

PORT DEVELOPMENT IN INDIA, WITH  
SPECIAL REFERENCES TO SHIPPING  
PRODUCTIVITY, REGIONAL COVERAGE  
AND FOREIGN TRADE.

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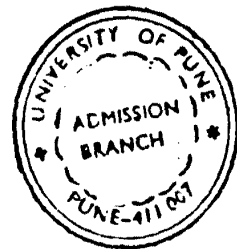
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APPENDIX : FORM 'A'

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FOREWORD

1. This study comprises of four Parts. These Parts are inter-linked and has effective and important roles in the Development of Ports in India.

Part A	-	Port Development in India.	(Section-1)
Part B	-	Shipping Productivity	(Section-2)
Part C	-	Regional Coverage	(Section-3)
Part D	-	Foreign Trade	(Section-4)

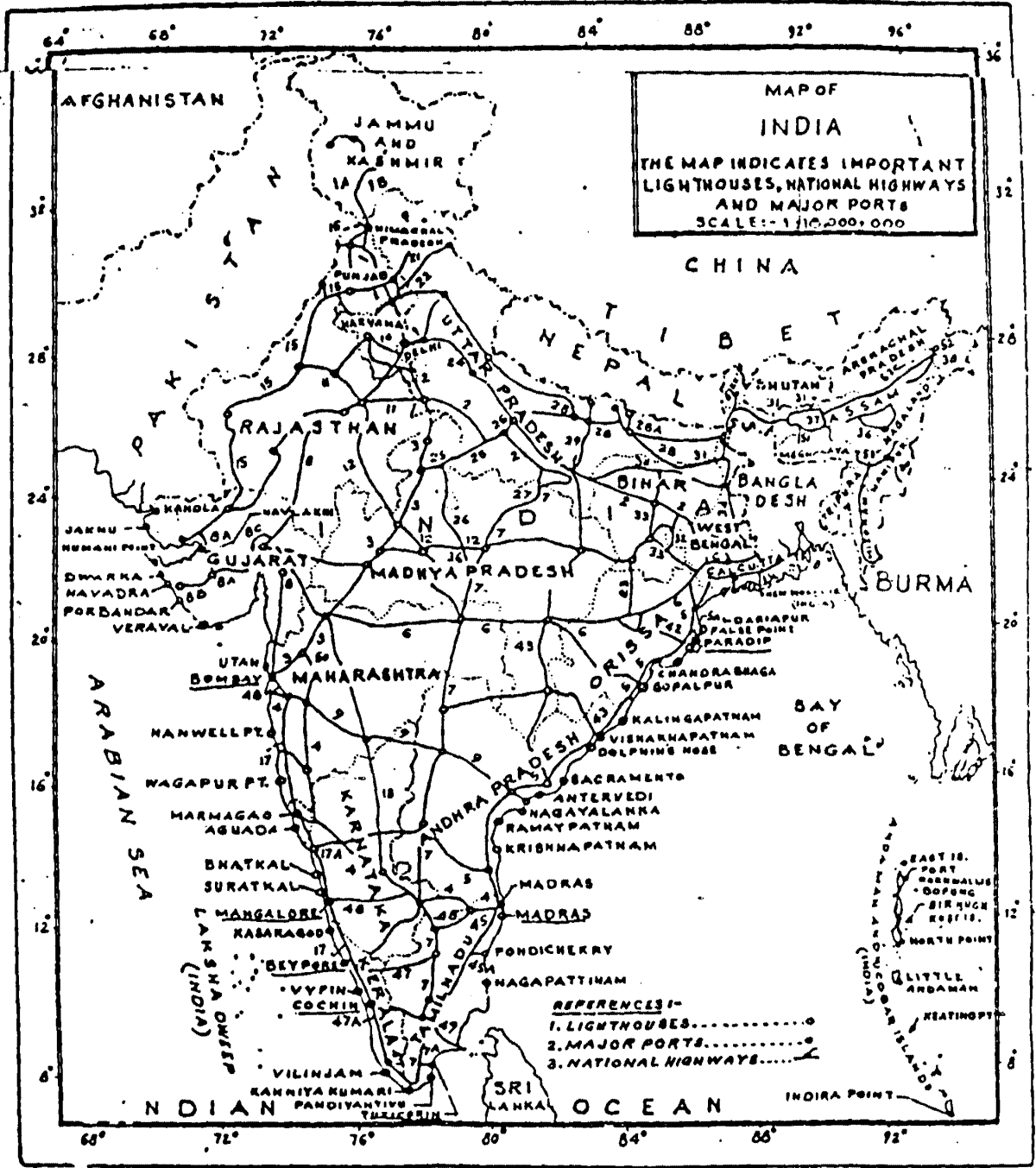
This study discusses the nature of relationship, and the reason for developing ports higher, in regard to Shipping Productivity and Sea Transportation, Regional Coverage and Inland Transportation, and Regional Development, Foreign Trade and Balance of Payments, the necessity of Open Door Economy for a stable and growing National Economy.

2. Methodology :

The method used in this study is Statistical findings and observations. Information was collected from Statistical Records and other Reports, eg. Annual Reports of Major Ports, and Surface Transport Ministry's Publications e.g. Basic Port Statistics, and Indian Shipping Statistics, Economic Survey of Maharashtra, Planning Commission of India and Eighth Five Year Plans, 1992-97 etc.

(Via)

PART. A. MAP-1



- NOTE:-
- (i) BASED UPON SURVEY OF INDIA MAP WITH THE PERMISSION OF THE SURVEYOR GENERAL OF INDIA GOVERNMENT OF INDIA COPY RIGHT 1930.
  - (ii) THE TERRITORIAL WATERS OF INDIA EXTEND INTO THE SEA TO A DISTANCE OF TWELVE NAUTICAL MILES MEASURED FROM THE APPROPRIATE BASE LINE.
  - (iii) THE BOUNDARY OF MEGHALAYA SHOWN ON THIS MAP IS AS INTERPRETED FROM THE NORTH-EASTERN AREAS (REORGANISATION) ACT, 1971, BUT HAS YET TO BE VERIFIED.
  - (iv) RESPONSIBILITY FOR THE CORRECTNESS OF INTERNAL DETAILS RESTS WITH THE PUBLISHER.
  - (v) THE ADMINISTRATIVE HEAD-QUARTERS OF CHANDIGARH, HARYANA AND PUNJAB ARE AT CHANDIGARH.

Source: Annual Report 1993-94, G.O.I. Ministry of Surface Transport, N. Delhi.

7. VII. LIST OF TABLES

Sr. No.	Particulars	Page No.
<u>P A R T A.</u>		
<u>Chapter No.</u>		
II.II. i.	The Composition of Payments in a British Port Cases I & II .. ..	31
II.II. ii.	Composition of Annual Port Cost for the expected Annual through- put of three Planned berths,  Port Kei-ang, 1974 .. ..	40
II.II. iii.	Indicators of Congestion of Two Major Indian Ports, 1969-70 ..	58
II.IV. i.	The Share of Conference lines in Cargo Tonnage of Routes into and out of Bombay. . . .	58
A. <u>Financial Indicators</u>		
IV. i.	The Tuticorin Port Trust .. ..	131
IV. ii.	The Visakhapatnam Port Trust ..	131
IV. iii.	The Madras Port Trust .. ..	132
IV. iv.	The Calcutta Port Trust .. ..	133
IV. v.	The Bombay Port Trust .. ..	133
B. <u>Port Performances.</u>		
IV. vi.	Annual Cargo Traffic .. ..	159
IV. vii.	Ships Arrival .. ..	161



## 7. List of Tables.

Sr. No.	Particulars	Page Nos
IV. viii)	Employment in Major Ports .. ..	161
IV. ix)	Average Turn-Rount Time of Ships ..	162
IV.8 x)	Berth Occupancy in Major Ports ..	162
Chapter VI.		
	I.i. Port Capacity as on 31-3-93/94 ..	199
VI	I.ii. Commoditywise Break-up of Port Capacity .. ..	194
VI.	I.iii. Single Round Voyage .. ..	199
VI	I.iv. Composition of Payments in Indian Ports, 1984-85 .. ..	199
VI	I.v. Share of Port and Cost expenses in Voyage Cost .. ..	200
VI.III. 1.	Total Container Traffic and Facilities, 1973 .. ..	219
VI.III. 2.	Port charges to the Consignee on Container Traffic .. ..	219
VI.III. 3.	Charges for the Hire of Ports Floating Crafts .. ..	220
VI.III.4.	Canadian Container Port Capacity, Annual Container Handling and charges .. ..	221
VI.III. 5.	Cost per Metric ton of Multi- berth Ports .. ..	221
VI.III.6.	Charges for use of Port Appliances & Plants. .. ..	222
VI.IV.1.a	Tugs & Launch Service to Owners, Masters and Agents of Vessels and Sailing Vessels. .. ..	231

## B. List of Tables :

Sr.No.	Particulars	Page nos.
VI.IV.III.D.	Pilotage Fees .. .. .	231
VI.IV.III.C.	Letting on hire of Cranes to Masters, Agents or Owners of Vessels Importers or Exporters .. ..	232
VI.IV.IV.D.	Congestion Surcharge of Shipments to Bombay and Karachi, 1973 .. ..	233
VI.VI.I.A	Berths, Moorings or Aircharges dues .. .. .	243
VI.VI.I.B.	Moorings Fees for the Mooring buoys by the Port Authority .. ..	244
VII.I.	Annual Expenditure by Major Ports in India, for 1991-92 .. ..	247
VII.III.I.	Port of Madras Authority Tariff, 1990, Container traffic per tonne .. ..	251
VII.III.II.	Four Ports in Developing Asia Indicators of Output, 1974 .. ..	255
<u>F R R F D.</u>		
IV.I.	Shipping Tonnage .. ..	309
IV.II.	Bulk Cargo Freight 1982-1986.. ..	322
<u>P A R T C.</u>		
IV. a.	Transport Sector - India .. ..	355
b.	Transport Sector - Maharashtra .. ..	356
<u>F A R T D.</u>		
IV.	Value of Foreign Trade. .. ..	395

3 List of Diagrams

Sr. No.	Particulars	Page No
<u>Part A-Port Development in India :</u>		
A.1.(1)	Derived Demand for Shipping & for Port Services in the Case of Fixed Proportions. .. .. .	33
A.2.(1)	Cost and Output .. .. .	33
A.2.(ii)	Variation in Demand .. .. .	42
A.3(i)	Port Cost with Diseconomies of Scale .. .. .	46
A.3(ii)	Average Occupancy Rate at which Costs are minimized for a Specific Number of Berths .. .. .	46
A.3(iii)	Total Cost of Two Identical Ports and a one Port Alternative .. .. .	48
A.3(iv)	Cost and Discontinuities of Ports. .. .. .	48
A.4(i)	Port Congestion with Competitive Shipping .. .. .	51
A.4(ii)	Port Congestion with Monopolised Shipowners (or Cartel) .. .. .	51
A.4(iii)	Demand for Ocean Transport & Derived Demand for Port Services. .. .. .	55
A.5(i)	A Port and its Hinterland .. .. .	60
A.5.(ii)	Demand Curve for Port Services .. .. .	60
A.5(iii)	Bi-lateral Monopoly .. .. .	63
A.5(iv)	Linear Demand Curve - The Profit Maximising Monopolist Absorbs Part of Cost Charges .. .. .	63

8. List of Diagrams :

Sr. No.	Particulars	Page No.
A.5(v)	Demand for Shipping and Demand for Port .. ..	65
A.6(i)	Kinked Demand Curve and Changes in Cost .. ..	69
II.A.7		
(i)	Demand for the Service of a Regional Transshipment Port "Small" Home Traffic and "Large" Transshipment market ..	76
II.A.7		
(ii)	Average Cost and Transshipment Pricing in Containers .. ..	70
II.A.7		
(iii)	National Port versus Regional Port ..	78
VI.A.2		
(i)	Variation of Port Cost and Ships time with increasing Traffic .. ..	202
VI.A.2		
(ii)	Variation in Total Cost in Ports with increasing Traffic .. ..	202
VI.A.2		
(iii)	Relation between Berth Occupancy and Ships Waiting Time .. ..	207

Sr. No.	Particulars	Page No.
<b>PART B.</b>		
II.B.(1)	Changes in Demand for Ships	
	Elasticity of Demand .. ..	292
II.B.2	Changes in Supply of Ships (Tonnages) ..	292
(11)		
II.B.2		
(111)	Profitability of Ships & Voyaes ..	295
II.B.3		
(iv)	Average & Marginal Cost .. ..	295
<b>PART C.</b>		
II.C.I		
(1)	Location Cost and Scale of Output ..	337
II.C. 2		
(11)	Demand Cone & Transportation Cost ..	337
II.C.3		
(111)	One Market, a One Material Source ..	367
II.C.4		
(iv)	Population .. ..	367
<b>PART D.</b>		
II.D.I		
(1)	Terms of Trade Changes .. ..	385
II.D.II		
(11)	Reciprocal Demand Relationship ..	385
II.D.IV		
(1)	The Edgeworth Box Diagram. .. ..	387

LIST OF GRAPHS

Sr. No.	Chapter Nos	Particulars Graphs	Page No.
<b>Part A. Financial Indicators :</b>			
1.	GRAPH A-1	Tuticorin Port .. ..	134
2.	GRAPH A-2	Visakhapatnam Port ..	135
3.	GRAPH A-3	Madras Port .. ..	136
4.	GRAPH A-4	Calcutta Port .. ..	137
5.	GRAPH A-5	Bombay Port .. ..	138
<b>Part A. Port Performances :</b>			
6.	GRAPH A-6	Annual Cargo Traffic .. ..	163
7.	GRAPH A-7	Employment in Ports .. ..	165
8.	GRAPH A-8	Ships Arrival in Ports ..	164
9.	GRAPH A-9	Average Turnaround of Ships ..	166
10.	GRAPH A-10	Berth Occupancy in Ports ..	167
11.	Part B. GRAPH B-1	Shipping Productivity G.R.T And No. of Ships. ..	310
12.	Part C GRAPH C-1	Transport Sector - Maharashtra State .. .. r. .. ..	357
		C-2 Transport Sector - India ..	358
13.	Part D GRAPH D-1	Foreign Trade Performance ..	396

LIST OF MAPS

Section	No.	Particulars	Page No.
<u>PART A</u>			
1) Map	A-1	Map of India	Va
	A-2	India Major Ports	86
Map Appdx	A-I	General Cargo Waterfront of New York Port	I.1
Map Appdx	A-II	Madras Port	I.2
Map Appdx	A-III	Visakhapatnam Port	I.3
Map Appdx	A-IV	Paradeep Port	I-4
Map Appdx	A-V	New Mangalore Port	I-5
Map Appdx	A-VI	Mormugao Port	I-6
<u>PART C</u>			
	C-1	India Planning Regions	323
	C-2	Regional Planning in Maharashtra	341
	C-3	National Capital Region.	370
<u>PART C</u>	C-4	Regional Coverage - Dimensions of Development Planning.	334

TABLE OF CONTENTS

Sr. No.	Particulars	Page No.
I.	Title	( 1 )
II.	Title Authors Name & details	( 11 )
III.	Form A.	(111 )
IV.	Acknowledgements	( iv )
V.	Foreword & Methodology	( v )
VI.	Abstract	( vi )
VII.	List of Tables	(xiii)
VIII.	List of Diagrams	(xvi )
IX	List of Graphs	(xix )
X	List of Maps	( xx )
<u>PART A.</u>	<u>Port Development in India</u>	
<u>Chapters.I</u>	<u>INTRODUCTION</u>	
I.	The Development of Ports	1
II.	Theoretical Aspects	4
	Port Usage and their Demand Function.	4
III.	Congestion in Ports	9
IV.	Data and Historical Development.	20
V.	The objectives & National Policies	26
II.1.	<u>The Theories of Port Operation</u>	
1)	Port Activities, Services & Usage	28
11)	The Demand Function.	29
II.2.	<u>The Cost Function in Ports</u>	
1)	The Short run Marginal Costs	36
11)	The Average Cost Function.	38
111)	The variation in Demand.	39



Sr. No.	Particulars	Page Nos.
II.3.	<u>The Economies of Scale in Port Operation</u>	
1)	Services of the Port and Size of Plant	43
ii)	Location of the Port	45
iii)	Occupancy of Berths	45
II.4	<u>Congestion in Ports</u>	
1)	The Congestion Theory	50
ii)	A Monoplist Steamship Service	54
iii)	Other Forms of Congestion.	57
II.5.	<u>Profit Maximization Theory</u>	59
1)	National Optimal Pricing	62
ii)	Bi-lateral Monopoly	64
iii)	Port charges on Traders & Consumers.	64
II.6.	<u>Competition in Shipping Industry</u>	
1)	Perfect Competition	66
ii)	Imperfect Competition in Shipping Monopoly.	67
II.7.	<u>The Supply Theory &amp; Variation</u>	68
1)	The Kinked Demand Curve	70
ii)	Price Discrimination	71
iii)	Discrimination among Goods	72
iv)	Discrimination among Conferences	73
II.8.	<u>Competition Theory</u>	
1)	Competitive Pricing among Ports	74
ii)	Competition in Transshipment	74
iii)	Containerization Effects.	77

Sr. No.	Particulars	Page Nos
<b>II.9. <u>Port Tariffs and Multi-part Tariffs</u></b>		
i)	Lease-a quay (LAQ)	81
ii)	Shippers Licences to use the PORT (LUP)	82
iii)	Percentage Levy	83
iv)	Allocation of Resources by Rule.	84
<u>PART A</u>		
<b><u>CHAPTERS III. Data and Historical Development</u></b>		
1)	The Port of Bombay	87
2)	The Port of Calcutta	92
3)	The Port of Madras	96
4)	The Port of Visakhapatnam	102
5)	The Port of Tuticorin	106
6.	The Port of Cochin	109
7.	The Port of Kandla	113
8.	The Development of Port Paradeep	119
9.	The Port of New Mangalore	124
10.	The Port of Mormugao.	127
<b>IV. <u>Financial Indicators</u></b>		
1.	Tuticorin Port Trust	139
ii.	Visakhapatnam Port Trust	143
iii.	Madras Port Trust	147
iv.	Bombay Port Trust	151
v.	Calcutta Port Trust	155
vi.	Annual Cargo Traffic	168
vii.	Ships Arrival in Major Ports	172
viii.	Employment in Major Ports	174
ix.	Average Turn Round Time (Ships)	177
x.	Berth Occupancy Rate.	180

Sr. No.	Particulars	Page Nos
Chapter V.	<u>National Objectives and Policies for Port Development.</u>	183
	a) General Transport Policies	184
	b) The Common Transport Policy (CTP)	184
	c) The High Cost of Maintaining Peaks	184
	d) Three Major Objectives	185
II.	National Transportation Policy.	186
III.	Pricing in Public Utilities.	188
VI.	<u>The Empirical Results</u>	192
I.	1) Port Activities, Services and Usage	194
	ii) The Demand Function	195
II.	1) The Cost Function in Ports	201
	ii) The Short Run Marginal Cost and its Function	208
	iii) The Average Cost Function. ∴	210
	iv) Variations in Demand	211
III.	<u>The Economies of Scale</u>	213
	1) Services of the Port, size of the plant	213
	ii) Location of the Port	214
	iii) Occupancy of Berths.	216
IV.	<u>Congestion in Ports.</u>	224
	1) Berth Capacity	224
	ii) Advantages of congestion pricing .	227
	iii) Disadvantages	227
	iv) Causes of Congestion	227
	v) Abnormal Congestion	228
	vi) Congestion Surcharges	229
	vii) Surcharge and Type of Service .	229
	viii) Bilateral Monopoly .	230

<u>Sl. No.</u>	<u>Particulars</u>	<u>Page Nos</u>
V.	<u>Profit Maximization in Ports</u>	234
	ii) A Monopolist Shipowner	237
	iii) Maximising Benefit to Nationals	239
	iv) The Gains to National Owners of Cargo	239
VI.	<u>The Supply Function &amp; Variations</u>	240
	ii) Discrimination by Origin	240
	iii) Other variations in Cost.	241
	<u>PART A.</u>	
	Chapter Nos	
VI	i) <u>Competitive Pricing among Ports</u>	245
	ii) Transshipment Competition	246
	iii) Container Service Mainline and Feeder.	246
VI.	i) <u>Port Tariffs and Multi-part Tariffs</u>	248
	ii) General Trend of charging Tariffs	248
	iii) Shippers Licence to use the Port (LUP)	252
	iv) Percentage levy	253
	v) Allocation by Rule.	256
VII.	<u>SUMMARY :</u>	
	I) The Significant Role of Ports in India	257
	II) Theoretical Arguments	259
	III) Review of the Major Ports in India	262
	i) Port Administration in India	262
	ii) Performance of Ports in India	264
	iii) Port Activities in India	267
IV.	Emerging Role of Ports in India	
	i) Policy of Ports System	268
	ii) Investment through various Five Year Plans.	270
	iii) Manpower at Major Ports	272

Sr. No.	Particulars	Page Nos
v)	Review of Port Efficiency	273
i.	Importers view on Port Efficiency	273
ii.	The Shipper's/Exporters view is identical to that of the Importers The efficiency of Ports Depends upon	274
iii.	Advantages gained	277
iv)	Other National Transport Objectives.	279
<b>Chapter VIII. <u>Conclusions</u></b>		
1)	Effects of Port Development on Shipping Productivity, Regional Coverage and Foreign Trade.	282
	a) Variable Trends in Port Development	282
	b) Port Capacity	283
	c) Effects of Ports Higher Development on Regional Development	284
ii)	Links of Port Development to the Three other Sectors	285
<b><u>12. PART B. Shipping Productivity.</u></b>		
<b>Chapter 1. <u>Introduction</u></b>		
1)	The Important Role of Sea-Transport	286
ii)	Theoretical Aspect.	287
iii)	Review of Indian Shipping	289
iv)	Problem of Peak	290
2.	<b><u>Theories :</u></b>	
1)	The demand Theory for Ocean Liners.	291
ii)	The Supply of Tonnage.	293
iii)	a) The Profitability of Ships & Voyages.	294
	b) The Average and Marginal Cost.	296
	c) The cost and Classification of Ships Theory.	296

Sr. No.	Particulars	Page No.
<b>12. PART B.</b>		
	iv) The Theory of Freight rates.	297
	v) Special Ships, the Economics of Running Big Ships.	299
<b>III.</b>	<b><u>Data and Historical Development</u></b>	
	1) Shipping India 1993	302
	2) Shipping bodies	302
	3) Shipping Companies	302
	4) Coastal Shipping	303
8	5) Ship Building	303
	6) Ship-repairs	303
	7) National Ship Design and Research Centre (NSDRC)	304
<b>II.</b>	Indian Registrar of Shipping.	304
<b>III.</b>	Container Corporation of India (Concor)	305
<b>IV.</b>	The Participation of the Indian Overseas Trade by Shipping Corporations.	306
<b>V.</b>	Growth of Indian Shipping in post Independence period.	307
	a) Composition and Ship size.	308
	b) Fleet Ownerships.	308
<b>Chapter IV.</b>	<b><u>Ships Performance and Revenues</u></b>	
<b>V.</b>	<b><u>National Objectives and Policies</u></b>	312
	a) India's Shipping Policy	312
	b) The Merchant Shipping Act, 1951.	312
<b>Chapter VI.</b>	<b><u>Empirical Results</u></b>	
<b>I.</b>	The Demand Theory for Ocean Liners	313

Sr. No.	Particulars	Page No.
<b>Chapter VI</b> <b><u>PART B.</u></b>		
II	The Average and Marginal Cost	314
II	a) The Classification of Shipping Cost	315
	b) The Profitability of Ships & Voyages	316
III	The Supply of Tonnage.	316
IV	Freight Rates and Pricing	317
V.	The Special Economics of Running Big Ships.	320
<b>Chapter VII.</b> <b><u>Summary</u></b>		
1)	The importance of Shipping Productivity.	323
11)	The Theoretical Arguments.	324
111)	Historical Review of Shipping in India	325
<b>Chapter VIII.</b> <b><u>Conclusions</u></b>		
1)	Effects of Shipping Productivity on Foreign Trade, Regional Coverage and Ports Developments.	326
11)	Links.	326
<b>13. PART C.</b> <b><u>Regional Coverage</u></b>		
<b>Chapters I)</b>		
1)	Introduction	329
11)	Theoretical Aspect	331
111)	Objectives of Regional Coverage.	332
<b>II.</b> <b><u>Theories of Regional Economics</u></b>		
1)	Location, Cost and Scale of Output	335
	a) Minimising Cost	336
	b) Receipts and Locations.	336

Sr. No.	Particulars	Page Nos
<b>Chapters II, 13. PART C. Regional Coverage</b>		
ii)	The Long Run Model of an Open Economy.	338
iii)	The population Theory.	340
<b>III.</b>	1) A case study of Maharashtra State for Regional Development to meet the Foreign Requirements of Bombay Port. .. .. .	341
	ii) Regional Planning in Maharashtra	353
	1) Bombay Metropolitan Region.	353
<b>IV.</b>	1) Maharashtra State Performance and Finances .. .. .	359
	1) Transport and Communications.	359
	ii) State Income Current and Constant (1980-81)	360
	iii) Per Capital Income	360
<b>V.</b>	1) Policies and Planning in the State of Maharashtra and in India and their Objectives. .. .. .	361
	ii) Centralised Planning and Decentralised Planning *	364
	iii) Corrective Planning & Development Planning. ....	365
<b>Chapter VI. <u>Empirical Results</u></b>		
	i) Location Cost and Scale of Output ..	366
	ii) The Long Run Model of an Open Economy .	368
	iii) The Population Theory	368



Sr. No.	Particulars	Page Nos
<u>PART C.*13</u> <u>Regional Coverage.</u>		
Chapter VI.	<u>Summary</u>	
1.	The Aim of Regional Development	371
ii.	Theoretical Arguments	372
iii.	Maharashtra States & Review.	372
VIII.	<u>Conclusions.</u>	
1.	Effects of Regional Coverage, Shipping Productivity, Port Development and Foreign Trade.	374
ii.	Links.	376
<u>14.PART D.</u> <u>FOREIGN TRADE</u>		
Chapter I.		
i)	Introduction	377
ii)	Theoretical Aspect	377
iii)	Problems of Foreign Trade	380
II.	1) The Classical Theories of Foreign Trade. .. .. .	383
ii)	The Theory of offer Curves	385
iii)	The Box Diagram Theory	386
iv)	The balance of payment Theory	389
III.	a) Data and Historical Development of India's Foreign Trade. .. .. .	390
b)	Monetary Events since 1971 .. .. .	392
c)	International Finance Corporations	
d)	Organisation .. .. .	393
e)	United Nations Conference on Trade and Development (UNCTA )	393

Sr. No.	Particulars	Page Nos
14. PART D.	<u>FOREIGN TRADE</u>	
IV.	Foreign Trade Performance	397
V.	National Objectives and Policies, of Foreign Trade.	401
VI.	<u>Empirical Results</u>	
	1) The Classical Theories of Foreign Trade.	403
	ii) The Theory of Offer Curves.	404
	iii) The Box Diagram Theory	404
	iv) The Balance of Payment Theory	405
	a) Foreign Trade Multiplier	405
	b) Trade has certain effects.	407
VII.	a) Summary .. .. .	408
	b) Theoretical Arguments.	409
VIII.	Conclusions	
	1. Effects of Foreign Trade on Port Development, Shipping Productivity and Regional Coverage. .. ..	411
	ii. Links. .. .. .	412
15.	General Conclusions	413
16.	Appendices	I - V
17.	References	Vi
18.	Terms and Abbreviations	VII

16. List of Appendixs

Sr. No.	Particulars	Page Nos.
---------	-------------	-----------

PART A.

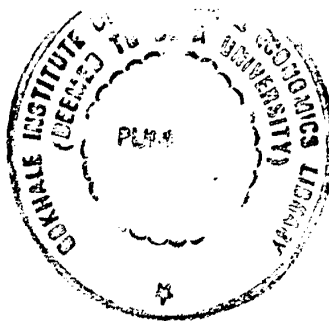
Appdx.A.I	Passenger Traffic at Major Ports in India .. ..	II.1
Appdx.A.II	Number of Major & Minor Ports in the Maritime Sttes. 1993-94 .. ..	II.2
Appdx.A.III.	Quequeing time Service time ratios	
Appdx.A.IV	Drafts and Lengths of Berths ..	II.3
Appdx.A.V	Trands of Cargo Traffic Handled at Various Major Ports .. ..	II.4
Appdx.A.VI	Trend of Container Traffic handled at Major Ports (Port wise) v. ..	II.5
Appdx.A.VII,	Port Locations and Existing Infrastructure .. ..	II.6
Appdx.A. VIII	Outlay Expenditure in Ports During Seventh/Eighth Plan & Annual Plan (Expenditure) .. ..	II.7
Appdx.A.IX	Containe Traffic handled from Major Ports .. ..	II.8

PART B.

Appdx.B.I	World fleet (By flag) As on 1st July	III.1
Appdx.B.II	Indian and World Shipping Tonnage.	III.2
Appdx.B. III.	Growth of Indian Shipping - Growth of Overseas Fleet by Type .. ..	III.3
Appdx.B.IV	Indian Shipping Tonnage - Companywise Deployment & Age Profile of Indian Overseas Shipping. .. ..	III.4

Sr. No.	Particulars	Page No.
Appdx.B.V.	India's Overseas Trade - 1992-93 ..	III.5
<u>PART C.</u>		
Appdx.C.I	Regional Coverage .. ..	IV.1
Appdx.C.II	State Income - Graph .. ..	IV.2
Appdx.C.Ia	State Income - Notes v. ..	IV.2a
Appdx.C.	Per Capital Income - Graph .. ..	IV.3
IIIa	Per Capita Income - Notes .. ..	IV.3a
Appdx.C.	Annual Growth Rates in State	
III.	& National Income - Graph .. ..	IV.4
Appdx.C.	Per Capita Income Growth rates of	
III.a	Important States during 1980-81 ..	IV.5
Appdx.C	Trends in State Income and National	
IV.a.	Income at constant (1980-81) prices. .	IV.6
Appdx.C.	Population of Maharashtra - Graph ..	IV.7
V.		
Appdx.V.a	Three Year moving average of Birth, Death and infant mortality rates 1981-1993. Notes .. ..	IV. 8
Appdx.VI.a	Factories and Factory Employment Graph	IV.9
Appdx.C.	Percentage share of employment in ..	
VI a.	different industries in Maharashtra	IV.10
	State .. ..	IV.11
<u>PART D.</u>		
Appdx. D.I	Direction of India's Import Trade During 1991-92, 1992.93 .. ..	V.1
Appdx.D.II.	Import of Principal Commodities During 1991-92 & 1992-93. .. ..	V.2

Sr. No.	Particulars	Page No.
Appdx.D. III.	Direction of India's Export Trade During 1991-92 & 1992-93. .. ..	V.3
Appdx.D. IV	Export Performance of Principal Commodities During 1991-92. & 1992-93 .. ..	V.4
Appdx.D.V	India's Exports (Including Re- exports) Imports and Balance of Trade during 1981-82 to 1992-93 ..	V.5
Appdx.D.VI.	Estimated Share of Foreign Trade by Sea in Total Foreign Trade of India by all modes of Transport During 1980-81 to 1992-93 .. ..	V.6
Appdx.D. VII	Foreign Trade - A. Annual .. ..	V.7
Appdx. D. VIII	Foreign Trade - B. Monthly .. ..	V.8



## 6. A B S T R A C T

### Introduction :

The study of Port Development that was undertaken by myself was to show the main objective and examine the importance of Ports, (Sea-ports) on our long coast line in developing our Nation's economy (Ma. No.A-1.)

### Emerging Roles of Ports:

To-day as we review India's progress in the 20th century and record the development in the surface Transport Sector, the coastal steamship, navigation, the Island Water Way, the developing and changing pattern of ports from way-side wharfs and fishing ports, to coastal trade, and the present day commercial and Major Ports of India, handling export and import trade to various countries, and competing in International World Trade. The productivity of shipping play a significant role in International Trade.

### Functions of Ports :

Dominance of Ports creates a regional development<sup>(1)</sup> and gives rise to regional imbalances in various parts of the country, drawing the population of the lesser developed regions to the port cities, causing the need for construction of inland roads and transport, Trade of Agriculture produce, setting up of industries, and work-shops, and utilisation of scarce resources, encouraging the growth of cities and metropolitan areas around the port in the most efficient way leading to regional Growth, increase in per capital income and State's income.

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(1) Chintz B. Freight and the Metropolis, New York  
1960, pp.11

The Aim of Port Development :

The nation's main aim is to widen its Foreign Trade, and achieve a favourable Balance of Trade. The present days main objectives are to encourage rapid and sustained growth, to facilitate imports, necessary inputs for sustaining industrial growth for modernisation and technology upgrading in order to build up scientific and technology capabilities and gain self-reliance and efficiency.

The Principle objectives for export is to encourage the productivity, modernisation and competitiveness of Indian industry, agriculture, services to compete internationally with standards of quality to develop the countries Research and Development (R & D) and technological capabilities and encourage the globalisation of Exports freely abroad.

To achieve these objectives and aims, the study is undertaken of Port Development in the perspective of increasing the Shipping Productivity, catering to large vessels, which are more economical in handling bulk and general cargo traffic.

Review the change from labour intensive to capital intensive, and its impact on the working population of the Regions. Examining the Financial needs of the Particular Major Port, and improving its performance increasing its capacity and modernising the cargo handling facilities, which will in turn improve the shipping productivity.

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Bigger ports needs a progressive hinterland, which in turn, require the construction of Inland transporation of Roads transport and Railways, the construction of Highways, and Bridges and hence the development and improvement to the Regional hinterland.

Port activity like many other industries is highly localised. The demand for the Port services originates to some extent in the Region whose industries produces goods for sale in foreign markets and exchange goods from abroad. Ports are called Gateways to the Nations Foreign Trade.

Ports are used for important transshipment point of domestic trade. Port serve as an important Centre for Trade and Industry, attracting labour and capital.

Important cities and Metropolis have developed, because of the dominance of Ports like, Bombay, New York, London, Calcutta, Madras, Tokyo, Marseilles, Amst-erdam etc.

We need to examine and study the development of Ports from small trading centres to Major Commercial Centres, like Bombay, Calcutta, Madras, After Independence these Ports become the Major Ports of our Country, and is being (systematically developed and modernised during the Five Year plans). At present, there are 10 Major Ports, 25 Intermediate Ports and 168 Minor Ports or sub-ports with a berthing capacity of about 170 berths to 200 berths in all these Ports.

Leading Ports in the World like New York Port have above 400 vessels berthing simulatneously <sup>(1)</sup>

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(2) Chintz B. "Freight & the Metropolis, New York 1960, pp.9



at the Port's General Cargo and bulk handling piers. In comparison this could provide scope for increasing in terms of berthing capacity to an economical meaningful scale, to a few thousand berths altogether for all our Major Ports around the country and making the best use of country's large coastline.

While reviewing the development of Ports, we have to take into consideration the economics of Port construction in regard to Sea-routes, weather location, hinterland development. The Government of India has set up a Committee to review Plans and Schemes and the performance at various ports, such as.

- i) Port Efficiency, administration and management.
- ii) Efficiency of Operation, their capacity and conditions of working.

Marginal cost is used as the basis for all ports tariffs a high service charges results in Port congestions and delays to several other sectors of the Economy.

Depending on the flow of traffic the design and layout of the Port keeps on changing. Specialised cargo handling facilities, the modernization of ships and their designs. The demand for ships is a derived demand for the uses of Port Services. High service charges results in Port congestion and vessels waiting in the roads for berths.

There are Economics of Scale in construction of large ports. The larger the Ports, the lesser the cost, such as speed, fuel intake etc.

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Congestion is felt also in transhit sheds, inland transportation, due to overcrowding of the Port site, and storage space.

Profit Maximation is due to the revenue of a port, because of its location and congestion charges, the Monopolist Port Authority and the Monopolist Shipowner causing a bi-lateral monopoly in the availability of ships and the elasticity of supply and demand of the commodity.

The Minimization of Price, leads to competitive behaviour of Port services and uses. Following the basic principle of "What the Traffic can Bear", and ability to pay", dis-crimination in regard to various Commodities, goods, their destinations and the tramp owner or Conference liner, has to be considered.

Tariffs are raised on rents of berths, hire of Cargo handling facilities, entry into a Port, causing a multiplicity of tariffs and complication to the accounting procedures of the Individual port.

Financial assistance mainly from World Organisation like "World Bank" (WB), International Development Bank (IDB) International Board for Reconstruction and Development (IBRD) and International Monetary Fund. (IMF).

Ports are usually self-finance entities and pays for their own developments over the years. Government borrowings and loans are also taken by the Port Authority.

The formulation of Port Projects has been made more complicated in recent years by the magnitude and capacity of technological changes. Bulk Lash Vessels,

---

(3)  
Hovercrafts, Hydrofoils all add new concepts to the handling of cargo and passenger traffic and new design dimensions to the complication of ports layout and capacity.

Ship-building is the next important stage in the construction of Ports, to suit the particular port, increase the productivity of Shipping to allow the ships to have a quick-turn round, spend less days waiting to berth and increase the speed of the loading/unloading Operations such as the growing trends towards containerization as a labour saving device.

Objectives :

The general objectives at the core of Regional Developmental efforts are, economic expansion, improved patterns of human settlement, industrial locations of balancing of population and migration with employment the promotion of social progress, together with social and economic development and effective legal organisations to ensure stable administrative patterns for carrying out the objectives and aims of Regional Development.

The efficient specialisation of the product to create the Comparative Advantage in which the country specialises by way of production, labour, capital and specialised managerial ability in building the Foreign Trade of a country, has links to the development of Port, and hence leads to Ports Higher Development in achieving the goals and targets of overseas trade, lessening the regional imbalances, by promoting growth and stability, economical to the regions hinterland, and encouraging the Research and Development of Shipping Productivity.

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(3) *ibid* Carmichael A.J. Journal of Maritime Law & Commerce (A world bank report) N.York, 1972. pp 123-124. 20128

The development of a shipping fleet can bring numerous benefits to a country, such as contributing to promotion of Exports and Imports of a country and to developing economic relations. Savings of foreign exchange for a country carrying its own cargo, as well as carrying another's country cargo, earning foreign exchange, as bringing down the freight rates for the country export-import trade.

The relationship between trade and growth described by Adam Smith, mainly working via the links between trade and efficiency, income and investment leading to growth in the National Economy.

Thus Exports is the Key to Growth for Developing Countries. Ports Higher Development are Gateways not only for Foreign Trade, but also for Shipping Productivity and Regional Development of the National Country.

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P A R T - A  
C H A P T E R -  
PORT DEVELOPMENT IN INDIA

1. INTRODUCTION :

- I. The Development of Ports :

- The place where there is an interchange of Trade of a Country is called the PORT, for Ocean-going vessels transportation, that links land transport like Road and Rail. There are various types of Sea-ports which is located mainly along the sea-coast of a country, or on Inland Waterways, deltas of rivers etc. They are called, Coastal Ports, Foreign or National Ports, Regional Ports, River Ports etc.
  - The reasons for development of Ports are many such as for Trade between countries to help the National Income, of a developing country in other words, to improve the growth of the National Economy, through imports of technology, machinery capital goods, foodgrains etc. while we export our manufactured goods, foods etc. To maintain the development of the hinterland region, to enhance foreign trade, earn foreign exchange to maintain a Balance of Payment Account, and benefit of Gains of Trade.
  - Ports are gateways for a Country trade, a link between land and sea transport. There are special places along a country's coastline, for ships to load/unload their mercantdis
-

- The reason for development of Ports in regard to the Shipping services, where there is a demand for ships there is also a demand for Port Services and facilities. The demand for ships is due to the development of the Regional hinterland and to the extent of Foreign Trade in these regions. The demand for Port uses is called a derived demand, as there must be a demand for ships, which is also a derived demand to the extent of exports and imports.
  - The demand for Ports may be seasonal, like Northern Hemisphere Ports are closed all winter months, Annually Ports open throughout the year, Tropical countries.
  - The Scope of Port Development is the Financial constraints which a country has to adhere to in regard its financial potential development countries are usually countries where there are the problems of finding sufficient finance to meet their requirement for development, hence these development plans takes a long period of time. In India, for example the real development of Ports started with the Third Five Year Plans. Now, we are facing an acute shortage every few years by reaching full capacity the Scope of development is greater today, and will be necessary to start building ports for the future needs.
  - The Role of ports, is therefore, playing an important and vital part in the National Economy
-

development of Ports require improved infrastructure facilities, like road and rail, and mechanised cargo handling facilities, in keeping with the latest developments not only of Seaborne vessels, but inland transport A bigger capacity of storage sheds and open space for container handling.

- Another important feature of Ports is the links to other economic sectors of the country like commercial markets, agriculture markets, and industrial trade fairs. These factors influence the market demand for Port uses and services.
  - The Aim of Port Development is therefore, to ensure the efficiency of shipping productivity the probability of its regional hinterland, and the growth of Foreign Trade in order to ensure a favourable Balance of Trade with other countries.
  - The Cost Function in Port Development, and the investment plans, have to be calculated, according to the conditions prevailing in that particular Port with variation in size and capacity the effects of dredging the demand for Ports, and economics of Scale in Ports.
  - The subsidies and loans of Governments, and the cost of raising revenue to meet the developmental expenditure, expenditure of engineering studies cost eg. World Bank The Benefits of Port Investment, and who will benefit from these investments. The variation in Port Cost is due to the type of vessels and type of commodity.
-

- The benefits of Ports Higher Development, and modernisation of Ports handling of cargo. Installation and labour, is
- Keeping in trend with World overseas Trade.
- Gaining entry of the Global markets in many countries.
- Seeking advance technology for Agricultural commodities in export.
- Improving Industrial manufactured goods.
- Balancing the Balance of Payments, in earning more Foreign Exchange.
- Closing the disparities between regions of the State and same Country.
- Since the cost of a ship is the time it spends at Ports, increased number of berths, will allow the shipowners the maximum time to maximise his Profits by the working of the ship in unloading/loading operations.
- The gain to the Port owners increases also.

## II . Theoretical Aspect.

### 3. Port Usuage and their Demand Function :

- Port Activities are ownership of land, quays piers and port surfaces
- Port services are sea-related services, such as entry to a port by way of pilotage, tugs, lighters berthing, moorings and buoys. (4)
- Land-related services, in regard to cargo handling by port's labour, ports machinery and equipment, crantage, vehicles, storage sheds, open space etc.

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(4) Bennatham Esra & Walters A.A. Port Pricing and Investment Policies 1979, N.York pp15.



- Delivery related services such as handling over-consignment, to customers, other related multi-modal transport, eg. road vehicles, trucks trailers, carriers, carts-hand, bullock, railway transports and depots, stations such as container inland depots, stations, warehousing.
  - The demand for Port services is a derived demand for shipping services, i.e. to trade with international countries, the needs of Port services arises, due to development in the regional hinterland. In order to grow, the economy of the Country, depends upon the Port services to the extent of foreign trade, the extent of its exports and imports.
  - The extent of the demand is limited by time e.g. a period of a year, for Port Services. This depends upon the size and capacity of a Port. Demand for Port services, is related to the costs of services and use of Ports facilities, and elasticity of demand.
  - Port costs depends upon the Economic Development Plan for Ports. The objectives of Development of Ports, the capacity of Ports Output, the Option of Ports services and uses, and their costs. These costs are marginal costs and their suitability to the long-run marginal costs.
  - Ports cost are too kinds, the short-run marginal costs, showing the scarcity of port capacity. Due to rapid changes in World trade trends, the short-run marginal cost theory is used as the basis for the development of Ports, and efficient management.
-

- These costs include dues levied on each ship call, on size of vessel, length of stay, dredging the channel, river dues, wharfage, storage, sheds fees.
- Service charges for use of labour, port equipment, moorings, berthings charges, pilotage, towing and use of tugs.
- Changes in prices charged for port services depends upon the legal and administrative systems of each Port.
- The concepts of Port costs depends upon the time taken and the demand for Port services.
- The location of Ports in respect of shipper and to other ports.
- The quality of services, such as frequency of services availability of equipment, and other land related transport.
- UNCTAD's study<sup>(5)</sup> of Port Development cost is
  - (a) A fixed cost based on the cost of facilities and services such as quays, sheds, cranes etc.
  - (b) A variable cost depending on the tonnage capacity which includes labour, staff costs fuel, maintenance costs, etc.
- variation of port cost increases with traffic and the time a ship spends in port.
- Port costs are determined by the objective of profit maximisation, competition between ports and price discrimination, according to the principles of "what the traffic can bear" and the ability to pay.

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(5) Indian Ports, "Indian Ports" Association New Delhi  
Dec. 1983, pp.13-15

- Time effects and shortages of berthing accommodation shows the variation in demand for port uses and services. The Elasticity of demand is due to seasonal factors, so that the marginal short-run cost is the best for pricing of Port services.
  - If there are constant Returns to scale for certain levels of traffic, the short-run marginal cost will equal to the long-run marginal costs (SRMC - LRMC).
  - There would be no economics of scale if the short run marginal cost falls below the long-run marginal cost, for traffic level lower and gives rise to deficits.
  - If there is high level of traffic, and demand for Port uses is high, the short-run marginal cost will be high showing scarcity in Port's capacity, i.e. congestion tariff will be high the short-run marginal cost is the appropriate value for the tariff.
  - The long-run marginal cost pricing is done for various sizes of Ports with their known capacity and output per year. The option of fixing both the price and quantity levels.
  - variation in port charges are due to structure of competition of shipping conferences monopolies, shifts in demand, such as seasonal shifts, quality of services congestion charges due to ship waiting to berth for use of port facilities, equipments and sheds other land transport.
  - The Port Authorities decide the capacities and output of Ports in an economic period of a year, thereby fixing the prices for the quantity
-

showing the revenue expected i.e.  $p - F(x)$ .

P - Price, x - quantity,

Revenue expected is :  $R - p.x - x.f(x)$ .

- The unit variable cost is less for larger facilities, but does not offset high capital cost, and this gives rise to decreasing returns to scale.
  - The average cost for large port operation is lower than small port operations. A larger port has economics of scale in use of more efficient equipment, dealing with larger vessels, more capacity and outputs.
  - The tonnage throughput by a berth, is expressed as a cost per ton, remains stable, until the berth becomes under pressure to accept high tonnage throughputs, the variable cost per ton will rise due to overtime, more costly methods of cargo handling rates.
  - To determine the berthing capacity and full utilization of berths, and waiting time of ships.
  - The number of channels to a port, the size of the port, its annual tonnage of cargo.
  - The total number of days which ship spends waiting for berth.
  - The total number of berths on an average rate when vacant.
  - The cost of idle berths and cost of ships time is calculated. This shows the optimal number of berths and their average annual occupancy rate.
-

- The output of berths is measured by the occupancy rate and number of berths.
- This proves larger the port, the lower the cost.
- This shows the benefits of Port Investment.

III Congestion in Ports : is also a notable feature of all transport and services, such as :

- Port services - long line of ships.
  - Port uses - extensive use of Facilities, and sheds,
  - Port connections - other land transports, railways road transport, also road and rail links.
  - A high demand for Port services is seen, causes congestion large queue of ships in the roads, encourage the charging of congestion levies to reduce the congestion in queue. This raises the freight rates, and ship tends to leave the line, rather than pay these charges.
  - The advantage of congestion levies, increases in ports revenue, extend more port facilities and increase ports profits.
  - Disadvantages of congestion, is that Demand is seasonal, eg. weather, size of crops, state of different markets, and this levy is borne by shipping companies.
  - Methods of clearing congestion has an effect on Ports and ships.
  - The greater the elasticity of demand for the services of the port, the smaller the rise in price, the larger the reduction in the tonnage shipped through the port.
-

- The elasticity of demand is low, if the quantity of tonnage is reduced, the increase in the overall freight charges will be small.
  - Congestion is felt mainly in bulk cargoes transportation.
  - Congestion is a form of competition between ship owners.
  - For conferences lines, it is a profit maximization of monopoly policies to gain more revenue.
  - There are two kinds of congestion, normal congestion a few hours wait, or normal delay on the average.
  - Abnormal congestion, either the ship leaves the queue and proceeds to another port or excessive waiting time, incurring additional cost, eg. transshipment.
  - Prices due to congestion delays are rental charges for facilities, berth occupancy, use of tugs, cranes occupancy of sheds or warehouses.
  - Disadvantage, revenue of port - decline such as cargo handling dues, port dues.
  - Cost to shipowners increases, fines, lost sales etc.
  - Bilateral Monopoly consists of the Port Authority and the shipowners. The Port Authority can fix the price of services, a specific fee (per ton) for its services and get a monopoly profit by this high tariff.
  - The shipowners can monopoly the use of his ships, avoid the congested port, or trade in some other part or agree to a bargain offer.
-

- Port Authority have to maximises profits for national benefits, according to their foreign trade policies.
  - Ports Authorities can maximise profits by setting prices on marginal cost pricing basis.
  - The Port Authorities maximises profits by adjusting the capacity and output, so that marginal gain i.e. marginal revenue equals marginal cost.
  - When  $MR = MC$  profits must be at maximum.
  - The location of a port will be chosen when the Port Authorities find it most advantageous to inland transport and the regional hinterland markets, so that profits are planned for a single economic period as well as over several economic periods. Maximum revenue is targetted at only a single period, and also for a long term period.
  - Likewise the prices charged by the port for its services varied. A reduction in the port prices will extend the production of the regional hinterland this increases the demand for port services. For a monopoly port the demand to elastic.
  - Then there is transport cost to the interior of the region, but still the Port prices is above the marginal cost, by an amount equal to half the transport cost to the port.
  - There are two reasons of Profit maximization, whether the port is owned by Private Companies or by the National Government eg. in India, some ports are owned by Railways Corporation, and some by Port Authorities of each State. Profit maximization here is mainly for National Benefit.
-

- Port Policies are set to maximize freight rates, port profits. Price discrimination is done by value of commodities, and distance of destinations, and on Conference liners, visiting certain ports.
- There is bi-lateral Monopoly due to Port Authorities being the monopolist in charging Port dues, and the Conference lines, being the monopolist, charging their own freight charges. e.g. large-scale containerized.
- in special container berths with modernised facilities and the conference providing a certain number of container sailings per month.
- If the Marginal cost for ship operation is constant there is a constant elasticity of demand for shipping where is the Elasticity of demand which is day, constant.

Any change in port prices will enlarge the factor.  $e/(e-1)$  and this will raise the freight rates this change in Port charge is passed on to the shipper.

- If the Port reduces the price of its services, freight rate will also fall, if elasticity of demand for shipping is constant.
  - Marginal costs is use for both shipping and port operations and is shipping marginal cost is taken as zero. Marginal cost is the best charge for port services.
  - When elasticity for demand for shipping is constant.
  - If the elasticity of demand for shipping declines as the quantity shipped increases, port charges will exceed port cost, causing a low elasticity of demand for port services.
-



- A port will expand its output by building and operating at higher capacities. Input-Output relations are those of returns to scale, the minimum cost of any output can be obtained by operating at less than its capacity. A port can charge according to the various types of commodities and berths used.
  - Several short-run costs. A Port can decide how by it plant should be, in making this decision, the Port survey the range of minimum costs. The Long Average Cost Curve is referred to as "The Planning Curve" of the Port, and shows the minimum cost of any output.
  - Another basic concept in Port operation process is Linear programming. It is a process of combination of certain inputs to produce certain outputs. e.g. labour and capital.
  - A linear programming problem, is to find the optimum combination, processes i.e. The combination that minimizes cost when there are constraints. e.g. Profits or revenues are to be maximised. Cost are to minimized.
  - Maximization of revenue by defining the capacity of the Ports, and the amount of labour available.
  - The optimum policy for a country as a whole is to pursue a policy of port pricing that will maximises total benefits to its nationals.
  - This occurs when marginal profit(loss) of the port is equal - to the marginal loss (gain) of the domestic crader.
-

- Equilibrium Prices in the yearly period is the prices that equates demand.
  - Pricing port services to shipping monopolies, the Port Authority has to accept competitive conditions, in the country Sea-Borne trade.
  - It was found that changes in port charges or services are not felt in freight rates.
  - There is a kink in the demand for ocean-vessels, if the Conferences reduce its rates, this causes a discontinuity in the marginal revenue curve and falls, this depends upon the destination of the ocean-carriers, say, Bombay or Calcutta, different rates prevail, but the difference is not much.
  - Variation in port charges are usually shown in the price of tramps and bulkers, which trends to be higher than Conference lines rates. A reduction in port charges, to competitive port users, will bring down the rates of Conference liners.
  - Port improvements of facilities or cargo handling equipment, does not affect port cost for all types of ships, say the change from conventional handling to a container system will affect only general cargo carried in containers.
  - Partial improvements in port facilities will lead to reduction in rates charged, but this depends upon the market competition, to raise or lower the cost.
  - Congestion is another form of competition ports, to raise a congestion levy.
-

- If an additional berth is constructed, it will add to the capacity of Port, and therefore the prices will be reduced, and freight rates lowered.
  - Improvements in port facilities has some effect on the Conference pricing policies.
  - Port charges form only a part of the total operating cost and therefore changes in port charges is a small part of the total cost of the Conference.
  - Discrimination in prices is mainly seen in monopoly pricing by Shipping Conference liners.
  - Discrimination depends upon the Direction of trade as the same rates apply usually in a wide variety of ports.
  - Conference lines can show Price Discrimination by charging the highest rate to then nearest exporter and lowest to farthest exporter.
  - A port can cover its costs by charging on the value of the commodities, a high valued commodity higher charges and a low valued commodity low charges, according to the Principle of - "What the traffic can bear" and "ability to pay". This also depends upon the size of the Port. These reductions are passed on to the Conferences in the form of rate reduction.
  - Ship dues also form discriminatory pricing by ports depending upon the type of vessel liner operations, tramp owners, and bulkers encouraging competition.
  - There is also inland competition between ports for the business of importer and exporters Port charges for identical services are kept the same, but
-

congestion at one port should quickly lead to vessels diverted to another port.

- The total overall cost depends upon the facilities at each port and the commodity shipped.
  - Inland transport cost to different destinations are different by road or rail.
  - Competition exists in transshipment of goods and commodities, specially containerization. This depends upon the main sea-routes and the equidistance of ports to compete for transshipment.
  - Containerization has an important role in competition and container ships are highly capital intensive, and has a fast turnaround voyage.
  - Discrimination may be also felt in tariffs levied by the Port Authorities. A larger Port will levy more tariff to meet its expenditure costs. Also it has to fill up capacity available and its marginal cost is near zero.
  - As the port technology changes from labour intensive to capital intensive port competition increases considerably.
  - Port Cost functions main feature are fixed cost and a low variable cost, this depends upon the number of specified services, tariffs are levied.
  - Port tariffs are mainly such as renting a berth or quay, as a specialised service to a Conference, or charging dredging cost to ships that enter the port, or a congestion fee, or a fixed fee for a certain number of visits per year for ships that enter the port, a special charge for container vessels and a low tariff for unloading a container.
-

- The appropriate base for port tariff is marginal costing to show the relative cost of berth-hire, channel dues, according to the capacity of the vessel.
  - Special charges to ensure a quick turn around of ships is given for handling operations.
  - Port tariffs can also be levied on "What the Traffic can bear" and "Ability to Pay" basis.
  - There are different tariffs according to the State of Ports, example. New Ports charge higher tariffs to meet their investment cost than old Ports.
  - Some Ports charge tariffs for Leasing a Quay, for a certain number of years. Others for berths etc. An Annual Fee to enter the Port may also form part of a two-part tariff.
  - Shippers Licence to use the port is another scheme to raise two part tariff.
  - Tariffs are charges as a percentage levy on the freight charges, say, 10 percent of the total freight received or sent.
  - There is discrimination in tariff charges according to the value of the commodity as well as to the cost of carriage.
  - Variable port charges are according to ability to pay.
  - The long haul voyages, and fractional freight charges tends to maximise profits of the port.
  - The fractional freight charges varies with the freight rates under slump or boom conditions.
-

- Fractional percentage levies on the freight is simple and posses built-in flexibility, varying with inflation.
  - Price leadership means that all the ports in a country follows the lead of one port. If the commodities are Homogeneous prices are usually uniform. If the commodities are differential prices an be uniform or different.
  - Other methods of basing the prices are channel dues, the characterstic of the ship, such as NRT DWT and different prices for different berths.
  - Pricing cargo handling charges is based on the unit of cargo e.g. tons.
  - Service charges, such as labour is based on time.
  - Tariffs should encourage efficient use of the port labour and equipment for fast turnaround of ships.
  - Dredging costs are important maintenance costs of a port, and may be as per depth of the channel, or charges on the size of the ship, and this is charged as the marginal cost of the passage of a vessel, which is nearly zero.
  - Tariffs charges for the storage space and sheds should be along as per marginal cost, to avoid congestion charges, as per days allowed to use, the facility, say 3 days etc., and there charges for extra waiting days.
  - Port tariffs are usually based on general charges and specific charges.
  - General charges are river or channel dues, cargo dues, if the ship wishes to use the port.
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- Specific charges are levied for services eg. crane charges.
  - Loading charges are based upon the manner and place where the cargo is unloaded e.g. quay, wharf or lighters, jetty or midstream.
  - Port discrimination is felt in various ways such as Transshipment in local, regional places according to the Policies, in Imports and Exports of certain commodities by handling charges, river duesm storage etc.
  - Prices are set mainly by rule, than by pricing.
  - If prices were used instead of rules, the gains from the scarce resources would be given by the port, to the user who has the greater value or it e.g. berths allocation.
  - If the price is set too high, the resource will be under used, if too low the price would be able to allow the allocation.
  - The difference is when a Port is congested, and there is no vacant berth available, a congestion charge together with the waiting time, would reduce the demand for the Port.
  - The choice of whether to build more berths and expand the capacity to a large extent calls for rationalization of prices.
  - Improvement in Port cargo handling facilities improves the working of the Port and also saves time, while higher prices could be charged for berth hire.
  - It is more realistic to overbuild ports to ensure a future of stability and profits maximization ability of the Port.
-

V. Data and Historical Development :

- Ports in India has a fascinating history, built over a century are some of the Major Important Ports, like Bombay, Calcutta, Madras, Cochin. The newer Ports are Kandla, Port, Visakhapatnam Port, Mormugao Port, New Mangalore Port, Tuticorin Port and Paradeep Port Haladia Dock Complex and Nhava Shava (J.L.Nehru Port).
- India has a long trading history with foreign trade, which lead to the discovery of new routes for shipping lines and Resource laden countries to trade with.
- Development Plans for Ports started during the third Five Year Plans and have carried on till the 8th Five Year Plan.
- Investment for Port Development was at a low level, till the 8th Five Year Plan in 1992.
- These Ports are open throughout the year, even during the Monsoon Seasons.
- These ports serve the hinterland of their Regional State and together the whole country.
- There are five ports<sup>(6)</sup> on the West Coast of India viz; Kandla Port, Bombay Port, together with J.L.Nehru Complex, Mormugao Port, New Managalore Port, Cochin Port.
- There is one port on the South Coast of India viz. Tuticorin Port.
- There are five ports on the East Coast of India viz., Madras Port, Visakhapatnam Port, Paradeep Port, Calcutta Port and Haladia Port Complex.

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( 6 ) Indian Ports Association, Indian Ports, N.Delhi  
Oct/Dec. 1992 pp.41.



- The Port of Kandla called the Seagate for North West of India, has the highest productivity rates among Indian Ports from 1955.
  - The Port of Bombay is the Commercial Gateway and Premier Port of India. Bombay Port is a fully integrated multipurpose port capable at handling dry bulk liquid berth, container Ro-Ro, food-grains steel etc. It has an annual traffic of 29m. tonnes. The Port is equipped with modern equipment to handle all types of cargo. It has inland communication by road, rail and air. It is one of oldest Port of India, started in the 19th Century.
  - J.N. Port Trust started during the Sixth Five Year Plan at Nhava Shava near Bombay, becomes the most modern Port of India with fully automatic and computer controlled facilities for handling cargo.
  - Mormugao Port called the Gateway to Goa State has a traditional of fine service joined the Indian Ports from 1962, and underwent an expansion and modernisation of its harbour and port.
  - New Mangalore Port Trust called the Gateways of Karnataka on the West Coast of India, is an all Weather port, started functioning in the Sixties and caters to large ships and ore carriers.
  - The Cochin Port Trust called the leading Port on the West Coast of India, was commissioned in 1936, as a Major Port of India. It has regular shipping services link into leading world Ports.
-

- Tuticorin Port Trust is called the Port of Choice a busy port on the South tip coast, has a cold storage plant, and modernised facilities for handling cargo, was commissioned a Major Port in 1968.
  - Madras Port Trust called the Eastern Gateway to India, has more than 70% of its facilities fully mechanised, a most modern floating dock with container berths is one of India's earliest port of the last Century.
  - Visakhapatnam Port Trust, is called a Growth Oriented Port, was declared a Major Port in 1933. It is the fastest growing port in the century and has achieved an unprecented growth of 30% over the previous year crossing the 20 million tonne mark in traffic.
  - Paradeep Port Trust, a deep seaport, free of congestion, was developed in 1968 as an outlet for iron ore exports, has mechanised wagaon tipping facilities for coal. It is an ideal port for bulk Carriers.
  - Calcutta Port Trust, a terminal port on the East Coast of India. Serving a vast hinterland was constructed in the 19th Century and has contributed to India's Economic Development since its inception.
  - Haldia Dock Complex situated, 50 miles from Calcutta Port, was constructed from 1966 and commissioned in 1980.
  - Indian Ports are labour intensive, but are gradually changing to mechanisation and capital intensive equipment and machinery.
-

- Bombay Port Trust employs the highest number of Employees, 28,105 followed by Calcutta Port, 22575 Madras, 10908; Visakhapatnam, 10608, Cochin 5750; Paradeep Port 5037 employees. Other ports are less than 5000 employees.
  - Port Railways are the inland transport connecting links with the Greater Cities in the hinterland and other important towns. Revenue caused is the form of demurrage, sidings charges, local haulage etc.
  - The Indian Railway Corporation owns the Port Railway in Cochin and Madras.
  - The Ports usually have large Estate and changes on these Estates by way of Rent is earned by the Port Authorities in terms of Lease Licence Agreement.
  - Port Capacity in all Major Ports has increased from 1950-51, 1st Five Year Plans of 20 million tons to 200 million tonnes in the 8th Five Year Plans of 1992-97.
  - POL products being the highest tariff in all Major Ports of 78 million tonnes followed by Iron ore, 42 million tonnes, Coal by 7 million tonnes, Fertilizers by 8 million tonnes, Container traffic by 7 million tonnes, other general cargo 28 million tonnes.
  - Investment in Ports was Rs. 26 crores during the 1st Five Year and reached Rs. 200 crores in the 7th Five year Plans.
  - Five Year Plan, and about Rs. 3600 crores in the 8th Five Year Plan.
-

- There are 129 General cargo berths at the major ports. At many ports very high berth occupancies are experienced at general cargo berths, and beyond the control of ports.
  - There are about 26, berths or oil terminals, 5 iron one berths, 7 fertilizers berths and 13 containers berths.
  - Each type of berth is equipped with machinery suitable for the commodity it handles.
  - The total capacity of POL berths is 70 million tonnes of Iron orde 32 million tonnes, 22 million tonnes for Coal, 7 million tonnes for Fertilizer and raw materials, 8 million tonnes for Containers, 19 million other General cargo.
  - The total of ships called is at various ports differ according to their size and type of Commodity and GRT. eg. Tuticorin in 1993-94, 806 Madras, 1863 etc.
  - The Average Pre-berthing time for want of Berths per ship was for Calcutta Port 7 days, Haldia 2 days Madras 2.63 days.
  - The average berth occupancy rate was 2.1 days in 1987-88, 1.6 day in 1991-92 and 1.9 days in 1992-93.
  - In Calcutta Port, the average turn-round time of a ship was 9.47 days, Haldia 7.18, Visakhapatnam Port 5.68 days Madras Port was 7.91, Tuticorin Port was 5.42 days.
  - The Average turn-round time of ships during April '94 to March 1995 is 7.80, in 1991-92 was 6.7 days.
  - The idle time at Berths in 1987-88 cms 36% in 1990-91 was 37 and in 1992-93 was 35.6 days.
-

- The total traffic throughput for all Ports was 3384 tonnes in 1987-88, 3372 lac tonnes in 1990-91 and 36471 tonnes in 1992-93.
  - The Employment at all Major Ports was 102244 workers in 1987 and 93957 workers in 1993.
  - The Growth Rate of Port tariff in all Ports was 5.0 in 1993-95.
  - In 1993-94, POL and other commodities was 70.92% Fertilizers Raw Material was 7.44, Iron Ore was 34.13%, Coal 26.58% and General Cargo was 34.19%.
  - The growth of container tariff in all Ports increased to 12249 Bombay Port 5413, Madras Port 1606, Calcutta Port/Haladia Port 1606, other ports 1456.
  - The operating Income in 1987-88 for Kandla Port was 39.00 lakhs in 1992-93, 86.91 lakhs for Bombay Port 1987-88, Rs. 180.18 lakhs in 1992-93 was Rs. 364.51 for Cochin Port in 1987-88 was Rs. 34.77 lakhs in 1992-93, 34.87 lacs Madras Port in 1987.88 was Rs. 101.52 lacs in 1992-93.
  - India's Imports were more than her exports in Rupee terms, 1990-91, Exports Rs. 32553, Imports Rs.431.91,
  - 1992-93 Exports were Rs. 37.329 and imports Rs.47480.
  - Investment made so far from the 1st Plan 1951-57 was Rs. 21 crores in 1992-97 was Rs. 3,216 crores.
  - Financial objectives was to raise considerable internal resources both for development and replacement of port facilities.
  - Source of Finances are (i) Loans advanced by Government (b) Debentures (c) Self-financing (d) External loans.
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- Port management consists of the Central Government of India, carried on by the Port Trust with the help of a Chairman, a Board of Commissioners or Trustee, or Ports are comprised of Major Intermediate and Minor Ports.
- Port transport communications is mainly Railways, roads and inland waterways system which provide the necessary links.
- Adequate and cheap communications with hinterland are of vital importance for the smooth flow of traffic to and from the ports.
- The National Transport Policies and the right to operate Transport enterprise, Rate Regulation and Discrimination and Fair competition.
- The progress and efficiency in the provision of transport services have been introduced initially to the drive, imitate and vision of private management.
- At the same time the Government determines the size of the transportation plan and its operating organisation the quality of service rendered etc.

V. The Objectives and National Policies :

- The Objectives of the Eighth Five Year Plan is development of Ports so that they can improve the economic growth, proper Container handling facilities and deepening of drafts at some Major Ports for larger vessel to call at Port.
  - Development and modernisation of existing Port facilities to work efficiently.
  - To take financial measure to improve the viability of Ports.
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- Encourage the Private Sector to invest in repair facilities dry docking terminals.
- To ensure traffic flow inland, to develop the rail and road transport.
- The Objectives of the National Transport Policies is to sought the problems of Transport control and the right to operate and discriminate, with fair competition.
- The development of transportation facilities on an economic basis requires that those who use them pay the bill. In this manner, the desirability of transportation projects can be judged in the light of the costs involved and the ability or willingness to pay these costs.
- Careful estimates of traffic output and benefits to be denied, levels of uses charges feasible to improve the facilities and shifts the financial burden from the general tax payer to those who specially benefit.
- The Regulation of the Port Commissioner on Major(7) Ports is "The Traffic passing through a port consists of many commodities. The Ability to bear the Port charges may vary considerably with individual commodities. Coal & Salt, low prices are to be charged in transporting them as bulk commodities. The bare cost atleast should be recovered in moving such traffic. Higher value commodities have higher costs. These two limits of direct cost should be the same range of the ability to pay and "What the traffic can bear" principles and factors influencing the traffic.

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(7) Commission on Major Ports, (Report) June 1970  
Ministry of Surface Transport N. Delhi, pp. 71.

P A R T - A  
C H A P T E R - II

II The Theories of Port Operations :

1) Port Activities, Services and Usage:

As all ports have several services or activities in common, the demand for Port Services depends on the services called for by tankers, dry bulk transport, conventional break-bulkers or unitized general cargo, container transport, therefore demand for port services is joint, most of them require, a combination of berth-space, tug towing cargo handling; warehousing, crantage.

The prices charged by ports are divided into two categories. Users Charges and Service charges (8). Users charges include dues levied on the ship for each call, vessels dimensions, length of stay, river conservancy dues; wharfage or cargo dues, storage fees, either cover sheds or warehouses.

Service charges include charges for labour ancillary equipment, in moving cargo, such as crantage charges according to the amount of cranes service consumed, mooring, berthing charges, pilotage, depending upon the size of the vessel, (GRT) towage and tugging.

The basic activity consists of the ownership of land quays, piers and port surface. Some of the ports have the responsibility to maintain and dredge the channel to the harbour, control and safety of traffic, provision and maintenance of navigational aids, pilotage, towing and tugging.

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Ibid (8) BennathamE & Walter A.A. "Port pricing & Investment Policies" N.York 1979



To carry on, its operations and activities Port has to own or rent mechanised equipment e.g. cranes, forklifts trailers, it owns and operates transit sheds, open or sheltered storage areas, warehouses etc. For moving cargo, the port has to employ labour, and control over the cargo operators vary with different ports.

Port activities can be shown in three categories: Sea-related services, provision of access to the port, by bouys, and moorings; berths, pilots tugs etc.

Land-related services, cargo handling by port labour port cranes, other equipment and vehicles, storage (in sheds or open).

Delivery-related service, handling to customs or consignee vehicles, container freight station warehousing and ports own transport. Sometimes there is demand for the services of one department e.g. vessels for bunkering or shelter.

2)a) The Demand Function :

The theory deals with concept and functions. A function - "states the relation between two or more variables, such as prices and physical quantities." The word "function", refers to the things that determine demand, cost, production and supply, Services can also be included as a component of demand, as people require services from physical objects, such as medical care, shifting cargo from one place to another. The proportion of service required is not fixed. The demand for port services has great importance for charging port prices.

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The demand for port services by shipowners and ports and ports supply of services. Each of the services involved is assumed to be priced at long-run average (equal to marginal cost). Thus, it is assumed that there is perfect competition in the shipping industry and that the price for providing port services is set competitively.

The cost of Using ports<sup>(9)</sup> is above 30 to 36 percent of voyage operating costs, depending upon the type of vessel, conventional vessel or container vessel.

For shipowners, there is also the cost of keeping the ship in port (One half of their annual voyage time in port i.e. for conventional liners.) Port expenses plus the cost of time in port may then amount to about 6 percent of annual voyage cost. It may be higher for container ship.

Then for the liner ship, port expenses are shared by the Conference and shipper. To determine the effect of change in cost for all ports equally depends upon the general change in port technology, or in international usage, movements. If liner companies used port services and other resources in strictly fixed proportions, and if a 10 percent increase in port charges would raise voyage cost by 1.3 to 1.9 percent. Whether this increase in port charges will have an effect on freight rates in similar proportions, will depend on the depreciation and profits of the liner industry, if it is to be competitive. The voyage cost is passed on to the shipper, if he makes separate payments to the port. Assume, again that port charges are paid by the ship and the shipper in equal amounts

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(9) *ibid* Bennatham E & Walters A.A.  
Port Pricing & Investment Policies,  
N.York, 1979.

then if liner companies pass on the full increase in port cost, the shipper's total transport cost<sup>(10)</sup> will rise by 2 to 2.8 percent, in regard to a 10 percent increase in port charges.

THE COMPOSITION OF PAYMENTS IN A BRITISH  
PORT CASES I AND II, 1974.

	Percentage of total payment in port	
	I	II
Total payment made in port 100 percent		
Dues		
Ships dues	18.3	10.3
Import dues (wharfage)	20.2	13.9
Cargo working cases and bags ex-ship to truck		
Stevedoring (excluding crantage)	19.1	20.5
	(24.1)	
Port labour(excluding crantage)	32.3	54.9
Cranage	10.1	u.a.
Payments by ship - 100 percent		
Dues	43	33
Stevedoring (including crantage)	57	67
Payments by shipper - 100 percent		
Dues	35	20
Labour (including crantage)	65	80

Note :Case I : Vessel of 6,400 NRT (1,200DWT) long distance voyage staying 1 day discharging 532 metric tons, mixed cargo. Case II vessel of 4,350 NRT (10,345 DWT), long distance voyage staying 1½ days, discharging a. Including crantage which could be distinguished in Case II n.a. - not available.

