Indian Economy output. 49.1% of India's exports are shipped to Asian countries while 19.5% are sailed to European importers. India delivers 18.1% to North America with 8.7% worth shipped to Africa. India's population of 1.267 billion people, the total of $261 billion in 2016 exports accoints to average of $200 for every resident of the country. On close examination from the above table, it is observed that Vehicles were of greater demand among the top 10 exports valuing for 162.2% for the 7 year period starting from 2009, followed by Pharmaceuticals which benefitted 160.3%. Electronics fell by 14.6% which is the only declining category.

Research Sources:
International Monetary Fund, *World Eonomic Outlook Database*. Accessed on June 9, 2017
The World Factbook, *Country Profiles*, Central Intelligence Agency
Trade Map, International Trade Centre. Accessed on June 11, 2017
Investopedia, *Net Exports Definition*. Accessed on June 11, 2017
Forbes *2015 Global 2000 Rankings*, The World's Biggest Public companies. Accessed on June 11, 2017.

- India's total trade with Major countries

The Annexure 6.6 gives the trade information of India with the top countries it deals with. The period of data is for 2016-2017(July) and the values are in US$ Million.
Source: Government Of India, Ministry of Commerce and Industry – export import data bank. Version 7.1 Tradestat

It is to be noted that Portugal does not stand in the list of top 24 countries that India trades with. However, there are 4 European countries in this list which include Germany, Switzerland, France & Italy. K Line operates regular routes from these ports to India.

The total share for top countries for export and import is at 186,934.75 and 304,364.65 respectively. The total trade stood at 491,299.40 and the trade balance is -117,429.90. India's total in export is 276,280.28 and the import is 384,318.66 and the total trade is 659,218.76. Trade balance in India's total stands at -108,038.38.
The percentage share of the above mentioned countries for export, import, total trade and trade balance are at 67.66, 79.20, 74.53, 108.69 respectively.

- India's Top 10 Major Export Companies

Source: Forbes *2016 Global 2000 individual company profiles*, Example of top Indian company compiled here is Reliance Industries. Accessed on June 20, 2017.
Trade Map, International Trade Centre. Accessed on June 20, 2017.

On observing Annexure 6.7, one can understand that four of India's largest export companies specialize in the petroleum industry. Also two major automotive industry rank among the list. The overall value of Indian exports fell by -12.3% in comparison with 2011 was US$ 301.5 billion against US$ 264.4 billion during 2015. Tata motors recorded 17.4% increase in sales slighty greater than Hindalco Industries which experienced sales of 16%. However, sales declined for Bharat Petroleum to -4.8% and -42% for Reliance Industries.

3.6 India's Trade Relation with Europe

India-EU relations have developed substantially since the adoption of the 1993 declaration. An extensive bilateral political involvement is involved, which includes regular annual summits, Troika Ministerial and senior Official level meetings to cover a wide range of issues. As both these countries are largest democracies in the world, they share common values and beliefs that helps the relationship between the two. They contribute towards preserving a rule based international order such as the United Nations (UN) or the World Trade Organisation (WTO). As European Union is evolving and enlarging, it faces diverse and complex global challenges and it is critically important to expand the multifaceted relationship to build the foundations. With the help of this policy, it fosters to

- Strength dialogue and consultation mechanisms
- Deepen the political dialogue and cooperation
- Bring together people and cultures
- Enhance Economic policy cooperation
- Develop trade and investment

The trade relations between the two countries dates back to the early 1962 (Eurostat 1988) when European Commission was only a group of six countries and it was at the initial stage of economic development. The 1994 cooperation agreement signed between both Europe and India took relations beyond just trade and economic cooperation. The first India-European Union Summit was held in Lisbon in June 2000.(European Commission Trade Policy) The relation between these countries has grown exponentially from what generally is purely trade and economic driven relationship to cover all areas of interaction.

India is presently the fastest growing economy in the world and is a important partner for the European Union which represents sizable and dynamic market. For this reason, the EU and India are committed to further increase the bilateral trade and investment through the Free Trade Agreement negotiations that was launched in 2007. The European Union is India's major partner with 13.5% of India's overall trade with the world (Ministry of Chamber and Commerce, India). India is EU's 9th trading partner in 2016 with 2.2% of EU's overall trade with the world after South Korea with 2.5% and ahead of China of 1.9%.(European Commission Trade and Policy data). The value of EU exports to India grew from €24.2 billion in 2006 to €37.8 billion in 2016 with major goods such as engineering goods, gems and jewellery, other manufactured goods and chemicals which tops the list.

The value of EU imports from India also increased from €22.6 billion in 2006 to €39.3 billion in 2016, with textiles and clothing, chemicals and engineering goods which tops the list. Trade in services almost tripled in the past decade, increasing from €10.5 billion in 2005 to €28.1 billion in 2015. The EU investment stocks in India amounted to €51.2 billion in 2016, increasing from €44.2 billion in the previous year.(Eurostat Comext – Statistical regime 4).

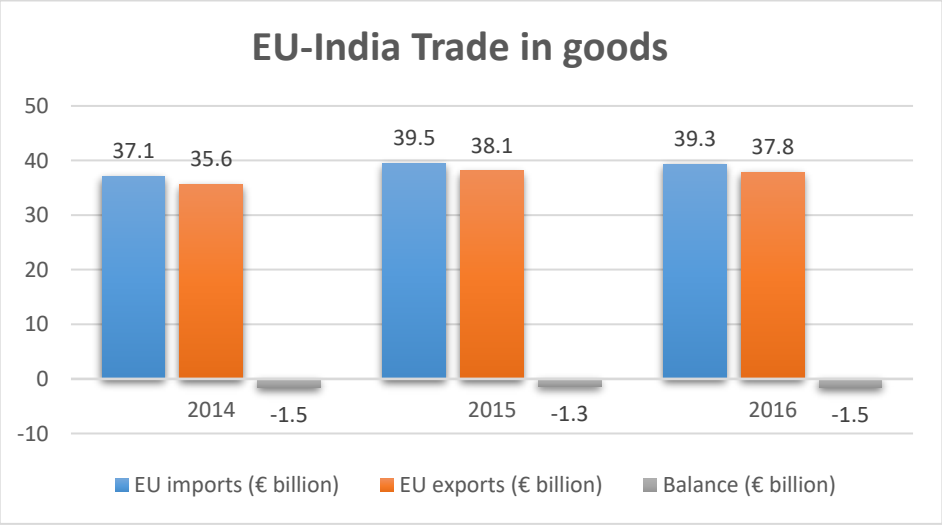

Figure 18 - EU-India Trade in Goods

Source: Government Of India, Ministry of Commerce & Industry, 2017

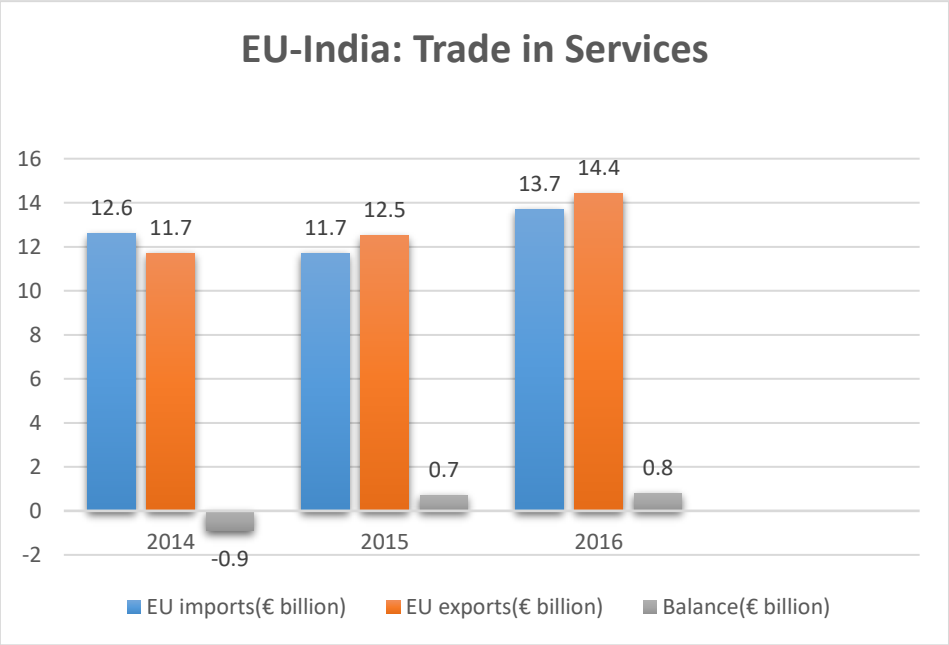

Figure 19 - EU-India Trade In Services

Source: Government Of India, Ministry Of Commerce and Industry, 2017

From the above graph, it can be understood that the total trade in services is at 13.7€ billion and 14.4€ billion for the period of 2016 and the balance stood at 0.8€ billion. It witnessed a growth against 11.7€ billion for exports, 12.5€ billion for imports for the period of 2015, however the balance was at 0.7€ billion. For the period of 2014, it was 12.6€ billion and 11.7€ billion for imports and exports respectively. However, the balance in trade remained at a negative of 0.9€ billion. Hence, in comparison we can conclude that the balance in trade is increasing between European Union and India.

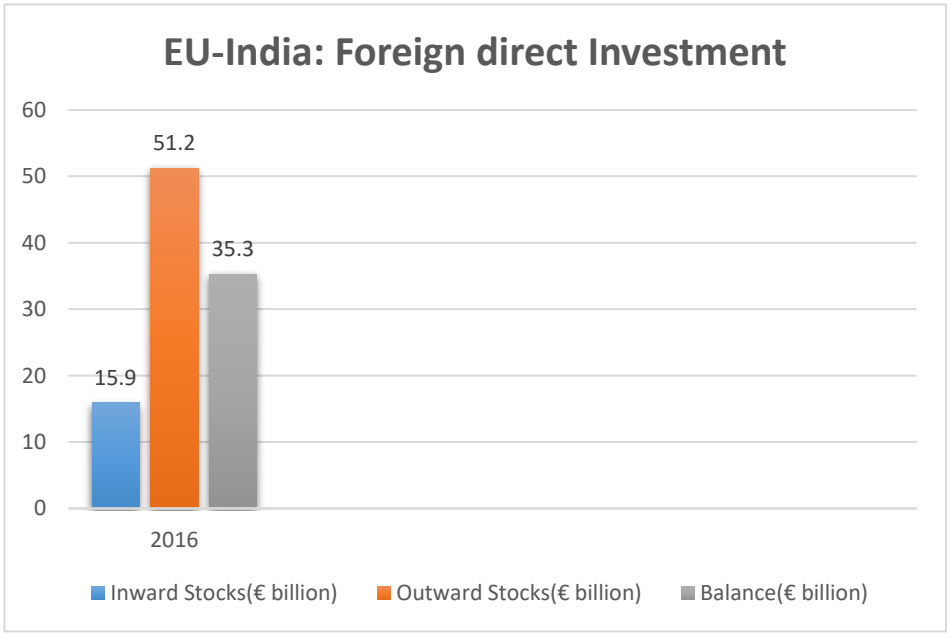

Figure 20 - EU-India Foreign direct Investment

Source: Government Of India, Ministry Of Commerce and Industry, 2017

The above graph is a description of the Foreign direct Investment on the two countries. For the inward stocks and the outward stocks it was 15.9€ billion and 51.2€ billion respectively for the period of 2016. The balance stood at 35.3€ billion.

