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ABSTRACT

Calcutta port, one of the major ports of India, has been stagnating in its activities for quite some time. This decline has often been attributed largely to the deteriorating navigability of River Hooghly and to meet this problem a new dock system at Haldia has been developed and the infrastructural facilities at Calcutta-Haldia port have been improved. The present study is an attempt to analyse the factors leading to the decline in the relative importance of this port and underutilisation of its capacity. The analysis shows particularly the link between the stagnation of Calcutta port and the economy of its hinterland and would raise several policy issues.

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CALCUTTA PORT - PROBLEMS AND PROSPECTS

S.N. Sau

I. INTRODUCTION

Of the major ports of India Calcutta is one of the oldest, biggest busiest in terms of the volume of cargo handled. But, for quite some time, it's activities have been shrinking. This decline has often been attributed to the deteriorating navigability of River Hooghly; and to meet this problem a new dock system at Haldia has been developed and commissioned and infrastructural facilities at Calcutta-Haldia port has been improved. Yet, the volume of traffic at this port complex has not increased in proportion to that at other major ports of India, while a large capacity remains unutilised. The present note is an attempt to analyse the factors leading to the decline in the relative importance of this port and the underutilisation of its capacity. It also attempts to analyse what the future holds for the port.

Several factors underline the importance of this study. First, the part played by the Calcutta port, historically, in the growth of overseas and coastal trade and in the economic development of India. An analysis of Calcutta Port's share in the foreign trade (excluding treasure) of India from 1870-71 through 1946-47 shows the important contribution made by this port to the economy. During this period about 41.6 to 33.2 per cent of India's foreign export and about 39.0 to 47.4 per cent of her import (both in terms of value) passed through Calcutta port.[1] During the same period, this port significantly helped the coastal traffic in India. Second, the study would also throw light on the economics of water transport made vis-a-vis surface modes of transport, viz. Railway and Road. Thirdly, this study reveals the economics of Calcutta port vis-a-vis

other major ports of India. Such study would also show the link between the Calcutta port and the economy of its hinterland, and would raise several policy issues.

It may be noted that the existing literature is not adequate. The port studies have been a relatively neglected branch of the literature on Indian economy. The first attempt to write the history of Calcutta port was made by Mukherjee in the mid-sixties.[2] The study by Banerjee[3] was concerned mainly with the economic history of Calcutta during the period 1833-1900. These books apart, there are some important research reports of the official committees which surveyed different aspects of traffic development and traffic prospects of major ports, including Calcutta-Haldia.[4] A recent study by the Calcutta Port Trust discusses the functional aspects of optimum utilisation of Calcutta-Haldia port complex.[5] The paper by Ghosal gives historical account of the development of the bulk commodity handling terminal at Haldia.[6]

The Seminar on Calcutta Port organised by the Indian Chamber of Commerce, Calcutta, in May 1980 discussed mainly technological, physical, institutional and managerial factors behind the decline in the port's traffic.[7] In another seminar, organised by the Calcutta Port Trust in July, 1980, the participants discussed the issue mainly from two angles - one, the physical, institutional, technological and managerial problems, and the other, the economic and policy aspects.[8] In the Conference on Metropolitan Development and Seminar on Calcutta, Yesterday, Today and Tomorrow, organised by Centre for Urban Economic Studies, Department of Economics, Calcutta University, Sau made an analysis of the problems of Calcutta Port.[9]

The brief survey of the existing port literature reveals that no detailed analysis of the economic factors has been made, excepting one,[10] which too needs to be updated.

In this paper we argue that neither the physical limitations (like deficiency in draft), nor the technological constraints (like low productivity) nor even the institutional bottlenecks (like labour unrest and detention of ships) sufficiently account for the poor performance of the Calcutta-Haldia port and that explanation lies mainly in some economic forces and policy parameters under operation. Section 2 analyses the trend of traffic of Calcutta port and the research problem. Section 3 examines the constraints on the Calcutta (-Haldia) port. Section 4 analyses the prospects of Calcutta Port and presents a perspective plan. Section 5 summarises the earlier discussion and makes concluding observations.

II. TRAFFIC OF CALCUTTA PORT

Calcutta Port handled 10.9 million tonnes of cargo per year during 1928-30, which was a significant volume, even at the international level, during that period.[11] During the later years the volume declined to 7.1 million tons at the time of independence, but this rose to 11.0 million tonnes in 1964-65, only to fall sharply to touch an all time low of 6.0 million tonnes in 1970-71. It rose again to 10.5 million tonnes in 1983-84, and 12.1 million tonnes in 1986-87 and then to 15.2 million tonnes in 1990-91.

In relative terms, the share of Calcutta Port in total traffic handled by major ports of India declined from about 50 per cent in 1929-30 to about 43 per cent in 1947-48, 23 per cent in 1964-65, 11 per cent in 1977-78 and about 10 per cent in 1990-91 (Table 1).

It may be noted that the rate of growth of traffic of Calcutta Port during the period has been very low compared to other major ports of India. During 1928-29 to 1990-91 the average annual rate of growth of traffic of Calcutta Port was

0.07 per cent while that for other major ports was 2.08 per cent. If we consider the traffic trend since the mid 1960's we also observe that the said rate of growth for Calcutta Port during 1964-65 to 1990-91 was 0.16 per cent while for other major ports that was 3.99 per cent.[31]

The slow increase of traffic of Calcutta Port, in the context of a large capacity created in the Haldia Dock System, has resulted in the emergence of excess capacity in the port. In 1983, 62.97 per cent of the total capacity of Calcutta-Haldia port was utilised, while the percentage of capacity utilisation at Bombay Port was 154, and those for Kandla, Visakhapatnam, Madras and Mormugao were 105, 102, 90, 86 and 81 respectively.[12] Even in 1986-87 the percentage of capacity utilisation at Calcutta-Haldia was 67.75, while those for Bombay and Kandla Ports were 99.24 and 130.50 respectively, and for Cochin, Visakhapatnam, Madras and Mormugao and Paradip ports, 96.48, 90.31, 123.21, 92.37 and 100.04, respectively.[13]

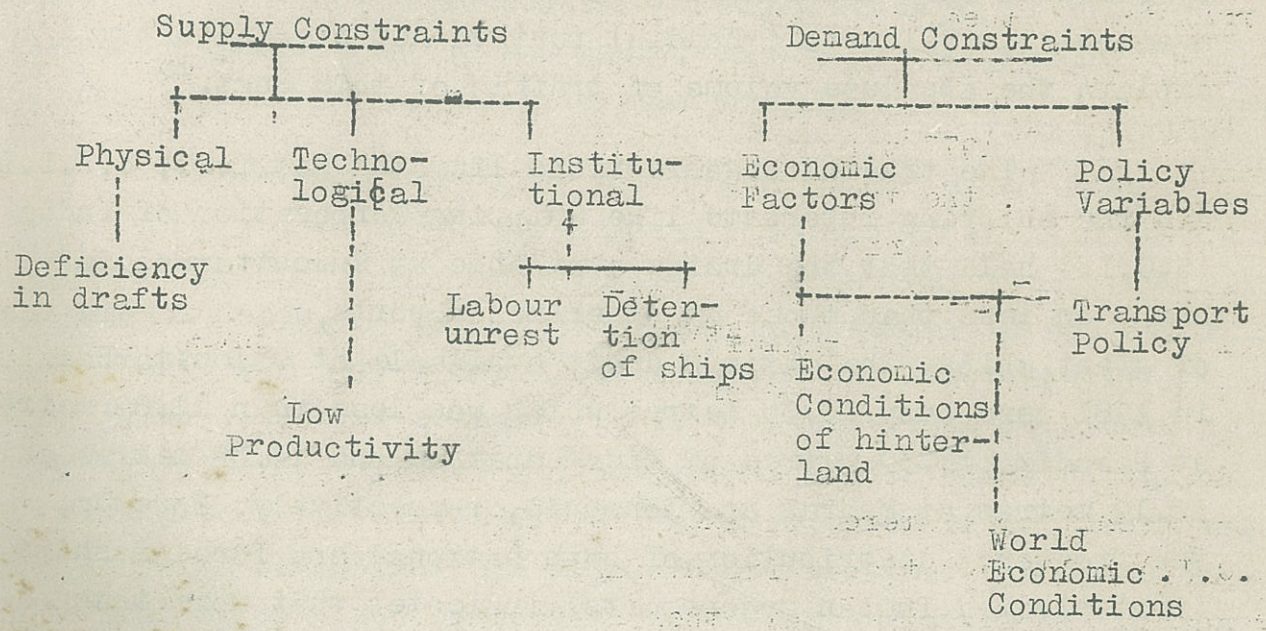
III. CONSTRAINTS ON CALCUTTA (-HALDIA) PORT

We have noted in the last section the low trend rate of growth of the traffic, of the Calcutta (-Haldia) port, the declining trend of its share at the national level, as also the under-utilisation of its capacity. The explanations for the phenomena may be classified into the following two types : supply constraints (i.e., the constraints which operate from the supply of port services) and demand constraints (i.e., the constraints which affect adversely the demand for port services). The supply factors are emphasised mainly by the port users, namely the Minerals and Metals Trading Corporation (M.M.T.C.), the Steel Authority of India Limited (S.A.I.L.), the Shippers' Associations like Eastern India Shippers' Association, the Commerce and Trade Organisation like Indian

Chamber of Commerce and Bengal Chamber of Commerce and Industry, These factors include physical limitations (i.e., the non-availability of adequate draft), technological constraints (i.e., low port productivity) and institutional bottlenecks (i.e., labour unrest). The demand factors are emphasised mainly by the academic experts (notably, Bose[14]) and research personnel. These factors include the economic conditions of the hinterland of the port and of the world, as well as policy variables (i.e., transport policy of the Government of India).