(10) Bennetham E & Walters A.A. Port Pricing & Investment Policy. N.York, 1979 pp 25.

b) Variations in Demand for Port Services, or the Elasticity of Demand (for one Port)

Assume that a country has only one Port <sup>(11)</sup> also

- a) There is perfect competition in the shipping industry eg. tramps.
- b) Port charges do not vary with the quantity of throughput.
- c) The country exports a commodity which is a small part of a large world market.
- d) There is a rising supply curve of the export commodity at the ports gate (due to limits of internal transport cost, or of cultivation etc.)
- e) It is not possible to substitute port services for shipping services or vice versa, port services and shipping services must be supplied in fixed proportions.

REFER DIAGRAM A.1.(1) DERIVED DEMAND FOR SHIPPING AND FOR PORT SERVICES

Figure A.1.(1) show illustrations where the supply conditions i.e. c.i.f. includes the steamship (tramp) cost of OS per unit and port charges of SH per unit. At quantity X, exports, equilibrium is found.

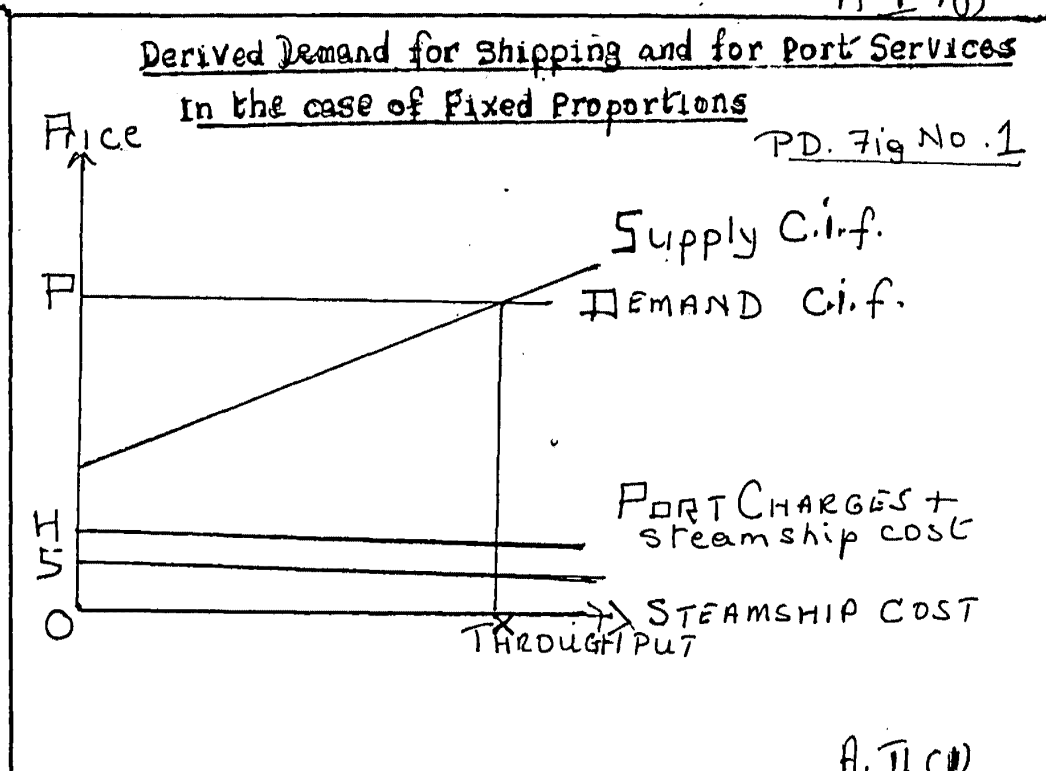
The elasticity of demand for the services of the port is calculated by making a small proportionate change SH/SH and calculated the effect on the quantity  $\Delta X/X$ , with the c.i.f. supply elasticity is denoted by  $e$  i.e. in words

$$\left( \begin{array}{l} \text{(SH/OP)} \\ \text{The fraction of port} \\ \text{cost in the cif price} \end{array} \right) \times \left( \begin{array}{l} X_e \\ \text{Elasticity} \\ \text{supply with} \\ \text{cif price} \end{array} \right)$$

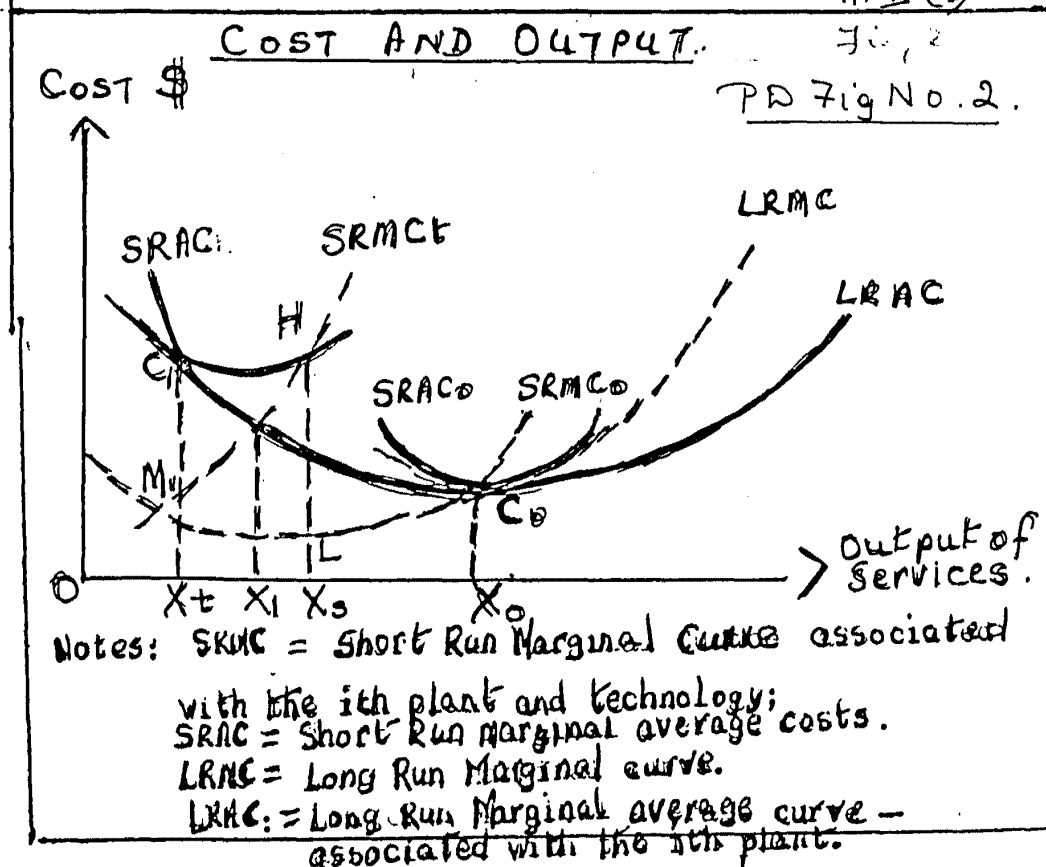
(11) Bennatham E & Walters A.A.  
Port Pricing & Investment Policies  
N.York 1979.

Chapter II

A.I.(i)



A.II (ii)



The share of port charges in the c.i.f. price of goods can be estimated from samples in different ports.

REFER DIAGRAM A.1.2 COST AND OUTPUT

Alfred Marshall<sup>(12)</sup>, was the first economist to give a clear formulation of price elasticity as the ratio of relative change in price. Let E stand for elasticity

$$\text{Then } E = \frac{\text{Relative change in quantity}}{\text{Relative change in price.}}$$

that 2 percent for quantity and 1 percent for price

$$E = \frac{2\%}{1\%} = 2$$

If price goes up, the quantity change is minimised percent and E is negative.

In this case, applying the Marshall formulate the demand elasticity of the port services is equal to the demand elasticity for imports multiplied by the fraction of port charges in total c.i.f. price. i.e. the proportion of total port changes in c.i.f. price will be below 5% of c.i.f. value for most countries and commodities.

Thus the elasticity of demand for port services may be less than 0.2 under all circumstances.

The assumption that the demand curve cif is perfectly elastic can be changed easily. With a downward sloping demand curve of given elasticity, the increase in the port charge would raise the final price (c.i.f.) and so modify the reduction in throughput as the supply curve is raised.

The port produces a wide variate of services, each having it own competitive conditions. e.g. dock and quay facilities are also provided by other ports elsewhere, or storage facilities. Due to the substitutes of these facilities, the port is constrained in its charging practices. These constraints are found in supply, a high degree of substitutability between ships gear and port cranes, or the choice of working alongside the quay, or loading or unloading over the side into lighters.

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P A R T - A  
C H A P T E R - II

II ) THE COST FUNCTION IN PORTS :

1) The Short-run Marginal Cost and its Function :

Marginal cost pricing, under conditions of equilibrium and perfect competition, the price is equal to the cost of resources absorbed in producing the service. Hence, if price exceeds the cost,<sup>(13)</sup> too little of the service will be produced, there will be inefficient use of the resources to produce other commodities and services. If price is below the cost of the resources, more services will be produced, than other goods.

If the change in price is too costly to change, the short-run marginal cost is suitable then for pricing. But, if the price is costly to change the Long-run marginal cost would be suitable. Due to these constraints the short-run marginal cost is found appropriate based for pricing.

If there are economics of scale in Port Operation, whether the short-run marginal cost, is less or more than the long-run marginal costs, depends on the Capital stock and equipment, which is adjusted to the level of output required to produce at the least cost.

- 1) Let us assume that the demand for future levels of traffic are estimated and known, and that the Port Operations under the Port Authority is working efficiently, with best technology for their scale of operations, at the minimum cost, the Average Long-Run cost is the same as the Average Short-run costs.

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(13) *Ibid* Bennatham E & Walters A.A. PP 31-32  
Price Theory & Investment Policies  
N.York 1979.



But this condition will prevail, only if there are constant returns to scale, for all maximum level of traffic for which the facilities have been invested in. If the service are priced at short-run marginal cost, this will attract traffic just enough to cover the port's cost.

REFER DIAGRAM A.2.1 COST & OUTPUT

If traffic levels <sup>(4)</sup> are substantially lower, the port facilities will be underused, the short-run marginal cost would fall below the long-run marginal cost. At these low levels of tonnage there would be no economics of scale i.e. with optimum level of traffic, the long and short run marginal costs are equal. Then, if there are economics of scale levying a price of SRMC - LRMC will give rise to deficits.

If demand is larger for the Port Authority to estimate, as tonnage is more and the equipment and wharves are not sufficient for these levels of traffic. Thus, the short-run marginal cost will be high, showing the scarcity of port capacity i.e. above the long-run marginal cost. If the port tariff is fixed near the value of long-run marginal cost, congestion would be found in the port. If the tariff shows the scarcity value of the port facilities, then congestion will not be found in the port.

Another reason is that, if the Port Authorities, overbuild their ports, the short-run marginal cost is below the long run marginal cost. If the long-run marginal cost was equal the port equipments will be underutilised, resulting in the short-run marginal

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(4) *ibid* Bennatham E. & Walters A.A.  
Port Pricing & Investment Polcies  
N. York 1979,

cost, being the appropriate base for pricing of the tariff.

The longrun marginal cost is suitable base for pricing when the Port Authorities predict their output and capacity correctly.

The Short run marginal cost is the suitable base for pricing whether the Port Authorities plan their forecast of traffic. Now, if tariff is set at short run marginal cost when there are increasing returns to scale. A deficit will result. Only when the port is operated under congested condition and there is no expansion undertaken of the Port there will be a surplus.

Assumptions were made that the Port Authorities could make adjustments to Port size, and hire labour suitable for the Port size. But as there are discontinuities in Port construction and Port sizes for this the short run marginal cost may coincide for wide ranges of output for the same size of plant. The long run marginal is suitable for the optimum size of Port not too long or too small a plant.

#### ii) The Average Cost Function :

A substitute for marginal cost pricing is the average cost pricing suitable for uncompetitive conditions, depending upon the political situation prevailing in a Country.

If price are above marginal cost, the port traffic should be above or below marginal cost, such as, if the specific resources under by the Port eg. capital, charges prices that are considerably above marginal

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cost, then the tariff should be above the marginal cost in the port, or the port may expand too much, and use more of these scarce resources.

The average cost pricing is used when there are too many services performed by the port, according to the principles for measuring average cost, such as cost is allocated according to weight, or volume or to what the traffic can bear or a combination of the two.

In dealing with Conference the port may sell services in an uncompetitive manner, being a shipping monopoly as it does to traders in a competitive way.

### iii) Variation in Demand :

There is variations in the prices charged for port services among different ports. Due to this reason The Authority has to ensure the prices do not shift with temporary shifts in demand.

#### REFER DIAGRAM A.2.1. VARIATION IN DEMAND

$D_1$  &  $D_h$  = low & high Demand.

At price  $P_0$  the low demand is for  $X_2$

$X_2 X_0$  = there is spare capacity

When demand is high  $X_h$  ships turn upto to be serviced then  $X_h - X_c$  and have to wait.

If  $X_c - X_2 = X_h - X_c$  then the waiting ships can be serviced in a week.

$D_1 (W = \Delta)$  and  $D_h (W = \Delta)$ , i.e.  $W$  - week's waiting time with no compensation.

A season variation, the price is  $P_h$  for high season and  $P_o$  for off season, no waiting time.

The port Authority should be above to cost their services, and pricing policies, such as the marginal cost in the short and long run, charges for port use services, storage facilities etc.

Table.3.1 Composition of Annual Port Cost for the  
Expected Annual Throughput of Three Planned  
Berths, Port Kelang, 1974.

At expected Dry bulk annual @ berth throughput (fertilizer (Percent)	General Cargo Berth		Container	
	Excluding back-up facility (percent)	Including back-up facility	Exclud- ingCFS@ (percent	Including CFS (Percent
1	2	3	4	5
Annual cost of 78 fixed assets @ as percent of to- tal annual cost.	52	57	82	71
Annual cost of 77 fixed cost as percent of total annual cost, omi- tting cost of land reclamation	52	57	81	70
Annual capital cost of land reclama-43 tion capital dred- ging and wharf as percent of total annual cost.	47	40	59	45
Annual capital 35 cost of plant as percent of total annual cost	3	4	23	19

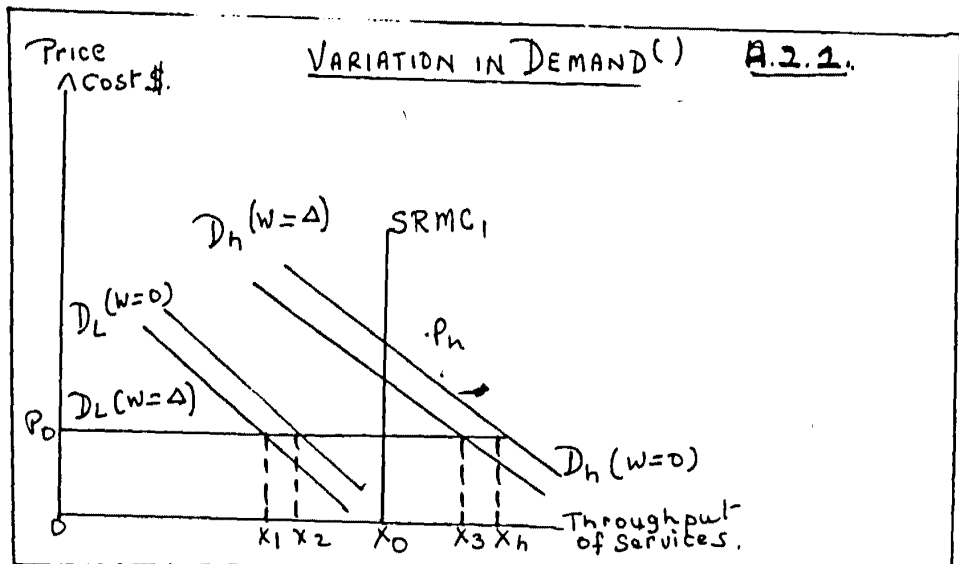
4  
 Table 4-7. Indicators of Congestion at Two Major  
 Indian Ports, 1969-70

Vessel class "All Others"	Port 1	Port II
Ship delayed because berths unavailable (percentage of all ships calling.	12.5	8.6
Average delays (days)	5.2	1.7
Expected delays to any ship entering port (days)	0.65	0.15
Ships days lost per berth- day of port	0.16	0.01
Cargo worked per berth day (tons)	600-700	325
Average turn-round (days)	5.4	8

- a. Steamers excluding tankers, bulkers and tramps  
 b. Berthday is the day which the berth is occupied  
 by a vessel.

Source : Computed from Director of Transport Research  
 Ministry of Shipping and Transport, Government  
 of India, Port Transport Statistics of India  
 (New Delhi, March 1971) Tables 5.3. and 12.7.

- a. Expected throughput per year dry bulk berth, 215000 tons. general cargo berth 200,000 tons, container berth 100,000 containers (TEU).
- b. The Components of fixed assets <sup>(15)</sup> for dry bulk berths, land reclamation, wharf, bridge, dolphins, conveyer, steel work dredging cranes, conveyer electrical works, for the additional general cargo berth wharf and bridges, transit shed, service, dredging and back-up facilities (land, roads, godowns, services) and plat for wharf and back-up facilities for the container berth-land reclamation, wharf and bridges, roads stacking areas, dredging, wharf cranes, straddle carriers prime movers and trailers, and CFS (Station buildings, services and forklifts.)
- c. The back-up facility has not been charged with any part of the annual labour cost of maintaining and operating the berth.
- d. The CFS has not been charged with any part of the annual administration cost of the container berth.



Note:  $D_h(w=0)$  High Demand no waiting.  $D_L(w=0)$  low Demand  
 $D_h(w=\Delta)$  High Demand with one week waiting. No waiting  
 $D_L(w=\Delta)$  low Demand with one week waiting.

(15) Bennetham & Wallers A.H. Port Pricing and Investment Policies. N.York 1979, pp. 34, 39.

P A R T - AC H A P T E R - II111) THE ECONOMICS OF SCALE IN PORT OPERATIONS:(1) Services of the Port and size of Plant :

The Port is a unit engaged in Production<sup>(16)</sup> or supplying services at a Profit, and with the objective of maximising profit. The Port Authority decides to expand or to contract output, to set prices etc. He makes the decision, hires out labour service, and decides the costs and prices of his inputs and outputs of resources. In forming tariff system one of the general question is whether there are economics of scale in the provision of services when the equipment and size of the Port are just right for the level of traffic and if the appropriate capital stock is available?

In the economics of port operations, the use of Price Theory is the "The Theory of the Firm", the wider meaning means "business and services and activities". The firm is a unit engaged in production for the sake of profit i.e. profit maximisation. Variable cost are relevant for the short-run decisions of the Port, and full cost or fixed cost for the long run, when the Port can vary the size of its plant and machinery.

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(16) Bennathan E. & Walters A.A. Port Pricing & Investment Policies N.York 1979. pp.56

The firm or port can, therefore expand its production by using more of all inputs eg. more labour more equipment, more space.. If the increase in output is proportion to the increase in inputs and causing a doubling of outputs it is called " Economics of Scale".

It is important in determining the pattern of cost, it is first necessary to examine the general conditions, especially those of geography and indivisibility. First, the economics of location of port facilities, and the appropriate size of those facilities must be considered. Optimal location, is applied only at the Planning stages. Thus, let demand<sup>(17)</sup>

for the port services increases, so that the port is led to expand from the existing sub-optimal to the optimal site, Unit cost will decline for the ports entire output, Next demand will fall to its original value. The port will then reduce its output<sup>(18)</sup> by scrapping and selling off the highest cost berths which lie in its original location, so that unit cost will once again decline analytically the port has moved on to lower cost curves, which were not available when the port was originally built, i.e. diminishing cost as output expands.

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(17) Ibid : Watson D.S. Price Theory and its uses, 1963  
(18) Ibid Bennatham E & Walters A.A. Port Pricing and Investment Policies, 1979. Pg.123&43 resp.



## 2) Location of the Port

Rational choice of location shows that unit cost will rise as output expands. Thus, the size effects on the cost of the port capacity must be considered. This location disadvantages will be shown by the economics of scale in the provision of port services e.g. Large ports mainly have more labour problems. These economics are from the use of large indivisible units of equipment, the provision of deep harbours, large ships facilities etc. demand respond with a finite elasticity to the frequency of a service.

### REFER DIAGRAM : A.3.1 PORT COST WITH DISECONOMICS OF SCALE

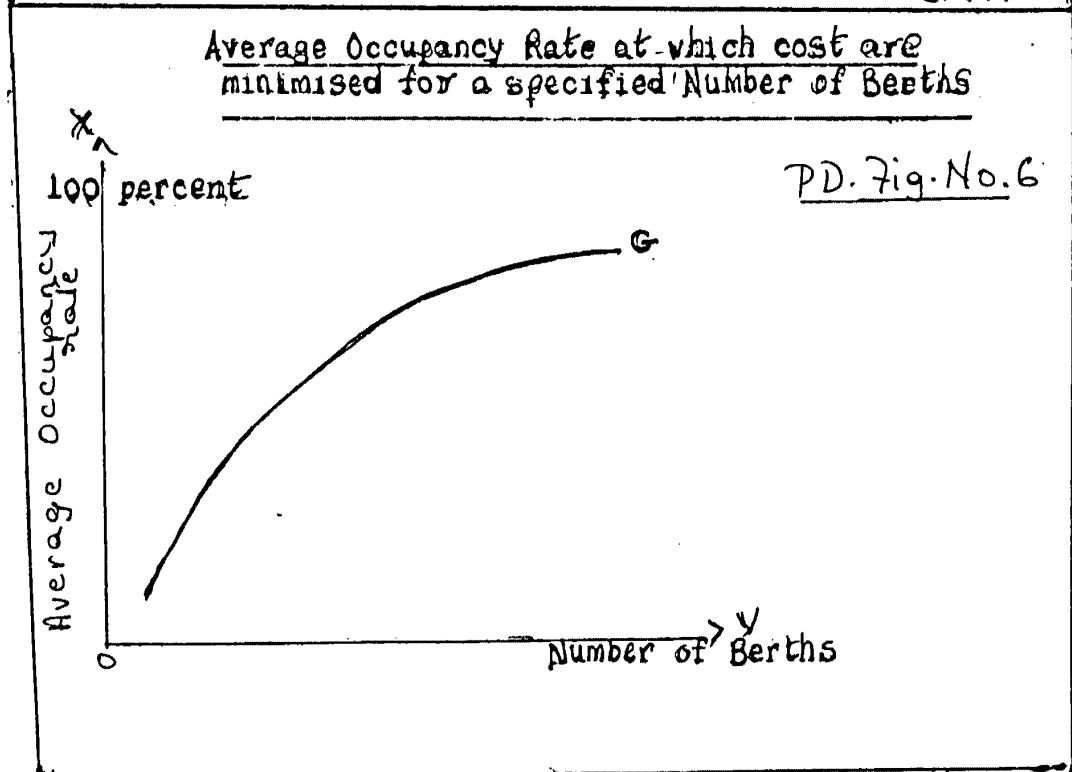
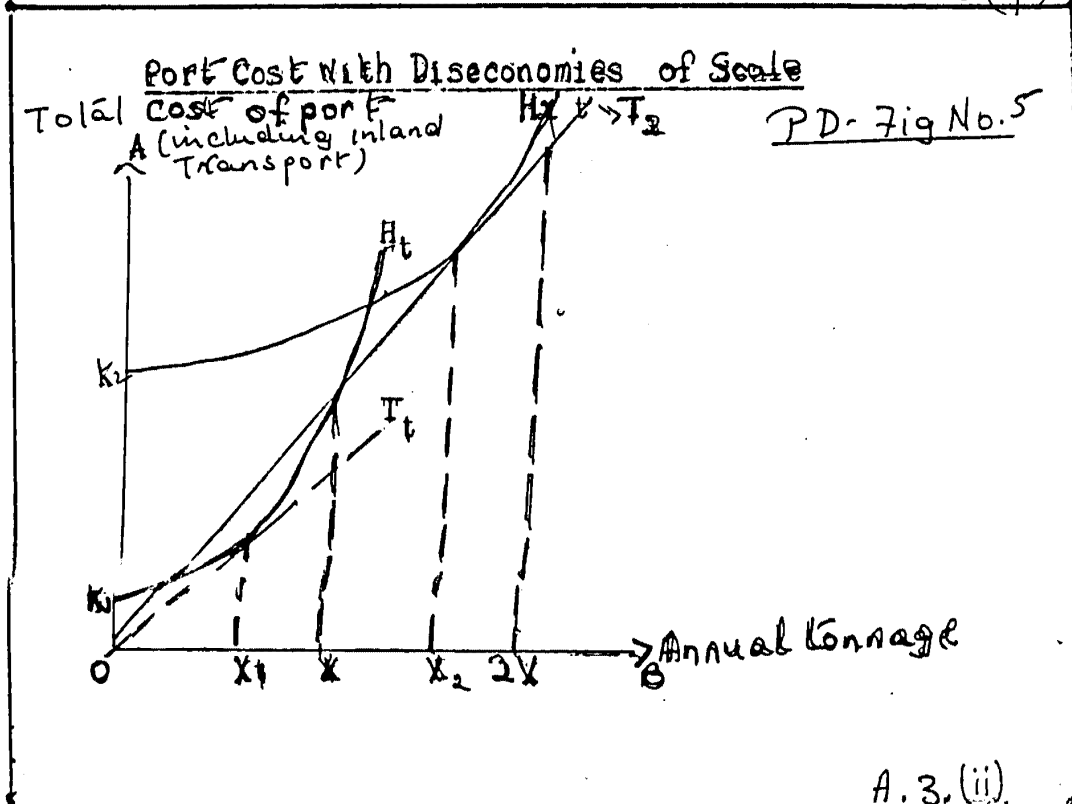
The effects of economics of scale in port are found in inland transport operations to ensure the minimum average cost of the large port complex is lower than small ports, a large port has efficient equipment, deals with large vessels, or same size vessels as a small port.

## 3) Occupancy of Berths :

Diminishing average cost is found in frequently calculating an optimal occupancy of berths by approximating the ship arrival in a day is constant, given the number of channels to a port, the size of the port, the expected annual tonnage of cargo, the total

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A.3.(1)(E)



Source; Port Pricing & Investment Policy: E. Bennathan & A.A. Wallers. 1979 ps. 45 & 48.

ap 21  
212

number of days the ship spends waiting to berth can be counted, as ship days spent in the queue involve costs, also the number of days the berth is vacant can be estimated. The joint cost of idle berths and ship time is then minimised, and thus the optimal number of berths, and average annual occupancy rate of those berths is calculated.

REFER DIAGRAM : A.3.2 AVERAGE OCCUPANCY RATE AT WHICH COSTS ARE MINIMISED FOR A SPECIFIC NUMBER OF BERTHS

Another form of economics of scale is where a port expands capacity by dredging a deeper channel, and providing equipment for large vessels and bulk carriers. After the dredging cost, a small annual maintenance cost, is required. The marginal cost per cargo ton will be lower for higher ranges of tonnage throughput.

A comparison study of a large port complex and a small port complex. See Diagram A.3.3 Total Cost of Two Identical Port and one Port Alternative

Explanation :

$H_1$  = Total cost of a small port;  $K_1$  = the fixed cost (dredging construction cost)

$X_1$  = the capacity of the Port. No more traffic the cost curve turn vertical.

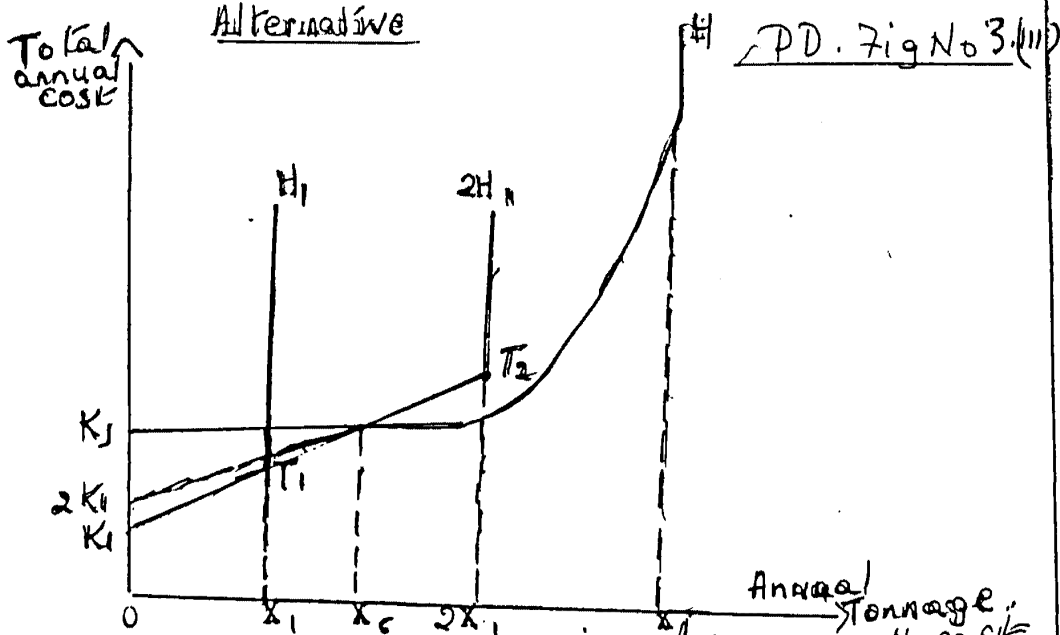
In adding a small port to the first port, the capacity of the old increases, for the same size of the ships. i.e. if the capacity is doubled the fixed cost will also be double.

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Chapter II

A.3. (iii)

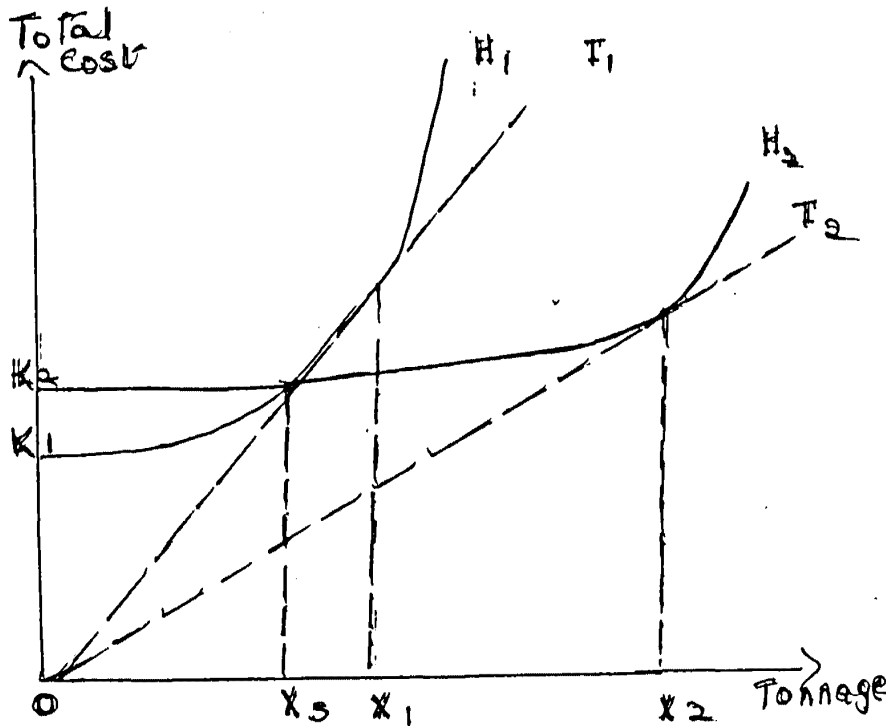
Total Cost of Two Identical port & One Port



Note:  $K_1$  = annual cost of capital for a small port  
 $K_2$  = annual cost of capital for a large port

Cost & Discontinuities of Ports A. 3. 4 (iv)

PD. Fig No 3. iv



$T_1$  &  $T_2$  - show the average cost is identical and  $T_1$  &  $T_2$  lie on the Ray through the origin. Also the marginal cost is the same.  $K_1$  is compared to  $2K_1$ , a large scale deep water port, which has a large fixed cost<sup>(19)</sup>

Marginal cost at first is low, due to low variable cost of the large port, and economics of large vessels. But, as internal transport cost increases, the economics of scale may be offset after a certain quantity  $X_j$  6 (Capacity of the port is reached). For a given country with certain specific resources, there are economics of scale in ports. The larger the port, other things being equal the lower cost for certain ranges.<sup>(20)</sup>

Diseconomics set in by internal transport cost and other distribution costs, and size of the market, lower volumes of population and resources of the country.

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(19) *ibid* Bennatnam E & Walters A.A.

Port Pricing & Investment Policies  
N.York, 1979.

pg.49

(20) *ibid*

pg.55

P A R T - AC H A P T E R - IIC O N G E S T I O N   I N   P O R T S :IV.1) The Congestion Theory :

A most troublesome problem is congestion of transport.<sup>(1)</sup> even if it takes the form of crawling traffic and jams, in Seaports, we find long queues of ships waiting in the roads for berth space or in transit sheds, clogged and chocked with goods and merchandise.

Hence, congestion is a notable feature of transport. We find congestion in Port services, long line of ships, in Port uses - for facilities and transit sheds and storage sheds in Port connection - other modes of transportation, in ports infrastructure - Roads and Railway lines, etc.

The existance of congestion<sup>(2)</sup> indicated that the Port Authority, possess a valuable scarce resource. If the Port were owned by a private party unconstrained by government and custom, it would raise port charges and profit from the scarcity. The long line of ships in the roads would be reduced to a few vessels as shipowners and shippers switched to alternative facilities.

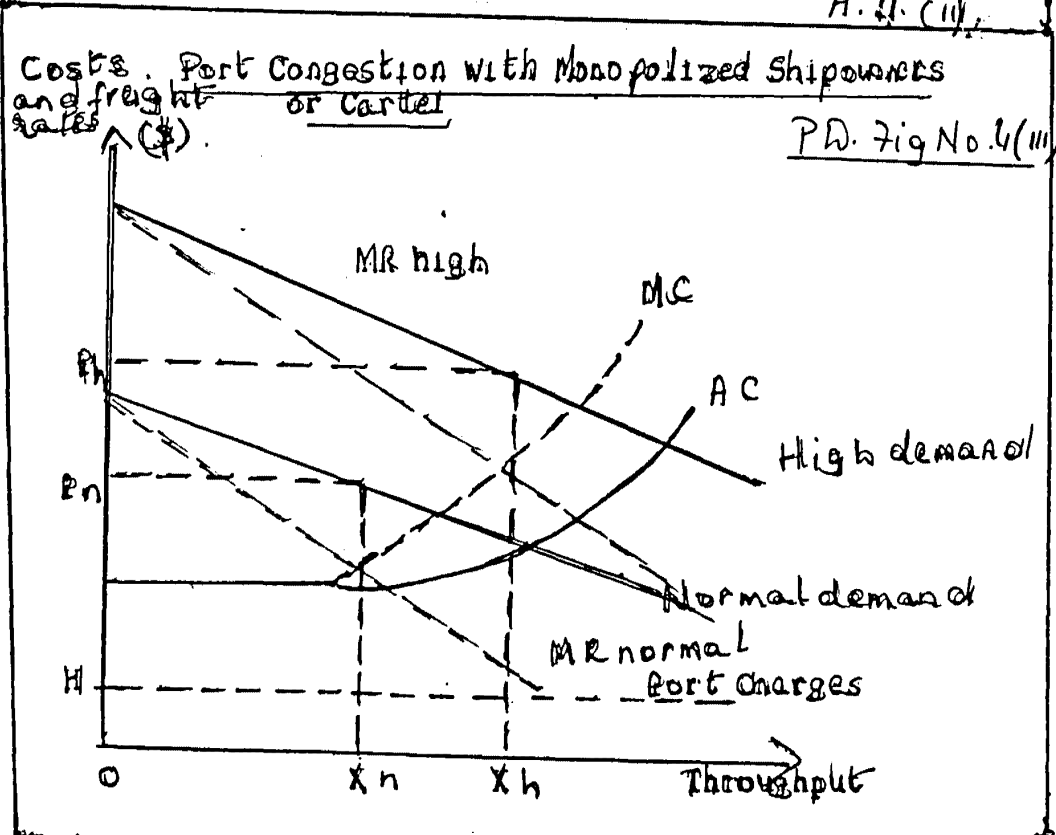
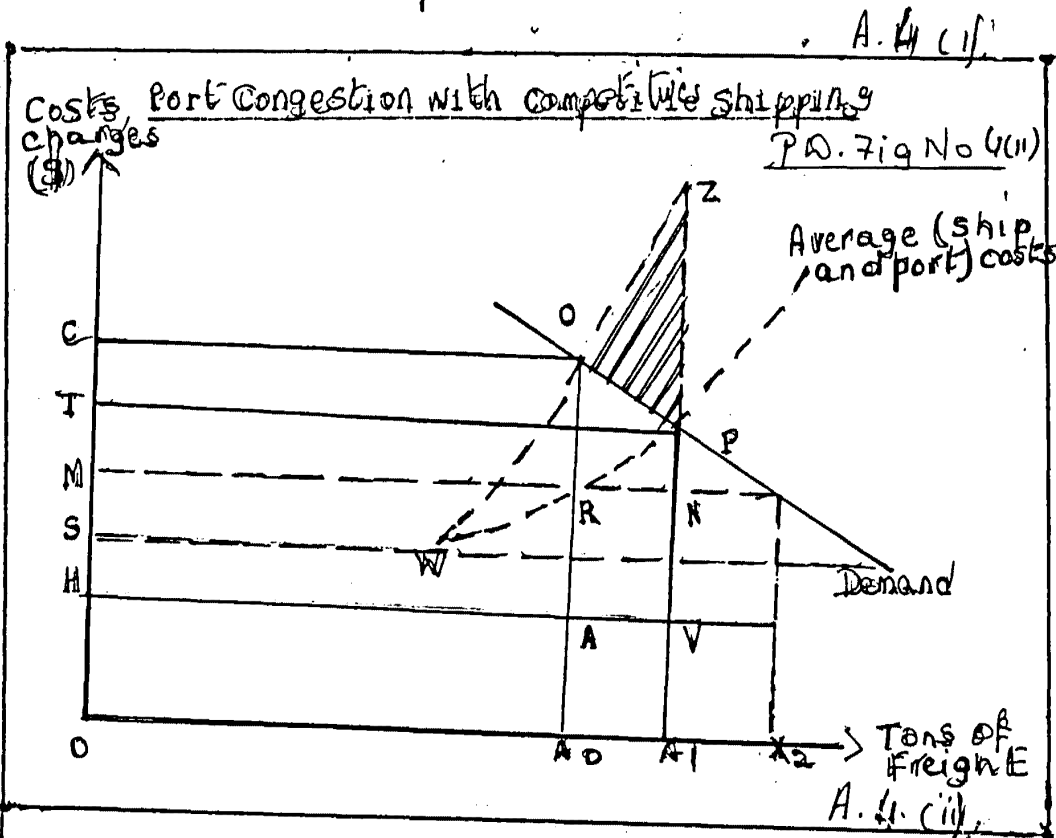
Tariffs are kept low in a congested port, because a rise in port prices would have an effect, in increased domestic prices of imported, and lowered domestic prices for exported goods.

Both competitive tramp owners and cartelized liners operators will charge atleast for the time that their ship spends in the queues, the former in the freight charges, or charter contract, and the latter in the form of congestion surcharge.

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(21)	Ibid	Bennatham E & Walters A.A.	Page 63.
(22)	Ibid	Port Pricing & Investment Policies, 1979, N.York	Page 53.

Chapter II



Source : Port Pricing & Investment Policy pp. 66  
 E. Bannatham & AA. Walters. 1979 ibid: 375

A Port Authority with Monopoly power can raise port charges above the marginal cost (including the value of the scarce port resources) and so increase the profit of the port. Higher port charges will raise freight rates, increase domestic prices of imports and reduce the domestic price of exports.

Refer Diagram A 4.1 Port Congestion with Competitive Shipping.

Horizontal axis shows Total traffic, <sup>(13)</sup> both exports and imports in tons, and also measures total trade flows.

Vertical axis shows the price. The Demand Curve represents the demand for shipping and the demand for Port Services in proportion to it.

As traffic increases, the cost rise to R (at  $X_0$ ) and P (at  $X_1$ ). Marginal cost at OC per ton. If congestion is greater than normal, i.e. more queuing in the roads. Each competitive shipowner will add these additional expenses to the freight charges, and the average ship and port cost will be equal to the appropriate demand price intersection P. Each shipowner will be levying a congestion surcharge of TM (Or PN) a ton. SWQ2 is the marginal cost curve.

At traffic level  $X_1$  tons, additional tons of cargo would cost  $ZX_1$  not  $PX_1$ .

By joining the queue, a shipowner will delay all ships that come after him, raising the cost at  $X_0$ . Price P is less than the marginal cost  $ZX_1$  of providing the ship service.

Too many ships join the queue, it would be best to reduce traffic to  $X_0$ .

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(13) Ibid ,Bennatham E & Walters A.A.  
Port Pricing & Investment Policies  
N. York, 1979



Port congestion is compared to the theory of highway congestion<sup>(24)</sup>, the same kind of congestion that is found on urban streets and city highways. The solution is the same. The port raises its charges from  $OH$  per ton by  $RQ$  per ton.  $RQ$  is the congestion levy of the Port.  $PN$  is congestion surcharge imposed under congested conditions at  $X_1$ , price  $P$ .

With traffic at  $X_0$  tons, shipowner average cost will be  $OM$  per ton, due to competition. If the Port Authority levies a charge at  $RQ$  per ton, it will not have to provide a service for less than the cost at  $X_1$ . The shaded area  $QPZ$ .

Diagram A.4.1 shows that when a congestion levy is imposed, the greater the elasticity of demand for the Port, the smaller the rise in price, and longer the throughput of the port. A small reduction in the quantity of tonnage causes a large fall in the cost of ship operations of elasticity of demand is not high, the freight charge will be small for revenue of the port.

$OHAX_0$  = normal charges,             $MCQR$  = congestion levy

The total revenue from both, normal charges and congestion levy probably will increase.

If the port imposes a suitable congestion surcharge  $RQ$ , the quantity of cargo will be reduced from  $X_1$  to  $X_0$ . The queue of vessels contracts to its normal level.

The next problem is to examine the effects of a port levying a congestion charge on conference, and steamship owners.

In judging these policies, it is to be considered whether the monopolist or cartel is owned by the domestic residents of the country, and follows the law, whereby

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(24) *ibid* Bennathan E & Walters A.A.  
Port Pricing & Investment Policies  
N. York 1979.

all traded goods must be carried by domestically owned ships, for this the form of competition in the shipping industry, and its effect on the forms must be considered, or congestion levy charges may generate an agreement of the Conferences, to deal with the congestion.

(II) A Monopolist Steamship Service :

In this case, there is only one shipowner (or one cartel) using the port.  $RQ$  is the appropriate congestion charge levied. The shipowner would charge the shipper at least a price of  $OC$ , and  $OH$  would go to the port Authority.  $HM$  would be their average cost of operation. The balance of the charge  $MC (RQ)$  represents the surplus which is appropriated by the monopolist cartel i.e.  $RQ$  measures the rent per ton, accruing to the port because of the scarce capacity of the port relative to the high demand for its services.

When there is high demand, in the case of a monopoly a single cartel.

Refer Diagram A.4.2 Port Congestion with Monopolized Shipowner (or cartel)

If the monopolist steamship owner produce more output in high demand conditions, he will incur a higher marginal cost, the difference in cost, will be of the form of increased congestion.

The Conference would thus claim  $P_h - P_n$  as the pseudo congestion surcharge in that Port.

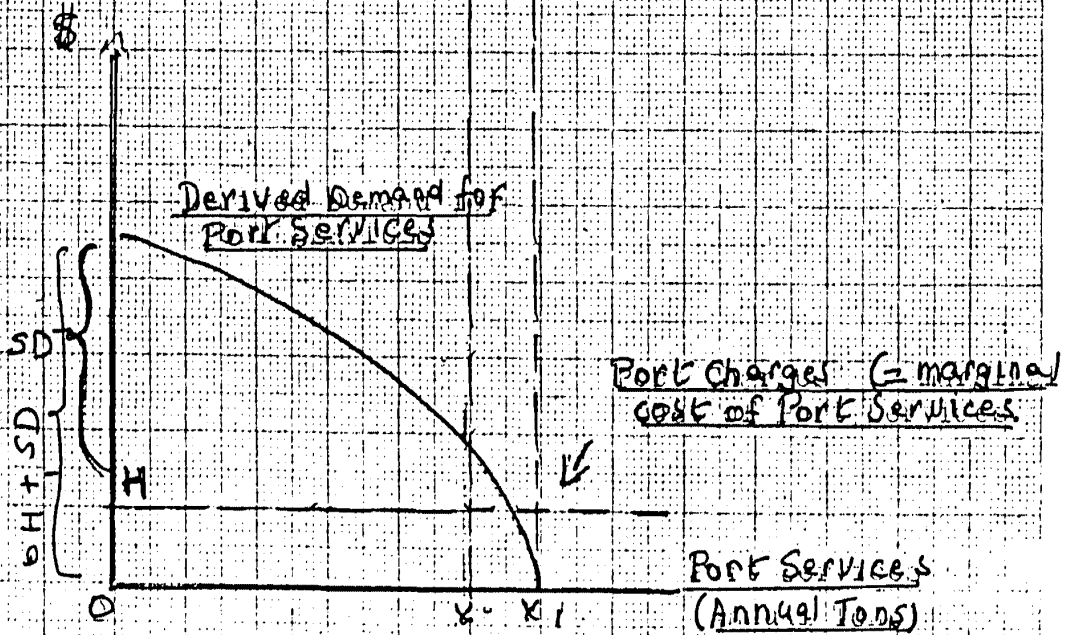
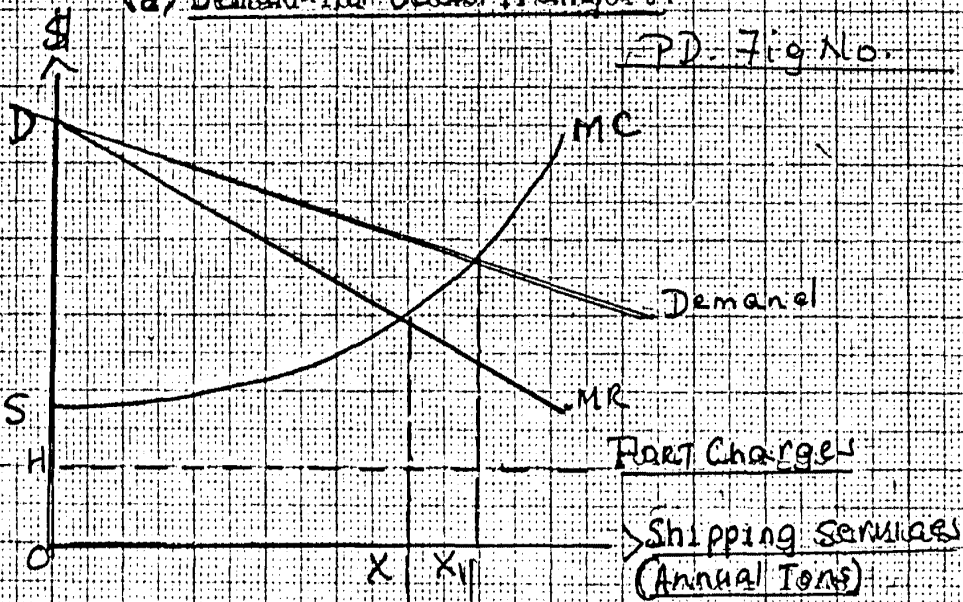
Diagram A.4.3 - Demand for Ocean Transport and Derived Demand for Port Services.

In the case of a monopolist shipowner, the port is being underused both under conditions of high and low

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DEMAND FOR OCEAN TRANSPORT AND DERIVED DEMAND FOR PORT SERVICES.

(a) Demand for Ocean Transport.



(B) Derived Demand for Port Services

Note:  $OH =$  Variable cost and overhead  $=$  port charges  
 $H =$  Ship cost per ton where there is no congestion

demand. The equilibrium output of port services is shown at  $X$  with the port charge of  $OH^{(25)}$ . The monopoly steamship owner will reduce freight rates and to expand his services and extend production to  $X_1$  where marginal cost is equal to price. This would be to subsidize port service, per unit so that the new lower marginal cost curve intersects the marginal revenue curve at the output level  $X_1$ .

Many competent shipowners, or groups of shipowners using the Port facilities (Diagram A.4.1).

Under congestion conditions at traffic levels  $X$  shipowners levy a congestion surcharge of  $NP(MT)$  per ton to cover their cost. As too much congestion prevails at the port, it is advisable to divert traffic to other ports. Shipowner raise a total revenue  $MTPN$  in congestion surcharge to compensate for the additional waiting time cost incurred. This cost of congestion  $NP(MT)$  per ton is passed along to the consignees.

Considering the policy of port charging congestion levies of  $RQ$  per ton, steamship owners, find it not possible to levy a congestion charge, since congestion will drop back to normal i.e. cost  $OM$ , if it does his freight tariff would rise above cost and other steamship owners, would charge less  $X_1$  to  $X_0$ .

Another problem is to find out what happens to the demand curve, or to the elasticity of demand for the conference traffic, when the port increases its traffic.

Encouraging tramp and bulk carriers competition. The usual Conference policy is to adhere strictly to scheduled sailings congestion, will increase the cost of liners more than the cost of unscheduled tramps and bulkers services. Thus, a congestion levy imposed by the

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(25) *ibid* Bennathan E. & Walters A.A.  
Port Pricing & Investment Policies  
N. York, 1979

port will be absolutely and relatively injurious to the liner conference and increase the elasticity of demand facing the conference.

3) Other forms of Congestion

Congestion is also primarily on the wharves and in transit sheds. Congestion may result from lack of quay space to accommodate the ships that attempt to call, and there may be more shed space and wharf capacity.

- i) Congestion charges levied for use of wharves and transit sheds.
- ii) Congestion charges levied against the occupancy of the quay, or occupancy of a narrow channel causes congestion.

Hence, it is important in finding out the proper unit and base for the congestion surcharge. Due to different ships design, some vessels will work cargo faster than others.

Packaging of cargo can be done by different handling techniques.

Other cases, a transit sheds full of merchandise that has an effect on the turn-around of vessels and the length of the queue waiting to discharge and load cargo.

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Table 4.1 : Indicators of Congestion of Two Major Indian Ports - 1969-70.

Vessel Class - All others	Port I	Port II
Ship delayed because berths unavailable (percentage of all ships calling)	12.5	8.6
Average delay (days)	5.2	1.7
Expected delay to any ship entering Port (ship)	0.65	0.15
Ship days lost per berth days to port	0.16	0.01
Cargo worked per berth days (tons)	600-700	325
Average turn round (days)	5.4	8

Table 4.2 : Congestion Surcharge of Shipments to Bombay and Karachi, 1973

Port	Conference	Route	Effective from	Rate %
Bombay	India/Pakistan West Coast of India/Pakistan/ US	UK/India, Pakistan	3.12.73	30
		US, Atlantic and California ports.	10.12.73	30
	Japan, India Persian Gulf, Japan.	Both ways Japan, India, Pakistan, Gulf.	1.12.73	15
	Gulf, Arabian Sea, Orient rate agreement	P. Gulf, Arabian sea, South Coast	1.12.73	15
		Asia, Taiwan, Korea, Phi- lippines	3.12.73	20
Karachi	India, Pakistan, West Coast of India, Pakistan, US		10.12.73	20

Source : E. Bennathan and A.A. Walters, Port Pricing and Investment Policy, 1979, p.93.

P A R T - A  
C H A P T E R - II

I V) (i) Profit Maximization Theory :

The Objective function in "Theory of Price" states the determinants of the quantity to be maximised or to be minimised. Profits or revenue are to be maximised Costs are to be minimised. The solution to a firm minimising costs, can be converted into, the solution for maximizing profits.

The effects of profit maximization on prices and output depends on the circumstances of the case. In enterprises like ports, the difficulty is usually multi-product firms selling each type of service in a variety of markets, each with its own demand conditions. Ports are taken as Public Utilities and hence, their charges have to be less e.g. Passenger travel.

Take the case of an export port <sup>(26)</sup> in one region along the coast. The basic activity being agriculture its experience constant returns to scale, increased transport cost, due to distances away from the Port, therefore, there is increasing marginal cost for the total production of the commodity.

REFER DIAGRAM A.5.1 A PORT AND ITS HINTERLAND

Let us suppose a port on a northern coast is only an export port, for agricultural produce. Traffic is along the straight Road PR, R is the limit of cultivation of the export product along the highway. The f.o.b. price offered for the export crop at the port is constant. The basic activity being agricultural,

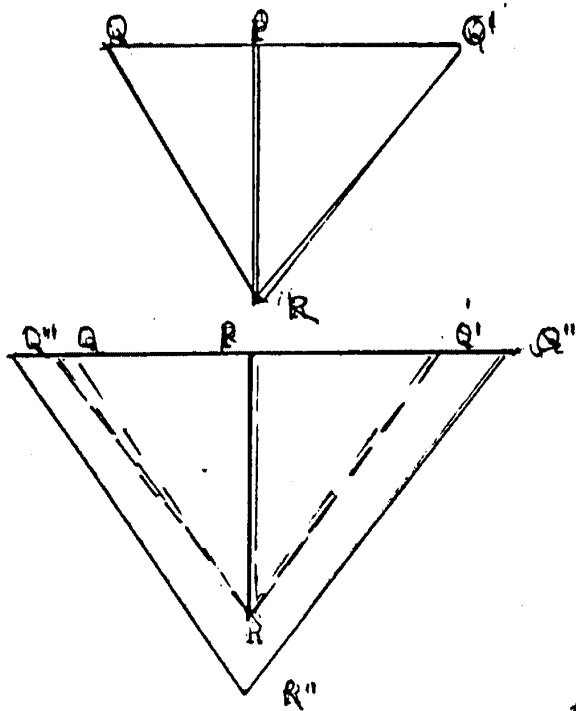
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(26) Bennatham E & Walters A.A.  
Port Pricing & Investment Policies  
N. York, 1979.

A. 5. (i)

A Port and its Hinterland.

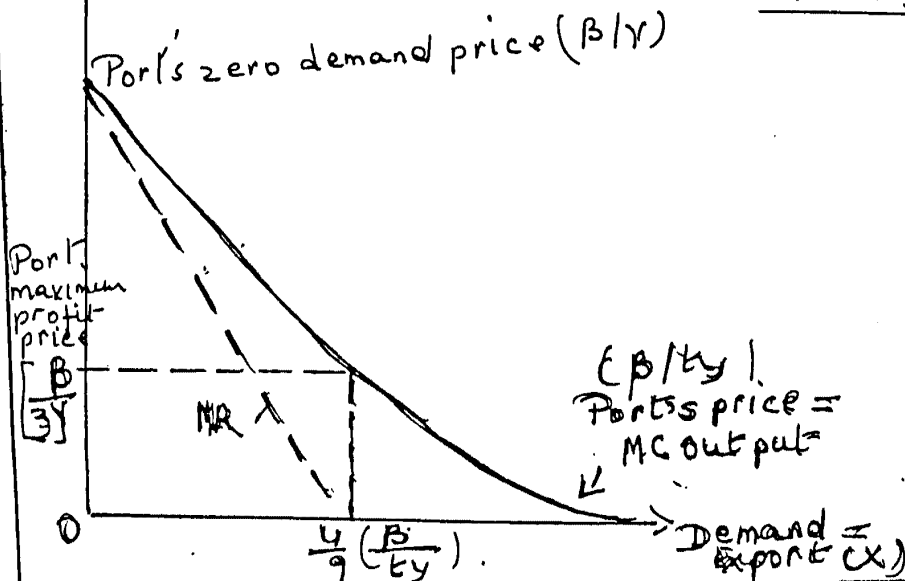
PD. Fig No



A. 5. (ii)

DEMAND CURVE FOR PORT SERVICES  
 Price of Port Services (P(b))  
 Ports maximum profit output.

PD. Fig No.



Source: Port Pricing & Investment Policy: page 99  
 E. Bennathan & AA Vatters 1979

Chp 5  
 5



it experiences constant returns to scale, increased transport cost, due distances away from the port, therefore there is increasing marginal cost for the total production of the commodity e.g. In a 100 square meter plot the cultivated area produces ton. This product has to be transported in one direction, along the road at a constant cost of \$.1 per 100 metres.<sup>(2)</sup> The area of cultivation is RQQ'.

Due to variation in port charges for its services there are several consequences such as :

- 1) A reduction in port prices, will extend production along the road and increase the area of cultivation in an east, west direction.
- 2) The Marginal Revenue obtained by the Port will increase  $Q^*QRQ'Q' R @$  by the new area cultivated.
- 3) There is an infinitely elasticity of demand for the commodity at the port.
- 4) With the increase in demand for port services more land is brought under cultivate, so that the cost of transport charges and port charges can be met.

We find that the demand curve is inelastic for monopoly port service. In this way, the ports profit maximising price will always exceed marginal cost by half the transport cost at the distant point.

$$1) \left( \begin{array}{l} \text{Ports profit} \\ \text{maximizing} \\ \text{price for} \\ \text{its monopoly} \\ \text{services} \end{array} \right) \begin{array}{l} -2/3 \\ \\ \\ \\ \end{array} \left( \begin{array}{l} \text{Port's} \\ \text{marginal} \\ \text{cost} \end{array} \right) \begin{array}{l} -1/3 \\ \\ \\ \end{array} \left( \begin{array}{l} \text{Port} \\ \text{zero} \\ \text{demand} \\ \text{price} \end{array} \right)$$

(2) Bennatham E & Walters A.A.  
 Port Pricing & Investment Policies  
 N. York, 1979.

The excess of the profit-maximizing price over marginal cost can also be expressed in terms of internal transport cost to the port.

REFER DIAGRAM: A.5.2 DEMAND CURVE FOR PORT SERVICES.

ii) National Optimal Pricing :

The Policy for national port shows a relation between the port price, the freight rate, port profit and the benefits to traders and domestic consumers. In the case of a Public Utility<sup>(28)</sup> suppliers and consumers are mainly nationals. Standard fiscal methods are used to regulate the distribution of any monopolistic surpluses in the economy.

In International transportation, some of the supplies are foreigners, and national shipowners.

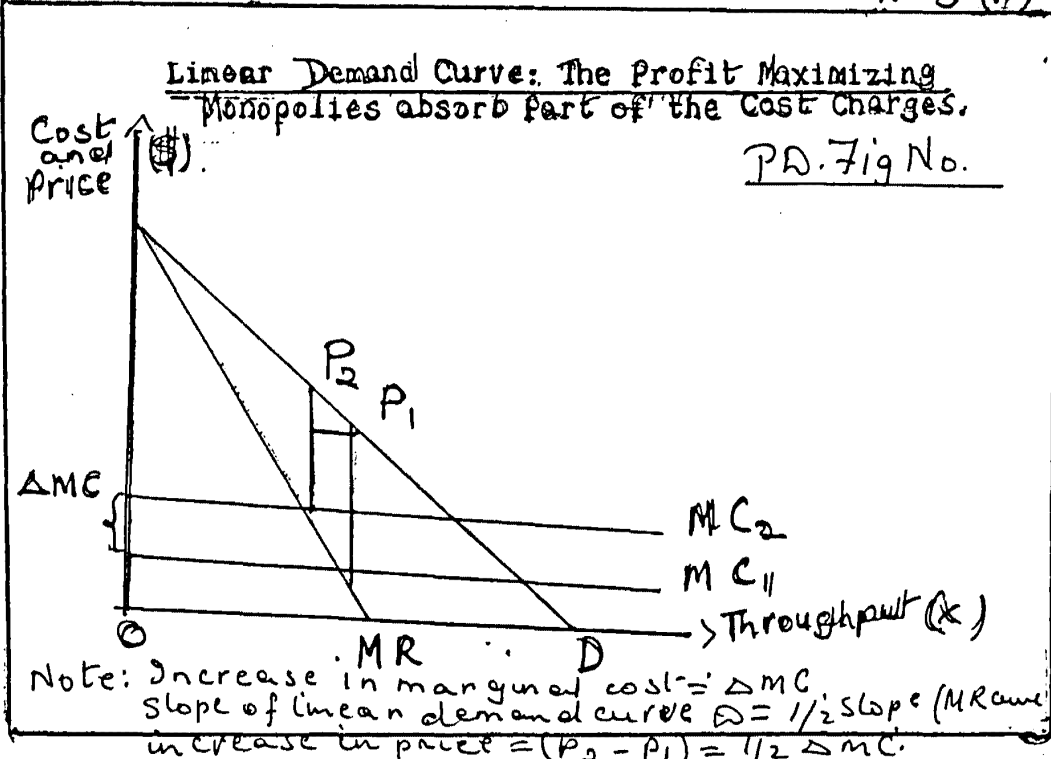
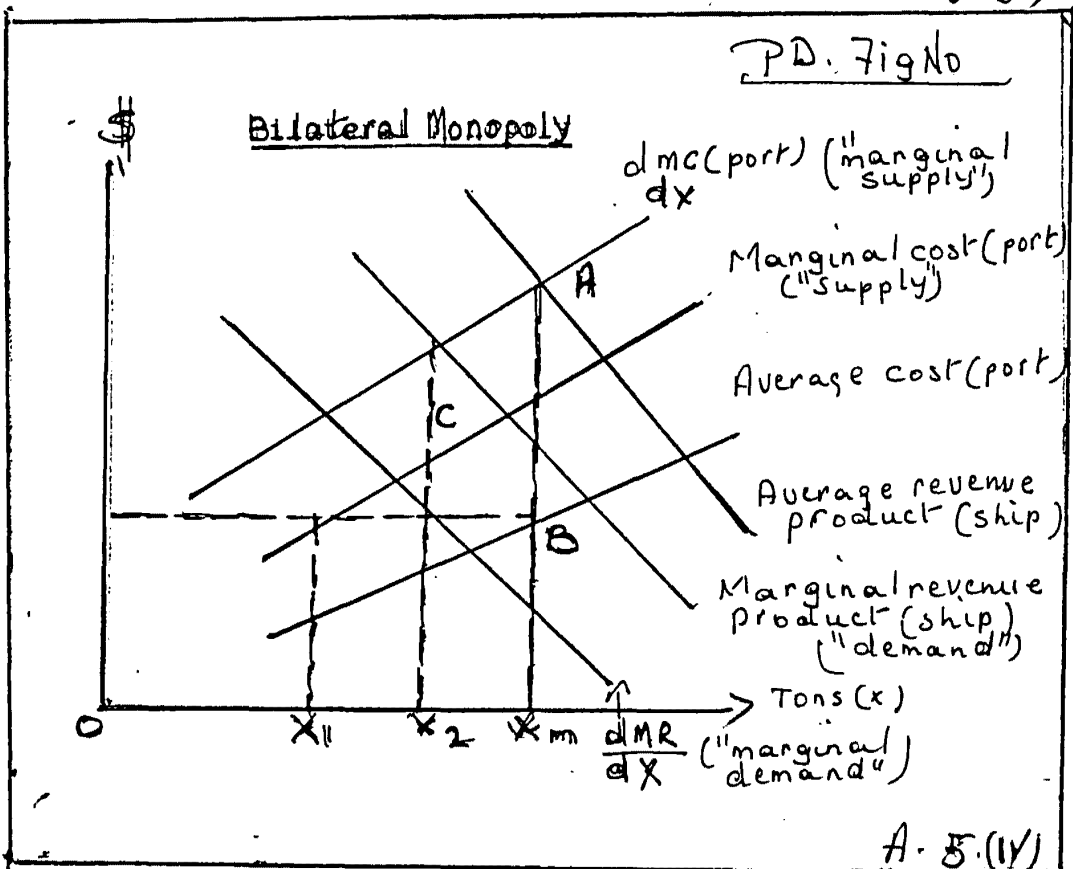
To solve this problems, the question are raised on the basis of who normally pays a port tariff? the way in which decisions on the use of port services are taken eg. conventional transport operation whether the effect on freight rates and the ships revenue will be the same. The efficient use of port resources requires that separate services should be priced according to cost<sup>(1)</sup>. The total benefit is the profit to the port and the surplus earned by traders or enjoyed by domestic consumers.

A reduced charge for port service will be reflected in a reduced freight rate, and the reduced freight rate is a an advantage to the traders and to the consumers.

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(28) *ibid* Bennatham E & Walters A.A.  
Port Pricing & Investment Policies  
N.York, 1979

A. 5. (iii)



Source: E. Barnathan & A.A. Walters: Port Pricing & Investment Policies 1979 pages 106 & 110

Chp  
11

iii) Bi-lateral Monopoly.

(29)

If the country is served by one monopolist firms and if the port industry is organised also as a state monopoly, a bilateral monopoly emerges.

The stronger party maximizing its non-profits while reducing the profits of the worker party, by bargaining for a certain volume of port services.

REFER DIAGRAM A.5.3 BILATERAL MONOPOLY

\$A per ton = price paid by ship

\$B per ton = price paid by Port

Xm. = same quantity tons annually.

X<sub>1</sub> = tons of service to be supplied by a strong port

Bargain efforts are such that exist between Ports and container consortia.

Unless the port provides separate terminals, the Consortia may omit the port call at a profit maximising price.

The port may bargain by insisting on a certain number of calls.

X<sub>2</sub> tons of service annually is demanded by the Shipping Monopoly.

\$ C per ton may be supplied by the port at marginal cost.

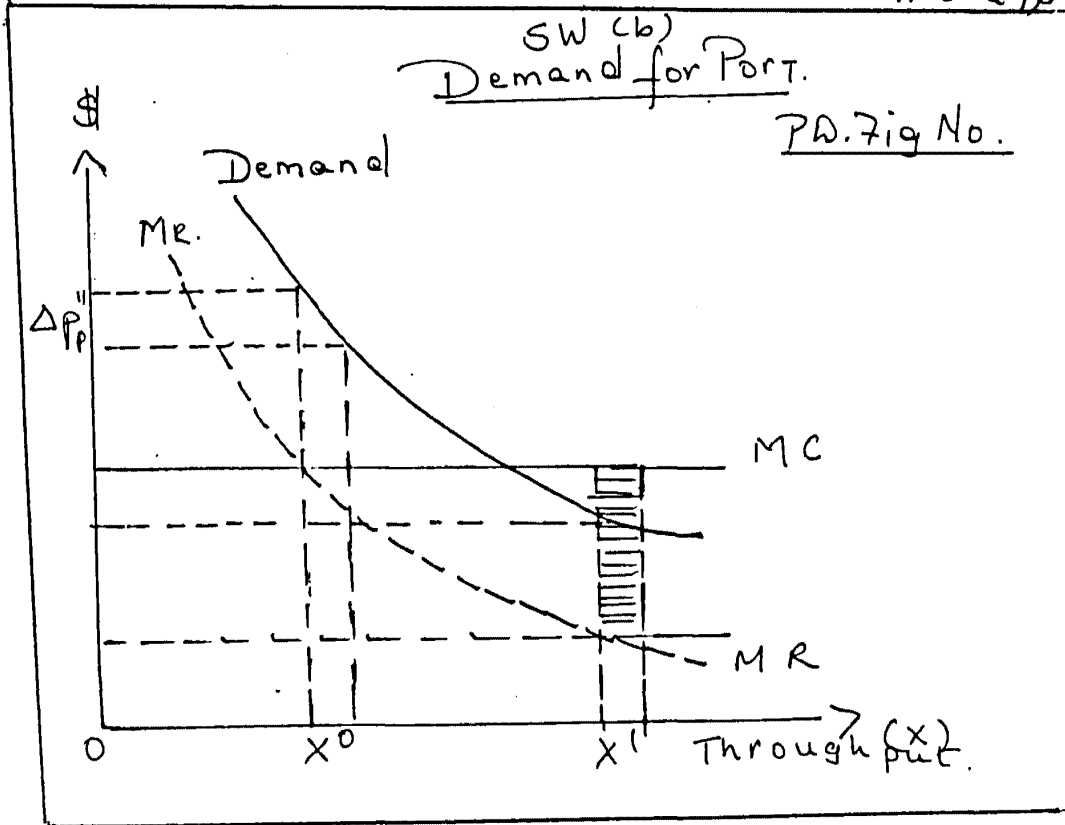
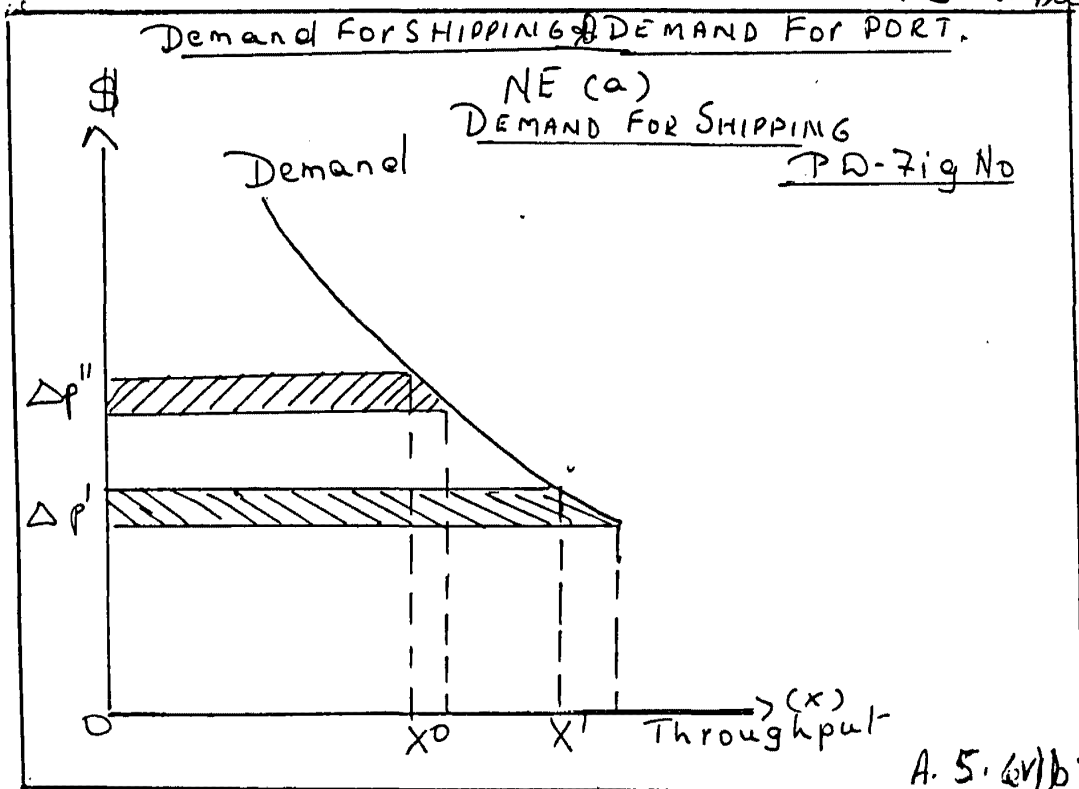
The ships maximises its profit i.e  $(D(mc)p)/dx =$

the ships non marginal revenue product.

REFER DIAGRAM : A.5.4 Linear DEMAND CURVES(v) Port Charges on Traders and Consumers :

If the elasticity of demand for shipping is constant, and the port reduces the prices of its service below the value that maximises the port profit, we have

A. 5. (v) b



Source: Port Pricing & Investment Pricing. E. Benardhan & A.A. Walters 1979 pages 113

copy 5.6

Fall in Freight rates  $= [e^x / (e^x - 1)]$  (fall in port price)

REFER DIAGRAM 5.4(a) DEMAND FOR SHIPPING AND DEMAND FOR PORT

The reduced freight rates to traders and consumers X the maximum amount they are willing to pay for the rate reduction, that is  $\Delta p^0 X^0$ . Since  $\Delta p^0$  is negative the gain to traders is minus this value. <sup>(30)</sup>

If the gain is compared to the loss of the port vertical hatched area, is the difference between the marginal cost and marginal revenue, if the throughput is increased by reduction in port price, and expansion of traffic.

If the loss is less to the port, than gain to traders The port will reduce its tariff and expand its services X' in Diagram (a) & (B).

If shaded area (a) Exceeds horizontal are b, it would be advantageous for the port to price its services below marginal cost.

V) Competition in Shipping Industry :

1) Perfect Competition :

In the Shipping Company the freight rate is equal to marginal cost including the price of the services of the port.