The Annexure 6.8 represents the key figures for India's trade relation with Europe. The total trade between the two countries was 77,021 Mio Euros and a negative balance of -1,530 Mio Euros occured between them. Europe stood in the 9th rank with imports in India's list and 10th in the exports list. The annual average growth rate was 1.1 Mio Euros for imports and a negative value of 0.6 Mio Euros for exports. Data sourced from European Commission, Directorate-General for trade.

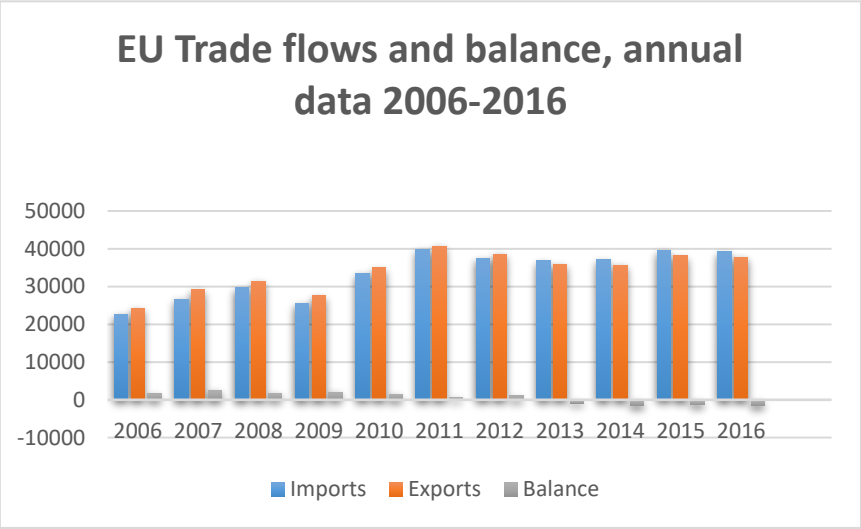

Figure 21 - European Trade Flows and Balances

Source: Eurostat Comext- Statistical Regime 4

The above graph and Annexure 6.9 denotes the total goods for European Union and their trade flow and balances are depicted below. The highest Import value was obtained during the period of 2011 accounting to 39,927 as compared to the lowest 2006 which was 22637. With the Exports section the highest also was obtained during the same year of 2011 with 40648 and the lowest was 2006 amounting to 24241. The highest balance was during the period of 2007 totalling to 2515. All the values are denoted in Mio€**.** Hence it becomes easy to say that the period of 2011 was a flourishing period for the European Union in international trade, also the trade relations is occuring at a constant rate and the trade relations between the two countries is stable.

3.7 Portugal trade with India

On May 20, 1498, Portuguese explorer Vasco da Gama landed in what is now Kozhikode, India. Da Gama was the first European to reach the lucative trade centers of India by sea. Portugal and other European empires had been trading with communities in India and throughout Southeast Asia for centuries. The legendary Silk Road was an overland trade route that linked the spice markets of the east with the bustling commerce of the west. Travelling in the territories of the Mediterranean Sea and Arabian Peninsula was dangerous and time consuming.(Oliver J. Thatcher, ed., The Library of original sources-Milwaukee: University Research Extension Co., 1907, Vol V: 9th to 16th centuries, pp.26-40).

Da Gama and his fleet used well travelled routes to navigate down the western coast of Africa. After re supplying in the Canary islands, da Gama took a chance and sailed west into the Atlantic ocean, taking advantage of the strong, reliable winds called Westerlies to quickly steer him to the southern coast of Africa. Da Gama and his fleet rounded the Cape of Good Hope in December 1497, and named the nearby coast Natal. He established poor relations with leaders in what are now the coasts of Mozambique and southern Kenya- the Europeans became pirates of Arab trading shios in this region.(The First Voyage of Vasco Da Gama, E-G. Ravenstein).

In what is now the port of Malindi, Kenya, da Gama met and interacted with Indian merchants and sailors. They advised him on favourable monsoon winds of the western Indian Ocean, and da Gama hired an experienced Indian Navigator to guide his fleet to the trade center of Calicut (now known as Kozhikode). Da Gama's sea route to India allowed Portugal to establish a rich trade with India and southeast Asia. Portugal was also able to expand its empire to include provinces from India (centered around the state of Goa, whose largest city is Vasco da Gama) to China (the island of Macau). (Howard la Fay, National Geographic, November 1992).

" *While Portugal's annual exports to India are worth €1200 million, India's exports to Portugal are only worth €500 million, so it is the right time to boost trade and investment between the two nations*", said Portugal Prime Minister Antonio Costa – (The Hindu Business Line dated January 9, 2017).
India's relations with Portugal remain close and friendly. Relations between India and Portugal began in 1947 after India's independence and diplomatic relations were established in 1949. The Bilateral relations went to decline after 1950 over Portugal's refusal to surrender its enclaves of Goa, Daman Diu and Nagar Haveli on India's west coast. The diplomatic relations were cut off between the two nations in 1995 due to a crisis which started the liberation of Goa by Indian military forces, ending the Portugal rule over India in 1961, bringing 451 years of Portuguese overseas provincial governance in Goa. A treaty of bilateral trade relation was signed again in New Delhi on December 31, 1974, and the countries shared their amicable trade relations.

Values in US$ Million

	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017(July)
EXPORTS	528.46	627.00	636.43	589.64	671.17
% Growth		18.65	1.50	-7.35	13.83
India's Total Export	300,400.58	314,405.30	310,338.48	262,290.13	276,280.29
%Growth		4.66	-1.29	-15.48	5.33
%Share	0.18	0.20	0.21	0.22	0.24
IMPORTS	378.21	339.98	145.05	102.54	141.16
% Growth		-10.11	-57.34	-29.30	37.66
India's Total Import	490,736.65	450,199.79	448,033.41	381,006.63	384,319.29
%Growth		-8.26	-0.48	-14.96	0.87
%Share	0.08	0.08	0.03	0.03	0.04
TOTAL TRADE	906.67	966.98	781.48	692.19	812.34
% Growth		6.65	-19.18	-11.43	17.36
India's Total Trade	791,137.23	764,605.09	758,371.89	643,296.75	660,599.58
%Growth		-3.35	-0.82	-15.17	2.69
%Share	0.11	0.13	0.10	0.11	0.12
TRADE BALANCE	c	287.02	491.38	487.10	530.01
India's Trade Balance	-190,336.07	-135,794.49	-137,694.93	-118,716.50	-108,039.01

Table 3 - Trade Exchange between India and Portugal

Datas sourced from Government of India, Ministry of Commerce & Industry-Export Import Data bank-Version 7.1-Tradestat accessed on July 15, 2017.

Bilateral trade has been growing steadily during the past few years. Major articles of export from India include : Cotton, Fish & Crustaceans, Iron and Steel, Machinery and Mechanical Appliances, Footwear, Plastics and articles, Man made fibres, Chemicals. Major articles of import from Portugal are Machinery and Mechanical Appliances,

Electrical machinery and equipments, plastics, organic chemicals, copper and articles, paper, raw hides and skins. (Embassy of India www.eolisbon.in India-Portugal Relations)

For the period of 2016-2017, bilateral trade was US$ 812.34 million. Portugal ranks 56th in Foreign Direct Investment to India, with total FDI inflows accounting to 36.49 million (Diplomatic trade relations *country wise*. Accessed on July 3 2017).Indian exports stood at USD 671.17 million and Portuguese exports at US$ 141.16 million. Trade balance favoured India. The trade between these countries increase by 120 Mn over the previous year share of 692.19 Million, which accounts for increase in 17.3%. It can be said that trade between these countries in increasing and resulted in a positive growth percentage for the current year. The below table shows the trade relationship from 2012-2013 to 2016-2017.

Year (April-March)	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
Exports	528.46	647.00	636.43	589.64	671.17
Imports	378.21	349.98	145.05	102.55	141.16
Total Trade	906.67	996.98	781.48	692.19	812.34
Percentage Growth	9.38	6.65	-19.18	-11.43	17.36

Table 4 - Indian Export and Imports with Portugal

Source: Indian Directorate General of Foreign Trade Accessed on 3 July 2017.

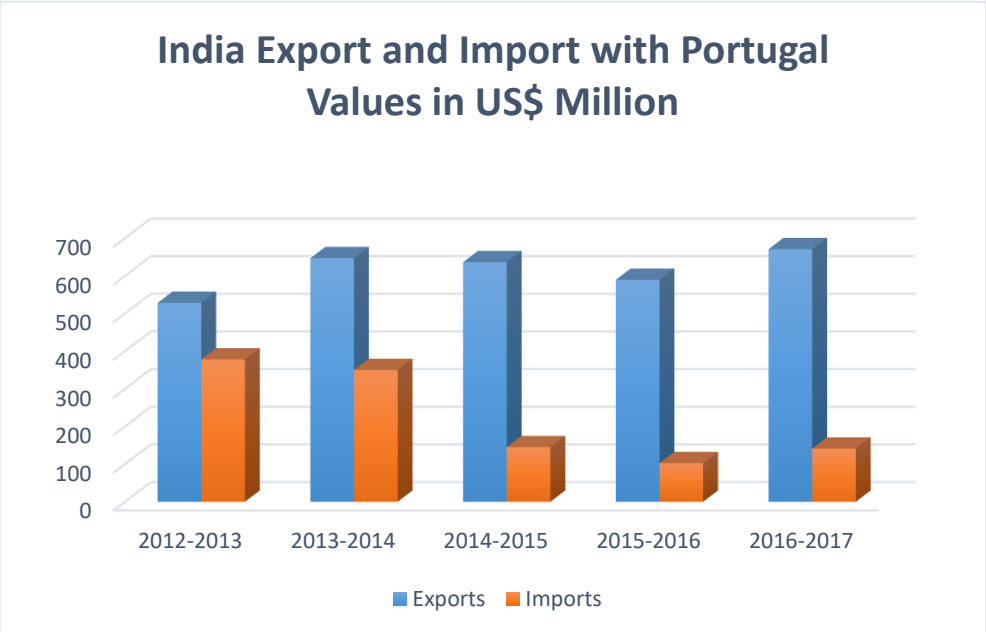

Figure 22 - India Export and Import with Portugal

3.7.1 India Exports to Portugal

Exports to Portugal in India decreased to 3.89 INR Billion in January 2017 from 4.10 INR Billion in December of 2016. The exports to Portugal averaged 1.21 INR Billion from 1991 until 2017, and it reached an all time high of 5.4INR Billion in December 2015 but recorded low of 0.05 INR Billion in October 1991. (Reserve Bank Of India).