These various constraints on Calcutta-Haldia port can be schematically represented as follows :

Schematic Presentation of Constraints on Calcutta Port



3.1 Supply Constraints

Deficiency in drafts :

Draft is defined as the depth of a ship by her outer-line upto which it submerges in water with safety. It varies according to the seasons and the depth of water in which the ship plies. Deficiency in draft naturally implies

deficiency in the depth of water in the case of the concerned port. It is said that Calcutta, the river port of India, suffers from low draft and over years draft remained static or even showed declining trends and along with it the traffic also declined.

But from the drafts available at Calcutta Port and the traffic handled over years it appears that there is little correlation between the two (See Table 2).

Besides, although with the commissioning of Haldia Dock System in 1977 the drafts available at Calcutta-Haldia Port increased, the traffic handled by the port during 1977-80 (and even during 1977-85) was less than that handled by Calcutta Port alone during 1964-65. Thus, the drafts available at Calcutta (-Haldia) port cannot significantly explain the absolute volume of traffic of this port.[15]

The trading organisations like the M.M.T.C., S.A.I.L., and the shipping interests like Shipping Corporation of India (S.C.I.) held that the drafts available at Calcutta-Haldia had been less than those at other major ports, which forbid the entry of giant ships. The maximum draft available at Calcutta-Haldia in 1981 were only 10.36 metres which was less than 11.89 metres at Paradip, 15.30 metres at Visakhapatnam and 14.02 metres and 12.19 metres at Madras and Mormugao, respectively. However, the frequency distribution of both national and foreign ships (that visited Indian major ports) indicates that more than 80 per cent of the ships that entered the major ports during 1969-77 required drafts of 9.2 metres and less (Tables 3 and 4). Thus, this factor alone would not be a major explanation for the low volume of trade by Calcutta Port.

Drafts at Calcutta-Haldia port are conditioned by two factors the headwater flow of the Ganga and the dredging works. It was the expectation that the Farakka Barrage, after completion in 1971, and would discharge a flow of 40,000 cusecs of water. However, the Commissions of Farakka Barrage was delayed uptil 1975, and, even then, the discharge of water was well below 40,000 cusecs. The maximum quantity ever received was 30,000 cusecs.[16] The resulting deficiency of headwater flow at the right time has led to further deterioration of Ganga. Indian Shippers' interests are concerned seriously with this. Although the Haldia Dock System was built for deep draft vessels, it would face serious navigational problems because of the inadequacy of water there.[17] In fact, the oil jetty has recently been tilted because of heavy scouring of the river bed at the base of the jetty, caused by the growing deposit of silt on the mouth of the Hooghly.

Systematic dredging operations in the inner estuary begal in November 1973. The initial achievement was indeed encouraging. The improvement in the outer estuary (i.e., the channel below Sagar) was particularly spectacular as the initial target of 10.78 metres draft was achieved at this place by July 1975. The inner estuary (i.e., the channel between Haldia and Sagar) posed problems - still, depth in the inner estuary continued to improve steadily and by 1975, 9.85 metres draft was available at Haldia for 132 days. But, thereafter, in spite of dredging operations, depths have not shown any signs of further improvement,[18] and the Haldia port has failed to achieve from the initial target of 10.78 metres throughout the year.

However, Tables 2,3 and 4 show most of the vessels that visited Indian major ports during 1969-77 could have visited Calcutta-Haldia Port at its permissible drafts.[19] However, Table 5 on Visakhapatnam Port in more recent years reveals that about 6 per cent of the vessels that

visited Visakhapatnam Port during 1978-79 could not have visited Calcutta-Haldia Port on account of the nonavailability of suitable drafts. On the other hand, 75 to 77 per cent of the vessels visiting Visakhapatnam Port during 1977-79 required less than 9.1 metres draft, would have easily entered Calcutta Port.

Our analysis so far, thus, reveals that the draft restrictions and problems arising from those, do exist at Calcutta-Haldia Port but these are not the major ones. This conclusion is also confirmed by our analysis of the composition of world fleet (Table 6).

Table 6 shows that only 22 per cent of the vessels sailing in the world require draft of 10.6 metres and above, which Calcutta-Haldia Port can not provide, but 70 per cent of these require drafts of 10 metres and less which are well within the limits of the Calcutta-Haldia Port for a reasonable number of days in the year. Thus, draft problem can hardly be constrained as a binding constraint on the growth of traffic in the port.

Low Productivity

Labour productivity in Calcutta port is said to be low and declining. For example, in 1976-77, the output of each hook in a shift comprising a gang of shore labourers was 50.7 tonnes of general cargo and in 1978-79 it was 39.3 tonnes. There has been a similar decline in the case of handling of foodgrains : from 106.6 tonnes to 101.5 tonnes. In case of fertilisers the figures declined from 107.00 tonnes to 67.7 tonnes in the same period.[7] However, with the commissioning of a modern dock complex at Haldia, the productivity of Calcutta port has increased and may become favourably comparable with those of the other major ports of India.

In more recent years there has been further improvement as indicated by Table 8. In 1984-87, the port productivity for general cargo of Calcutta compared favourably with that of Bombay, while at Haldia, the average service time to handle 1000 tonnes of Coal during 1985-86 was 3.84 hours, compared to 8.99 tonnes at Visakhapatnam port (for June 1985).

It then follows that productivity at Calcutta-Haldia Port can not be a major constraint on the growth of traffic of the port.

Institutional Constraints

Labour Unrest

Labourers at Calcutta port are said to be more militant than their counterparts in manufacturing industries in the state of West Bengal. It is said that if the labour clashes continue, Calcutta would shortly become a dead port.[20] However, labour unrest adversely affected almost all the major ports, and the figures for mandays lost for Bombay and Calcutta ports for the seventies, do not indicate that labour situations at Calcutta port is any worse than that at Bombay (Table 9). Figures of mandays lost for more recent years also support the above conclusion (Table 10).

Detention of Ships

Ships are detained at a port for a number of reasons, namely labour strike, non-availability of suitable berths, bore tide restriction, late tide, wagon shortage at the dock complex, etc. Calcutta-Haldia port is seen not to be unfavourably placed in these respects. After the commissioning of Haldia Dock System in 1977 the number of ships detained at Calcutta port has declined and has been even less than at Bombay port. Recently, the time of detention of ships at some other major ports, notably Bombay, is even higher and even longer than that at Calcutta-Haldia port (see Table 11).

For more recent years also we observe that the average detention of ships at Bombay Port has been longer than at

Calcutta-Haldia port. For example, average pre-berthing detention of ships at Calcutta-Haldia port for general cargo was 0.7, 2.38 and 0.73 days during 1984-85, 1985-86 and 1986-87, respectively, while, at Bombay port, the corresponding figures are 7.9, 4.7 and 3.1 days.

The foregoing analysis shows that neither draft nor productivity constraint nor labour unrest and detention time can explain the problem of excess capacity in Calcutta-Haldia dock system or the port's declining share in Indian trade. The relevant statistical exercise (namely, multiple correlation) also reveals that draft and productivity factors can not significantly explain the trend of traffic of Calcutta-Haldia port, e.g. the respective values of R^2 ranging 0.081 and 0.177.

