

## AN ANALYSIS OF STEAM COAL IMPORT LOGISTICS IN INDIA AND FACTORS EFFECTING THE COSTS IN THE SUPPLY CHAIN WITH REFERENCE TO INDIAN POWER SECTOR

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### ABSTRACT

*India has an ambitious plan of going for additional power generation capacity of 65000MW out of which 44000MW would through coal based. In the year 2009-2010 the domestic thermal coal production has been 400 million tonnes and 44 million tonnes of thermal coal has been imported. So at present 11% of our thermal coal consumption is being met through imports. Keeping in view the limitations in increasing domestic production like environmental, forestry and productivity issues, India is would be more dependent on imported coal for future needs. The projection of Integrated Energy policy report indicates that the range of coal requirement under various scenarios would be between 860- 1296 million tonnes in the year 2031-32 of which imports are projected in the range of 53% to 57%. This underscores the need for adequate and efficient port handling facilities and ocean transport facilities for connecting the supply chain for the thermal power plants. The eleventh five year plan envisages an additional coal handling capacity to 115 million tonnes by the end of the plan period. In additional it is critical to indentify the bottlenecks and cut down costs in ocean trade Logistics and supply chain for more low cost fuel for the power requirements. The paper attempts to analyse various kinds of vessels transporting coal from Indonesia and South Africa to India. The major problems related to import logistics have been discussed and analysed. It can be concluded that Size of ships and Port Infrastructure are key factors which could reduce the costs in the supply chain.*

## 1. Introduction

In India coal is a predominant source of Energy. This has been main source of energy in India for electricity generation and industries like cement, chemical, fertilizers. India has an ambitious plan of going for additional power generation capacity of 65000MW out of which 44000MW would through coal based. In the year 2009-2010 the domestic thermal coal production has been 400 million tonnes and 44 million tonnes of thermal coal has been imported. So at present 11% of our thermal coal consumption is being met through imports. Keeping in view the limitations in increasing domestic production like environmental, forestry and productivity issues, India would be more dependent on imported coal for future needs. In addition it is critical to indentify the bottlenecks and cut down costs in ocean trade Logistics and supply chain for more low cost fuel for the power requirements. The paper attempts to analyse various kinds of vessels transporting coal from Indonesia and South Africa to India. The major problems related to import logistics have been discussed and analysed. It can be concluded that Size of ships and Port Infrastructure are key factors which could reduce the costs in the supply chain. It also attempts to give an insight look into two aspects, the first one is that shipbuilders can opt for building of capsized vessels for handling steam coal from Indonesia and South Africa. Secondly to recommend policy makers to build infrastructure for handling capsized vessels for imparting steam coal with cost effective and minimal environment interference.

Past researchers like Mr. Philip rogers and John Strange have discussed about various vessels carrying steam coal in the book "coal carriage by sea" published by Llyod's of London Press Ltd in 1991. Mr. Shun chen from department of maritime technology and Transportation, Delft University of technology, delft, Netherlands have made study published in Maritime Economics & Logistics journal in the year 2010, published by macmillan, where freight markets of panama vessels and capsizes and their interrelationships have been made for various dry cargoes through various routes.

## 2. Research Objectives

- a. The first objective is to analyse various types of vessels handling steam coal, their freight rates and to find the role of ports.
- b. The second objective is to examine the most suitable type of vessel for import of steam coal.