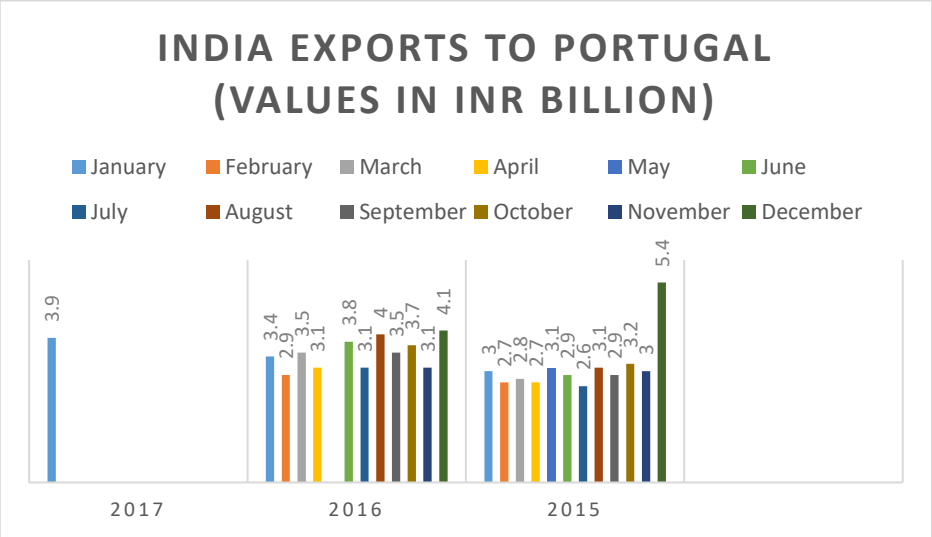

Figure 23 - India's Exports to Portugal

The Annexure 6.10 gives the data on the goods that are exported from India to Portugal. All the values are in US$ Million.
Datas sourced from Government Of India, Ministry of Commerce & Industry Export data Bank – Version 7.1 Tradestat Accessed on 15 July 2017.

From the annexure it is understood that India's total for the export of good in 2015-2016 stood at US$262,290.13. The value rose to US$275,280.29 during 2016-2017 accounting for a 1.8% increase in the current year. Total trade balance between the two countries increased from US$ 589.64 Millions to US$ 669.66 Millions amounting to US$ 80.02 million increase in the current year.

3.7.2 India's Import From Portugal

India's import of goods from Portugal increased to 0.93 INR Billion in January 2017 from 0.74 Billion in December 2016. Imports form Portugal averaged an amount of 0.32 INR Billion from 1991 till 2017, reaching all time high of 3.25 INR Billion in March 2013 and recorded low of 0 INR Billion in April 1991.

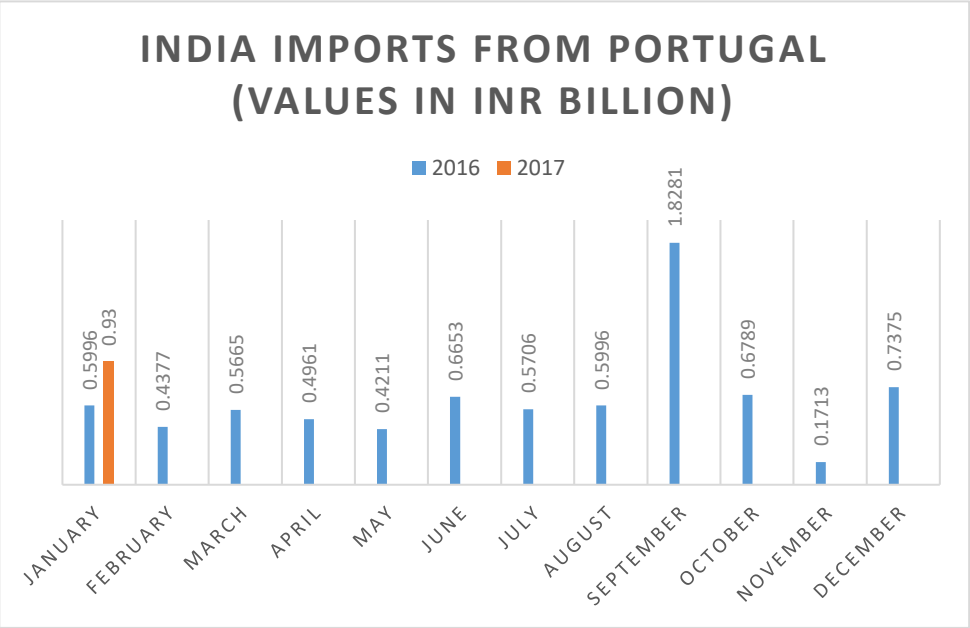

Figure 24 - India Imports from Portugal

Datas sourced from Government Of India, Ministry of Commerce & Industry Import data Bank – Version 7.1 Tradestat Accessed on 15 July 2017.

The Annexure 6.11 gives information on some of the goods that are imported to India from Portugal. All the values are in US$ Million.

Datas sourced from Government Of India, Ministry of Commerce & Industry Import data Bank – Version 7.1 Tradestat Accessed on 15 July 2017

From the annexure it is observed that India's total share in imports for 2015-2016 stood at US$ 381,006.60 and is at US$ 384,355.55 for the period of 2061-2017 while the percentage of share went up by 23% for the current year with trade share amounting to 0.269 and 0.0367 for 2015-2016 & 2016-2017 respectively.

3.8 SWOT Analysis Of Indian Import Export

Strengths	**Weakness**
S1- fastest growing major economy S2- Foreign direct investment increases S3 – Economic Reforms S4 – Optimal Use of natural resources	W1 - volatile market prices W2 – impediment in development of home industries
Opportunities	**Threats**
O1-Banks facilitate the financing O2 – Free Trade Agreements O3 – More Employment	T1- Trade barriers T2 – Standards, Testing, labeling and certification T3 – Anti Dumping and countervailing measures T4 – Restrict FDI in Sensitive sectors

Table 5 - Swot Analysis Of India's trade

SWOT analysis is a useful method of summaries of all the information generated during the export planning. These help to isolate the strong and weak areas within the export strategy.

SWOT also indicates the future opportunities or threats that may exist in the chosen markets and is instrumental in strategy formulation and selection.

3.8.1 Strengths

S1- fastest growing major economy
The Gross Domestic Product growth of 7.9% in the first quarter of 2017, India overtook China as the fastest growing economy in the world. Despite volatility in global markets, India’s stock market stood firm. (The Brics Post, 28-06-2017)

S2-Foreign direct investment increases
With the increasing import-exports of India, foreign direct investments increased by 3409 USD Million in July of 2017. This averaged 1252.56 USD Million from 1995 until 2017. (Trading Economics, India FDI August 2017)

S3 – Economic Reforms
Stronger business and consumer confidence are the key to international trade. In the Union Budget 2017, the Indian Government rolled out reform initiatives and measures to target focus on global economy trade. The introduction of GST (Global Sales Tax) which is replaced by VAT (Value Added Tax) enables the country to unify the trade into a single market and ease the process of doing business. However, GST will not affect exports of goods and services. (The National Council for Applied Economic Research (NCAER)).

S4 – Optimal use of natural resources
International trade helps each country to make optimum use of its natural resources. Each country can major on goods which its resources are best suited, hence wastage of resources is avoided. Example: India is best in handicrafts and cottage industries and is a major component in export to other countries. The total value of exports for this sector stood at 24392.39 INR crores for the period of June 2016-June 2017.(Indian Export promotion council for handicrafts annual report).

3.8.2 Weakness

The weakness are classified as follows

W1- Volatile market prices
India's exports have been falling for 17 months in a row, and dropped by 6.7% compared to the same time last year. 2015-2016,was the first time in six years that India's volume of exports decreased. This happens as considerable amount of India's total exports comprises either raw materials such as precious metals (12%) and natiral resource based products like refined oil (32%); both of which are highly exposed to volatile market prices. (The Brics Post, 28-06-2017)

W2 - Impediment in development of home industries
The international trade has an adverse effect on the development of home industries, also it plays a threat to the survival of emerging industries at home country. Due to foreign competiton and unrestricted imports, the emerging industries may collapse. To condiser this, coffee and tea is a well established sector in India and due to the rising imports of the same , home industries which process coffee and tea suffer a risk. Coffee and tea imports to India stood at US$ 771.29 million for the period of 2016-2017 (April-August) as against US$ 299.25 million for the same period of 2015-2016. (Government of India, Minstry of Commerce and Industry, Department of Commerce, Press Release dated 31 August 2017).

3.8.3 Opportunities

The external environmental analysis may reveal certain new opportunities for profit and growth. Such factors of opportunities include:

O1- Banks facilitate the financing
With the increase in imports and exports, it becomes an opportunity for many bankers to finance the trade which can actively attract many companies bank with them, thus increasing their share. International banks have the essential access to the cross border banking connections that Indian exporters need. This helps India's foreign trading partners travel new and unfamiliar territories by absorbing the risks for foreign counter parties.(The Brics Post, 28-06-2017).

O2 – Free Trade Agreements
With the rising import export and strong trade relations between the two countries, free trade policy occurs,by which the government does not restrict imports from, or exports to the respective country. One example of free trade is the trade agreement between the United states, Mexico and Canada known as the North American FreeTrade Agreement (NAFTA) which was established on January 1, 1994.(United States Economy, Definition, Types and examples).

O3 – More Employment
International trade brings in lot of employment opportunities as more number of people are required to support this sector. India depends heavily on its service industries for economic expansion as it holds a dominant share of the global trade and requires support from information technology (IT) and business process management (BPM). Export information from IT-BPM services are mainly to the developed countries, in particular to the US and Europe. The economy of this sector reached US$154 billion in the fiscal year 2017.(India Market Profile-HKTDC Research).