3.2 Demand Constraints - Economic Factors

Economic conditions of Hinterland : The eastern region of India provides the major support to the traffic of Calcutta-Haldia port.[21] The sluggish nature of the growth in the economy of this region in recent years can be a major explanation for the declining trend in the share of traffic of this port. We have taken the State Domestic Product (SDP), as the index of economic well-being of a state, while relative growth (economic) propensity has been measured by the ratio of SDP to Net Domestic Product (NDP) of India. Similarly, 'relative growth propensity of traffic' has been measured by the ratio of total traffic of a port to that of the country as a whole.

The relative economic growth propensity of the eastern region (i.e. West Bengal, Bihar and Orissa) appears to be highly correlated with the relative growth propensity of traffic of Calcutta-Haldia port and the correlation coefficient (r) is estimated to be 0.756, r^2 being 0.571. (Table 12).

The relatively sluggish growth of the economy of the eastern region may, thus, be the outcome of the relatively slow growth of its manufacturing and agricultural sectors.

In Table 13, income from the manufacturing sector of the eastern region, over the period 1968-69 to 1984-85, appears to be highly correlated with the trend of traffic of Calcutta-Haldia port over the same period. The correlation-coefficient (r) of the indices of income from manufacturing sector of the region and of volume of traffic of Calcutta-Haldia port is estimated to be 0.9486 and $r^2 = 0.8998$.

While income from manufacturing sector of the eastern region increased during the period 1970-85 by 51.9 per cent, that of India as a whole increased by 87.8 per cent. This led to a decline in the share of the eastern region to income from manufacturing sector of India from 18.6 per cent in 1970-71 to 15.1 per cent in 1984-85. This relative decline in the share of the eastern region may well explain the declining share of Calcutta-Haldia port to the total traffic handled by all major ports of India from 10.8 per cent in 1970-71 to 9.8 per cent in 1984-85.

The decline in the share of the eastern region to income from manufacturing sector of India may now analysed. We find that the Indian economy took a decisive turn around 1965-66, when at the end of the Third Plan, the country entered into a phase of Annual Plans. Major decisions on expansion of capacity in the basic and heavy industrial sector were deferred on account of stringency of resources and the narrow time-horizon. The programme for expansion of capacity for power generation suffered seriously. Decision for investments on additional capacity for steel was stalled. Plans for increasing the capacity of transport system was shelved. The development of heavy and engineering industries,

which formed the hard core of the industrial structure of the Eastern region, suffered badly.[22]

As regards power, it is observed that the average annual rate of growth of installed capacity of the eastern region during 1960-61 to 1965-66 was around 17.0 per cent. But during the period from 1965-66 to 1970-71 the rate of growth of the installed capacity declined to 9.0 per cent. There was also regional disparity in growth of installed capacity (Table 14). The growth of installed capacity of power in the eastern region during 1951-80 was only 724 per cent, compared with a national average of 2000 per cent. The eastern region had got during this period the lowest share of the total installed capacity of the country. Its share had been less than one-sixth of the total capacity of the country in 1980 despite a heavy concentration of industries in this area and the fact that about one-fourth of the country's population lived here.[23]

The basic structure of the regional industrial economy may be looked into. One distinctive feature of the industrial economy of the eastern region is that basic metals and alloys industry is important here accounting for 16 to 22 per cent of total value of industrial output in West Bengal and Bihar in 1978-79, while in the Western and Southern regions chemicals and chemical products industry is comparatively important, accounting for 10 to 42 per cent of industrial output in Maharastra, Gujarat and Tamil Nadu in the same year. But of these two types of industries, it was the chemical products industry, which achieved higher growth rate since the late 1960's (Table 15).

While more than 52 per cent of the value of output in basic metal industries was produced in Bihar and West Bengal during 1983-84, more than 41 per cent of the value of output in Chemical and Chemical industry was produced in

Bihar and West Bengal during 1983-84 more than 41 per cent of the value of output in Chemical and Chemical industry was produced in Maharastra and Gujarat.[24] During 1960-84 the Chemicals and Chemicals products industry achieved more than 500 per cent growth while the growth rate for basic metals industry was 316. The absence of any petro-chemical complex in the eastern region led to its comparatively slow industrial growth, which affected adversely the growth of traffic of Calcutta-Haldia port leading to the massive under-utilisation of its berths.

The apathy and indifference of the Central Government to issue industrial licences for new industrial units in the eastern region may be mentioned here. The percentage share of this region to total licences issued in India declined from 24.9 in 1965 to 10.8 during 1982-86 and 7.2 during 1987-89 (Table 16).

The share of Western Region increased from 50.8 per cent in 1963 to 64.4 per cent during 1987-89 and that of Southern Region from 21.1 to 28.3 per cent during the same period. The most important among the modern industrial projects for which industrial license was denied to the eastern region, particularly West Bengal (and Haldia), was the petro-chemical complex at Haldia.

In the agricultural sector also, the eastern region exhibited the least growth rate. The eastern region achieved lower annual exponential growth rates of agricultural production and yield per hectare during 1952 to 1979 than Western and Southern Regions (Table 17).

Among the factors responsible for slower growth rate in agricultural production, etc. in the eastern region the most relevant and important was lower fertiliser consumption in this region than elsewhere (Table 18).

This explains very well why fertiliser imports through Calcutta-Haldia port was lower (4 lakh tonnes in 1977-78) than those through Madras Port (6 lakh tonnes) and Visakhapatnam Port (8 lakh tonnes). In recent years fertiliser consumption in the eastern region has substantially improved but it is still lower than those for the states of the Southern Region. For instance, in 1987-88 fertiliser consumption per hectare of gross cropped area in West Bengal was 74.0 Kg., 58.4 in Bihar and 17.8 Kg. in Orissa, while that in Andhra Pradesh was 79.2 and 95.8 in Tamil Nadu. During this year fertiliser (including raw materials) imports through Calcutta-Haldia port was 4.8 lakh tonnes, while that through Madras port was 6.2 lakh tonnes and through Visakhapatnam 7.5 lakh tonnes.

We note that the pattern of growth of hinterland of Calcutta-Haldia port explains, in a significant way, the relative decline in the share of the port. The growth of Bombay and Kandla Ports is mainly oil - and chemical-based, that of Mormugao port is iron ore export-based and that of Visakhapatnam and Madras ports is based on both, but that of Calcutta-Haldia port is based on neither of the two. It was mainly coal-based and general cargo-oriented. But the pattern of growth of sea-borne trade of India during 1950-89 changed in favour of petroleum oil lubricants (POL), iron ore and fertiliser but against coal (Table 19). Hence, Bombay, Kandla, Visakhapatnam and Madras ports benefited largely from this type of change in India's sea-borne trade and their relative share in total traffic of India improved while that of Calcutta-Haldia declined (Table 12 is referred back).

The pattern of traffic has in recent years changed in favour of oil and coal which have helped a lot in increasing the absolute volume of cargo in Haldia or Calcutta-Haldia port. (Table 1 and Table 12 referred back). But volume of cargo in iron ore has declined absolutely in recent years (from 23.00

million tonnes in 1979-80 to 21.86 million tonnes in 1983-84). This has been responsible for the under-utilisation of the capacity in iron ore berths of Paradip and Visakhapatnam ports for which the respective volumes of iron ore traffic declined absolutely from 2.20 million tonnes and 6.06 million tonnes in 1977-78 to 0.93 million tonnes and 4.97 million tonnes in 1983-84.

Following the oil crisis of 1973 the world steel industry has been passing through a recession, which has also affected the world sea-borne trade in iron ore. The volume of iron ore export of India, has declined from 23.47 million tonnes in 1976-77 to 22.40 million tonnes in 1980-81, leading to under-utilisation of capacities created in iron ore handling ports namely Mormugao , Madras, Visakhapatnam, Paradip and Haldia. In 1977-78, 85 per cent of the additional capacities installed in the iron ore berths of the first three ports mentioned above remained unutilised.

Thus, our analysis shows that economic factors are a significant explanation of the trend of traffic at Calcutta-Haldia port as well as of the falling share of the port in total sea-borne traffic of major ports of India in recent years.

3.3 Policy Variables

Among the policy variables that might have affected the growth of traffic of Calcutta-Haldia port, we first discuss the inter-modal transport policy of the Government of India. Coastal shipping has recently faced severe competition from railways and road transport and the total volume of traffic carried by coastal shipping in India declined from 41.0 lakh tonnes in 1962 to 12.8 lakh tonnes in 1980 - the volume of coal carried declined from 19.8 lakh tonnes to 8.8 lakh tonnes, of salt from 4.8 lakh tonnes to 2.4 lakh tonnes and of general cargo from 16.4 lakh tonnes to 1.7 lakh tonnes during the period.