If the port reduces its profits by expending its services to the marginal cost equal price output is shown by the value of the reduction in freight rates to traders and consumers, holds good if the elasticity of demand for shipping is constant.

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(30) ibid Bennathan E & Walters A.A.  
Port Pricing & Investment Policies  
N. York, 1979.

If the quantity shipped increases, the Optimal port charges will exceed marginal port cost, if the elasticity of demand declines, The Low elasticity of demand for port services, raises the optimal port price above marginal cost.<sup>(31)</sup>

#### ii) Imperfect Competition in Shipping Monopoly.

Assume that the marginal cost of ship operation is constant. Then the increased profit from the expansion of the ports output by 1 ton is

$$P_S R - C'_S - C'_P + P_S R_w$$

Where  $P_S$  = freight rate per ton,  $R_w$  = ratio.

$MR$  = marginal revenue of ship or  $(1-1/e) - e =$  elasticity of demand for shipping, is less than zero.

$C'_S$  = marginal cost of port operation.

$C'_S$  = the marginal cost (MC) of ship operations

$C'_P$  = Marginal cost of port operation.

$W$  = term, or rate at which  $R$  declines as quantity of shipping output increases.

If elasticity of demand  $e$  is constant,  $w$  is negative. Port's marginal revenue is :

$$P_S R (R+W) - C'_S - C'_P \text{ or } (MR_{ship} (R+W) - mMC_{ship} \text{ value added}) - MC \text{ ports.}$$

The next case is when a port has to maximise profit in dealing with a shipping industry or Conference or owners.

$$\frac{1}{R} C'_P + \frac{(1-1)}{R} C'_S + P_S w$$

Ports optimal price increases according to the rate at which elasticity of demand declines with rising shipping tonnage. The ports makes profit from higher charges.

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(31) *ibid* Bennatham E & Walters A.A. PP 114-115  
Port Pricing & Investment Policies  
N. York. 1979.

P A R T - AC H A P T E R - IIVI) THE SUPPLY THEORY & VARIATION :

In order to make ports and shipping more competitive, the Port Authorities, have to make competitive conditions in the country's International Trade, as they are to compete with monopolist shipowners, and Shipping Conferences changes in port charges, reflecting freight charges<sup>(31)</sup>.

The method and practice of defining the geographical scope of a Conference, includes a choice of particular routes, and ports to be served by a Conference subject to a common agreed tariff such as output transshipment to ports outside the geographical area of the Conference, between base ports, direct ports, way ports etc.

A Conference tends to equalize freight rates<sup>(32)</sup> for a number of ports in the same general area e.g. the same freight rate is charged across the Pacific for all the ports on the West Coast of North America, or Calcutta and Chittagong have the same freight rate for shipments from Europe.

A study of what advantages a port has, if it improves the quantity of service or changes Port charges?

The main constraints on Conference pricing is the risk of entry of tramps and non-Conference competition. This indicates that, if the Conference reduced its rates, it would attract less traffic as the elasticity of demand for ocean carriage is low. Thus, there is a kink in the demand curve facing the conference<sup>( )</sup>. This causes a discontinuity in the marginal revenue curve.

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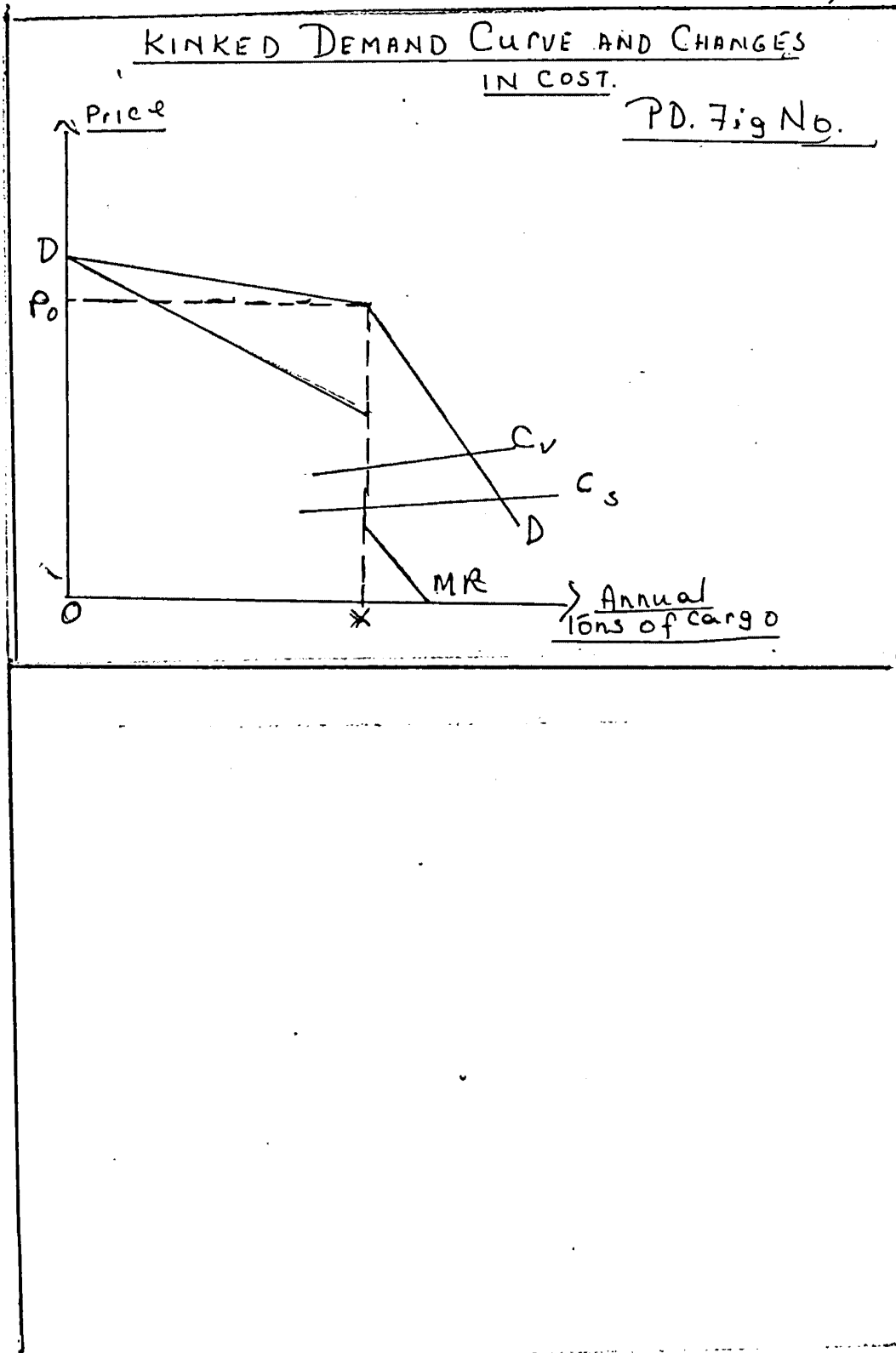
(31) Ibid Bennatham E. & Walters A.A.  
Port Pricing & Investment Policies  
New York, 1979.

Pg. 134.

Pg 134.



A.6.(1)



Source: 'Port Pricing & Investment Policies.  
E. Bennatnam & A.A. Walters. 1979 pp. 136

1) Diagram : Part A, Chapt. II (VII) Kinked Demand Curve & Changes in Cost.

In the diagram A.6.1 the demand curve facing the Conference is drawn by the highly elastic section above its current freight rate which is less than those of potential competitors, and it is relatively inelastic for ranges of freight rates below that value. In the region of  $X_0$ , the marginal revenue curve of the Conference falls vertically.  $X_0$  and  $P_0$  are the best level of output  $X_0$  and the associated freight rate  $P_0$  respectively.

- 2) Some changes in port charges or quality of port services, will be reflected, risk of entry of tramps, therefore, there is a kink in the demand curve of a Conference.
  - 3) Similarity of freight rates for different ports under competitive conditions any variations in port charges will be reflected in the price of the tramps and bulk carriers.
  - 4) Port Improvement or reduction in Port charges from conventional handling to a container system will affect port cost and charges for general cargo carried in containers.
  - 5) There are circumstances in which partial improvements in port facilities will lead to reduction in the rates charged. If competition is found within container consortia, there will be reduction in their rates.
  - 6) The Construction of a container berth will result in a reduction of the price for conventional handling. Only general port improvement for conventional or bulk carriage has some effect on the Conference pricing.
-

- 7) Conference tariffs<sup>(33)</sup> are set by a Committee procedure and it is costly to change the existing rates. Conference rates tend to be sticky unless the conference happens to be competing with some different type of vessel.

ii) Price Discrimination :

Price Discrimination is an important feature of monopoly pricing in shipping, mainly by origin, destination and by value of commodities.

Discrimination is defined as differences in prices freight rates, port charges etc.

- 1) Discrimination by origin and by destination helps the Conference, or Liner Shipping Company to divide his market into segments, and apply his tariffs at the same rates to a variety of ports.

The Share of Conference Liners, in Cargo.  
Tonnage of Routes, in and out of Bombay.

Route	Cargo Tonnage on Conference carriers	
	Loaded (Percent)	Discharged (Percent)
Short Distance routes	0	0
Hong Kong	6	-
Japan	93	90
U.K. & France	74	100
Calcutta	100	-
Bombay	-	100

(33) Ibid Benmamtham E. & Walters A.A.  
Port Pricing & Investment Policies  
New York, 1979.

This shows that the rate charged is from inland transport port to foreign ports depending on the charges for inland transport.

- 2) Discrimination is found when the Conference charges the same rate to destinations with widely different costs e.g. European Ports for general cargo movements at competitive rates.

Discrimination by origin is practiced by Conferences according to the cost conditions, competition on that route and the elasticity of supply of traffic. <sup>(1)</sup>

### iii) Discrimination among Goods.

Discrimination among goods in Port Economics enables the port to cover its costs and to charge low development charges for low valued commodities. If the elasticity of demand is related to the inverse of the value per ton or per volumetric quantity, the variation in the port levy, in regard to the value of the commodity will be according to the ability to pay, such as the railways and the liner conference.

The question arises whether the Port Authority should levy charges according to the ability to pay, such as between goods from developed countries and goods, manufactured from less developed countries.

If, there are Economies of Scale in port operation to recover total cost, it may be best to charge all costs by a constant percentage. The lower port price may cause increased competition from non conference liners and tramps.

---

(V) Discrimination among Conferences :

Different fees are levied for different types of ships used by liner operators, tramp owners and bulkers. In order to bring down the monopoly powers it is best to encourage competitors and discriminate in favour of bulk carriers or tramp vessels, and charge fees for the Conference vessels. This has little effect on the Conference freight rates. The competitive tramp industry will charge lower rates which will lower cost of shipping by Chartered vessels and influence freight rate negotiation.

Discrimination is also found in the type of vessel, used, according to whether the vessel belongs to a Conference or not, such charges would discriminate against the Conference, and encourage non conference bulkers and tramps.

The Port Authorities in some cases, finds it difficult to distinguish whether a vessel is controlled by a conference or not? It may also have an effect on the relationship between Port Authority and the Conference.

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P A R T - A  
C H A P T E R - II  
(VII) COMPETITION THEORY

VII) Competitive Pricing among Ports :

The Theory of Monopolistic competition explains price and output in market structures where sellers are many and where each seller has a product differentiated from those of his rivals. The monopolist can adjust his profits according to price, or quantity of his product, or sales effort and advertisements.

Inland competition exists among ports.

- 1) Sharing the same hinterland, in competing for import and export of goods.
- 2) Congestion at one port leads to vessels being diverted to the other port, with the additional cost of inland transport to a particular location.
- 3) If the quantity of facilities differs.<sup>(34)</sup>
- 4) Congestion leads regularly to substitution between ports.
- 5) Development of transport infrastructure leads to competition.
- 6) A more efficient port in a country attracts more traffic, as cost is less, service efficient, as pricing is based on marginal cost there will be an efficient allocation of cargo and traffic .
- 7) There is discrimination in inland transport cost to different destinations e.g. container.

ii) Competition in Transhipment

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(34) *ibid* Bennatham E. & Walters A.A.  
Port Pricing & Investment Policy  
New York, 1979.

- 1) Inter port competition involves transshipment and multiport use. e.g. consignment from Bombay to Japan may be transhipped through Singapore to Japan. Singapore Port may be competing with Hong Kong Port for transshipment. Thus, Singapore transshipments must be lower than Hong Kong rates.
- 2) The transshipment charges will be determined by port charges including labour rates.
- 3) Competitive Transshipment also depends upon location of the Port on the Sea-route.

REFER DIAGRAM A .7.1

- 1) The total market consists of the limited home market with relatively low demand elasticity<sup>(35)</sup>
  - ii) The relatively large and elastic demand for transshipments.
  - iii) A total demand curve with a convex kink results.
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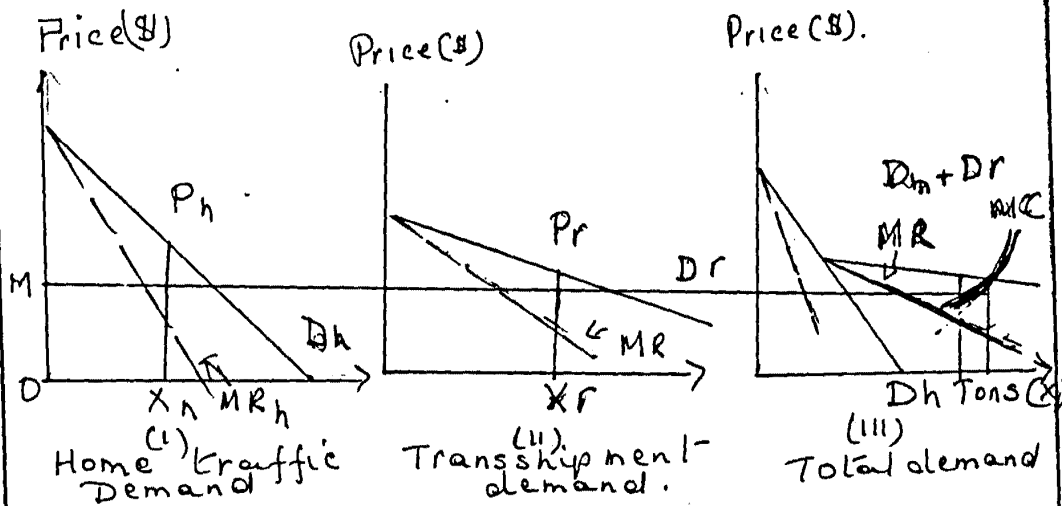
PART A

Chapter II

A.7.(i)

Demand For Services of a Regional Transhipment Port: "Small Home traffic and Large Transshipment Market".

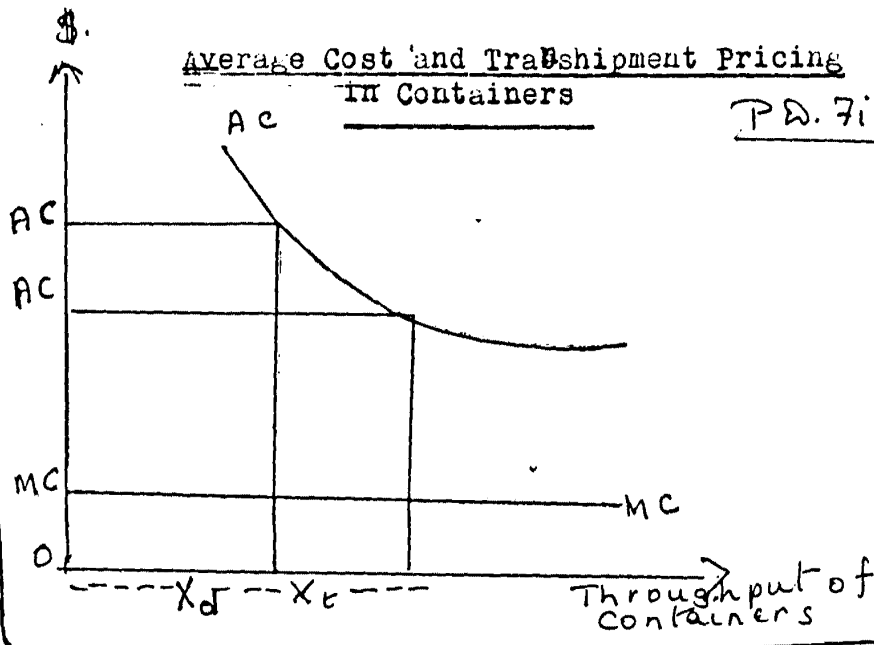
PD Fig No.



A.7. (ii)

Average Cost and Transshipment Pricing in Containers

PD. Fig No.



Source: E. Bennathan & A.A. Walters : 1979 pages 154 & 160  
 Port Pricing & Investment Policy. Chpt 7.1  
7.2



If the port maximises profit, it would set prices for each of the two sub-markets according to the rule; marginal cost (for the total output) equal to marginal revenue for the submarket.

Transshipment charges are per ton of conventional cargo distinguishing normal cargo exported from or imported cargoes. Then there is the marginal cost of storage.

Each ton of transshipment cargo received by the port will cause an income under the heads of port dues and dockage at the time of the outward movement.

iii) Containerization Effects :

The main container ship is highly capital intensive and has a fast turnaround time of ship. This shows a shortened conventional liners itinerary and a reduced number of port call. The competitive aspects of port containerization shows in Port investment and container projects.

Due to the intensity of competition for container transshipment business, is reflected in port tariffs. There is competition between ports for main line container services and feeder services.

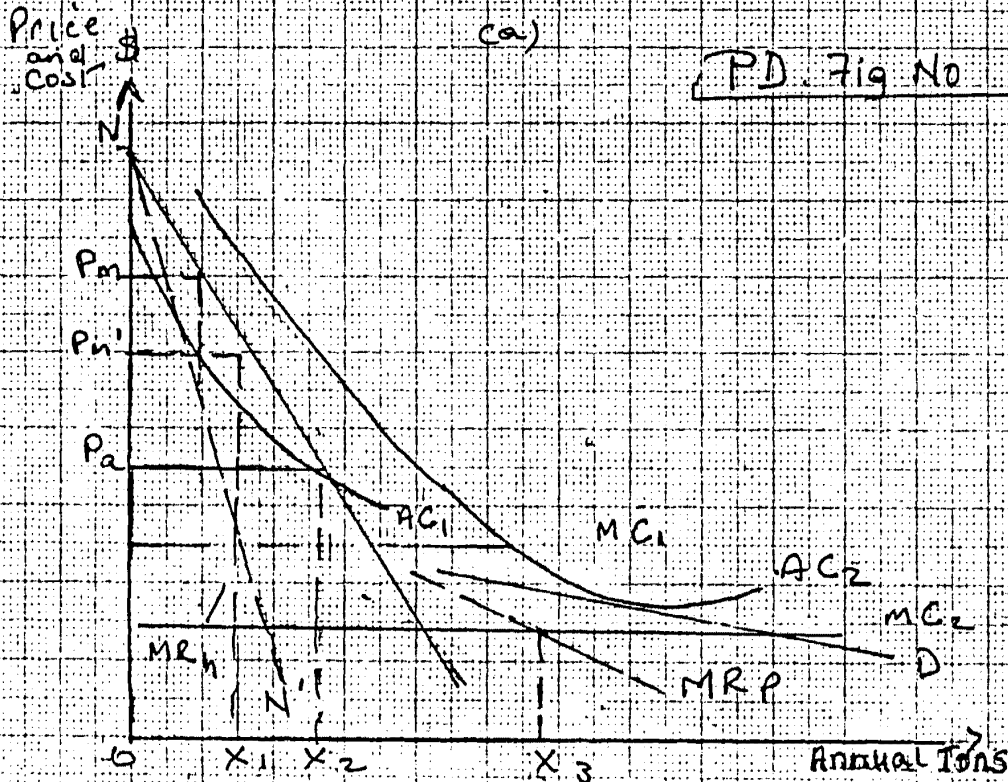
The elasticity of demand for port services have increased due to containerization, influencing port prices and port use. This encourages discrimination in competitive transshipment.

REFER DIAGRAMS A.7.2 AVERAGE COST AND TRANSHIPMENT PRICING.

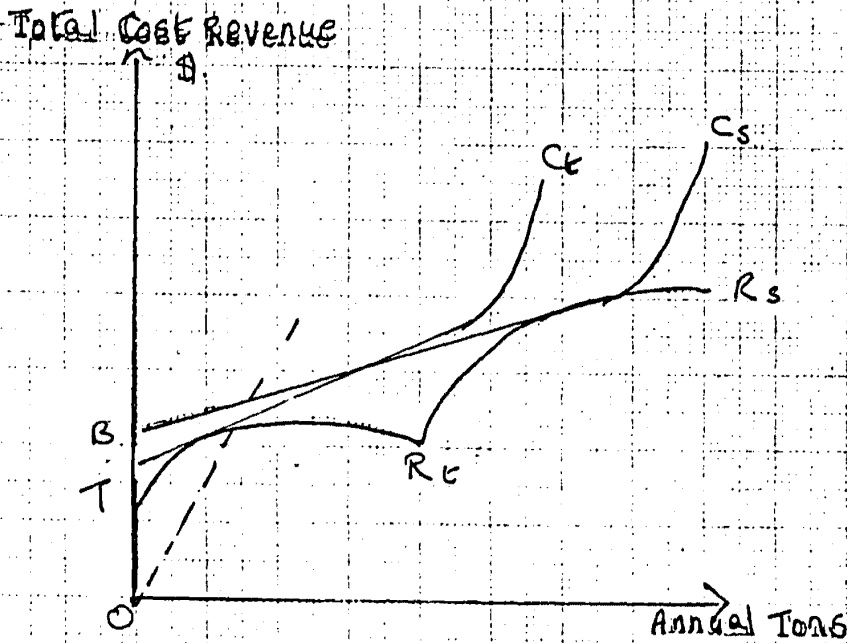
(MC) Marginal Cost is constant, (AC) Average cost falls for a whole relevant range of throughput.

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NATIONAL PORT VERSUS REGIONAL PORT



(b)



$AC_d$  = Average Cost for domestic traffic

$X_d$  and  $X_t$  = domestic and transshipment container.

$AC_d / AC_{dt}$  = Average Cost of domestic container (34)

$AC_d$  exceeds the average cost of total traffic  $AC_{dt}$ .

The larger the amount of transshipment traffic for a given number of domestic container ( $X_d$ ), the higher the domestic charge ( $AC_d$ ) than the average cost of all traffic ( $AC_{dt}$ ).

In this case, as the quantity of domestic container is fixed, difference in traffic is the same, degree of discrimination is the same, level of transshipment is the same.

REFER DIAGRAM A (VIII).3(III) NATIONAL PORT VERSUS REGIONAL PORT.

Let,  $NN'$  = Demand Curve, Aggregate Demand =  $NKD$ .

$P_a$  = price average cost, or  $P_m$  = Profit Maximization Price

$P_a$  is less than  $P_m$ .  $P_a$  will be charged to cover cost at less than the lowest price level.

Lower Marginal Cost ( $MC_2$ )

$AC_2$  lies above  $NKD$  (total demand curve)

Price shifts from  $P_a$  to  $P_m$ .

Annual throughput increases from  $OX_2$  tons to  $OX_3$  tons.

Service is reduced from  $OX_3$  to  $OX_1$ . Quantity ( $OX_2 - OX_1$ ) will be zero.

This may lead to transfer of revenue from exporters or importers to the port. The container consortia has to decide whether to ship directly or tranship, depending largely on the criteria of the volumes of cargo throughput of the Port. Feeder operations adds to the cost, It is therefore, found risky to develop Regional Ports, due to large development cost and competition from well established transshipment ports.

As port size increases <sup>(3)</sup>, the element of fixed cost becomes more important, the degree of indivisibility becomes larger, and so marginal cost tends to become smaller relative to average cost for normal operations conditions. The large port is under great pressure to fill up available capacity, especially when marginal cost moves close to zero. As the technology of port switches from labour intensive to capital intensive forms, the potential for port competition increased considerably.

P A R T - AC H A P T E R - IIVIII) PORT TARIFFS AND MULTIPART TARIFFS :

The main features of port cost functions are a large fixed cost and relatively low variable cost upto the point where congestion really becomes felt. <sup>(38)</sup>

Charges in principle should be so arranged that one part - the fixed charge pays atleast for the fixed cost of the facilities and one part (the variable charge) is levied according to the use of the facilities and measures the marginal cost.

These charges are advantageous to shipowners who call in regularly at the port, than the casual caller, with regular calls, it is easier to plan a quay occupation schedule to avoid waste and waiting. The regular subscription list clients have lower overall charges than the casual client.

Alternatively the service may be got for booking quay space for specific and agreed times, so that they have no waiting time cost, or the difference in quality of service. This charge can be varied by the various size of the vessel.

- i) Lease-a-quay (LAQ) is the extreme form of two-part tariff. The Port Authority rents the port function, either on annual basis, or on longer terms leased to a Consortium, Conference etc. Petroleum facilities, container quays.

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(38) Ibid Bennatnam E & Watters A.A  
Port Pricing & Investment Policies  
New York, 1979.

- 2) Annual Fee to Enter (AFTE) Annual Fee to enter the port at nominal rates is levied specifically for dredging the ports and finding out the ships size etc.
- 3) Container Charges. The Two-part Tariff most important application is the discount given in container operation.

There is considerably competition between ports for container vessels and services.

- 4) The third factor is that unit cost declines. There are large economies of scale as the container operation increases and there is reduction in handling cost.
- 5) Also encourages competition among container suppliers supply the port with container.

ii) Shippers Licence to use the Port (LUP), a non-transferable licence to use the port (LUP) would be sold to shippers entitling the holding to use the port resources.

The Port also charges a Percentage levy on the goods loaded and unloaded. These fractional charges are levied say at 10% of the total freight. This helps to reduce rates, and so reduce port cost equally.

- 1) It helps to maximising profit of the Port by discriminating according to value of the Commodity and ability to pay, and favours transshipment cargo to domestic cargo.
  - 2) The fractional freight rates varies with the freight charges and rates when there is a slump, the freight, the port charges would fall when there is a boom conditions, the Port charges would rise.
-

- 3) Another advantage of a fractional freight charge is that the shipowner may reduce rates, if the Port Cost is reduced at the same time.
- 4) The charge would tend to adjust automatically to any inflation of the general world price. Freight rates, conference rates have usually risen with bunker, labour and ship prices. The fractional charges would show these variations.
- 5) The port should levy charges for the use of storage space, or quay space beyond the period specified in the fractional charge tariff.
- 6) The fractional charging system is simple, as does not require a knowledge of all costs nor a detailed specification of port operation.

It possesses built-in flexibility. It is easily understood.

iii). Percentage Levy

These may be adverse effects of such a system of fractional charge.

- 1) It may encourage cargo to be sent to neighboring ports and transshipped on a short feeder route to its destination port where the fractional freight rate charging operates.
  - 2) It might lead to incorrect recording of the freight charges to secure a lower port charge.
  - 3) The charge may be difficult to apply to certain tramp vessels that may be on charter hire, and where no specific freight rate is charged for identified cargo.
-

- 4) Different percentages will have to be fixed for freight charges covering different ranges of services.

Container may be stuffed and stripped in the port, at freight stations outside the port or at shipping premises.

An appropriate base in planning port tariffs berth hire, and channel dues according to the capacity (NRT) of the ship or berth is rented at a fee, and not for size of vessel. Designing charges that encourage a quick turnaround of vessel is important for handling operations eg. (tonnages).

#### IV) ALLOCATION OF RESOURCES BY RULE :

The Port Authority allocate ( ) some of the ports resources by rule rather than by pricing which involves cost, the administrative cost of levying a charge and the cost of charging prices as the demand and supply situation, in the port changes eg. cornes. Allocation by rule is resorted to when there are conflicting demand for search resources.

- 1) The beneficiary of the rule gains from being given access to a scarce resource, but it is doubtful whether this gain is useful.
  - 2) If prices were used instead of rules, the gains from the scarce resource would be obtained by the port, and the resource would be allocated to that users who places the greatest value on it.
  - 3) In the allocation of berths the rule first come first serve is widely practised.
-



- 4) Due to the Utility of Time, specialised carrier e.g. timber ships are most costly than general cargo carriers.
- 5) Container terminals have similar priority rules, the largest vessels get served first.
- 6) Some ships are given preference in berths for serving them or to that vessel that will unload/load fastest.

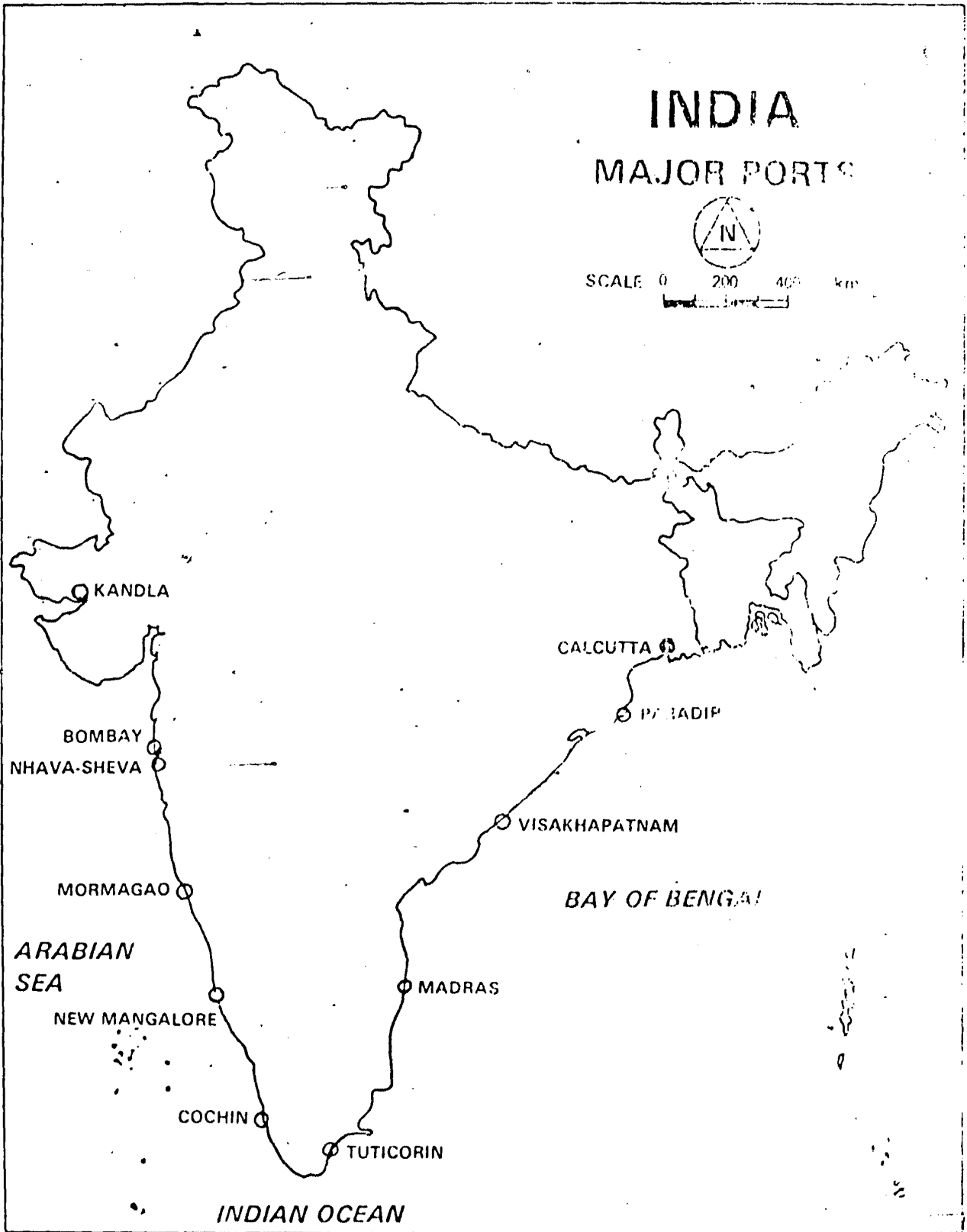
The differences in the layout and equipment of berths are fixed features of the port. Pricing a resource<sup>(39)</sup> is not easy due to thereason, if the prices are set too high, the resource will be underused, if too low, It may not be necessary to allocate the berth.

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(39). *ibid* Bennatnam E & Walters A.A.  
Port Pricing & Investment Policies  
New York, 1979.

PORTS DEVELOPMENT

MAP-2



DESIGN AND CARTOGRAPHY COURTESY MAHARASHTRA INDUSTRIAL DEVELOPMENT CORPORATION  
BOMBAY-411 003

M. S. G. I. PEREIRA

P A R T - A  
C H A P T E R - III -- Data & Historial  
(1) THE PORT OF BOMBAY - Development

Location : The Port of Bombay situated on the West Coast of India, Lat. 18°54' N & Long. 72° 49' E. <sup>(40)</sup>  
Located in the bay, between the mainland on the East, and the Island of Bombay on the West, the Port is gifted with a natural deep-water harbour some 18,000 hectares (70 sq Miles) in extent, protected by the mainland of Konkan on its East and the Island of Bombay on its West. The deep waters in the harbours provide a secure and ample sheltered for shipping throughout the year. This gift of nature encouraged men and enterprises with vision and purpose to develop these natural facilities for shipping. Bombay is one of the most fortunate of the world's port.

Geography: The modern island of Bombay, consists of a cluster of seven islands, of volcanic origin and formation.

Bombay Port has been the Keystone of the prosperity of Bombay City. ( ) The development of this pioneer port started 200 years ago. The first dock to be constructed in India was the Sassoon Dock in 1875 in Bombay, then Princes and Victoria Docks in 1880 & 1888 respectively. The Alexamndara Dock the most modern of Bombay's dock was constructed in 1905-1914.

Bombay's cebtral position on the West Coast of India, its advantageous position in respect of the Suez Canal and Europe. Three broad guage railways, running

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(40) Source : Port of Bombay, Bombay Port Trust, 1967, Bombay pp-13

north, east & South with a network of national and State Highways.

History : The name "Bombay" <sup>(41)</sup> is said to be derived from the Portugues "Buon Bahia" (a good harbour) also derived from "Mumba Ai" (Maha-Amba-Ai) the consort of Lord Shiva, the patron deity of the Kolis. In 1498, the first Portuguese trading expeditions led by Vasco de Gama's flag ship "San Gabriel" docked, and the discovery of the all Sea route to India. In 1487, Bartholomew Dias discovery of the Caple of Good Hope, and the sea-route to India then lay open, shortly after Vasco de Gama reached India, In 1861, under the marriage treaty between Charles II of Great Britian and the Infanta Catherine, of Portugal "The Port & Island of Bombay" were transferred to the King of Great Britain, his heirs and assigns, In 1668, <sup>(42)</sup> the Port and Island of Bombay were transferred from the British Crown to the East India Company. Under the Company's rule measures for the encouragement of trade were forthwith promulgated i.e. Construction of a Custom House and warehouse, etc.

Bombay's first dry dock projected in 1686, completed in 1748 was 209 feet long, 47 feet wide, depth 15 feet. The Port Trust can into existence in 1873. The first lighthouse in Colaba in 1844, In 1866 Water supply was made available, at Rs. 3/- per ton. In 1862, the Government provide one lac acres of land for the terminus of the G.I.P. Railway.

The Port afforded facilities for repairs of ships of different sizes. The Government set up Board of

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(41) *ibid* Port of Bombay, Bombay Port Trust, 1967, Bombay.

(42) *ibid*

Trustees for the administration of the affairs of the Port of Bombay, under the Bombay Port Trust Act, 1873. Under the management of the Board, new facilities were added to the Port, "The Princess Dock was opened on 1st January 1880. The Victoria Dock was opened in 1888, and the Merry-Weather Dry Docks in 1891.

The history of Bombay in the Second half of the 19th Century, is a remarkable record of progress in every direction. <sup>(43)</sup> Railway communication with the interior was opened up in 1853, seven cotton mills commenced working between 1854 and 1860, steam coastal ferry services were inaugurated in 1866, revolutionised the maritime trade of Bombay.

The Pilot Vessel. Pilotage is compulsory in and out of the Harbour for vessels of 100 tons and upwards. The Harbour is about 1½ miles in width, and depth about 30 feet. (datum) lights & Navigation : The entrance to the port is guarded by two powerful manned light houses and outer light vessel.

Kennery lighthouse and Prongs Lighthouses.

Port Services : The Port Trustees maintain a large fleet of harbour and Dock tugs, passenger tenders, moorings launches and a salvage boat. Other services are supply of water, fire vehicles etc.

Port Trust Railways : The Port Trust Railways has a route mileage of 2 miles and a track mileage of 132 miles. There are 10 stations serving the Docks and Depots.

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(43) Port of Bombay, Bombay Port Trust, Bombay 1967

The Port Trust landed Eastate : The Eastate <sup>(44)</sup> extends from Pilot Bunder in the South to Wadala in the north, a distance of about 9 miles and vary in width from about  $\frac{1}{4}$  of a mile to  $1\frac{1}{2}$  miles.

The Marine Oil Terminal: <sup>(45)</sup> This terminal at Butcher Island consists of three berths each capable of accommodating tankers upto 650 feet in length and drawings 34'6". The Employees of the Port : In Bombay Port, the trade <sup>(46)</sup> union movement was started in 1920 mainly by Shri F.J. Ginwalla, A socicitor, Shri N.M.Joshi, a member of the "Servants of India Society" he was later known as "The Father of the Indian Trade Union Movement" The Bombay Port Trust Dock Staff Union followed in 1926. In 1931, Dr. M.R.Shetty and Shri. H.Gulati founded the Bombay Dock Workers Union drawing its membership from among the stevedore workers. The Bombay Port Trust General Workers Union was founded in 1944 and in 1947, the Bombay Stevedore and Dock Labourers Union, which is affiliated with the INTUC. Shri Placid D'Mello whose work in the fields of trade unionism among Port & Dock workers needs special attention. The labour in Bombay Port is well organised and most of its membership is spread over five active trade unions. The Port Trust is one of the largest employees in Bombay.

Shipping Services : The Port of Bombay is intimately connected with several of the world's greatest shipping interest, whose expansion has been together with the Port.

1. The Pennisular & Oriental Steam Navigation Co.(P & O)
2. The Anchor Line. Ownes "California, Tuscania Britannia etc.
3. The Ellerman lines : Seral other lines - City Line Hall Line "The City of Baltimore" being the first

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(44) Port of Bombay, Bombay Port Trust, 1967, Bombay 4/

(45) ibid

(46) ibiel

ship on this run, the Ellerman and Papayanni Lines, The West coast and Lawrence Lines.

4. The Lloyd Triestino Company. Since 1920 the vessels of the above Company have called regularly at Bombay, sailing between Bombay, Venice, Genoa and Naples.

Commerce Trade : Principal Exports : Oil cakes grain, pulses cotton and oil seeds. Other exports were hides & skins, sugar & spices.

Principal Imports : Quality cotton manufacturers, and other textiles, fabricated iron and steel, machinery and railway materials, motorcars and parts, chemicals & dye stuffs, hardware, provisions and miscellaneous stores. Bombay Port has the largest number of berths in India about 55-60 berths.

1948-49 to 1957-58

Labour Problems caused the Great Port of Bombay to slow down its work. Certain Labour committees were appointed like, Dock Workers Regulation of Employment Act, 1948. A state of congestion was felt at the Major Ports due to in 1954-55 modernisation of Princes and Victoria Docks estimated to cost Rs. 450 lacs.

1958-59/1967-68 (47) Dredging of the Bombay Harbour Channel in view of the survey carried out in 1954-56. Hydraulic model experiments were conducted at the Central Water and Poon Research Station Poon.

In 1963-64 to 1964-65 Dock Expansion Scheme and the Ballard Pier Extension Scheme. Improvements were made to Oil Handling Facilities, Rim Bascule Bridge at Alexandria Docks.

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(47) Annual Reports, Bombay Port Trust, 1958-59, Bombay.  
pp 86.

1969-70 to 1980-81 : Dock Extension Scheme and the Ballard Pier Extension Scheme, and Ferry terminal Jetty expansion, together with provide eight additional berths at the Bombay Port. In 1976-77, all the major works including marine works under the Dock expansion scheme have been completed.

1982-83 to 1993-94. Saw the 4th Oil berths at Butcher islands, at estimated cost of Rs. 38.79 crores, three transtainer (Yard) cranes for handling containers. One more quay crane at an estimated cost of Rs. 5.33 crores. A scheme for construction of officers quarters at a cost of Rs. 1.62 crores. Other constructions works. Transit sheds, Ro-Ro facilities, at Rs. 1.62 crores, New Jetty at Pir Pau for handling bulk liquid.

P A R T - A

C H A P T E R - III

(11) THE PORT OF CALCUTTA

Location : Latitude L 22° 33'N. Longitude 88° 20' E. (48)  
Situated on East Coast of India, on the Gangetic Delta in the State of West Bengal, on the River Hooghly following into the Bay of Bengal.

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(48) (1) Ministry of Transport, GOI Press Calcutta  
Gezette 1961. pp 5.

Commissioners for the Port of Calcutta. pp5.



Geography : The approaches to the port which is about 198 kms from the Sand heads, are difficult to navigate on account of the task of maintaining adequate depths, the length of the navigable channle accounting 203 Kms from the set mark limit, the existence of 14 tars and number of sharp bends on the river, hence necessary restrictions on the size of the vessels. A regular Pilot service required for navigation on the Hooghly.

- 2) The East side of India experiences heavy rain during the Monsoon Season from May to October, and cyclonic storms.

History & Administration :

The early development of the Port of Calcutta ( ) is from the British settlement and the starting of the East India Company. Its location has considerable influence on the growth of the Port, and Calcutta Port ranks high among the great ports of the world.

A Calcutta Port Commission was established with nine Trustees under the Act V of 1870.

1875 : The Construction of the Howrah Bridge

1877 : Port Trust Building was completed. The first stretch of Port Trust Railway connection, Bagh Bazaar and Meerbhur Ghat. & Opening of Budge Petroleum Wharf. & Tea Warehouse.

1892 : Other works were a Dry Dock system, Turning basin dry dock transit sheds, Opening of Ferry service.

1929 : After the war, the Port Commissioners decided large scale expansion of the facilities i.e. Kidderpore Docks Systems, A new dock called "King George Dock".

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1939-1945 : Due to Second World War, the Port was closed for some time, and the war had a severe impact on the Port traffic.

Restoration of the Port was taken up after Independence. The Port at this time had double stories transit sheds equipped with 2 tons electric travelling cranes. Kidderpore Docks had sheer legs cranes of 100 tons, lifting capacity. Pilotage is compulsory due to bars and neap tides at diamond Harbour. Trade at this time was cotton, sugar, saltpetre, indigo, shallac dye, bales of twist, silk cotton, etc.

The longest Turnround time of Ships - 16 days in Calcutta Port. Heavy stilting of Rivers Hooghly & Ganges dradging is done daily.

1947-1956 : During the 1st and 2nd Five Year Plans, Several new Committees were set up, such as Ports (Technical Committee), which recommended the development of Calcutta Port. New Dredgers were commissioned, Improvements of Berths 22-26 at Kidderpore Docks.

1957-1966 : During the 3th and 4th Five Year Plans. To increase efficiency at Calcutta Port, the Calcutta decided to take measures, such anti-pilgerge action by regulating entry into the docks by a system of permits, Enclosing Railway yards by boundary wall, Improving Lighting arrangements, construction of Double-carriers gates at entrance, lock-fast sheds, assessment non Police, Watch & Ward. Developmental work of 'B' & 'D' & berths King George Docks into General Cargo berths, &

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'C' berth in Oil Berth. Improving the Channel on the River Hooghly, by dredging and incurring an expenditure of Rs. 25 lacs. Floating cranes, costings Rs. 95 lacs, Jet Dredger at Rs. 15 lakhs & Two Fire Floats at Rs. 67 lacs.

1967-1976: A provision of Rs. 7 crores was made in the Third Five Year Plans, for estuarian Dredger "Mohana". In 1966-77, Haldia Project was envisaged to provide relief to Calcutta Port. The Haldia Dock Project, estimated at Rs. 53.83 crores consists of six berths, within an enclosed dock two of which are meant for general cargo, four for bulk cargo e.g. ore, coal phosphate etc. and an oil jetter outside, the Dock system.

1977-1986 : The development works at Haldia Docks, River training works by the Port Trust on the Bhagirathi-Hooghly river at estimated cost of Rs. 9.10 crores, to derive the benefit of the Farakka Barrage Project. In 1983-84 Calcutta Port showed surplus revenue. In 1987-88 Calcutta Port had a net surplus of Rs.3.45 crores.

1987-1990 - 1993-1994 : Calcutta Port which had shown a net deficit of Rs. 156.44 lacs in 1987-88 has shown a net surplus of Rs. 101-02 lacs in 1988-89 and Rs. 229.14 lacs in 1989-90. (49)

In 1992-93 the Modernisation of Dry Dock in Calcutta at KPD and NSD docks at Rs. 5.23 crores, continued during the year.

In 1993-94 Calcutta Port showed a net surplus of Rs. 44.88 crores before appropriation. The break-up was Rs.39.24 crores for Haldia Dock Complex and

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(49) Source : Ministry of Surface transport GOI, New Delhi, annual reports.

1985-86 Appdx. IV pp 77 -78.

Rs. 5.44 crores for Calcutta Dock System.

All the Port Authorities continued to pay attention to the provision of various amenities to their employees for welfare measures. Free medical aid, scholarships for children, Housing canteen co-operative stores recreation etc.

P A R T - A

C H A P T E R - III

(111) THE PORT OF MADRAS

Location :

Madras Harbour is located on the East Coast of India, In latitude  $13^{\circ} 03' - 48''$  N and longitude  $80^{\circ} - 17''$ ,  $48.5''$  E<sup>(50)</sup> width at entrance is 400 feet, depth of water at entrance at high water 37 feet, and at low water 34 feet in the Bay of Bengal.

Geography :

In 1876, construction of an artificial Harbour was taken up to protect ships, during all seasons of the year. By 1890, two concrete arms, each projecting from the shore eastwards to the sea to a length of 2,500 ft (762 metres) were constructed. The third side, the eastern breakwater, was begun in 1890, and was completed in 1896.

As trade grew, between 1910 and 1916, new works consisting of quay berths transit sheds, and warehouses resulting in four more berths known as "West Quay Berths I to IV" a fifth two South Quay I, all equipped with transit sheds and warehouses to serve them. The subsequent

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(50) NCAER, Traffic Survey of the Port of Madras,  
New Delhi . NCAER. pp. 4.

development of the port consisted in the construction around the same perimeter of the harbour basis, of two new quay berths which were known as the "North Quay and South Quay II", and the erection of more transit sheds and warehouses. Electric Quay cranes, were also provided, Madras Port being the first among the major ports in India to electrify its shore cranes.

On the east coast of India, there is littoral movement of sand, northwards during the southwest monsoon period for about five months between March and September. A 1,500 tonnes capacity such as hopper dredger to effectively dredge the entrance to the harbour.

Madras Port is not seriously affected by the South-West monsoon and does not, therefore, have to deal with long rainy periods, which affect other Major Ports operations Cyclonic storms, are felt during October to December.

History : Prior to 1870 Madras Port was an important trading centre, ships which called at Madras had to lay off one Mile off shore. Small "masulla" boats called cargo between ships and shore. Construction of harbour proper began in 1876.

Port Signal Station : This office is manned 24 hours through out. Pilotage : A Pilotage service is provided is compulsory. Ships are requested to hoist the necessary flag or signal.

Lighthouse and Navigational Aids :

The Madras Lighthouse is situated in the Main Tower of the High Court Buildings very near the port and is electricfied.

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Anchorage Light :

One white light Group flashing 2 every five seconds. It has a range of 10 miles.

Bunkering facilities - Coal :

Bunker coal is shipped at all quays and sufficient number of lighters is available for bunkering coal to vessels at moorings.

Water Supply :

The City Corporation provides the water supply.

Port Facilities :The Jawahar Dock - Six Berths<sup>(51)</sup>

This dock is located immediately to the south of the main harbour basin to which it is connected by an entrance 33.5 metres wide. It has six berths, three on each side of its length for ship drafts of 9.8 metres on the Western side and 10.7 metres on the Eastern sides. 3 berths are intended for general cargo and served by 3 transit sheds Utility services, such as fuel, oil and water supply lines to ships, telephone facilities at the berths have been provided according to modern standards. Also shore cranes of various capacities, including two for heavy lifts. A Fleet of 48 mobile cranes with lifting capacities from 3½ to 10 tons. A floating crane of 120 tonnes capacity.

Port Railway :

The Port operates its own railway. The railway is of mixed gauge, broad and metre gauge. Broad gauge at Royapuram and metre gauge at the Madras Beach Station. The Port Trust railway accepts goods arriving by sea for

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(51) NCAER T.S. of Madras Port pp.9-11  
National Council of Applied Economic Research, N. Delhi.

booking to any station in any railway in India both broad and metre gauge.

Road communication :

The Port premises have road access from the North beach Road South Beach road.

Ship Repair : The Port Trust maintains a workshop and a Running shed for the repairs and maintenance of its locomotives cranes, floating crafts etc.

Other Facilities : Harbour lighting, special facilities cold storage, telephone facilities.

Port Finances :

The Port has over the year evolved into a premier major port in the Southern Region. This port is financially sound and have financed its own developments.

Madras Port traffic :

Consists of Petroleum products Iron ore and other ores, Coal, Fertilizers, Foodgrains General Cargo.

Passenger traffic :

The Madras port handles a large amount of passenger traffic, at the North Quay with modern facilities at the passenger-cum-cargo berths commissioned in 1958-69.

Employment Services :

The Port Trust's responsibility is limited to the maintenance of an adequate supply of shore labour. Labour for the removal of the cargo from the transit sheds is that of the consignee or the clearing agent. Labour working in the holds of ships known as Stevedore labour, have regularity of employment known as Dock Labour Board.

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Science and Economy :

The past five decades excess of its capacity. Productivity consciousness have therefore been the guide lines of operation at this port. It has since wharf cranes of modern high efficiency, electric cranes, railway wagons for increasing the speed of foodgrains and transit sheds. Due to limitations of space within the port area, and the general state of congestion all round workshop and repair facilities have to increase to meet the growing requirements. All capital expenditure is expected to be met out of the funds, arising from surplus profits each year, and according to the Central Government Outlay for each Five Year Plans, that is in operation at the present period. The development of Madras Port started in 1948 - 49 on the recommendation of Ports (Technical Committee).

1949-50 - 1959-60

The main developmental scheme with which Madras was concerned was the proposal to extend the harbour South wards by constructing a wet dock capable of accommodation four large ships and at an estimated cost of Rs. 4.5 crores.

The Government of Madras have given the Port Trust right over the land to the south of the harbour.

The working of the Madras Port during 1951-52 resulted in a surplus of Rs. 48.49 lacs. The number of vessels that entered the harbour during the year 1950-51 was 1,091.

1955-66 I-Wet Dock scheme Stages I Part A & B

The construction of the Coal, Ore and the Passenger

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Station Jetties had commenced. 2) Construction of Administrative Offices at an estimated cost of Rs.2.81 lacs.

Construction of warehouse to cost Rs. 6.40 lacs.

1960-61 - 1970-71 :

A mechanical Coal Berth has been constructed at an estimated cost of about Rs.28 lacs and equipment is about Rs. 42 lakhs. The largest cargo vessel "KARA KORUM" visited the Port of Madras.

1970-71 - 1980-81 :

Outer Harbour Project : Work on the construction of an Outer Harbour is in progress. It will include an oil berth and an ore berth. The Oil berth designed to provide facilities for Oil tankers of 77,000 DWT in the initial stage and 1,00,000DWT ultimately. At an estimated cost of Rs. 9.70 crores for the provision of iron ore berth and mechanical ore handling berth with a loading rate of 6,000 tonnes per hour had been sanctioned.

1980-81 - 1990-91 :

Work on the construction of Outer arm at the Port is continuing. When completed, the deep draughted vessels would be handled throughout the year.

An extensive programme for containerisation service is being undertaken by the port. The acquisition of container handling equipment at the cost of Rs. 4.22 crores has been sanctioned.

The work of construction of an Outer arm estimated cost of Rs. 9.19 crores is expected to be completed by the end of 1983 instead of 1981.

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As required by the Japanese Steel Mills Ltd., and MMTC the existing Bharathi Dock was deepened to accept 1,30,000 dwt ore carriers at an estimated cost of Rs. 30 crores.

A Grab Dredger with a capacity of 450 cm capable of grabbing upto a depth of 20M is being acquired at a cost of Rs. 7 crores in replacement of the existing Grab Dredger.

1991-92 - 1993-94 :

The Operating income of the Port during 1990-91 was Rs. 143.58 crores, in 1992-93 it was Rs. 143.59 crores and in 1993-94 it was Rs. 189.05. A proposal for construction of a New Port at Ennore has been sanctioned at an estimated cost of about Rs. 593.90 crores. It will have two oil berths, of 8,00 million tonnes for 65,000 DWT geared vessels and about 19 million tonnes for 65,000 DWT self unloading vessels.

P A R T - A

C H A P T E R - III

(IV) THE PORT OF VISAKHAPATNAM

Location :

The port lies on the eastern coast of India about midway <sup>(52)</sup> on the rail route between Calcutta to the north-east and Madras to the South and projects into the Bay of Bengal.

Geography : Visakhapatnam situated midway between Madras and Calcutta was only a minor port. The advantage of Visakhapatnam was the natural protection afforded by

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(52) NCAER Traffic Survey of Visakhapatnam Port. NCAER N. DELHI

the "Dolphin Nose" and the low tidal range made it ideal for development into a Major Port. Manganese Ore was the main item of export from Madhya and Andhra Pradesh.

The coastal sand-drift is from the South to North to avoid heavy silting of the channel, an Island break-water was constructed which is an improved feature of the port. The approach channel between "Dolphin Nose" Yards and Darga Hills is 1.6 km long. The turning Basin has a diameter of 365,760 metres.

The hinterland of Visakhapatnam is Andhra Pradesh, Madhya Pradesh, Orissa and Maharashtra. This gives a triangular shape to the hinterland of Visakhapatnam with the coastline as its base and railway lines covering on Nagpur in Maharashtra. This hinterland is made up of four units. Coastal plains along the entire length of the coastline from Guntu and Eastern Ghats. The Chhatissgarh basin lies to the north, of these highlands. In the south west, the Godavari and Krishna rivers have developed broad peneplains. Population consists of people from these four states.

#### History :

The first stage of development of the port was started in 1927. The initial project comprises of acquisition of land, deepening and widening of the entrance channel provision of a 488 metres long quay, the formation of a turning basin, with 4 mooring berths around it, laying of about 21 kms of broad gauge railway lines, providing of electric cranes and facilities for storage and export of ore, reclamation of land and other ancillary works.

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The development of Visakhapatnam Port :

With the beginning of planning in India, the Visakhapatnam Port entered a new era and the port facilities were expanded, rapidly.

The northern arm was constructed in 1933. The berths in this arm handled the bulk of the ports traffic and provides facilities for various type of cargoes.

The western arm provides two oil berths and one fertiliser berth on its northern side.<sup>(1)</sup> The Southern side is used by Hindustan Shipyard and the Navy. A dry dock is built on the eastern side of the southern Bank for repair work.

Oil Berths, Two Oil berths, ORI and OR II are located on the northern side of the western arm.

The Fertilizers Berths is used for import of rock phosphate and sulphur from Coromandel Fertilizers. Discharge is done mechanically.

Mooring : The port has 6 mooring, 3 in the turning basin, 3 in the north western arm.

Southern Ligher Channel. This channel provides lighters facilities to the barges and lighers for loading operations at the moorings.

Facilities : Floating Crafts, the port has two suction dredgers, three dædgers, one clipper dredger cum rock breaker and seven hopper barges to avoid sand drifts at the entrance channel. Other equipment like Pilot Vessels. Tugs, Motor launches, Lighters, Floating Cranes, Shore equipment etc.

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Trade & Commerce :

Liquid Bulk Cargo consists of crude petroleum, petroleum products, molasses etc.

Dry Bulk cargo consists of foodgrains, fertilizers and fertilizers raw materials.

General Cargo among these iron and steel imports Raw materials consists of rock phosphate, sulphur, potash and raw cotton and chemicals, iron & steel etc. Others are foodgrains, such as Rice, sugar, oilseeds oil cakes etc.

1948-51 - 1960-61

The development of Visakhapatnam started in 1948 on the recommendation of Ports (Technical) Committee.

In 1957-58 Construction of an additional berth was began. Night Navigation schemes estimated cost of Rs. 10.41 lacs was sanctioned. A new dredger was ordered the labour situation at Visakhapatnam was not good, and workers went on strike. A piece-rate scheme was introduced at Visakhapatnam.

1961-62 - to 1972-73 :

Four Berth Schemes. It has been decided to construct four additional berths, two for general cargo and two for ores and to mechanise, the two ore berths.

New Road cum-Rail Bridge is proposed to be constructed connection Visakhapatnam Port with the Oil Refinery to the Hindustan Shipyard etc. The scheme is estimated to cost Rs. 58 lacs.

Improvement and Modifications to the Iron ore Handling Plant has began and has a capacity of 6 million tonnes per annum.

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( ) Source : annual Reports of Visakhapatnam Port  
for 1965-66 pp 54.

1973-74 to 1983-84 :

The South breakwater has been completed. The East breakwater is in progress and half the work is completed. The mechanical ore berth was commissioned in 1976. An estimate of Rs. 1.58 crores has been sanctioned for the construction of an oil mooring berths in the Visakhapatnam Outer harbour, for handling larger tankers.

1984-85 to 1993-94 :

There has been a delay in the progress of construction of additional oil berthing facilities due to

- a) Non-availability of suitable dredger in time.
- b) Hostile weather conditions.

Installation of a Third Wagon Tippler, at an estimated cost of Rs. 7.02 crores. Also, the project of construction of an Oil Berth at a cost of Rs. 28.93 crores.

In 1990-91 the port has been showing satisfactory financial results. The net surplus of the Port during the year 1987-88, 1988-89 and 1989-90 was Rs. 706.37 lacs, Rs. 686.67 lacs and Rs. 1023.32 lacs respectively.

During the year 1992-93 the Port Trust generated an operating surplus of Rs. 57.75 crores as against Rs. 36.93 crores during the last year.

P A R T - AC H A P T E R - III(v) THE PORT OF TUTICORINLocation :

Tuticorin Port is located on Lat.80°N long 78°E on the Gulf of Mannar about 100 miles from Cape Comorin. (53)

The Port was an open roadsted, ( ) the anchorage being situated roughly 6 miles off-shore to the east of Hare Island.

Geography :

The Port lies outside the cyclonic area and is open to traffic throughout the year. The average maximum temperature at Tuticorin is about 100°F and the minimum 72° F. Tuticorin is the terminus of the metre-gauge railway line via Maniyachi, connected with the Southern Railway, metre-gauge railway system.

History :

The Hinterland has a well developed pattern of trade location of industrial establishment, transport facilities for movement of raw materials. The main industries are cotton and ginning mills. The local fisheries are important. There are salt pans, match factories, sugar mills, cotton presses. The town is well served by roads.

63% of the population were engaged in Agriculture production, 12 to 18 percent in industries 6.25% in commerce and 1.37% in transport, and the remaining in miscellaneous occupations. Salt is produced, together with caustic soda, calcium chloride, liquid chlorine, Cotton textile etc. Handloom industry in Kanyakumari district has an exportable surplus of 1.7 million yarns.

Commerce and Trade :

The trade in the hinterland is brisk, energetic and quick to see and seize opportunities. Branch Banking is very well developed in this region. The hinterland also affords facilities for the training of personnel in industries, agriculture and commerce.

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Transport :

The Port is connected with the hinterland by a metre gauge railway and a network of roads. Facilities at Port Tuticorin are cranes, transit sheds open stacking space for coal, harbour crafts, Motor tug, Motor launches, lighters etc.

Development of New Tuticorin Port.

The Scheme for the construction of an all weather port at Tuticorin envisages the formation of an enclosed berth by the construction of two breakwaters. The Project was sanctioned in July 1969, will have four berths one for coal, one for salt, one for forcement and one for General Cargo. The Port project was estimated to cost Rs. 46 crores. The Port was declared a Major Port, in July 1974.

1975-76 to 1985-86 :

Construction work was completed during this phase. A Coal jetty with a capacity of 2.2.5 million tonnes was commissioned in December 1982. The 2 additional berths for handling General Cargo at the port, costing Rs.11.33 crores was completed by October, 1983.

1987-88 to 1992-93 :

Construction of four alongside berths and ancilliary facilities at an estimated cost of Rs. 46.95 crores have been completed. <sup>(54)</sup>

In 1990-91 the Port maintained a marginal surplus Rs. 8.69 crores as compared to Rs. 8.17 crores in the previous year.

The Port generated an operating surplus of Rs.10.26 crores as against Rs.8.09 crores in 1990-91. The net surplus transferred to general reserve fund was Rs.40.02 lacs as against Rs.21.17 lacs of 1989-90.

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(54) Source : Annual Reports of the Port of Tuticorin.  
1993-94 pp 31.



P A R T - A  
C H A P T E R - III  
(vi) THE PORT OF COCHIN

Location :

The Port of Cochin, a major port of India is situated on the West coast of India. Cochin Port has a natural harbour. At latitude 9 degrees, 58 minutes north and longitude 76 degrees 14 minutes, West. <sup>(55)</sup> It is 580 nautical miles south of Bombay. New Mangalore and Mormugao are two major ports situated between Cochin and Bombay, on the West Coast. About 160 km north of Cape Commorin is another major Port of Tuticorin.

Geography :

The Port of Cochin lies in the Southern Sector of the 579 kms long coastline of the Kerala State, which is a narrow strip of territory between the Arabaian Sea to the West and the Western Ghats to the East. The Ghats consists of long spurs extensive ravines dense forests, of teak, rose wood and other valuable timber and tangled jungles rising terrace after terrace, with a luxuriance of foliage and flowers. Between the back-waters and the sea is along and narrow stretch of sandy land, densely covered with coconuts palms and rice fields. The port is at the hub of a network of water ways running parallel to the sea. The port is served by a National Highway, as well as by a network of roads connecting the industrial and trade centres of Kerala. Its hinter-land is densely populated by peoples from Kerala, Madras and Karnataka. It is rich in agriculture and forest wealth.

The Port area comprises on the east by Ernakulam foreshore, sea on the north and the South 5 km South of the harbour, the western side faces the fairway buoy.

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(55) National Council of Applied Economic Research,  
New Delhi. Traffic Survey of Port of Cochin. Cochin pp 1.

It includes the Willingdon Island. Vessels can lie comfortably in the harbour and carry on with loading and shipping operations in the heaviest monsoon rains. The all-weather port enables it to be open throughout the year.

History :

Cochin is an ancient colony of Jewish settlement for more than a thousand years. The Portuguese Admirable Cabral, visited Cochin Harbour with his fleet in 1500 A.D. Followed by Vasco De Gama, in 1502 and Albuquerque in 1503. In 1663 the Port passed from the Portuguese to the Dutch and in 1796 to the British. From a road-stead, the Port of Cochin developed from minor, intermediate to today a Major and Important Port of India.

A formidable bar of hard sand encircled the entrance to the harbour from the sea. For 70 years, one engineer after another sort out the feasibility of cutting a channel through this bar. Since Cochin was at the corner of a number States, such as State of Travancore, State of Cochin a strip in the Malabar district of Madras Presidency. Proposals for the development of the Port into a major port necessarily involved large financial outlays and problems of jurisdiction and sharing responsibilities among these authorities. The rail connection between the harbour was a metre guage track with Ernakulam and broad guage with Shoranur Junction.

The Governor of Madras, Lord Willingdon appointed Sir Robert Bristow, as the Engineer in charge of these works in 1925. A special designed dredger was order named the "Lord Willingdon" which arrived in Cochin in March 1926. In 1928-29, the channel was widened to 137 metres, deepened

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to 1,097 metres and lengthened to 4,877 metres. In 1931, ships of 9 metres draft began to enter the Harbour. In 1936, Cochin Port was declared a Major Port of India. A Bridge and watersupply connected the Willingdon Islands. During the First and Second Five Year Plans, developments were one coal berth, South, in 1955-56 north and South tanker Jetties, and 1959 North, coal berth amounting to Rs. 3 crores.

#### Port Administration and Facilities :

The Willingdon Island is the main centre of the Port Activities and facilities are located, such as The Malabar Hotel and Port Trust Offices. The Southern half of the Islands accommodate the Civil Airport. National Highway No.47 links the Island to the mainland by road-rail bridge.

- a) Deep water wharves on Willingdon Island
- b) The Mattancherry Wharf.
- c) The Ernakulam Wharf.

The Port has transit sheds, storage sheds and warehouses, Cargo handling equipment, Coal berth, Board Train Piper Jetty, Tanker Berths, Lighterage Jetties, Fort Cochin wharf.

#### The Port Light :

Situated at Fort Cochin, 25 metres high Pilotage is compulsory for all merchant vessels.

#### Tides and Rainfall :

The rainfall is heavy between June to September months.

The Port has lighterage, tugs, dredgers, Moorings launches, Workshop and Dry dock is provided. Water supply and Fire fighting services are also provided.

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Cochin Harbour Railway :

Railway facilities are provided for freight and passenger trains both tourist and travellers and railways sidings.

The Port is administered by the Port Trust Board, under Major Port Trust Act, 1963, with the usual Departmental Officers.

Cargo Traffic :

Handled by Port of Cochin in 1950-51 was 1.37 million tonnes rose to 290 million tonnes in 1965-66. Commodities imported were foodgrains, coal, cashenuts, machinery and others.

Commodities exported, Coir products, cashewnuts, Tea Rubber, Coconut, copra, coconut oil, Prawns and others.

1949-50-60 :

The Cochin Port development scheme consisted mainly of the construction of a wharf frontage at an estimated cost of about Rs. 37 lacs. The working of the Port during 1951-52 resulted in a surplus of Rs. 16.96 lacs. The navy suggested for Naval training centres 200 acres of land on Willingdon Island. Other developments were Medical facilities, Apprentice Ship training, Welfare and Education Schemes and several other measures to improve conditions of service were undertaken by Port Authorities.

1961-62-1971-72 :

New Construction projects such as Four additional wharf berths, a new Wet Dock with six berths. Open berth and an oil terminal.

1972-73 - 1982-83 :

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Oil Dock Project which can accommodate deep drafted Oil tankers of 80,000 DWT and 40 ft draft for crude Oil to Cochin Refinery estimated to cost Rs.9 crores. The extension of the 9 berth is in progress. 1980-81, the Bhagirathi Hooghly river, training works are being continued to derive the full benefits of the Farakka Barrage Project. Acquisition of container handling equipment by the Port at a cost of Rs. 1.5 crores has been sanctioned.

1982-83 - 1992-93 :

The Integrated Development Project for Cochin Port consists of three components construction of an Oil berth, construction of a Fertilizer Berth and dredging the approach channel, at an estimated cost of Rs.35.86 crores. Container handling equipment, the estimated cost of this project was Rs. 6.04 crores all electrical and mechanical works connected with the Project were completed. A Dredger estimated cost of Rs. 21.29 crores was ordered.

During the year 1989-90 Cochin Port, showed a net surplus, of Rs. 361.40 lacs after many years of deficits.

The Annual Plan Outlay for the schemes during 1992-93 was Rs. 8.84 crores and the expenditure incurred upto Oct. 92 was Rs. 2.63 crores.

P A R T - A

C H A P T E R - III

(vii) THE PORT OF KANDLA

Location : Latitude 23° 00' 5N Long. 70°13' 3E <sup>(56)</sup>

It is a natural sheltered harbour for safe navigation in all seasons and remains unaffected by cyclonic weather

in the Arabaian Sea. The swell in the creek rises not more than 2 feet. The Pilot station is at the North of Kandla in Tunabhoy which is about 15 miles from the Port. There is a bar at the mouth of the creek on which about (15 feet) 4.57 metres depth, is maintained by occasional dredging, at the lowest waters so that ships upto 9 to 10 metres of depth could enter the harbour. The cargo jetties at the Port have a depth of 32 feet 9,10 metres at low water, and Oil Jetty, (30 feet) 9 metres.

#### Geography :

Kandla Port is the only Port in India which enjoys a dry climate with minimum loss of days due to monsoons. The climate is good through the year, and the best of all ports India. Kandla Port Jetties are designed to be earthquake proof. Monsoons Period mid June to mid Sept.

#### History :

The foundation of Port of Kandla was laid by Maharao Khengurji III, The Ruler of Kutch in the year 1930. As the Port was visited on an average by over one hundred large vessels every year a concrete jetty was constructed and a Pier for Oil tankers. The Maharao also built facilities for storage, such as warehouses and put a crane on the jetty for discharging general cargo.

The Central Government 1948, appointed the West Coast Major Port Development Committee to examine the facilities and make recommendations. The Committee recommended to the Government of India to set up a Major Port in Kandla Creek. The actual site was selected 3 miles to the South of United Salt works. In 1949, the preliminary work on the construction of the Harbour at Kandla was started.

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In April 1950, the Minor Port of Kandla was formally taken on by the Government of India for development as a Major Port.

After necessary survey and investigation the design of the development of Kandla as a Major Port was examined by a Committee of experts.

On 10th January 1971, the Foundation Stone of Kandla Port was laid, by the Late Prime Minister, Shri J.L.Nehru. In October 1952, a metre gauge railway link below Kandla, and Deesa was completed and declared open for traffic. In April 1955, Kandla was declared as a Major Port by the Late Bahadur Shastri, the Transport Minister. By the end of 1957, the first two Cargo Berths were declared opened, by Shri J.Ram, Transport Minister Government of India.

The main object of a free Trade zone is to make merchandise competitive to eliminate overhead costs and to boost industries for export. A Free Trade Zone is a segregated area, in which foreign goods may be brought for re-export after processing or manufacture.

Port Administration and Law :

The Authority for the Port of Kandla was constituted by an act of Government of India, in 1964. The Kandla Port Trust had a whole time Chairman and a Board Office, from various associations. These Trustees are nominated for a period of 3 years.

Port Facilities :

Pilotage at the Port is compulsory. There is also radar communication to enable the incoming vessels to be sighted.

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Berthings : Dry Cargo :

Cargo Jetties of 2,700 feet provides berths (about four) alongside. The fifth berth 1,175 feet of quayage is completed. Then, there are four moorings berths one for deep drafted ships, upto 36 feet draft, and a mooring berth for loading, salt in bulk.

Liquid Cargo : An R.C.C. Pier of 91.44 metres (300 feet) length for berthing, Mineral Oils and Chemicals.

Sailing Vessels :

Bunder Basin having two wharves in 182.88 metres long.

Passenger Launches : Two landing stages for Passenger launches.

Fishing Vessels :

Fishing Jetty under construction others equipment like dredgers, heavy lifts, mobile cranes transit sheds.

Port Finances :

Financed by the Government of India. Five Year Plan Outlays and Port charges such as wharfage, Transit Dues, Rent for Storage of Goods in Port area, Cranage depending on the load, pilotage fees etc. which makes the port self sufficient in funds.

Commerce & Trade :

The Traffic in Trade is foodgrains mineral oils, Kirana, cloth, oils, oil cakes, soaps, and fancy goods, salt.

There are heavy, medium and light industries at Kandla. The Port and the township is supplied from the Thermal Power Station. Kandla, the Gujarat Electricity Boards. The other main features of the hinterland are Housing

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for the Kandla Port township and other housing plans, Educational facilities from primary to college and Institute for training. The Municipality was constituted by the Government for the Kandla Port township in October 1958.

Science & Economics :

The report of the Committee on the first investigation has been received and considered by Government, and it was decided to develop Kandla as a Major Port in May 1948.

1950-51 - 1960-61 :

Kandla Port Construction Project<sup>(57)</sup> for the Main Harbour works at Kandla, harbour works is to be placed on Messrs. Mckenzie Henrich Butzer (India, Ltd. had been finalised. Messrs. Adams Edward and Greenlay of USA in the planning of a township at Gandhiham. The estimated cost of about Rs. 7 crores. Kandla Port Project, the Main Harbour works at Kandla have progressed well.

a) Four deep water berths and ancillaries structures comprising the main items in the first stage of its development has been completed. Two cargo berths were opened to traffic in March 1957, and the remaining two in July 1957. An iron ore berth costing about Rs. 107 lacs, has sanctioned other items of work, office building, staff colonies, water supply works, oil pipelines, power houses workshops etc.

Further expenditure upto Rs. 158.32 lacs was sanctioned for the Township of Gandhidham.