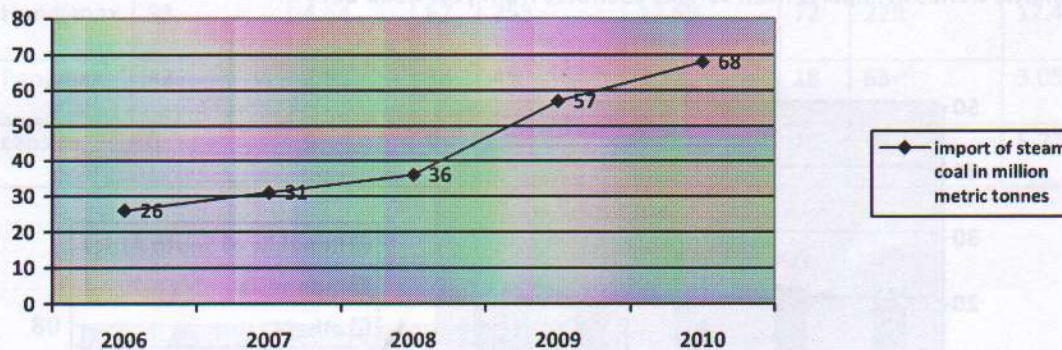
## 3. Present Scenario

The projection of Integrated Energy policy report indicates that the range of coal requirement under various scenarios would be between 860- 1296 million tonnes in the year 2031-32 of which imports are projected in the range of 53% to 57%. This underscores the need for adequate and efficient port handling facilities and ocean transport facilities for connecting the supply chain for the thermal power plants. The eleventh five year plan envisages an additional coal handling capacity to 115 million tonnes by the end of the plan period.

Year/ million tonnes	2006	2007	2008	2009	2010
Steam coal imports	26	31	36	57	68

Table 1: table shows the import of steam coal from 2006 to 2010 in million tones.

Courtesy: Port statistics, Transport Research wing, ministry of shipping India, www.shipping.nic.in



Graph 1 Graph showing the import of steam coal from 2006-2010

The analysis of data reveals that there has been tremendous increase of steam coal. As per the Indian coal ministry the demand for steam coal is projected at 652 million tonnes for the year 2012 and 1020 million tonnes for the year 2020. Domestic suppliers have always fallen short of expectations due to various reasons.

#### 4. Methodology

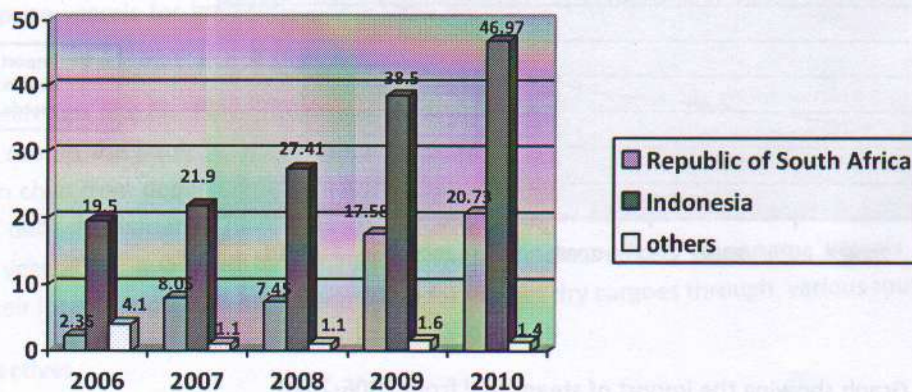
Data has been collected from various sources like port statistics, ministry of shipping- government of India, cargo surveyors, coal information report published by International energy agency and from other authentic sources. These were analysed as below.

### 5. Origin of Steam coal

Out of the coal exporting nations Indonesia and South Africa have emerged out to be the leading countries.

	2006	2007	2008	2009	2010
Republic of South Africa	4.1	8	7.49	17.5	20.73
Indonesia	19.5	21.9	27.41	38.5	45.87
Others	2.40	1.1	1.1	1	1.4

Table 2. shows trends in imports from various countries from year 2006-2010



Graph 2. trends of increase in coal imports from various countries from year 2006-2010

From the above table it can be observed that the Indonesian Imports have increased from 19.5 million tonnes to 46.7 million tonnes which has doubled over four years. The South African coal has almost increased by 10 times from 2.35 million tonnes to 20.73 million tonnes.