Several factors are responsible for this decline. With the doubling up of railway truck in Southern Zones, railways declined to carry most of their coal requirements in the South by all-rail route. Dieselisation of locomotives which reduced railways' coal requirements in these areas also contributed to this decline of coastal coal traffic. Besides, the industries in the South and the West which were depending on steam were progressively allowed to switch over to fuel oil.

Let us now examine the economics of coastal shipping of coal through Haldia Port vis-a-vis the alternative modes of transport, viz. rail and road, to ascertain whether it is the only transport policy which has adversely affected the coastal traffic of the commodity for Calcutta-Haldia Port. The percentage of capacity utilisation of collieries is estimated to be 85 during 1977-78 to 1979-80 and the average stay period of collieries to be 10 days during this period. The comparative estimates of resource costs[27] for railways, roads and coastal shipping for the period are shown in Table 20.

Rail-cum-sea distance is seen to be uniformly higher in coastal shipping of coal between the origin of cargo and its different destinations. Despite the inherent difficulty, rail-cum-sea resource costs of coal movement from Andal via Haldia to all the destinations above are observed to be far less than all-rail and all-road resource costs.[28]

Thus we observe that coastal shipping was really cost-efficient relative to railways and roads over long routes for movement of coal. Hence, the explanation for the fact that coastal movement of coal via Haldia port did not pick up in the initial years might be found in transport policy of the Central Government which encouraged railway movement. However, in recent years, coal cargo volume improved a lot on account of the large demand for coal from Tamil Nadu Power Plant of Tamil Nadu State Electricity Board.

Economics of Haldia Port vis-a-vis its competitive Ports :

We will now discuss the economics of cargo transportation via Haldia Port vis-a-vis other major competitive ports of India.

For a shipowner the economic result of a voyage for a ship is largely determined by what time of voyage was spent in ports and handling cost.[29] Unless a large ship can be unloaded quickly in port, its advantage is lost.[30]

For a comprehensive economic study, apart from the cost of sea transport (i.e. freight rate) and the cost at ports, the cost at hinterland is also relevant. While the costs at ports may be reflected in the port charges, the cost at hinterland consists of road, railway or/and water transport costs. These three components of costs - freight rate, the cost at ports and the cost at hinterland - constitute the total cost of cargo movement from the origin of the cargo to its destination.

In our cost study, we will deal with two export commodities, iron ore and coal, and one imported commodity, fertiliser. We note in this context that inter-modal transport decisions of the Government trading agencies, namely the Minerals and Metals Trading Corporation (MMTC) of India Ltd., the Fertiliser Corporation of India, etc. and the concerned Ministries like Ministry of Food and Agriculture, etc. determine the port through which the cargo would pass.

Iron ore Export : Both Haldia and Paradip Ports were the competitors for Barajamda iron ore of Bihar. This iron ore passed via Panskura to Haldia port and via Kharagpur to Paradip Port. Since there are draft restrictions at Haldia port

for iron ore carriers, only the small carriers could visit Haldia port. It is observed that the MMTC channellised Barajamda iron ore of Bihar mostly through Paradip port (not through Haldia) though the railway distance between the mining areas and Haldia, and, hence, even at the existing telescoping rates the railway freight to Haldia was cheaper than that to Paradip. It is observed that at least 50 per cent of the iron ore carriers that visited Paradip port in 1977-78 could have been fully loaded at Haldia and sailed in lesser time than they took at Paradip and in this process could have achieved transport cost economy (Table 21).

Haldia port is seen to have enjoyed a cost economy of Rs. 20.70 per tonne of iron ore when small iron ore carriers have been put in use.

Coal overseas Export : For the overseas export of coal from the Raniganj - Jharia fields, while at Paradip loading was done at General Cargo Berth, Haldia port has, on the other hand, got a full-fledged coal berth with mechanical aids. The comparative costs for loading coal from Paradip and Haldia in 18000 D.W.T. Ships (optimum load of 16,500 tonnes) are shown in Table 22, which prove that total cost per tonne of loading coal from Haldia is lower than that for Paradip.

Chemical Fertilisers Import : For the sake of simplicity, let us assume that (i) only four competitive ports are working, (ii) the origin of the cargo is in Canada (Western Ports) and the cargo is carried in Indian ships of the Shipping Corporation of India Ltd. (SCI), (iii) landing charges at the ports are variable and all other port charges are same and constant, the ports work under normal conditions, i.e., there are no surcharges, (iv) railways are the only mode used on transporting the cargo from the ports to the major centres for

trade of India, and (v) these centres are Kanpur, Allahabad, Baranasi, Patna, Burdwan and Gauhati. Let the landing charges at the ports be denoted by L.C. and inland (railway) transport cost by LTC. Comparative cost conditions are shown in Table 23.

It may be relevant here to introduce the concept of economic hinterland of a port which may be defined to be an optimum geographical area which minimises total transportation cost (consisting of inland transport costs, port costs and shipping costs) from the origin of cargo to destination points. So defined, the destinations like Kanpur, Allahabad and Baranasi of the Northern Region, and Gauhati of the Eastern Region of India fall within the Economic hinterland of Calcutta-Haldia port for the airport cargo of chemical fertilisers. For other bulk commodities like coal, foodgrains, etc. the shipping charges being, more or less, the same for Indian ports, the above observation applies also for other bulk commodities.

Though Calcutta-Haldia port enjoys an internal cost advantage over Madras, Vizag and Bombay in handling cargo of/for West Bengal, Bihar, Assam and other ports of North Eastern Region, traffic is diverted to other ports in respect of bulk commodities, namely fertiliser, foodgrains, etc. and in general cargoes like iron and steel. The low traffic performance of Calcutta-Haldia port in recent years, therefore, is no wonder.

IV. PROSPECTS OF CALCUTTA PORT AND ITS PROSPECTIVE PLAN

Our analysis thus shows that the supply constraints are not the dominant constraints on the growth of traffic of Calcutta-Haldia port and that the root of the problem lies in economic factors, namely, slow and undiversified economic growth of the hinterland of the port and some transport policy issues.

Hence, the prospects of the port should be analysed in the perspective of future behaviour of these so-called demand factors.

Water-ways remain the cheapest among the organised transport modes. The 'Hanover Committee' of 1980 and the 6th and 7th five year plans highlighted the increased role of coastal shipping. The Central Government has earmarked massive investment for substantial increase in coal production. The installation of coal-based thermal power generation projects in the South has also created massive demand for coal from the eastern region of India. All these would improve the volume of coastal traffic in coal from Calcutta-Haldia port.

The trade potential of the Haldia Petro-Chemical Complex for which industrial license has been received in the late-eighties is undoubtedly high. There exists also a tremendous scope for expansion of non-traditional exports, particularly engineering goods, iron and steel, etc. to neighbouring countries like Bangladesh, Nepal, Burma, Srilanka and the ASEAN group nations.

Based on these observations, we may now attempt to prepare a perspective plan for Calcutta-Haldia port, founded on the expected rate and pattern of growth of the hinterland of the port and various policy parameters.

Two alternative traffic projections upto 2010 for Calcutta-Haldia could be made based on two different assumptions, (i) Perpetuation of existing conditions, i.e. existing rates of growth of manufacturing sector and state domestic product of the Eastern Region, (ii) Changing conditions.

Certain important changes occured during the 1989-90 National Front Government, when Haldia Petrochemical Complex Project and works on Bakreswar Thermal Power Plant

were given green signal. Though the National Front Government disintregated in 1990, we are assuming that in future Eastern India would receive a fairer deal from the national institutions in the coming years. It may be noted that per capita outlay during the Sixth Five Year Plan was Rs. 545 for the Eastern Region, Rs. 560 for Assam, while it was Rs. 1017 for the Western Region and Rs. 610 for the Southern Region. This disparity, we are hoping, would be narrowed down and the Eastern Region would receive at least the National average. We expect that larger long term financial assistance from industrial finance institutions, namely, industrial Finance Corporation of India (I.F.C.I.) and Industrial Development Bank of India (I.D.B.I.) would be forthcoming for the Eastern and North Eastern Regions where very meagre proportions of such assistances have so far been sanctioned and disbursed. For example, in 1986-87 only 6 per cent of IFCI and 9 per cent of IDBI assistances were sanctioned for the Eastern Region while more than double these percentages were extended to Western and Southern Regions. All these may be contrasted with population share of 20 per cent in the Eastern Region, 14 per cent in the Western Region and 20 per cent in the Southern Region of India. In the same year Rs. 45.59 crores were sanctioned from IDBI for Assam, while 122.77 crores for Haryana and Rs. 147.00 crores for Punjab though the population of each of the latter two states was less than that of the former. In 1988-89 only 0.5 per cent of total disbursements by IFCI was made for Assam while 4.1 per cent for Haryana and 6.5 per cent for Punjab.