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(57) Source : Annual Reports of Port of Kandla. Kandla pp. oo.

1960-61 - 1970-71 :

The port is now equipped with all the requisite facilities on the most modern and upto date lines, to allow for easy shipping movements and quick handling of cargo.

The construction of fifth berth has been completed except for dredging. The construction of the Broad gauge link to Kandla is to be opened in, October 1969.

1971-72 - 1981-82 :

The work is in progress on the fifth berth, oil jetty etc. The work of the second stage are in progress. The Port Trust estimated Rs. 9.90 crores for the facilities of infre-structure for the off shore oil Terminal which has been sanction. Construction of an oil/jetty at Kandla at an estimated cost of Rs. 6.02 crores has been approved. An estimate of Rs. 59.35 lacs for the purchase of container handling equipment.

1982-83 - 1992-93 :

A steel floating Dry dock sanctioned at an estimated cost of Rs. 4.96 crores.

The sixth General Cargo Berth revised cost Rs. 20.93 crores.

Construction of the Sixth General Cargo Berth revised cost of Rs. 20.93 crores has been completed in May.

Procurement of other port equipment and facilities has been done.

Construction of a 7th Cargo berth, Length 343 metres is in progress, at an estimated cost of Rs. 29.80 crores.

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The Operating income of the Port was 1990-91 was Rs. 64.39 crores as against Rs. 58.46 crores during 1989-90. In 1992-93, the Port generated an operating surplus of Rs. 43.39 crores, as against Rs. 31.66 crores in 1991-92.

P A R T - A

C H A P T E R - III

(viii) THE DEVELOPMENT OF PORT PARADEEP

Location : (Lat. 20° 17' 15" N; Long. 86° 42' 26" E. <sup>(58)</sup>)

It lies approximately midway between Calcutta and Vishakapatnam. It had few access to roads to the hinterland. It is situated on the East Coast of India, in Orissa State of India, close to Cuttack and Barang.

Geography :

A deep-water lagoon type of harbour at a site <sup>(1)</sup> on the coast, five miles or so south of the Mahanadi river at the entrance of the Taldanda canal and the road from Cuttack stop short. The port is to be connected with the sea by a channel about half a mile long which cuts nearly at right angles to the coast (Map 1.) Paradeep Port is a deep water, all weather port, with the State of Orissa as its hinterland. The area comprising the iron ore deposits in Tomka-Daiteri in Cuttack district, Bonai in Sundargarh and Gandhamardhan in Keonjhar district. The manganese ore deposits in Sundargarh and Keonjhar district, the chromite Kamakhyapur, Sukinda and Anandpur, the coal mines of Talcher the development the industrial area of Rourkela, Hirakud and Cuttack and the rice and jute belts around Paradeep Port.

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(58) NCAER, Development of Paradeep Port New Delhi  
1963, pp 9-11

Important towns and trading centres are, Jharsuguda, Barajamda, Rairangpur, Baripada and Berhampur, Talcher. Manoharpur, Bilaspur nearer to Paradeep. East is Cuttack Keonjhar and Dhenkanal districts to Ballasore, Ganjam, Sambalpur and Sundargarh districts. South Bihar to Singhbhum districts and Eastern Madhya Pradesh.

Physical Features :

There are four main geographic features the plain level country along the coast (250 miles long) the river valleys of the Mahanadi, the Brahamani, the Baitarani and the Tel the plateau north of the Mahanadi extending beyond the hinterland to the Chotanapur plateau, and the hills of the Eastern Ghats. The coastal plains begins as a narrow fertile strip in Ganjam, and skirt round the Chilka lake into the sane hills, on the Southern coast of Puri district. Beyond Puri district, the coast broadens out into the deltaic areas of the Mahanadi in Cuttack district, fringed in the north-west, by the iron ore bearing hilly region of Sukindaa. Further north on the coast is Balasore. The Mahanadi divides the plateau into two regions. The northern plateau is itself divided into three parallel blocks The easternmost lies in Mayurbanj and shows up in its spine of hills - the Simlipali hills. Eastern Ghats run over the tableland almost parallel to the Coastal plains, from Phulbani districts to Koratpur, outside the hinterland.

Climate :

The temperature ranges from 26°C in January, to 35° in July, with average annual rainfall 140 cms. Paradeep Balasore and other towns on the coast encounter cyclones & storms periodically.

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Area :

The hinterland constitute 65.3 percent of the total area of the State.

Population :

In 1961, the total population of 17.55 million of Orissa State, or 93.7%. Tribals forms 19.8 percent (2.6 million) of the total Population. Percentage of Literacy is 23.7% in the hinterland, the strength of the working force in the hinterland is 6.39 million, (48.78%).

History :

Orissa was mainly dependent on Calcutta for her markets of rice and jute and exports of bidi (Kendu) leaves, pig iron ore in the import of machinery, equipment, chemicals, salt and petroleum products. Paradeep Port can be Orissa hopes to develop its own imports and exports houses and handle her share of the foreign trade of India.

Since 1948, various proposals have been made for the creation of a deep sea port at a suitable location on the Orissa Coast. Iron ore was considered, an export item as fairly goods deposits of iron ore occur within hundred miles of Paradeep. The export of goods from the use of such industries as the manufacture of steel. Steel tubes, pipe and structurals, aluminium and aluminium products, paper, glass, cement, refractories etc. There are promising development in sugar, coal based chemicals and heavy machinery in the State.

Finance :

The main Port construction is estimated to cost Rs. 11.7 crores, of this foreign exchange requirement was Rs. 2.8 crores. Other items, such as ore handling equi-

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ment stockyard, dredger, harbour craft, road services canal extension and building may cost Rs. 4.5 crores. The cost of providing additional port capacity will be about Rs. 40 crores.

Agriculture :

Rice takes the first place in acreage. Other crops such as sugarcane, oil seeds, groundnuts. It has irrigation facilities, potential for production of cement, paper textiles etc.

1965-66 - 1976-77 :

The work on the port project was commenced by the State Government in November 1962. The first stage construction of the port consisted of the dredging of a lagoon with an approach channel two break waters to protect the approach channel from waves and siltation and an iron ore berth which can accommodate 60,000 tones ore carriers.

The Port was declared a Major Port on the 18th April 1966. A Port Trust was set at Paradeep Port from 1st Nov. 1967.

The first stage of development of the Port commenced from 1st November 1967 and completed in 1969-70.

In 1973-74 rail link movement of iron ore between Cuttack and Paradeep had been established.

1976-77 - 1986-87 :

The present annual capacity of the ore handling plant at the Port is expected to be stepped up from 3 million tonnes to 4 million tonnes annually.<sup>(59)</sup> A sea-wall to counteract severe structures have been placed.

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(59) Source : Ministry of Surface Transport, GOI New Delhi, annual Reports. 1980-81 pp. 109 - 115. Appx. xi.

In 1983-84 the construction of a second General Cargo berths sanctioned cost of Rs.7.26 crores. Other works are Modifications of Iron ore handling Plant construction of third general cargo berth, a fertilizer berth etc.

1987-77 to 1992-93 :

The Port had shown operational deficits for several years, but during 1986-88, it had a operation surplus of Rs. 0.31 crores.

1988-89 : Deepening of Paradeep Port to receive vessels of 1,70,000 DWT for export of iron ore.

1989-90 : For past two year the Financial position improved showed, a net surplus of Rs. 529.44 lacs & Rs.268.78 lacs.

1992-93 : The Net surplus was Rs. 15.43 crores. Construction of a fishing Harbour and Multipurpose Cargo berth was started. Rs. 587.41 crores was sanctioned for a mechanical coal handling facilities at Paradeep port, including foreign exchange content of Rs. 263.08 crores.

In 1993-94, a Proposal for a Fishing Harbour and a multipurpose cargo berth at the Port had been sanctioned and a creation of Mechanical Coal handling facilities at Rs. 587.41 crores.

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P A R T - A  
C H A P T E R - III  
(ix) THE PORT OF NEW MANGALORE

Location :

The Port of Mangalore Lat.  $12^{\circ} 52'N$ . Long  $70^{\circ} 51'E$ <sup>(60)</sup> is situated on the Mysore Coast, of the Arabian Sea. Two rivers, the Netrawati and the Gurpu meet in the harbour and flow for a mile before reaching the sea. The port is 196 miles South of Mormugao and 190 miles north of Cochin.

Geography : The Port of Managalore is closed from May to September during the South-West Monsoons.

History : The Port Town of Mangalore has a large population. A broad gauge railway line from Madras terminates at the town. The town is situated on the West Coast Highway which connects Bombay, Cochin and Cape Commorin. Good roads lead to all major towns in the neighbouring States. Malpe, Mysore, Shimoga, Chikmagalur etc. The fishing industry is important along the coast of Mangalore. Being a trade centre, the exports business in coffee, tiles, cashew, cardamon fish tobacco etc. The traffic is mainly Betelnuts, coffee, pepper, coir timber and tiles for exports. Fire wood salt, copra, grains, hardware and cuttlery, fish and fish products are among the imports. The Hinterland of the port is generally determined by geography existing and evolving patterns of production and distributions. The Hinterland consists of the mountain barrier "Sahyadri Hills", and plateau east of the barrier called "The Maidan". The sandy bars, and breaches are lined with coconut plantations. Paddy is grown on the available land, then also there are Jackfruits, Tapiocac. In the middle and eastern region is

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(60) NCAER Traffic Survey of Mangalore & maple Ports  
NCAER N. Delhi, pp3.



mineral ore. In the hilly ranges are coffee, cardamon, pepper grown. North, is the cotton growing region. In the south, are sugar cane fields, rice acre and coconuts. Next to cotton, Coffee is intensively grown and cashewnuts.

The State has a very high hydro-electric potential especially in the hinterland of the ports. There are a number of industrial units in places like Mysore, Hassan, Mangalore, Bhadrawati is the seat of Mysore Steel Industry.

The Industrial development programmes is drawn up according to the Five Year Plans of the Central Government with State participation in the Plans. Mines and Mineral ores are another important sector of Mysore State. The Iron ore resources of Mysore are very great next only to Bihar, Orissa and Madhya Pradesh. Manganese Ore and Chromite are also being exported.

#### The Railway System :

The Port of Mangalore is fed by a Railway net of lines, running through the State upto Bangalore, Maharashtra, Goa, Kerala etc.

#### Roads and Road Transport :

The hinterland of the Port of New Mangalore is fairly well provided with roads.

Inland Water Transport : from Mangalore to Coondapur.

#### Port Administration :

The Port is administered by a Port Trust constituted under the Mangalore Port Trust Act, 1953.

#### Port Facilities :

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The Port has bunderting facilities for Oil imports. 3 transit sheds, a small dry dock for dredgers a workshop building, a passenger shed. Harbour Craft of Suction dredger 'Gurpu' a general dredger, Motor launches, Cranes -3, fixed hand cranes, 3 tons, 2 tons and 1 ton. Water supply to ships, cargo handling equipment, Navigation Aids, Lighthouses, Pilotage etc.

Commerce and Trade :

Iron ore exports. Since Mangalore has also large number of commercial institutions, banks, chamber of Commerce, Educational set-up etc.

Development of Mangalore Port 1963-64 is included in the Third Five Year Plan. The scheme was estimated to cost about Rs. 15.63 crores, including Foreign exchange component of Rs. 3.91.

1963-64 to 1974 :

The new port has one General Cargo Berth, one berth for Iron ore and Manganese Ore, one for raw material imports other than Naptha for fertilizers, one oil jetty for naptha petroleum products and a shall draught berth for loading vessels upto 6 meters draught.

1974-75 to 1984-85 :

All construction work sanctioned for the last ten years have been completed. Overall progress of construction of an additional General Cargo Berth at an estimated cost of Rs. 7.28 crores. Two Tugs each of 22.5 tons Bollard Pull, at an estimated cost of Rs.2.20 crores have sanctioned. (61)

1986-87 to 1992-93 :

Procurement of two Tugs in January 1985 at an estimated cost of Rs. 9.55 crores. Other quarters of 'B' and 'C' type together with a school building and a Community Hall was sanctioned at an estimated cost of Rs.1.20 crores.

During the years, 1986-87, 1987-88, 1988-89 the Port generated an operating surplus of Rs. 620.39 lacs, Rs. 645.39 lacs, and Rs. 1112.76 lacs respectively. This whole surplus was transferred to various obligatory reserves.

In 1992-93 the Port Trust generated an operating income of Rs. 3209.06 lacs against Rs. 3035.51 lacs and Operating surplus of Rs. 944.66 lacs against Rs.1424.82 lacs during that year. A proposal for creation for Port facilities for handling crude and POL Products at an estimated cost of Rs.182.00 crores has been completed.

#### P A R T - A

#### C H A P T E R - III

#### (x) THE PORT OF MORMUGAO

Location : The Port of Mormugao is situated on the West Coast of India. Lat.  $15^{\circ} 25' N$ . Long.  $73^{\circ} 47' E$ . To the South of Mormugao Ports are the ports of New Mangalore, Cochin and north is Bombay Port. The Port of Mormugao became one of the Major Ports of the country when Goa was liberated from Portuguese control, by the Government of India, in December 1961. It was declared a Major Port in December 1963.

#### Geography :

Goa is endowed with a magnificent natural Harbour and a beautiful coast line <sup>(51)</sup> permitting access to the

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(62) Ministry of Shipping & Transport, Report of the Communist Party. Major Ports June 1970, New Delhi, pp.12

navigable waters of two rivers, namely the Mandovi, and the Zauri, Panaji the capital of Goa is situated on the Mandovi river. It was already a flourishing trading centre even before the Portuguese came to India. The two rivers are navigable for a distance of 60 kilometres and five other rivers of the Goa river system are navigable for small lengths of 3 to 3.5 kilometers. More than 90 percent of export of ore in recent years was brought over the river system in self-propelled barges. The Port provided an outlet for a hinterland beyond the original Portuguese territory.

#### History :

The Port and its railways which was connecting the Port to the hinterland worked as part of the Indian Railway from 1902 to 1955. In 1963, the line was transferred to the Indian Railway system.

The Port has its own marshalling yard, permanent way, harbour wagons, locomotives, workshops and staff for operations. As from July 1964, the provisions of the Major Port Trust Act, 1968, was made applicable to it and a Board of Trustees were constituted.

The Development of the Port of Mormugao started by the end of the Third Five Year Plan, (1961-62 to 1965-66) The capacity of the Port during 1965-66 was 8.00 million tonnes.

#### Port Facilities :

The Mormugao Port Development Project envisages construction of an ore berth, and installation of mechanical ore handling facilities with a rated capacity of 8000 tonnes per hour, a mineral oil berth and improvements to existing facilities. The Port will be able to handle ore

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carriers, upto 60,000 DWT at alongside berth in the initial stages, and it has been planned to develop capacity to handle ore carriers of 1,00,000 DWT.

A 2500 cy. m. hopper capacity dredger was procured by the Port Trust in May, 1975. Two Tugs for which order have been placed are scheduled to be delivered in July 1976.

1962-63 to 1972-73 :

The Port of Mormugao was declared to be a Major Port with effect from 14-23-63 under the provisions of the Major Port Trust Act.

Mormugao Port Development Project envisages essentially the construction of an ore berth serviced by high speed mechanical ore handling equipment. The total estimated cost for this would be in the region of Rs.76 crores.

1974-75 to 1984-85 :

The Mormugao Port Project was estimated to cost Rs. 50.90 crores. Orders had been placed on MAMC for the construction and supply of ship loaders, reclaimers etc. required for the provision of mechanised iron ore handling facilities.

The dredging and reclamation work is the most critical item of the Mormugao Port Development Project.

In 1983-84 the civil works for the scheme of construction of multi-purpose general cargo berth, sanctioned at an estimated cost of Rs. 11.70 crores was expected to be completed by March 1984.

Residential quarters, 416 nos out of 463 have been completed by May 1983.

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1984-85 to 1993-94 :

In 1985-86, the Multipurpose General Cargo berth became operational the revised cost of the project was Rs. 12.35 crores. The Tug "Dona Paula" was replaced by a 30 tonne Bollard Pull capacity.

In 1990-91 Mormugao Port Trust has been showing a net surplus for the last three years. 1987-88, 1988-89 and 1989-90 a net surplus of Rs. 2.25 lacs, Rs. 2.86 lacs and Rs. 5.38 lacs respectively.

The Port could meet its entire plan expenditure from its own internal resources without budgetary support from the Government.

In 1992-93, the construction of Additional General Cargo berth No.11, at an estimated cost of Rs.25 crores has already been started and expected to be completed in July 1995, with all necessary facilities. During the year the Port generated, a net surplus of Rs.21.40 crores as against Rs. 10.27 crores in the previous year, 1992-93.

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IV FINANCIAL INDICATORSPART-A

LACS

Rs. in lacs

Name	1980-81	1985-86	1989-90	1993-94
<b>d) Tuticorin Port</b>				
Operating Income	519.43	1379.41	2099.04	3355.55
Operating expenditure	482.83	829.07	1273.88	2209.34
Operating Surplus/ Deficit(-)	36.60	550.34	8165.30	1146.21
Net Surplus/ Deficit(-)	13.31	18.03	44.20	50.21
<b>e) Visakhapatnam Port</b>				
Operating Income	3666.28	6908.45	12241.62	18096.26
Operating expenditure	2975.72	4603.90	6979.84	11046.05
Operating Surplus/ Deficit	34.63	864.28	3996.43	5801.42
Net Surplus/ Deficit (-)	43.18	858.04	989.25	13.03

Source : Annual Reports of Ministry of Surface Transportation  
Govt. N. Delhi. for years - 1980-81, 85-86, 89-90,  
93-94. pp. 109-113 App. XI.

FINANCIAL INDICATORS OF PORTS

3

(Rs. in lacs)

	1980-81	1985-86	1989-90	1993-94
<b>(c) <u>Madras Port Trust</u> :</b>				
Operating income	3,953.70	9,118.14	1,310.06	2,162.80
Operating expenditure	2,601.06	5,071.21	7,320.62	1,068.80
Operating Surplus (+)				
Deficit (-)	+1,352.64	+4,046.93	+5,780.04	+109.39
Net Surplus (+)				
Deficit (-)	+33.69	+81.70	+98.87	+95.21



P A R T - A  
C H A P T E R - IV  
FINANCIAL INDICATORS OF PORTS

L 2 B

(Rs.in lacs)

	1980-81	1985-86	1989-90	1993-94
<b>(a) <u>Bombay Port Trust</u></b>				
Operating income	89,144	163.50	223.38	417.00
Operating expenditure	57,888	106.43	162.32	240.00
Operating Surplus(+)	+31.26	+57.07	62.07	172.00
Deficit (-)				
Net Surplus(+)	+34.87	72.57	74.03	0.28
Deficit(-)				
<b>(b) <u>Calcutta Port Trust</u></b>				
Operating income	9,667.69	146.530	2.473	413.19
Operating expenditure	8,319.12	123.733	1.989	252.29
Operating Surplus (+)	+1,295.28	-1.92	+48.45	+76.89
Deficit (-)				
Net Surplus (+)	-3.27	-13.06	+2.29	+44.68
Deficit (-)				

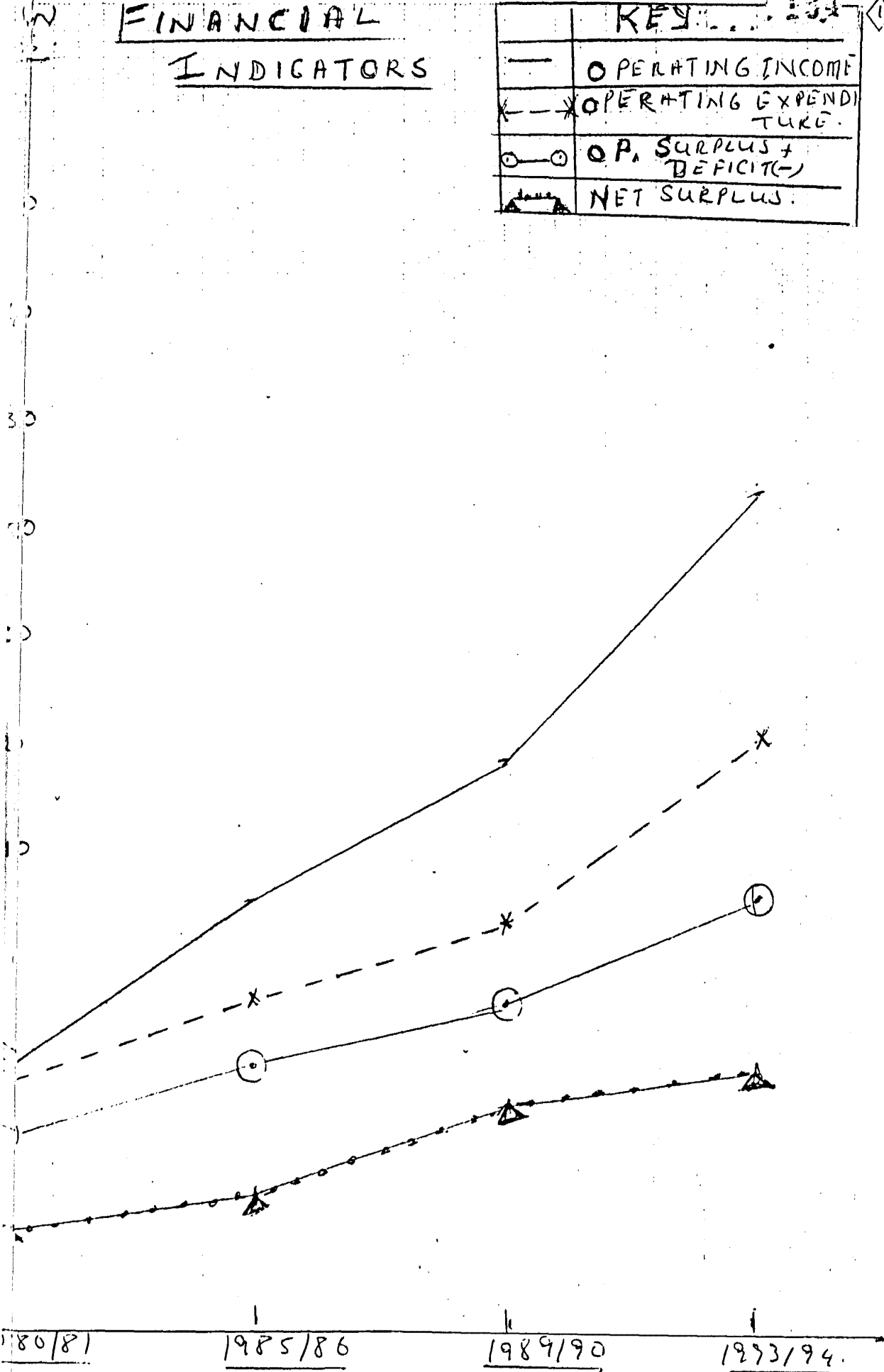
Source : Annual Reports of Bombay Port Trust and Calcutta Port Trust for 1980-81, 85-86, 89-90 and 93-94. pp.77-79 Appa.IV,

# TUTICORIN PORT PARTA II

## FINANCIAL INDICATORS

KEY	
—	OPERATING INCOME
- - - X	OPERATING EXPENDITURE
○—○	O.P. SURPLUS + DEFICIT(-)
▲	NET SURPLUS

131



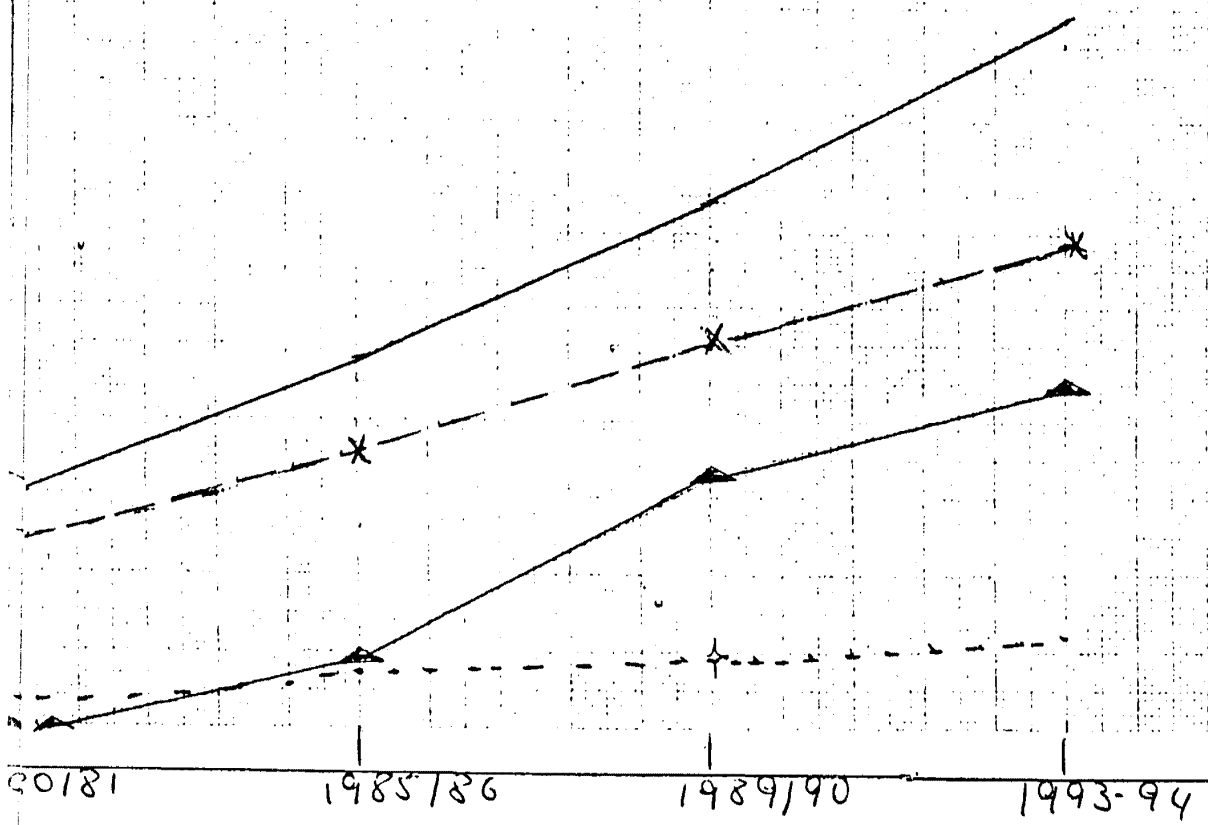
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SPACS

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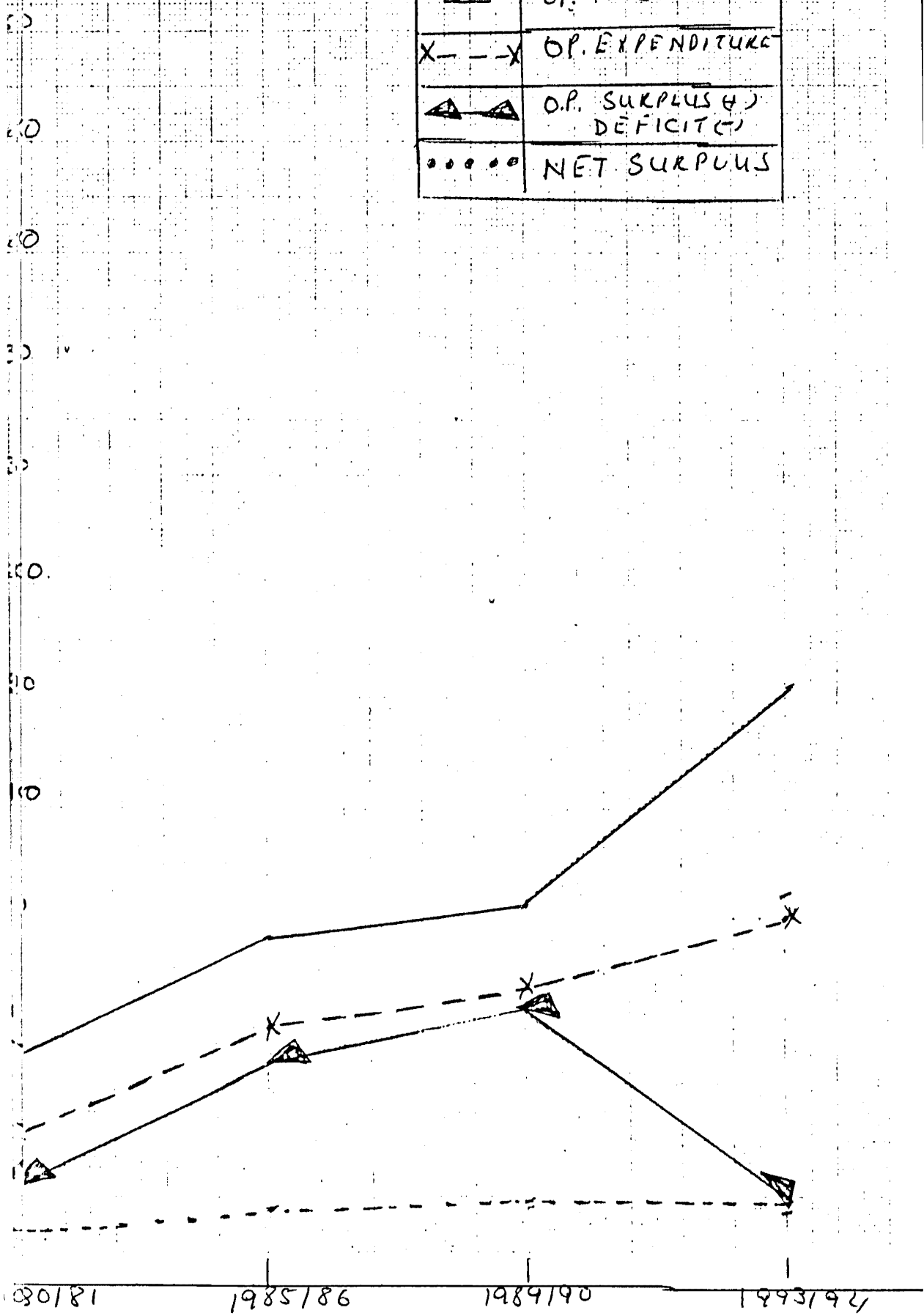
FINANCIAL INDICATORS

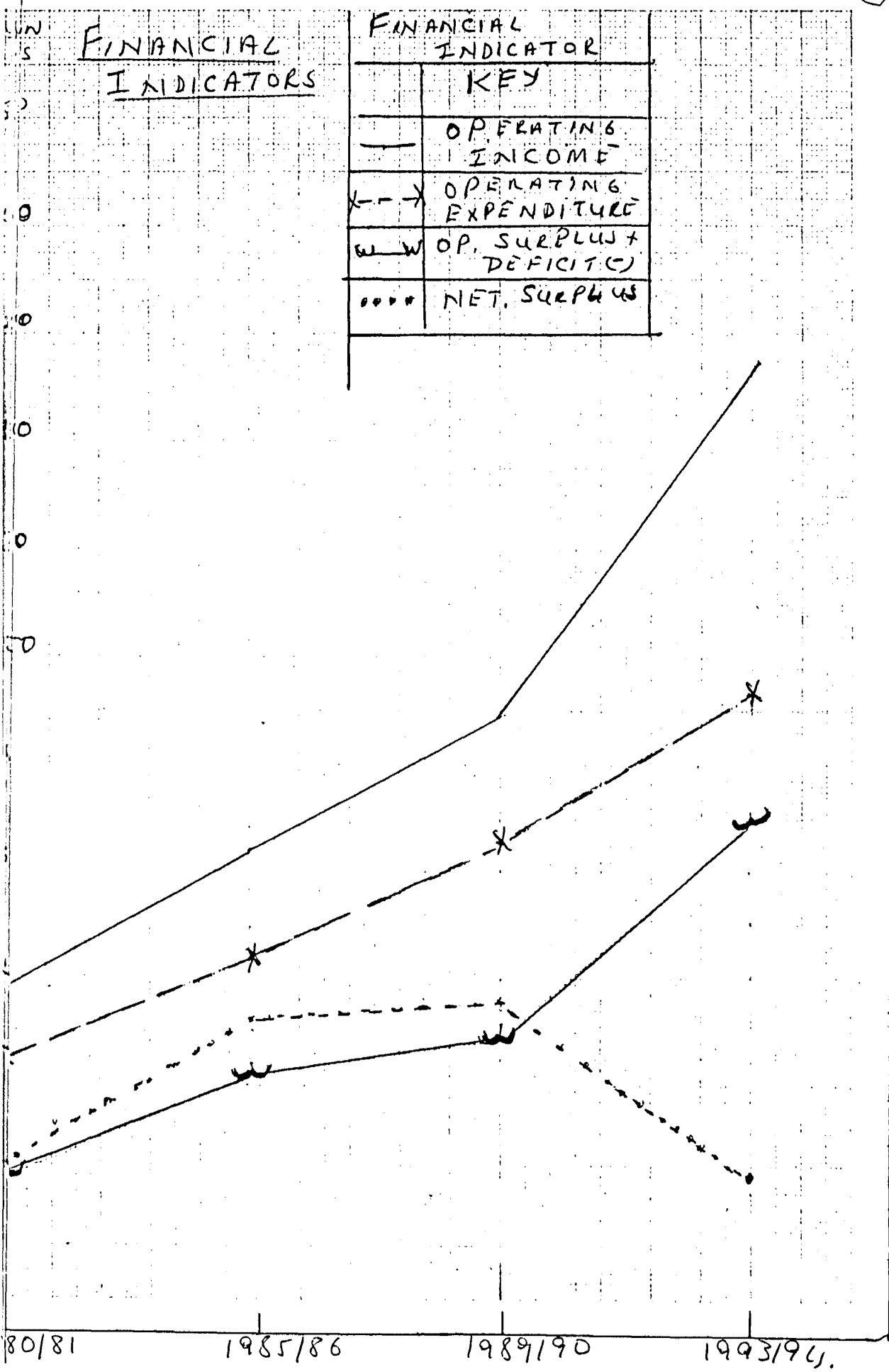
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—	OPERATING INCOME	
X—X	OPERATING EXPENSE	
▲—▲	OPERATING SURPLUS	
·····	NET SURPLUS	



## UN LACS FINANCIAL INDICATORS

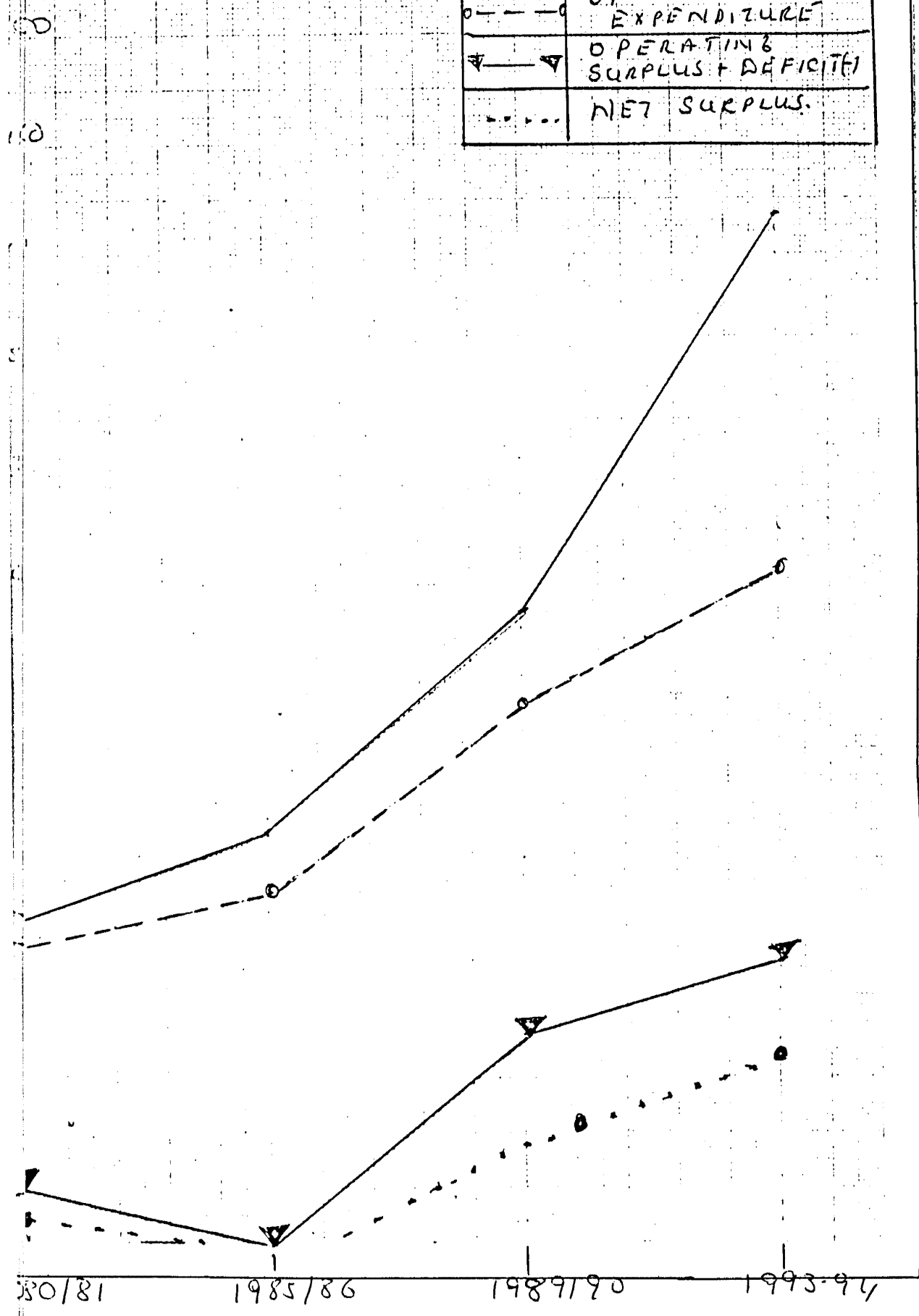
KEY	
—	O.P. INCOME
X - - X	O.P. EXPENDITURE
▲ — ▲	O.P. SURPLUS (+) DEFICIT (-)
•••••	NET SURPLUS





FINANCIAL INDICATORS

—	OPERATING INCOME
- - - -	OPERATING EXPENDITURE
▼ — ▼	OPERATING SURPLUS / DEFICIT
· · · · ·	NET SURPLUS



P A R T - A  
C H A P T E R - IV  
MAJOR PORTS FINANCIAL INDICATORS  
I. TUTICORIN PORT TRUST

1980-81 :

The Operating Income for Tuticorin Port Trust was Rs. 519.43 lacs in 1980-81. The Operating Expenditure was Rs. 482.63 lacs. The Finance and Miscellaneous income was Rs. 37.69 lacs and Expenditure was Rs 37.52 lacs.

The Operating Surplus during 1980-81 was Rs. 36.60 lacs. After providing for Debt charges and contribution the result was a Net Deficit of Rs. 13.23 lacs.

This deficit was due to additional salaries and wages, implemented by Wage Revision Committee Report in respect of Group III and IV. Group 3 & 5

The Port registered a traffic of 26.31 lacs tonnes. The Export traffic was 4.43 lacs tonnes, and import traffic 21.88 lac tonnes. Transshipment cargo was 68,000 tonnes . The number of vessels handled during the said year was 154 ships.

The Industrial Relations was satisfactory with no strikes, no stoppages of work.

The Capital Plan Works for the year 1980-81 was Port Development Project works; construction of Permanent Oil Jetty, Procurement of third tug of 30-T bollard pull, Construction of Coal Jetty, Purchases of Diesel Locomotives of 1500-T handling capacity. New Schemes on hand and the construction of two additional warehouses and two berths alongside.

1989-90 :

The Operating Income, during the year was Rs.2090.41 lacs. The Finance & Miscellaneous Income was Rs. 183.57 lacs. The Operating expenditure was Rs.1,273.88. The Finance & Miscellaneous Expenditure was Rs. 798.72 lacs.

The Gross Operating surplus was Rs. 816.53 lacs, and a Net Surplus carried over to Rs. 14.42 lacs.

Tuticorin Port handled an all time high traffic of 53.24 lacs tonnes. Import was 49.00 lacs tonnes and export was 4.24 lacs tonnes. In 1989-90, 638 ships were handled at Port. Transshipment cargo handled was 15.70 tonnes in 1989-90.

The capital works were Port Development Project Works, Conversion of the existing metre gauge Railway Lines into Broad Gauge within Port Premises. Construction of Second Coal Jetty, Replacement of two numbers of Mooring Berths, and setting up Hydrographic Survey Units.

Industrial Relations. There were 15 Registered Trade Unions. As there was a strike/stoppage of work by cargo handling workers and few of the Port Staff in connection with Bharath Bandh.

1985-86 :

The Operating income during the year was Rs. 1,379.41 lacs. The Operating Expenditure was Rs. 829.07 lacs. The Finance and Miscellaneous income was Rs. 133.44 lacs. and Finance & Miscellaneous Expenditure was Rs.360.18 lacs.

The Gross Operating Surplus was Rs. 550.34 lacs, after making provision to various reserves and contributions to earmarked funds and amortization of loans. The Net Surplus was Rs. 18.08 lacs.

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The traffic handled was 42.25 lacs tonnes. Imports during 1986-86 increased to 40.12 lacs tonnes, and exports increased to 2.06 lacs tonnes. The transshipment traffic during the year was 6766 tonnes.

The number of vessels handled was 452. The Capital Works project was Port Development Construction of two additional General Cargo berths and minor construction works.

There was no strike during the year, and relations of labour unions with Port Authority was deemed cordial.

1993-94 :

The Operating Income was Rs. 5355.55 lacs. The Finance and Miscellaneous Income was Rs. 552.93 lacs.

The Operating Expenditure was Rs. 2,209.34 lacs. The Finance & Miscellaneous Expenditure was Rs. 688.92 lacs.

The Gross Operating Surplus was Rs. 1146.21 lacs and Net Surplus carried over to Rs. 50.21 lacs.

The record traffic of 67.00 lacs comprised of 56.06 lacs tonnes of imports and 10.94 lacs tonnes of export.

The number of vessels handled was 844. Capital Works projects are dredging the approach channel, construction of IInd Coal Jetty, costing Rs. 1046.14 lacs, and other Port minor construction and maintenance work.

The Tuticorin Port Trust has gradually succeeded in earning surplus profits from the period of 1985-86. In 1980-81, a Net Deficit of Rs. 13.23 lacs was attributed to revision of salaries.

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The Net Surplus of 1985-86 (Rs.18.03 lacs) was a marginal profit. In 1989-90, the Net Surplus dropped back to Rs. 14.42 lacs and in 1993-94 the Net Surplus rose to Rs. 50.12 lacs. This was due to record traffic of 67.00 lac tonnes, of which the traffic in Coal was 38.97 lacs. The number of containers handled showed a growth rate of 37%. The number of ships called was 10½ in 1989-90 increased in shipping activity over the previous period.

There has been an increase in the Operating Income for Rs. 519.43 lacs in 1980-81 to Rs. 1,379.41 lacs in 1985-86, to 1989-90 Rs. 2,099.04 lacs and Rs. 3,355.55 in 1993-94. There was also a rising trend in the Operating Expenditure for the year, 1980-81, (Rs. 482.83), 1985-86 (Rs. 829.07, 1989-90 (Rs. 1,273.88) and 1993-94 (Rs.2209.34.

There was a net deficit of Rs. 13.23 lacs in 1980-81, the year 1985-86 showed a net surplus of Rs. 18.03 lacs, Rs. 14.40 crores in 1989-90 and Rs. 50.21 lacs in 1993-94.

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P A R T - AC H A P T E R - IVMAJOR PORT - FINANCIAL INDICATORS2. VISAKHAPATNAM PORT TRUST1980-81 :

The Operating Income for the year 1980-81 was Rs. 3,666.28 lacs. The Finance & Miscellaneous income was Rs. 294.72 lacs. The Operating Expenditure was Rs. 2,975.72 lacs. The Finance & Miscellaneous Expenditure was Rs. 1,342.37 lacs. This resulted in a deficit of Rs. 346.32 lacs. Though there was an increase in income due to increase rail borne traffic and levies of various sea charges on port rates and charges for inner harbour traffic, and revision on port charges on Iron Ore traffic at Outer Harbour to yield Rs. 30.15 per tonne. Graph No 4.

During the year, 1980-81, the Port was open to Ocean-going vessels. The total traffic handled in 1980-81 was 117.45 lac tonnes. A net surplus Rs. 43.18 lacs on account of pilotage earnings or fees with effect from 28.2.1980. Balance available in depreciation reserve is nil, as the entire balance amount sent to General reserve shows a deficit of Rs.26.88 crores as on 31-3-1981.

Imports during the year 1980-81 was 4,059,490 tonnes and Exports increased to 6,201,329 tonnes.

Capital works project, 65 works (capital) were sanctioned during the year, amounting to Rs. 304.33 lacs. Capital works aggregating Rs. 10,619.96 lacs on the Outer Harbour and Rs. 613.50 lacs on the fishing harbour. The Pilotage account showed a surplus of Rs. 43.18 lacs in 1980-91.

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(64) Source : Annual Reports of the Port of Tuticorin for the years 1980-81, 85-86, 89-90 & 1993-94 resp. pp 81-90.

1985-86 :

The Operating Income was Rs. 6,908.45 lacs. The Operating Expenditure was Rs. 4,603.90 lacs. The decrease in Finance and Miscellaneous Income is due to withdrawal of income on Capital dredging, Rs.264.39 lacs.

The increase in Finance & Miscellaneous Expenditure Rs. 1,704.66 was due to salaries and wages by Rs.211.93 lacs, increase in stores expenditure, and new minor works, special repair, wagon hire. The year's working disclose a surplus of Rs. 858.00 lacs (Operating Surplus Rs.864.28).

The traffic handled in 1985-86 was 159.12 lac tonnes. Imports 6,443,380 tonnes. Exports 6,970.000 tonnes. The number of ships sailed in 1985-86 was 756.

There were no strikes by the employees, but one bandh call and two stoppages of work during the year.

1989-90 :

The years working disclosed a net surplus of Rs.989.25 lacs, as against the preceding years for Visakhapatnam Port.

The Operating Income was Rs. 12,244.62 lacs and Operating Expenditure of Rs. 6,979.84 lacs. The Finance & Miscellaneous Income was Rs. 776.00 lacs and Finance & Miscellaneous Expenditure was Rs. 2074.34 lacs. Operating Surplus was Rs. 3,996.43 lacs and Net Surplus was Rs. 989.25 lacs.

An unprecedented traffic level of 21.12 million tonnes of traffic was handled in 1989-90, the highest ever in the history of the Port was 126 percent utilisation of 16.7 million of handling Capacity of the Port. The growth rate of 4 percent was registered the target

of 18.95 million tonnes was exceeded in 1989-70. Imports Rs. 93.38 lacs tonnes, Exports were 107.07 lacs tonnes. Transshipment cargo was 10.72 lacs tonnes.

The number of ships call was 839. Capital works project like construction works on the Outer Harbour and Fishing Harbour are in progress. Industrial relations were peaceful during the year.

1993-94 :

The Operating Income was Rs. 18,096.26 lacs. The Finance & Miscellaneous Income was Rs. 2,129.71 lacs. The Operating Expenditure was Rs. 11,046.05 lacs. The Finance & Miscellaneous Expenditure was Rs. 3378.50. The Operating Surplus was Rs. 5,801.42 lacs in 1993-94. The Net surplus was Rs. 130.03 lacs.

The Traffic handled was 25.60 m. tonnes. Exports during 1993-94 was 12.67 m. tonnes. Imports during 1993-94 was 11.47 m. tonnes. Transshipment cargo during 1993-94 was 1.45, . tonnes. Passenger traffic was disembarked 7,380 Nos and embarked 4,633 numbers.

1074 ships entered the Port in 1993-94. There was 62 Capital Works, the total sanctioned cost of these works are Rs. 2664.77 lacs. Industrial relations were peaceful.

There was a steady increase in Operating Income, in 1980-81. Operating Income was Rs. 3,666.28 lacs in 1985-86 the Operating was Rs.6,908.45 in 1989-90 Rs. 12,741.62 and Rs. 18,096.26 in 1993-94 about 45% increase since 1980-81 was Rs. 2,975.72 for 1985-86, Rs.4,603.90 and 1989-90 - Rs. 6,979.84 and Rs. 11,046.05 for 1993-94 had been steadily increasing as the volume of traffic of the Port increases.

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Operating Surplus for 1980-81 showed a deficit of Rs. 346.36 lacs in 1985-86 it showed Rs.864.28 as Surplus, and in 1989-90 it was Rs.3,996.43 by 1993-94 it was Rs. 5,801.42 showing the Ports Finances as sound. There was a net surplus of Rs. 43.18 lacs, 1980-81 of Rs. 858.04 lacs, 1985-86, and Rs. 989.25 lacs, 1989-90 and Rs. 13.03 crores in 1993-94.

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P A R T - A  
C H A P T E R - IV  
111) MADRAS PORT TRUST

1980-81 :

The operating income was Rs. 3,953 lacs during 1980-81, (65.)  
the Finance and Miscellaneous income was Rs. 448.14 lacs.

The operating expenditure was Rs. 2,601.06 lacs. The  
finance and Miscellaneous expenditure was Rs. 548.74 lacs.

The Operating surplus was Rs. 1,352.64 lacs, a net  
surplus of Rs. 33.69 lacs.

The port recorded an all time high record of 10.45  
million tonnes, 1120 merchant vessels were handled during  
the year. The export traffic was 3.96 million tonnes and  
the import traffic was 6.42 million. The additional commi-  
tment on account of the revision of scales of pay, by an  
agreement reached by the Government of India, with the  
Labour Federations for Class III and Class IV employees  
from 1st January 1980 was Rs. 156 lakhs. Graph No. 3

1985-86 :

The total operating income was Rs.9,118.14 crores,  
the Finance and Miscellaneous income was Rs. 7.21 crores.  
The Operating Expenditure Rs. 507.21 is mainly due to  
salaries and wages, and escalation in the cost of stores,  
and other consumables commodities. The Finance and Mis-  
cellaneous expenditure was Rs. 11.24 crores.

The Operating Surplus was Rs. 40.47 crores. A net  
surplus of Rs. 81.70 crores is carried over to general  
reserve during the year.

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(65) Source : Annual Report of Madras Port Trust, Madras,  
1980-81, 85-86, 89-90 & 93-94 resp. Appdx XI.

1985-86 was a growth oriented year with a need though put of 18.15 million tonnes. Imports increased by 1.25 million tonnes and exports increased by 0.96 million tonnes. In 1985-86, 1.80 million tonnes of cargo were transhipped.

The total number of vessels that called at port was 1864.

Railway traffic was 5,604.854 tonnes. The cargo handling equipment was working satisfactory throughout the year.

Payments made towards pension and gratuity during the year amounted to Rs. 2.69 crores.

1989-90 :

The Operating Income was Rs. 131.01 crores, during the year 1989-90. The Finance and Miscellaneous income was Rs. 17.31 crores. The increase in Operating Income was mainly due to the traffic increase in ores and general cargo traffic, also increase in container traffic.

The Operating Expenditure was 73.21 crores. The increase in expenditure is mainly due to pay revision to Class III and IV employees, normal increments and increase in variable dearness allowance.

The Finance and Miscellaneous Expenditure was Rs. 15.61 crores.

The Operating Surplus was Rs. 57.80 crores, a net surplus of Rs. 98.84 lakhs was carried over to general reserves during the year.

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The imports increased by 6.25 percent, the tonnage being 134,06,140. The exports increased by 2.02 percent, the tonnage being 9,152,830.

The total traffic was 23.94 million tonnes. The total number of vessels called at port in 1989-90 was 2,777 numbers. The railway traffic was 95,66,419 tonnes, and charges collected were freight Rs. 772.41 lakhs. Haulage charges Rs. 476.91 lacs. During the year, there were 5 strikes/stoppages of work. This included the all India port 17th from 19th to 22nd April 1989. The total mandays lost was 61.011.

1993-94 :

The total operating income was Rs. 216.28 crores in 1993-94. The Finance and Miscellaneous income was Rs. 84.01 crores.

The Operating Expenditure was Rs. 106.88 crores. The Finance and Miscellaneous expenditure was Rs. 48.60 crores.

The Operating Surplus was Rs. 109.39 crores with a Net Surplus of Rs. 95.21 lakhs.

The total traffic handled was 26.54 million tonnes. Import was 15,930,362 m. tonnes and export 8,713,620 m. tonnes.

The total number of vessels that called at port was 1,863. The number of containers handled increased to 23.1 percent.

The Operating Income for Madras Port from 1980-81 was Rs. 3,953.70 lacs, this increased to Rs. 91.18 crores in 1985-86, and Rs. 131.10 crores in 1989-90 and to Rs.216.28 crores in 1993-94.

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The Operating Expenditure also increased in proportion to the Operating Income as such from Rs. 260.66 lacs to Rs. 5,071.21 crores in 1985-86, to Rs. 7,320.62 in 1989-90, and declined to Rs. 1,068.80 crores in 1993-94.

The net Surplus showed a rising trend from Rs.33.69 lacs in 1980-81, to Rs. 81.70 lacs in 1985-86, and Rs. 98.87 lacs in 1989-90. A small decrease in 1993-94 to Rs. 95.21 lacs.

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P A R T - A  
C H A P T E R - IV  
PORT PERFORMANCE AND FINANCIAL INDICATORS

V) BOMBAY PORT TRUST

1980-81 :

The Operating Income for the year Rs. 89.14 crores was higher than previous years. The bulk (Rs.4.76 crores) was higher than previous years, was mainly due to cargo handling and storage, demurrage fees (Rs.1.37 crores), wharfage on general cargo Rs.2.04 crores and on POL (Rs.1.13 crores). The increase under port and dock facilities is Rs. 0.75 crores, port dues (Rs.0.4 crores), towage and mooring (Rs. 0.28 crores). Graph No.1.

The Operating Expenditure for 1980-81 was Rs. 57.88. This increase was mainly under salaries/wages and allowances (Rs.6.62 crores) due to revision of pay and allowances of Class III and Class IV employees. Other items of increase are stores, Sundry Expenses (Rs. 0.38 crores), Electric Power (Rs. 0.13 crores) Depreciation (Rs.0.15 crores.).

The Finance and Miscellaneous Income was Rs.18.19 crores and Finance and Miscellaneous Expenditure was Rs. 14.58 crores.

The Operating Surplus during the year was Rs. 31.26 crores. Increase in the total expenditure being more than total income, the net surplus was for the year Rs.34.87 crores. Out of this surplus, a contribution of Rs.20.00 lacs was made to the Employees Welfare Fund and Rs.4.64 to increase cost of replacement of assets.

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(76) Source : Annual Report of Bombay Port Trust Bombay, 1980-81, 85-86, 89-90 & 93-94, resp. pp.86.

The cargo traffic handled in 1980-81 was 17.571 mil. tonnes. The number of ships called at port was 3,307.

Government's assistance may be required for meeting the expenditure of Nhava Shewa Port Project, which is likely to cost Rs. 400 crores.

The labour situation of the port trust was unsettled due to strikes for demand in revision of pay from 1-4-1980.

1985-86 :

(7)

The Operating Income for 1985-86 from Bombay Port Trust was Rs. 163.50 crores.

The Operating Expenditure of Rs. 106.43 crores, showed an increase of Rs. 9.16 crores (Rs.97.27 crores) in 1984-85 and other years.

There was an Operating Surplus of Rs. 57.07 crores.

The Finance and Miscellaneous Income for the year (Rs. 43.43 crores). This was mainly due to availability of larger cash balances for investment.

The Finance and Miscellaneous Expenditure showed a decrease of Rs. 9.50 crores from the preceding year was Rs. 27.93 crores.

The Net Surplus was Rs. 72.57 crores. This is mainly due to increase in Operating Income and fall in Finance and Miscellaneous Expenditure.

The traffic handled at the port in 1980-81 was 24.40 m. tonnes. The number of ships that entered the port was 4,238 in 1980-81. The port handled 2,14,691 containers. The port was congestion free during the year under review.

1989-90 :

The Operating Income during 1989-90 aggregated Rs. 223 crores. The Finance and Miscellaneous Income amounted to Rs. 62.41 crores.

The total expenditure during 1989-90 increased to Rs. 211 crores. The Operating Expenditure was Rs. 162.32 crores. The wage revision of port and dock workers from 1-1-1988 and enhanced contribution towards pension fund were mainly responsible for increase in total expenditure .

The Operating Surplus amounted to Rs. 62.07 crores. Net surplus amounted to Rs. 74 crores. After contributing another Rs. 8.45 crores to other earmarked funds, the Net Surplus transferred to general reserve fund amounted to Rs. 2.28 crores.

The traffic handled was 281.29 m. tonnes and the number of ships called was 4,326.

The internal resources of the port have been the net internal resources amounted to Rs. 222 crores.

The port's modernisation and development programmes gained momentum. The ports Eighth Five Year Plan envisages an outlay of Rs. 450 crores. The emphasis on replacement rehabilitation and modernisation of transit, sheds, cargo handling equipments, floating craft, tele-communications systems etc. to enable the port to give efficient service and at reduced cost.

The traffic of imports was 13.9 m. tonnes and export traffic was 14.6 m. tonnes.

There were a number of strikes of labour in 1989-90.

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1993-94 .:

The ports Operating Income was Rs. 417 crores (Rs. 365 crores) in the preceding years.

The Operating Expenditure was Rs. 239.94 crores. Net surplus before transfers to/from reserves and funds was Rs.178.25 crores. Surplus after transfers to/from reserves and fund was Rs. 0.28 crores.

The financial front the ports income went up by 14 per cent and the surplus by 35 percent.

4,914 vessels called at the port. The import traffic was 17.14 m. tonnes, and export traffic was 13.61 m. tonnes. The total traffic including POL was 30.75 m. tonnes. Industrial relations were generally cordial barring a few incidents of strikes/stoppages of work.

In the year 1993-94, Rs. 68 crores was generated from investment of surplus funds and from other miscellaneous/unclaimed cargo, old capital assets, etc. On account of Rs. 240 crores was spent on operating services.

To build sufficient resources for development, modernisation programme, Rs. 178 crores has been set aside from the surplus Rs. 4.25 crores has been earmarked for Miscellaneous Welfare measures governed by welfare fund from the net surplus of Rs. 183 crores in 1993-94.

For the years, under review, that is the Operating Income for 1980-81 was rising from Rs. 8,914.45 crores to Rs. 168.50 crores.

In 1985-86 was Rs. 223.38 crores, in 1989-90 and Rs. 416.68 for 1993-94, an increasing trend, corresponding to the traffic of the port. The Operating Expenditure

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rose from Rs. 5,788.87 lacs in 1980-81 to Rs.240 crores in 1993-94, (Rs.106.43 lacs in 1985-86 and Rs.161.32 crores in 1989-90).

The Net surplus was Rs. 8029.64 lacs in 1980-81, and Rs. 5415.31 lacs in 1985-86 and Rs. 2.28 in 1980-90 to Rs. 0.28 crores in 1993-94. There is a decline in the net surplus over the years, this is due to meeting the needs to build sufficient resources for development, modernisation programme and welfare fund.

P A R T - A

C H A P T E R - I V

11) CALCUTTA PORT TRUST

1980-81 :

Operating income during 1980-81 was Rs. 96.68 crores. Finance and miscellaneous income was Rs.4.97 crores. The Operating Expenditure was Rs. 83.10 crores. The Finance Miscellaneous Expenditure was Rs. 15.18 crores. Graph No.2

Operating surplus was Rs. 1,293.28 crores and a Net Surplus of Rs. 3.27 crores, as the total traffic was 95.12 lac tonnes. Import traffic was 6988 and export was 2302 lakh tonnes traffic. In imports, the rise was mainly due to increase in POL traffic-4850 lac tonnes and fertilizer by 625000 tonnes. There was a rise in container traffic at both Calcutta and Haldia. The revenue account for Calcutta Dock system closed with a deficit of Rs. 5.26 crores and that for Haldia Dock complex a surplus of Rs. 7.93 crores. The net surplus of Rs. 3.27 crores. The overall financial performance of the year was satisfactory.

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(65) Source : Annual Reports of Calcutta Port Trust Calcutta, 1980-81, 85-86, 89-90 and 93-94, resp. pp17 App IV

due to increase volume of traffic. The increase in expenditure was due to general rise in prices, steep rise in cost of POL products and steady rise in establishment dues to revision of wages.

1045 ships called at Calcutta Dock system and Haldia Dock complex in 1980-81.

1985-86 :

Calcutta and Haldia Dock Systems the total Operating Income for both dock systems was Rs. 146.53 crores. The Operating Expenditure was Rs. 123.73 crores.

The Finance and Miscellaneous Expenditure was Rs.24.72 crores. At Calcutta Dock System, there was a deficit of Rs. 12.87 crores in 1985-86 as against a surplus year earlier. For the two dock systems together, the financial year 1985-86 for a Calcutta Port ended a net deficit of Rs. 1.92 crores. The combined revenue account closed with a net deficit of Rs. 13.06 crores. The rise in expenditure was mainly due to salaries and wages, consumption of oil and miscellaneous expenditure items. The traffic handled at the Calcutta Port was 105.24 lac tonnes an increase of 15.23 percent. Container handling increased by 45.3 per cent both at Calcutta Dock system and Haldia Dock. The number of vessels that called at Calcutta Dock was 869 and at Haldia Dock 567 Nos. A second oil jetty is being constructed at Haldia at an estimated cost of Rs.35.71 crores.

1989-90 :

The total Operating Income for Calcutta Port Trust was Rs.247.37 crores, and total Operating Expenditure was Rs.198.91. This includes the combined income and expendi-

(66)



ture of Calcutta Dock System and Haldia Dock System. The financial working showed net surplus of Rs. 48.45 crores before appropriation (Rs. 2.55 crores for CDS and 45.90 crores for HDS), their results showed an improvement over the previous years.

In 1989-90 the total income for CDS and HDC together was Rs. 247.36 crores, as compared to the previous years income of Rs. 227.98 crores, an increase of Rs. 19.38 crores was mainly due to increased handling of traffic. Also increase in the earnings of transit sheds, (demurrage) also had contributed to the increased income. Traffic handled was 14,223 million tonnes.

After appropriation, the Revenue Account of Calcutta Dock System closed with a net surplus of Rs. 2.29 crores.

In 1989-90, 1393 vessels called at both Calcutta and Haldia dock systems.

At CDS during 1989-90, there were three cases of strikes/stoppage of work resulting in loss of 1,12,860 mandays. This includes the all India strike by port and dock workers during 16th April 1989 to 20th April 1989, causing a loss of 1,12,495 mandays. Due to Bharat Bandh on 30th August 1989, 5,177 mandays were lost. Altogether 1,18,037 mandays were lost during the year 1989-90.

#### 1993-94 (CDS & HDS)

The total operating Income of Calcutta Port Trust (CDS & HDS) taken together, during the year i.e. 1993-94 was Rs. 413.19 crores. The Operating Surplus was Rs.76.89 crores (Rs.17.37 crores for Calcutta and Rs. 59.52 crores for Haldia Dock).

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The total expenditure registered an increase of Rs. 45.52 crores.

Out of the Revenue Surplus of Rs. 59.52 crores for 1993-94 of Haldia dock system a sum of Rs.38.39 crores has been appropriated for making provision for meeting expenditure on plan and non-plan capital works of Haldia which were executed during 1993-94, and also these stated for execution during future years and the balance Rs.2.47 crores has been provided for repayment of government loans. In the revenue account of 1993-94 dredging subsidy receivable from the government has been considered as income. The total number of vessels called at CDS and HDS combined was 1,452.

The volume of cargo handled by Calcutta Port during 1993-94 was 184.96 lac tonnes, export traffic of the port increased by 8.57 lac tonnes, whereas import traffic decreased by 6.98 lac tonnes during 1993-94.

The total number of merchant vessels were 1457 which left CDS and HDC.

The Operating Income for 1980-81, Rs. 9,667.69 crores, rose to Rs. 146.53 crores for 1985-86, and increased to Rs. 24.736 crores for 1989-90. In 1993-94 it was Rs. 413 crores. Similarly the total Operating Expenditure rose from Rs. 8,319.12 crores to Rs. 123.73 crores for year 1985-86, in 1989-90 it was Rs. 1989.12 crores shows a decrease as compared to the total income. The operating Expenditure in 1993-94 increased to Rs. 252.29 crores and was more than in previous years. The Operating Surplus had a marginal increase in 1980-81, but a deficit 1985-86 Rs. 1.92 crores. In 1989-90, it had a surplus of Rs.48.45 crores and Rs. 76.89 in 1993-94. The net surplus increased from Rs.(-) 3.27 to Rs.44.68 crores in 1993-94.

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P A R T - A  
C H A P T E R - IV  
P O R T P E R F O R M A N C E  
A N N U A L C A R G O T R A F F I C

6. IV.

(in 000 tonnes)

Port Name	Imports	Exports	Total
<u>Year 1980-81 :</u>			
Tuticorin	2120	4437	2631
Visakahpatnam	4059	6201	1174
Madras	6412	3962	1044
Calcutta	6988	2302	9512
Bombay	1827	4294	1757
<u>Year 1985-86 :</u>			
Tuticorin	4016	2090	4229
Visakhapatnam	6443	6970	1590
Madras	9303	7040	1814
Calcutta	8520	3607	1219
Bombay (67)	1198	1241	2440

(67) Source : Annual Reports, of 1980-81, ~~85-86~~, 1989-90, 1993-94. (Bombay Port) pp. 8 & 13

PORT PERFORMANCE  
ANNUAL CARGO TRAFFIC

6 (IV)

(in 000 tonnes)

Port Name	Imports	Exports	Total
<u>Year 1989-90 :</u>			
Tuticorin	4900	424	5324
Visakhapatnam <sup>(68)</sup>	934	107	2112
Madras	1340	9152	2993
Calcutta	9756	4938	1468
Bombay	1390	1460	2855
<u>Year 1993-94 :</u>			
Tuticorin	5606	1094	6700
Visakhapatnam <sup>(69)</sup>	115	1267	2559
Madras	1593	8713	2654
Calcutta	1221	6279	1849
Bombay	1714	1371	3075

(68) Source : Annual Report of each Port. (Visakhapatnam Port)

1980-81, 1985-86, 1989-90 &amp; 1993-94 pp. 12 &amp; 11.

(69) ibid pp xi

P A R T - A  
C H A P T E R - IV  
P O R T P E R F O R M A N C E

7 &amp; 8

Ports name	1980-81	1985-86	1989-90	1993-94
<u>Number of Employees</u> : <sup>(70)</sup>				(in nos)
Tuticorin Port	2258	2236	2270	2192
Visakhapatnam Port	12047	11950	10848	10337
Madras Port	11917	12128	11346	11918
Calcutta Port	32665	27180	23643	21006
Bombay Port	30793	30736	29349	26952
<u>Number of Ships Arrival</u> <sup>(71)</sup>				(in Nos)
Tuticorin Port	354	452	638	806
Visakhapatnam Port	518	754	838	1074
Madras Port	1120	1864	2717	1863
Calcutta Port	1045	1358	1393	1452
Bombay Port	3307	4238	4147	4914

(70) Source : Annual Reports of each port. (Madras Port )  
1980-81, 1985-86, 1989-90 & 1993-94 pp.XViii, 17, 19; 26  
(71) *ibid* . pp. XV; 11; 14. 14.

P A R T - A  
C H A P T E R - IV  
P O R T P E R F O R M A N C E

(In Nos) 9 x 10

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Port Name	1980-81	1985-86	1989-90	1993-94
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<u>Average Turn Round Time of Ships in Days :</u>				
Tuticorin	3.1	5.9	4.7	5.7
Visakhapatnam <sup>(72)</sup>	6.0	5.7	5.6	5.9
Madras 8	9.2	9.5	6.3	6.2
Calcutta	9.2	11.3	8.3	8.1
Bombay	9.2	9.9	7.9	8.7
 <u>Berth Occupancy in Days in Percentage</u>				
Tuticorin	78.0	64.18	73.3	85.0
Visakhapatnam	50.0	69.31	63.26	69.25
Madras	70.0	77.36	88.90	80.41
Calcutta	63.5	69.73	63.44	69.75
Bombay	78.32	72.5	78.9	75.71
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(72) Annual Reports of each Port for the years (Visakhapatnam)  
1985-86 pp 11V & 38.

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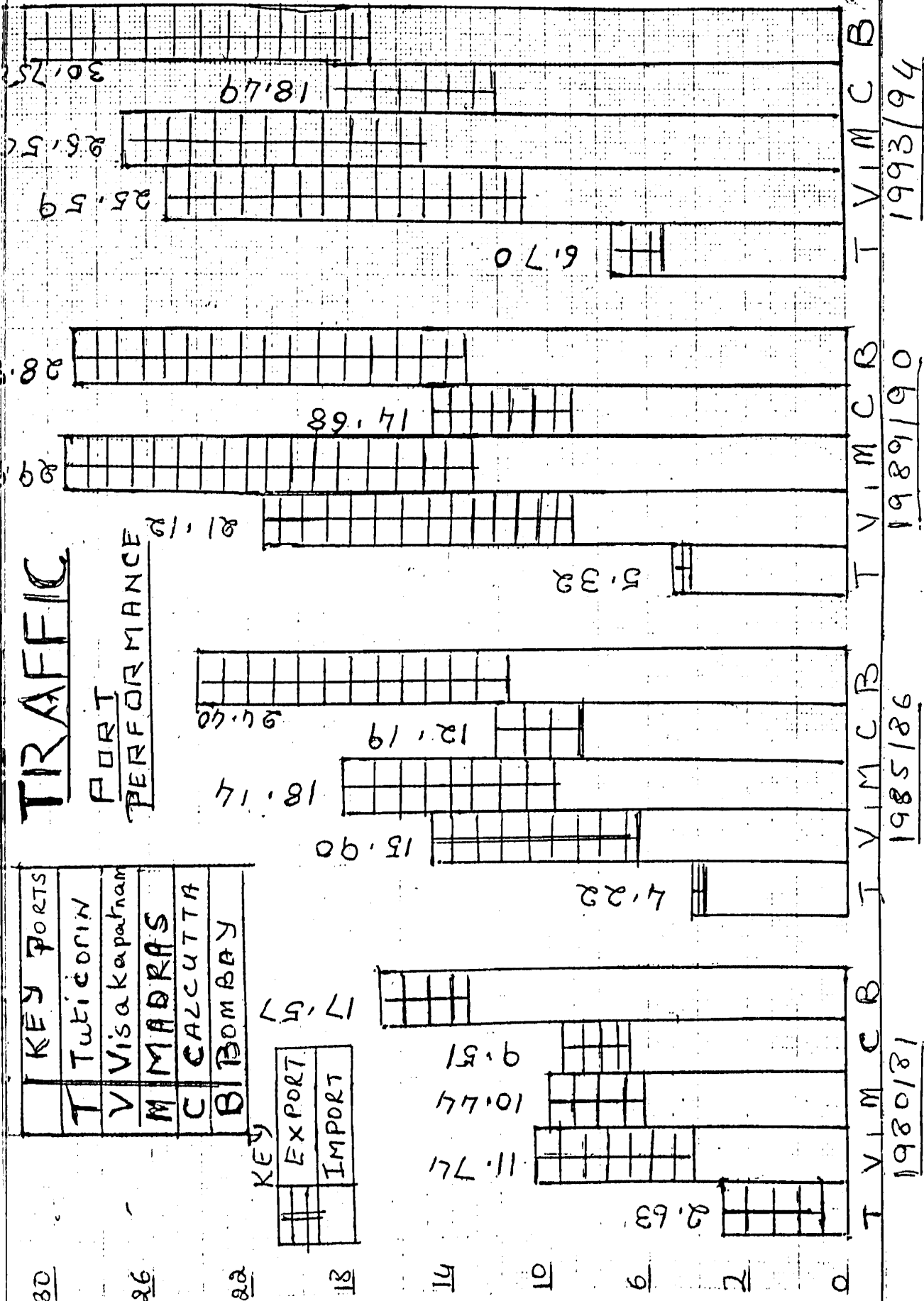
Source : Annual Reports of each port.  
1980-81, 1985-86, 1989-90, & 1993-94 pp. 11V & 38.