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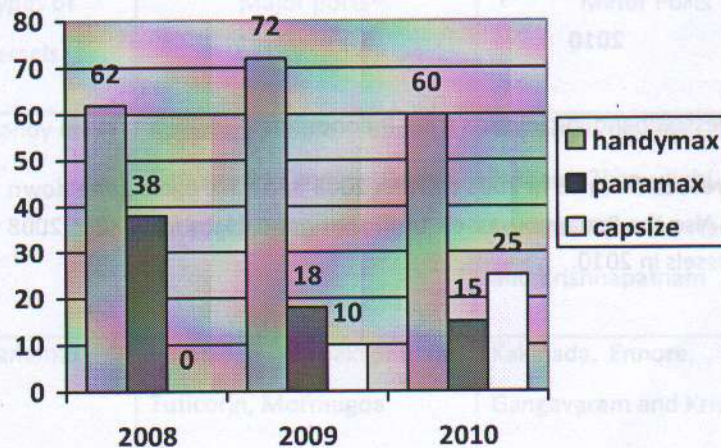
### 6. Classification of coal transporting vessels

Various types of vessels transporting coal to India are

1. Handymax: Vessels having capacity less than 60,000 DWT.
2. Panamax: Vessels having capacity greater than 60,000 DWT and less than 80,000 DWT.
3. Cape size: Vessels having capacity above 80,000 DWT up to 2,00,000 DWT.

Table 3 Analysis of various types Of Vessels transporting Steam coal from South Africa

Vessel type	2008			2009			2010		
	number of vessels	tonnage	%	number of vessels	tonnage	%	number of vessels	tonnage	%
Handymax	93	4.64	62	253	12.59	72	229	12.41	60
Panamax	42	2.81	38	45	3.12	18	63	3.05	15
capsize	0	0	0	13	1.87	10	35	5.27	25

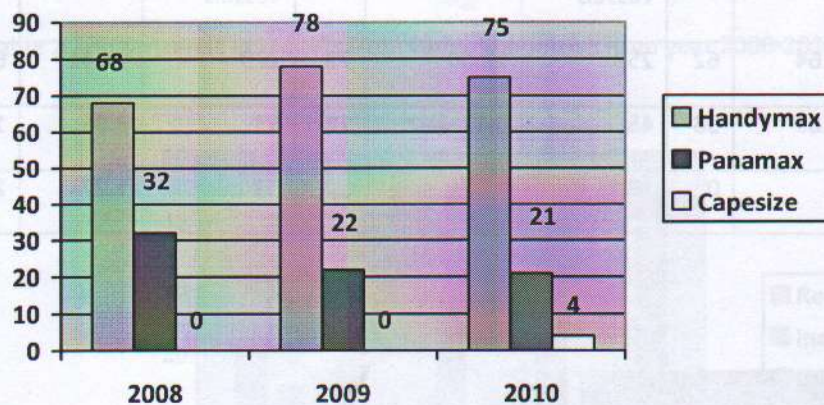


Graph 3 percentage of cargo handled by various types of vessels from Republic of South Africa

From the above data we can infer that the percentage of cargo handled by panamax vessels have decreased from 38 to 15 over a period of two years and percentage of cargo handled by capsizes has gone up by 25%. The cargo handled by handy max vessels remains to be almost at same level at around 60%.

Table 4 Analysis of various types of vessels transporting Steam coal from Indonesia

Vessel type	2008			2009			2010		
	number of vessels	tonnage	%	number of vessels	tonnage	%	number of vessels	tonnage	%
Handymax	371	18.56	68	598	30.07	78	694	35.18	75
Panamax	134	8.85	32	117	8.43	22	138	9.77	21
capsize	0	0	0	0	0	0	16	2.02	4



Graph 4. Analysis of various types of vessels handling imports from Indonesia

The Handymax vessels traffic have increased from 68 in 2008 to 78 in 2009 and have again gone down to 75 due to introduction of capsize vessels. Also the Panamax vessels traffic has gone down from 32 in 2008 to 21 in 2010 with introduction of capsize vessels in 2010.