We are hoping that the Eastern and North Eastern Regions of India would undergo important structural changes favouring industrial development and, hence of the Calcutta-Haldia Port.

Besides, in conditions of oil crisis and dwindling domestic -- commercial energy sources, Inland Water Transport and the high energy and land use efficiency of Coastal Shipping vis-a-vis surface modes of transport would be recognised, a la the National Transport Policy Committee (NTPC) and Rail India Technical Economic Services (RITES) and Asian Development Bank's CES Report on Coastal Shipping of December 1988. It is expected that coal will be the largest single commodity to move on the coast. Thermal power stations are proposed to be set up in Madras, Tuticorin, Goa, Dabhal, Cuddalore, Kanyakumari, Cochin, Narmada and Sikka with an aggregate capacity of 10000 MW requiring about 8 million tonnes by 1994-95 and 20 million tonnes by the year of 2000 A.D. According to the projections made by the Central Electricity Authority (CEA), even if 50 to 70 per cent of the projected cargo of 20 million tonnes of coal is carried by Coastal Carriers, the annual movement of coal will be in the range of 10 to 15 million tonnes of coal in 2000 A.D. The main loading port will be Haldia. The port and infrastructural facilities will have to be upgraded. Moreover, there has already occured a revolution in shipping technology. Containerisation of cargo has become the order of the day. Calcutta-Howrah-Durgapur-Asansol region being highly developed in basic metal and alloy industries, Container Industries have high prospects of development in the region assisted greatly by highly technical man power resources of the region.

The increasing demand for Container Cargo in the world market would imply that the container traffic of Calcutta-Haldia is likely to take off in the present decade and expand faster in the coming decade. India can avail herself of the right opportunity by development of a Container Freight Station at Calcutta and full-fledged development of Inland Water Transport which would ensure the cheapest mode of movement of

containers to distant areas. The steep rises in fuel prices and increasing trend toward containerisation have created an awareness to develop the inland water transport system as a complementary means of surface transport in India. The channel in the Hooghly-Bhagirathi system is being readied for navigation upstream of Farakka. In the face of acute shortage of wagons and non-availability of diesel for road vehicles, Inland Water Transport holds prospect of a bright future and this would not only help accelerate the economic development of Eastern Region but also the growth of traffic in Calcutta-Haldia port complex by providing a more economic mode of transportation relative to other ports.

As indicated earlier, the commodity traffic that is likely to be boosted are Petroleum Oil Lubricants (P.O.L.) and Chemical products, coal and general cargo including jute. The trade potential of the Haldia Petrochemical Complex, now under construction, is undoubtedly high. There is almost an unlimited prospect of export growth in engineering goods through Calcutta-Haldia port and this can be realised through developing India's share in neighbouring countries like, Bangladesh, Nepal, Burma, Sri Lanka and making a dent on ASEAN group of nations. There is also a market in the oil-rich countries of West Asia and Africa. With increasing containerisation of cargo Calcutta-Haldia port can improve its traffic volume in this cargo.

Prospects of trade in traditional export of jute appear bright in view of the accentuating oil crisis all over the globe. Different incentive measures taken by the Government of India will be a powerful aid to increase production and boost exports.

With these factors and prospects of trade flows in mind we may now endeavour to make some quantitative analysis on the existing trend rates of growth of cargo of all major ports of India and Calcutta-Haldia Port and of their respective determinants, the GNP and income from manufacturing sector of India

and the SDP and income from manufacturing sector of the Eastern Region including Assam, which may be used to arrive at the projected trade volume in 2000-01 and 2010-11 under assumptions of (i) the perpetuation of the existing trends, (ii) the changed conditions.

Trend rates of growth : Since the rate of growth calculated by comparing two end points is found unreliable, we may attempt growth calculations on the basis of trend fitting exercises. Two popular forms of growth curves attempted here are :

Linear $Y = a + bt$

Exponential $Y = ab^t$

We may try to find out rates of growth of cargo and income for the period 1970-71 to 1986-87 with the help of these two types of trend equation. Fitted equation with origin at 1978-79 and corresponding rates of growth are :

A. For All Major Ports Cargo :

Function		R^2	Growth Rate (%)
Linear	$Y = 805.76 + 41.00t$	0.9088	5.1
Exponential	$Y = 780.53(1.05)^t$	0.9529	5.1
B. For GNP of India			
Linear	$Y = 488.12 + 19.84t$	0.9642	4.1
Exponential	$Y = 478.35(1.04)^t$	0.9800	4.1
C. For Income from Manufacturing Sector of India			
Linear	$Y = 6813.12 + 324.19t$	0.9572	4.8
Exponential	$Y = 6626.21(1.05)^t$	0.9831	4.9
D. For Calcutta-Haldia Port Cargo :			
Linear	$Y = 879.41 + 36.47t$	0.9319	4.1
Exponential	$Y = 860.31(1.04)^t$	0.9398	4.2

	Function		R^2	Growth Rate (%)
E.	Linear	Y = 4802.82 + 138.98t	0.9136	2.9
	Exponential	Y = 4751.78(1.03)t	0.9361	2.9
F.	For Income from manufacturing sector of Eastern region :			
	Linear	Y = 1184.94 + 37.96t	0.9349	3.2
	Exponential	Y = 1169.41(1.03)t	0.9412	3.3

From the equations above the exponential equations with higher R^2 are found better fit than the linear ones.

We observe that there is a close correlation between volume of cargo handled by ports and income of their respective hinterland. The regression equations of the cargo are shown in Table 24.

Projected Income and Traffic under existing conditions :

It is tried to estimate the projected GNP of India, Major ports traffic, SDP of the Eastern Region including Assam and Calcutta - Haldia Port Traffic for 2000-01 and 2010-11 based on exponential rates of growth. Values obtained are shown in Table 25.

Projected Traffic of Calcutta-Haldia Port under changed conditions:

Since the eastern region of India including Assam is expected to grow faster in the coming years than before, the volume of cargo to be handled by the port is expected to get a boost. The projected volume of cargo for Calcutta-Haldia Port becomes 23.19 million tonnes in 2000-01 and 38.01 in 2010-11, based on the exponential rates of growth obtained from the trend equations (with the help of values from 1970-71 to 1986-87).

As we have already seen that the volume to traffic of any port depends highly on the income or production of its hinterland we may try to project the volume of cargo in Calcutta-Haldia Port for 2000-01 and 2010-11 in a different way with the assumption that such relation between traffic and income will continue to exist and the trend rate of growth of income will also remain unchanged. Such projected values are found to be 19.07 million tonnes for 2000-01 and 26.45 million tonnes for 2010-11. These projected values are observed to be much lower than those under changed conditions and even slightly lower than under existing conditions. This indicates that unless with the development of infrastructure in Calcutta-Haldia port its hinterlands also develop sufficiently to reach the all India Growth rate in SDP or manufacturing income, the projected values under changed conditions can never be reached. Expected values will then be slightly greater than those obtained under existing conditions.

V. SUMMARY AND CONCLUDING OBSERVATIONS

While trade circles attribute the phenomenon of the declining share of Calcutta-Haldia port in the total volume of cargo handled by major ports of India to its physical constraints like deficiency in drafts and other supply constraints like low productivity, labour unrest and detention of ships, our analysis shows that the root of the problem lies in economic factors like slow and undiversified economic growth of the hinterland of the port and in some major transport policy issues.

Hence, the basic issue, for the future, is how to increase the traffic flow through diversified economic growth of the hinterland of the Calcutta port, through a change in the orientation the national transport policy.

EPILOGUE

Recent years have witnessed a significant increase in cargo through put of Calcutta-Haldia Port. Cargo traffic handled by this port was 9.3 million tonnes in 1980-81, which nearly doubled to 18.3 million tonnes in 1992-93. Average annual growth of traffic works out to be 7.44 per cent. The traffic growth rate during the initial years of the 1990's has been faster than in the earlier years of the 1980s. Average annual growth rate of traffic during the decade 1980-81 to 1989-90 was 5.81 per cent per annum, which increased to 6.80 per cent for the later three years, i.e., 1990-91 to 1992-93. Calcutta Port's rank among the major ports of India elevated to the fifth in 1992-93 in contrast to its sixth position even in 1985-86. It handled 8.5 per cent of major ports' traffic in 1986-87. That increased to 11.0 per cent in 1992-93.

In the initial years of the 1990s there has been a significant increase in the traffic of bulk cargo, namely, petroleum oil lubricants (POL), coal and fertilisers including fertiliser raw materials. While this port handled 6.44 million tonnes of POL, 4.22 million tonnes of coal in 1989-90, 8.92 million tonnes of POL and 5.06 million tonnes of coal were handled in 1992-93. The fertilisers import cargo increased from 5.33 lakh tonnes in 1988-89 to 6.20 lakh tonnes in 1992-93.