# TRAFFIC

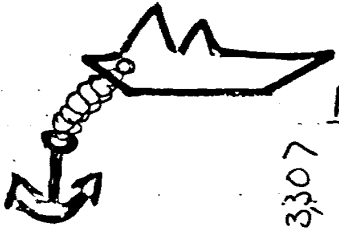
## PORT PERFORMANCE

KEY PORTS
T Tuticorin
V Visakhapatnam
M MADRAS
C CALCUTTA
B BOMBAY

KEY
EXPORT
IMPORT



# SHIPS ARRIVAL



## PORT PERFORMANCE

4000

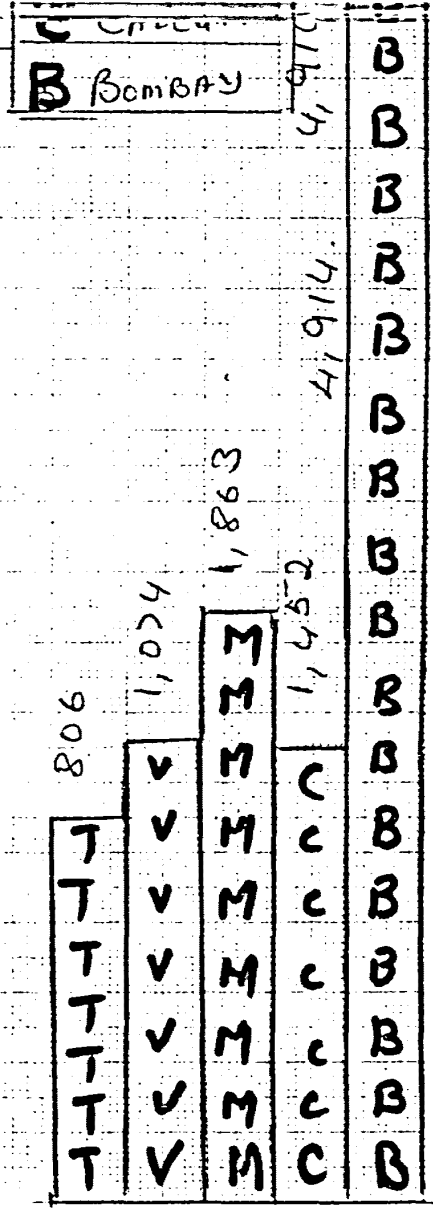
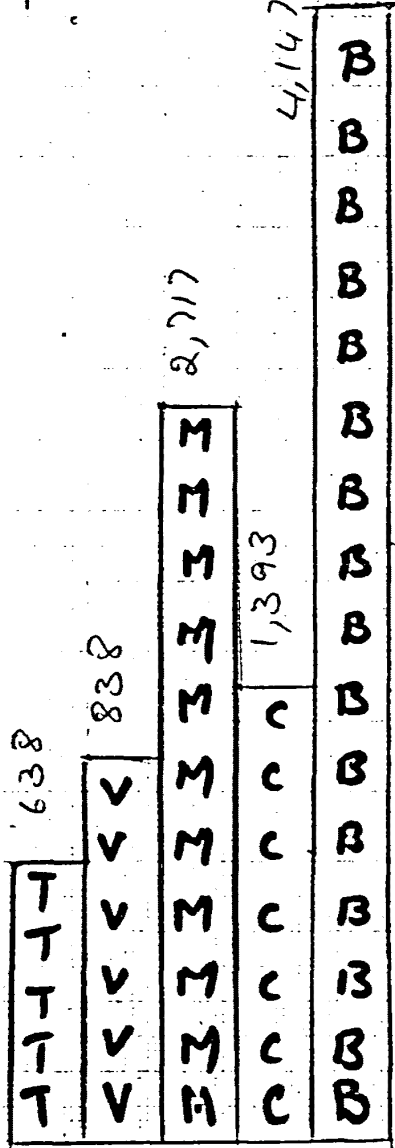
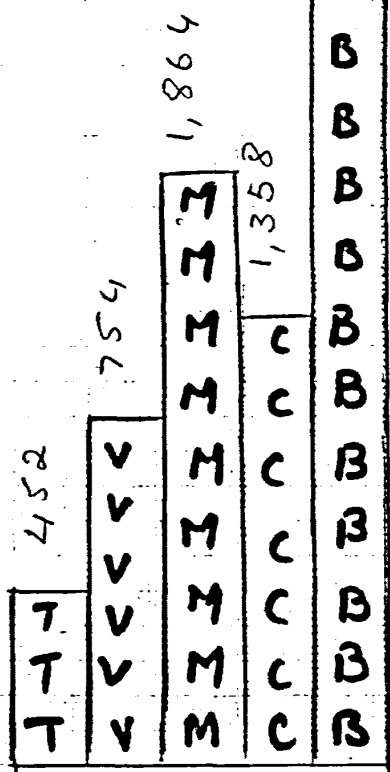
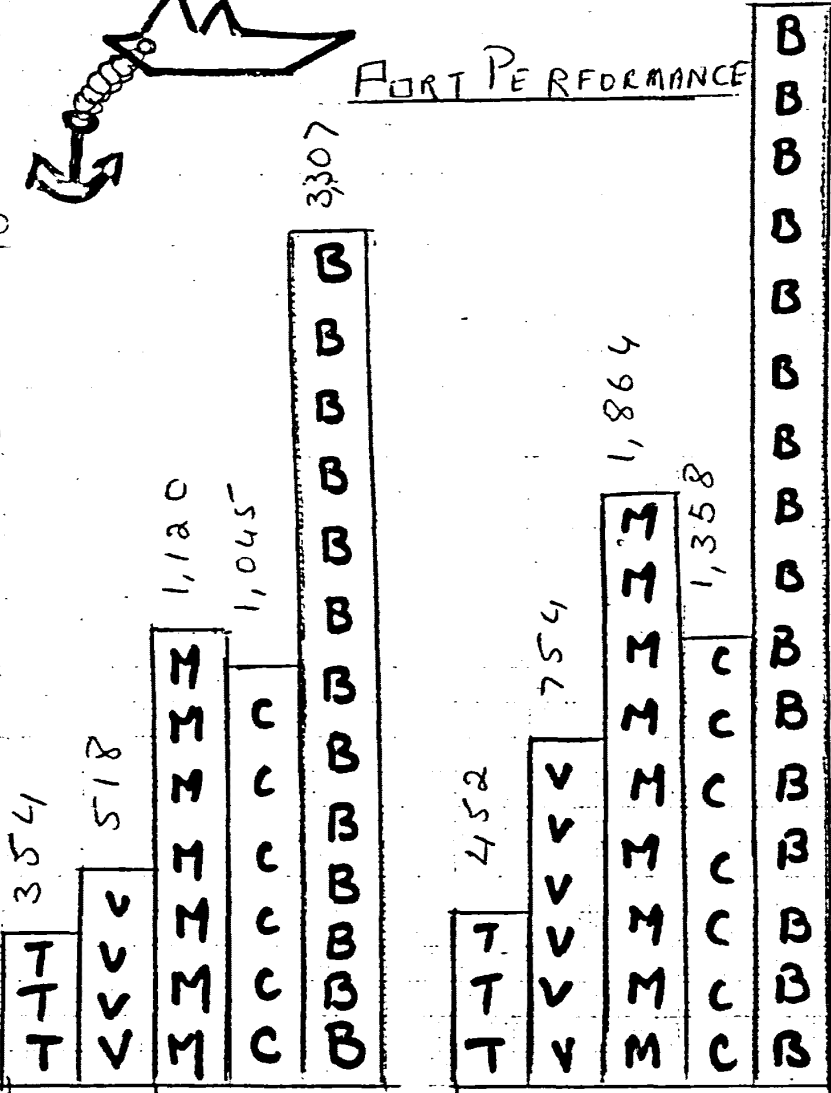
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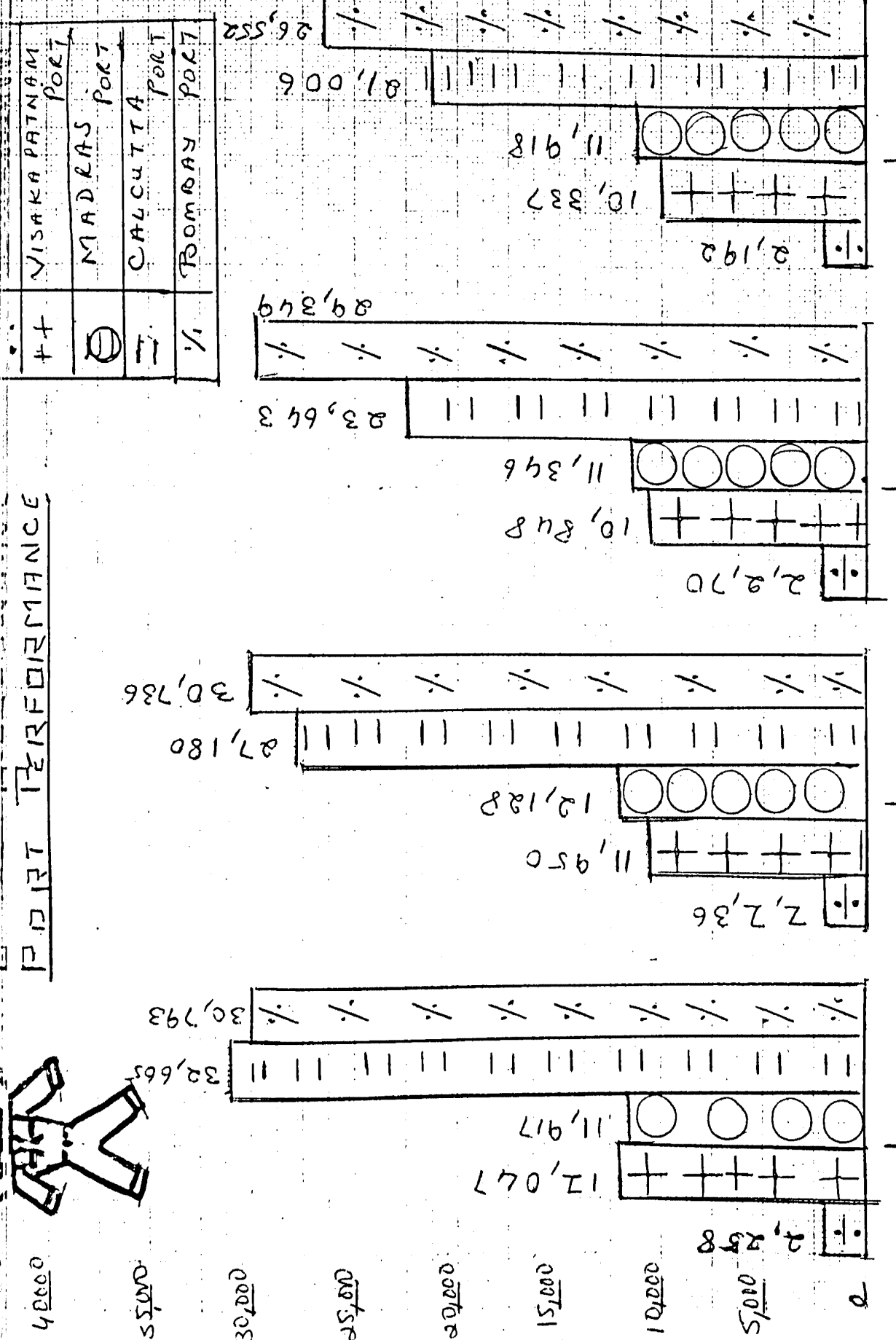
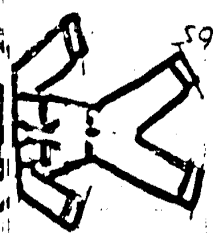
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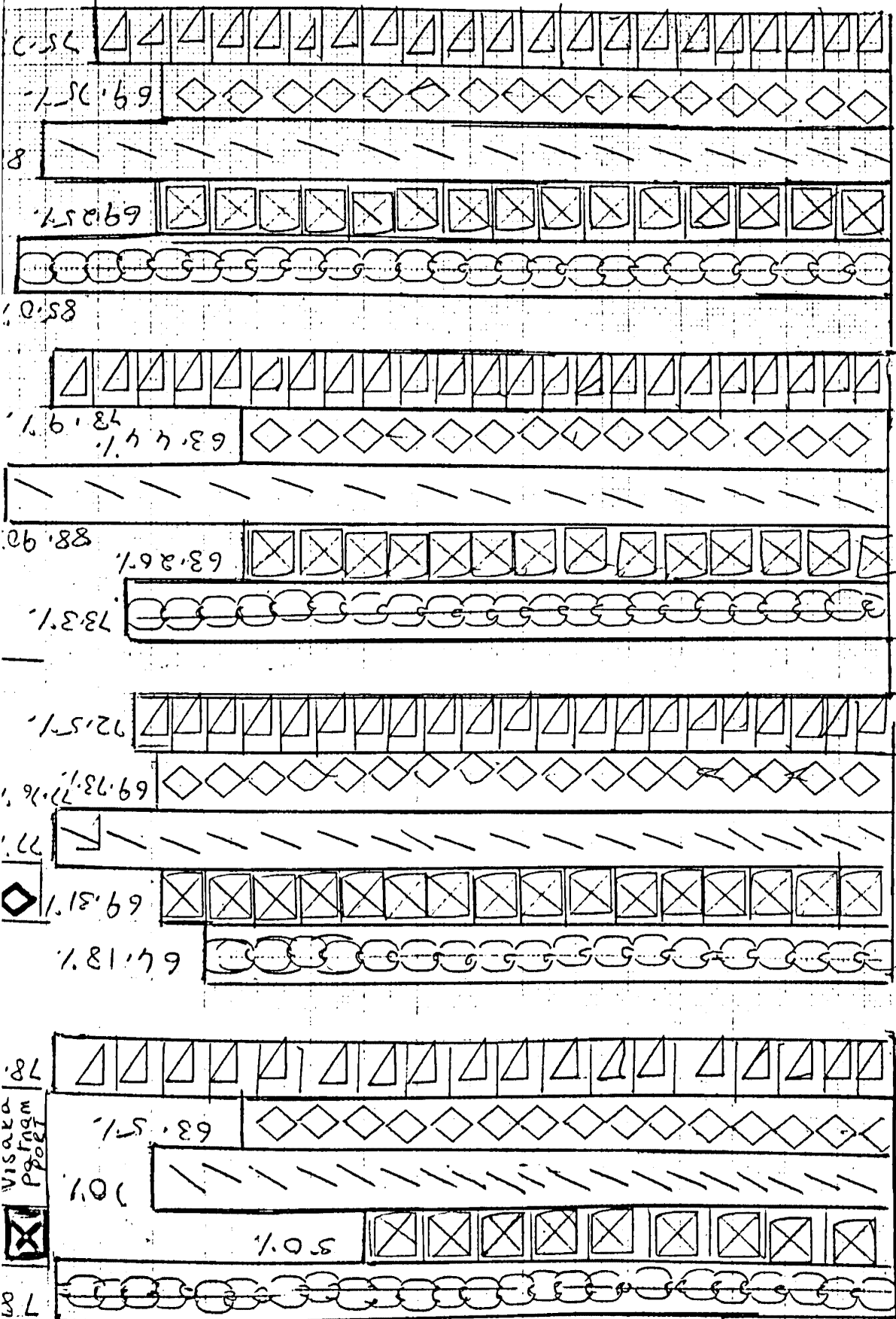


PART A IV No 7. 100

PORT PERFORMANCE



40000  
35000  
30000  
25000  
20000  
15000  
10000  
5000  
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1993-94  
 1989/90  
 1985/86  
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visado  
P. Pringm  
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8 7 6 5 4 3 2 1 0

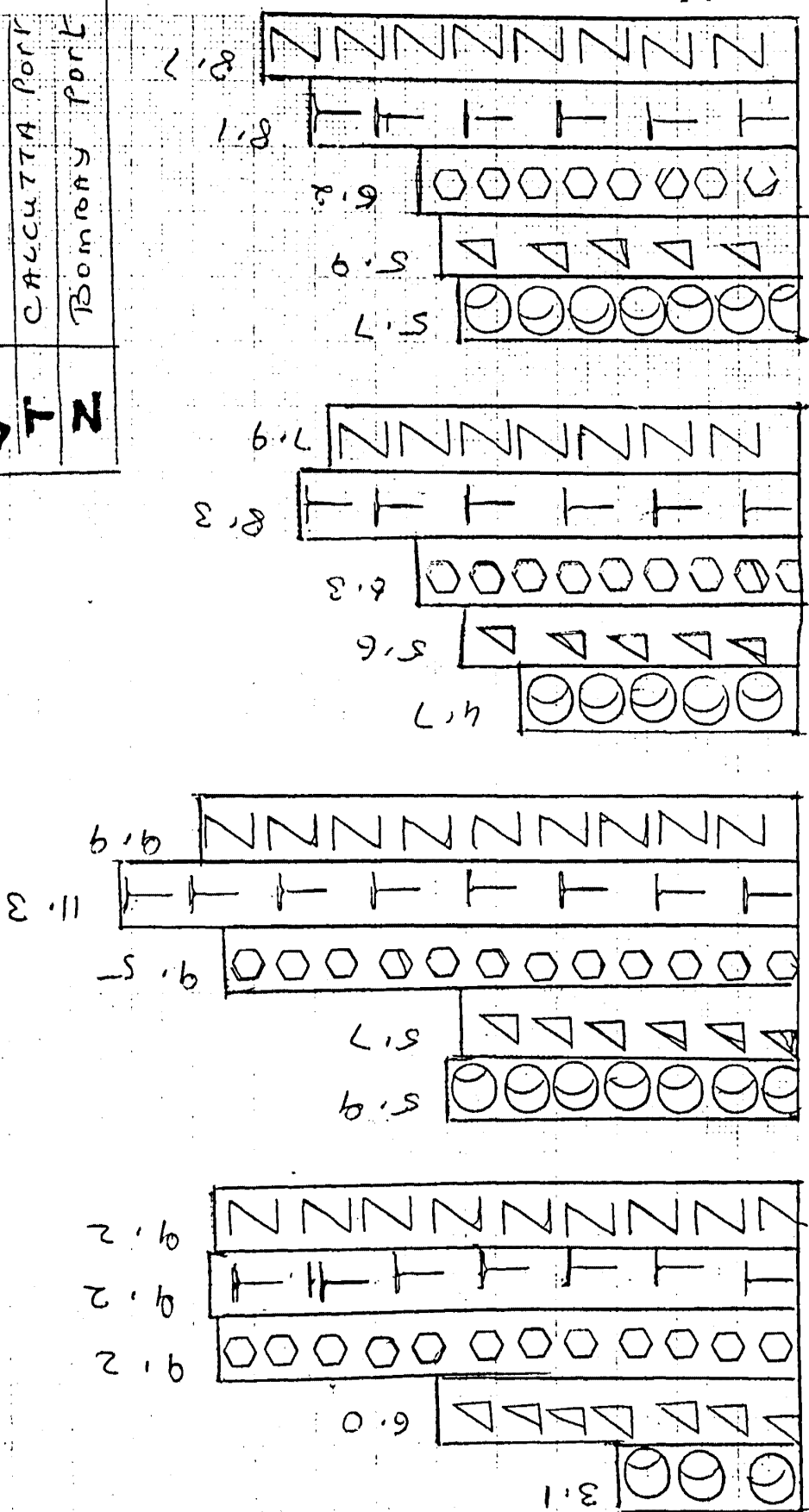
PORT PERFORMANCE.

KEY

0	TUTICORIN PORT
7	VISAKHAPATNAM PORT
Q	MADRAS PORT
T	CALCUTTA PORT
N	BOMBAY PORT



16  
14  
12  
10  
8  
6  
4  
2  
0



1980/81 1981/82 1982/83 1983/84 1984/85

P A R T - A  
C H A P T E R - IV  
PORT PERFORMANCE

V1) Annual Cargo Traffic  
For the year under review 1980-81 :

The traffic handled at the Five Major Ports of India, namely Tuticorin, Visakhapatnam, Madras, Calcutta and Bombay Ports showed a big difference in the tonnage handled. This is mainly due to the capacity of the Port, the target given by the Surface Ministry of Transportation, and the number of ships that called at each Port, and other technical details such as the situation or Location of the Port, (Calcutta & Madras & Visakhapatnam Port on the East Coast of India, Tuticorin Port on the South Coast of India, and Bombay on the West Coast of India.

The Average Turn-round time of ships, the Employment of Labour, the utilisation of machinery and other equipment, the number of Berths in each Port, the number of transit sheds, storage areas, and connecting transportation like Road and Railways.

Form the Statement No. 6(IV) Graph No. 6IV  
the trend of traffic through each of the Ports and years in comparision with each of them.

In 1980-81, Tuticorin Port registered a traffic of 2.631 lacs tonnes, Visakhapatnam Port, 117.45 lac tonnes, Madras Port, 10.45 lac tonnes, Calcutta Port, 95.12 lac tonnes, Bombay Port 175.21 lac tonnes.<sup>(73)</sup>

In 1985-86, Tuticorin Port registered a Traffic of 42.25 lac tonnes, Visakhapatnam Port was 159.12 tonnes Madras Port, 181.5 lac tonnes, Calcutta Port 121.27 lac tonnes together with Haldia Dock System, 7964 lac tonnes and Calcutta Port 4163 lac tonnes together, 12127 lac tonnes. Bombay Port recorded 2440 lac tonnes.

(73) Source : Annual Reports of Bombay Port Trust, Calcutta, Port Trust, Madras Port Trust Visakhapatnam Port Trust, & Tuticorin Port Trust, 1980-81, 85-86, 89-90, 93-94. pp. 22,33;28; 40;41.

P A R T - A  
C H A P T E R - IV  
P O R T P E R F O R M A N C E

V1) Annual Cargo Traffic

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In 1989-90, Tuticorin Port recorded a traffic of 53.24 lac tonnes, Visakhapatnam Port handled 2112 lac tonnes. Madras Port 239.4 lac tonnes and Calcutta Port volume of cargo handled was 146.89 lac tonnes for Calcutta/Haladia Dock Complex. Bombay Port recorded a traffic of 2855 lac tonnes.

In 1993-94 the traffic handled at Tuticorin Port was 67.00 lac tonnes, Visakhapatnam Port Traffic was 255.9 lac tonnes. The total throughput of Madras Port was 26542 lac tonnes. Calcutta Port recorded 184.96 lac tonnes, and Bombay Port handled 3075 lac tonnes.

The Port capacity in all Major Ports was 1690 lac tonnes in 1993-94.

In 1990, the Ports capacity are as follows :

<u>Ports Capacity</u>	<u>M.tonnes</u>	<u>Utilisation</u>
Bombay Ports	26.80	108%
JL Nehru Port	5.90	
Calcutta/Haldia D.C.	23.53	82.5%
Madras	22.07	115%
Visakhapatnam	23.53	101%
Tuticorin	5.10	122%

The aggregate port's capacity of India Ports which was around 20 million tonnes at the beginning of the First Five Year Plan has been built upto 170 million tonnes, at the beginning of the Eighth Five Year Plan i.e. April, 1992. In 1980-81 the Ports capacity was 102 million tonnes.

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<u>Period</u>	<u>Aggregate Port Capacity</u> in (million tonnes)
At the beginning of 1st Plan	(1950-51) 20m.tonnes.
At the end of 2nd F.Y.Plans	(1957-60) 38 m.tonnes.
At the end of 3rd F.Y.Plans	(1961-66) 54 m.tonnes
At the end of 4th F.Y.Plans	(1969-74) 71 m. tonnes.
At the end of 5th F.Y.Plans	(1974-79) 101 m.tonnes.
At the end of 6th F.Y.Plans	(1980-84) 132 m.tonnes.
At the end of 7th F.Y. Plans	(1985-90) 163 m.tonnes.
Annual Plans	(1990-92) 170 m.tonnes

Traffic handled at the major ports increased from 20m tonnes in 1950-51 to 158 million tonnes in 1991-92 & 169 m. tonnes in 1993-94.

It has been projected that the traffic through ports at the end of the Eighth Five Year Plan (1996-97) would cross 210 million tonnes.

<u>POL Handling (Ports)</u>	<u>Capacity in M.tonnes.</u>
Calcutta Port	2.40
Haldia	8.50
Visakhapatnam	11.50
Madras	8.50
Tuticorin	1.10
Bombay Port	18.00
<u>Iron Ore Handling</u>	<u>Capacity in M. Tonnes</u>
Visakhapatnam	8.00
Madras	8.00
<u>Thermal Coal Handling</u>	
Haldia	5.00
Tuticorin	2.00
<u>Fertilizers Handlings</u>	<u>Capacity in M. Tonnes</u>
J.L. Nehru	2.90
Visakhapatnam	0.35
Haldia	1.80

Container handling facilities at Bombay, Madras, Calcutta/Haladia, Tuticorin Ports and few other Ports.

Other General Cargo Handling :

Some of the ports bulk commodities like fertilizers foodgrains, coking coal and thermal coal are also handled at General Cargo berths, where there are no bulk handling facilities for such commodities. There are about 129 General Cargo berths at the Major Ports.

The performance of Ports in Cargo handling traffic from 1980-81 to 1993-94 was very satisfactory inspite of increased number of ships and labour problems faced by the Ports management.

Tuticorin port registered an increase of 40.69 lacs tonnes in 1993-94, over the period from 1980-81. Visakhapatnam had a small increase of 13.85 lac tonnes, Madras Port had increased Annual traffic to 16.1 lacs tonnes, Calcutta/Haldia Port, 8.98 lac tonnes and Bombay port 13.18 lac tonnes.

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P A R T - AC H A P T E R - IVP O R T P E R F O R M A N C ES H I P S A R R I V A L I N M A J O R P O R T S

The number of ships that call at the Major Ports of Bombay, Calcutta, Madras,<sup>(74)</sup> Visakhapatnam and Tuticorin for the year 1980-81, 1985-86, 1989-90 and 1993-94, shows an increasing number in proportion to the increasing volume of Traffic handled in these Ports.

The Performance of Ports depends upon the number of ships that called at each port, the number of ships that are berthed, their size in DWT, and GRT (Gross Registered tonnage), the different kinds of Products/ Commodities handled, whether for Export or Import. The number of passenger traffic on Coastal side. The freight loaded and unloaded. The demand for Port Services depends upon the number of ships that enter and sail in each port per year. The waiting time in the roads for a berth, the pre-detention time of waiting at berths. The average stay at berths, the number of berths occupied in each Port, the working time at berths and non-working time at berth. The daily cargo traffic loaded and unloaded and also the average Turn-round time of ships. The increasing number of ships show, the trend of trade in each Port in a year.

1980-81 :

In the period 1980-81, 354 ships called at Tuticorin Port, 518 ships at Visakhapatnam, Port; 1,120 at Madras Port, 1045 ships at Calcutta/Haldia Dock Systems and 3,307 ships at Bombay Port. From the Statement Graphs No.

8 it shows that there has been a growing trend of ships in each Port.

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(74) Annual Reports for Bombay, Calcutta, Madras Visakhapatnam, Tuticorin Port Trusts, 1980-81, 85-86, 89-90 and 1993-94. - pp 7; 5; XV)

In 1985-86, the number of ships that called was, in Tuticorin Port 452 in Visakhapatnam 754, in Madras Port 1,864 ships, in Calcutta/Haldia together 1,358 ships and in Bombay Port 1,863 ships.

In 1989-90, the number of vessels handled at Tuticorin Port was 638 at Visakhapatnam Port, 838 numbers in Madras Port, 2,717 numbers in Calcutta Port, 1,398 and in Bombay Port, 4,147 numbers. This shows the increasing traffic in each of the Ports in 1989-90, and also foreign, and coastal traffic depending upon the nationality of the ships that called.

1993-94 :

As the rate of handling per berthday improves due to modernising of cargo lifting equipment, the time spent at working berth improves e.g. Break bulk cargoes, containerization ships, and lessens the time of average turn-round of ships and average pre-berthing detention of a vessels. In tuticorin Port, 806 vessels were handled at port at Visakhapatnam, 1074 vessels, in Madras 1,863 vessels, in Calcutta/Haldia Ports, 1,452 and Bombay Port, 4,914. In Madras Port and Calcutta the number of vessels decreased.

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P A R T - AC H A P T E R - IVP O R T P E R F O R M A N C Eviii ) E M P L O Y M E N T I N M A J O R P O R T S

The Productivity of Ports, depends upon the strength of the persons employed in a given year. The Port labour consists of Shore labour, Officers undertraining and officers of the Port, and other workers, such as Pilots, Dredging employees, etc. All the Ports have, medical facilities, recreation facilities, welfare measures, for their employees. The labour employed is made up of scheduled tribes, and scheduled caste.

The Labour situation in each Major Port during the years, under report are important for the Port Performance and Productivity.

In 1980-81 from the Statement <sup>(75)</sup> 728 and Graph No 7. we find, Tuticorin Port had 2,120 employees. The Port had not organised any labour force on the short or on board vessels. All operations were carried out by steamer Agents/clearing and Forwarding Agents by employing their own labour. The Port Administration then issued 'Dock Entry Permit Cards to 2,500, casual pool of cargo handling workers and supervisory personnel employed by private agencies.

Strikes and Bundhs are frequent occurrences at Ports, and this caused stoppages at work, loss of man-hours, and mandays in a year. Multi-publicity of Unions, caused Union reivalaries in raising demands.

In 1980-81, Visakhapatnam had 12,047 persons employed Madras Port, 11,917 and Calcutta Port, 32,665, Bombay

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(75) Tuticorin Port Trust Annual Report, Tuticorin, 1985-86  
pp. 15 & 30

Port had 30,793 persons employed.

In 1985-86, the number of employed persons showed a declining rate, such as Tuticorin Port, 2236, Visakhapatnam Port, 11,950 persons, Madras Port had an increase number of 1,000 more persons i.e. 12,128; Calcutta Port had 27,180 persons and Bombay Port, 30,736 persons.

Due to modernisation and Port Development Programmes, such as Cargo Handling Facilities, transit sheds and Operational efficiency of Supervisory staff, the number of employees showed a declining trend, inspite of increase volume of traffic per port. Such as in 1989-90, Tuticorin Port, employed 2270 labourers and supervisors, Visakhapatnam Port, 10848 persons, Madras Port, 1136 persons Calcutta/Haldia Dock Complex 23,643 persons and Bombay Port, 29,349 persons.

Industrial relations improved, there were fewer strikes and stoppages of work. Also the revision in pay scales, helped to reduce the number of workers in the Class III & IV category. In 1993-94, Tuticorin Port 2192 persons showed a decrease in the workers employed likewise Visakhapatnam Port 10,337 persons, Madras Port, also had a declining rate of 11,918 persons. Calcutta/Haldia Dock Complex had on 21,006 persons, and Bombay Port had reduced its number of workers due to improved Port handling facilities to 26,552.

For Employment numbers declined over the period 1980-81 to 1993-94 in Tuticorin Port by 66 persons. Visakhapatnam Port by 1,710 persons, Madras Port nil, Calcutta Port by 11,605 persons and Bombay Port by 4,241 persons.

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This was due to extensive efforts to contain cost of services with the co-operation of Labour Unions, it is hoped that there will be definite improvement in productivity, enabling the Port to keep the unit cost at reasonably lower level Voluntary Retirement Schemes were introduced in 1992.

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P A R T - AC H A P T E R - IViv) AVERAGE TURN ROUND TIME (SHIPS)

One main indicator of port performances is the turn round time of ships, when they enter a port, and the time they take to leave a port. The productivity of ships depends upon the lesser time taken at each Port of Call, if ships are assumed to arrive at ports regularly, and if the time to discharge and load such ships were constant. Both liner and tramp ships arrive at random at ports, and the time taken to discharge and load ships varies substantially due not only to the different quantities and types of cargo handled, but to a whole lot of factors which combine to affect the cargo handling rate.

Next, we have to consider the cost of ships time in port i.e. (1) the time the ships spend at the berth (including time needed to proceed to and leave the berth). (2) the time the ships spends waiting for a berth to become vacant. (Refer Graph No. 10)

As traffic increases and the port has to increase its throughput, there are two effects (a) the time the ship spends at the berth is reduced due to extra working (over time etc.) (b) but the time the ship spends waiting to get a berth increases, due to the increase in berth occupancy caused by the increased traffic. This causes congestion in ports and therefore, a congestion levy has to be raised increasing the cost of ship's time. It is important to know the turn-round time of ships so that a port can find ways of handling peak demands placed on it, which permit it to avoid the extremely long queues which would otherwise occur.

The important ways to avoid long queues is a temporary increase of its berthing capacity by the use of moorings (or the double banking of ships). Second, a temporary increase in the rate of cargo handling by the use of more or larger gangs and over time working. Thus, the minimum cost point depends on the relationship between berth occupancy and ship's waiting time.

The average turn round time of ships depends also on the average tonnage of cargo load/unloaded by a vessel per day, the average output per berth day, the average pre-berthing detention per ship (days), the average detention (days) and berth occupancy (percentages).

In 1980-81 we find a high rate of the average turn-round time of ships, in proportion to the size of the ports, and their capacity. In the port of Tuticorin, the average turn-round time of ships was 3.1 days, in Visakhapatnam Port 6.0 days, in Madras Port 9.2 days, in Calcutta 9.25 and Bombay Port it was 9.22 days.

During 1985-86 the average turn-round time of ships increased, Tuticorin Port it was 5.9 days, Visakhapatnam Port it decreased by a marginal rate of .3 i.e. 5-7 days, Madras Port it increased to 9.5 as compared to 1980-81 it was 9.2, Calcutta dock system has a longer time due to pilotage time being included, it takes about 2 days from Sand Head to Sand Head, one day for Calcutta Port and one day for Haldia dock. In Bombay Port in 1985-86 the average turn-round time was 9.9 days.

The average turn-round time of ships improved in 1989-90, in Tuticorin Port it was 4.70 days, in Visakhapatnam it was 5.61, Madras Port had 6.3 days, Calcutta Port 8.3 days and Bombay Port had 7.9 days.<sup>(76)</sup> The graph

shows a lessening of the average turn-round time in 1989-90.

The average turn-round time of ships differs for vessels carrying food-grains, fertilizers and containers. In various ports the increase in average turn-round time for vessels carrying POL products is primarily due to increase in average pre-berthing detention.

In 1993-94 it was noticed a longer time taken for all ports, as the volume of trade increases. Some ports had expansion programmes, like Bombay Port had the Nhava-Shewa dock system, and an increase in berths. Bombay Port average turn-round time of ships was 8.7 days, Calcutta Port 8 days, Madras Port 6.2 days, Visakhapatnam Port 5.9 days and Tuticorin Port 5.78 days.

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P A R T - A  
C H A P T E R - IV  
P O R T P E R F O R M A N C E S  
B E R T H O C C U P A N C Y R A T E

Berth occupancy rate can be calculated by analysing the arrival pattern of ships, and the discharging/loading line of ships, it is possible to calculate the relationship between the number of berths the average berth occupancy and the expected ships waiting time.

Berth occupancy rate is said to be high when the berth is occupied for a maximum number of days in a year. The average rate is taken for a certain number of berths in a particular port for a year. If a port has two berths, the days these two berths are occupied in a year, say berth one (1) has an occupancy rate of 325 days in a year and Berth 2 has an occupancy rate of 330 days, the average rate of occupancy is 95.3% for the port. This indicator shows whether there is congestion in the Ports, and if it is necessary to improve efficiency, or the number of berths, according to the volume of traffic expected to be handled in future.

In 1980/81, Tuticorin Port which has 8 berths, had a berth occupancy rate of 78.0%. Visakhapatnam Port has 20 berths, and a berth occupancy rate of 50%. Madras has 23 berths and a berth occupancy rate of 70%. Calcutta which has 34 Berths and Haldia has 9 berths together has a Berth Occupancy rate of 63.5% and Bombay Port in 1980-81 had a berth occupancy rate of 78.32% for about 50 berths.

In 1985-86, the Berth Occupancy rate was 64.18% for Tuticorin Port, 69.31% for Visakhapatnam for 77.76% for Madras, 69.7% for Calcutta/Haldia Dock System and 72.5% for Bombay Port. Graph No. 9.

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Source : Annual Report of each respective Port, Bombay Calcutta, Madras, Visakhapatnam & Tuticorin pp 32 for 1980-81, 85-86, 89-90, & 1993-94.

The berth occupancy rate for Tuticorin Port in 1985, (78%) was due to coal handling cargo at the Coal Jetty (87%) occupancy. For Visakhapatnam Port, the maximum ship movements in a month was 233 recorded, and a maximum number of 19 ships was in Port, in a day. The maximum number of ships waiting at the roads for berths on any single day in 1985-86 was 18.

Madras Port had 77.76% of berth occupancy rate in 1985-86, a high rate of berth occupancy. In Calcutta Port in 1985-86, vessels carrying mainly fertilizers and related raw materials were affected due to this congestion. The primary reason for the increase in Pre-berthing detention was congestion in the Ports, following the intensification of an anti-corruption drive in July, 1985. The General Cargo berth at Haldia had a Berth Occupancy rate of 94%. In Bombay port in 1985-86, a 72.5% berth occupancy rate, showed an all round improvement in the Ports performance during the year. The average and shift output reached an all time high of 132-05 tons for general cargo. There was an apprecable improvement in the other spheres as well, such like, total ship-days lost on account of non-availability of berth fell by 35%, the average pre-berthing detention by 37% and turn-round of vessels by 19%. The Port was congestion free through out the year, except the Monsoon period.

(77)

In 1989-90, the rate of berth occupancy was 73.3% for Tuticorin Port, 63.26% for Visakhapatnam Port, a very high rate for Madras Port at 88.90% and 63.44 for Calcutta Port. 75.7% for Bombay Port. The Average output per berthday increased to 2500 tonnes in 1989-90 from 2553 tonnes in 1988-89, for Tuticorin Port in 1989-90. Visakhapatnam Port had a generally high berth occupancy 342 days for WQ 4 berths.

In 1993-94, the Berth occupancy rate was Tuticorin Port (85%) Visakhapatnam (69.25%), Madras (80.4%); Calcutta (69.7%) and Bombay (75.71%).

At Calcutta Dock System, berth occupancy of KPD berths, during 1993-94, decreased marginally as compared to that in 1992-93 owing to less demand for KPD berths. For NSD berths, the occupancy rate was normal (41.19%). Decline in traffic resulted in marginally lower berth occupancy level at Budge Budge Jetties. Improved performance of vessels led to lower berth occupancy at all the berths of Haldia Dock Complex.

In 1993-94, the berth occupancy rate for all 5 Ports was 75.6%, 1989-90, it was 73.56% in 1985-86 it was 70% and in 1980-81 it was 68%.

These Ports will soon be facing congestion even though there has been improvement in Operational efficiency and number of berths.

As the increase in throughput of the berth due to the increase in the volume of traffic, and the number of vessels handled, the need to build more berths has arisen. Capital plan works for Ports, have included the construction of new berths, or the improvement of productivity of ships and management efficiency, by use of modern technology installation of machinery, encouragement of containerisation system for general cargoes.

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P A R T - AC H A P T E R - VNATIONAL OBJECTIVES AND POLICIES FOR PORT DEVELOPMENT

The following are the broad objectives for development of ports during the Eighth Five Year Plan.

- 1) Development of ports in such a way that they can move with and subserve the overall economic<sup>(78)</sup> growth.
- 2) Development of proper container facilities, port development to keep pace with the technical changes in the shipping scenario.
- 3) Deepening of drafts at selected major ports to receive larger vessels.
- 4) Increase in dredging capacity by replacement of averaged dredgers with modern cargo capacity dredgers.
- 5) Before embarking on any major investment on creation of additional infrastructural facilities, development and modernisation of existing port facilities to receive top priority. This is to improve the overall efficiency of ports.
- 6) Use of updated technology.
- 7) Appropriate financial measures to be taken to improve the viability of ports including the pooling of resources of major ports, rationalisation of ports in tariff and simplification of the documentation in ports.

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(78) Source : Annual Report, Govt. of India, 1993-94, Page 46.  
Ministry of Surface Transport, N.D.

- 8) Encourage the private sector in suitable areas of investment such as ship repairs, cargo facilities, dry docking terminal construction etc.
- 9) Development of inter-face transport links like rail and road to enable smooth flow of traffic.

a) General Transport Policies.

- \* To regulate the supply of transport services.
- \* To prevent discrimination.
- \* To set a standard of competition
- \* To regulate the level of Sea ports and Railways earnings.
- \* To co-ordinate and integrate transport agencies.
- \* To improve railroad efficiency by consolidation.

b) The Common Transport Policy (CTP) <sup>(79)</sup>

- 1) Transport infrastructure improvements will generate economic development benefits.
- 2) Freeing the operator from restrictive regulations and fastening free competition with the improved efficiency.
- 3) Improving journey times is the same thing as improving transport provisions.
- 4) The dominant theme is that transport policy must keep pace in promoting the structural changes necessary for economic growth with the major policies of the Community.

c) The high cost of meeting peaks.

- 1) In capacity requirement.

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(79) Dearing Charles and W. Owen  
National Transportation Policy Westington 1949,

- 2) Greater traffic congestion is reducing the average speeds attainable in peak hours. (81)
- 3) This causes cross subsidisation.
- 4) Discrimination is to be their method of meeting their indirect costs. Direct cost through taxation.
- 5) For the sake of the better allocation of our economic resources which could be achieved by charging on a basis of marginal rather than average indirect cost.

d) Three major objectives.

- 1) To prevent public carriers from discriminatory practices between individuals and communities in the matter of prices and services.
- 2) To allocate traffic among the competing carriers in accordance with the relative efficiency and economy of each.
- 3) To maintain the financial solvency of the regulated carriers.

Principles. i) Cost of Service ii) Value of Service.

The development of transportation facilities on an economic basis requires that those who use them pay the bill. In this way, the desirability of transportation projects can be judged in the light of the cost involved and the ability or willingness to pay these costs.

Willingness to pay for improvement. To improve the facilities and shifts the financial burden from the General taxpayers to those who especially benefit.

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( 81 ) Dearing Charles and W. Owen, National Transporta- Pg. 229  
tion Policy, Washington, 1949.

**II. National Transportation Policy.**

- 1) The Objectives of Transport Control  
 Problems of Public Control  
 The right to Operate Transport Enterprises. <sup>(80)</sup>  
 Rate, Regulation and discrimination. With fair competition.
- 2) Reduction in costs, makes transportation easier for goods and passenger at a given distance.
- 3) Consumers enjoy the benefit of many goods - due to unsuitable climate, lack of raw materials or other limiting factors. Exchange of goods due to cheap transportation.
- 4) For agriculture, cheap transportation is therefore advantageous. It minimises famines, reduces waste of overproduction. It also stabilizers and equalizers prices.

The lower the cost of the freight, broader the market.

- 5) It reduces the cost of goods to consumers,
  - 1) due to competition.
  - 2) Improvement in transportation.
  - 3) Lessening the cost of producing goods.
  - 4) Encourage large scale production. Promote monopoly in the long run.
  - 5) Decentralization of industries is the choice of many, so that there would be more or less transportation charges.

- 6) Transportation is a part of production, and low rates trend to be passed on to the consumers.
- 7) 2 ways, basic it has an effect upon the cost of production 1) helping the geographical divisions of labour (2) A community specializes in production.
- 8) Gains from localization of crop growing (wheat) Large scale production, like specialization depends upon the extent of the market and therefore upon efficient transportation.
- 9) With large scale production, have come real economic gains. Efficient transportation makes it easier to manage large enterprises because it promotes the movement of goods and facilities cheap and rapid communication either through travel or by mail.

Social Effects.

- 1) It determines the concentration and spread of population.
- 2) Better transportation raises the standard and changes the mode of living.

Political Effects.

- 1) It promotes national Unity.
  - ii) Strengthening of national defence.
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Note :

Pricing in Public Utilities

The Term 'Public Utility refers to an industry affected with a public interest as it supplies a commodity or service essential to the community.

Public Utilities refer to a group of such industries, Transportation, electricity, gas, water supply, post telegraph and telephone services are some examples of public utilities. These are fundamental to the daily conduct of a system once they are established and any upset in these services or their unduly high price causes great inconvenience to the public in general. There may be other basic industries, such as iron and steel, coal and other materials which are essential for the community, but they are not public utilities as their non-availability for some time may not upset the whole system and the demand for these goods is not so highly inelastic.

Characteristic of Public Utilities. <sup>(82)</sup>

- 1) One source of supply or control thereof facilities efficient and uniform flow of service of these public utilities. e.g. Railway telephones, electricity.
- ii) Unit cost of production in public utilities is lower, if they require monopolistic character. Characteristically in these industries the principal cost are the fixed cost, which are incurred at the time of laying down and erection of the project. These fixed costs are heavy and require a high amount of investment (on the other hand, the running costs

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(82) Mehta J.K. Analysis Micro-economics, N.Delhi,  
1977 page.291.

(variable cost) of these undertakings are quite low, and mainly comprise the salaries or wages paid to the staff running these undertakings e.g. little cost is incurred when water is pumped into a reservoir or when the electricity flows from the generator and satisfies the needs of the consumer. The cost of operation of public utilities is thus much smaller in relation to their fixed cost. Hence, several undertakings in these fields may serve neither the purpose of the producer in that of the consumer.

Due to these reasons the public utilities usually acquire a monopolistic character. e.g. railways, roadways (when they are under private ownership. Electricity Power Plants face competition from gas works in supplying light heat and power for industrial plants, and for private home use.

The Second characteristic of a public utility is that, it often enjoys some rights and privileges which are not granted to other enterprises.

Thirdly, as it has been pointed out earlier the public utilities are established with the objective of rendering service to the society, and therefore, work with a Welfare motive. They supply certain material essential commodities and services.

Certain principles have been set to govern the procedure of rate regulation by the government.<sup>(82)</sup> The general rule is that the rates (or prices) established must cover the costs of rendering the service plus a reasonable of return on the investment of the undertaking.

Thus, the fair rates of public utility services are made up of three components.

- (i) fixed cost components
- (ii) working cost component.
- (iii) a fair rate of return

- i) Fixed cost component, main problems on the basis of value of fixed capital (or fixed cost) should be calculated.

Real cost, i.e. cost originally incurred on the production of the fixed input under consideration or the reproduction cost i.e. a similar plant. It is held fair to the consumer because it will require them to pay the producers for what it has actually cost the latter on this account.

Working Cost : With increasing price level, the variable cost goes on increasing. The problem is whether this increased cost should go only to those units of the product in the production of which these inputs have been used or whether it should be distributed over large range of output units.

Fair Return : After recovering the fixed and working cost, the Public Utility rates should also ensure a fair return on investment. The rate of return to investors must include both the pure interest or capital and reward for undertaking risks.

An investment with greater risk should be allowed to earn a higher rate of return. This rate of return may also be favourably linked with high quality of

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of management to encourage efficiency.

If the public utility concern needs expansion in future, a higher rate of return may be admissible forecasting capital for expansion and for attracting outside capital.

The service rendered by many of the public utilities are of differentiated nature and so they have to resort to discriminatory pricing. (or rate making) with regard to these services. e.g. Railway, according to the dictum "what the traffic can bear", or according to the capacity to pay, telephone/telegraphs sent ordinary or urgent. So there is a problem of working out a schedule of rates which is not unreasonably discriminatory between different classes of users and which in the aggregate cover the cost of providing the services including a fair return to the investors.

In order to prevent the public utilities from charging too high prices from the consumer and to give him a measure of protection against exploitation by the former, the government of almost all countries have appointed price tribunals or commissions. These commissions are given the power, to fix prices schedules for the services provided by the public utilities. The Railway rate tribunal in India.

#### Marginal Cost Pricing :

In the case of public utilities, particularly railways, transport, gas and power, marginal cost pricing has been advocated by quite a large number of economists.

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II.

PART - A  
CHAPTER - VI

I EMPRICIAL RESULTS :

The main theme or propositions in this study is whether India can increase its berths in Ports, to an Optinum size, keeping in view the location of the Ports, the trends in World Trade, in transportation and Shipping Productivity and Regional growth?

In comparision to other countries, in the developed world, and our data on the development of our Major Ports, we find that the Country has a neglible amount of berths, 168 berths in 1993-94. (Refer Appendix No.A)

For example, in one Port, i.e. State of New York, USA, has about 400 berths <sup>(83)</sup> in New York Port, General Cargo (Refer Appendix No.Part No.A)

We have at present, about 168 Nos. of berths in all Minor/Intermediate and Major Ports of India, even with the increased in New Dock Complexes of Calcutta, Bombay and Madras (Haldia Dock Complexes, Nhava Sheva or J.L. Nehum Port, at Ennore, Madras.)

Development of these Ports is on the estimated capacity of Ports, for future years, according to the World Trade Statistics and estimated growth of Trade for India.

From the Statistical data of the "Basic Port Statistics" Ministry of surface Transport, Government of India, New Delhi, we find the data about the average capacities of Berths, Annual Traffic throughput

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(83). *ibid* (1) Chintz B. Freight and the Metropolis, Havard University Press. Massc. 1960 pp.9

etc of these Major Ports these 10 Major Ports and 168 Minor Ports, in the country handled 166.61 million tonnes of cargo in 1992-93, an increase of 6.4% over the previous year 1991-93, and 179.26 million tonnes of cargo during the year, 1993-94 and increase of 8.1% during 1993-94.

Trend Analysis <sup>(84)</sup> of commoditywise cargo traffic handled in 1993-94 at Major Ports shows that commodities like POL, Iron ore, Fertilizers and others including containerised cargo registered an increase while commodities, like fertilizers, raw materials and food grains showed decline in 1993-94.

## 1.1

<u>No.</u>	<u>Port</u>	<u>Port Capacity as on</u>	
		<u>31-3-93</u>	<u>31-3-94</u>
1.	Calcutta and Haldia	23.53	23.64
2.	Paradeep Port	7.65	7.65
3.	Visakhapatnam	23.05	23.35
4.	Madras	22.07	22.07
5.	Tuticorin	5.10	6.10
6.	Cochin	10.66	10.80
7.	New Managlore	9.55	9.55
8.	Mormugao	15.92	15.92
9.	Kandla	26.80	26.80
10.	Bombay &	20.80	20.80
	J.N. P.T.	5.90	5.90
		<u>171.03</u>	<u>172.59</u>
		*****	*****

(84) Ibid (1) Ministry of surface Transport, "Basic Port Statistics of India, 1993-94 pg. (v).

<u>1.2 Commodity-wise Break-up of Port capacities</u>		
(In million tonnes)		
<u>Commodity</u>	<u>Capacity as on</u>	
	<u>31-3-93</u>	<u>31-3-94</u>
1. POL	78.00	78.00
2. Iron Ore	41.50	41.50
3. Coal	7.00	8.00
4. Fertilizer & its raw Material	7.95	7.95
5. Others including Containers	36.58	37.14
Total : All Ports	<u>171.03</u> =====	<u>172.59</u> =====

VI. I. Port Activities, Services and Usage.

The main activities of Ports in India are :

- (1) Maintenance of Port approaches, navigable channels and alongside berths, dredging conservancy, hydrographic surveys. <sup>(85)</sup>
- (2) Light houses and light vessels, under the Port.
- (3) Pilotage, towage, berthing and unberthing of visiting ships.
- (4) Handling warehousing, and transportation of goods in Ports area.
- (5) Civil, mechanical and electrical engineering and maintenance of harbour crafts and plants.
- (6) Fire fighting and fumigation.
- (7) Stores
- (8) Medicals, Welfare housing etc.
- (9) Management of Port properties and estates.

(85) Ibid (1). Ministry of Surface Transport, Basic Port Statistics of India, 1993-94. pg.(11)

In order to carry out various activities the Port employs different types of labour such as "Port Workers" and they work on shore "Dock Labour" for workers that work on board the ship.

Indian Ports mainly derive their revenue from cargo handled in their Port areas, charges on the ships visiting their areas and other related charges.

The main source of revenue from Cargo traffic are

- (i) Wharfage/landing fees, cargo related charges.
- (ii) Crane hire charges.
- (iii) Rentals from warehouse.
- (iv) Demurrage charges
- (v) Charges for providing rail and other transport for the cargo movement and providing water facilities for the visiting ships.

Other sources of revenue are :

- (i) Port dues, (ii) Pilotage (iii) Berths hire
- (iv) Survey and measuring fees (v) Ship repairs in dock areas.

We can examine, with the aid of a model, the effect of port conditions, investments and charges on the cost of shipping. (Refer Appendix A.VI.(1))

#### VI. II. The Demand Function :

We assume each of the services involved to be priced at long-run average (equal to marginal cost). The condition is perfect competition in the shipping industry and competitive prices for port services.

Assume that the ship is full, and in one operation the total cargo is loaded or discharged. The time that the ship spends in port during each ship

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call depends upon the rate at which it can unload cargo i.e. (86)

The daily tons  $Lm$  for a ship size  $C$  is  $L$  &  $m$  where  $L$  and  $m$  are constants. The time spent in port by a ship is measured in days ( $T_p$ ) is :

$$(1) \quad T_p = C (L + mC)^{-1}$$

The daily cost of operating a ship in port is

$$(2) \quad K_p = A + g^C \quad (g \geq 0; A \geq 0)$$

'A' = fixed cost; 'g' = variable cost for each ton showing the daily cost of the ship in port, and other payments as well.

The size of the vessel and the cost of a call is shown as ( $g'$ ). The cost of a port call for each ship is then

$$(3) \quad T_p K_p = C(L+mC)^{-1} (A + gC)$$

The cost of operating a ship for a day at sea with  $B$  as the fixed cost and  $L$  as the variable cost is shown as  $B+LC$  for each ton.

Also assume that speed is the same for all vessels, so that the distance is in proportion to the number of days for each voyage  $D$ .

The sea cost of a voyage is :  $D(B+LC)$

Thus, the cost of a completed voyage including two port calls is :

$$(4) \quad V = D(B+LC) + 2C(L+mC)^{-1} (A+gC)$$

Under monopoly competitive conditions, in order to pursue maximum profits, the technology chosen will be that which minimizes voyage cost, per ton, that is Container operation, depends on

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(86) Ibid . Bennatham E. & Walters A.A. Port Pricing and Investment Policies. N. York. 1979. pg.17-21

Such improvement in port facilities or ships design increases the minimum cost size of ship.

min  $V/C$ , Equation 4, is divided by  $C$ , equated to zero, for minimum costs size of vessel.

$$(5) \quad C = mLDB + L (2\alpha C - mA) DB^{-\frac{1}{2}} \\ (2(gL - mA) - m^2 DB)^{-1}$$

Suppose that  $M=0$ ,  $L$  is positive, whatever the size of ship, it can unload only  $L$  tons a day.

$$(6) \quad C \pm \sqrt{(DBL/2g)}$$

The greater the distance  $D$ , the larger the vessel size  $A$  general formula shows port cost and the efficiency with which vessels can be loaded or discharged

$(gL-mA)^{-\frac{1}{2}}$  the size of the vessel.

( Port cost for	(Tons unloaded)	(Increase in)	( Fixed )
( each ton	(each day irr-)	(tons unload)	( Port )
	(espective of )	(ed each day)	( cost )
	(size	(for additi-	( )
		(onal DWT of	( )
		(ship	( )

A Port controls directly the prices that are levied for its services, but the shipping companies controls indirectly the choice of technology. Therefore,  $L$  and  $m$  are determined by shipping Companies according to the port conditions.

Assume that the port has more control over  $g$  (which includes port charges, handling cost etc.)<sup>h</sup> and  $L$  (depends on the port's general efficient layout and equipment). The then influences the

the port cost per ton, and not on the size of ship. For larger container ships additional cranes & equipment could be used. Container through-put is dependent on the transit shed/storage sheds.

By adding I (Idle time) to account for queueing, thus assume that each ship has to spend a full I day in port, and that a fractional  $\alpha$  of time can be used for cargo working.

Voyage cost is :-

$$(7) \quad V = D(hC+B) + 2I(A+gc) + \frac{(2C - 2\alpha C I)}{(L + mC)} (A + gc)$$

Subject to  $(C/L+mC) > \alpha I$ .

The shipowner has to minimise voyage cost for each ton (V/C)

The minimum cost size of ship increases with idle days eg.  $m = 0, \alpha > 0$

$$(8) \quad C = \sqrt{L(DB+2AI)(I-\alpha)/2g}$$

The optimum size of vessel increases with <sup>(87)</sup> idleness. Larger ships are cheaper per DWT, so it is better for a big ship DWT to be kept in idleness than a small ships DWT. Idleness is also identified with congestion.

- i) Constraints are on ship size in the cost of shipping into a small congested port.
- ii) Small vessels will benefit if port development is under-taken to remove congestion.

The result is opposite if the speed of cargo working is increased in a day (L or m) act just like lengthening the voyage distance(D).

size of vessels, so that national shipping can benefit from economics of shipping in large vessels. (Refer Appendix A.VI.I.(1))

Table PD No.1.3: Single Round Voyage - 12 Months

	Cargo expenses	% of total cost	Other port cost
Kandla Port traffic			
Unloaded	20.56		
Loaded	2.41		
Total	22.91	1013	462
Bombay Port traffic			
Unloaded	14.92		
Loaded	13.77		
Total	28.69	1949	490
Madras Port traffic			
Unloaded	15.68		
Loaded	8.45		
Total	24.13	1594	3772

Table PD No.2.4: Composition of Payments in Indian Ports 1984-85

(Rs.in lacs)

Port	Total expenses	Port & dock pilotage	Cargo handled	Others
Bombay	13470	2405	4901	3743
Madras	5580	826	2274	945
Calcutta	9565	2497	2094	1815

Source : T-2.8.1, Basic Ports Statistics of India, 1993-94.

P A R T - A  
C H A P T E R - VI

**II) i) The Cost Function in Ports :**

What are the costs or port charges for its services, these costs are fixed costs and variable costs.

- (a) Fixed cost are capital cost for facilities and services, such as quays, sheds, cranes.
- (b) Variable cost depends on tonnage, including labour and staff costs, fuel, maintenance costs etc.

As the tonnage increases, the fixed component expressed as a cost per ton decreases.

The variable costs per ton also increases as the throughput of a berth increases.

(REFER DIAGRAM A VI.(11) Variation in Port Cost with increasing traffic)

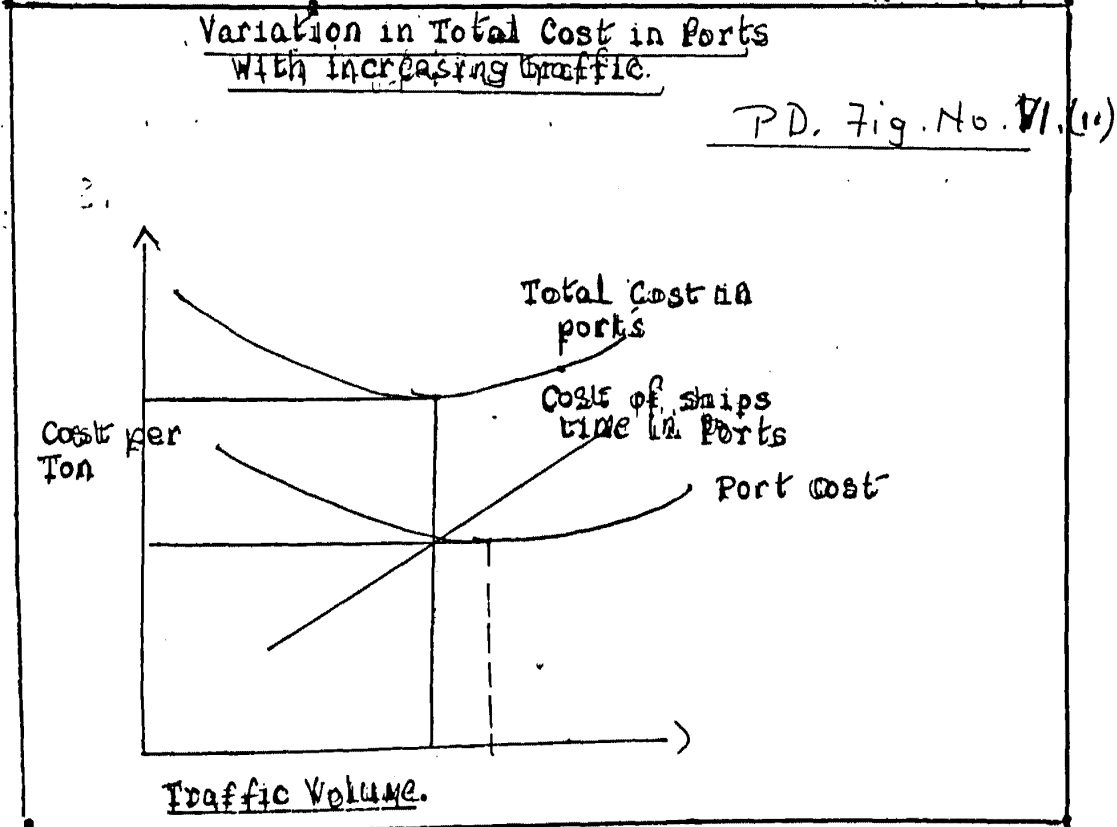
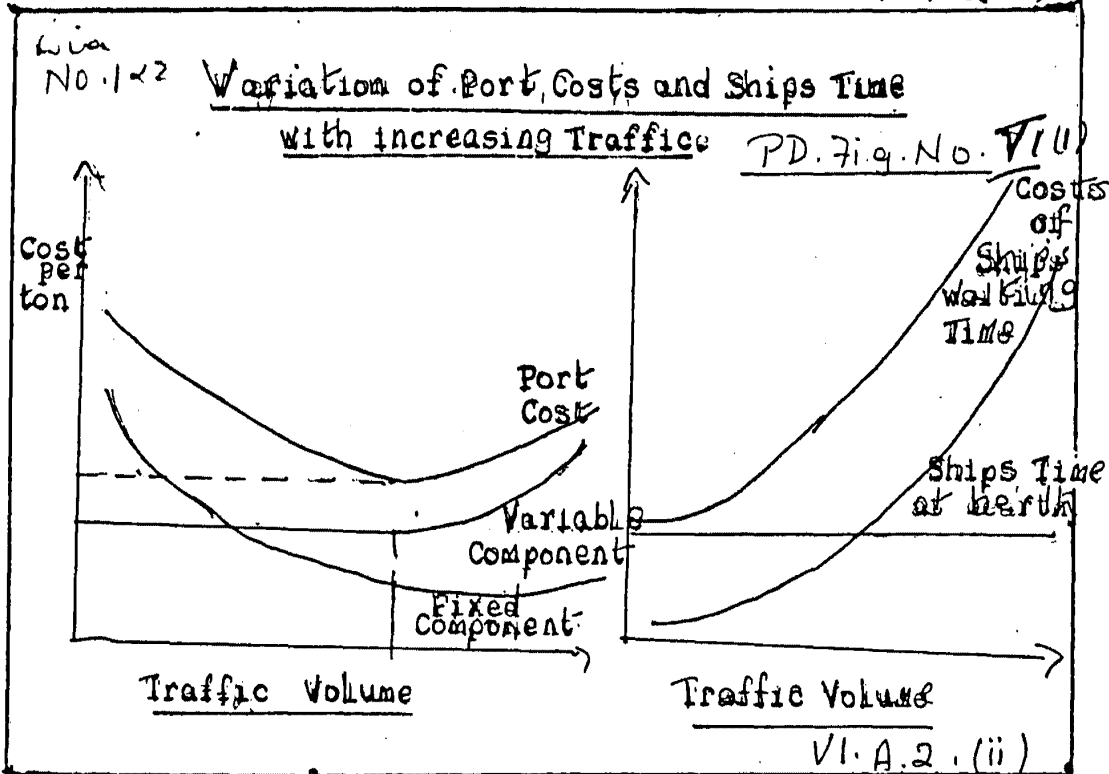
As the traffic increases the ships waiting time increases to get a berth, and at high berth occupancies causes an increase in the ships waiting time.

If there is a perfect competition, the prices are fixed so as to equal the cost of the resources absorbed in producing the service, marginal cost pricing should be used.

If the price exceeds cost of the resources, too little of the services will be produced. If the price is below cost of the resources too much of the service will be produced relative to the quantity of other goods.

As it would not take much to change the prices, or price change quickly, the marginal cost pricing is suitable under these circumstances.

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A port has a number of ways of coping with the peak<sup>(89)</sup> demands placed on it, to avoid long queue such as :

- 1) a temporary increase of its berthing capacity by the use of moorings (or the double banking of ships).
- 2) A temporary increase in the rate of cargo-handling by the use of more or larger gangs and overtime working.

Additional costs are involved in both these methods, but as these costs are smaller than the cost of the congestion build up. If the next years traffic is going to be greater than this year's traffic more capacity is required to avoid the congestion build up. Either the port will have to provide more berths as it will have to increase the capacity of existing ones.

Example :

At present a port handles 900,000 tons p.a. of general cargo through 6 berths.

Average berth occupancy is 75 per cent.

Average discharging loading time of ships - 4 days.

Waiting for a free berth a ship spend 1.1 days.

Estimated forecasts shows in 2 years time the amount of cargo handled, 1,050 tons p.a.

To handle this increase of cargo traffic there are two ways of comparing which method will be suitable.

- Building more berths.
- increasing the capacity of existing ones, in order that the total time ships spends in the port should not increase.

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(89) Ibid Indian Ports Association pg.No.12.Jan, 1984.  
Indian ports, N.Delhi, p.No.12.

Alternative A - Build one more berth.

This would lead to the following situation

Total throughput	:	1,050 tons p.a.
No of Berths	:	7
Average throughput per berth	:	150,000 tons p.a. (as before)
Berth Occupancy	:	75 percent (as Before)
Discharging loading time	:	4 days (as before)
Average waiting time of ships for berth	:	0.88 days (from table No.APP).
Average time ship spends at port	:	4.88 days.

Alternative B - Increase the intrinsic capacity of existing berths.

Increasing the intrinsic capacity of existing berths<sup>(90)</sup> by 17 percent (resulting from an increase of 17 percent in the effective discharging/loading rate/would lead to the following situation.

Total throughput	:	1,050,000 tons p.a.
Average throughput per berth	:	175,000 tons p.a.
No. of berths	:	6
Discharging/loading time	:	3.43 days (6/7th of previous figure)
Berth Occupancy	:	75 percent
Average waiting time of ships for berths	:	0.96 days (see table No.APP.)
Average time ships spend in port	:	4.39 days.



Thus, a 17% increase in the effective productivity copes with the increase in traffic rather better than a 17% increase in the number of berths, in that it also leads to ships spending half-a-day less time on average in port.

By reducing the idle time, we can increase effectively the productivity of ships. The extra cost of more intensive working are certainly going to be smaller than the high costs of immobilisation of ships.

Another example, is when 2 ships arrive at the port at the same time, and there are two (2) berths vacant. As there is not enough resource available the alternative are :

- 1) To work intensively one ship, and discharge it in 2 days.
- 2) Or spread the work over both ships and take 4 days to discharge them.

The Shipowner may benefit from intensive working. The Port Authority may not have the power to ensure the intensive working of ships. The Shipping Agents or shipper controls the schedule of ships, and may spread the unloading/loading time of the vessel over a fixed number of days, and have an adverse effect on the ships turn round time.

Methodology : In Finance the daily cost of a vessel in port.

Let us assume that a port is handling about one million tons of general cargo through 8 berths. The average berth occupancy is 90% and the average discharging loading time is 3 days. The daily cost of a vessel in port is \$3,000/- to find out the annual savings to ship owners.

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Solution :

(a) For 8 berths with a 90% berth occupancy

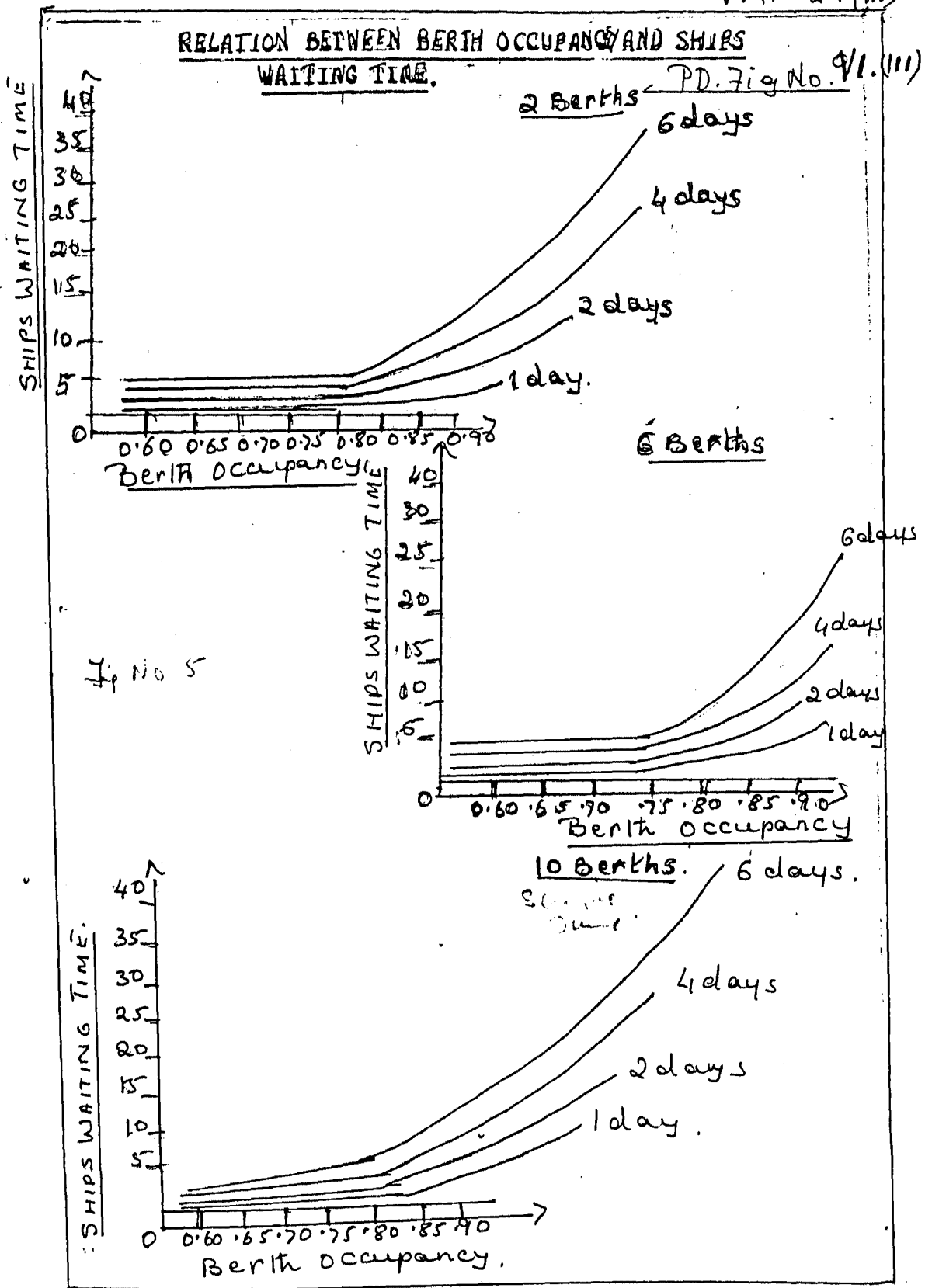
<u>Queue time</u>	- 0.877 (See APP.) )
Service time	
Queueing time	- 0.877 X Service time
	- 0.877 x 3
	- 2.63 days.
Total turn-around time	- Queue Time - Service Time
	- 2.63 - 3.00
	- 5.63 days.

Effect of increase in discharging/loading rate of 1/8th reduces service. Time from 3 days of 2.5 days and therefore, the berth occupancy from 90% to 75%.

<u>New Queueing Time</u>	- 0.178 (See APP.) )
Service Time	
--New Queueing time	- 0.178 X New Service time.
	- 0.178 x 2.5
	- 0.46 days.
New total turnaround time	- 0.45 - 2.5
	- 2.95 days.
..Savings in total turn	- 5.43 - 2.95
	- 2.68 days.

- (b) Initially each berth was occupied by a ship on 270 days per year on average.
- (c) The average service time was 3 days, this represent an average of 90 ships per berth per year.
- (d) There are 8 berths to a total number of 720 ships per year for the whole port.
- (e) Total port time saved by quicker and speedier working.
-

VI, A. 2. (iii)



- 720 x 2.68
- 1930 ship days per year
- Total savings to Shipping lines - 3000 x 1930
- \$ 5.79 million per annum.

(Refer Appendix No.A.VI.II)

- 1) If there is perfect competition, and the price are fixed so as to equal the cost of the resources absorbed in producing the service, marginal cost pricing should be used.