3.8.4 Threats

Changes in the external environmental may also contribute to the this factor. Other examples of such threats include:

T1 – Trade barriers
Any restriction imposed on the free flow of trade is a trade barrier. One of the most common non tariff barriers is the prohibition or restrictions on imports maintained through import licensing requirements. Although India has eliminated its import licensing related trade barriers, certain products still face the same. For example, Indian government requires a special import license for motorcycles and vehicles that is very restrictive. (Ministry of Chamber and commerce, Indian Government Accessed 19-06-2017).

T2- Standards, testing, labeling & Certification
The Indian Government has identified 109 commodities that must be certified by its National standards body, the Bureau of Indian Standards (BIS). Food related certifications go under the Food Safety and Standards Authority of India which is established under the Food Safety and Standards Act,2006 as a statutory body for standards for articles of food and regulating manufacturing, processing, distribution and sale and import of food.(Food safety and standards authority of India, circular dated 02-11-2016)

T3 – Anti Dumping and countervailing measures
These measures are permitted by the World Trade Organisations in specified situations to protect the domestic industry from serious injury arising from dumped or subsidized

imports. This policy has been followed by India from time-to-time to protect any such accidents. In recent years, India seems to have aggressively increased its application of the anti dumping law.(Export and International Trade Administration, India country commercial guide, 8-1-2017).

T4 – Restrict FDI in sensitive sectors
Equity restrictions and other trade related investment measures are currently in place which give an unfair advantage to domestic companies. The Government of India continues to restrict or prohibit FDI in sensitive sectors such as retail trade and agriculture. Additionally there is an unpublished policy that favors counter trade. Example include the Jawaharlal Nehru National solar mission (JNNSM). (Make in India Policies, Restrictions in foreign direct trade).

3.9 Sea Routes Between India and Portugal

3.9.1 Direct Vs Transhipment Services

Ships that are required to carry cargo must fill their capacity to the maximum to benefit profit and economize the cost. It also helps in continuous serivce between the two countries. Before deciding the operations cost, calculation of the market requirement and the demand of the cargo must be given prime importance. Based on the number of services offered in between the ports, port stay time, voyage time and other related factors related complete one voyage from the port of starting and reaching back the same port, the amount of vessel is decided. The international trade between countries is exchanged through bankers on faith and a letter of credit or other agreements based on the relationship of parties.

- Direct service

It can be coined as an independent or alliance shipping line, operating services from one port to another port or group of ports, without transshipping. Direct service means a service under which a vessel operator carries the container / cargo from the point of loading to the port of destination without off loading the container in any trans shipment ports enroute. For example, K Line operates a direct service route from Leixoes to Rotterdam. In this route, the ship is loaded at the port of loading and directly shipped to port of discharge.(information from website www.grip.kline.co.jp)

- Trans Shipment service

It may be termed as an independent or alliance shipping line operating services operating services connecting only hub ports from the port of loading and trans shipping the containers to smaller ports through feeder vessels. It may also be stated that trans shipment service through which the container / cargo is carried by a feeder vessel from the Gateway port and delivered to the final port of destination undergoing trans shipment in different hub/hub ports. During this voyage, in the first leg, the container

will be carried from the port of loading to the trans shipment hub. From this point, it will be offloaded from the vessel and will be loaded in the next vessel which will transport it to the desired port. For example, shipment from Leixoes to Chennai port takes trans shipment in which in the first phase of its journey, ship travels from Leixoes to Rotterdam, further continued till Colombo and from there it reaches its destination port-Chennai. (information from website www.grip.kline.co.jp).

Presented below is the chief shipping lines operating in the world at present.

Chief Shipping Lines in the world	
Shipping Routes	**Regions Connected**
The North Atlantic Route	W.Europe, E.Canada and USA
The Mediterranean-Red Sea-Indian Ocean Route	N.W.Europe, Mediterranean, E.Europe, S.Asia and E.Asia
The Cape Route	W.Europe, Africa, Australia via Cape of Good Hope
The South Atlantic Route	S.E.South America, N.W. Europe, Mediterranean
The Panama Route	E.N.America, W.United States, W.Canada, Chile
The North Pacific Route	W.N.America, E.Asia, N.America, Australia
Note: N-North, W-West, S-South, E-East	

Table 6 - Chief shipping routes of the world

Information sourced from World Shipping council, Linear market shares BRS report for routes, January 2015.

3.9.2 Sea Routes between Portugal to India

Different companies follow different routes for their voyage. Presented below is the detailed description of K Line for their journey from Portugal to India. It can be observed from their route schedule that they trans-ship their shipment for Portugal to India route. Other than K Line companies which offer shipment from Portugal to India are mSC, CMA-CGM & MOL. For comparison purposes, mSC & CMA-CGM are compared for routings and costs.

The major sea ports in Portugal in which K Line operates are

- Leixoes
- Lisboa

It operates to Indian ports which are as follows

- Kolkata
- Cochin
- Chennai
- Tuticorn
- Haldia
- Vizag
- Nhava Sheva

From here, other ports of India are covered either by road or railway network.
Below is the detailed explanation of routes of K Line along with its competitors.

➢ Leixoes – Indian Ports

The Annexure 6.12 describes the route information from Leixoes to different ports of India. Although majority of carriers operate between this route, K Line, mSC, MOL & CMA CGM are choosen as they are the main carriers who operate between these routes. The above information is dated for 16 September 2017 and is sorted by the earliest departure schedule. The price information have been sourced from the respective company sources and is effective till 30 September 2017. There are different schedules operated by them, but explained here is the shortest time (Earliest Departure, Earlier Arrival) taken by them to reach the port of destination.

➢ Lisboa to Indian ports

The Annexure 6.13 explains the different routes provided by the major carriers which ship from Portugal to Europe. Currently It can be clearly understood that it follows a trans-shipment between the two countries. The above information is sourced from their respective company website. It is effective till 30 September 2017. There may be different routes and time schedules provided by the operators but explained here is the shortest time (Earliest departure, Earliest Arrival) taken by them to reach the port of destination.

➢ Sines to Indian Ports

The Annexure 6.14 describes the routes along with the cost of operating from Sines to major Indian ports. It is to be noted that K Line does not operate from Sines and only the other two major carriers mSC and CMA-CGM operates between them. However in close comparison with the other two major ports of Portugal, Sines takes a longer duration in average to reach the port of destination even though the cost of operation is nearly the same. Respective information is sourced from the company website and routings and cost are effective till 30 September 2017.

3.9.3 Advantages and disadvantages of Direct & Trans-shipment

As explained in the previous section the explanation of direct and trans shipment services, it is now beneficial to understand the advantages and disadvantages of both. As seen above, the different routes between India and Portugal, the advantages & disadvantages may be concluded as:

- Containers take a longer time to reach
  As seen from the tables above, it is understood that majority of routes follow a trans shipment route and only one route is offered as a direct service. In trans shipment service, it can be understood that containers take a longer duration to reach the port of destination.

Ice Crystal / 010N	IBESCO-A / N	Lisbon [PTLIS]	Sotagus/Tcsa	17/Sep/2017 (Sun) 22:00	Rotterdam [NLRTM]	Rotterdam World Gateway	18/Sep/2017 (Mon) 22:00
Bremen Express / 057E	FE5 / E	Rotterdam [NLRTM]	Ect Delta Tml	27/Sep/2017 (Wed) 02:00	Colombo [LKCMB]	Colombo Intl Container Terminal	21/Oct/2017 (Sat) 09:00
	Feeder	Colombo [LKCMB]		21/Oct/2017 (Sat) 09:00	Chennai [INMAA]		26/Oct/2017 (Thu) 09:00

Figure 25 - K Line route from Lisbon to Chennai

Containers take a longer duration to reach the final destination as many days are wasted in the trans shipment ports. From the above figure it is clear that the containers remain idle for a period of 9 days, hence reaching the port of destination 9 days later which can prove unsatisfactory to the customers. Example sourced from www.grip.kline.co.jp

- Inventory Costs
  The major problem of trans-shipment also charges the container for inventory costs. The more number of days the container stays at the port, it incurs additional cost which are to be borne by the carriers. Hence if an option of direct service is followed, additional costs such as inventory, handling costs can be reduced. (Shipping Economics, Ross Robinson, pg 267-231)

- More number of human labour
  For a trans-shipment route, additional human labour is required to operate the containers. This can be either in the form of loading or off loading the containers from the vessels. In general, labour requires money to do operations and hence transhipment can charge for labour.(Franceso M Di, Fancello G et al (2015), Optimal management of human resources in transhipment container ports).

- Additional Revenue to the carriers
  Trans-shipment benefits the carriers. In broad terms, it can be said that in trans-shipment locations, additional shipments can be loaded in the vessels, hence offering revenue to the carriers. This can be one of the major reasons why carriers often follow a trans-shipment route even though the time consumed is

high.(A survey of trans shipment in Pacific Island and countries-Opportunities for increasing benefits and improving monitoring:1-70).

3.10 Highlights of K Line concerning Portugal and India trade

With the market research and increasing trade relations between the two countries, forecast predicts that international trade between these countries will grow in the coming years. Both these countries depend on each other for the goods and bilateral trade is made possible with the help of several carriers travelling in this route. With the ever growing trade, several competitors help by offering cut throat competition with low cost and less time for the delivery. K Line also plays a major role in this sector by offering frequent vessels for their operation between these routes and in close comparison with their competitors, they offer less cost by delivering in the port of destination. K Line can reduce their period of wait in the trans shipment port so that the vessels reach the destination even more faster. In relation with the title of this dissertation, market study of India proves a increasing trend for future years and K Line can increase their profit for this route by operating more number of vessels between these countries.

CONCLUSIONS

4.1 CONCLUSIONS

4.1.1 Market study of India

4.1.2 Effective sea route between Portugal and India

4.2 Proposals of Future Works

4 CONCLUSIONS AND PROPOSALS OF FUTURE WORKS

4.1 CONCLUSIONS

4.1.1 Market study of India

Regarding the Indian international trade, the exports are expected to reach $750 billion by 2018-19 with improvement in the global trade scenario.(The Economic Times 17 September 2017). Despite the current uncertainities on global growth, The World Trade Organisation (WTO) forecasted the growth in volume of global trade from 1.3% in 2016 to 2.4% in 2017. The global trade has surpassed this forecast and is growing in the range from 1.8% to 3.6%. This can further continue ranging between 2.1% to 4% in 2018. The 2.4% growth in global trade volume in 2017 is because of stagnating imports to developed countries which touched 2%. The demand for imports rose mainly from Asian and European countries.