Among the factors which may explain this revival of Calcutta-Haldia port mention may be made of the agricultural progress that the hinterland of the port has achieved in recent years and the government policy that has turned to be favourable for the enhancement of coal traffic through this port.

The eastern region of India including Assam has developed significantly in agriculture in recent years. Average annual growth rate of foodgrains production in the Eastern region worked-out to be 4.56 per cent while that in the rest of India was 3.54 per cent during 1987-88 to 1991-92. The share of the eastern region in the all-India food grains production has increased from 19.84 per cent in 1987-88 to 20.74 per cent in 1991-92. This has boosted up the volume of traffic, particularly that of fertilisers and POL traffic. The share of Calcutta-Haldia port in the fertiliser cargo of all major ports taken together has increased from 6.82 per cent in 1987-88 to 8.41 per cent in 1992-93, and that in of POL traffic from 10.03 per cent to 12.69 per cent during the same period. Also, the volume of coal traffic has increased from 3.13 million tonnes to 5.06 million tonnes during this period, that is, by more than 10 per cent per annum. This has occurred on account of the decision of the Tamil Nadu State Electricity Board to import most of their required coal from the Eastern region through the Haldia Port.

It may be noted that the prospect of Calcutta-Haldia Port may brighten with the development of Petro-Chemical Complex at Haldia which would help the whole of Eastern region achieve a coveted diversified economic growth, which in turn, would boost up the traffic of this Port, particularly in the bulk cargo. The growth potential of this region in respect of agriculture is also high and, if it is realised, that would also accelerate the rate of increase of traffic of the Calcutta-Haldia Port.

TABLE - 1

TRENDS OF TRAFFIC OF CALCUTTA PORT AND ITS PERCENTAGE SHARE AMONG MAJOR PORTS OF INDIA, 1928-29 TO 1990-91

Years	Volume of Cargo (in million tonnes)		Percentage share of traffic of Calcutta Port
	Calcutta Port	All major Port	
1928-29	10.9	22.0	49.5
1947-48	7.1	16.4	43.2
1951-52	9.7	23.1	42.1
1960-61	9.0	39.5	22.7
1964-65	11.0	45.0(a)	24.4
1970-71	6.0	55.6	10.7
1977-78(b)	7.6	66.2	11.5
1983-84	10.5	100.6	10.4
1986-87	12.1	142.4	8.5
1988-89	14.2	146.4	9.7
1990-91	15.2	152.8	9.9

Source : The Commissioners for the Port of Calcutta, Calcutta Port Trust.

Note : (a) Figure refers to traffic of all ports of India

(b) This year Haldia Dock Complex was commissioned.

TABLE - 2

DRAFT[a] OF CALCUTTA PORT AND ITS TRAFFIC, 1947-48 to 1979-80

Year	Mean draft available (in metres)	Volume of traffic (in million tonnes)
1947-48	7.35	7.1
1951-52	7.88	9.7
1960-61	7.10	9.0
1964-65	6.90	11.0
1970-71	7.29	7.6
1977-78[b]	7.05 - 9.63	8.6
1979-80	7.05 - 8.98	10.5

Source : Calcutta Port Trust

Notes : (a) Outward mean draft

(b) Haldia Dock System was commissioned and deeper drafts were available since then.

TABLE - 3

PERMISSIBLE DRAFTS OF SHIPS ENTERING MAJOR PORTS OF INDIA

Name of the Major Port	Permissible Drafts (deepest)		
	1978	1981	1988
1. Calcutta-Haldia			
i. Haldia	10.36	10.36	11.50
ii. Calcutta	8.30	8.30	9.23
2. Paradip	11.89	11.89	11.90
3. Visakhapatnam			
i. Inner Harbour	10.20	10.21	10.21
ii. Outer Harbour	15.30	15.30	17.00
4. Madras	9.50 to 14.02	9.50 to 14.02	9.50 to 17.40
5. Tuticorin	8.40	8.85	8.24
6. Cochin	9.14	9.14	10.70
7. Kandla	10.36	10.36	10.36
8. Mormugao	12.19	12.19	12.80
9. New Mangalore	9.15	12.50	12.50
10. Bombay	10.36 to 11.60	10.67	10.70 to 14.3

Sources: (a) Visakhapatnam Port Trust (1979)
''Statistical Bulletin''
(b) Indian Ports Association (1981)
''Major Ports of India''
(c) Planning Commission[31]

TABLE - 4

DISTRIBUTION OF BOTH NATIONAL AND FOREIGN SHIPS ENTERING MAJOR PORTS AS PER DRAFT
1969-77

Drafts (metres)	1969		1976		1977(a)	
	No. of ships	Percentage of total	No. of ships	Percentage of total	No. of ships	Percentage of total
Less than 7.7	5574	76	5172	71.8	1834	65
7.7-9.2(b)	1079	15	1179	16.4	487	17
9.3 and above	649	9	859	11.8	491	18
Total(c)	7298	100	7208	100	2821	100

Source : Mukherjee, S. (1980) : 'Problems of Calcutta Port - An Assessment', paper presented to the Seminar on Problems of Calcutta Port and Suggested Remedies, Calcutta.

Notes : (a) Figures for the first half of the year (i.e., upto 30.6.1977).
(b) The drafts are presented in the form in which they are available. They are not standardised figures.
(c) Figures in respect of Bombay Port relate to financial years.

TABLE - 5

DISTRIBUTION OF VESSELS ENTERING VISAKHAPATNAM PORT AS PER DRAFT, 1977-78 to 1978-79

Drafts (metres)	Number of vessels	
	1977-78	1978-79
Less than 7.6	234 (5.1)	246 (50.2)
7.6 - 9.0	113 (26.8)	121 (24.6)
9.1 - 10.5	96 (21.0)	95 (19.3)
10.6 and above	5 (1.1)	29 (5.9)
Total	458 (100)	492 (100)

Source : Vizag Port Trust (1980) : Statistical Bulletin

TABLE - 6

GLOBAL DRAFTWISE DISTRIBUTION OF VESSELS, 1977

Drafts (Metres)	Number of vessels
Less than 7.8	982 (8.0)
7.8 - 9.0	3737 (30.1)
9.1 - 10.9	3882 (31.5)
10.1 - 10.5	1029 (8.4)
10.6 and above	2703 (22.0)
Total	12303 (100)

Source : Lloyd's Register of Shipping : Statistical Tables.

TABLE - 4

DISTRIBUTION OF BOTH NATIONAL AND FOREIGN SHIPS ENTERING MAJOR PORTS AS PER DRAFT

TABLE - 7

AVERAGE SERVICE TIME TO HANDLE 1000 TONNES OF FERTILISERS AT MAJOR PORTS, JULY 1978 TO SEPTEMBER, 1979 (HOURS)

Year	Calcutta-Haldia	Bombay	Madras	Visakhapatnam
1978				
July to September	30.3	31.9	31.2	34.7
October to December	32.3	22.1	20.8	35.1
1979				
January to March	37.2	29.4	24.3	24.4
April to June	38.5	28.0	20.0	35.6
July to September	34.7	59.4	35.7	22.7

Source : Visakhapatnam Port Trust : Statistical Bulletin, 1978-79.

TABLE - 8

AVERAGE QUANTUM OF GENERAL CARGO HANDLED AT CALCUTTA AND BOMBAY PORTS PER STEAMER DAY, 1984-87 (TONNES)

Year	Calcutta Port	Bombay Port
1984-85	627	409
1985-86	523	524
1986-87	650	598

Source : Calcutta Port Trust : Administrative Reports
Bombay Port Trust : Administrative Reports.

TABLE - 9

MANDAYS LOST PER EMPLOYEE AT CALCUTTA AND BOMBAY PORTS DURING 1971-72 TO 1978-79

Year	Number of mandays lost per employee (a) Calcutta Port (b)	Bombay Port
1971-72 to 1975-76 - Yearly Average	0.82	1.47
1976-77	0.02	0.03
1977-78	0.19	2.20
1978-79	2.52	10.12

Source : Bombay Port Trust and Calcutta Port Trust.
Notes : (a) Employment at ports as on 31st March of the year.
(b) Figures here are for Calender year.