If the price exceeds cost of the resources, too little of the services will be produced. If the price is below cost of the resources too much of the service will be produced relative to the quantity of other goods. As it would not take much to change the prices, or price change quickly, the marginal cost pricing is suitable under these circumstances a port

ii) The Short Run Marginal Cost and its Functions

This indicates that the Port Authorities are conducting their business atleast cost and the Average Long-run cost is the same as the Average short run cost. LRMC = SRMC constant returns to scale for facilities equal to level of production. If the services are priced at the short-run marginal cost, the port cost will be covered with that much traffic.

- 2) If the traffic is less, the port facilities will be under used, the SRMC will be below LRMC, there still will be economies of scale.
-

- 3) If the port has the optimal level of traffic, the long and short run marginal costs are equal, the  $srmc = LRMC$  then there will be deficit and there will be no economies of scale.
  - 4) Now, if the wharves and equipment are not appropriately adjusted to the level of traffic and the tonnage grew at unanticipated high (or low) rate, or demand is much larger than could be met with, Thus the short-run marginal cost will be high above the long run marginal showing the scarcity of port capacity.
  - 5) If, on the other hand, the port is overbuilt, the short-run marginal cost is below the long run marginal cost and is the appropriate basis for pricing.
  - 6) When the output and capacity is forecasted correctly by the Port Authorities, the LRMC will be equal to SRMC, and long-run marginal cost will then be the suitable base for pricing. But, it is better to put the price on the short-run marginal cost basis, as there as increasing returns to scale, a deficit is likely, there will be surplus only when the authorities fail to expand the plant more and heavy congested conditions exists.
  - 7) The size of the plant, could be changed by adjustment made by the Port Authorities e.g. labour hiring. Port construction is mainly discontinuous, the argument that short.run marginal cost is always correct and long-run marginal cost is always the right base, as  $LRM_6 = SRM_6$  for broad range output of the same size of the plant.
-

- 8) The long run marginal cost is best only if the size of the plant is suitable for the value of construction and is operating, otherwise it is irrelevant.

4ii) The Average Cost Function :

In discussing that the marginal cost pricing is assumed that the price of a resource measures its marginal cost.

- 1) Average cost pricing could be substituted for marginal cost prices. If prices and marginal cost differ, for adjusting the marginal price of the port.
- 2) If prices are above marginal cost, the port tariffs for specific resources used by the port, the price above marginal cost, then the tariffs can be raised above the marginal cost in the port, or the port may expand too much.
- 3) Much depends on whether the competing demands for the resources used by the port came from commodities or services that are competitive with or complementary to port services, eg. Road Transport.

If the competing buyer of capital produces complements to the ports output, the port will set its prices below its marginal cost and vice versa. The main competitor for resources is probably Road transport. The output of road services usually complements that of port services.

If the competitors are customers of the port, the prices act above marginal cost, shipping conferences.

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The alternative principle of average cost pricing is when here are many services performed. There is no unique measure of average cost for the multiproduct firm. Conferences are usually non-competitive in shipping and port business. There are exceptions in State Trading and Marketing organisations. "Port sells its services directly to traders, so that traders can decide more or less freely how much they will buy e.g. storage services.

1✓) Variations in Demand :

The concept of difficulty of adjustment of prices, has two or three sides.

- 1) The Authority is concerned about only permanent shifts e.g. month or year. eg. seasonal variations, and raise tariff according to the seasonal demand.

Refer Diagram

Assume that there is perfect competition,<sup>(91)</sup> supply if includes the cost of steamship tramp cost of OS per unit :

Port charges SH per unit. X = Equilibrium quantity exported.

The elasticity of demand for the services of the port is  $\Delta SH/SH =$  a small proportionate change, on quantity  $\Delta X/X$ .

- 2) Port charges are not variable with throughput. Port services and shipping services are supplied in fixed proportions. The country exports a small part of the large world market of the commodity.

Pricing, but lacking knowledge of their cost is done some-times by the Port Authorities. Knowledge of Marginal cost both in the short run and long run is very useful for appropriate decisions on investment to meet the increasing demand for port services.

- 2) There is an assortment of transactions.
- 3) To determine marginal cost it is then necessary to instigate specific surveys of port activities, so that investments can be made.
- 4) In practice, the first step is to levy charges, so that the use of the port is either increased or reduced to efficient level in port economics.

Then, the port authorities need to estimate the reaction of the demand for port services to changes in the price. The structure of port tariffs must be correct so that the price of each service shows the cost involved in supplying it eg. The price of storage capacity is fixed so that the facility is used efficiently as per its physical capacity.

The Port Authorities may be aware of only a part of the variable cost of a service. If the authority has to cover cost, its total revenue will be equal to or above total variable cost, such as the cost of services or supplies used in several activities. Marginal cost pricing is the best to use for pricing services.

For investment, knowledge of costs is necessary for efficient decisions, eg. value of assets, in case of expanding port facilities, the cost of the new facilities replacement cost, and thus increasing the efficiency of port management if cost accounting is used.

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P A R T - A  
C H A P T E R - VI

III. The Economies of Scale

i) Services of the Port, Size of the plant.

In principle, it should be possible to examine various manifestations of port cost to <sup>(92)</sup> see whether the theory is relevant to reality.

- 1) To examine a cross section of different port sizes, to find out how unit cost varies with the tonnage throughput.
- 2) The costs of a port could be traced through time as it expands to cater to an increasing volume of traffic.
- 3) Then the cost engineering and manning specifications for typical ports, by servicing the Port survey done earlier, at the time of planning the specific port site etc.
  - a. For a particular port size, for use of facilities, unit cost falls upto full use and then rises as fast as congestion sets in.
  - b. Fixed cost are small for small port, but variable cost are high. Dredging a new channel, building more berths and installing more moving equipment will increase vastly the fixed cost of the port, but it will also reduce, the variable cost per unit as larger ships are used and cheaper handling techniques becomes feasible.

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(92) Pennington E & Walters A.A. Port Pricing & Investment Policies, N.York, 1979 pp.51 - 54.

- c. Similarly berths are expanded most efficiently, by building in large, more or less standardized units. There are some discontinuities in port construction. If traffic expands gradually, then it becomes efficient to convert the small port into a large one, before it has achieved the minimum unit cost.
- d. The large port will have excess capacity at first, as traffic continues to expand. This apparent overbuilding of ports is, however, quite rationale in the cost conditions.

### III. 1) Location of the Port

The typical cost pattern of port development is illustrated in Fig. 3.1. The total cost of the first port is described by the curve H. This shows the cost of the most advantageous location and includes not merely the port cost but also the inland transport cost. This gives rise to a low average cost at the volume  $X_1$  where minimum average cost is shown by the ray  $X_1$ . To accommodate tonnages larger than  $X_1$ , however the port must be expanded by increasing quays and drafts and the facilities or by developing another location. Either of these alternatives involves higher capital cost, ( $K_2$  compared with  $K_1$  in the diagram) The unit variable cost may be less with the larger facility, but not low enough to offset the higher capital cost, thus giving decreasing returns to scale from  $X_1$  to  $X$ . Diagram A./1

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shows that there are discontinuities in the provision of port facilities there can be either a small port or the larger port complex and there is not in-between.

The effects of economies of scale in port and associated inland transport operations would be to ensure that the minimum average cost of the large port complex is lower than small port. The ray  $T_2$  would be below  $T_1$  in Fig. A.II.3.i. The larger port can use more efficient equipment and deal with larger vessels from the small port, or the larger port may deal with approximately the same size of vessel, but can increase the frequency of services.

This indicates, that to get lower cost, too much capacity must be installed in relation to the quantity of present traffic.

With the growing level of traffic, through time, it may be best to overbuild the port<sup>(93)</sup> and suffer the excess cost at low traffic volumes to secure the lower cost at later high traffic volumes location of the Port.

Refer Diagram A.3.4 Port Cost with Diseconomies of Scale

Two ports,  $K_1H_1$  &  $K_2H_2$ . Life of the port is 50 years and difficult to expand the Port once it is built.  $K_1H_1$ .

It may be best to build the large port even for the initial low traffic volumes, i.e.  $X_1$  to gain the low cost on the increased traffic in later years, and gain the increase in the economies of scale.

As there are some discontinuities in Port Building and construction, perfect plans for ports are only theoretical concepts. Another disadvantage is as a port is required to recover cost, the Port Authority has to Control its costs and expansion plans, or the Port Authority may overbuild the Port and run an inefficient port instead.

As the Port Activities depends upon the elasticity of demand, with regard to price, and the competition between ports, the elasticity of demand for port services is low, as port charges are small part of the total transport charge and delivery price.

111) Occupancy of Berths

For Container berths, the short-run marginal cost lies below the short run average cost. If the berth is built to cope with different volume of annual throughput. As per a British container experience, an increase in berth throughput from 10,000 to 75,000 units. Berth Annual capacity of 100,000 standard units), has a decline of cost per unit from 7:1 in ratio terms i.e. the cost per container will decline from ₹ 25/- to ₹ 16/- as berth capacity is raised from 10,000 to 10000 TEU per year. This indicates that the long run marginal cost lies below the long run average cost. There are economies of scale in container business.

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The annual throughput capacity of a modern full fledged container berth is estimated at 1 to 1.5 million tonnes against the conventional berth capacity of 1.5 to lakhs per tonne per annum. The cost of construction of a container berth will be higher by about 25 percent over that of a conventional General Cargo berth. Although considerable additional investment will be called for in container ships, internal transport facilities, between the ports and destination points and point of origin of the container, reducing the loading and unloading cost for general cargo, quicker turn-round of ships and low ratio per tonne investment in container berth will more than off-set the additional investment. The I.S.O. standard container box of 6 x 2.435 cubic meters, (20' x 8 x 8') and 12 x 2.435 x 2.435 cubic metres (40' x 8 x 8') is the same size as 8 wheeler stock and 4 wheeler stock of the Indian Railways.

Refer Table A.3.1 & 3.2

Port planners frequently calculate an optimal occupancy rate of berths by a method which involves minimizing the same of port cost and ship cost. The joint cost of idle berths and ship time is then minimised and this minimum defined the optimal number of berths and the average annual occupancy rate of those berths.

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a) Normal Procedure :

Approximate ship arrivals by the poisson Frequency distribution which the probability of a ship arrivals in a time interval e.g. a day, given number of channels to the port, the size of the port, the expected annual tonnage of cargo, the pattern of ship arrivals, the total number of days which ships would spend waiting for berths the number of days when the berths are vacant the joint cost of idle berth and ship time is then minimised.

This minimum defines the optimal number of berths also the average annual occupancy rate of those berths. (Figure A.3.1 Curve G.)

This curve shows that the minimum cost occupancy rate of the berths rises as the number of berths rises and that the optimal excess capacity in each berth falls as the capacity of the port increases. The traffic passing through a port consists of many commodities. The ability to bear the port charges may vary considerably with individual commodities e.g. coal and salt. In such cases, the ports should recover atleast the bare cost of moving such traffic. These are called direct cost, make up the floor charges in the rating system. Commodities of higher value and comparatively smaller bulk can stand higher rates which may be fixed on the principle of ports charging<sup>u</sup> what the traffic can bear<sup>v</sup>.

In India, further differential rates are implicit in the value, volume and direction of trade. Public interest <sup>(1)</sup>, may also necessitate

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preferential tariffs for certain kinds of commodities and for certain periods. All these factors will have to be taken in account in formulating a rating policy for the ports. Cross-subsidisation is a necessary concomitant of the application of the twin principles of direct costs on low rated commodities on the one hand and "charging what the traffic can bear", on the other. This will ensure the full utilization of the port facilities by taking in both the low-rated bulk commodities and high value cargo.

Table 3.1 : Total Container Traffic and Facilities, 1973<sup>(94)</sup>

	Traffic (TEU)	No of berths	Cranes	Acres
Vancouver	88,000	3	1	15
Seattle	377,000	11	12	161

@Includes inbound, outbound, loaded and empty Containers.

Table A.3.2 Port Charges to the Consignee on Container Traffic

	Vancouver(\$)	Seattle(\$)
Wharfage	23.63	33.75
Handling and through port charge	81.27	40.00
Vessel Service and facilities charge	0	21.60
Tailgate loading	22.28	0
Total of port charges per container	127.18	95.35

(94) Bennathan E & Walter A.A. Port Pricing & Investment Policies, N. York, 1979 pp58. & 59

Table A.3.3. : Charges for the Hire of Ports  
Floating Crafts

Particulars of crafts	Unit of charge other	Charge when hired by other vessels	Charges when hired by others
(1)	(2)	(3)	(4)
Barges or lighters	Per tonne schedule capacity of barges or lighters per day or part thereof	7.0	5.0
Mechanised vessels (excluding dredger)	Per hour or part thereof	100	60.00
(a) Upto 99 HP			
(b) Over 90 HP and upto 199 HP	-do-	150	100.00
(c) Over 199 HP and upto 399 HP	-do-	200	140.00
(d) Over 399 HP upto 749 HP	-do-	400	250.00
(e) Over 749 HP	-do-	600	400.00

- (95)
- Notes : (a) The right to refuse to let on hire, port craft is reserved for Port Authority.
- (b) When a craft is required to be taken outside the port limit, double the charges mentioned in Cols. 3 & 4.
- (c) The period of hire shall be counted from the time the craft leaves, its moorings to the time it returns to its moorings.



Table A.3.iv : Canadian Container Port Capacity, Annual Container Handling and charges. <sup>(97)</sup>

	Halifax (Chalturn)	Quebec (Wolfe's Cove)	Vancouver (Centennial "6".
<b>Capacity</b>			
Number of berths	2	2	1
Depth (feet)	40	37	40
Cranes and capacity (tons)	1.40	1.35	1.40
Storage (TEU)	3,100	2,000	2,000
1972 capacity (containers)	100,000	50,000	50,000
<b>Output (1972)</b>			
Container handling 1972	97,453	51,900	48,294
<b>Handling charges (1971) (Canadian \$ per container)</b>			
Inward	59.00	n.a.	60.00-77.50
Outward	59.00	n.a.	58.75-66.875

n.a. Not available.

Table 3.5 Cost per Metric Ton of Multiberth Port  
(Alongside Berths at Henecon (1971 US/\$))

Berths used to capacity	Metric ton per	Capital cost	Mainte- nance cost	Admini- strative cost	Cargo hand- ling cost	Total cost
2	200,000	4.96	4.56	0.70	1.64	11.86
3	340,000	3.91	2.81	0.70	1.64	9.06
4.	460,000	2.99	2.14	0.70	1.64	7.47
5.	580,000	3.00	1.74	0.70	1.64	7.08

(97) Bennatham E & Walters A.A. Port Pricing & Investment  
policy N.York 1979 pp.60 - 61.

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Table No.A.3.7. : Charges for Use of Port Appliances & Plants (96)

1.	Trays & Tubs	:	Rs. 5/- per tray or tub per or part thereof.
2.	Wire and Chain slings of capacity not exceeding 3 tonnes	:	Rs. 5/- per sling per day or part thereof
3.	Wire and chain slings of capacity exceeding 3 tonnes, but not exceeding 5 tonnes.	:	Rs. 8/- per sling per day or part thereof.
4.	Tarpaulins	:	Rs. 5.00 per tarpaulin per day or part thereof
5.	Trailor pump	:	Rs. 225.00 for the first three hours and Rs. 75/- for every additional hour or part thereof with a minimum of Rs. 300.00
6.	Gangway hire	:	Rs. 30.00 per day or part thereof
7.	Port wagon for loading and unloading work	:	Rs. 1.00 per tonne of carrying capacity marked on wagon per trip of duration not exceeding 3½ hours.
8.	Ports Shunting Engine	:	Rs. 15.00 per 15 minutes or part Rs. 30.00 for more than 15 minutes and upto and include 30 minutes and upto and including 60 minutes. Rs. 675.00 per day assuming two shifts of eight hours each.
9.	Weighing Scales	:	Re.1/- per tonne or part thereof with a minimum of Rs. 6/-

Note : (i) Charges for use of the derricks of a dradger for lifting masts of sailing vessels etc. shall be levied at the rate prescribed above for crange under itesms (i) to (iv) These services will be rendered at the direction of the Port Authority.

(ii) "day" means a day of 24 hours commencing at the hour at which the services is availed of

(iii) "tonne" means metric tonne if 1,000 kilograms

Source: Rules, Regu. Ports of Gujarat State. pp 68-69,70.

4. Fees for Cancellation 50% of intimation is given before departure of Pilot.

Other Fees :

Demurrage on goods landed, on goods shipped,

- A. Lighterage Fees,
- B. Dentention Fees
- C. Licence to vehicles
- D. Overtime Fees, Open Space Fees, Passengers disembarking and embarking.

P A R T - A  
C H A P T E R - VI

IV) Congestion in Ports:

The high capital cost of providing new port facilities and equipment renders it necessary to ensure that the existing facilities at the port are best utilised to the best advantage.

1) Berth Capacity :

The capacity of a general cargo berth is dependent on a wide range of factors, such as the lengths of the berths the draft available, the rate of occupancy, the workers output, the area of the shed adjoining the berths, the rate of shed clearance, the nature of the cargo and its packing and the cargo handling equipment employed. The capacity of bulk or mono-commodity berths (eg. iron POL, fertilizers, raw materials etc.) On the other hand can be determined more readily by the availability of mechanical handling equipment and the speed at which it operates.

The area of the transit shed along with the proper layout and proper operating methods determine the capacity of the berth. (Refer Appendix A.VI.(IV) (1))

With fixed proportion, the difference between the marginal cost and the associated average cost can be measured, by a constant single daily amount C per ship load.

The length of the queue in terms of vessels <sup>(98)</sup> (q) is an increasing function of the throughput of port (x), where (x) is measured in terms of ship loads per day.

This means that the occupancy rate of berths can be increased only by having a longer queue of vessels. Total cost (K) then consists of two elements.

( Port cost per )	(Port throughput)	(Daily)	(Length of )
( ship load )	(ship loads per )	(ship )	( queue )
	(day	) (cost )	( and number)
			( of vessels)
			( in port )

or in symbols.

$$(1) K(X) = cpX + cq(X)$$

The total cost associated with a daily throughput of X ship loads, thus is composed of the port's cost of handling these ship loads and the days cost of the queue. That the delay per ship (D), or number of days the ship spends waiting, or in port is a function of X and is related to q and X as; (a)  $X = q(x)/D(x)$

$$\text{Thus} \quad K(X) = cpX + cxD(X).$$

The total cost of a particular daily level of throughput is now expressed as the sum of the associated port cost, and the cost of the time which those shiploads had to wait before being discharged from the port.

To find the marginal cost of the throughput

$$(3) \frac{dK(x)}{dx} = cp + C(D(X)) + \frac{X DD(x)}{dx}$$

$$= cp + CD(x) \left[ 1 + \frac{X dD(x)}{D(X) dx} \right]$$

Thus, the marginal cost of shiploads of cargo consists of the port cost (constant) plus the cost of time spent by an additional ship  $[CD(X)]$ , plus the delay cost which that additional shipload imposes on all other users of the port.

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Thus, the marginal cost of shiploads of cargo consists of the port cost (constant) plus the cost of time spent by an additional ship  $[CD(X)]$ , plus the delay cost which that additional shipload imposes on all other users of the port.

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$$\begin{array}{l} \text{(Marginal cost)} \\ \text{(per vessel)} \\ \text{(load)} \end{array} \begin{array}{l} \text{\$Port)} \\ \text{)} \\ \text{)} \end{array} = \begin{array}{l} \text{(cost)} \\ \text{( )} \\ \text{( )} \end{array} + \begin{array}{l} \text{(Own } \Phi \text{ (Additional delays )} \\ \text{(delay )} \\ \text{(cost )} \end{array} + \begin{array}{l} \text{(costs caused to all )} \\ \text{(other vessels )} \\ \text{( )} \end{array}$$

Refer Fig. A.4.1 shows the difference between SWQZ and SWRP. Thus for any particular value of X, the required congestion surcharge can be calculated.

It consists of the components the delay cost per ship/ or per ship load multiplied by the elasticity of delay with respect to the throughput of the port.

The elasticity of delay - the percentage increase in ship delay per 1 percent.

In any congested port, it should be possible to calculate the congestion surcharge appropriate for the tones of throughput (X) actually observed. Such as daily cost of operating a typical vessel in port, or in the line, the daily inventory cost of a shipload of typical cargo, and the elasticity of delay with respect to throughput. In a heavily congested port, the value of this surcharge might be very large because another ship joining the line will lengthen significantly, the average waiting time suffered by all the vessels in the circular flow of vessels through the port. The surcharge, may then amount to two or three (or more) times the new entrants own cost of incremental delay. The queue of ships (and shiploads) will contract and, as set out in the example, the total tonnage presented to the port must shrink. The surcharge calculated for the levels of throughput under heavy congestion would accordingly cause a big contraction of the number of vessels sailing to the port, if it were levied, it would have to be lowered again. The surcharge will lead to the desired level of port use only if the elasticity of demand for the port is known.

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ii) Advantages of congestion pricing :

- 1) The Port Authority would gain by the surplus caused by the demand for its facilities.
- 2) These charges or levies could provide funds to expand the port Services, and make the port self-sufficient.
- 3) Congestion levies will encourage efficient use of the port facilities, i.e. got by a larger throughput of traffic.
- 4) Due to congestion levies, the Port Authority receives rent for storage sheds, storage space, facilities etc.

iii) Disadvantages :

- 1) Charge congestion levies, separately for handling and wharfage charges which are joint, and leads to administrative complications in accounting procedures.
- 2) The Congestion levies are passed on by the ship-owners companies, depending on the type of congestion experienced.

iv) Cause of Congestion :

Some of the causes of congestion are under the control of the parties involved in transport operations, i.e. bunching of ship arrivals, by scheduling voyages by varying speeds, delays in removing cargo, due to the responsibility of cargo owners and inland transport operators.

- 2) Breakdown in port facilities due to inspection maintenance and stocking of spares.
  - 3) Weather conditions - storms, heavy rains which delay vessel movement, cargo working and strikes of labour or procedural delay.
  - 4) Congestion may affect a berth only or a storage facility, eg. Grain traffic.
-



Congestion is measured by time that ships spend waiting for berth, the degree of capacity use, occupancy rates of berths or sheds.

There are two types of congestion - normal and abnormal congestion.

Normal congestion is experienced for a few hours of delay, depending on the size of vessels transshipment patterns outside operations, cargo handling equipment on board.

Refer (Table : Indicators of congestion)

V) Abnormal Congestion :

A port Authority sometimes defines congestion as the situation where a ship actually leaves the queue and sails to another port.

A shipowner defines congestion as excessive waiting time. Other rule of thumbs are in terms of critical levels of available capacity use.

For conventional general cargo berths, the critical level is 70 to 80 percent, depending on the number of berths.

For container ship is 30 percent occupancy for a single container berth as they do not wait.

Frequently faster working which accounts for higher cost per unit of output.

Some Port rates are charged per unit of time, charges for berth occupancy, use of tugs, cranes and slings, for the occupancy of sheds or warehouses.

Cargo owners have increased cost due to inventory cost, contractual fines, last sales, or higher insurance

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premium, diversion of shipments, search for cargo in sheds etc. lighters movements in port may increase the cargo. Shipper may re-route and tranship to other cheaper vessels.

vi) Congestion Surcharges :

Surcharges are percentages of the freight rates i.e. 5 to 10 percent in Bombay to 130 percent in Tripoli. Conferences usually set uniform surcharges for all the members.

The decision to impose a surcharge must be agreed between operators who differ in their interests their costs and their competitive position in the cartel, such as liner.

Short delays on amultiport voyage can be recovered by faster working in other ports on the voyage, at a lesser cost. Delays of two days can be made up by working overtime in the next port of call, working weekends, shortening the maintenance period, rescheduling ports of call, or missing out a port of call.

vii) Surcharge and Type of Service :

Liners, unlike tramps work on sailing schedules. Consider the case of a 4 day delay affecting a liner Company operating 30 day round trip with calls at eight or nine ports. If the normal turnaround time is 2 days, a 4 day delay in one port requires that one of the remaining eight ports to be omitted. If four vessels in the company experience the delay i.e. ship days lost full round of eight ports calls missed on the service,

The cost differential arise from the liners strict adherence to Schedule. If this cost is charged to the congested port cargo, the unscheduled tramps and bulk

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carriers will have a price advantage.  
 Surcharge and the degree of monopoly.

Table 4.3

(Refer Appendix A-VI(iv)(ii))

Surcharge on smaller routes and surcharges on long routes to Europe or U.S.A. Lower surcharge seems to give the time indicator of the cost of congestion to the ships.

viii) Bilateral Monopoly.

Bilateral Monopoly is found in the port and the shipowner.

The Port Authority will know the minimum price at which it is willing to provide port services.<sup>(99)</sup> The steamship owner will know the minimum net return, he will require to call at Port, or avoid the Port call. An increase in prices, is limited by other transport services, and also by the elasticity of supply and demand of the commodity, and both the Port Authority and Steamship owner then have a bargain agreement on the price to pay.

In general the Port Authority, when he comes across on Monopolist Steamship owner should price the facilities of the port according to security in relation to the demand for them.

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(99) Bennathan E & Walters AA. Port Pricing & Investment Policies, N.York 1979.

4.1a

Section I

Tugs and Launch Service to Owners, Masters and Agents of Vessels and Sailing vessels.

- (a) Tug Service : For berthing and unberthing of the ship in and sailing vessels.
- (b) The Inner Harbour area : Rs. 500.00 per ship per tug
- (c) The outer Harbour area : Rs. 800.00 per ship per tug
- (d) One Part of Port to another Part : Rs. 1000.00 per ship per tug
- (i) One Part of Port to another Part : Rs. 50.00 per barge or crafts
- (ii) Sailing craft or : Rs. 20.00 per barge or crafts.

Section II

4.1b

Pilotage Fees

Unit of Rate	Overseas		Coastal	
	During day	After Sunset & before Sunrise	During day	After Sunset & before Sunrise
Per 100 tons (GRT) or Part	40	80	25	50
thereof per vessel each way subject to minimum charges	400	800	250	500

2. Sailing Vessels ( Rs.
- (a) Sailing Vessels of over 100 and below 200 tons 200/ per vessel each way
- (b) Sailing Vessels of 200 tonnes & over 300/ -do-
3. Pilotage fees for shifting & movement requisitioned by Master of steamers.

Table No. 44C

Section III

Letting on hire of Cranes, to Masters, Agents or  
Owners of Vessels Importers or Exporters.

Sr. No. Crane hiring No lifting capacity	Rate
i. 3 tons or less than 3 tons	Rs. 12.00 per hour or part thereof with a minimum charge of Rs. 36.00
ii. More than 3 tons out not more than 5 tons	Rs. 18.00 per hour or part thereof with a minimum charge of Rs. 5.40.
iii. More than 5 tons but not more than 10 tons	Rs. 23.00 per hour or part thereof with a minimum charge of Rs. 69.00
iv. More than 10 tons	Rs. 45/- per hour or part thereof with a minimum charge of Rs. 135.00
v. Hand Operated Crane with labour	Rs. 9.00 per hour or part thereof with a minimum charge of Rs. 27.00
vi. Hand operated Crane without labour	Rs. 8.00 per hour or part thereof with a minimum charge of Rs. 24.00

Table : 4.3 Congestion Surcharge of shipments to  
Bombay and Karachi, 1973.

Port	Conference	Route	effective from	Rate (%)
Bombay	India/Pakistan	UK/India	3-12-73	30
	West Coast of India/Pakistan US.S	Pakistan US, Atlantic & Gulf Ports	10-12-73	30
	Japan/India/ Persan, Gulf of Japan	Both ways Japan India Palistine Gulf	1-12-73	15
	Gulf, Arabian Sea Orient rate agreement	P. Gulf Arabain Sea Southeast Asia Taiwan Korea Philippines	1-12-73	15
Karachi	India/Pakistan West Coast of India Pakistan/ USA	Korea, Phillippines	3-12-73	20
			10-13-73	30

P A R T - A  
C H A P T E R - VI

✓ 1) PROFIT MAXIMIZATION IN PORTS

Port Profit Maximization compared with Marginal Cost Pricing.

Ports which lack monopoly power have little choice in the way they set their charges.<sup>(100)</sup> But most ports have some monopoly power and thus also some choice between setting prices approximately equal to marginal cost and pricing their services to maximize profits.

The effects of profit maximization on prices and output depends on the circumstances of the case and are usually difficult to ascertain even in specific cases. The difficulty is naturally greatest in enterprises like ports which are usually multiproduct firms selling each type of service in a variety of markets each with its own demand conditions. The empirical fact that, with a given plant, marginal costs will after a certain point increase with an increase in the product.

(Refer to Diagram A.51.) To obtain an idea of the size of the effects of pricing to maximize profits, it is necessary to work with a model which shows, some of the demand conditions of area or hinterland.

The first equation describes the amount of output originating  $m(100)$  meters from the port.<sup>(101)</sup> This is shown as a linear function of the price levied by the port, plus the internal transport cost, Thus,

$$X(m) = \beta - \gamma P(m)$$

Where

$$p(m) = p(0) + tm.$$

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(100) *ibid* Bennathan E & Walters AA pp. 97-98

(101) *ibid* Port Pricing & Investment pp.121-123  
Policies N.York, 1979. Appendix A.

$2x(m)$  is the quantity offered for export at a distance  $m$  (100 metres) down the road,  $p(m)$  is the price of transport along the road plus the port charge  $p(0)$ , and  $t$  is the transport cost, constant per ton per 100 metres along the road. Suppose that there are no variable factor inputs into production other than those of transport.

$C(x)$  is the port cost function, where  $X$  is the total traffic shipped through the port.

$$X = \int_0^n 2x(m)dm.$$

Thus, the profit of the port Authority is given by

$$\pi = p(0) \cdot X - C(x)$$

and the marginal profit is :

$$\frac{d\pi}{dx} = \frac{dp(0)}{dx} \cdot X + p(0) - C'$$

Where  $C'$  is marginal cost.

Owing to the choice of units for  $t$  and  $x(m)$ , the total output  $X$  can be represented as the product of the distance  $R$  and value of  $X(0)$ . That is the base of the triangle  $QP$  multiplied by the height  $PR$ ,  
Fig. A.5.1 solving for  $X(0)$ .

$$X(0) = \beta - \gamma P(0).$$

At  $R$  is clear that  $x(R) = 0$

$$\begin{aligned} \text{and so : } X(R) = 0 &= \beta - \gamma P(R) \\ &= \beta - \gamma(p(0) + Rt). \end{aligned}$$

$$\text{Thus : } R = \frac{1}{\gamma t} (\beta - \gamma P(0))$$

$$\text{Total output is therefore : } X = \frac{1}{\gamma t} (\beta - \gamma P(0))$$

$$\text{Then } \frac{dX}{dp(0)} = \frac{-2}{t} (\beta - \gamma P(0))$$

from the first order condition for profit maximization,

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$$\frac{d}{dx} = 0 \quad \frac{-1}{2y} (\beta - yp(0) + p(0) - C') = 0$$

$$= \frac{\beta}{2y} + p(0)/2 + p(0) - C' = 0$$

$$\text{so that : } p(0) = \frac{2}{3} C' + \frac{B}{3y}$$

This can be expressed alternatively in terms of R

$$\text{since } p(R) = p(0) + Rt$$

$$\text{and } p(R) = \beta/y$$

$$p(0) = \frac{2}{3} C' + \frac{1}{3} p(R)$$

$$= \frac{2}{3} C' + \frac{p(0) + Rt}{3}$$

$$p(0) = C' + \frac{Rt}{2}$$

In Fig. A.5.2. if the two price rules are substituted into the output formula profit maximization reduced output of the exported good to four ninths of the level that would be achieved under marginal cost pricing conditions.

The ratio of the total revenues is :

$$\frac{\text{Maximum revenue}}{\text{MC revenue}} = \frac{4}{27} \left[ \frac{(2yC' + B)}{C'} \right] C' > 0$$

- 1) The distributional aspects of international transport differ in one major respect from those of predominantly national projects, e.g. Public Utility.
  - 2) In that case marginal cost pricing itself supplemented where necessary by the computation of shadow prices perform a major distributional function.
  - 3) Standard fiscal methods can then atleast regulate the distribution of any monopolistic surpluses that remain in the economy.
  - 4) Problems arise when in international transportation when suppliers are foreigners, It is thus in
-

accordance with the principle that the party which causes the port to incur particular costs should both know the price and pay for it.

### 11) A Monopolist Shipowners.

The price which the monopolistic shipping conference<sup>(102)</sup> would be prepared to pay for the port's service is the difference between their marginal revenue (MR) and marginal cost. Thus

(1)  $P_p = MR_s - C'_s - p_s R - C'_s$ . The profit of the port are  $\pi = X p_p - \text{port cost for } X = X P_p - C_p$ .

Hence, the marginal profit of port throughput is

$$\begin{aligned} \frac{d\pi}{dX} &= \frac{d(XP_p) - C_p}{dX} \\ &= \frac{d(X(p_s R - C'_s))}{dX} - C'_p \\ &= X \frac{d}{dX} (p_s R - C'_s) + (p_s R - C'_s) - C'_p \\ &= p_s \left( X \frac{dR}{dX} \right) + X R \frac{dp_s}{dX} - X C'_s + (p_s R - C'_s) - C'_p \end{aligned}$$

$X(dR/dX)$  can be written as  $R_w$  where  $w$  is the elasticity of  $R$  with respect to changes in ship or port throughput.  $X$  If the elasticity of demand for shipping ( $e$ ) is constant  $dR/dX = 0$  and hence also  $w = 0$ . If elasticity of demand decreases in absolute value as  $X$  increases  $dR/dX$  and  $w$  will both be negative and positive as  $X$  increases.

$$(2) \frac{d\pi}{dX} = p_s R_w - X R \frac{dp_s}{dX} - X C'_s + p_s R - C'_s - C'_p$$

$$\text{Next: } X R \frac{dp_s}{dX} \left[ \frac{1+1}{e} \right] \frac{dp_s}{dX} = - \frac{p_s (1+1)}{e}$$

Therefore :

$$\frac{d\pi}{dx} = pR + p \frac{(1+1)}{e} - C_s' X + p_s \frac{(1+1)}{e} - C' s - C p'$$

$$= p_s R_w + p_s \frac{(1-1)^2}{e} - C_s'' X - C_s' - C' p$$

OR

$$(3) \frac{d\pi}{dx} = p_s R_w + p_s R = C_s'' X - C_s' - C p'$$

Finally, since  $p_p = P_s R - C' s$

$$(4) \frac{d\pi}{dx} = p_s R_w + P_p R - C_s' R + C_s'' X - C_s' - C p''$$

The Profit maximising port will fix its price so that  $dn/dx = 0$

$$(5) P_p = \frac{1}{R} [C' s + C_s'' X + C' p - C_s' R - P_s R_w]$$

$$= \frac{1}{R} [C' p + C_s' (1 - R) + C_s'' X - P_s R_w]$$

In this case  $w = 0$  when  $e$  is constant<sup>(103)</sup>

$$(6) P_p = \frac{1}{R} [C' p + (1-R) (C_s')] \quad 0 < R < 1.$$

When  $e$  is not constant and decreases as  $X$  increases, the demand curves are kinked concave to origin, equation 5. When  $e$  is not constant but increases as  $X$  increases ( $w > 0$ ) the port will charge lower prices to exploit the much large quantity generated at high throughput volumes, and the profit maximising revenue will exceed marginal cost pricing revenue if  $\gamma$  and  $C'$  are sufficiently small relative to  $\beta$  so that  $\beta > 19/4 \gamma C'$ . Thus, if the marginal cost is very low, the triangle is not elongated i.e. if  $R$  is small in width),

(104)

The elasticity of demand for port services with respect to its own price  $p(0)$  is shown in various forms. Thus : elasticity  $= \frac{p(0)}{X} \cdot \frac{dX}{dp(0)}$

(103) *ibid* pp. 126

(104) *ibid* pp. 123.

$$-2yp(0)/(\beta - yp(0)) \text{ or: } -2 - \frac{2\beta}{x(0)} \quad 0 < x(0) < \beta$$

iii) Maximising Benefit to Nationals. (105)

Economic decisions often mean choosing, one or several possible courses of action which size of plant to build which product to produce, which machine to buy etc. Rational decisions means choosing the optimum combinations of revenue and of cost. Profits always mean revenue minus cost. Revenue minus full cost will be called net profits.

Let  $P_p$  = the price per unit of the port service.

$P_s$  = the freight rate,  $C_p$  = cost of port service.  $C_p'$  the marginal cost of the port services.  $C_s'$  = the cost of shipping.  $X$  = tonnage of ship cargo = port throughput.

$e$  = elasticity of demand for shipping  $R = (1 + (1/e))$ , the ratio of marginal revenue in shipping to the freight rate.

iv) The gains to national Owners of Cargo:

The gains to cargo owners of reduced freight rate<sup>(106)</sup> is measured by the quantity of cargo multiplied by the (small) reduction in the charge per ton of cargo, that is to say,  $-X\Delta p_s$ . This is the compensating variation of income associated with the price change  $\Delta p_s$ . i.e.  $-X\Delta p_s \cdot \frac{\Delta X}{\Delta X}$ . Taking the limit as  $\Delta X$  becomes very small.

$$-\frac{X\Delta p_s}{\Delta X} \cdot \Delta X = -Xdp_s \cdot dX = \frac{P_s}{e} \cdot dX \quad \text{defining } e < 0.$$

This implied that the price ( or freight rate) divided by the elasticity of demand will measure the marginal gain (loss) to nationals other than the Port Authority of a reduction (increase) in the freight rate associated with a small change in throughput.

(105) *ibid* pp. 124.

(106) *ibid* pp 129.

P A R T - ACHAPTER - VIVI.1 The Supply Function & Variations.

The proposition that changes in Port charges or services will not be reflected as freight rates is quite true. The main constraints on Conference pricing is the risk of entry of tramps and non-conference competition. If the Conference reduced its rates, there would be little traffic, the elasticity of demand is quite low. Thus, there is a kink in the demand curve facing the Conference. There are many variations in the cost conditions of the Conference, without any effect on the freight rate. Kinked Demand Curve and Changes in Cost Prices.

( Refer Diagram A.6.1)

If the cost of operating to Calcutta is higher than to Bombay, say  $C_c$  compared to  $C_b$ , then provided there is not an enormous difference between them, the Conference will be induced to equalize the two rates. If the rates are the same, the demand curve is drawn with respect to a given price charged by the Conference or competitors, that indicates the elastic branch of the kinked demand curve reflects this price.

VI.1i Discrimination by Origin :

Let us suppose that a Conference is the transporter of the produce of a farmer that is in the hinterland of the Port. Suppose the Conference can discriminate in its rates according to the origin of the goods. The farmer has to pay S.T. per unit for every mile of transport along the road, i.e.  $m$  miles he pay  $R t m$ . One mile, one unit of quantity can be produced. The amount that the

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FARMER will send for export will depend upon the price that he must pay to deliver it at the export market. This is equal to the price which is levied by the Conference for transport overseas i.e.  $P(m)$ , the Price for the  $m$ 'th mile along the highway, the cost per unit of sending the goods to the foreign market is  $P(m) + mt$  dollars

$$(1) \quad X(m) = a - b (P(m) + mt)$$

Demand of the farmer<sup>(107)</sup> situated  $m$  miles away from the Port Marginal Cost is constant  $C$ , the net revenue from the farmer at the  $m$ 'th mile is then :

$$(2) \quad P(M) - C) X(m) = P(M - C) (a - b(P(m) + mt)$$

$P_m$  value is maximised  $P(m) = 0.5b^{-1}(a - bmt + cb)$   
OR

$$(3) \quad P(m) = 0.5 (a/b) - mt + c$$

Farther away from the port the Conference will reduce its rates by 50 percent for inland transport.

$$(4) \quad X(M \max) = a - (B/2) [(a/b - mt + C + 2mt)] = 0$$

that is :  $a - (a/2 + (bmt/2) - (bc/2) - bmt = 0$

$$(5) \quad m_{\max} = (a - bc)/bt.$$

#### VI. (iii) Other Variations in Cost.

Suppose that there is a continuous port operation along the road, - as though the ship can travel up the highway and collect traffic at each point.

The marginal cost of collecting a small unit of cargo  $c/m$  from a distant main port.

$$(6) \quad P(m) = (a/2B) - mt/2 + (C(m)/2)$$

Thus the increasing cost of ports from the most distant locations -

1. Conference does not vary price according to the Port
2. Discrimination exists, since prices do not vary according to the costs, they are constant.
3. This shows constancy of freight rates over a region
4. Alternatively, cost of ports depend upon the amount of traffic that passes through the port. Marginal cost diminishes as the quantity of traffic increased.
5. Model of a Single Port, in the hinterland, or several parts to a hinterland country, each differ in its productivity. Parameters are 'a' and 'b' highly productive hinterland have high values of the parameter 'a', so that the monopolistic ship-owner would charge high freight rates for high productivity areas, and discriminate against the high productive area.

(Refer Appendix A.VI(VI) (1))

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6a. Berths, Moorings or Aircharge Dues.

Sr. Classification No.	Rate			Unit
	Upto 10 tons	Over 10 tons but below 50 tons	Over 50 tons	
1. Sailing Vessels with Sails only	Free	2.00	4.00	Per day or part thereof
2. Sailing vessels mechanised	Free	5.00	10.00	- do -
3. Tugs & Launches	5.00	15.00	30.00	- do -
4. Barges & other crafts (Non-mechanised used as harbour craft	"	5.00	10.00	- do -
5. Barges and other crafts (mechanised) used as harbour crafts	"	20.00	40.00	- do -
6. Fishing Vessels (Non- mechanised)	Free	30.00	60.00	Once in 30 days
7. Fishing Vessel (Mech.) including trawlers	50.00	100.00	200.00	- do -
8. Sailing Vessels with sails only utilised for Passenger Ferry Service	3.00	5.00	10.00	Once in 30 days counting from the 1st day of avail- ing of berths
9. Sailing Vessels (mech. utilised for Passenger Ferry Services	5.00	10.00	20.00	- do -
10. Sailing Vessels landing and shipping Cherwood	Free	3.00	5.00	- do -



Mr. G. I. PEREIRA

8.b Mooring Fees for the mooring buoys by the Port Authority Sr.No.

Sr.No.	Particulars	Rates for Vessels of	
		Less than 1500 tons net	1500 tons net & above
		Rs.	Rs.
1.	For use of moorings on first day or part thereof	100.00	150.00
2.	For use of mooring on each subsequent day or part thereof	50.00	100.00

Note : Supply of Fresh Water to vessels Dock Jetty, Pier & wharf in stream

Rs. 5.00 per 1000 litres  
Rs.20.00 per 1000 liters

P A R T - A  
C H A P T E R - VI

VII. 1) Competitive Pricing among Ports :

Ports in a situation of inland competition e.g. Major Ports, therefore keep their prices for identical services closely in line with each other.

Congestion at one port, should quickly lead to vessels being diverted to the other, the additional cost of inland transportation to a particular location.

If port pricing and internal transportation pricing policy are based on marginal cost, there will be an efficient allocation of cargo and traffic.

The total overcase will depend on whether the commodity is shipped by conference vessel, or by competitive shipping.

For Conference services, the price of a shipping service is the same whether the goods are carried from Bombay to Singapore. By looking at its size. Singapore has many more frequent and varied services. Waiting time is so long for a ship and an exporter will save on inventory and wastage cost. For timber ships, estimated cost to be 4/5 weeks for Bombay, and 1/2 weeks from Singapore. 3 weeks delivery involves considerable inventory cost, interest at high rates, and liquidity is scarce and may

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cause considerable cash flow problems.

11) Transshipment Competition :

Transshipment Competition can be found in

- (1) The more complex form of interport competition involving transshipment and multi-port use.
- (2) Equidistant ports compete for transshipment to a third port, then port charges becomes the decisive factor in the outcome of the competition.
- (3) Due to location site of the port, in regard to high traffic flows eliminates many ports from a particular race.
- (4) If there is competition between transshipment ports within the same region, or between transshipment port and well developed ports in the country of destination then, the transshipment demand will have relatively high elasticity.

The main difference between transshipment and a reshipment cargo is that the former must be moving on a through bill of lading. The difference is that transshipment cargoes arrived before the cargo leaves the original port. Reshipment is done by local shippers and can be stored at low cost.

(Refer Appendix A VI(VI) (1))

111) Container Service Mainline and feeder.

Container services unlike conventional break-bulk services comprises both mainline and feeder operations.

Feeder operations add two handling operations and normally show the cost per container to be higher for the feeder service, except for great distance or the small number of container.

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55 percent of the cost of feeder service from Singapore to Bangkok for instance consists of handling charges. (Refer Appendix.AVI(VI)(i)).

Table No. 7.1 a

Annual Expenditure by Major Ports in India for 1991-92

Port	Total Expenditure	Port & Dock including	Cargo Handled warehousing	Railways Finance	Land & Bldg.
Kandla	4490	2126	835	4	293 452
Bombay	26394	4214	1184	1184	1318 7010
J.Nehru	6542	833	3206	14	244 1099
Mormugao	4966	1070	1556	104	139 1125
N.Mangalore	2715	1260	265	-	63 451
Cochin	5667	1576	1105	17	167 1454
Tuticorin	3086	506	447	68	123 407

Table No. 7.1 b

Vessel Class	all Others	Port I	Port II
Ship delayed because berths unavailable (percentage of all ships calling)		12.5	8.6
Average delay (days)		5.2	1.7
Expected delays to any ship entering port (ship)		0.65	0.15
Ships days lost per berth-days to port		0.16	0.01
Cargo worked per berthday(tons)	600-700		325
Average turn round (days)		5.4	8

P A R T - A  
C H A P T E R - VI

VIII. Port Tariffs and Multi-part Tariffs.

1) A two-part tariff<sup>(109)</sup> is a pricing technique that firms often use to reduce consumer surplus. It requires consumers to pay a fixed fee that gives them the right to purchase units of a good at a specified price. After paying the fixed fee consumers can purchase as many units. These two-part tariffs are used in Amusement Parks by a firm renting specialised durable goods. A Port cost functions comprise of a large fixed cost and a low variable cost up to the point where congestion really becomes felt. Thus, the price for using the facilities should be suitably low, and probably not much above the marginal cost of use.

ii) General Trend of charging tariffs.

Charges should be designed so that one part (the fixed charges) pays at least for the fixed cost of the facilities, and one part, (the variable charge) is levied according to the use of the facilities and measures the marginal cost.

Charges are fixed for regular calls, i.e. Conference liners and casual call or visits, tramps, bulkers. A regular call charges is less than a casual call or visit charge, as it is easier to plan a quay occupation schedule to avoid waiting time period, or they can lease a quay space at the times specified as agreed with the

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(108) *ibid* Pashigan B.P. Price Theory and Applications, McGraw Hill Inc. N. York. 1995, pp.407

Shipowners, and are less than a casual visit charge. In order to cover cost, with restricting the use of facilities forms the two-part tariffs and can be used for welfare and the other part on income distribution.

a. Lease a quay (LAQ) <sup>(1)</sup>

The Port Authority builds facilities, rents them out to annual basis or on a long term lease or a charge, for non quay services, use of the channel, tugs, storage, outside the quay and special port equipment.

Advantages :

- 1) The shipowner may adjust his use of the port facilities to minimise his cost.
- 2) This leasing agreement makes it possible to have a combination of public ownership, Port Authority and private efficiency, shipowner.

Laq schemes are formed between a port and shipper - Petroleum facilities leased to Oil Companies.

Laq schemes are used for container quays and terminals at large ports.

Developing countries can offer a quay for rent, say on a 5 year contract. To ensure extensive use of the quay, the lessee may offer the berth for rent to a third party or sublet the berth to other users. Lease a quay may also induce competition and the lessee will regard the payment as a fixed cost, and he may encourage traffic so that the marginal revenue covers the low cost upto capacity.

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Leasing arrangements, are contracted for other facilities such as berths or special cranes. The customer may only lease the site and general services from the port and install his own equipment.

b. Annual Fee to Enter (A.F.T.E.)

Another two-part tariff is an annual fee to enter the port.

- 1) This depends upon the vessel size, for dredging the channel deeper.  
Queries arise on imposing this tariff on whom should this levy be charged to the Conference or to all members of the Conference? Now to calculate the standing charge on yearly basis or a period three year basis. Ships may receive a discount according to the number of visits they make, or the Port Authorities may rule ten visits per year. In this case, the large user may gain, such as liner Conference.  
The charge should be calculated so that the port revenue are increased.
- 2) Only if, there is a persistant excess capacity should this system be used say for more than 1 year.
- 3) A group of conference will find this system most useful, if they are the owners of the Port.

c. Container Charges (109)

- 1) There is more investment scope for container facilities specially developing country.

(109) ibid pp187. Bennathan E. and Walkers A.B. Port Pricing and Investment Pricing N.York 1979.

M s. G. I. PEREIRA

- 2) There is considerable competition between ports for container vessels and services.
- 3) The Unit cost declines rapidly for any use below capacity.

8.1. Port of Madras Authority tariff, 1993  
Container traffic per tonne.

Income	Rs. in crores
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a) Variation according to activity.	
Cargo handling and storage charges	3.72
Port and Dock charges	9.48
Railway Working	0.54
Estate Rental	0.06
Container Handling	13.91
	<hr/>
Finance & Miscellaneous Income	23.67
	<hr/>
	57.18
Handling & Storage of General Cargo	4.31
Storage of goods in warehouses	(.) 0.22
Craneage	(.) 0.42
Petroleum, Oil & lubricants & Handling charges	1.27
Handling of ore at New Berth	(-) 0.75
Towage and Mooring Fees	2.55
Port Dues	2.04
Water supply to shipping	(-) 0.44
Pilotage Fees	5.01
Freight & Handling charges	0.36
Terminal charges	0.30
Accommodation provided to outside offices	0.90
Container Handling	15.91
Other items	30.76
	<hr/>
	57,18.
	<hr/>
	1992-93
<u>Container Traffic :</u>	
1, 32, 482 TEUs 1992-93	1, 07, 583 TEUs
Import	62, 923
Export	63, 512
Transshipment	925
Shifting	5, 122
	<hr/>
Total	1, 32, 482
	<hr/>



M s. G. I. PEREIRA

4. Containerization may be so advantageous that it is worthwhile paying the higher handling charge where all general cargo is containerized in some ports, conventional operation is often important and continues as the dominant form of handling with some containerized cargoes on certain routes.

The port handling charge is an important factor in determining whether or not to containerize cargo. There are very large economies of scale in container operations, as the number of containers increase, the average handling cost decreases, because of the more intensive use of equipment. Once Containers facilities are installed, the charges for container handling should be kept low enough to realise the economies of scale.

The contract of the port with the container consortium would specify the annual rent for the right to operate a container service to the port. The two-part tariff will encourage the container company to seek additional traffic and to realise the economies of scale in container operation.

The fixed rental charges, however, will ensure that the country or port will share in the advantages of containerization.

iii) Shippers Licence to use the Port (LUP)

A non-transferable licence to use the port (LUP) could be thus sold to shipper, entitling the holder to use the port resources at price equal to incremental variable cost.

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Mrs. G. I. PEREIRA

iv) Percentage Levy :

The levy charged by Port Authority on the goods unloaded and loaded would be calculated at 10 percent of the total of the freight receipts.

- 1) The fractional freight charges could benefit those vessel that make frequent visits with smaller loads.
  - 2) The shipowners will reduce rates, hence port cost is equal proportion is reduced.
  - 3) The fractional freight charge does discriminate between the long distance and short distance traffic in terms of ability to pay, the long-haul voyages have greater potential. Also, there is discrimination according to the value of the commodity as well as to the cost of carriage. Again, this would vary port charges according to ability to pay.
  - 4) The transshipment cargo has greater elasticity of demand for port services, than other cargo and is assured of a way to raise revenue and to maximise the profit of the Port.
  - 5) The fractional freight rate would change with the change in freight rates. During a slump, the freight charge and port charge fall together, under boom changes the port charge would rise. Due to excess capacity the marginal cost is very low during a slump.
  - 6) The fractional freight charge tends to adjust automatically to any inflation of
-

the general world price level i.e. freight rates tend to rise with bunker labour and ship prices, especially the Conference rates.

- 7) The question of how much of a percentage levy is covered by fractional charges for labour services? This depends upon the standardization of labour operation, on the labour intensity of cargo operations and whether the port labour is casual or not.
- 8) The fractional charging system is simple, it possesses a built-in flexibility and is easily understood.

The disadvantages of fractional freight charges are

- 1) It encourages cargo to be sent to neighbouring ports and transshipment on a short-feeder route to where there is a fractional freight rate charging operates.
- 2) Accountancy system may show a lower port charge, or a high or port charge, due to discrimination with Conference members.
- 3) The fraction freight charge is difficult to apply to certain tramp vessels on charter-hire where there is no freight rate charged.

Different percentages will have to be fixed for freight charges covering different ranges of service. The fractional scheme is best suited to the conventional port to port service as it is a standardized service rendered by ship owners to the shipper. Containers may be stuffed and stripped in the port, at freight stations outside the port or at shipper premises, and had additional labour services, and some in land transport services.

Table 8.1 Four Ports in Developing Asia :  
Indicators of Output, 1974

	Number of vessels	Imports (million tons)	Exports (million tons)	Total (million tons)
Port of Singapore	19,629			
Ship calls (over 75 NRT)				
Cargo handled (freight tons)		37.7	22.8	60.5
Dry		(9.1)	(5.7)	(14.8)
Oil in Bulk		(28.6)	(17.1)	(45.7)
<u>Port Kelang</u>				
Ship calls		3,170		
Foreign going contained outships and tanker long tons		(2,524)		
Cargo handled		2.7	2.0	5.6
Dry cargo		(2.0)	(2.2)	(4.2)
over authority facilities		(2.4)	(1.9)	(4.3)
Port of Bangkok (Provision)	4,330			
Ship calls				
Cargo handled (measurement tons (authority's installations.		8.6	2.4	10.0
Dry		(3.5)	(2.4)	(5.9)
Petroleum		(5.1)		(5.1)
<u>Port of Chittagong</u>				
(July 1974-June 1971)				
Ship calls	749	749		
Cargo handled		4.2	4.2	
excluding bulk oil			0.3	4.5
			(3.0)	(3.3)

V) Allocation by Rule :

Allocation by rule is resorted to when there are conflicting demands for scarce resource, the beneficiary gains, and the owner loses the benefit. If prices used instead of rules, the gains from the scarce resource allocated to the user who required it.

In the allocation of berths, the rule, first come, first served, is practised eg. import vessels get preferences over other vessels, as these vessels may be arriving ballast for loading (Oil tankers).

Bulk truck carriers are shown preference at timber wharves.

Container terminals have large vessels served first. Preference is given to vessels that will discharge and load faster, and for servicing ships. Berths allocation <sup>(10)</sup> and differences in the layout and equipment of berths are fixed features of the port. It is not easy to price resource, if the price is too high, the resource will be underused, if it is prices too low, the price cannot perform the allocation.

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(10) *ibid* Port Pricing & Investment Polic- pg.214  
1cs. Benhabib E & Walters AA. N.York 1979.

P A R T - A

PORT DEVELOPMENT IN INDIA

Chapter -VII. - S U M M A R Y.

- 1) The Significant Role of Ports in India.
    - a) Transport Link in the Multi-model transportation of a National Economy. (Land and Sea.)
    - b) They are vital gateways for freight and passenger traffic.
    - c) Ports meets the needs of shipowners, in supplying them a service, and to their customers i.e. Importers and Exporters or in Foreign Trade.
    - d) They create employment opportunities for others to provide goods and services, stevedores, haulers, ship repairers, bonkers etc.
    - e) Ports promote a trading place or a market i.e. exchange of goods and services.
    - f) Ports cater to the Regional Development of the hinterland, to the population of the hinterland.
    - g) Ports develop commercial centres, Foreign trade Centres, and thereby make a substantial contribution to the Regional as well as National Economy.
    - h) The development of Ports depends upon certain factors, their size, and location of the Country, State of Economic Development etc.
    - i) The strategic importance of ports and their pivotal role in the achievement of national economic goods.
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M. G. P. PEREIRA

The main objectives for the Development of Ports in India during the VIII Five Year Plans 1992-93.<sup>(iii)</sup>

- a) Development of Ports - to serve the economic growth.
- b) Keeping up with the Newest Technology.
- c) Proper facilities for container handling at all Major Ports.
- d) Appropriate size of ships for specialised cargo and automation of machinery.
- e) Deepening of drafts and selected Major Ports to receive larger vessels.
- f) Improved Dredging capacity by newer built dredgers.
- g) Reduce at some percent unemployment in the Country.
- h) Improve the Regional hinterland in Human and Material Resources.
- i) Coping with the International Trade trends in goods and services, ships.
- j) Improving the Port Performances, to avoid congestion in Ports, sheds, and Inland Transport.
- h) Ports have to satisfy numerous objectives including social and political ones.
- i) National safety.
  - ii) Contribution to Budget of the State or Local employment.
  - iii) Appropriate financial measures to be taken to improve the viability of Ports, streamlining tariffs documentation systems.
  - iv) Development of inter-face transport links like rail and road to enable smooth trans-shipment and flow of traffic.

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(iii) *ibid* Eighth Five Year Plan, 1992-93 N.Delhi, vol.II. Basic Ports Statistics pp 192.

## II. Theoretical Arguments :

- 1) What are the important aspect of Port Economics?
  - a) Time Factor, transportation, from place to place country to country, Port to Port, both national and international passenger services and freight services with the economy of time.
  - b) The size of the Operation in keeping with the size of the Port, its location and trade.
  - c) The prices charges for services and goods depends on a number of factors, i.e. size of the ship, the country's traffic policies etc.
  - d) The Investment in Ports by a developing country, for infra-structure and Port facilities. Investment that reduces time will have the benefit, as a large ship the cost per ton is less than a small vessel.
  - e) Since a competitive free economy is changing to the trends in latest technology, it is better to base all port tariffs on the short-run marginal costs. Marginal cost is also required for efficient management. ( )
  - f) Are there Economies of Scale in the size of a Port? i.e. larger the Port, the lower is the cost. ( ) Therefore it is important to improve the efficiency and administration of Ports and the distribution of resources.
  - g) The Demand for Port services is high, specially causes congestion, this raised the prices of Port Services, in such a way that the Port can earn high Profits, since the demand
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of the by way of foreign trade, a connecting link of inland transport, like Road transport, railway lines with the Sea transports like ships, Ocean going vessels. The country imports, not only goods and commodities by valuable technology and capital goods, and exports manufactured products and processed goods. To improve, the trade of a country; Ports should be able to save valuable time, by improving their working and suitability to the trends in Shipping development also, in handling cargo and accommodating Sea-vessels.

- The function of Ports is therefore, efficient service and economic use of Ports, The quantitative relationships of Demand for Port services, Preferences in their pricing of these services, the usage and expenditure in keeping with the objectives and Market forces. Price fixation and the supply function in relation to competition between Ports.
  - The maximising of profits in regard to the location of Ports, variations in Demand and Supply, and the fixing of costs during an economic period.
  - Price discrimination for various commodities, destination, and supply of vessels, and levying of tariffs.
  - As the greater volume of foreign trade being Sea borne a country economic growth depends to a great extent on the efficiency of its Ports. Being the important link in foreign trade to inland transport and ocean going vessels, the
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for Port services is inelastic the Ports can raise their prices. Due to high freight rates, caused by long queues the increase in congestion levy, will tend to lessen the queue.

- h) With limited resources and space, a Port has to maximise profits by reducing traffic, to its potential capacity. Prices and traffic depends on the competitive shipowners and the shipping services offered. Only, if the elasticity of demand is constant, is the optimum port tariff equal to the marginal port cost.
  - i) Competition in Ports services tends to cause discrimination in prices policies. Container services may capture the port services, in preference to conventional type of boxes transhipped. A port with container services may have elasticities of demand for a profit maximizing port.
  - j) Various Port tariffs such as lease on a quay for two years (LAQ) or an Annual Free to Enter the Port (AFTE) or renting a berth to a Conference for a period of time etc.
  - k) Improving the Port Performance by building more berths offering more cargo facilities for handling cargo etc. Thus reducing the prices of Port charges and encouraging the free flow of goods and services.
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III.A) Review of the Major Ports in India :

- A.1 The capacity of Indian Ports at the time of Independence was around 15-20 million tonnes in all ports of India's 600 Km coast line.
2. There were 5 Major Ports, Bombay, Calcutta, Madras, Cochin, Visakhapatnam.
3. The Kandla Port was commissioned in 1957, as the 6th Major Port.
4. In 1962 - Goa Liberation, Mormugao Port become the 7th Major Port.
5. Later in 1966, Pradeep Port and Tuticorin Port become the 8th and 9th Major Port respectively.
6. New Mangalore Port in (1947) and last J.L. Nehru in 1989.
7. In addition, Port facilities were developed in 1977. Haldia, 58 nautical miles downstream from Calcutta Port for handling bulk cargoes.
8. In 1993-94, the total throughput was above 180 million tonnes.
9. All the Major Ports are set to achieve the desired results, of Eighth Plan target of 228 million tonnes by 1997.

B) Port Administration in India.

- Administratively all Major Ports in India are autonomous bodies under the Board of Trustee / Port commission.
  - There are Major Ports, Ten in number, Intermediate Ports (168 in numbers) under the Central Government.
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- The administration of the Port is carried on by the Port Trust, with the Chairman, and a Board of Commissioners or Trustees.
  - The MPT Act (1963) on Port Tariff Major Port Trust 1963 (the Act).
  - The administration of Intermediate and minor Ports is governed by the State Governments, Private Ownership. e.g. Railways etc.
  - The Major Ports offer a combination of Port facilities for conventional berth terminals. General Cargo berths unitised break-bulk cargo containerised cargoes are handled.
  - Eighty percent of the total traffic is shared by Six major ports, viz : Bombay (17%); Madras (15%); Visakhapatnam and Kandla Port (14%) each; and Mormugao and Calcutta Port (10%) each.) (.....)
  - Overall estimated capacity at Major Ports on 31st March 1993-94 - 173.04 million tones achieved actually 179.26 million tonnes.
  - Capacity utilisation was around 10' to 120% at seven out of the eleven Major Ports (.....)
  - Credit for this progressive growth is given to Five Year Plans from 1951-52 for modernization of ports infrastructure and cargo handling facilities.
  - The capability of Major Ports at present is  
78 million tonnes liquid bulk cargos -  
41.50 m. tonnes of Iron ore  
8.50 m. tonnes of Containerized cargo  
8.00 m. tonnes of Coal  
7.95 m. tonnes of Fertilizers
-

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- To build up a cargo capacity of around 216 million tonnes by the end of the Eighth Five Year Plan period.

C) Design and Layout of Ports :

- The first essential requirement for a port is that it should afford shelter for shipping.<sup>(112)</sup>
- The design and layout of a port are determined by Geographical position natural contour of the land on which it has been built, hinterland, depth of water.
- Berths whether they form part of open quays or are situated in docks are constructed either in a continuous straightline or on the jetties principle.<sup>(113)</sup>
- Dry Docks are provided in ports for the purpose of carrying out repairs maintenance to ships.

VI. Performance of Ports in India :

1. The growth of traffic is increasing :

1989-90, 147.28 m. tonnes.

1991-92, 155.00 m. tonnes.

POL traffic had a significant growth  
Capacity at Major Ports in India.

from 132.73 m. tonnes in 1984-85

" 161.32 m. tonnes in 1989-90

" 167.58 m. tonnes in 1991-92.

E. Productivity :

The Port Productivity in terms of ships. Turn-round Time and Average Ship-s berthday Output.

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(112) Bown A.H.J, Dove C.A., Tooth E.S., Port operation and administration 2nd Ed. London 1960, pp.63

(113) *ibid*

pp.79

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Average Turn Round time : 1984-85 - 18.9 days.  
 1989-90 - 8.9 days.  
 1990-91 - 8.1 days.

declining rates

Average Ship Berth day Output :

1984-85	-	2314 tonnes per day
1989-90	-	3277 tonnes per day
1990-91	-	3372 tonnes per day

F) The Disadvantages :

- Output per gang shift is longer, equipment old labour surplus.
- Equipment utilisation is low due to operational constraints, such as - Equipment break-down, time spent on Surveys, deballasting, power failure etc.
- Container handling rates are low as compared to International Standards, Tonne Equivalent Unit (TEU) per crane hour is 7 in Bombay, 15 in Madras compared to 26 in Colombo and 32 in Singapore.

G) Comments :

- 1) A port being a sub-system of the larger and complex system of transportation between the consignee and the consignors premises. To ensure that the overall costs of transportation per tonne of cargo are minimised.

The parameters used as follows :

1. The first parameter used is the Port charges.
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M. S. G. I. PEREIRA

- ii. The second parameter used in the "Turn Round time of ships". If 7 days is the average turn round time of ships with an average parcel size of 20000 tonnes, it is more economical than an average turn round time of 0.5 days / ships with an average parcel size of 10,000 tonnes.
- The 3rd parameter used is the Average and Pre-berthing detention of 1.36 days/ship becomes a non issue when the average non-working time at berth is 4 days/ship.
  - The basic objective should be to reduce the time of a ship in ports, as a ship earns only when it is sailing.
  - The waiting period for a ship is a common users' port is inter alia, a function of berth occupancy, which in turn is dependent of the rate of leading and discharge.
  - This depends upon the quality and availability of adequate transit sheds / storage at berth, and the degree of mechanisation of shore handling operations.
  - The availability of adequate transit storage area depends inter alia on the pace of arrival of export cargo and clearance of import cargo.
  - The Improvement in Port Performance, shows there is a potential for substantial Improvement in Port Performance by increasing the quality and quantity of transit storage area and by greated mechanisation of shore handling operations.
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M. S. G. S. S. S.

1. Also Port Performance can improve further of idle time at berth is reduced.
2. Very high custom duties on the importer plant and equipment, therefore increases hire charges for import/export cargoes.
3. Facilities for economical and quick repair to ships are important in terminal ports.
4. Increase in the size of tankers, larger container vessels, lash vessels, Ro-Ro vessels.
5. There is demand for increase in size of Ports due to increase in size of vessels, cargo, volume of POL average parcel size.

#### Port Activities in India.

1. Leasing of equipment to Private Management.
  2. Use of their own equipment by the Private Sector for Cargo handling operations and stevedores.
  3. Dredging capacity to be increased by use of modern and larger capacity dredgers.
  4. Conducting hydrographic and preparation of modern charts to improve Port development activities for deeper draft ships.
  5. To set up Planning and Research cells.
  6. There are two institutions in India :
    - a) National Institute of Port Management (NIPM)
    - b) India Institute of Port Management (IIPM)
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IV) A Emerging Role of Ports in India :

a) The Policy of Ports System :

- a) The Policy of the Central Government for the development of Ports began in the 2nd Five Year Plan, but was not sufficiently effective till the 4th Five Year Plan phase, when Visakhapatnam Port and Kandla Port began their development.
- b) These developments depend upon the Investments made by the Government, the Financial Policies of the Government, and the baissneeds of the regions.
- c) In India, the Ports are administered by the State Governments, Local Municipal Corporation, Port Trust, Railway Corporation and Private Ownership ports.

B Investments in Ports can bring many advantages, such as :

- a) Development of Coastal lands, reclamation of land from the sea, for overcrowded cities near the Ports.
  - b) Regional competition can speed up the development in the coastal regions in trade and transport.
  - c) By adopting a bold and imaginative Policy in the Investment of Ports, we could join the developments of the hinterland, like Agriculture, Industry, Commerce and Trade with the Regional Planning and plan the size and location of Ports.
  - d) Other ways of financing, in which governments can influence port investment are concessions on Custom duties, Free ports, Entrepots etc. Thus, creating a buyer's market, excess supply over demand.
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M s. G. I. PEREIRA

- e) Major investment is necessary to create an industrial hinterland, in regard to the growth of traffic and thus create a need for investment in new or improved roads to serve markets.
  - f) Investment in Container traffic helps specialised in Container Ports, (inland with modernised equipments and technology lessening the congestion at Ports.
  - g) The World Bank is known for its financing programmes for Port Projects in several countries. <sup>(114)</sup>  
The aggregate amounts of contracts awarded to Engineering Consultant in connection with Port Projects ranges between \$50 million to \$100 million per year i.e. Rs. 155 crores to Rupees 310 crores respectively.
  - h) A typical feasibility study leading to a port project is likely to be regional in nature, if the country is large, or national in nature if the country is small.
  - i) The feasibility study depends upon the ability of the existing ports to handle the traffic or to be modified to do so, the suitability of the proposed site for low cost construction and further expansion, the benefitting firm the Economies of Scale by building to full capacity, or construction by stages, taken in the possibility of technological changes in the pattern of trade.
- Ports are considered as revenue-earning entities and expect them to make a reasonable return on the net fixed assets employed say, 7%.

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(112) Carmichael A.J. Journal of Maritime Law & Commerce  
1970, N.York pp.121.

- The economic benefits are calculated as economics of using larger ships more efficient cargo handling equipment (containerization). A reduction of labour force, increased productivity of labour, reduction in ships waiting and turn-around time, elimination of lighterage reduced damaged to cargo, reduced Insurance premiums, elimination of surcharges, placed on cargo in a congested port, reduced pilferages, fasterment of goods through the port.

(115)

Port Engineering :

- a) There is a need for accurate cost estimates based on sound technical studies.
- b) Also borings, hydraulic and meteorological observations, so that proper rates for labour and material is given.
- c) To determine the optimum number of berths to a port, the optimum depth of water should be provided i.e. a length of 600 ft and a depth of atleast 32 ft at mean low water, for break-bulk general cargo berths.
- d) For Modern bulk, dry cargo vessels depths of 45 ft are expected.
- e) Tankers expected to load/unload in deep water at the end of a submerged pipeline.

Investment through various Five Year Plans.

- Investment in the Port sector <sup>(116)</sup> for additional, modernisation, and upgradation of various ports facilities increased from the 1st Five Year Plan

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(115) Carmichael A.J. Journal of Maritime Law & Commerce  
1970, N.York pp.122-124

(116) Indian Ports Association, Indian Ports N.Delhi  
Jan 1995 pp.5-11.

in (1950-51) from Rs. 27 crores to Rs.3,216 crores in 1992-97 of the Eighth Five Year Plans phase.

- This was 2% of the Transport Sector during the Five Year Plans periods.
- Availability of funds of the development projects and concluded this requirement is met through internally generated resources, by the Ports, budgetary supports from the Government, Extra budgetary supports/resources generated through loans from World Bank, Asian Development Bank, OECF etc. bilaterla loan agreements with corporate loans from other ports etc.

## II Port Finances :

- 1) Financial results of working of Major Ports. or Net income (Operation surplus, Net Income).
- 2) Sources of Finance.
- 3) Reserves
- 4) Policy for provision of depreciation.
- 5) Other Miscellaneous accounting charges.

## III Source of Finance

- 1) Loans advanced by Governments.<sup>(ii)</sup>
- 2) External Loans
- 3) Debentures and
- 4) Self-financing schemes.

The components of the Capital base prior to the Five Year Plans does not afford much of a guidance with the commencement of the Five Year Plans periods, the traffic developed.

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(ii) Ministry of Shipping & Transport  
Report of the Commission on Major Ports June 1970  
Vol.I Report N.Delhi pp.55

Pace of development <sup>(118)</sup> & traffic development was accelerate from Plan to Plan.

IV. Manpower at Major Ports :

- a) A large work force in the major Ports of India
  - b) Low productivity is primarily because of the high manning scale.
  - c) 2 agencies in India and Shore Labour and on Board workers, supplied by the Port and Dock labour Board (DBL) respectively.
  - d) Manpower employed at Major Ports and DBL is nearly 1 lac, 12 thousand workers on 31st December 1993. Of which 4% in Management Cadre, 58% of Non-Cargo handling capacity, 12 percent workers of various technical categories, mechanics, foreman, equipment operators, floating craft crew etc. unregistered listed casual workers 26 percent.
- Industrial Relations in Ports are now peaceful and cordial. A steep decline in mandays lost due to reduction in strikes, bundhs etc.
 

1993-94	Mandays lost	48,835
1992-93	Mandays lost	53,479
  - 58% & 86% of Mandays lost respectively accounted for strikes/bunds calls by various agencies.
  - Indian Ports suffered due mainly due to strikes and bunds led by the Multiplicity of Unions.
  - Welfare measures are introduced for Education, Health care, housing creation and accidents etc.

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(118) Ministry of Shipping & Transport, Report on the Commission on Major Ports June 1970, Vol I. Report, N. Delhi pp.55

M s. G. I. PEREIRA

1.