## 6. Ocean freight

Table 5. Analysis of Ocean freight for coal carriage by various types of vessels in US\$/PMT

Type of Vessel	Handymax	Panamax	Cape size
Republic of South Africa	21 to 23	15 to 18	9 to 11
Indonesia	16 to 17	11 to 12	8 to 9

From the above data, we can infer that for shipments from South Africa the capsize freight is US \$ 10 less than the freight by handymax. For shipments from Indonesia the capsize freight is less by US \$ 8 /PMT approximately. This clearly indicates that the freight rates by capsize vessel have clear advantage over handymax and panama freights.

## 7. Ports

Ports have also play a significant role in bringing a change in dynamics of Thermal Coal imports.

In India the import of coal is done primarily by twelve major ports and other minor ports.

Types of vessels	Major ports	Minor Ports
Handy max	Kolkata, Haldia, Chennai, Tuticorin, Kandla, Cochin, Paradip, Vishakapatnam	Gopalpur, navlaksi, Bhavnagar, Magdalla, jafrabad, Bedi, Jakhau, Okha, dighi,, haji Bunder, Dharamtar, Kakinada, Ennore, Pipavav, New mangalore, Mundra, Gangavaram and Krishnapatnam
Panamax	Paradip, Vishakapatnam, Tuticorin, Mormugoa	Kakinada, Ennore, , pipavav,, New mangalore, Mundra, Gangavaram and Krishnapatnam
Cape size	Nil	Mundra , Gangavaram and Krishnapatanam

Table shows various major and minor ports which are capable of handling various types of vessels.

With the birth of Private ports like Mundra, Krishnapatnam and Gangavaram India have started importing on capsized vessels. The major factors favouring capsized vessels at these ports are draft, automated unloading by state of the art equipments and strategic location serving east coast and west coast of India. These new ports have been operational in 2009 commercially, which in turn have invited importers to import through large carriers like capsized vessels. Thus have reduced ocean freight and also have made import from geographically distant countries like South Africa more affordable.

#### Conclusions and Recommendations

After scanning Indian port infrastructure and the trends of various vessel sizes in shipping for handling steam coal from Indonesia and South Africa, the following conclusions and recommendations have been established

1. India could reduce costs of imports by shifting to cape size vessels from Handymax and Panamax vessels.
2. India's trade flow has been increasing for last few years because of its Gross domestic product. So the import of coal for domestic usage has been increasing. Our findings show that the capsized vessels are most suitable. To anchor these capsized vessels at Indian ports there is a need for development of infrastructure for larger berths and higher drafts at the ports. The paper recommends for need for higher dredging activity in India. The Dredging corporation of India dominates the sector and there is need for opening of this sector for higher depths at the port and for expansion of berths to accommodate larger ships. There is also need to shift from conventional mechanical systems to modern conveyor based handling systems to increase the efficiency at the port for handling these cape size vessels.

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### ABSTRACT

India has an ambitious plan of giving for additional power generation capacity of 83000MW out of which 44000MW would through coal based. In the year 2007-2010 the domestic thermal coal production has been 40 million tonnes and 44 million tonnes of thermal coal has been imported. So at present 11% of our thermal coal consumption is being met through imports. Keeping in view the limitations in increasing domestic production like environmental, forestry and productivity issues, India is unable to meet demand for imported coal for future needs. The projection of Integrated Energy policy report indicates that the range of coal requirement under various scenarios would be between 200-2200 million tonnes in the year 2011-12 of which imports are projected in the range of 52% to 57%. This underlines the need for adequate and efficient port handling facilities and ocean transport facilities for connecting the supply chain for the thermal power plants. The eleven year plan envisages an additional coal handling capacity to 110 million tonnes by the end of the plan period. In addition it is critical to identify the bottlenecks and cut down costs in ocean trade. Logistics and supply chain for more low cost fuel for the power requirements. The paper attempts to analyse various kinds of vessels transporting coal from Indonesia and South Africa to India. The major problems related to import logistics have been discussed and analysed. It can be concluded that size of ships and Port infrastructure are key factors which really reduce the costs in the supply chain.