TABLE - 7
AVERAGE SERVICE TIME TO HANDLE 1000 TONNES OF FERTILISERS AT MAJOR PORTS, 1979 (HOURS)

TABLE - 10

MANDAYS LOST AT CALCUTTA-HALDIA AND BOMBAY PORTS, 1984-86

Y e a r	Calcutta-Haldia Port (a)	Bombay Port (b)
1984-85	2,21,541	3,24,452
1985-86	15,690	18,376

Source : Calcutta Port Trust and Bombay Port Trust.

Notes : (a) Number of employees in 1984-85 and 1985-86 were 31,231 and 29,547 respectively.

(b) Number of employees in 1985-86 were 30,0988.

TABLE - 11

NUMBER OF SHIPS DETAINED AND SHIPDAYS LOST AT CALCUTTA-HALDIA AND BOMBAY PORTS DURING 1974-75 TO 1978-79

Y e a r s	Number of ships detained		Shipdays lost	
	Calcutta-Haldia	Bombay	Calcutta-Haldia	Bom
1968-69	459	569	2161	31
1974-75	306	844	1314	52
1977-78	141	1135	325	97
1978-79	67	921	309	114

Source : (1) Ministry of Shipping and Transport, Govt. of India (1971)[4]

(2) Administrative Reports of Ports

TABLE - 12

RELATIVE ECONOMIC GROWTH PROPENSITY OF EASTERN REGION OF INDIA AND RELATIVE GROWTH PROPENSITY OF TRAFFIC OF CALCUTTA-HALDIA PORT, 1968-69 TO 1984-85

Year	Net Domestic Product at factor cost (Rs. crores) at constant prices		Relative Economic growth propensity of Easterm Region (%)	Total Traffic (in million tonnes		Relative growth propensity of traffic of Calcutta-Haldia Port (%)
	Eastern Region	All-India		Calcutta -Haldia Port	All major ports	
1968-69	3241	17112	28.9	7.96	55.09	14.4
1969-70	3349	18202	18.4	6.90	54.51	12.7
1970-71	3459	19228	18.0	6.01	55.58	10.8
1971-72	3533	19498	18.1	7.30	59.01	12.4
1972-73	3524	19202	18.3	6.68	58.26	11.5
1973-74	3571	20201	17.7	6.32	63.66	09.9
1974-75	3659	20450	17.9	7.50	65.74	11.4
1975-76	3940	22471	17.5	7.70	66.20	11.6
1976-77	3969	22766	17.4	8.00	68.20	11.7
1977-78	2486	24632	17.4	7.81	66.77	11.7
1978-79	4328	26193	16.5	7.98	71.04	11.2
1979-80	4064	24761	16.4	8.80	79.90	11.0
1980-81	4600	26608	17.3	9.51	81.32	11.7
1981-82	4631	27973	16.6	9.92	87.98	11.3
1982-83	4609	28924	15.9	10.69	93.70	11.4
1983-84	4545	31200	14.6	10.47	100.60	10.4
1984-85	4615	32445	14.2	10.52	107.80	9.8

Sources:
1. Govt. of West Bengal : Economic Reviews
2. Govt. of Bihar, State Planning Board : Selected Plan Statistics, 1982.
3. Govt. of Orissa : Statistical Abstract of Orissa
4. Sreelekha Basu : ''West Bengal's Economic Growth in All-India Perspective'', Economic and Political Weekly, July 25, 1987
5. Calcutta Port Trust.

TABIE - 13

TREND OF INCOME OF EASTERN REGION OF INDIA FROM MANUFACTURING SECTOR AND THAT OF CARGO OF CALCUTTA-HALDIA PORT, 1968-69 TO 1984-85

Y e a r	Income of the eastern region from the manufacturing sector		Volume of traffic of Calcutta-Haldia Port	
	Income (Rs. crores)	Index	Volume (in million tonnes)	Index
1968-69	997.06	100	7.96	100
1970-71	860.95	86	6.01	76
1971-72	860.95	86	7.36	93
1972-73	877.34	89	6.68	84
1973-74	911.53	91	6.32	79
1974-75	903.45	91	7.53	95
1975-76	921.69	92	7.70	97
1976-77	1046.67	105	8.36	105
1977-78	1079.83	108	7.81	98
1978-79	1093.70	110	8.24	104
1979-80	1082.35	109	8.80	111
1980-81	1145.68	115	9.51	120
1981-82	1223.93	123	9.92	125
1982-83	1264.62	127	10.69	134
1983-84	1316.68	132	10.47	132
1984-85	1308.11	131	10.52	132

Sources: 1. Govt. of West Bengal : Economic Reviews
2. Govt. of Bihar, State Planning Board : Selected Plan Statistics, 1982
3. Govt. of Orissa : Statistical Abstract of Orissa
4. Sreelekha Basu : ''West Bengal's Economic Growth in All-India Perspective'', Economic and Political Weekly, July 25, 1987
5. Calcutta Port Trust.

TABLE - 14

INSTALLED CAPACITY OF POWER OF THE EASTERN REGION VIS-A-VIS OTHER REGIONS OF INDIA
1951 to 1980

Regions	Capacity installed (M.W.)				Increase from 1951 to 1980 (%)
	1951	1961	1973	1980	
Eastern Region	599(34.5)	1241(26.8)	3654(22.4)	5335(16.3)	724
Southern Region	354(20.4)	908(19.6)	4075(25.0)	7907(29.9)	2234
Nothern Region	422(24.3)	1359(29.4)	4069(24.9)	7318(27.7)	1734
Western Region	363(20.8)	1115(24.2)	4517(27.7)	6897(26.1)	1900
Total	1738(100)	4623(100)	16315(100)	24457(100)	1407

Source : The Economic Times dt. 29.7.1981.

Note : Figures in parentheses refer to percentage share to total.

TABLE - 15

INDEX OF INDUSTRIAL PRODUCTION OF INDIA IN 2 MAJOR COMMODITY GROUPS (1960-100)

Commodity Group	1961	1965	1968	1971	1976	1980-81	1983-84
1. Basic Metal Industries	118.7	180.9	191.5	213.5	286.4	270.5	316.3
2. Manufactures of Chemical and Chemical Products	113.3	152.6	168.4	256.3	355.2	414.7	510.0

Source : Annual Survey of Industries

TABLE - 16

NUMBER OF INDUSTRIAL LICENCES ISSUED TO DIFFERENT STATES OF INDIA, 1965 TO 1986

Region	States	1965	1970	1977	1980	1982-86	1987-89
Eastern Region	Bihar	61	22	16	4	93	17
	Orissa	5	4	2	8	76	14
	West Bengal	67	46	40	23	263	61
	Total	133	72	58	35	432	92
		(24.9)	(20.0)	(11.2)	(13.6)	(10.8)	(7.2)
Western Region	Maharastra	134	112	159	107	636	242
	Gujarat	39	39	60	85	421	236
	Madhya Pradesh	14	2	8	18	148	59
	Rajasthan	13	7	17	15	197	36
	Punjab and Haryana	24	39	46	38	594	112
	Uttar Pradesh	48	26	41	30	348	121
	Total	272	225	322	293	2344	806
		(50.8)	(59.7)	(62.2)	(61.7)	(58.4)	(64.4)
Southern Region	Tamil Nadu	59	36	32	37	440	117
	Karnataka	22	17	45	40	259	114
	Kerala	8	10	16	11	89	19
	Andhra Pradesh	24	13	27	42	244	104
	Total	113	77	120	130	1032	354
		(21.1)	(20.4)	(23.2)	(27.4)	(25.7)	(28.3)

Source : Govt. of West Bengal : Economic Review

TABLE - 15

INDEX OF INDUSTRIAL PRODUCTION OF INDIA IN 2 MAJOR COMMODITY GROUPS (1960-100)

TABLE - 17

ANNUAL EXPONENTIAL GROWTH RATES OF AGRICULTURAL PRODUCTION AND YIELD PER HECTARE IN INDIAN STATES, 1952 - 1979 (a)

Region and States		Annual Exponential Growth Rate	
Region	States	Production	Yield per hectare
Eastern	Bihar	1.67	1.13
	Orissa	1.40	0.14
	West Bengal	1.85	0.89
Western	Maharastra	1.83	1.53
	Gujarat	2.83	2.73
	Madhya Pradesh	1.09	0.36
	Rajasthan	2.24	1.27
	Punjab	4.28	3.10
	Uttar Pradesh	1.96	1.55
Southern	Tamil Nadu	2.13	1.89
	Karnataka	2.38	2.32
	Kerala	2.36	1.54
	Andhra Pradesh	1.84	1.71
All India		2.35	1.72

Source : Nair[25]

Note : (a) Based on the data for 28 crops.