- The development of deep sea-ports to serve as efficient and modern model points, of exchange of cargoes between sea-surface and water-ways transport modes.
  - A global view of port efficiency is :
    - a. A vessel under any flag is not made to wait, in other words, there is no preberthing detention.
    - b. For regulating the vessel to the allotted berths, pilot and tugs and ready and soon after berthing cargo loading/unloading operations commence.
    - c. Security environment is goods.
    - d. Cargo transfer from ships to shore and Vice versa is free of trouble.
    - e. Pricing of services is reasonable by comparative standards.
  - B. Importers view of Port Efficiency :
    - 1. All the landed cargo is delivered to directly and promptly transported to a shed or warehouse.
    - 2. Recorded all shortages of packages landed at the quay to facilitate compensation claims.
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M s. G. I. PEREIRA

3. Documents flow tally with cargo flows at all different stages of landing upto delivery time.
4. The quality and price of services should be to his.

The efficiency of Ports depends upon :

- 1) The Geographical location influences growth. <sup>(119)</sup>
- 2) Lack of availability of resources to acquire and induct new technology required for the changing trends in trade.
- 3) Management inability to harness the required technical manpower.
- 4) Socio-economic problems, obstructing modernization and induction of new capital intensive technology etc.
- 5) Each port needs to evolve goals and objectives, a set of parameters for the measurement of efficiency, induces such as monthly, quarterly, half yearly or annually indices.
- 6) The average pre-berthing detention time of vessels calling at the port. (Specialised vessels, tanker, container vessels, dry bulkers etc.)
  - ratio of idle time to working time.
  - vessel turn-around time.
  - Berth output per ship day.
  - Gang shift and workers productivity.

M s. G. I. PEREIRA

- Equipment utilisation and availability.
- Ratio of operating income to Operating expenditure.
- Technology along cannot enhance productivity, it needs skill for every operation, therefore, provision for developing human resources skills.

D. Another practical way to Improve Port Efficiency and development :

- Increase in the number of berths, thereby increasing the storage sheds.<sup>(120)</sup>
- Increase in the number of berths requires increase in Cargo handling facilities.
- Also labour manhours, are put to full utilisation, in increased number of berths.
- Administration efficiency increases.
- The problem of congestion lessens.
- Capacity utilisation increases as trade increases.
- Port charges the same for a berth, but earns more by increase in numbers.
- To avail the fullest extent the space of a vessel for cargo, more time for larger vessels can be taken, as economic cost are less, than small vessels.
- Marginal cost is lower because of the low variable cost of a large port and economies of the large vessel.

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(120) IPA, Oct. 1983. pp.2  
 Indian Ports Association, Indian Ports. N. Delhi  
 Oct. 1983 pp 2.



M s. G. I. PEREIRA

- The arguments of a large port is that it will have excess capacity for some time, but as trade and traffic pick up, it will have lower cost too much capacity and attract traffic.
  - It may be better to overbuild the port, as the time factor and life of a port is almost 50 years, the port may experience low traffic volumes for some-time, but gain as trade increases. Whether it is economical to build more berths (berthing capacity) or increase in the rate of cargo handling or use larger gangs and overtime working of labour?.
  - From the above the conclusion is drawn, that for the last five years 1990-91, to 1993-94 the financial performances have shown surplus income.
  - The Annual outlays out of the 5 years outlays of Rs. 3216 for the 8th Plan Period.
  - It is feasible to increase the number of berths, and build large ports, to gain economically, by investing a larger amount of capital of a few thousand crores.
  - e.g. Kandla Port to build 8/9 berths at a sum of Rs. 40/- crores has been allotted.
  - India has about 170 to 190 berths. To build more berths per Major Port, say upto total 1000 berths in the 1st phase.
  - The berth occupancy has reached 90/100%, at present at most of the Major Ports even with the New add Ports of J.L. Nehra of 8 berths.
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M s. G. I. PEREIRA

- It would be advisable to invest in larger ports, so that the National Economics could enjoy the economies of Scale in ports and drafts of ships sizes and keep up with the latest technology in cargo handling facilities and allied transportation links.

E. Advantages gained.

- Enlargement of Ports by berths.
  - Increase in the number of berths a boon to shipowners.
  - Conferences and Shipping Companies can lease/rent on yearly basis a quay, berth and schedule their vessels arrival.
  - More developing countries are entering the Global Markets, hence an increase in Sea-Borne Trade reducing India's percentage in World Trade, therefore, more competition is required for Global Markets.
  - For future requirements the capacity of Ports will increase, and ward off congestion, as storage sheds are increased.
  - Cargo handling facilities can also be increased for specialised berths.
  - The Foreign Exchange earnings in the National Economy will be increased by Berth Charges, Port dues and shipping Freights, even if the same rate is charged for the number of berth increased.
  - Foreign trade will benefit by new technology.
  - It has been found feasible to increase the total number of berthing capacity in all Major Ports, in a few years time.
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M s. G. I. FERREIRA

.. Productivity :

- Improved during last five years.
  - At Global level, due to substantial use in World Sea-borne trade.
  - Improvement in Ocean freight and charter rates, as well as an equilibrium in the overall supply/demand relation in world shipping.
  - The constrains due to conditions obtaining in ports and cargo-handling facilities, shows productivity less than developed countries.
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Other National Transport Objectives :

- to regulate the supply of transport services.
- to prevent discrimination.
- to set a standard of competition.
- to co-ordinate and integrate transport agencies.
- The high cost in meeting peak traffics.
- In capacity requirement.
- by greater traffic congestion average speed in peak hours.
- A uniform sur-charge per ton mile on every goods.

PORTS HIGHER DEVELOPMENT is essential to the National Economy.

- (a) An increase in the strength, stability and steady growth of the National Economy.
- (b) An increase in the welfare of the Nations individual people and their relief by raising the per capital income.

The Conclusions are the larger the Port, the more the economies of scale.

- The overcrowded Port cities could be expanded.
  - gradually a reclamation of land from sea.
  - New manufacturing units and helping units could be built up in keeping with the latest development.
  - Transport method of specialised cargo handling facilities should be improved.
  - Development of regional co-ordination of investments in such specialised terminal ports.
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M.S. G. I. PEREIRA

- Agriculture - Winnowing, Threshing, cleaning of grain import for export potential.
  - Small scale industries and Medium Scale industries requires a good advertising media, but difficult to reduce transport cost, therefore imbalances to markets, and other hindrances.
  - Working towards National growth, National Banks delays in Commercial services, loss of documents, wrongly written or sent.
  - Improvement required are in Labour intensive pay scales training fees for specialised skills, encouragement by way of wage revision, incentives, bonuses etc.
  - Encouragement to build more berths that will increase the capacity of the Ports for developing countries.
  - Modernising of facilities when there is a large amount of berthing capacity.
  - In keeping with the latest trends and design of ships.
  - Stimulating higher development in regions, thereby lessening the gap of regional disparities.
  - Increase in berths, help speed the foreign Trade, vital foreign exchange balancing the Balance of payment.
  - There is no dispute with shipowners regarding delays in Berthing or Berth vacancy etc. depends upon the shipper's ability to have a quicker turnaround of ships.
  - Increase in the long term investments of Ports, the marginal cost is kept at minimum.
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- Increase in berths more profits for the Ports and better improved services to all

The Higher Development of ports is a key factor, in the economy of a developing country like India, where imbalances of trade payments are to be avoided.

In India, the pricing policy of ports is designed according to the transport Principle for Pricing the cost of service should be the base and what the traffic can bear and ability to pay should form the top.

This will attract traffic and give a filip to the export trade of our country. Modernised communications and higher computerisation will benefit the Ports administration systems and improve the port performance and functioning of ports in India.

Large ports with more accomodating berths will bring in Economics of Scale. Save valuable time and allow the Private shipowner to maximise his profits.

Regional developments will accelerate the efficient services provided by Port.

Foreign Trade will improve the National Economy Balance of Payments and per capita of the Region.

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P A R T - A  
C H A P T E R - V I I I  
C O N C L U S I O N S

1) Effects of Port Development on Shipping Productivity, Regional Coverage and Foreign Trade

a) Variable Trends in Port Development

Effects of Port Development on Foreign Trade, Regional Coverage and Shipping Productivity.

Technological changes through the centuries, such as from the wooden bark ship to the steel ships, have taken places. Ports have been developing from a single pier, or wharf into large dockyards and bunkers.

The oldest Indian ports are Calcutta, Bombay and Madras in the 18th and 19th century. Development was started in 1930s for new major ports at Vishakhapatnam and Cochin.

After independence, and with planned development through the Five Year Plans, Kandla Port project was started, during the First Five Year Plan.

During the Second and Third Five Year Plans period (1956-61 to 1961-66), with increased industrialisation the volume of cargo doubled from 19 million tonnes to 40 million tonnes. The percentage of bulk cargo increased from about 50 percent to 68 percent.

During the Fourth Five Year Plan (1969-74) to Sixth Plan (1980-81) some of the developments undertaken were

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- 1) Construction of a satellite port at Haldia,
- 2) An iron ore berth at Vishakhapatnam,
- 3) An outer harbour jetty at Madras for oil tankers and ore carriers,
- 4) Modernising of cargo handling facilities at Mormugao Port,
- 5) New Mangalore Port, a new to go on type Major harbour,
- 6) POL handling facilities at Kandla Port, Bombay, Cochin and Vishakhapatnam,
- 7) New container terminals at Madras Port.

During the Seventh Five Year Plan (1985-90), and Annual Plans (1990-92), notable developments were the construction of a new port at Nhava Shewa (Jawaharlal Nehru Port) near Bombay, deepening of Madras harbour, an oil berth for Paradeep Port and container handling facilities at Bombay and Cochin.

b) Port Capacity

The major ports capacity increased from 20 million tonnes to 170 million tonnes till the Eighth Five Year Plan.

Port investment was Rs. 26 crores in the First Five Year Plan increased to Rs. 200 crores in 1991-92 and Rs. 3,216 crores during the Eighth Five Year Plan. During this period the ports of Paradeep, Vishakhapatnam, Madras, Mormugao and New Mangalore will be deepened to handle iron ore, thermal coal and fertilizers. There

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are 129 general cargo berths at all ports for food-grains, coking-coal etc. Very high berth occupancies rate exist at many of these ports.

Computerisation has also been installed in some of the major ports.

The present problems faced by the major ports are :

Planning in ports suffers because of lack of data, erroneous assumption, lack of systematic approach, and coordination of plans of various ports.

Productivity as well as capacity utilisation might be low, because of inappropriate organisation structure, improper delegation of power, cumbersome procedures, irrational port prices etc.

Problems arise due to berth and facilities utilisation for the specific traffic and the alternative use of these facilities.

To find out the pattern of investment in ports, keeping in view limited resources.

Investments, indicated by the International Monetary Fund study team and ESCAP<sup>(12)</sup> such as

- 1) Increase in ships size and draft,
- 2) Increase in specialised ships, LASH, Ro-Ro ships,
- 3) Quick service matching its demand,
- 4) The urgent need for ports efficiency and effectiveness.

c) Effects of Ports Higher Development on Regional Development

1. While planning the development of larger Ports, regional background of Trade will help to build the right type of installation, berth, and equipment eg. Iron ore, coal, POL Products etc.

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(12) Indian Ports Association, New Delhi, April/June 1986, pp.63-65

M s. G. I. PEREIRA

2. Training programmes for the employees on the latest machinery, skill in computer operation and new transportation of Rail and Road.
3. In communications transportation of new ideas to rural isolated areas from urban and international cities.
4. Developing the regions to cater to enormous needs of foreign trade in agricultural horticulture, various types of farming, cattle & dairy farming, Poultry farming.
5. In economic ways of storage, transportation and marketing of goods.
6. In raising the per capita income of the Population of the region by way of competition encouraging regional goods and products, charging less taxes and tariffs for indigenous exports.
7. Building more accommodating houses for encouraging tourism.
8. Seeking ways to solve the water and energy problems.
9. Investing in Regional industries more efficient and stable.
10. Building a better Regional Economic life.

ii) Links of Port Development to the Three Other Sectors

To build larger capacity for ports, the shipping productivity must be efficient, in keeping with the demand for shipping services. The same demand is reflected in the state of development of the regional hinterland and their links, the development of ports to regional hinterland and the Open Door Economy called Foreign Trade.

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M. S. G. I. PEREIRA

PART B - SHIPPING PRODUCTIVITYCHAPTER - IINTRODUCTION :I. The Important Role of Sea-Transport :-

Shipping or Sea transport is of vital importance to developing maritime countries.

By carrying its own cargo it can save foreign exchange for the home country and also carry cargo for other countries and earn foreign exchange.

The role of shipping services is vital for exports as well as imports, in order to carry on the foreign trade of ones country.

The promotion of shipping in India, is undertaken by the National Shipowners Association (NSA).

The Govt. of India's Policy is reservation of <sup>(122)</sup> the entire coastal trade to Indian Shipping 75% in near and adjustment trade. 50% in the distant trades and 30 percent in the oriental trades to foreign vessels.

Financial assistance for ship acquisitions, establishment of the Shipping Development Fund Committee (SDFC,) setting up Nautical Engineering Colleges.

The Government in the successive Five Year Plans Outlays provided funds for the programmes of acquisition of the shipping tonnage.

## II. Theoretical Aspect :\*

The most important determinant in the demand for Shipping tonnage is the level of International trade and the size and structure of trade.

Statistical measurements of international trade take two forms, measures of value and measures of Volume when trade is expressed in value terms it is usually value of the goods "free on board" in the country of export.

Movements of trade interms of weight are of course more relevant to the demand for shipping space, than interms of value of trade.

Passenger travel movements determines the demand for shipping.

The demand for freight of goods is a derved demand and causes demand and causes demand for transport services as a means to get the goods. Space in ship-hold and demand for goods.

The trend or pattern of Internation trade will determine the demand for shipping.

Quantity of the goods will increase, if the price of the goods is reduced.

Demand is elastic, if price falls, increases the amount of goods demanded.

Demand is inelastic when there is little increase even if the price falls.

The demand is inelastic if freight rates are low in proportion to the value of the articles, jewellery watches, as based on the principles of "what the traffic can bear".

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- Certain costs are overhead in liner operations are variable costs to voyage charter operations, eg. length of voyages and number of ports in a voyage. For liners on schedule services, amount of cargo or number of passenger carried.
  - Fixed costs, sometime called fixed overhead costs which do not vary with the quality according to the size of the output, and variable costs according to the output or extent of the services rendered.
  - Variable costs or marginal costs of carrying an extra ton of cargo, handling costs, incurred by that extra tones, or additional fuel costs, or port charges. The average variable costs differs from port to port but do not vary according to quantity.
  - Time utility is the opportunity cost of a ship at high level of cargo deliveries.
  - For tramps with no fixed schedules, fuel and port charges called voyage costs are variable cost, involve choice between voyages.
  - Costs increase with the size of the ships, crane charges maintenance and repairs, port dues and charges.
  - There are Economies of Scale in bulk purchases of materials, discounts on large contracts, and consumption to size and speed requirement.
  - The bigger the ship, the less the material and horse power required per earning ton.
  - There is savings in costs for big ships such as depreciation cost per ton. Fuel cost, Bigger ships has the advantage of being faster, quicker, can handle more ton load, more storage space, more hatches or outlets than smaller ships.
-

M. S. G. I. PEREIRA

over a period of time, It takes a year or two to build ships.

The freight rates for tramps arise by the economic forces of supply and demand working on an international scale. Liner freight rates are determined by tariffs of rates between ports or group of commodities.

In freight fixing prices, there are two type of rates, such as port and distance determinants and cargo type determinants.

Cargo type determinants of freight rates are of two kinds, those cost-based and those which are revenue based.

Revenue-based determination, the principle of charging of "what the tariff will bear" a high ratio of value to weight or size, and low value in proportion to size.

- There are various kinds of chartering such as bare-boat charter, time charter, or voyage charter, and the freight rates depends on the type of chartering required.

State participation includes subsidies, direct and indirect ownership of state fleet, tax concession to home flag shipowners and cargo preferences and flag discrimination, port discrimination.

#### IV. Review of Indian Shipping :-

- During the earlier years of Independence the shipping tonnage registered a remarkable growth. Indian possessed 11 Overseas trade vessels with 0.3 million GRT, the fleet strength increased to 32.9 with 5.98 million GRT by the end of the Sixth Plan.
-

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- The disadvantages are bigger ships have more dredging or channel charges, they can enter only certain ports but call at more ports to fillup cargo. The berth length should be suitable to the ship's length.
- Although the demand for ships increases suddently the supply cannot be met, at short notice, often time is required to increase supplies, this may eventual raise the proces.
- Elasticity of supply is measured by relating change in price to the amount supplied. If the boom continues laid up ships will be accommissioned so that the freight rates and tonnage can be increased.

### III. Problems of Peak :-

- The peak demand problem, experienced in other modes of transport, in terms of certain time, on the routes at which traffic will be heavier say- Summer months, in the Countries in the Far Northern Hemisphere, called also "peak hours" or "Seasons." (131)
- The peak problems helps to use the capital equipment and earn more revenue to cover all capital and other overhead costs involved.
- The importance if the peak is determining the amount of tonnage, if the peak could be flatten by shipowners in rescheduling or by price discrimination, they may givin lower capital costs per ton or cargo carried.
- The amount of tonnage required in a certain trade is determined by the meximum demand at the peak point in the voyage.
- There are cycles in ship building, such as regular pattern of launching, ageing, scrapping and replacing

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(131) O'Lou, nlin C. The Economics of Sea-Transportation Oxford. 1967, pp 75-77.

I. The Demand Theory for Ocean Liners.

The most important determinate is the demand for ocean Transport, Shipping Tonnage is the level of international trade, and the size and structure of world fleet are determinate by growth and structure of Trade <sup>(123)</sup>.

Trade when expressed in value terms is usually value of goods Free on Board and in volume terms is usually the unit of weight of quantity (DWT or NRT).

The demand for carriage of goods is a derived demand in that country first demanding the goods themselves and only demanding the transport to get the goods <sup>(124)</sup>.

From "The Price Theory" we find if prices falls, the demand of good increases and vice versa.

1. Thus is a shipping line the sole carrier of oil product, to a country, with no means of transport he may be in a position to increase freight charges without reducing a demand for his services.
2. Freight rates can increase or decrease the quantity of trade of a country in the international markets. The comparative advantage of certain goods be lost due to increase in freight rates.
3. Cargo space too may become more or less depending on the freight rates, is more likely to lead to the substitution of home made articles in the place of imported articles.
4. At the other extreme, if freight rates is low Proportion of the value of the articles, watches etc.

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(123) O'Loughlin C. The Economics of Sea-transport, Oxford 1967.

(124) *ibid* pp41

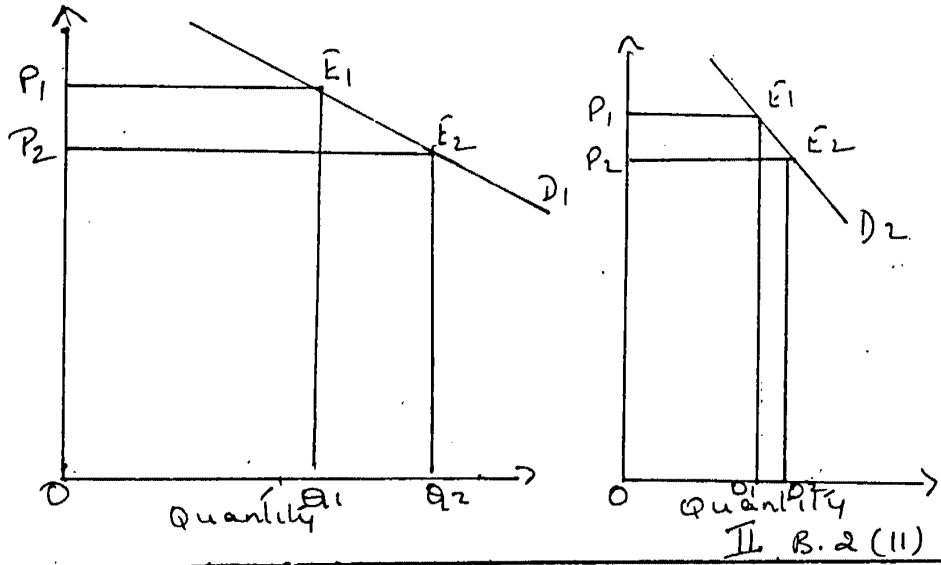


PART B II

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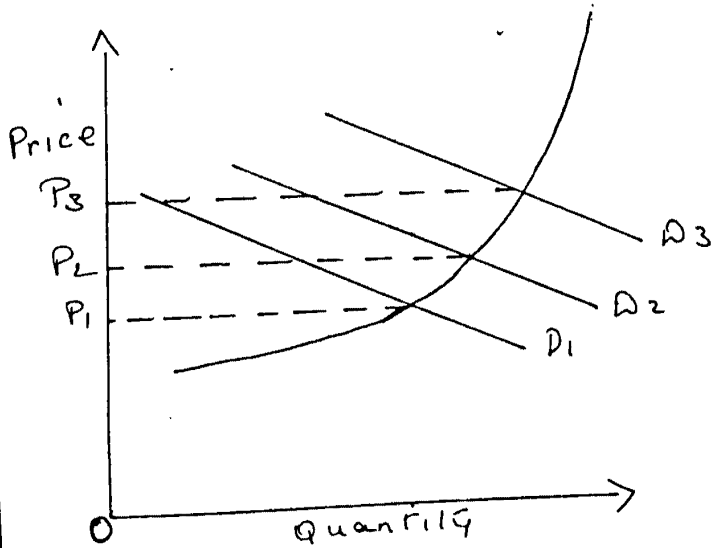
Changes in Demand for Ships  
Elasticity of Demand.

SP-Fig 1



Changes in Supply of Ships (Tonnage)

SP. Fig 2.



Source: The Economics of Sea Transport. C. O'Loughlin 1967 pages 53, 70.

5. As there is an increase in freight rates leads to decrease in demand for shipping space, demand is relatively inelastic. Basing the rate policy on the principle on "what the traffic can bear" we find both in tramps and liners, the container freight rates, the value of article has an important relation to the freight rate charges.

(Refer diagram B. II. (1) a- Changes in Demand for Ships. Elasticity of Demand.

Total Revenue same as before price change. i.e. fall in price. Elasticity of demand - to unity Total Revenue is less after price fall, Ed is less than unity.

Total Revenue is more E is greater than unity  
P - Y axis, Quantity - X axis.  $P_1 P_2$  Prices  $Q_1 Q_2$   
Quantities. Total Revenue  $O_1 P_1 E_1 Q_1$  to  $O_2 P_2 E_2 Q_2$

In Fig I a Demand is inelastic Fig I b demand inelastic reduction in price increase in sale from  $Q_1$  to  $Q_2$  decline in total revenue from  $O_1 P_1 E_1 Q_1$  to  $O_2 P_2 E_2 Q_2$ .

## II. The Supply of Tonnage & The Profitability of Ship & Voyages. (125)

1. If demand increases suddenly new supplies cannot be brought in at a short notice. Time is required, with the result, there is a shortage in supply, with prices rising e.g. grains, loading of wheat.
2. If demand is large, an increase in freight rates will be able to secure the tonnage required.
3. In supply, an increase in price tends to bring out an increase in supply, the supply curve then has a positive slope, sloping upwards Left to right.

M s. G. I. PEREIRA

4. The elasticity of supply, depends upon the time period for new ships can be built.
5. Upon the freight rates is short period the ship owner's decisions, e.g. long term charter to specific traders, liners companies, specialised vessels etc.
6. The supply of Tonnage depends upon the country export-import trade.
7. Port charges due to quantity or throughput.

8. Perfect competition in the shipping industry.<sup>(126)</sup>  
The elasticity of demand for the services of the port is calculated by making a small proportionate change.  $SH/Sh$  and calculating the effect on the quantity  $DX/X$ . The cife supply elasticity is denoted by  $e$ .

$$e = \frac{(SH/OP)}{X} \times \frac{e}{e}$$
 The frection of Elasticity of  
 port cost in supply with  
 the price(cif) cif price.

Refer diagram B II (b) Changes in supply of Ships (Tonnages)

Let P - Price, D - Demand, S - Supply Curve.

Assume that  $D_1$  increases to  $D_2$  ships that are not used are called in, as  $D_2$  increases to  $D_3$  the cost of ships increases. The urgent demand will make the supply curve vertical in a short period.

II. The Profitability of Ships & Voyages.<sup>(127)</sup>

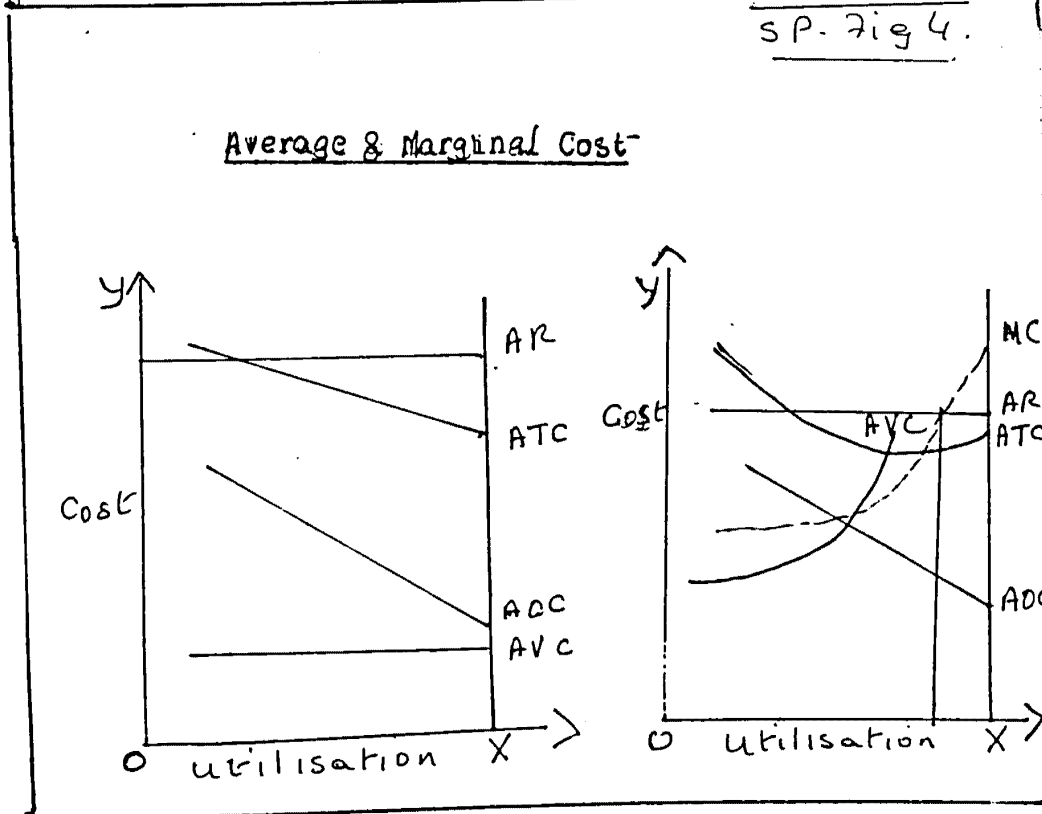
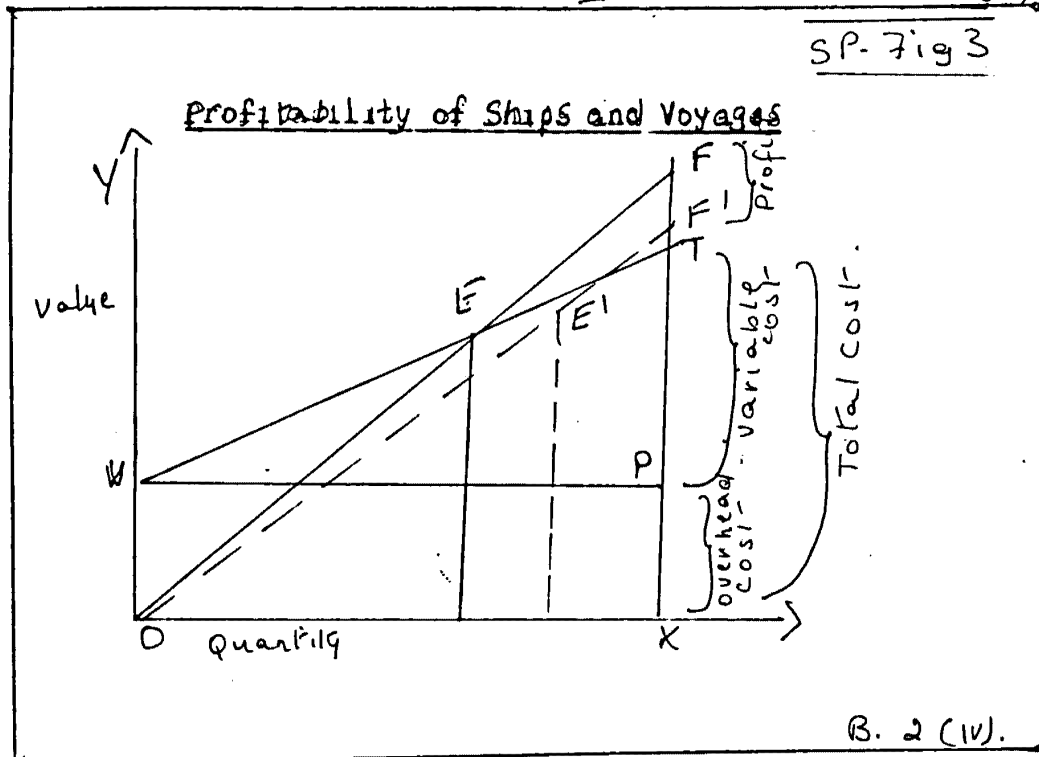
For a ship has to be profitable enought she has to cover her vessels over heads cost of management, interest on capital to earn a fair profit. A voyage is profitable, if only the gross freight earnings exceed voyage cost.

(a) (127) O'Loughlin C. The Economies of Sea-Transporation Oxferd 1967 pp 97.

(11) (129) Bennatham E & Walter A.A. Port Pricing & Investment Policy N.York 1979 pp.26

PART B II

B. 2 (ii)



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The importance of covering all cost in the long run is shown in Diagram B II (ii) a. Profitability of Ships and Voyages.

Freight rate is fixed by market or by agreement. Quantity - Tons of Cargo on X axis. Value - total cost. Overhead and variable cost OF on vertical axis. Line Vp = fixed cost, VI = total cost. PT = variable costs at full utilization. TF = Profits. The line PT represent variable cost. E is the breakpoint about 50% of cost is covered. Distance TF = profits at full utilization. EF, ET shows difference in profits between 50 - 100 percent utilization. VO will represent loss. Again, if  $OF_1$  represents breakeven point is E' which is near full capacity, The profit is IF' if ship achieves full utilization is low profit.

### III. The Average and Marginal Cost - The Cost and Classification of ships, Theory.

1. In the Theory of the Firm, we find the marginal cost of one unit of a good or a service is the net amount by which total costs will be increased in order to provide this unit. In Shipping, the marginal cost of carrying an extra ton of cargo will generally be handling costs like additional port charges or full costs may be involved. Refer Diagram. B II i (b)

Average & Marginal Cost. <sup>(128)</sup>

In this Figure VP = Total overhead costs. Greater the output the lower the unit overhead cost. The average cost (overheads) curve will fall for each unit of output until full

(128) O'Loughlin C. The Economies of Sea-Transportation  
Oxford 1967 pp.101

M s. G. I. PEREIRA

capacity is reach. In shipping average variable cost tends to be same per unit according to quantity. Thus AVC, is a straight line. ATC = average cost will thus fall, but not as steeply as AOC.

AMC = Average marginal cost. A stable freight rate is assumed AR - average revenue is a straight line. Profits that is difference between average revenue and average total costs will be maximised at the point of full utilization.

Refer diagram B II ii b2,

In the figure we find situation in shipping in which the variable costs curve tends to rise i.e. schedule service - liner, due to additional overtime in ports and consequentially shows a rising marginal cost. ATC is 'U' shaped due to increased cost. If the average cost curve (ATC) falls and then rises the marginal cost MC will cut it at its lowest point because of rise in Average cost each unit cost will be greater than previous unit. Profitable capacity if the ship is the loading to OT. Increased business involves extra cost, overtime, speed, fuel cost, extra labour employed. Profit is determined by the level of freight rates.

Time is thus one of the main aims of the cost structure or the economic use of time.

#### IV. THE Theory of Freight Rates.

With increased speed, and more economical operations in terms of fuel consumed and time taken for voyage. through the size of ship and economy of speed fuel.

The price of shipping service is the freight rate and the trend of freight rates.

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M s. G. I. PEREIRA

freight rates are arising from tramp operations are closely determined by the economic forces of demand and supply working on an international scale than are liner freight rates which may be subject to deliberate arrangements in which supply and demand are not the only determinants.

Liner Conferences tariffs lay down rates between ports or groups of ports and in respect of commodities and group of commodities. In freight rate fixing, therefore, two types of consideration enter, port and distance determinants and cargo type determinants.

Cargo type is at least as important a determinant and are of 2 kinds, cost based and those which are revenue based. In cost based per ton freight rate for specific cargo may be higher or lower because of special handling or carrying problems, such as dirtiness, fragility, and volatility or awkwardness of shape of handling and storage.

Revenue based determinants arises from the principle of charging of "what the traffic will bear" therefore results in higher freight for commodities with a high ratio of value to weight or size.

Tramps rates fluctuate widely according to supply and demand and their movements show a cyclical pattern. Liner rates tend to increase by any period in which costs and prices tend to rise.<sup>(129)</sup>

In increasing speed, and economical operations in terms of fuel consumption, and time taken for voyages, both ship space and ship size, increase the economy of fuel consumption in terms of speed and more capacity in terms of space, thus having an effect on the freight rates of ocean vessels.

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(129) O' Loughlin C. The economies of Sea-Transportation, Oxford, 1967, pp.129

M s. G. I. PEREIRA

Fixing freight rates depends upon the Conference liners members, on shipowners, who have to agreed among themselves on the rate to be charged on certain commodities, the number of sailings, and the Port of call for loading or discharging cargo.

The sailing rights of members in various ports differ.

V. Special Ships, the Economics of Running Big Ships.<sup>(130)</sup>

There are economics of scale in running large and big ships, such as lower depreciation, cost per ton mile, fuel cost. Big ships are speedier and faster, can handle more ton load, more stores and space. While big ships have more dredging costs, limited ports to call, due to their size, they can enter only deep sea ports etc.

The bigger the ship, the less the material and horse power required per earning ton. The result is that Capital cost per ton and hence the depreciation per ton mile or smaller for big ships than for smaller ships. Fuel cost per ton mile, one also lower for the bigger ship provided speed is not raised. Alternatively but within limits, the bigger ships can be made faster without increasing fuel cost per ton-mile above that of smaller ships.

Big ships are also floating warehouses which spend a good deal of time in port having goods taken out and put in. The correct economic size of ship cannot be determined until port time has been taken into account.

To simplify the consideration let us assume that loading and discharging rates per cent (hatch oil outlet are the same in tons per hour for each type



M. S. G. I. PEREIRA

of cargo, no matter what the size of the ship the actual rate of cargo handling of any Ship is the number of vents, multiplied by the rate per vent per hour  $R = N (r \times h)$ .

If, as the size of the ship increases, the number of vents increases, proportionately and all vents can be worked, then the bigger ship spends no longer time in port than the smaller ship and so loses some of the advantages of sizes at sea, by delays in port.

The position of the cargo liners is more complicated. Ships do not simply load in the one port and discharge in another, but call at several ports each trip and load and discharge at each port. A big ship may have to call at more ports to collect a full cargo than a small ship does.

1. There is no doubt that the opportunities open to big tramps and bulk carriers are not exhausted while the same is probably true of tankers.
  2. World port improvements within the area of operations of an owner permits an allocation of resources nearer to the economic optimum.
-

3. In reviewing the size of ships, the length of the berth space also has to be viewed. In developing up depending on the demand in using them, vessels with build cargoes tend to operate more competitively with general cargo vessels ports and berth dues should thus act as an incentive for quick turn about of ships channel dues, connected with dredging may be levied for the depth of the water the larger ships can use it a lower costs.
  4. Time is more costly for specialised ships eg. Timber, Container ship, delays to these carriers would lead to a greater increase in freight rates. Priority rules Last to first out LIFO, or first in and first out FIFO shows the largest vessel get served first.
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DR S. G. I. FERREIRA .

PART B - DATA AND HISTORICAL DEVELOPMENTCHAPTER - IIII. 1) Shipping : India 1993

Overseas shipping has an extremely important role to play in India's International trade. The country has the largest merchant shipping fleet among developing countries and rank 18th in the world-in-shipping tonnage. As on 31 Dec. 1990, the Operative tonnage consisted of 430 vessels totalling to 6,275 m. GRT.

2) Shipping Bodies :

National Shipping Board, is statutory body set up under the Merchant Shipping Act, 1958 to advise the Government on shipping matters. Ship Acquisition<sup>with</sup> Licensing Committee deals/ships acquisition proposals received from shipping companies. Inter-ministerial highlevel committee looks into problems of the Shipping Companies. Indian National Ship-owners Association seeks to promote the interest of national shipping and other allied industries.

3) Shipping Companies :

There were 55 Shipping Companies in the country in Operations as on 31 Dec. 1992, including the Shipping Corporation of India, a public sector undertaking of these 29 are engaged exclusively in coastal trade, 20 in overseas trade and the remaining six in both coastal and overseas trade. Shipping Corporation of India, which is the biggest Shipping line of the country, had a merchant fleet of 127

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M s. G. I. PEREIRA

vessels of 30 lacs GRT, as on 31st. Dec. 1992, and operated on all maritime routes.

4) Coastal Shipping :

Coastal Shipping is the most efficient and comparatively cheaper mode of transport for carriage of bulk traffic over long hauls particularly when origin and destinations of traffic stream is located along the coast. India has a long coast line of 5,560 Kms, coastal shipping plays an important role in integrated transport network of the country particularly when inland modes are strained. Seventh Plan had targetted a coastal GRT requirement of 3.1 lakhs by 1989-90, as compared to 2.37 lacs GRT at the end of the Sixth Plan. The coastal tonnage was 3.12 lacs GRT AND ON 1st April, 1985 (beginning of Seventh Plan) as on 30th Nov. 1991, it was 5.61 lacs GRT.

5) Ship - Building :

There are four major and three medium size ship yards in India in the public sector. Apart from these, there are about 35 small shipyards in private sector which cater to domestic requirements for small crafts. Maximum size of vessels that could be constructed in Cochin Shipyard, Cochin and Hindustan Shipyard Visakhapatnam are 86,000 DWT and 48,000 DWT respectively.

6) Ship Repairs :

Of the 17 Dry Dock in the country, are available for commercial shiprepairs activities. While dry docks at Cochin and Visakhapatnam can accommodate maximum size of 1,00,000 lac DWT and 57,000 DWT respective range.

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7) National Ship Design and Research Centre (NSDRC)

A premier national institution, namely National Ship Design & Research Centre (NSDRC) has been established at Visakhapatnam as an autonomous body under the administrative control of Ministry of Surface Transport. This institute has been set up with a view to provide a National Technological infrastructure to assist Indian shipping industries.

II. Indian Register of Shipping :

1) India's National Ship Classification Society was formed in March 1975 under the Companies Act, 1956. Its main objectives are (i) to provide faithful and accurate classification and record of mercantile shipping classed with Indian Register of Shipping (IRS).

IRS (Indian Register of Shipping (IRS) has its lead office in Bombay, Calcutta, Visakhapatnam, Madras, Cochin, Goa, Pune and several other cities. General Insurance Corporation of India, and Tariff Advisory Committee accept all India flag vessels irrespective of type, sum insured and tradingwarranty for full insurance even if singly classed with IRS without warranting any war classification, extra, Government has authorised the IRS to assign international load lines and carry out cargo ship safety constructed surveys of India Flag ships.

By April 1992 the Society had 841 ships totalling 53.35 lakh GRT units class and 192 ships of various types constructed in India and abroad under IRS class.

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**III. Container Corporation of India (CONCOR).**

At present Concor<sup>(134)</sup> does not have container depots at all ports in the country. The Corporation has a share of only 95,794 TEUs (Twenty four Equivalent Units) as against a total container handling of 6,77,000 TEUs by all the ports in the Country.

Rapid changes in the field of containerization are also taking place on the global front.

Concor was started in 1988 as an autonomous body with an authorised capital of Rs. 1,000 million. At first Concor took over the seven existing inland container depots (ICDs) from the Railways which started this Corporation and at present manages 18 container depots i.e. Container freight stations (CFS) port side container terminals (PSCTs), and domestic Container Terminals (DCTs).

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VI, The Participation of the Indian Overseas Trade by Shipping Corporations.

- Share of Shipping Transport during the period 1984-88 to 1992-93 ranges between 34 percent to 38 percent, except, 1987-88 was 40.7 percent.
- Imports have a larger share of cargo, 50%
- Exports are around 16 percent carried in Indian ships.

○ Emerging technological changes.

- Rapid advances in shipping
- More fuel efficient ships with greater automation.
- Reduction in Manning Scales.
- Cost Reduction through fuel efficiency.
- On the increase is liner shipping, containerization.

○ Shipping Policies :

- Improving balance of payments.
  - Increasing Employment.
  - Promoting Economic Growth.
  - The shipping policy should serve the following broad objectives.
    - 1) It should provide for the expansion of shipping services, and a strategy for the development of National Shipping industry.
    - 1i) It should enable a healthy competition in the provision of shipping facilities.
-

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iii) Encourage competition on fair terms with foreign competitors.

iv) Should provide efficient functioning, of shipping services.

Q Growth of Indian Shipping in post Independence period:

- 1) Long coastline - 6000km approximately, a need for protection of external and internal security.
  - 2) A number of natural harbours, close to important shipping routes, an advantage for shipping Industry to develop.
  - 3) An important and economical mode of transport which forms part of the multi-modal transport chain, linking sea to land transport.
  - 4) Development of the national trade - regional resources.
  - 5) A support to National economy, large foreign exchange earner. Total freight bill of Seaborne Trade in India estimated about Rs.6,265 crores in 1991-92.
  - 6) A National shipping industry also supports national ships building; ship breaking, ship repairs and other ancilliary industries.
- Shipping Industry generates employment, ancilliary activities, 5000 Officers, on Board ships, 10,000 seamen on board.
  - Shipping Industry to grow as an efficient and economic mode of transport.
  - In 1958, SDFC, Shipping Development Fund Committee was set up.
-



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- In 1960, Transchart, a Catering Organisation of the Government.
- Incorporation of the Shipping Corporation of India, (SCI), in 1961.
- Omstotitopma; refpr.s. strictira; camges scrapping of uneconomic vessels and infusions of funds, improved the Indian Shipping Industry.
- Institutional reforms, structural changes scrapping of uneconomic vessels and infusion of funds, improved the Indian Shipping Industry.
- Improved global cargo flows from 1988 onwards, coupled with a better balance between demand and supply of shipping services in several sectors, freight rates to move upwards.
- The Growth of Indian tonnage from 0.2 million tonnes GRT in 1947 to 6.23 m. tonnes (GRT) in June 1993.

a. a. Composition and Ship Size :

The average ship-size has progressively increased ~~and~~ benefiting the economics in the Operation costs of larger ships.

In March 1992 - Average size of ships.

General Cargo ships -	11,400 GRT.
Tankers (crude Oil) -	53,265 GRT.
Bulk carriers -	21,400 GRT.

b. b. Fleet Ownerships.

- 64 Shipping Companies.
  - Shipping Corporation of India has 128 - 3 million GRT or 32%.
-

P A R T - B  
C H A P T E R - IV  
SHIPPING PRODUCTIVITY  
SHIPS PERFORMANCE

YEAR	COASTAL		OVERSESS		TOTAL	
	Ships Nos	GRT	Ships Nos	GRT	Ships Nos	GRT
1980	58	2,51,586	325	54,25,850	383	56,79,436
1985	111	3,55,108	317	60,33,664	428	63,88,712
1989	149	4,68,293	253	54,38,034	402	59,06,327
1993	202	6,42,431	241	56,24,880	443	62,67,311

Source : Annual Report of each year, 1980,85,89,93,  
 Ministry of Surface Transport, GOI press, N.Delhi pp 9  
 New Delhi.

PART - B  
CHAPTER - IV

SHIPPING PRODUCTIVITY  
SHIPS PERFORMANCE

YEAR	COASTAL		OVERSESS		TOTAL	
	Ships Nos	GRT	Ships Nos	GRT	Ships Nos	GRT
1980	58	2,51,586	325	54,25,850	383	56,79,436
1985	111	3,55,108	317	60,33,664	428	63,88,712
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Source : Annual Report of each year, 1980,85,89,93.  
Ministry of Surface Transport, GOI press, N.Delhi pp 9  
New Delhi.

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309

# SHIPPING PRODUCTIVITY PART B

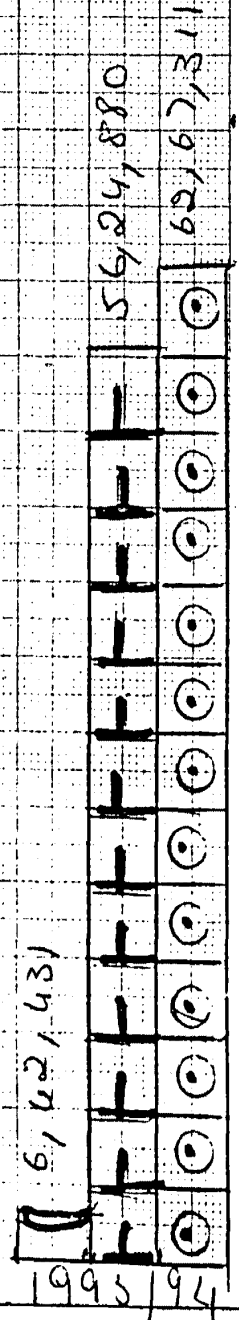
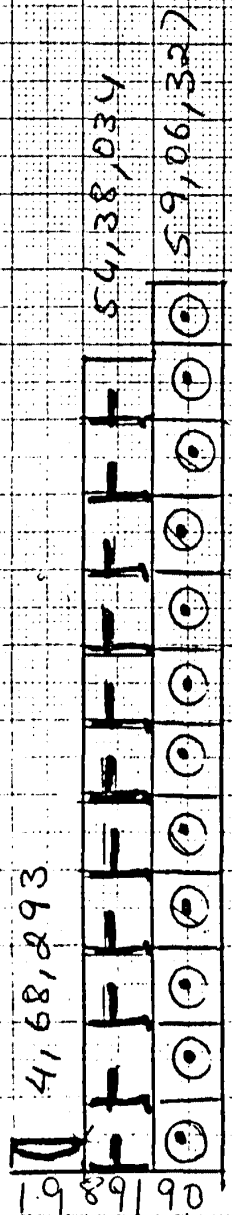
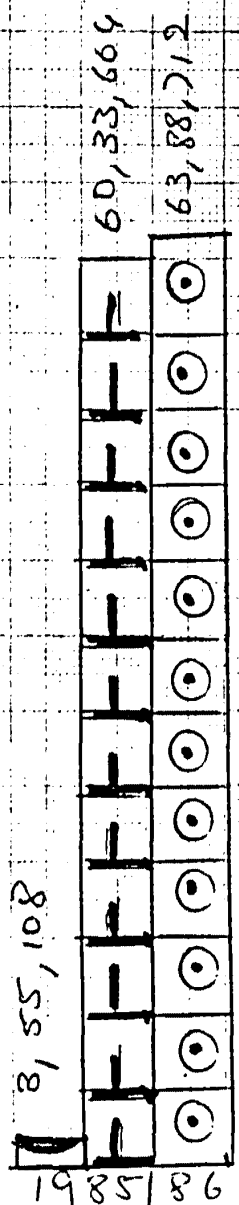
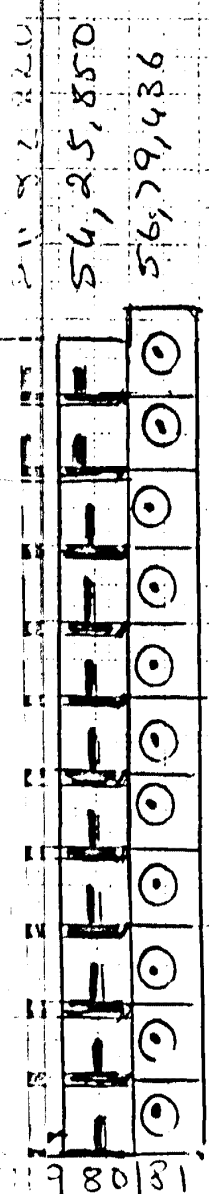
tonnes M.S. G. I. PEREIRA

310 <sup>TV</sup>  
'000 tonnes  
GRT

KEY

—	Coastal
⌋	Overseas
⊙	Total

Year	No. OF SHIPS	
1980-81	⌋	58
	⌋	325
	⊙	383
1985-86	⌋	111
	⌋	317
	⊙	428
1989-90	⌋	149
	⌋	253
	⊙	402
1993-94	⌋	202
	⌋	241
	⊙	443



P A R T - B  
C H A P T E R - IV  
SHIPS PERFORMANCE AND REVENUES

Since independence (1947) till 1980, the Indian fleet expanded rapidly, growing 27 times, in a span of 33 years.<sup>(133)</sup> From 1980 till 1988, there was hardly any growth in the Indian tonnage. There has been a marked improvement in the shipping scenario, since 1988 and the Indian tonnage starting increasing upward slowly. The Indian fleet comprised of 443 ships, after the scapping of old and uneconomical ships aggregating to 6,287 million GKT as on 31-12-1993. In 1980, 58 coastal ships called, the number increased to 111 to 1985, and 149 in 1989 and 202 in 1993.

In 1980, 325 overseas vessels called, the number declined to 317 in 1985, and to 253 in 1989, in 1993 the number of overseas vessels declined to 241.

The GRT of coastal vessels was 2,54,586 in 1980 3.55,108 GRT in 1985, 468,293 GRT in 1989 and 6,42,431 in 1993.

The GRT of overseas vessels was 54,25,850 in 1980, 60,33,664 in 1985, 54,380.34 in 1989 and 56,24,880 in 1993.

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(133) 11 Annual Report 1993-94, Government of India, Ministry of Defence Transport, New Delhi, No.3.1.4, p.9.

P A R T - B  
C H A P T E R - V  
NATIONAL OBJECTIVES AND POLICIES

- a) India's Shipping Policy <sup>(134)</sup>
- a) Increasing self-reliance in the carriage of country's overseas trade and
  - b) Reservation of 100 per cent coastal trade to national shipping.

A new shipping policy on 27-11-1991 was initiated with a view to provide rapid development of shipping, maximise foreign exchange earnings, eliminate obstacles of procedures, and increase the role of private and foreign participation. The coastal trade is reserved for Indian ships, unless foreign ships are licensed by the Director General of Shipping.

- b) The Merchants Shipping Act 1951 :

Contains 461 Section is divided into 18 parts. The Act makes it compulsory for every Indian ship to be registered and for this purpose register books have to be opened. A National Registrar of Ships has been created in accordance with the Act. Each vessel has to display its name, as registered a certificate of inspection and other specific details.

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(134)2 Annual Report, Ministry of Surface Transport, Government of India, New Delhi, 1993-94, p.8.

SECTION - II.Part B - Shipping ProductivityCHAPTER VI - EMPIRICAL RESULTS :I. The Demand Theory for Ocean Liners.

To first analyse the reason for Shipping Productivity, to be efficient, we come back to the Ports, the place where the main activity of transporting goods, either for export or imports where should these ocean going vessels, fill up and empty out? How many days does it require, is there any place where they could be repaired? How many hands or workers do they require? Are all berths suitable for the various ships, commodities etc.

Though trade has been for endless centuries, the need for transportation of goods from one country to another, meets the demand for trade, and therefore, the need for ships is a derived demand. That is, to day where there are goods for export/import there is a demand for transportation of these goods, an ocean-going vessel.

Next comes, the question, whether any vessel is suitable for this type of trade ? Whether the Port has been able to provide the proper facilities etc ? As time changes, so also the structure of Ocean vessels changes to meet the requirements of Foreign Trade. Specialised and larger ships are required as trade expands over the Globe to the five Continents. There is a need to be able to cope with new expansion by building specialised ships for specialised cargo, and the feasibility and profitability of such type of vessels.

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A ship's life is about 25/20 years and calls for heavy investment. Certain developing countries do not have adequate port facilities to encourage larger vessels, and have to bye-pass these vessels in calling at their Ports. To accommodate these larger vessels a deeper berths is required, and the length of the ship should be also be taken into account. Then the ships turn around time, should be shortened, because for heavy and larger ships, it take longer to turn around in a small congested port.

Refer Diagram B (11).

In 1991-92 Indian ships in India's overseas Trade was :

	<u>1991-92</u>	<u>1992-93</u>
General Cargo	2.49 (12.9)	2.47 (14.4)
Dry Bulk Cargo	10.14 (28.9)	13.29 (23.3)
POL & Other Products	23.38 (58.27)	26.40 (57.37)
	-----	-----
	41.01 (36.9)	02.66 (34.9)
	-----	-----

From the above statement our major requirement is POL Products, their Dry Bulk Cargo and General Cargo. Refer Diagram B (11).

## II. The Average and Marginal Cost :

Like all transportation industries there is cost Classification by way of investment of capital, overhead cost, fixed cost in short run, marginal cost (MC) must be lower than average total cost (TC) at any level of output which occurs under conditions of falling average cost (AC).

Shipping cost varies from one route to another, in the form of step shaped curves. Therefore freight rates are negotiated in competition depending on the

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elasticity of demand, and competition, "Charging what the market will bear" for shipping services.

a) The Classification of Shipping cost : <sup>(135)</sup>

Certain costs which are vessel overheads in liner Operations, are variable cost to voyage charter operations, these are the costs usually referred to as "voyage costs of which fuel and port charges may be the major item. For ships on voyage charter, however these costs will be variable according to the length of voyage and number of ports in a voyage and should be considered broadly as variable with the cargoes carried. Costs which are included are as follows :

A share of each vessels in management and selling overheads, depreciations manning and crew costs including security insurance and travelling formcrew, repairs maintenance and surveys. Other vessels, overheads such as ratio, water lundry and smaller items and the voyage cost of fuel and port and canal charges.

On a vessel basis management and fixed

Selling cost. ...	8.15%
Depreciation ...	15 to 25%
Manning & crew cost---	18 to 35%
Repairs & Maintenance ...	10 to 15%
such as painting dry dockings etc.	
Deck & Engine stores ...	5 to 8%
Insurance various with value... of vessel	5%

Port charges on any particular schedule or charter vary according to the amount of total time that is

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(135) O'Loughlin Carleen. The Economies of Sea-Transportation Oxford 1967 pp.91

spent in ports and also according to the number of ports.

Port charges included are harbour and berth dues, towages and pilotage, light dues and canal dues when relevant. Port charges vary from port to port. Port charges usually increase with size of the vessel.

Port fees vary from 5 to 12 percent of the total cost.

b) The Profitability of Ships & Voyages :

For a ship to be profitable she should earn enough within a given period of time to cover her vessels overheads and contribute her share of the costs of management, interest on capital and a fair profit. A voyage is said to be profitable, if gross freight earnings exceed voyage costs and in liner operations where voyage takes place irrespective of the size of the business offered, any freight earnings which can cover the handling charge and contribute something to overheads are better than no earnings.

Vessels would be unprofitable and there would be a wholesale scrapping and laying up of tonnage. The ship cycles would become more severe, as more shipping would be laid up.

Competition by shippers would bring about a much higher freight rates.

Pl. refer Diagram.

III. The Supply of Tonnage : <sup>(136)</sup>

1. If demand is large and increase in freight rates will be necessary to secure the tonnage, for a short period time.
2. Given a much longer period, the supply of tonnage can be increased by building i.e. in the short run the supply of tonnage will be less elastic in regard to the increase in freight rates.

(136) O'Loughlin Carleen. The Economies of Sea-Transportation Oxford 1967 pp. 69-77

3. elasticity of supply, due to freight rates also depend upon the time and technical factors.
  4. Owners may not withdraw ships, even if freight rates fall, unless they fall below cost of shipping operation.
  5. Then there are Conference lines, time charter voyage on specific trades, and specialised cargo.
  6. Competition from shippers will raise the freight rates and increase the supply.
  7. Seasonal variations and peak periods.
- Pl. Refer diagram. 11 (1) a.

Conditions of Supply (37)

A common feature is the large share of capital costs in total cost. In all these transport industries, the high proportion of capital and other overhead costs including organisational costs which are fixed in the short run implies that Average Total costs per unit of output will decline as Output increases from zero. Also marginal cost (MC) must be lower than Average Total cost (AC) at any level of output which occurs under condition of falling AC.

Pl. refer to diagram. 11 (1) b.

Step - shaped Curve.

One class of problems is known as the transportation problem. Here a firm owns several plants from which it ships its product to several destinations. The plants have different capacities. Shipping cost per ton varies

IV. Freight Rates and Pricing :

A Comparison of the costs of operating a conference liner on a particular route and a time chartered vessel

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of similar size and quality at the same time on the same route and loading a similar amount of cargo reveals the subject to the data base, the cost of the Conference conditions. Time chartered shipping rates are seen to be subject to wide fluctuations due to strong and abrupt changes in the forces of demand.

Freight transport services may be seen as the means by which time and place utilities are added to form utilities. The demand for a factor of production is a derived demand, derived from the demand for the product of the factor.

That is the elasticity of derived demand for a factor of production is equal to the cost of the factor. To substitute elasticity of demand for transport service (e trans for the elasticity of the derived demand for a factor of production i.e. transport cost (TC)

$$e_{trans} = \frac{t_c \cdot e_d}{p} \quad (38)$$

where  $e_d$  is the elasticity of demand for the product,  $p$  is the landed price of the commodity in the area of destination.

i.e. Higher the elasticity of demand in the product market higher will be the demand for transport services to that market.

2. Higher is  $t_c/p$  as a proportion of c.i.f. (landed) price the higher is the elasticity of demand for transport service to the point of landing.

$$e_{trans} = t_c/p \cdot e_d$$

$$e_{trans} = T \frac{e_s - e_d}{e_s - (1 - T) E_d}, \quad T \text{ is } t_c/p \text{ with cif}$$

price.

M s. G. I. PEREIRA

$E_s$   $U_s$  the elasticity of supply of the commodity shipped and has a value between zero and same number less than infinity.

In the short run, the supply of the commodity is inelastic i.e. since supply is irresponsive to changes in price of the product, then  $E_s$  takes a low value and  $e$  trans will be below. i.e. lower  $E_s$ . lower  $e$  trans the conference is in a position to raise its rates of freight without losing traffic. Then if  $E_s$  is high  $e$  trans will be high.

So, differential Conference prices (rates of freight are made on the principle "What the market will bear" based on  $t = \frac{c}{p}$  a d eg. toys machinery etc.

In summary form, we find.

1. Negotiated freight rates <sup>(137)</sup>, when individual commodities, where technical factors relating to the commodity shipped are complex.
2. Competition in the product market in the area of destination reflect the price elasticity of demand.
3. For machinery, where the landed freight forms a high proportion of the freight the elasticity of demand for shipping services is also high.
4. Competition for shipping services more competition heigher price elasticities.
5. "Charging what the market will bear" pricing higher in the lower where the elasticity is higher.
6. Relationship between weight of individual commodities and their cubic measurement i.e. weight (W) or measurement (M) basis according to whichever

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(137) Deakin B.M. Shipping Conferences, London, 1973 pp.143

yield higher freight e.g. toys/machinery.

a) value b) tonnage or consignment size c) stowage.  
 d) Hazardous cargo e) Refrigerated and cool chamber  
 stowage of cargo. f) consignments prices by indi-  
 vidual Conference members g) Residual and unknown -  
 influences. <sup>(40)</sup>

#### V. The Special Economics of Running Big Ships.

The average size of ships has increased because of technical knowledge has enabled economies of size to be secured without incurring economic of service penalties. ( ) The bigger the ship the less the material and horse power required per earning ton. The result is that capital cost per ton and hence the depreciation per ton mile are also lower for the bigger ships provided ship can be made faster without increasing fuel cost per ton mile about that of smaller ships.

A 50,000 ton ship carrying 50,000 ton gives lower cost per ton mile than two 25,000 ton ships each fully laden. But a 50,000 ton ship carrying 25,000 tons has higher cost per ton mile than a 25,000 ship full laden. i.e. two 50,000 tonners are economically better than ten 10,000 tonnes.

The correct economic size of ships cannot be determined until port time has been taken into account, or big ships spends a good deal of time in port for loading and unloading goods. As the size of the vessel increases the number of vents increase proportionately.

(Refer )

1. Due to increasing technical knowledge the average size of ship has increased.

2. The bigger the ship, the less the material and horse power required per earning ton i.e. reduces cost per ton and depreciation per ton mile.
3. Fuel cost per ton mile are also lower for bigger ships, and also increased speed for economical reasons.  
Double size of tankers, bulkers and tramps.
4. It is easier to man a bigger ship, with a given labour force. force.
5. Depreciation, fuel and wages are the major part of the operating cost of a ship.
6. Big ships are more economically carriers than small ships, as shown in port facilities, trade volume and port time.

The disadvantages are :

1. The port size, is a constraint on the size of the ship.
  2. Port facilities in some parts do not cater to the large ships or optimal size ships.
  3. A trader has to operate with a higher level of stocks, involving storage capacity and charges.
  4. Assume that loading and discharging rates per vent (hatch, oil outlet are the same in tons, per hour for each type of cargo. The actual rate of cargo handling of any ship is the number of vents multiplied by the rate per vent per hour.
  5. A big ship may have to call at more ports to collect a full cargo than a small ship.
-

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Bulk Cargo Freight1980 - 19867.2 International Shipping :

Year	Index Shipping	Single Voyage		12 Month Time Charter			
		Coal	Grains	25000	50000	10000	
		New Inter-H.R.	US Gulf	US Gulf	US Gulf		
		Jap(FO)	AFA(F10)	Japan			
1980	213.3	24.20	10.15	28.65	10.05	6.35	4.25
81	195.5	21.55	13.20	24.60	90.15	5.85	3.05
82	158.9	14.85	8.95	18.15	5.40	2.60	1.25
83	170.3	14.10	8.35	18.40	4.65	2.60	1.50
84	172.6	12.50	8.95	15.00	4.75	3.30	2.25
85	167.0	11.65	8.35	13.60	4.25	2.95	1.65
86	157.7	8.96	8.15	10.20	3.30	2.10	1.48

Notes : USD at valid exchange rates. All fixtures are averages Coal and grain rates are based on cargo sizes of 50-55000 tons, 30,000 DWT @ 60,000 @@@ DWT, 1,20,000 DWT.

Source: Indian Shipping Statistics, 1990.



PART - B.CHAPTER VII - SUMMARY.I. The importance of Shipping Productivity.

Shipping productivity and port efficiency depends upon.

1. The tonnage level of world trade.
2. The demand for port services and shipping services.
3. The time taken for a ship to berth while waiting in the roads.
4. The berth occupancy rate and waiting at berth.
5. The time taken in loading/unloading per deep per year.
6. The amount of gang shifts and cargo facilities for these operations.
7. The average turn round time of ships.
8. The storage and space available.
9. The connecting transportation roads, movement the goods.

Shipping or sea transport is of vital importance to developing maritime countries. By carrying its own cargo, it can save foreign exchange for the home country and also carry cargo for other countries and earn foreign exchange for the national economy. The promotion of shipping in India, is undertaken by the National Ship Owners' Association (NSA).

The Government of India's policy is reservation of the entire coastal trade to Indian shipping, 75 per cent in near and adjacent trade, 50 per cent in the distant trade and 30 per cent in the oriental trade to foreign vessels.

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- Successiv five year plans have helped the growth of the national merchant marine fleets.
- The government in the successive Five year Plan outlays provides fund for the programmes of acquisition of the shipping tonnage.

## II. The Theoretical Argument .

- The most important determinant in the demand for shipping tonnage is the level of international trade and size and structure of trade.
  - Demand is elastic, if prices falls and the goods demanded increases, and inelastic if there is little increase, even if price falls. Variable costs or marginal costs of carrying an extra ton of cargo, handling cost, incurred by that extra ton, or additional fuel costs or port charges.
  - The average variable cost differs from port to port, but does not vary according to quantity.
  - Profit maximisation is at full utilisation when profit equals the difference between average revenue and average total costs. Increase cargo offerings involve marginal costs.
  - There are economics of scale in bulk purchases of materials, discounts on large contracts, and consumption to size and speed requirement.
  - There is savings in costs for big ship such as depreciation, fuel cost, speed, more tonnage, more storage space more outlets than small ships.
  - The cost in sea-transportation is reduced of the turn around time of ships is reduced by its owners and in competition with other owners.
  - Elasticity of supply is measured by relating change in price to the amount supplied.
  - Liner freight rates are more inelastic than tramp ship freight rates.
-

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The economics of running big ships.

1. The bigger the ship less the horse power required per ton, such as capital cost and depreciation cost.

A 50,000 ton ship carrying 50,000 ton gives lower cost per ton more than two 25,000 ton ships each fully laden. A big ship spends a good deal of time in port, for unloading/loading operations.

### III. Historical Review of Shipping in India.

The India Shipping Tonnage grew from 0.2 m. Gross Registered Tonnage (mgt) and placed India 15th among the maritime nations of the world.

The average ship size has also progressively increased, thus benefitting from the economies in the operational cost of larger ships India has a large number of shipping companies 64 of them. The Shipping Corporation of India Ltd. (SCI) owns 128 ships, total tonnage of nearly 3 million grt. (4)

The average age of an Indian ship is 14 years. The productivity of Indian fleet has improved during the last few years and has a 34-40% share in India's overseas Trade.

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(4) Rajawade Thapar, Indian Shipping Industry, N.Delhi 1993 pp10-12.

M. S. G. J. FERREIRA

PART - B  
CHAPTER - VIII

CONCLUSIONS

- 1) Effects of Shipping Productivity on Foreign Trade, Regional Coverage and Ports Developments
- 1) Specialisation of cargo, cargo handling facilities.
- 2) A fast turn around of ships, more trade as more ports of call and better labour productivity.
- 3) Less freight rates, less waiting for queues or for berths, less charges and levies for port services.
- 4) More employment of manpower, increasing the regional earning capacity.  
Specialised ships for specialised cargo, use of latest technology in cargo handling facilities, more skilled manpower.
- 5) Large investments in ocean going vessels more returns of capital, raising both national and regional income.
- 6) Induces Port Development on a large scale, increasing the berthing capacity, the tonnage loading/unloading capacity, less time spent at berths, in queues. More employment is generated at ports to avoid congestion, encourages competition and discrimination among goods, ports and other shipping companies.
- 7) Increases and gain access to the market around the world.

11) Link

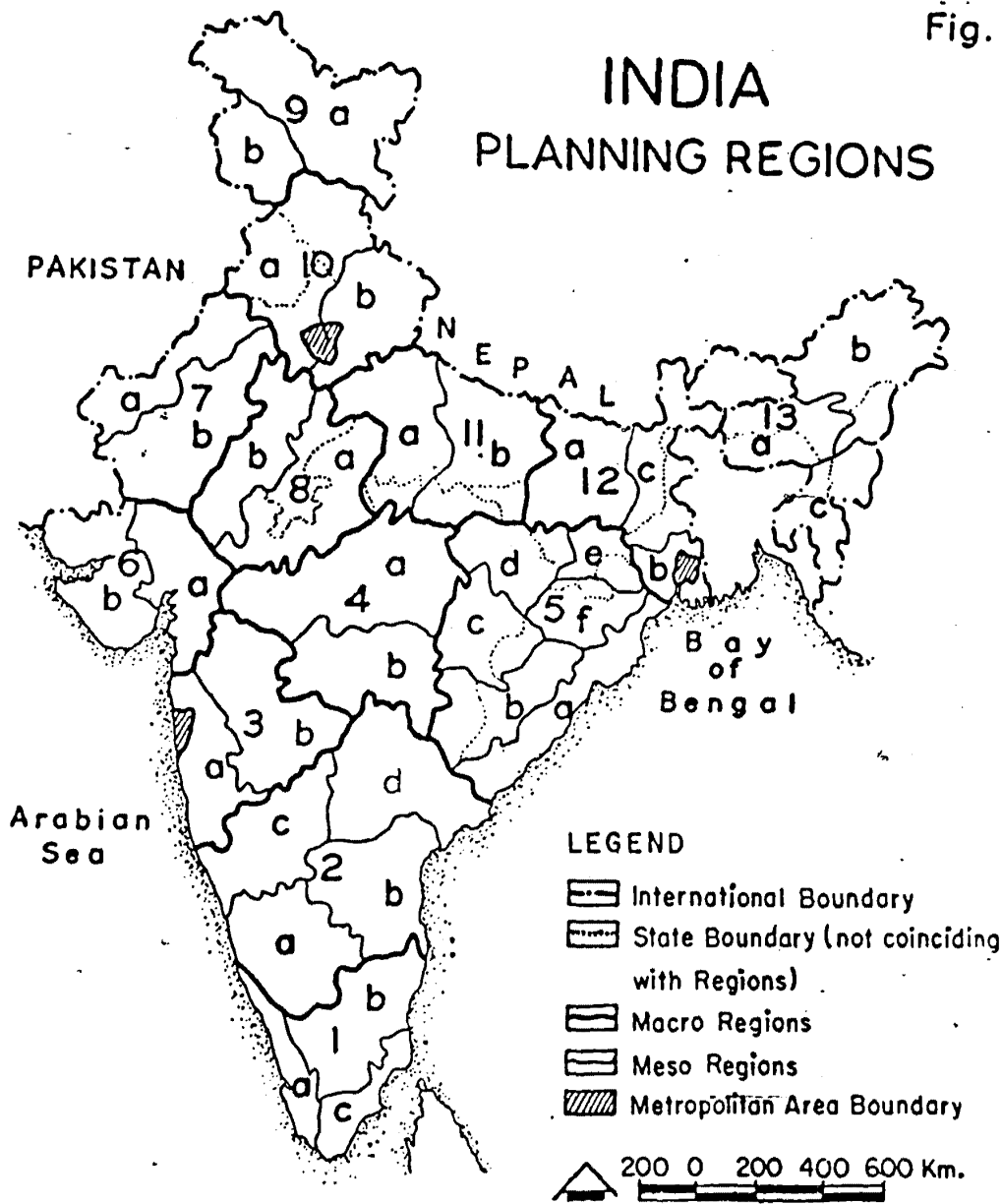
Shipping productivity is an important link of port development, regional coverage and foreign trade.

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- The main objective of the Eighth Plan in regard to the shipping sector are stated to be the mode and diversification of the shipping fleet with a view to fulfilling the national objective of export promotion and improve balance of payments.
  - The other objective is modernisation of the Indian fleet, a package of fiscal and monetary incentive linked to foreign exchange earnings of the sector.
  - In 1958, a Shipping Development Fund Committee set up.
  - In carrying their traffic the country could either
    - i) entirely use foreign ships.
    - ii) entirely use national ships
    - iii) partly in foreign ship and partly in national ships.
  - The economic objective of national shipping is complementary to that of national trade with foreign countries. When goods are sold in a c.i.f. basis, the exporter or his agent is responsible for the payment of freight.
  - The SCICI started to play a crucial role to revive the private shipping industry through financial assistance rehabilitation and development activities.
-

Fig. 1



MACRO REGIONS

- |                      |                                      |
|----------------------|--------------------------------------|
| 1 South Peninsular   | 8 Aravali Regions                    |
| 2 Central Peninsular | 9 Jammu Kashmir & Ladakh             |
| 3 Western Peninsular | 10 Trans Indo Gangetic Plain & Hills |
| 4 Central Deccan     | 11 Ganga Yamuna Plains               |
| 5 Eastern Peninsular | 12 Lower Ganga Plains                |
| 6 Gujarat            | 13 North Eastern Region              |
| 7 Western Rajasthan  |                                      |

Source: Regional Planning Efforts in India, 1982. GOI.

PART C - Regional CoverageChapter - II. Introduction :

- Region is the name given sometimes for a district, a group of villages, a particular state, or group of states. The name has very wide meaning.
- The functional region comprises, heterogenous units such as cities, towns and villages.
- In developing regions, homogeneity or nodality are important factors in finding the similarity of a regions to interlink these nodes, or centre points.
- Keeble defines<sup>(14)</sup> a planning regions to be as area that is large enough to enable substantial changes in the distribution of population and employment to take place within its boundaries.
- A region should be large enough to contain an array of resources, climatic conditions and a size that is convenient for economic plans and investments.
- Lastly a region should be geographically, a continuous unit, whether its runs into plains hilly tracks, coastal belt, lake area etc.
- The people of the region should have similarity in social and cultural relations. It should have a separate unit for data collection and analyses.
- The economic regions depends upon per capita income levels and national income of a country.
- The main reason for choosing a location of a business industry is guided by Profit Maximiation such as quick yielding luxury goods, consumer goods

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(14) *ibid* Chand Mahesh, Puri V.K. Regional Planning in India, 1963, Ahmedabad, pp.3.

industries, than in basic capital goods industries, such as transport facilities, dams and other infra-structure for development.