A complete analysis was done on the import export list of goods between Europe and India. This was made possible because of the easily available data from the respective Government sources and a comparison was done for the past 5 years. More focus was given on the trade between India and Portugal and the importance of this trade is studied thus achieving a complete justice to the market study section of this dissertation.

4.1.2 Effective sea route between Portugal and India

To find the effective sea route between countries of Portugal and India, from annexure 12, 13 & 14 it can be understood that majority of the carriers follows a trans-shipment route and only one direct route is available but with a high cost of operation. In my point of view, routes operating from Lisbon & Leixoes to Indian ports can be considered as effective routings as demand from these two ports is high in regard to the number of services offered by different carriers. In order to estimate the perfect route from Portugal to India, it becomes difficult as the trend in demand from these areas have to be studied, the selection of Trans-shipment port in view of distance, waiting time, cost should be considered which could not be done in a period of 6 months due to high data in demand, many number of ports for loading, unloading and transhipment. Given a database with the above mentioned difficulties, it might become a easy solution to provide a perfect route in terms of less cost less time between the two countries.

4.2 Proposals of Future Works

The growth in shipping container demand will increase the container volume in the upcoming years, leading the over capacity in shipping industry to significantly worsen and also double by the end of 2020.(Boston consulting Group-15 August 2017). This consultant predicts growth between 2 and 3.3 million TEUs by the end of 2020. Industry capacity also will grow in the range of 8.2% and 13.8% by the end of 2020, which is 7% in demand in the current year. Global container traffic will grow between 2.2% and 3.8% in the following years and with the increasing demand for international trade in India, K Line should consider increasing their vessels to offer more services. Also in comparison with the cost and duration offered by its competitor, K Line can revise their cost policy and also reduce the number of days in the trans-shipment port by organising a faster service vessel from that port. Hence if cost and the waiting period is reduced, it can attract more customers.

In an article in 'The Economic Times' dated 18 September 2017, states that Maersk Line is expanding its cargo-shipping role in India to establish as a provider of end-to-end supply chain solutions that would include doorstep delivery. This would include the company's involvement in the road and railway legs of shipments for importers and delivering consigments at factories or warehouses. Hence, K Line could look upon it and instead of just doing a port to port business, it can go the extra mile in delivering inland container depots to the costumer's premises which can help increase revenue and create more value proposition for customers.

REFERENCES AND OTHER SOURCES OF INFORMATION

5.1 Websites

5.2 Research papers

5 REFERENCES AND OTHER SOURCES OF INFORMATION

5.1 Websites

1. K Line intranet: www.grip.kline.co.jp Accessed on 14 September 2017
2. K Line website: www.klineurope.com Accessed on 06 June 2017
3. Msc website: www.msc.com Accessed on 14 September 2017
4. CMA-CGM website : www.cma-cgm.com Accessed on 14 September 2017
5. www.eoilisbon.in Accessed on 15 July 2017
6. www.fd.ulisboa.pt Accessed on 16 July 2017
7. www.ec.europa.eu Accessed on 16 July 2017
8. www.commerce.gov.in Accessed on 15 July 2017

5.2 Research papers

Adam Smith.(1986), The Wealth of Nations, ISBN 13:9780140400120

Al-Bakery, Thamer, (2006). Marketing Communications and Promotion, The first edition, Dar AlHamed for publishing and Distribution, Amman, Jordan

Balmer, John M. T. (2001). Corporate Identity, Corporate Branding and Corporate Marketing – Seeing Through the Fog. European Journal of Marketing, Vol. 35, No. 3/4, pp. 348-291

Barabba, V. P., & Zaltman, G. (1991). Hearing the Voice of the Market: Competitive Advantage through Creative Use of Market Information. Dar Al-Hamed for Publishing and Distribution, Amman, Jordan

Blind, K. & Gauch, S. J Technol Transf (2009) 34: 320. https://doi.org/10.1007/s10961-008-9089-8Creswell, John W. (2003). Research Design – Qualitative, Quantitative, and Mixed Methods Approaches. 2nd Edition. California: Sage publication Ltd.

Bush, S., Connell, M., & Denney, R. (2006). Ethical practice in forensic psychology. Washington, DC: American Psychological Association

Creswell, John W. (2003). Research Design – Qualitative, Quantitative, and Mixed Methods Approaches. 2nd Edition. California: Sage publication Ltd.

Cudahy, Brian J., "Box Boats: How Container Ships Changed the World" (2007).

Dekeba, Alemayehu. 2003. —Basic of Marketing Research Methods‖ URL: http://www.globusz.com/ebooks/MarketingResearch/index.htm Econometrica 76 (5), 1017– 1074.

Gould, M.D., Porter, M.A., Williams, S., McDonald, M., Fenn, D.J. and Howison, S.D., Statistical properties of foreign exchange limit order books, 2011

Gupta, M. C., & Di Benedett, C. A., (2007). Optimal pricing and advertising strategy for introducing a new business product with threat of competitive entry. Industrial Marketing Management. Vol. 36 (4), 540–548.

Helpman, Elhanan, (1981), International trade in the presence of product differentiation, economies of scale and monopolistic competition: A Chamberlin-Heckscher-Ohlin approach, Journal of International Economics, 11, issue 3, p. 305-340

Jaworski, B. J. and A. K. Kohli (2000), "Market Orientation: Antecedents and Consequences," in Journal of Marketing, 57 (3), 53-70

Levinson, M. 2006. The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger. Princeton University Press. p. 1

McDonald, M. (2002). How come your marketing plans aren't working?: The essential guide to marketing planning. London: Kogan Page Limited

Metaxas BN (1971) The economics of tramp shipping. The Athlone Press of the University of London, London

Notteboom T (2002) Current issues in port logistics and intermodality. Institute of Transport and Maritime Management Antwerp and Institute of Maritime Transport and Seaborne Trade, Antwerp

Nevo, A., (2001). Measuring market power in the ready-to-eat cereal industry. Econometrica 69 (2), 307–342

Payer, H.G., (1999) "Feasibility and practical implications of container ships of 8000, 10,000 or even 15,000 Exhibition

Rantasila, K., Pilli-Sihvola, E., Permala, A., 2012 Technologies enabling efficient transport monitoring, 5th European Conference on ICT for Transport Logistics, November 2012, Gothenburg, Sweden

Steenken, D., Voss, S. and Stahlbock, R. (2004) Container terminal operation and operations research: a classification and literature review, OR Spectrum, 26(1), pp. 3–49

Stopford (2004), World Shipbuilding 2004, Advance Press Conference SMM 2004

Suez Canal Authority (2008) About Suez Canal. http://www.suezcanal.gov.eg/sc.aspx?show=17

Van den Bulte Christophe, Yogeh V. Joshi (2007), "New Product Diffusion with Influentials and Imitators", Marketing Science, 26 (3), 400-21

Van Everdingen, Y., & Fok, D. S. S., (2009). Modeling global spillover of new product takeoff. Journal of Marketing Research, Vol. 46 (5), 637–652

ANNEXES

6.1 Cargo traffic handled by major and non-major ports of India

6.2 Cargo handled at major ports

6.3 Exports & Imports Trade data

6.4 India's top 10 imports for 2016-2017

6.5 India's top 10 exports for 2016-2017

6.6 India's trade with major countries

6.7 Top 10 major export companies of India

6.8 Key Figure's of India's trade relation with Europe

6.9 Total goods: EU trade flows and balance

6.10 Goods exported from India to Portugal

6.11 Goods Imported to India from Portugal

6.12 Sea Route from Leixoes to Indian Ports

6.13 Sea Routes from Lisbon to Indian Ports

6.14 Sea Routes from Sines to Indian Ports

6 ANNEXES

6.1 Cargo traffic handled by major and non-major ports of India

Source: Indian Ports Association, Major port Statistics

Cargo traffic Handled By Major and Non-Major Ports Of India		
(In Million Tonnes)		
Period	**Major Ports**	**Non Major Ports**
2001-2002	287.58	95.52
2002-2003	313.55	108.3
2003-2004	344.8	118.86
2004-2005	383.75	138.20
2005-2006	423.56	155.42
2006-2007	463.83	181.11
2007-2008	519.31	206.37
2008-2009	530.53	213.22
2009-2010	561.09	289.32
2010-2011	569.91	314.64
2011-2012	560.19	353.74
2012-2013	545.83	387.92
2013-2014	555.49 (1.8)	416.96 (7.5)
2014-2015	581.34 (4.7)	470.89 (12.9)
2015-2016 (P)	606.37 (4.3)	466.1 (1.0)
2016-2017 #	315.42 (5.2)	234.32 (4.9)

Annexure 1 – Cargo Traffic Handled by Major and Non Major Ports Of India

6.2 Cargo handled at major ports

Port	Traffic Period	P.O.L(Crude, LPG/LNG)	Other liquids	Iron Ore Including Pellets	Fertilizers		Coal		containers		Other Misc. cargo	Total	% Var against 2016-2017
					Fine	Raw	Thermal, Steam	Cooking, others	Tonnage	TEUs			
Kolkalta Kolkata Dock System	April-Aug 2017	. 278	350	-	59	9	7	147	4089	266	1936	6875	
	April-Aug 2016	318	294	-	38	-	-	517	4299	279	1628	7094	-3.09
Kolkata Haldia Dock System	April-Aug 2017	3452	2066	640	209	118	799	4640	1044	57	3129	16097	
	April-Aug 2016	2632	1848	68	48	90	599	5103	590	40	2540	13518	19.08

Total Kolkata	April-Aug 2017	3730	2416	640	268	127	806	4787	5133	323	5065	22972	
	April-Aug 2016	2950	2142	68	86	90	599	5620	4889	319	4168	20612	11.45
Paradip	April-Aug 2017	14418	648	4419	4	1806	10438	5009	25	2	3607	40374	
	April-Aug 2016	10715	870	2857	20	1614	12147	4212	28	1	3403	35866	12.57
Visakhapatnam	April-Aug 2017	6948	856	4581	860	411	2983	2338	2662	154	3806	25445	
	April-Aug 2016	6655	756	4262	938	379	4137	1983	2687	156	3975	25772	-1.27