TABLE - 18

CONSUMPTION OF PLANT NUTRIENTS AND AGRICULTURAL PRODUCTIVITY IN THE EASTERN REGION VIS-A-VIS SOME OTHER STATES IN THE SOUTH REGION DURING 1978 KHARIFF SEASON

Region and States		Consumption of plant nutrients (kilogrammes) per hectare	Productivity (Yield per hectare in Kg.)
Eastern	Bihar	5	985
	Orissa	5	735
	West Bengal	13	1133
Southern	Andhra Pradesh	27	1378
	Tamil Nadu	45	2129

Source : The Statesman, June 16, 1980.

TABLE - 19

CHANGE IN PATTERN OF SEA-BORNE TRADE OF INDIA (QUANTITY IN 100,000 TONNES

Year	POL	Iron Ore	Coal	Fertiliser	General Cargo and other cargo	Total
1960-61	122.10 (30.54)	79.44 (19.87)	21.16 (5.40)	7.63 (1.91)	169.40 (42.38)	399.73 (100.00)
1970-71	187.74 (33.71)	109.97 (34.47)	6.16 (1.19)	21.16 (3.80)	230.85 (41.45)	556.88 (100.00)
1975-76	207.95 (31.41)	210.88 (31.85)	10.34 (1.50)	37.09 (5.60)	195.78 (29.57)	662.04 (100.00)
1977-78	253.80 (38.00)	209.00 (31.30)	-	41.00 (6.14)	-	667.75 (100.00)
1979-80	285.00 (35.67)	230.00 (28.80)	15.00 (1.8)	59.00 (7.38)	210.00 (26.28)	799.00 (100.00)
1983-84	475.00 (47.22)	218.60 (21.73)	46.10 (4.58)	35.90 (3.57)	230.40 (22.90)	1006.00 (100.00)
1985-86	548.89 (45.93)	288.17 (24.11)	75.38 (6.31)	61.72 (5.16)	220.91 (11.49)	1195.07 (100.00)
1986-87	555.49 (44.70)	305.98 (24.62)	94.22 (7.58)	49.93 (4.02)	237.21 (19.09)	1242.83 (100.00)
1988-89	643.60 (43.97)	327.30 (22.36)	156.00 (10.66)	51.10 (3.49)	228.80 (15.63)	1463.80 (100.00)

Source : (i) Govt. of India[26]

(ii) Planning and Research Cell, Calcutta Port Trust.

TABLE - 20

RESOURCE COST COMPARISON FOR TRANSPORTATION OF COAL : RAILWAYS, ROADS TRANSPORT AND COASTAL SHIPPING, 1977-78 TO 1979-80

Pairs of Points	Resource cost per tonne in Rs.		
	Railways	Roads	Rail-cum-sea (coastal shipping)
1. Andal-Haldia-Tuticorin	234.3	240.1	138.7
(Distance (Kms)	2579	2355	2704
2. Andal-Haldia-Cochin	187.1	237.8	137.5
Distance (Kms)	2442	2321	2922
3. Andal-Haldia-Navalakhi	209.1	211.2	151.5
Distance (Kms)	2209	2058	4676

TABLE - 21

COMPARATIVE COST POSITION IN RESPECT OF LOADING IRON ORE FROM HALDIA AND PARADIP IN SMALL CARRIERS, 1979-80

Port	Railway Freight (Rs.)	Port charges (Rs.)	Detention cost (Rs.)	Total cost (Rs.)
Haldia	75.60	19.00	0.00	94.60
Paradip	98.72	13.34	3.24	115.30

Source : (i) South Eastern Railway
(ii) Calcutta Port Trust
(iii) Paradip Port Trust

Note : Rs. 40,000 is taken for detention cost per vessel per day.

TABLE - 22

COMPARATIVE COST POSITION IN RESPECT OF LOADING OF COAL FROM PARADIP AND HALDIA BY 18000 DWT SHIPS, 1976-77

Ports	Railway Freight (Rs.)	Port charges (Rs.)	Port days cost of ships for loading (Rs.)	Total cost (Rs.) per tonne
Paradip	42.30φ	19.51	11.03	72.84
Haldia	26.00φφ	25.13	1.57	52.70

Source : (i) Calcutta Port Trust
(ii) South Eastern Railway

Note : φ The distance from Andal to Paradip via Dankuni - Kharagpur is 612 Kms.

φφ The Distance from Andal to Haldia via Dankuni - Panskura is 326 Kms.

TABLE - 23

COMPARATIVE COSTS OF TRANSPORTATION OF CHEMICAL FERTILISERS FROM CANADA[a] (WESTERN PORTS) TO SOME CENTRES OF TRADE IN INDIA (FIGURES IN Rs. IN 1979)

Destination	Ports					
	Haldia			Visakhapatnam		
	L.C.[b]	L.T.C.	Total[c]	L.C.	L.T.C.	Total[c]
Kanpur	19.50	112.50	1254.75	13.0	137.40	1273.15
Allahabad	19.50	96.80	1239.05	13.0	123.30	1259.05
Baranasi	19.50	87.00	1229.25	13.0	133.80	1269.55
Patna	19.50	74.00	1216.25	13.0	112.50	1248.25
Burdwan	19.50	30.70	1172.95	13.0	106.60	1242.35
Gauhati	19.50	110.40	1250.65	13.0	191.60	1237.35
	Madras			Bombay		
	L.C.	L.T.C.	Total[c]	L.C.	L.T.C.	Total[c]
	15.84	184.60	1341.19	4.9	126.8	1254.45
	15.84	174.05	1330.59	4.9	128.6	1256.25
	15.84	180.50	1337.09	4.9	130.0	1257.65
	15.84	164.80	1321.39	4.9	152.9	1280.55
	15.84	162.10	1318.69	4.9	174.0	1301.65
	15.84	216.20	1372.79	4.9	200.4	1328.05

Source : 1. The Shipping Corporation of India Ltd., 2. Indian Railways (S.E.R., E.R.), 3. Major Ports of India.

Note : (a) From West Germany and U.S.S.R. Ports, shipping charges were same for all Indian Ports in Chemical manures. Hence, the relative cost positions remain the same and the observations derived remains unaltered. For most bulk commodities, same S.C. for Indian Ports.

(b) L.C. = Landing charges at port.

(c) Total = Landing charges at port + inland transport cost (LTC) + shipping charges (SC)

TABLE - 24

REGRESSION EQUATIONS FOR CARGO HANDLED BY PORTS DURING 1970-71 TO 1986-89

Ports	Explanatory Variables					
	Constant	X_1	X_2	X_3	X_4	r^2
Major Ports of	-206.7	2.0743	-	-	-	0.9499
India	- 56.8	-	0.1266	-	-	0.9516
Calcutta-Haldia	-315.1	-	-	-	-	0.9162
Port	-182.1	-	-	-	0.8958	0.8666

X_1 = GNP of India, X_2 = Manufacturing Income of India, X_3 = SDP of Eastern Region, X_4 = Manufacturing Income of Eastern Region.

TABLE - 25

PROJECTED FIGURES OF INCOME AND PORT-TRAFFIC : 2000-01 and 2010-11

	2000-01	2010-11
GNP of India (Rs. crores) at Constant Prices	116607	174835
Major Ports Cargo (Million tonnes)	231.55	379.57
SDP of Eastern Region (Rs. Crores)	8933	11901
Calcutta-Haldia Port Cargo (Million tonnes)	21.41	32.40
Manufacturing Income of India (Rs. Crores)	18883	30396
Manufacturing Income of Eastern Region (Rs. Crores)	2374	3276

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15. The frequency distribution of daily drafts available at Haldia over the years 1977-78 to 1979-80 reveals that for most of the days in a year drafts varied between 8.9 (and below) and 9.9 metres.

Frequency distribution of drafts available for days at Haldia Port, 1977-78 to 1979-80

Drafts (metres)	Number of days available	
	1977-78	1979-80
8.9 and below	154	173
9.0 - 9.9	179	181
10.0 and above	32	12
Total	365	365

Source : Calcutta Port Trust.

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32. In major ports of India P.O.L. traffic increased to 643.6 and coal to 156.0 lakh tonnes in 1988-89.

33. Output per ship day is, on the average, higher in Haldia Port than that in other major ports of India (See, data given below).

— Output per ship day at Haldia Port vis-a-vis other major ports of India, 1985-86 to 1988-89 (in tonnes)

Ports	1985-86	1986-87	1987-88	1988-89	Average
Haldia	3994	5381	6693	6288	5589
Paradip	2448	3335	4674	4272	3682
Visakhapatnam	3896	5127	6127	6833	5496
Madras	3358	4184	4364	4285	4048
Bombay	2155	2516	2765	2355	2448
Kandla	5392	5403	5893	5051	5435

Source : Planning Commission[31].