Kamaraj (Ennore)	April-Aug 2017	1751	44	-	-	-	9279	-	-	-	1005	12079	
	April-Aug 2016	1686	46	-	-	-	9716	79	1	-	1012	12540	-3.68
Chennai	April-Aug 2017	5747	703	-	-	52	-	-	12751	661	2711	21964	
	April-Aug 2016	5494	518	-	12	87	-	-	12195	632	3640	21946	0.08
V.O Chidambaranar	April-Aug 2017	294	338	-	60	381	3502	1337	5644	281	2923	14479	
	April-Aug 2016	289	391	-	207	375	4845	1704	5468	272	2946	16225	-10.76

Cochin	April-Aug 2017	8071	146	-	15	98	-	-	3166	228	435	11931	
	April-Aug 2016	6306	222	-	-	117	44	-	2807	202	447	9943	19.99
New Mangalore	April-Aug 2017	9587	790	1817	211	51	1496	1042	631	40	496	16121	
	April-Aug 2016	9417	686	124	167	26	1389	1553	538	36	333	14233	13.26
Mormugao	April-Aug 2017	257	246	3960	82	-	873	4084	161	11	1575	11238	
	April-Aug 2016	239	150	4065	68	-	1504	3372	158	11	1937	11493	-2.22

Mumbai	April-Aug 2017	15440	803	2865	88	30	1095	1797	262	20	3456	25836	
	April-Aug 2016	15383	893	2910	115	-	1191	1712	245	19	3103	25552	1.11
J.N.P.T	April-Aug 2017	1936	1102	-	-	-	-	-	24170	2020	327	27535	
	April-Aug 2016	1719	947	-	-	-	-	-	22949	1903	317	25932	6.18
Kandla	April-Aug 2017	24966	3652	450	1629	45	4656	116	659	44	7813	43986	
	April-Aug 2016	25108	3310	199	1957	165	7604	170	76	4	6604	45193	-2.67

All Ports	April-Aug 2017	93145	11744	18732	3217	3001	35128	20510	55264	3784	33219	273960	
	April-Aug 2016	85961	10931	14485	3570	2853	43176	20405	52041	3555	31885	265307	3.26
% variation from previous year		8.36	7.44	29.32	-9.89	5.19	-18.64	0.51	6.19	6.44	4.18	3.26	

Annexure 2 - Traffic Handled at major ports

6.3 Exports & Imports Trade data

Source: Reserve Bank Of India dated 14 August 2017

Exports & Imports (US$ Million)		
(Provisional)		
	July	**April-July**
Exports		
2016-2017	21689.57	87001.34
2017-2018	22543.80	94756.13
% Growth 2017-18/ 2016-17	**3.94**	**8.91**
Imports		
2016-2017	29450.97	113996.75
2017-2018	33993.61	146256.71
% Growth 2017-18/ 2016-17	**15.42**	**28.30**
Trade Balance		
2016-2017	-7761.40	-26995.41
2017-2018	-11449.81	-51500.58

Annexure 3 - Exports & Imports Trade data

6.4 India's top 10 imports for 2016-2017

Source : International Trade Database- India, 2017

S.No	Type Of Goods	Value (US$ Billion)	% Share (%) of total Imports
1.	Mineral fuels including oil	89.3	25
2.	Gems, precious metals	48.1	13.5
3.	Electrical machinery, equipment	37	10.4
4.	Machinery including computers	32.5	9.1
5.	Organic chemicals	14.8	4.1
6.	Plastics, Plastic articles	11.4	3.2
7.	Animal/Vegetable fats, oils, waxes	10.5	2.9
8.	Iron, Steel	8.7	2.4
9.	Optical, technical, medical apparatus	7.2	2
10.	Ships, boats	5.5	1.5

Annexure 4 - India's top 10 imports for 2016-2017

6.5 India's top 10 exports for 2016-2017

Source – World Economic Outlook Database, 2017

S.No	Type Of Goods	Value (US$ Billion)	% Share (%) of total Exports
1.	Gems, precious metals	43	16.5
2.	Mineral fuels including oil	27.7	10.6
3.	Vehicles	15	5.7
4.	Machinery including computers	13.6	5.2
5.	Pharmaceuticals	13	5
6.	Organic chemicals	11.3	4.3
7.	Clothing, accessories	9	3.5
8.	Electrical Machinery equipments	8.2	3.1
9.	Knit or crochet clothing, accessories	7.9	3
10.	Iron, Steel	6.4	2.5

Annexure 5 - India's top 10 exports for 2016-2017

6.6 India's trade with major countries

Year:2016-2017(July); Values in US$ Million

Rank	Country	Export	Import	Total trade	Trade balance
1.	China	10,196.69	61,286.24	71,482.93	-51,089.55
2.	U S A	42,331.32	22,343.53	64,674.85	19,987.79
3.	United Arab Emirates	31,305.80	21,498.20	52,804.00	9,807.60
4.	Saudi Arabia	5,134.63	19,945.17	25,079.80	-14,810.54
5.	Hong Kong	14,157.57	8,205.14	22,362.71	5,952.43
6.	Germany	7,213.14	11,583.64	18,796.78	-4,370.50
7.	Switzerland	980.19	17,248.68	18,228.87	-16,268.49
8.	Indonesia	3,501.46	13,437.43	16,938.89	-9,935.96
9.	Korea Republic	4,243.56	12,592.55	16,836.10	-8,348.99
10.	Singapore	9,568.95	7,086.45	16,655.40	2,482.50
11.	Malaysia	5,234.17	8,934.93	14,169.10	-3,700.76
12.	Australia	2,966.51	11,154.48	14,120.99	-8,187.97
13.	Japan	3,855.59	9,756.21	13,611.80	-5,900.62
14.	Iran	2,393.12	10,506.51	12,899.63	-8113.39
15.	Iraq	1,115.50	11,702.07	12,817.57	-10,586.57
16.	Belgium	5,668.68	6,624.63	12,293.31	-955.95
17.	United Kingdom	8,560.66	3,664.96	12,225.62	4,895.70
18.	France	4,925.46	5,707.78	10,633.24	-782.32
19.	Vietnam Social Republic	6,815.43	3,320.56	10,135.99	3,494.87
20.	Nigeria	1,771.33	7,659.48	9,430.81	-5888.15
21.	South Africa	3,554.43	5,813.22	9,367.65	-2,258.78
22.	Italy	4,947.77	3,896.67	8,844.44	1,051.09
23.	Thailand	3,174.49	5,415.40	8,589.89	-2,240.91
24.	Qatar	787.47	7,638.17	8,425.64	-6,850.70

Annexure 6 - India's total trade with Major Countries

6.7 Top 10 major export companies of India

Source: Forbes *2016 Global 2000 individual company profiles*, Example of top Indian company compiled here is Reliance Industries. Accessed on June 20, 2017
Trade Map, International Trade Centre. Accessed on June 20, 2017

S.No	Company	Value for Period- (2016-2017) US$ Billions	% Share (%) From 2015
1.	Indian Oil Corporation	70.6	Down -5.3%
2.	Reliance Industries	42.2	Down -42%
3.	Tata Motors	40.5	Up 17.4%
4.	Bharat Petroleum	38.4	Down -4.8%
5.	Oil & Natural Gas Corporation of India	26.1	Down -11.9%
6.	Tata Steel	18.7	Down -21.3%
7.	Hindalco Industries	16.9	Up 16%
8.	Coal India	11.8	Down -6.4%
9.	Mahindra & Mahindra	10.5	Down -15.7%
10.	Steel Authority of India	7.4	Down -9.5%

Annexure 7 - Top 10 Major Export Companies of India

6.8 Key Figure's of India's trade relation with Europe

Indicator	Unit	Period	Imports	Exports	Total Trade	Balance
Last Year	Mio Euros	2016	39,626	37,745	77,021	-1,530
Rank as EU partner		2016	9	10	9	
Share in EU trade	%	2016	2.3	2.2	2.2	
Annual growth rate	%	2015-2016	-0.5	-1.0		
Annual average growth rate	%	2012-2016	1.1	-0.6		

Annexure 8 – Key Figures of India's trade relation with Europe

6.9 Total goods: EU trade flows and balance

Period	Imports			Exports			Balance Value Mio €	Total trade Value Mio €
	Value (Mio€)	% Growth	% Extra-EU	Value (Mio€)	% Growth	% Extra-EU		
2006	22637		1.7	24241		2.1	1604	46876
2007	26666	17.8	1.8	29181	20.4	2.4	2515	55647
2008	29632	11.1	1.9	31356	7.5	2.4	1724	60988
2009	25503	-13.9	2.1	27499	-12.3	2.5	1996	53003
2010	33464	31.2	2.2	34985	27.2	2.6	1521	68448
2011	39927	19.3	2.3	40648	16.2	2.6	721	80575
2012	37528	-6.0	2.1	38595	-5.1	2.3	1067	76123
2013	36843	-1.8	2.2	35959	-6.8	2.1	-884	72801
2014	37147	0.8	2.2	35625	-0.9	2.1	-1522	72772
2015	39464	6.2	2.3	38125	7.0	2.1	-1340	77589
2016	39276	-0.5	2.3	37745	-1.0	2.2	-1530	77021

Annexure 9 - Total goods: EU Trade flows and balances

6.10 Goods exported from India to Portugal

The below annexure gives information on the goods that are exported from India to Portugal. All the values are in US$ Million.

S.No	HS Code	Commodity	2015-2016	2016-2017	% Growth
1	03	Fish and Crustaceans, Molluscs and other Aquatic Invertabrates	44.34	58.87	32.52
2	05	Products of animal origin, not elsewhere specified or included	0.27	0.17	-35.87
3	06	Live trees and other plants; bulbs; roots and the like; cut flowers and ornamental foliage	0.16	0.11	-29.98
4	07	Edible vegetables and certain roots and tubers	1.94	1.69	-12.92
5	08	Edible fruit and nuts; Peel or Citrus Fruit or Melons	1.38	1.13	-17.66
6	09	Coffee, Tea, Mate and Spices	7.10	7.88	10.95
7	10	Cereals	4.35	5.79	33.19
8	11	Products of the Milling industry; Malt; Starches; Inulin; wheat Gluten		0.00	
9	12	Oil seeds and Olea Fruits; Misc Grains seeds and Fruit; Industrial or Medicinal Plants; straw and fodder	0.34	0.34	0.80
10	13	Lac; Gums, resins and Other Vegetable Saps and Extracts	0.09	0.34	263.33
11	14	Vegetable Plaiting Materials; Vegetable Products not elsewhere specified or included	0.01	0.02	19.05
12	15	Animal or Vegetable Fats and Oils and their Cleavage Products; Pre edible fats; Animal or vegetable waxex	0.01	0.01	41.67

13	16	Preparations of Meat of fish or of crustaceans, molluscs or other aquatic invertebrates		0.07	
14	17	Sugars and sugar confectionary	0.07	0.00	-92.68
15	18	Cocoa and cocoa preparations	0.00		
16	19	Preparations of cereals, flour, starch or milk; pastry cooks products	0.31	0.13	-59.09
17	20	Preparations of vegetables, fruit, nuts or other parts of plants	0.11	0.17	59.23
18	21	Miscellaneous edible preparations	0.04	0.03	-43.60
19	22	Beverages, spirits and vinegar		0.01	
20	23	Residues and waste from the food industries; prepared animal foder	0.01	0.00	-50.00
21	24	Tobacco and manufactured tobacco substitutes	2.07	0.36	-82.66
22	25	Salt,sulphur; earths and stone; plastering materials, lime and cement	0.68	0.28	-58.35
23	27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	0.04	0.02	-59.28
24	28	Inorganic chemicals; organic or inorganic compounds of precious metals of rare-earth metals, or radi.elem or of isotopes	2.90	3.72	28.19
25	29	Organic chemicals	25.17	23.07	-8.35
26	30	Pharmaceutical products	5.44	4.04	-25.74
27	32	Tanning or dyeing extracts; tannins and their derivatives dyes, pigments and other colouring matter; paints and ver; putty and other mastics; inks	12.89	10.69	-17.08

28	33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	0.65	0.66	0.87
29	34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations	0.01	0.02	232.86
30	35	Albuminoidal substances; modified starches; glues; enzymes	0.24	0.13	-45.62
31	36	Explosives; pyrotechnic products;matches;Pyrophoric alloys; certain combustible preparations	0.32	0.19	-40.86
32	38	Miscellaneous chemical products	4.68	6.71	43.33
33	39	Plastic and articles thereof	35.19	30.11	-14.43
34	40	Rubber and articles thereof	19.32	19.37	0.24
35	41	Raw hides and skins (other than furskis) and leather	17.28	15.36	-11.12
36	42	Articles of leather, saddlery and harness; travel goods, handbags and similar articles of animal gut (other than Silk worm) Gut.	7.42	8.54	15.14
37	43	Furskins and artificial fur, manufactures therof	0.01	0.03	131.36
38	44	Wood and articles of wood; wood charcoal	0.40	0.31	-23.78
39	45	Cork and articles of cork		0.00	
40	46	Manufactures of straw of Esparto or of other plaiting materials; basketware and wickerwork			
41	48	Paper and paperboard; articles of paper pulp of paper or of paperboard	1.23	2.05	66.56
42	49	Printed books, newspapers, pictures and other products of the printing industry,	0.50	0.28	-45.32

		manuscripts, typescripts and plans			
43	50	Silk	0.13	0.03	-77.21
44	51	Wool, Fine or Coarse animal hair, horsehair yarn and woven fabric	2.92	0.28	-90.32
45	52	Cotton	124.20	140.84	13.40
46	53	Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn	0.60	0.68	12.64
47	54	Man-made filaments	12.15	14.16	16.34
48	55	Man-made Staple fibres	26.13	25.20	-3.59
49	56	Wadding, felt and nonwovens; spacial yarns; Twine, Cordage, ropes and cables and articles thereof	0.50	0.48	-3.92
50	57	Carpets and other textile floor coverings	10.48	9.76	-6.82
51	58	Special woven fabrics; tufted textile fabrics;lace; tapesteries; trimmings; embroidery	0.86	0.69	-19.57
52	59	Impregnated, coated, covered, or laminated textile fabrics; textile articles of a kind suitable for industrial use	0.14	0.03	-76.42
53	60	Knitted or crocheted fabrics	0.01	0.17	2112.66
54	61	Articles of apparel and clothing accessories, knitted or crocheted	10.20	10.54	3.27
55	62	Articles of apparel and clothing accessories, not knitted or corcheted	23. 79	29.92	25.77
56	63	Other made up textiles articles; sets; worn clothing and worn textile articles; rags	7.12	8.07	13.28
57	64	Footwear, gaiters and the like; parts of such articles	38.52	45.36	17.76
58	65	Headgear and parts thereof	0.05	0.10	89.60
59	66	Umbrellas, sun umbrellas,walking-sticks,	0.00		

		seat-sticks, whips, riding-crops and parts thereof			
60	67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	0.77	0.49	-35.95
61	68	Articles of stone, plaster, cement, asbestos, mica or similar materials	0.99	1.28	29.36
62	69	Ceramic products	0.05	0.04	-32.52
63	70	Glass and Glassware	1.48	1.59	7.79
64	71	Natural or cultured pearls, precious or semiprecious stones, pre metals, clad with pre metal and articles thereof imitation jewellery; coins	1.43	0.94	-34.12
65	72	Iron and steel	41.34	84.43	103.73
66	73	Articles of iron and steel	7.56	7.18	-4.94
67	74	Copper and articles thereof	1.13	1.17	4.02
68	76	Aluminium and articles thereof	1.75	2.25	28.19
69	79	Zinc and articles thereof	0.06	0.14	137.76
70	82	Tools implements, cutlery, spoons and forks, of base metal; parts thereof base metal	0.81	0.64	-20.64
71	83	Miscellaneous articles of base metal	0.87	0.99	14.00
72	84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	40.15	25.44	-36.64
73	85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers and parts	15.75	21.29	35.15
74	86	Railway or tramway locomotives, rolling stock and parts thereof; railways or tramways track fixtures and	0.00		

		fittings and parts thereof; mechanical			
75	87	Vehicles other than railway or tramway rolling stock,and parts and accessories therof	12.86	24.59	91.16
76	88	Aircraft, spacecraft, and parts thereof	0.00	0.05	1118.42
77	90	Optical, photographic cinematographic measuring, checking precision, medical or surgical instruments and apparatus parts and accessories thereof	4.11	4.35	5.84
78	91	Clocks and watches and parts thereof	0.03	0.00	-90.40
79	92	Musical instruments; parts and accessories of such articles	0.00	0.00	28.57
80	94	Furniture; beeding, mattresses, mattress supports, cushions and similar stuffed furnishing; lamps and lightning fittings not elsewhere specified	2.31	2.53	9.29
81	95	Toys, games and sports requisites; parts and accessories thereof	0.75	0.92	22.35
82	96	Miscellaneous manufactured articles	0.47	0.56	18.64
83	97	Works of art collectors pieces and antiques	0.05	0.03	-29.11
84	98	Project goods, some special uses	0.01	0.02	267.86
85	99	Miscellaneous goods	0.03	0.00	-85.38
Total			**589.64**	**669.66**	
India's total			**262290.13**	**275851.71**	
% Share			**0.2248**	**0.2428**	

Annexure 10 - List of goods exported from India to Portugal

6.11 Goods Imported to India from Portugal

The below annexure gives information on the list of goods that are imported to India from Portugal. All the values are in US$ Million.

S.No.	HS Code	Commodity	2015-2016	2016-2017	% Growth
1	06	Live trees and other plants; bulbs; roots and the like; cut flowers and ornamental foliage		0.64	
2	07	Edible Vegetables and certain roots and tubers	0.01		
3	08	Edible Fruit and Nuts; Peel or Citrus Fruit or Melons	0.00	0.00	625.00
4	14	Vegetable Plaiting Materials; Vegetable Products not elsewhere Specified or Included			
5	15	Animal or Vegetable Fats and oils and their cleavage products; pre edible fats; animal or vegetable waxex	0.85	0.80	-5.47
6	18	Cocoa and cocoa preparations	0.06	0.01	-83.48

7	19	Preparations of cereals, Flour, Starch or Milk; Pastry cooks products		0.00	
8	20	Preparations of Vegetables, fruits, nuts or other parts of plants	0.03	0.19	561.38
9	21	Miscellaneous Edible preparations	0.21	0.12	-43.16
10	22	Beverages, spirits and Vinegar	0.09	0.10	6.26
11	24	Tobacco and Manufactured Tobacco Substitutes		0.00	
12	25	Salt; Sulphur; Earths and Stone; Plastering Materials, Lime and Cement	3.66	4.19	14.36
13	26	Ores, Slag and Ash	0.95	1.60	68.78
14	27	Mineral Fuels, Mineral Oil and Products of Their Distillation; Bituminous Substances; Mineral waxes	0.03	27.76	81,559.71
15	28	Inorganic chemicals; organic or inorganic compounds of precious metals of rare earth metals	0.04	0.01	-74.59

		or radi.elem or of isotopes			
16	29	Organic Chemicals	5.86	19.29	228.95
17	30	Pharmaceutical products	0.15	0.82	461.92
18	32	Tanning or Dyeing Extracts; Tannins and their Deri. Dyes, Pigments and other colouring matter; paints and Ver; Putty and Other Mastics; Inks	0.61	0.37	-39.08
19	33	Essential oils and Resinoids; Perfumery, cosmetic or toilet preparations	0.02	0.14	660.89
20	34	Soap, Organic surface-Active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations	0.12	0.12	-0.56
21	35	Albuminoidal Substances, Modified Starches; Glues; Enzymes	0.04	0.15	273.11
22	38	Miscellaneous Chemical Products	0.96	2.63	172.64

23	39	Plastic and articles therof	9.33	10.25	9.87
24	40	Rubber and Articles therof	0.89	0.78	-12.64
25	41	Raw hides and skins (other than furskins) and leather	5.10	5.51	8.13
26	42	Articles of Leather Saddlery and Harness; Travel goods; Handbags and similar containing articles of animal Gut (other than Silk worm) Gut.	0.61	0.39	-35.45
27	43	Furskins and Artificial Fur, Manufactures Therof	0.01	0.01	73.97
28	44	Wood and Articles of Wood; Wood Charcoal	0.94	0.92	-2.16
29	45	Cork and articles of Cork	2.54	2.43	-4.07
30	47	Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard	0.45	0.42	-6.34
31	48	Paper and paperboard; articles of paper pulp, of paper or paperboard	5.10	5.16	1.09

32	49	Printed books, newspapers, pictures and other products of the printing industry, manuscripts, typescripts and plans	0.09	0.01	-87.12
33	51	Wool, fine or coarse animal hair, horsehair yarn and woven fabric	0.15	0.04	-75.03
34	52	Cotton	0.35	0.53	51.70
35	53	Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn	0.00	0.00	0.00
36	54	Man-made filaments	0.07	0.43	522.41
37	55	Man-made staple fibres	1.10	0.97	-12.44
38	56	Wadding felt and nonwovens; spacial yarns; twine, cordage, ropes and cables and articles thereof	0.46	0.60	31.25
39	57	Carpets and other textile floor coverings	0.04	0.00	-92.84
40	58	Special woven fabrics; tuffed textile fabrics; lace; tapestries;	0.24	0.30	26.66

		trimmings; embroidery			
41	59	Impregnated, coated, coivered or laminated textile fabrics, textile articles of a kind suitable for industrial use	1.63	1.70	4.17
42	60	Knitted or crocheted fabrics	0.01	0.02	200.00
43	61	Articles of apparel and clothing accessories, knitted or corcheted	0.47	0.48	3.14
44	62	Articles of apparel and clothing accessories, not knitted or crocheted	0.70	0.54	-22.00
45	63	Other made up textile articles; sets; worn clothing and worn textile articles; rags	0.57	0.35	-37.96
46	64	Footwear, gaiters and the like; parts of such articles	1.25	1.44	15.05
47	65	Headgear and parts thereof	0.05	0.08	68.96
48	66	Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof		0.00	

49	67	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	0.00	0.00	900.00
50	68	Articles of stone, plaster, cement, asbestos, mica or similar products	4.50	3.67	-18.39
51	69	Ceramic products	1.05	0.78	-25.72
52	70	Glass and glassware	0.43	0.32	-24.02
53	71	Natural or cultures pearls, precious or semiprecious stines, pre metals, clad with pre.metal and articles thereof imitation jewellery; coin	0.04	0.01	-69.06
54	72	Iron and steel	2.44	3.82	56.88
55	73	Articles of iron and steel	0.76	0.64	-16.55
56	74	Copper and articles thereof	5.50	2.09	-62.11
57	75	Nickel and articles thereof	0.18	0.00	-99.62
58	76	Aluminium and articles thereof	2.40	1.02	-57.41
59	78	Lead and articles thereof	0.23		
60	79	Zinc and articles thereof	0.68	1.54	125.50

61	80	Tin and articles thereof	0.01		
62	82	Tools implements, cutlery, spoons and forks of base metal, parts thereof of base metal	0.28	0.60	115.39
63	83	Miscellaneous articles of base metal	0.76	0.75	-0.89
64	84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	19.64	15.02	-23.52
65	85	Electrical machinery and equipment and parts therof; sound recorders and reproducers; television image and sound recorders and reproducers and parts	10.82	13.31	23.10
66	86	Railway or tramway Locomotives, rolling-Stock and parts thereof; railway or tramway track fictures and fittings and parts thereof; Mechanical	0.01		

67	87	Vehicles other than railway or tramway rolling stock and parts and accessories thereof	0.14	0.56	310.35
68	88	Aircraft, Spacecraft and parts therof	0.00	0.00	-77.42
69	89	Ships, Boats and floating structures	0.01	0.14	993.70
70	90	Optical, photographic cinematographic measuring, checking precision, medical or surgical instruments and apparatus parts and accessories thereof	1.19	0.91	-23.18
71	91	Clocks and watches and parts thereof	0.03	0.00	-92.21
72	93	Arms and ammunition; parts and accessories thereof	0.01	0.01	3.39
73	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishing, lamps and lightning	0.37	1.33	260.67

		fittings not elsewhere specified			
74	95	Toys, games and sports requisites; parts and accessories thereof	0.33	0.20	-38.38
75	96	Miscellaneous manufactured articles	0.15	0.16	7.20
76	97	Works of art collectors pieces and antiques		0.00	
77	98	Project Goods, Some special uses	4.62	2.31	-50.10
78	99	Miscellaneous Goods	0.10	0.22	111.59
Total			**102.54**	**141.16**	37.66
India's total			**381,006.62**	**384,355.55**	0.88
% Share			**0.0269**	**0.0367**	

Annexure 11 - List of Goods imported to India from Portugal

6.12 Sea Route from Leixoes to Indian Ports

S.No	Journey Details	Shipping Company	Route	Total Duration	Cost (US$)		
					20 DV	40 DV	40 HC
1.	**Leixoes-Kolkata**	K Line	Leixoes to Rotterdam Rotterdam to Singapore Singapore to Kolkata	40 days	1150	1500	1500
		mSC	Leixoes to Sines Sines to Colombo Colombo to Kolkata	54 days	1200	1900	1900
		CMA CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Kolkata	34 days	950	1750	1750
2.	**Leixoes-Cochin**	K Line	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Cochin	35 days	1150	1500	1500

		mSC	Leixoes to Antwerp Antwerp to Colombo Colombo to cochin	35 days	1100	1700	1700
		CMA CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Cochin	34 days	950	1750	1750
3.	**Leixoes-Chennai**	K Line	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Chennai	40 days	1100	1400	1400
		mSC	Leixoes to Antwerp Antwerp to Colombo Colombo to Chennai	40 days	1100	1700	1700
		CMA CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Chennai	33 days	950	1750	1750

4.	**Leixoes-Tuticorn**	K Line	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Tuticorn	35 days	1150	1500	1500
		mSC	Leixoes to Antwerp Antwerp to Colombo Colombo to Tuticorn	35 days	1100	1700	1700
		CMA-CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Tuticorn	33 days	1250	1900	1900
5.	**Leixoes-Vizag**	K Line	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Visakhapatnam	37 days	1250	1600	1600
		mSC	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Visakhapatnam	36 days	1200	1900	1900

		CMA-CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Visakhapatnam	34 days	950	1750	1750
6.	**Leixoes-Haldia**	K Line	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Haldia	40 days	1025	1500	1500
		mSC	Leixoes to Antwerp Antwerp to Colombo Colombo to Haldia	35 days	1100	1700	1700
		CMA-CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Haldia	35 days	950	1750	1750
7.	**Leixoes-Nhava Sheva**	Kline	Leixoes to Rotterdam Rotterdam to Singapore Singapore to Nhava Sheva	41 days	950	1200	1200

		mSC	Leixoes to Antwerp Antwerp to Nhava Sheva	36 days	1100	1700	1700
		CMA-CGM	Leixoes to Rotterdam Rotterdam to Nhava Sheva	37 days	950	1750	1750

Annexure 12 - Sea Routes form Leixoes to Indian Ports

6.13 Sea Routes from Lisbon to Indian Ports

S.No	Journey Details	Shipping Company	Route	Total Duration	Cost (US$)		
					20 DV	40 DV	40 HC
1.	**Lisboa-Kolkata**	K Line	Lisboa to Rotterdam Rotterdam to Singapore Singapore to Kolkata	39 days	1150	1500	1500
		CMA CGM	Lisboa to Tanger MED Tanger MED to Singapore Singapore to Kolkata	33 days	950	1750	1750
2.	**Lisboa-Cochin**	K Line	Lisboa to Rotterdam Rotterdam to Colombo Colombo to Cochin	34 days	1150	1500	1500

		CMA CGM	Lisboa to Tanger Med Tanger Med to Mundra Mundra to Cochin	43 days	950	1750	1750
3.	**Lisboa-Chennai**	K Line	Lisbon to Rotterdam Rotterdam to Colombo Colombo to Chennai	39 days	1100	1400	1400
		CMA CGM	Lisboa to Rotterdam Rotterdam to Colombo Colombo to Chennai	31 days	950	1750	1750
4.	**Lisboa-Tuticorn**	K Line	Lisboa to Rotterdam Rotterdam to Colombo Colombo to Tuticorn	34 days	1150	1500	1500
		CMA-CGM	Leixoes to Rotterdam Rotterdam to Colombo Colombo to Tuticorn	39 days	1250	1900	1900

5.	**Lisboa-Vizag**	K Line	Lisboa to Rotterdam Rotterdam to Colombo Colombo to Visakhapatnam	36 days	1250	1600	1600
		CMA-CGM	Lisboa to Rotterdam Rotterdam to Colombo Colombo to Visakhapatnam	34 days	950	1750	1750
6.	**Lisboa-Haldia**	K Line	Lisboa to Rotterdam Rotterdam to Colombo Colombo to Haldia	39 days	1025	1500	1500
		CMA-CGM	Lisboa to Tanger MED Tanger MED to Singapore Singapore to Haldia	33 days	950	1750	1750
7.	**Lisboa-Nhava Sheva**	K Line	Lisbon to Rotterdam Rotterdam to Singapore Singapore to Nhava Sheva	41 days	950	1200	1200

		CMA-CGM	Lisboa to Tanger Med Tanger Med to Nhava Sheva	36 days	950	1750	1750

Annexure 13 - Sea Routes from Lisbon to Indian Ports

6.14 Sea Routes from Sines to Indian Ports

S.No	Journey Details	Shipping Company	Route	Total Duration	Cost (US$)		
					20 DV	40 DV	40 HC
1.	**Sines-Kolkata**	mSC	Sines to Colombo Colombo to Kolkata	32	1200	1900	1900
		CMA-CGM	Sines to Antwerp Antwerp to Le Havre, France Le Havre, France to Port Kelang Port Kelang to Kolkata	46	950	1750	1750
2.	**Sines-Cochin**	mSC	Sines to Colombo Colombo to Cochin	21	1200	1900	1900

		CMA-CGM	Sines to Lisboa Lisboa to Tanger Med Tanger Med to Jebel Ali Jebel Ali to Cochin	35	1100	1750	1750
3.	**Sines-Chennai**	mSC	Sines To Colombo Colombo to Chennai	24	1200	1900	1900
		CMA-CGM	Sines to Lisboa Lisboa to Tanger Med Tanger Med to Damietta Damietta to Chennai	68	950	1750	1750
4.	**Sines to Tuticorn**	mSC	Sines to Colombo Colombo to Tuticorn	36	1200	1900	1900
		CMA-CGM	Sines to Lisboa Lisboa to Tanger Med Tanger Med to Mundra Mundra to Tuticorn	36	950	1750	1750

5.	**Sines to Vizag**	mSC	Sines to Colombo Colombo to Visakhapatnam	39	1200	1900	1900
		CMA-CGM	Sines to Antwerp Antwerp to Le Havre Le Havre to Port Kelang Port Kelang to Visakhapatnam	47	950	1750	1750
6.	**Sines to Haldia**	mSc	Sines to Colombo Colombo to Haldia	35	1200	1900	1900
		CMA-CGM	Sines to Antwerp Antwerp to Le Havre, France Le Havre, France to Port Kelang Port Kelang to Haldia	48	950	1750	1750
7.	**Sines to Nhava Sheva**	mSC	Sines to Nhava Sheva	20 days	1100	1700	1700
		CMA CGM	Sines to Lisboa Lisboa to Tanger Med Tanger Med to Nhava Sheva	29 days	950	1750	1750

Annexure 14 - Sea Routes from Sines to Indian Ports