- According to the Planning Commission of India -  
"Planning involves the acceptance of a clearly defined system of objectives in terms to which to frame overall policies, a strategy for promoting the realisation of ends defined. Planning is essentially an attempt at working to coordinate means and ends."<sup>(14)</sup>
- Regional planning is to ensure, optimal utilization of space and optimal distribution pattern of human activities. This helps to improve the sectoral efficiency of the investment processes.
- Regional coverage is to reduce disparities, among states, and inequalities in different areas of the same state to ensure a minimum level of subsistence.
- Regional Development is vital for Port Development if the export and import trade through it has to be profitable.
- The development of a port process includes the whole process of agricultural and industrial growth and social development.
- The larger port have Railway lines and Roads which branch out in all directions.
- Port Development in many regions depends upon national planning and a high cost site.
- The development of modern ships has made development of modern ships has made development

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(14)

Chand Mahesh, Puri V.K. Regional Planning in India, Bombay, 1983, pp.46



expensive in providing port facilities and deep dredging required.

## II. Theoretical Aspect :

- Regional development then becomes a long plan for an Open Economy.
  - Where a region is located the decision of business for agricultural and industrial spatial pattern, depends on the availability of the factors of production, land labour and capital.
  - Population density is unequally distributed geographically.
  - Land is limited by the sea, food is limited by the area of the land under cultivation, by Prof. Malthus, as his theory did not include capital and labour to land. This increased the production possibilities of agriculture and industry.
  - Increase in Education, skilled labour, management, health care and medical has helped raised the subsistence levels.
  - Population moves to where there is work and income and transportation, this causes the market price to rise or fall according to the demand and density of the population.
  - The economic activity depends upon the Population of each region.
  - According to Prof Malthus of 1798 Century, we find -
    - i) that Population is limited by foods.
    - ii) Population grows larger in a geometric ratio and subsistence or food in an arithmetical progression and population can double itself.
-

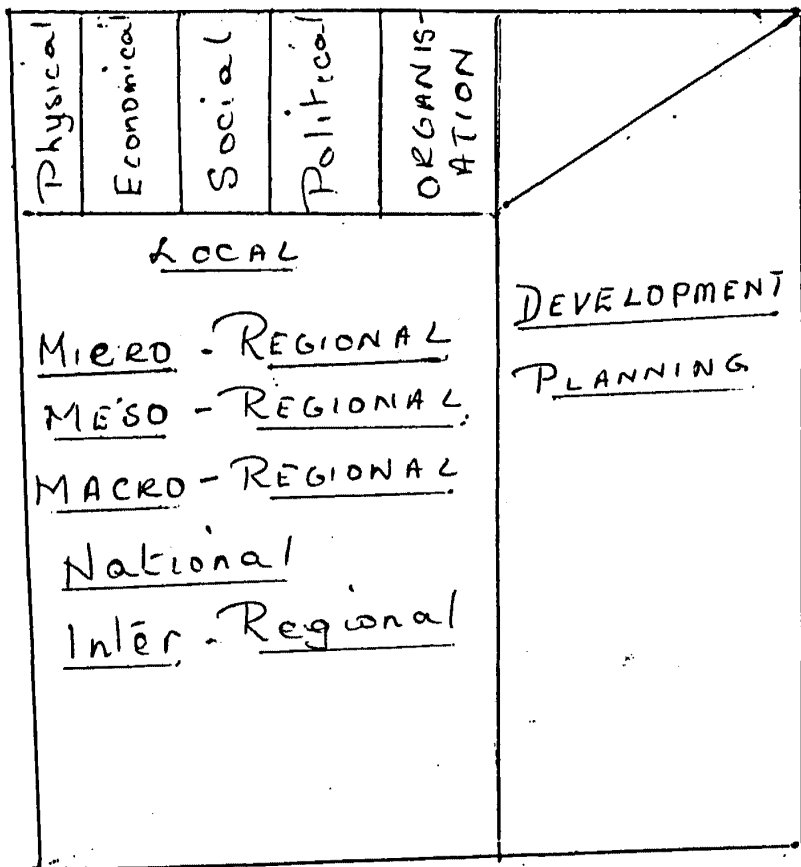
- iii) If demand increases for goods and services, more people would be needed to satisfy the demand, this depends upon the size of population.
- One of the ways in improving the Region is Exchange or Trade, i.e. encouraging competition between regions.
  - Regional planners seek to improve the distribution pattern of human activity and (2) to reduce the disparities between the rich and the poor regions of the country.
  - Regional planning is designed to formulate measures to assist the growth of certain regions.
  - Regional planning should aim at development of rural areas through the establishment of growth foci and through the linking of different villages, services centres, growth centres and growth poles in an integrate way.
  - The task of regional planning is to help us indicate what industries or activities should be located at different levels, so that the overall development of all villages and urban centres can be insured in an integrated way at minimum cost in terms of money, time and effort. This is called Utility of Time and Place.

### III. Objectives of Regional Coverage :

- The main objective being the development of the regions, its people and port to ensure growth with stability in the National Economy.
-

- Regional growth is unbalanced on account of differences in resources endowments, therefore conflicts arise.
  - Transport integration is the essential Port function, but a modern Sea-port note within a multi-modal transport system frequently developed also as a major urban centre, an industrial focus, an important sources of employment and an influncial factor in National and Regional Development.
  - The prosperity of coastal cities largely depended upon the Sea and the maritime trading links which in turn fostered the original economic growth.
-

DIMENSIONS OF DEVELOPMENT PLANNING



Development planning has two essential dimensions - sectoral and the spatial. These are shown in the figure. At each spatial level, the relative importance of the sectors is different. Also, the inter-relations among the sectors are very different between each spatial level.

Source: W. G. I. M. Growth Centers in Spatial

Planning, Oxford, 1974.

P A R T - C  
C H A P T E R - II  
THEORIES OF REGIONAL ECONOMICS

1) Location, Cost and Scale of Output :

A producer will seek out the most profitable location<sup>(149)</sup> to run his business such as cost and labour advantages, proximity to customer and central location, proximity to materials. To seek the economic factors to determine location patterns of production, is that the average cost decreases with the increased rates of production, so that it becomes profitable to produce and sell. The market is limited by transportation costs of shipping the product.

To assume that each activity is the centre with the same size of market, and these activity are distributed over a wide area, forming a spatial distribution of cities with small markets or towns, providing only essential goods. The distance depends upon howfar the people will travel to buy these goods e.g. banking and educational places, textiles and household goods are located in smaller towns.

Differences in profits at different sites within a region, shows the location patterns of various regions. Transportation costs increase at the same rate is very different from the centre.

Changes in the demand for local resources or products most profitability produced, are due to short run changes in the location of some economic activity e.g. the coal mines exhausted, or long run changes such as shift of manufacturing activity, market accessibility, production

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(149) Nourse O'Hugh Regional Economies 1968 N.York pp.9

costs, or in such areas or changes are due to falling in export reduces the wage and income earning rate causing migration of labour force, causing shortage of skilled workers and transportation facilities lack of capital and knowledge of investment possibilities, taxation policies etc.

### Minimising Cost

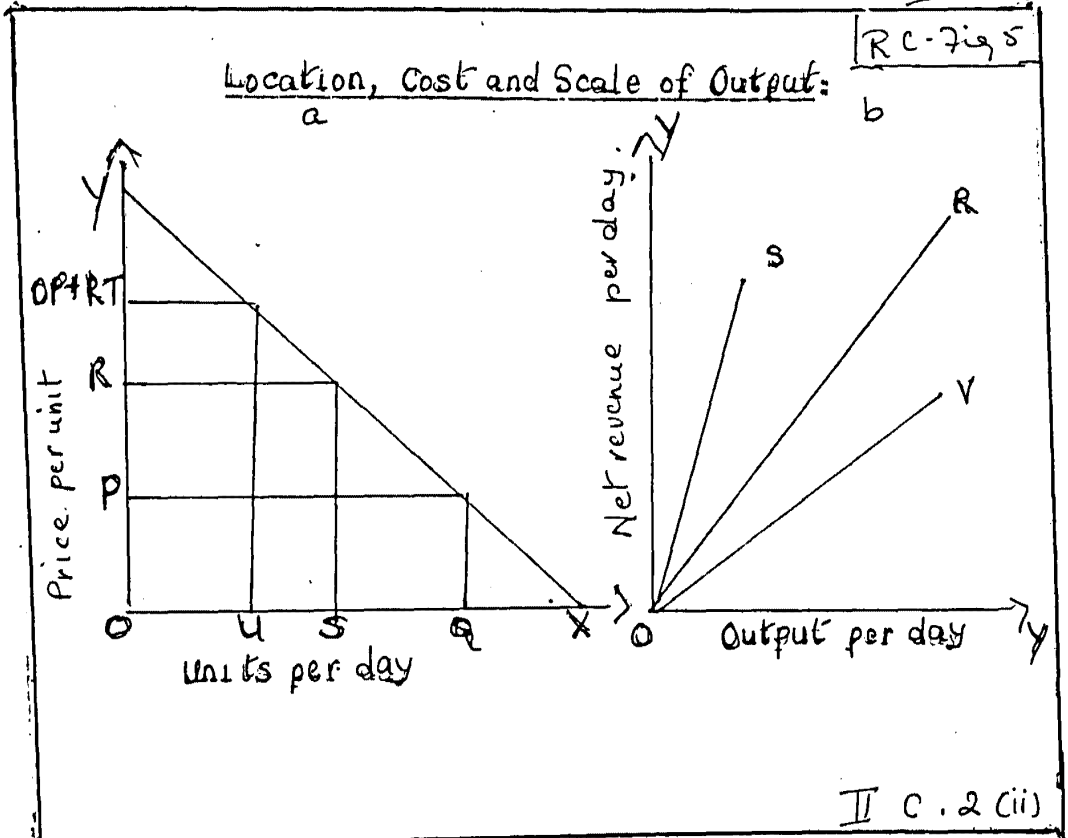
A labour force equipped with different skills <sup>(145)</sup> is combines with other resources such as materials equipment, buildings land and management to yield an output. For example, a producer can use many semiskilled workers and a large amount of machinery in an assembly line process or can hire highly skilled workers and use less machinery. The production function thus described the possible combinations of resources for producing any particular output per hour, day, week or other unit of time.

The next step is to vary the rate of production and relate it to the changes in cost that are incurred. The location decision is a long run decision in which all costs are variable costs. Economies of scale may be the result of a number of factors. The fuller use of some inputs with a large fixed capacity will reduce the average cost of using such inputs. A greater rate of production also allows more specialization of functions with its attendant greater efficiency.

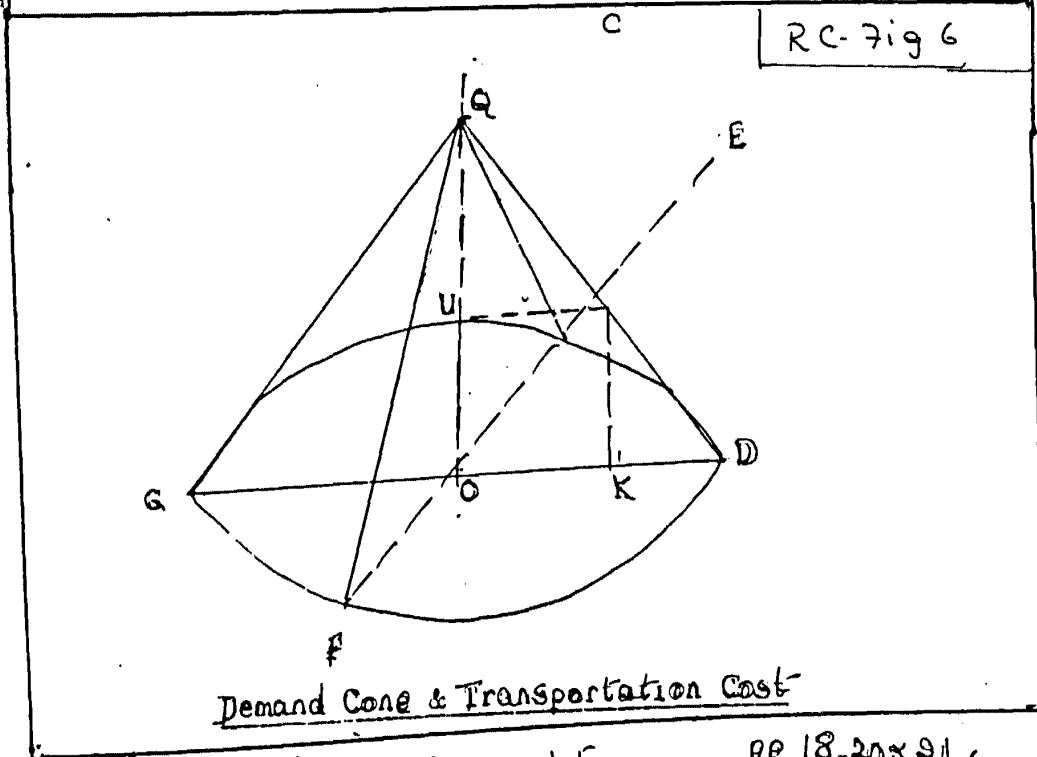
### Receipts and Locations :

The number of customers and the quantity each customer purchases depends on their incomes and taste, the prices of the total quantity demanded from the producer for any price

II c. 1 (i)



II c. 2 (ii)



Source: H. O'Nourse. Regional Economics pp 18, 20 x 21. 1968 ✓

say OP can be illustrated by a Demand Cone.<sup>(14)</sup> Refer diagram C.IIc. The two lines EF and GD intersect at O on a plane to represent north, south and east-west direction. OQ is the quantity of the product that is demanded by the consumer adjacent to the plant. Location - D. OU units per day by the consumer k miles from the plant. The quantity demanded is the same distance from O. The triangle OQP can be revolved on the axis OQ to generate a cone.

Price of plant OP, transportation cost T per unit per mile. The total revenue received would be price OP times the quantity demanded. Thus with an increase in price the total quantity demanded would decrease. Decrease in price the total quantity demanded would increase, the cone will be larger.

#### ii) The Long Run Model of an Open Economy

After a region has been defined and human and natural resources matched suitably, technology for plant and equipment determine potential income of the region could be found out.

The development of a port is viewed as a region in which the whole process of agriculture and industrial growth, social development is reviewed.<sup>(15)</sup> A ports railway lines will branch out in all directions, serving the hinter land which utilise the port.

The development of modern ship such as containerisation other commodities and the price of the product in question and the distance between customer and seller  
(Refer Diagram C.II.A. . . .)

(14) *ibid* Nourse Hugh O, Regional Economies N York 1968 pp.182

(15) *ibid* O'Leahlin, C. . The Economies of Sea-Transport, pp.169  
Oxford 1967.



Demand curve XY is assumed to be linear. The line XY traces the quantity demanded by an individual consumer per unit of time for alternative prices e.g. If the price were OP, the consumer would purchase OQ units per day, if the price were OR, the consumer would purchase OS units per day.

If the price were OP, and he were K miles from the producer he might only purchase OU units per day. The price would be OP plus the transportation cost of using the production from the producer. If the cost of transportation were T per unit per mile. The price be  $OP - KT$ . The quantity he would demand would be OU. On the other hand, if the producer pays the transportation cost of shipping the product to the consumer the price he receives is  $OP - KT$  for OQ units of the product.

To the producer the net price will be the same, no matter how great is the rate of production. The relation between total receipts or revenues and the rate of production is the net revenue line, illustrated by line OR in diagram C.II.b.

If the production site were shifted to a different location the producer's net revenue line would rotate up or down depending on whether the alternative site were closer to or farther from the market e.g. site close to market, net price higher the revenue line would rotate upwards to OS, transportation cost less. A site farther net price lower, transportation cost more the net revenue line rotates downward to OV. has made the process of ocean transport more continuous, in providing port facilities, dredging deeper channels etc.

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iv) The Population Theory

"Land is limited by sea, food is limited by the area of the land under cultivation". Population density is unequally distributed. Prof. Malthus in his Theory did not include the other factors of production, capital and labour to land.

Population grows larger in a geometric ratio and subsistence or food is an arithmetic progression ratio, but population can double itself.

Population moves to where there is work and income and transportation, this causes the market price to rise or fall according to the demand and the density of population. By locating the appropriate financial structure in the agricultural patterns of using good crops and industries suitable to the raw materials available, regional coverage seeks to improve the distribution pattern of human activity and reduce the disparities between the rich and poor region of the country.

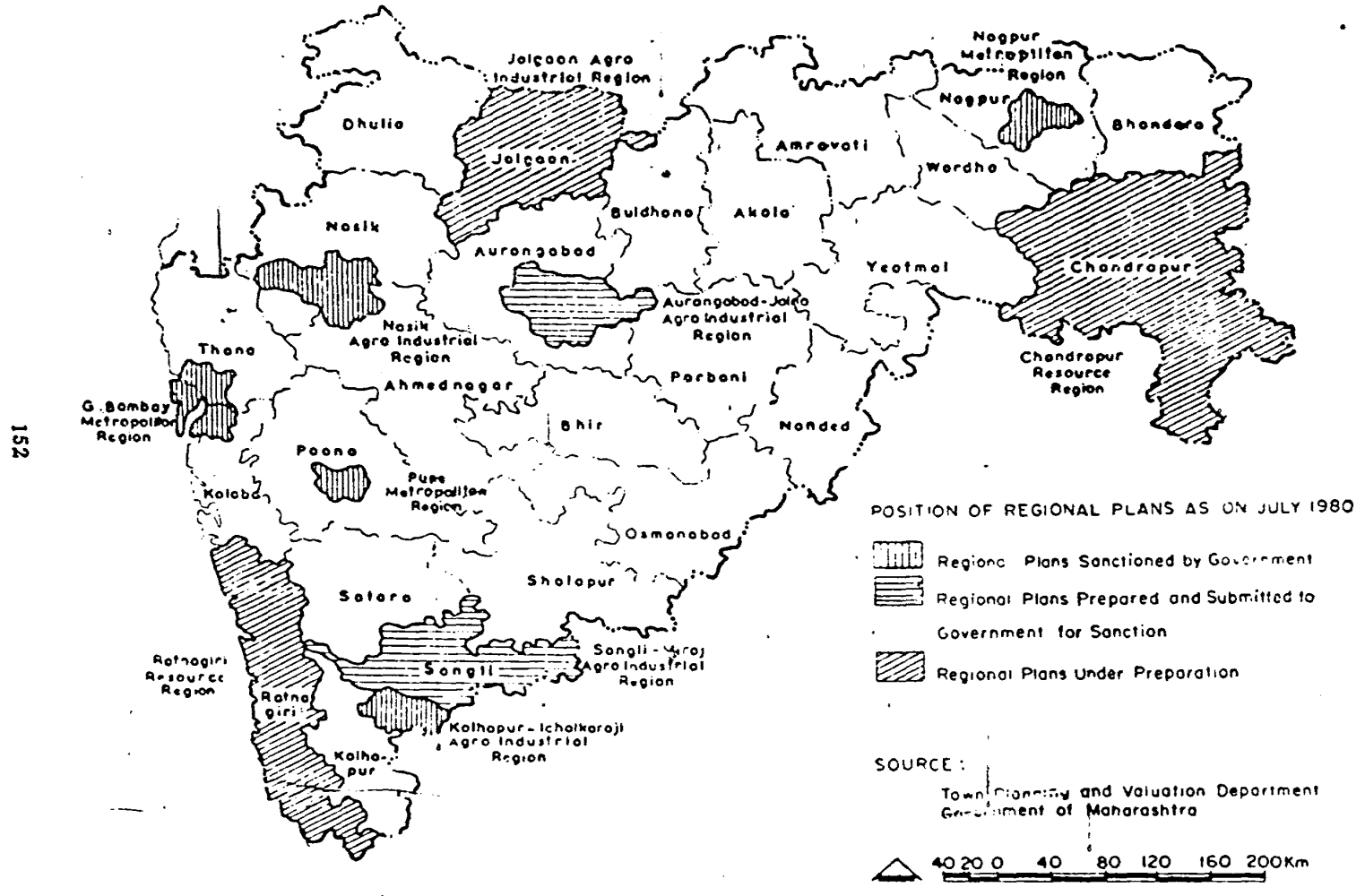
Regional planning is designed to formulate measures to assist the growth of certain regions.

Market economy depends upon the proximity of the establishment to the nearest market and increase or decrease in its price. One way of improving the region is exchange or trade, i.e. encouraging competition between regions.

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Fig.34

# Regional Planning in Maharashtra



M. S. C. S. FERREIRA

PART-C REGIONAL COVERAGE

MAP-C-2

341

PP 152

Source: Regional Planning Efforts in India, Dec 1988, Govt. Press.

PP. 152

PART - C  
CHAPTER - III

A CASE STUDY OF MAHARASHTRA STATE  
FOR REGIONAL DEVELOPMENT TO MEET THE  
FOREIGN REQUIREMENTS OF BOMBAY PORT

REGIONAL COVERAGE

Maharashtra State completed 35 years in 1995, established in 1960.

Maharashtra State has made considerable progress since it came into existence. <sup>(148)</sup> It is one of the leading industrialized state in the country.

There has been progress in agriculture, horticulture and production of milk, bread and poultry and cattle farming.

It also has surplus power generation. <sup>(149)</sup> It has a high level of literacy as compared with many other states. And has many leading institutions of higher education in the country. It has employment Guarantee Schemes, with better employment programmes in many states. It is one of the better administered States and has made significant progress in removing social inequalities.

The State is faced with some serious problems which needs urgent attention.

As a result of urbanisation due to industrial growth a greater percentage of people live in the cities and towns in Maharashtra.

Due to rapid urbanisation, greater opportunities offered by the cities, and as a consequence of extreme poverty and social discrimination in rural areas which drives people to the cities like Bombay, Pune, Nagpur, Aurangabad etc. The large influx of population has created vast slums, where millions live in sub-human conditions. These slums give rise to numerous social and economic problems. Rapid

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(148) Gadgil G. Profs & Deshpande A.A. Maharashtra Potential and Prospects, Bombay, 1988 PP.VII Introd.

(149) ibid pp VII introd.

M. S. G. I. PEREIRA

urbanisation puts an enormous strain on the urban infrastructure of transportation, Roads, water supply and power generation, consumers food supply and other services.

This effects the Municipal finances well as the municipal administration, which come under a severe strain a few measures may include slums.

- 1) Effective implementation of rural development programmes in all parts of the country.
- 2) Master Plans for regional development, instead of city development on a scientific basis.
- 3) Educational programmes for proper maintenance of the city in terms of health, environment sanitation traffic etc. has to be incorporated effectively.

Large parts of Maharashtra receive moderate and ever scanty rainfall. <sup>(150)</sup> Some districts are draught prone. The possibilities of canal irrigation are limited. It becomes necessary to fully and efficiently utilise the available waterresources and to take adequate measures for water conservation and management.

The cropping pattern has also to be determined in the light of this limited availability of water.

Recommendation such as a policy for water management and conservations or inter-regional transfer of water from surplus to deficit areas is a long term solution.

The problems of unemployment and under employment is difficult to assess due to not sufficient data collection. Reasons and modern advanced technology. Migration of labour from other states in the industrial centres of Maharashtra adds to pressure of employment or the available employment

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(150) Gadgil G Deshpande A.A. Prof.  
Maharashtra, Problems, Potential & Prospects Bombay  
1988 pp VIII.

M. S. G. I. PEREIRA

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(150) Gadgil G Deshpande A.A. Prof.  
Maharashtra, Problems, Potential & Prospects Bombay  
1988 pp VIII.

M. S. C. I. PEREIRA

opportunities. Demand for higher wages by urban labour can also reduce employment opportunities. Then, there is decline in the cottage industries, handicrafts employment schemes, small or tiny scale sector or single, sole employment, Chenna, Gram, Peanuts.

Various schemes are implemented for employment such as Employment Guarantee Schemes.

The vital problem of energy is an important issue in economic development of one State, but all of India alternative sources of energy such as agro-renewable liquid fuel for cooking, bio-gas plants, wind power fans and social forestry. Recommendation made was for micro-biological treatment of effluents, establishment of micro hydel stations, improved chullas, or solar cookers, also educating the masses of people for the need for energy conservation.

There is a large concentration of urban population in the belt area of Bombay, Pune and Nasik. But by development of alternative growth centres and economic development of rural areas it should be possible to reduce the influx to some extent. Various anti-poverty schemes like the Employment Guarantee Scheme, the Integrated Rural Development Programmes (IRDP) and NREP can play a useful role.

Development of rural areas on the basis of regional development plans such as

- (i) adequate funds for development of small and urban towns
- (ii) provision of adequate water supply for the Municipal towns.

Maharashtra State enjoys a reputation for efficient municipal administration.<sup>(151)</sup> To make it more efficient and

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(151) Gadgil G. Deshpande A.A. Prof.  
Maharashtra, Problems, Potential and Prospects  
Bombay, 1988. PP XVII

effective, by incorporating more specialised and professionals in the Municipal bodies, co-ordination of committees for services like Telephones, water supply Transport etc.

Finance :

State finances depends upon States Taxation Municipal Finance depends upon octroi, property taxes, water cess, education cess. Development of markets and commercial centres. Capital funds are financed by Government loans open-market borrowings permitted by Government.

The Problems of the Greater City of Bombay.

- i) Early development of Nhava Sheva Port.
- ii) Connecting the New Bombay Project to the Telephone Exchange
- iii) Estimating the population of Bombay by 2000 would be 1.5 crores in Greater Bombay.
- iv) Shifting of markets.
- v) Development of necessary rail links to New Bombay  
Internal problems of the city are :
  - a) Constructions of new truck terminals near warehouses.
  - b) Construction of road links from East to West in the suburbs.
- vi) Other problems, <sup>(152)</sup> such as removing congestion on roads by parking only on certain roads, reducing the access of truck traffic during the daytime, shifting of office peak hours, development of pedestrains traffic patterns in the city, setting up of Urban Transport Authority.

Measures to prevent clandestine conversion of residential areas into commercial and warehousing centres.

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(5) Gadgil G, Deshpande A.A. Profs.  
Maharashtra, Problems, Potential and Prospects  
Bombay, 1988 pp. XVII



By far the most important problem of Bombay is housing including slums, which is established to be about 40 lakhs while another 3 lakhs or so dwell on open-space or pavements.

As regards lands it has been estimated that the construction of 12 lakhs of tenements will require 16000 acres of land as against 19000 acres available.

1) State Government Lands	8,000 acres
2) Land under slums	4,000 acres
3) Land under dilapadated Buildings	3,000 acres
4) Vacant land on Industrial zone	2,000 acres
5) Land now likely to be available under Urban land ceiling	2,000 acres.
Total	<u>19,000 acres</u> =====

#### Solutions :

Slum dwellers are mostly construction workers, and are liable to shift from place to place after their work is completed say, one to 5 years, depending upon the construction, next land can also be claimed from the Sea. eg. Nariman point, where multi-storeyed building can be constructed to ease the housing problem.

The problem of drought areas in the State. Take for example the districts of Marathawada and Vidarabha Solutions such as

- 1) transfer of water from surplus regions to water deficit regions. This also involves complex technical questions as well as huge capital investments. Suggestion such as a more economical development and widespread
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M s. G. I. PEREIRA

allocation of the canal water.

- ii) Promoting both improved water-saving techniques of irrigation and cropping patterns.
- iii) Water and soil conservations by estimating the requirements of water per hectare for irrigation etc.

Basic Facts and Figures : See appendic.

National Water Policy :

Taking into consideration the vastness of the Country and the existence of about twenty major river basins. The need for the conservation, utilization and inter-basin transfer of the nations most vital natural resource of which almost 9th/10th is needed for irrigation, and putting priorities for the use of water as between irrigation, power generation, industrial and domestic purpose etc. The Commission found is necessary to set up an apex body to frame national policies for the utilisation of the country water resources.

Particularly in the drought prone areas of Maharashtra there is just not enough water to meet civic industrial and agricultural needs. On first priority in planning the use of water resources for providing adequate and clean drinking water to our growing population. For industrial use, and industrial development. For agricultural use, economic and efficient use of water even in areas of assured rainfall and in regions of surplus rainfall must have highest priority by employing modern technology in the use of water resources and also to drought prone area.

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Agricultural sector is going to be the largest consumer of natural water resources, therefore it is important to harness the latest technology such as the drip of trickle irrigation. This not only saves the quantum of water required by plants, but also nearly 30% of the fertilizers which are wasted due to flooding of the productivity of most of the crop irrigated under drop system goes up substantially. In case of horticulture the quality of fruit improves. This will create more employment in rural areas. This system is also suitable for hilly slopes for commercial and profitable agriculture, horticulture etc. Due to the drip system efficiencies of 80% are achieved than 30% over the furrow irrigation.

Other systems are utilisation of Canal Water, specially for sugar cane crop.

#### The Problem of Unemployment :

As per statistics available from the Employment Exchange at the end of 1985, there were 26.3 million persons on the Live Register who were seeking jobs assistance. About half of them i.e. 13.3 million are educated and about 17% are women.

#### The main causes of unemployment :

- 1) Rapid growth in population e.g. March 1986, the total population in the country was about 761 million of which 192 million was in the urban sector.

Estimated figure for the year 2000 is 972 million Labour force is expected to rise correspondingly from 305.40 million to 427.98 million by the year 2000.

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- 2) Unemployment due to a faulty education and training system, and development in the art of staying employed.
- 3) Unemployed persons prefer salaried jobs in organised sector, which has limitations and is about only 10 to 12% in this sector.
- 4) Concentration of creation of employment in urban areas rather than in rural areas etc. such as problems of landless workers, marginal farmers, rural artisans, including fishermen, backward classes and backward tribes, having no assets, no skills and no regular employment or full time jobs.

Plans for specific target groups areas for employment creation, income generation and poverty alleviation. The Seventh Five Year Plans, lays emphasis on the country abundant human resources and improving their capabilities for development. Fuller utilisation of already available manpower through upgradation skills and on the job training/retaining has also been emphasised such as training courses.

For Seventh Plan aims at stabilising the growth rate of the economy at an average annual rate of 5% and that for agricultural and industry as 4% and 8% respectively.

National Rural Employment Programme (NREP) etc. and all efforts are thus being made to create conditions for the utilisation of the surplus manpower. Whether it is possible to increase employment opportunities in rural areas.

Whether the existing fields can be made more productive. Whether there is scope to generate employment and

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M.S. C. I. PEREIRA

income through reorganisation of land, water etc small marginal farmers in Maharashtra.

An effective solution would be to bring small holdings into compact block and introduce suitable co-operative methods of cultivation.

There are other ways of improving economic of such irrigation schemes such as providing electricity cheaper breakdown of machinery, needs repairs and maintenance.

Voltage fluctuations, financial needs and payments Maharashtra State has two schemes for self-employment employment guarantee schemes (EGS and Integrated Rural Development Programmes (IRDP).

Technology Policy for further Gainful Employment. The crucial factor in economic growth is technology which is estimated to have contributed between one third and one half of overall productivity, such as technology of power generation, telecommunications has decentralised work situations and channelling substantial part of GDP to research and development thus ensuring technological advancement leading to better quality and cheaper goods, more demand for goods and more employment to people.

The technology capacity to manipulate materials provides us a number of new and useful consumer goods ranging from better chemicals products to computers, providing new seeds insecticides and fertilizers and greener fields.

Economic development and growth in industrial sector gives rise to commercial and finance and better services for whole sale and retail trade and government and financial operations and managements. With technology upgrada-

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tion, we get, hi-tech industries and high economic growth thereby technology increases job opportunities, telecommunication breaks the isolation and backwardness of rural areas, bio-technology helps agriculture, forestry preventive health care etc.

Encourage technologists to encourage R & D in industries agricultural and research institutions.

Technology has to be understood at the local level and demands adequate knowledge and understanding.

Technology necessitates updating skills, training and knowledge of employees, technicians, engineers, supervisory personnel and management on a continuous basis for which facilities have to be created.

Commercial gains through technology encourages Industrialist to take up Research & Development programmes to improve products and processes.

Technology improves competition resulting in high and critical demand conditions.

Technology is a boon to the exporter, to improve products seek possible markets at low price range in a foreign market.

#### Energy Resources :

Energy conservation and energy generation in response to oil imports. Estimating the requirement of energy for the demand and supply conditions, there are many constraints, high costs, shortages etc. Investment in an energy conservation project takes a longer period for pay back. Furnance Oil, coal, solar wind and naphtna and around Rs. 3,400 a tonne electricity and diesel oil.

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Electricity rotates wheels of industry, helps farmers to increase farm output, modern communication equipment need electricity.

Mini & micro hydel projects are undertaken for irrigation. Thermal power stations for major generations in the state.

In Maharashtra, major generation is on the east, where thermal stations are located near coal mines and Chandrapur and Nagpur District, while the major loads are in the West in Pune-Bombay region.

Wind Energy : Average wind speed in India varies from 10 to 20 km per hour. Installation of wind generators of 55 KW at Deogad in Konkan area.

Solar Energy : 5 to 10 MW in Vidarbha region where temperature are high which gets the sun's energy all the year round. (153)

Bio-mass : By utilising the wastes of large cattle population and vast quantities of agricultural wastes, to meet the domestic and other needs of fuel in the rural township.

Garbage Power Plant :

To avoid pollution of air, garbage can be burnt in a boiler and electricity can be generated, while keeping the city clean.

Energy problems in Rural Maharashtra.

Direct use of fuels are in cooking/wood, kerosenes LPG transport (diesel petrol) water pumping (diesel pumpsets).

Electricity usage in rural Maharashtra for water pumping and most other commercial activities.

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(153) Gadgil G. Deshpande A.A. Profs  
Maharashtra, Problems, Potential & Prospects, pp.138  
N.Delhi, 1988

## II. Regional Planning in Maharashtra :

A regional approach to planning and development in Maharashtra has, therefore, been adopted and regional plans for the metropolitan regions of Bombay, Poona, Nagpur as also for Agro-industrial regions of Kolhapur, Ichal Karanji, Sanli Miraj, Aurangabad and Nasik have been prepared. Work in progress for district Regional Plans for Jalgaon, Chandrapur and Ratnagiri is in progress.

### 1. Bombay Metropolitan Region :

Bombay Metropolitan Region with Greater Bombay as the main hub of activities includes in addition to the area of Greater Bombay, the revenue tehsils of Bassein Bhivandi, Thana Kalyan and Ulhas nagar of Thana District and Uran and part of Karjet, Panvel and Khalapur Tehsils of Kolaba district. The Metropolitan Region has an area of 3,965 sq km and a population of 7.67 million as per 1971 census. It has 10 urban centres and 1,013 rural settlements. The Region extends to 88 km in north-south direction and 17 km in the east-west direction and lies between River Tansa the north and Patal Ganga on the South. In the South-eastern portion, it reaches upto the foot hills of Sahyadri i.e. administrative boundaries of Kalyan and Bhiwandi tehsils.

A plan for the Bombay Metropolitan Region was prepared by the Bombay Metropolitan Regional Planning Board constituted under the Statutory provisions of Maharashtra Regional and town planning Act, 1966. In connection with the preparation of the Regional Plan, the Board had appointed a number of study groups and

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(154) Gadgil G Deshpande A.A. Profs, Maharashtra, Problems, Potential and Prospects, Bombay 1988



committees comprising of officials and experts to carry out several studies and to go into the details of various aspects of the development plan.

The population of the Region has been projected at 124.61 lakhs by 1991 out of which the urban component may be 112.93 lakhs which would give an overspill of 28 lacs of which 21 lacs has been proposed to be accommodated across the Thana Creek by establishing the Twin City and the balance.

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M s. G. V. FERREIRA

Table No. : MAHARASHTRA STATE - TRANSPORT SECTOR  
PERFORMANCE.

Class of roads	(Length in kms.)			
	1980-81	1985-86	1989-90	1993-94
National high ways	2,945	2,947	2,949	2,953
State high ways	18,842	19,029	30,737	31,427
Major district roads	25,138	26,272	38,936	40,142
Other district roads	24,804	28,104	39,316	65,379

Source : Economic Survey of Maharashtra State, 1994-95  
p.80.

P A R T - C  
C H A P T E R - IV  
REGIONAL COVERAGE  
TRANSPORT SECTOR FINANCIAL INDICATOR  
OUTLAY FOR 5 YEAR PLAN FOR INDIA

	<u>Rs. in crores</u>			
TRANSPORT	1980-81	1985-86	1989-90	1993-94
1. Railways	5100	12334	5000	6900
2. Roads	3439	5200	1833	2749
3. Road Transport	1169	1920	475	720
4. Ports (including minor Port)	647	1260	588	695
5. Shipping	755	827	776	1165
6. Inland Water Transport	72	226	70	56

Source : Transport Statistics, Ministry of Transport, 1993-94.

2) Annual Plan 1993-94, Planning Commission.

3) Eighth five years Plans, 1992-97, Vol 11. Planning Commission.

# TRANSPORT SECTOR OF MAHARASHTRA STATE

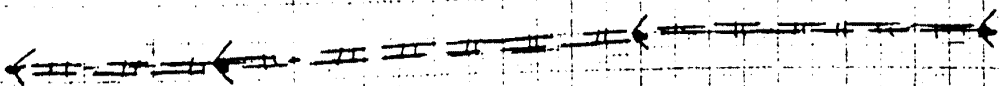
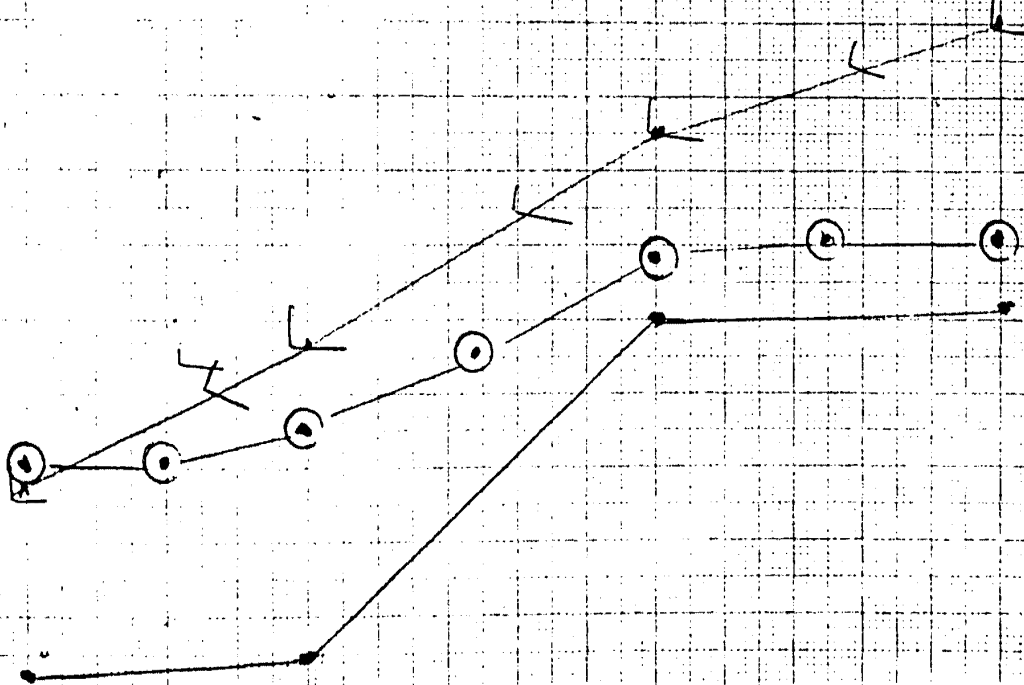
PART C IV II

SCALE  
1 cm = 1000 kms.

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KEY	
⊕	RAILWAYS
—	STATE HIGHWAYS
○-○	MAJOR DISTRICT ROADS
⌒-⌒	OTHER DISTRICTS ROADS

857



1980/81

1987/86

1989/90

1993/94.

# REGIONAL COVERAGE FINANCIAL INDICATORS.

RS IN CRORES

M.S.C. I. REGIONAL

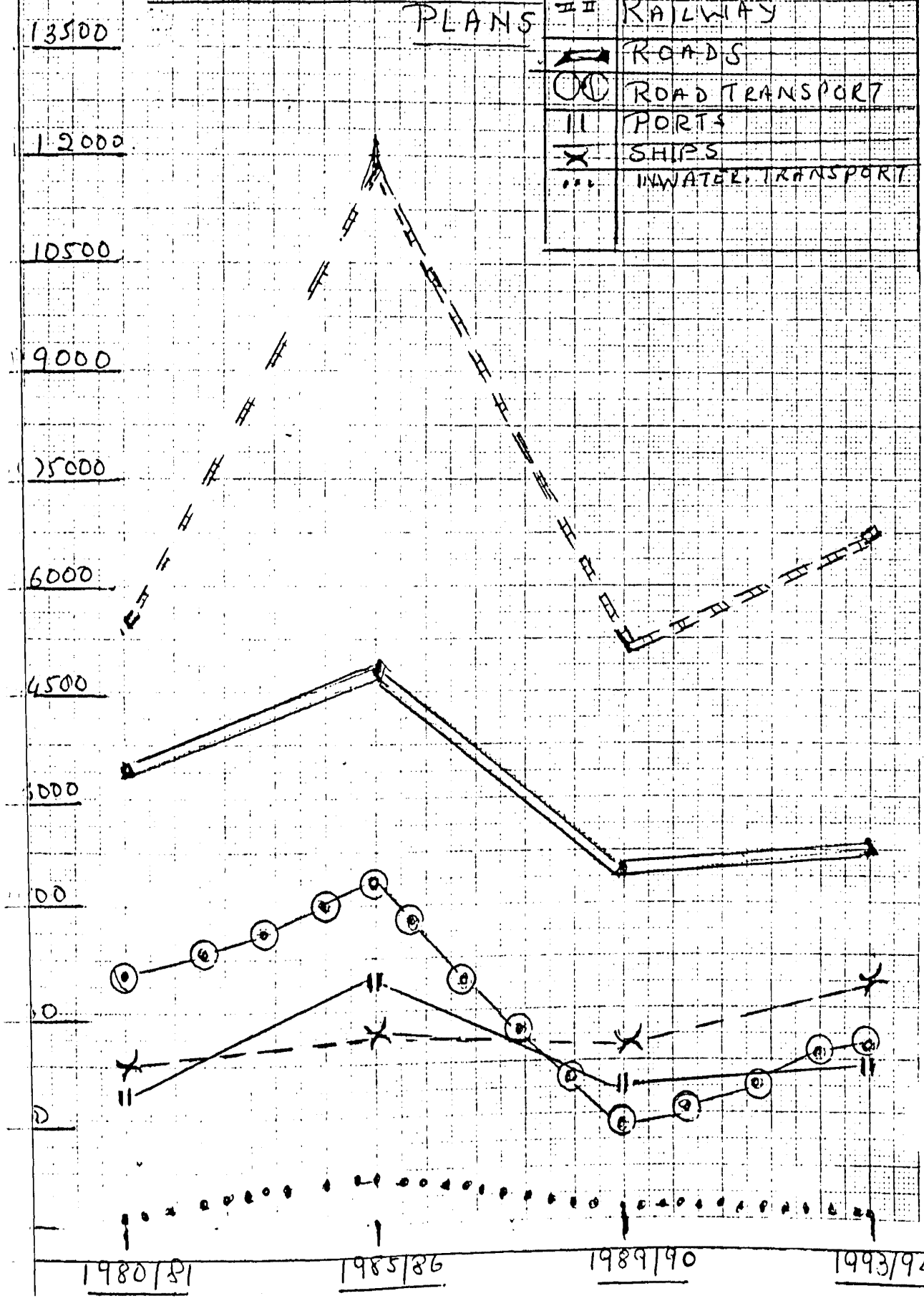
PART C IV-13

OUTLAY FOR 5 YEAR PLANS

KEY

II	RAILWAY
—	ROADS
○	ROAD TRANSPORT
	PORTS
X	SHIPS
...	INWATER TRANSPORT

858



P A R T - CC H A P T E R - IVMAHARASHTRA STATE PERFORMANCE AND FINANCE1) Transport and Communications :

The road length at the end of March 1994 maintained by Public Works Department (PWD) and Zilla Parishad was 1,80,241 km. showing an increase of 3,229 km. (1.8 per cent) over that of March 1993.<sup>5</sup>

The roads are classified into five categories viz. national high ways, state high way, major district roads, other district roads and rural roads.<sup>(158)</sup>

During 1993-94 (end of March 1994) the length of major district roads, other district roads and rural roads marginally increased by 2.0 per cent, 1.3 per cent and 3.6 per cent respectively over that of the previous year.

The percentage of surfaced and unsurfaced road length to total road length was 81 per cent and 19 per cent respectively.

The total length of railway routes in the state increased from 5,455 km. as at the end of 31st March 1993 to 5,459 km. 3,605 (66 per cent by broad-gauge) 754 km. (14 per cent) meter gauge, 1,100 km. (20 per cent) under narrow gauge. (See Graph RC-C-1).

ii) State Income Current and Constant (1980-81)

The State Economy has registered a growth of 7.6 per cent during the year 1993-94.

The preliminary estimate of Net State Domestic Product (i.e. state income) at current prices is Rs. 91,208 crores for 1993-94 as against Rs. 78,394 crores for 1992-93.

At constant (1980-81) prices the growth was 7.6 per cent in the State income during the year 1993-94 as against 41.5 per cent during 1992-93.

iii) Per Capita Income :

The per capita income at current prices is estimated at Rs. 10,984 for the year 1993-94 as against Rs. 9,628 in 1992-93 showing an increase of 14.1 per cent. At constant (1980-81) prices, the per capita state income increased by 5.6 per cent from Rs. 3,696 in 1992-93 to Rs. 3,901 in 1993-94.

**Transport Sector - Outlay for 5 year Plan for India.**

In 1980-81 : The out lay for Roads in India was Rs. 3439 crore, in 1985-86, Rs. 5200 crores in 1989-90 - Rs. 1833 and in 1993-94 Rs. 2749 corores. (Table No. refer).

**II. Transport Sector - Outlay for 5 Year Plan for India.**

In 1980-81 the outlay for Roads in India was Rs. 3439 crores, in 1985-86, it was Rs. 5200 crores, in 1989-90, Rs. 1833 crores and in 1993-94 it was Rs. 2749 crores ( Refer Table No. IV.a and Graph No. )

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PART - D  
CHAPTER - V

POLICIES AND PLANNING IN THE STATE OF MAHARASHTRA  
AND IN INDIA AND THEIR OBJECTIVES.

- 1) Regional plans for the development of Maharashtra includes the metropolitan region of Bombay, Pune, Nagpur, Agro-industrial regions of Kolhapur-Ichalkaranangi, Sangli, Miraj, Aurangabad and Nasik. District Regional Plans <sup>(155)</sup> for Jalgaon, Chandrapur and Ratnagiri were under study. Bombay Region - main centre of activities has a Major Port, includes districts of Bassein, Bhivandi, Thana, Kalyan and Ulhasnagar, Uran, Karjat, Panvel and Kholapur tehsils of Kolaba. The area size is 3,965 sq.km and a population of 7.67 million as per 1971 census. The Region extends to 88 km in north-south direction and 17 km in the east-west direction, between the River Tansa on the north and Patel Ganga on the South, upto the foothills of the Sahyadri Mountains. The population for Bombay is projected as 124.61 lacs in 1991, in urban areas about 112.93 lacs. Greater Bombay alone the population is expected to reach 98 lacs by 1991, an overspill of 28 lacs which is proposed to be accommodated in other urban centres of the Region e.g. Thana Creek called the Twin City in nearby town of Virar, Nalaspuram Bassein, in nearby town of Titwala, Neral, Wangani and Baddalpur besides Kalyan complex.

To regulate development it was decided to zone the land uses by U zone for residential development, <sup>(156)</sup> G zone for resource base industries, industrial zone etc. Classified Highways like Bombay, Poona National Highways. Establishing a new port at Bhava Sheva, and New

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(155) *Ibid* Town & Country Planning Organisation, G.O.I  
Min of W & Housing, N.Delhi pp. 153

(156) *Ibid* Regional Planning Efforts in India Dec.1982  
New Delhi pp.151



Airport Rewas near Colaba District.

CIDCO <sup>(156)</sup> (City Industrial Development Corporation) for acquiring land and preparing development plans.

Likewise, regional plans were made for Poona Metropolitan Regions, MIDC or Maharashtra Industrial Development Corporation near Pimpri-Chinchwad complex since 1960.

For public Utility services of piped water, supply to all the urban areas.

For rural Planning, the region is divided in village clusters, (sub-regions) with a centrally placed village services as a nucleus settlement.

Development of Tourism <sup>(1)</sup> to places of interest, areas of religious and historic importance and places scenic beauty e.g. Panchgaon.

The cost involves about Rs. 200/- crores according to estimates. The Development Authority receives a loan of Rs. 45 lakhs from the State Government for acquiring the necessary area of land for development of New Township e.g. Pimpri-Chinchwad Town.

There are various objectives and Planning Schemes for the various other regions in the State like Nasik, Region, Sangli, Miraj Region, Aurangabad Jalia Region.

The Regional plans identified various growth centres and different economic activities <sup>(157)</sup> were proposed in different settlement were expected to work such as Central Village\* Urban growth Centre having 3 activities settlement having 1 activity etc.

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(157) *ibid* Town & Country Planning Organ. Regional Planning efforts in India, N.Delhi 1982 pp. 153  
pp. 156  
pp. 166

M s. G. I. PEREIRA

For Industries allocation of land for industry indifferent growth centres is proposed on the basis of the desirable distribution of urban population and work force employed in manufacturing industries in each growth centre.

For transportation, Central villages were to be connected by OBR and growth centres by M.D.R. and urban growth centres by State Highways. National Highways are Nasik, Nirmal State Jalgaon Aurangabad State Highways and Aurangabad Wadigodri State Highways. Railways were not connected by broad gauge in Nanded, Sholapur, Chalisagaon and new lines for Chikhali Abilabad and Ghugus etc.

For Tourism, there were plans for development of more accommodation, parking places, improvement near historic places, development of hill stations etc. The entire work was divided into 3 phases of 5 years each and the board expected the plan to be implemented by 1991.

There are also various types of planning in India, like Planning by inducement and Planning by Direction.

- 2) Perspective Planning 15 to 25 years and short-terms. Planning, divided into five years plans and annual plans.
  - 3) Authoritarian Planning and Democratic Planning in which the State Controls the economic affairs with a Central plan e.g. Socialist economics. The Planning Authority is the Supreme body which decides
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M. S. G. PEREIRA

about the targets, Schemes, allocations and method of any implementation of the plan.

Centralized Planning and Decentralised Planning :

The concentration of power and authority in a Central Planning Body which adopts, formulates executes and supervise the entire work of planning. To achieve the twin objectives of effective implementation of the anti-poverty programmes and ensuring a balanced regional development at least in respect of minimum needs, the planning process is also decentralised.

Regional planning, National Planning and International Planning near regional decentralisation, a part of national planning is carried out primarily to develop a particular area or region in the national economy to meet their needs.

National planning tends to promote economic nationalism or national self-sufficiency.

The Objective of Planning is to bring about most rational utilisation of resources.

International planning naturally crosses national frontiers, sometimes uniting national frontiers to form a new Republic eg. New United Arab republic, Egypt Syria and Iraw. The second type of international planning is more common. The Colombo Plan, Marshall Plan, European Common Market, GATT etc. to avoid wars, maintain peace assist the under-developed and backward countries in the process of development.

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Corrective Planning & Development Planning :

In the developed free market economics the purpose of planning is to remove the evils of free enterprise economy and unrestricted competition. This corrective type of planning is not suitable for under developed countries.

Therefore, development planning becomes an urgent necessity to lift the economy from a stagnant traditional economy to the take-off stage, on to the path of self-sustained growth.

To accelerate the rate of economic development, more expenditure has to be made on the right type of projects the need for flow of new investments has to be increased, to improve levels of nutrition, housing, health education and general culture.

1. Linking of Regional Development to Port Development, may incorporate employment for many of the power sections for a number of years in Port development plans.
2. Encouraging the discovery of new natural resources building more transport links like roads and railways which generate more employment, extending the agriculture boundaries to the distant sections of the states by encouraging the use of equipment and machinery for agricultural processes and export.

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P A R T - DChapter -VIEMPRICIAL RESULTS1) Location Cost and Scale of Output

In the study of location of business sites, the location of a port in any region becomes important features for the region, from the geographical point of view and economic importance.

Whether a port should be situated in a region north or south, whether the region is fully populated? What are the main regions agriculture product, industries? The distance and cost of transporating the goods to the markets, to the ports and time taken etc.

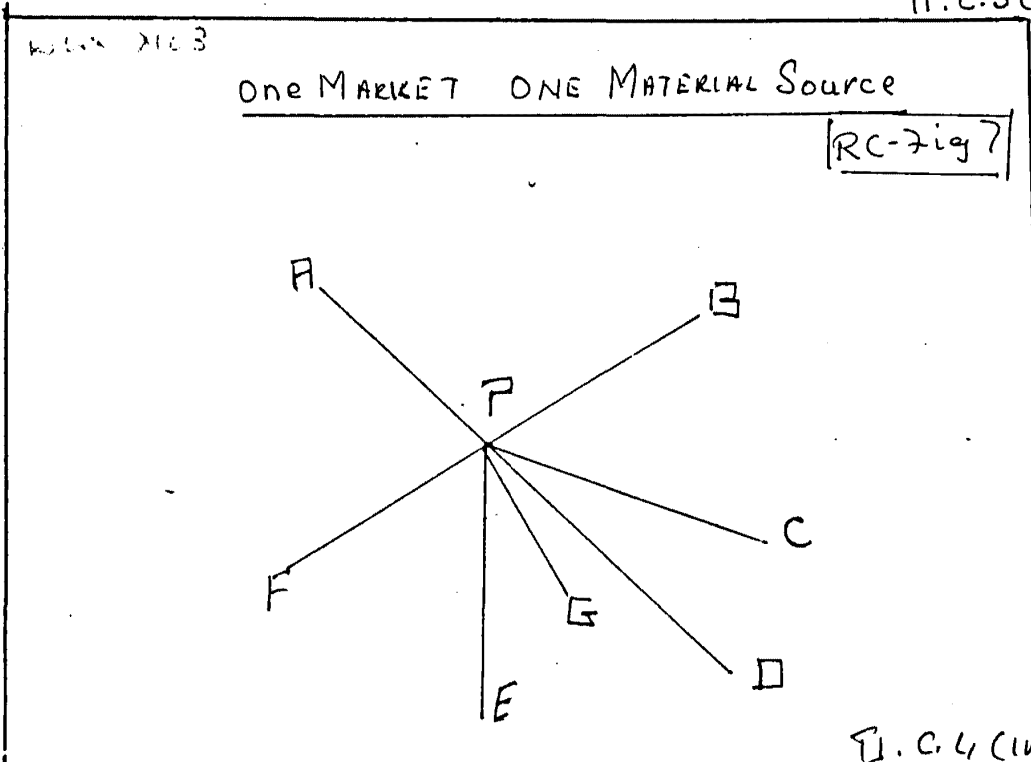
Transshipment points may be the minimum transport cost locations for plants or establishments when the transport costs on material and product are nearly equally and transshipment cost are high, as in the case of bulky commodities.

This analysis a tradition one in location theory is easily adapted to situations with more than one market and one material source.<sup>(158)</sup> Each point is a mechanical force where a market, a material source, or input site. This equilibrium site occurs where no movement in any direction will allow more savings. For example : Two market and three different inputs sources (Refer diagram C.II.iv).

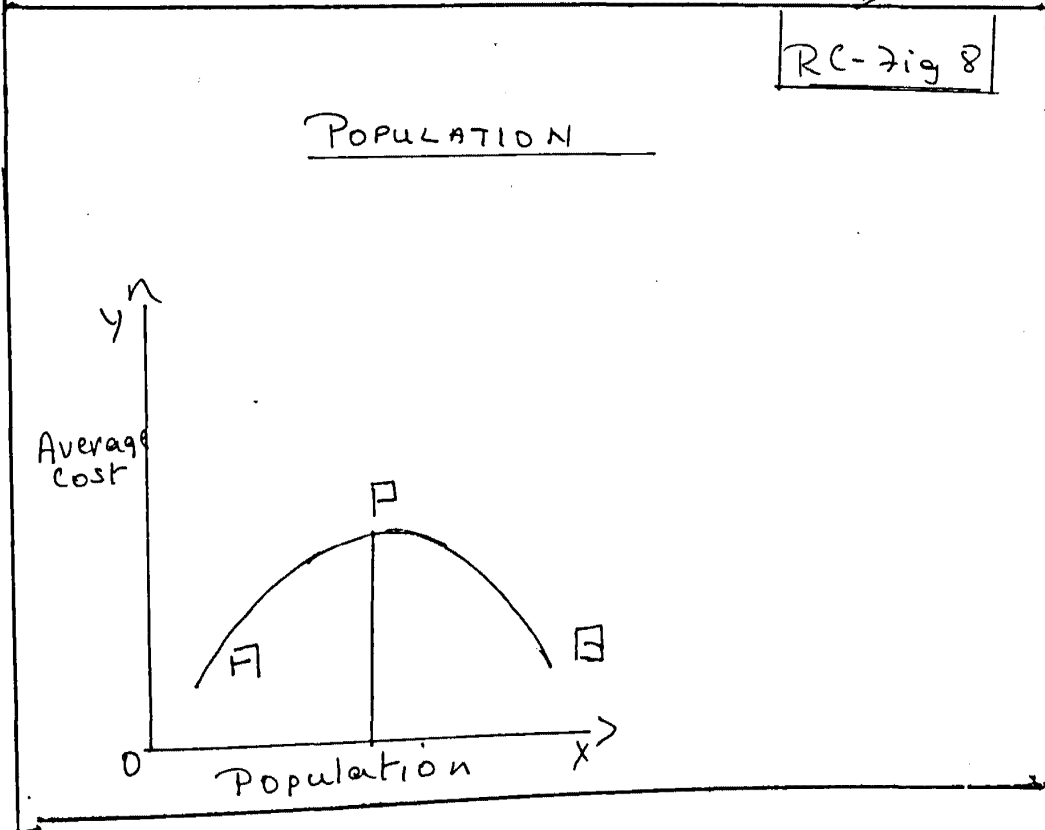
These points are A through G might be the best plant site. A shift of the plant towards one of the points say a market site would reduce transporation costs per unit of final product. The plant site would be shifted in the direction of the cost savings. This last equilibrium point

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(158) Nourse Hugh O, Regional Economies, N.York 1968



II.C.4(11)



Source: Hugh O Nourse. Regional Economics 1968 pages 80. ✓

Source. Mehra J.K.

would be best or more profitable site for the plant.

ii) The Long Run Model of an Open Economy

Once a region has been defined the human and material resources tallied the technology accounted for and the plant and equipment totalled up, we can theoretically determine the potential output and income of the region. Output is still defined as net regional product.

Technically there would be many combinations of amounts of exports and local services that could be provided with the given skills resources and economic organisations. These possibilities can be shown in a production possibility curve. Combinations of production inside the curve are possible, but they represent less than full employment in the economy.

Changes in transportation cost, discoveries of new raw material deposits or changes in relative factor costs in other regions, may make other regions more profitable locations for production of the product.

Growth of a region, income of course may be caused by changes in productivity technology or known resources within a region. As new sites become more profitable for the production of a particular goods, production tends to increase in that place relative to previous site because the place can offer the product at lower prices.

iii) The Population Theory :

The argument of Prof. T.R. Malthus that population in his time period was limited by food, was the dawning of the agriculture Era. His pessimistic statement that population grows in geometrical progression and means by subsistence increase in arithmetical progression. The ratios Malthus had in mind were as follows.

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Geometrical progression for population growth 1, 2, 4, 6, 8, 16, 32.

Arithmetical progression for increase in means of subsistence Malthus believed that population double itself in 25 years.

The optimistic Theory of Population shows an ideal size of population given the resources, techniques of production, and the demands for goods and services needed to satisfy the demand.

The Optimum Theory of Population. Refer diagram C.VI.b.

In this diagram the curve AB rises showing the highest point p as population increase, and then slopes downwards with further increase in population. P indicates the optimum point where the average per capital income is higher. Section AP of the curve shows under population section PB of the curve shows over population.

Regions are either under populated or over-populated according to the resources available and their utilisation.

The Theory of Demographic transition by Prof. C.P. Blacker shows the stages of economic growth, through the five transition periods, and the population ratio in these periods of transition, from primary stage to the stage of highly developed economy, passing the stage of economic initial development, to a pathway of economic development, reaching the production of high economic goods and development and solving problems of goods and other resources.

Urbanisation of villages to town, and towns to cities with a specific population, doing the technological changes, the development of transportation and improvement in the export and import trade of a country. Refer Appendix G1-IV

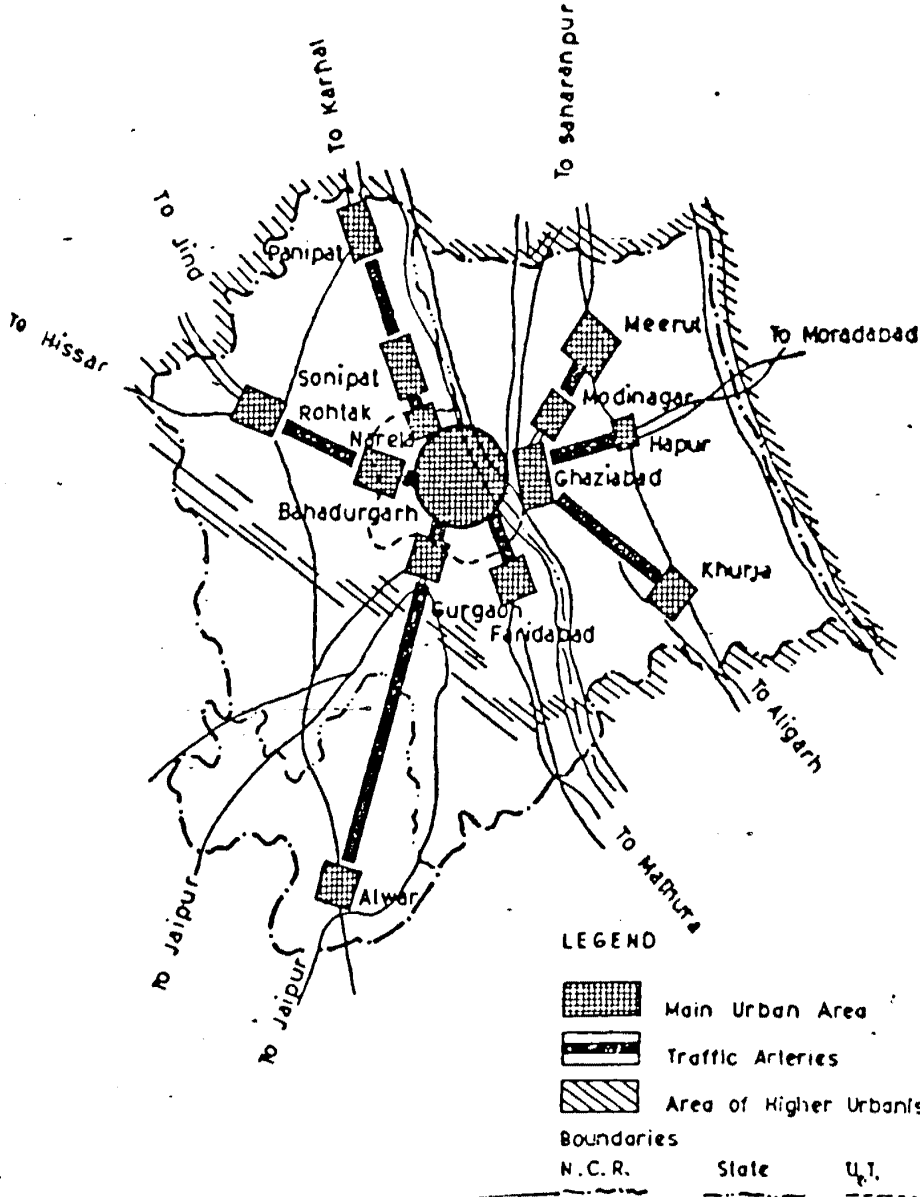
(59) Mehta S.K. Elements of Economic analysis Vol.1.  
N.Delhi, 1977 pp.150



PART-C. REGIONAL COVERAGE

Alternative Urban Growth Pattern  
Radial Corridor Pattern

Fig. 7



NATIONAL CAPITAL REGION

Source: Regional Planning Efforts in India, 1982  
C.O. Press, N. Delhi. pp. 27

PART - CCHAPTER VII - SummaryI. The Aim of Regional Development :

Region is the name given sometimes for a district, a group of villages, a particular state or group of states.

A region is limited by the homogeneity of physical, economic and social characteristics.

A region should be large enough to contain an array of resources, climatic conditions and a size that is convenient for economic plans and investments.

The main resources for choosing a location of an industry is guided by profit maximisation of quick yielding goods, the importance of transportation and communications.

According to the Planning Commission of India, "Planning is essentially a way of organising and utilising resources to maximum advantage in terms of defined social ends."<sup>(160)</sup>

The aim of planning is to initiate and accelerate development free from troubles of private enterprise as experienced in developed countries.

Regional coverage is to reduce disparities among states to ensure a minimum level of subsistence.

Regional development is vital for port development if the export and import trade through it has to be profitable.

Port development in many regions depends upon

national planning and a high cost site. A large port has railway lines and roads branching out in all directions.

II. Theoretical Argument :

Regional development then becomes a long run plan for an 'Open Door Economy'.

Location of a port affects cost of the goods produced since the producers aims to maximise profits, and it is important as his prices and output.

Population density is unequally distributed geographically.

Population movement is where there is work, income, shelter and transportation.

Market economy depends upon the proximity of the establishment to the nearest market and increase in its price.<sup>8(168)</sup>

III. Maharashtra States a Review :

Maharashtra State completed 35 years in 1995 established in 1960, and has considerable progress since it came into existence.

The large influx of population has created vast slums, thereby giving use to numerous social and economic problems.

Maharashtra State enjoys a reputation for efficient municipal administration.

State's finances depends upon states taxation, water cess, education cess etc.

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8(168) G. Gadgil and A. A. Deshpande, Maharashtra, Problems, Potential and Prospects, 1988, p.

Capital funds are financed by government loans, open market borrowings permitted by the government.

A regional approach to planning and development in Maharashtra has, therefore, been adopted, and regional plans for the metropolitan regions of Bombay, Pune, Nagpur as also for Kolhapur, Ichalkarangi, Sangli, Miraj, Aurangabad, Nashik have been prepared. In progress is district regional plans for Jalgaon, Chandrapur and Ratnagiri.

The regional Plans identifies various growth centres, and different economic activities proposed in different settlements, as 'Central Village', Urban Growth Centres, having these activities, settlements having activity.

These objectives are set to bring about the most rational utilisation of resources.

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PART - C  
CHAPTER - VIII  
CONCLUSIONS

1) Effects on Regional Coverage on Shipping Productivity, Port Development and Foreign Trade

1) Location and Employment -

Employment in agriculture and mining is determined by the location of the relevant raw resources, procurement costs is the result to locate near raw materials due to weight and loss of weight in the process of refining, such as (brick, cement products). These raw materials are difficult to remove and find that these industries are scattered.

2) Suitable labour, selling and many other services near the purchaser, access to the market.

3) Where the product may spoil, or market varies according to location, production will be near market, site and services, bread and newspapers.

"The location of all the various branches of economic<sup>9</sup> activity in its relation to their internal structure, on the one hand, and the balance requirements of the system, as a whole, on the other. The regional balances of trade, are accordingly explained in terms of the inter-regional distribution of industries".

4) Injecting capital to poorer region, with no new raw resources, skills, would cause a deficit, as there will be no new investments, and cause serious balance of payments problems for these regions.

Problems in measuring imports and exports of these regions. A poorer region will import more food, and pay for it from its manufactured goods and services. Industrial regions vary from agricultural region in their balance of payments.

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We, then derive the demand for the regionally type of goods. economic development is not possible because of lack of capital, government revenues, opposition from other areas, no other opportunities.

Trade unions are organised on a national basis, and wages set on a national level e.g. steel, automobile industries. Trade unions are then of unequal strength in these regions. Wages are different, hence deterioration in the terms of trade, or competitive position is difficult to solve, a cut or decline in wages. Then, there are changes in occupation of workers, due to decline in the manufacturing units, movement of workers to other locations. (169)

In short, factor movements tend to bring about on equalisation of income among regions.

Regional development has in turn, its effects on the demand for exports and imports, leading to the derived demand for shipping services and port uses and services. The location of a port is important to its hinterland, as much as the manufacturing unit, industry or agriculture production. The structure of the port shows the type of commodity being exported for its regional hinterland, e.g. Paradeep Port, coal and ore.

A highly developed region will naturally have a modernised port and shipping services e.g. Bombay Port.

ii) Links to Port Development, Shipping Productivity  
and Foreign Trade

Regional Coverage is the link, we seek in the construction of larger ports, the production possibilities of region, together with the location of port site, the inland transportation, increases the shipping productivity, and leads to the reciprocal demand for foreign trade, and gains in trade due to the Open Door Economy.

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PART - D :FOREIGN TRADECHAPTER - II. Introduction :

- A country is said to be an exporting or importing country depending upon the volume of trade that flows in and out of the country. This kind of a country is called an Open Door Economy.
- The reasons why a country exports her commodities and goods is to have a favourable Balance of Payments, so that the country can import, manufactured goods from other countries or machinery or technological knowledge if it is a developing country.
- Trade helps with the growth of the economy, by way of the National Income of the Country. If a country has a favourable balance of Trade, the per capita income of the country increases.

II. Theoretical Aspect :

- There is a difference in terms of national resources <sup>(10)</sup> endowments, climatic conditions, mineral resources and mines labour and capital resources, technological capabilities, entrepreneurial and managerial skills and many other variables resources which determine the capacities of countries to produce goods and services.
- A country specialises in the Production and exports of those goods and services in which it has absolute or a comparative advantage and exports other goods and services in the production of which it has an absolute or a comparative disadvantage over the countries of the world.



Mr. S. G. I. PEREIRA

- The New Export - Import Policy for the year 1992-97 is Freedom in Exports/Import Trade, for 5 years.
  - GATT and UNCTAD General Agreements on Trade and Tariffs (GATT) was established in 1947 as an bargaining forum to negotiate lowering of trade and tariff barriers between DLCs and LDCs.
  - GATT operation is based upon the twin principles of reciprocity and non-discrimination.
  - Foreign Exchange Earnings year 1990-91 were Net Earning Rs. 1,170 crores, 1991-92 net Earnings was Rs. 1,558, 1992-93 Net earnings was Rs.1,808 crores and in 1993-94 net earnings was Rs. 2,845 crores.
  - India's Liner trade includes exports of Jute, Tea, Oil Cakes, cotton goods, coffee, marine products, Tobacco, spices, chemicals, Iron and Steel bars pipes, coir mats and matting etc.
  - The imports consists of electrical equipment transport equipment, newsprint, metals, chemicals etc.
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M. S. G. M. FERREIRA

- The Balance of Payments transaction include all the foreign receipts of any payments by a country during a given year.
- Balances of trade may be defined as the difference between the value of goods and services sold to foreigners by the residents and firms of the home country and the value of goods and services purchased by them from foreigners.
- The Balance of Payments adjustment methods of policy instruments are :
  - a) Monetary and Fiscal Policy (Expenditure Changing Policy.
  - b) Devaluation (Expenditure Switching Policy.)
  - c) Exchange Controls. (17)
- The International Monetary fund was started as a result of Bretton Woods Agreement concluded in 1944.
- The main objectives of IMF is to help members nations tide over their Balance of payments difficulties of short term and long term character.
- To promote exchange rate stability and avoid competitive exchange rate depreciation.
- To re-establish multi-lateral trade among the member countries.

### III. Review of India's Foreign Trade :

- India's exports earnings during the year from 1961-67 to 1984-85 increased to 17% Rs. 60 crores World exports increased about 15 times.
- By 1992-93 India's Exports were Rs. 5335054 crores and Imports were Rs. 62722.80 crores.

II. Problems of Foreign Trade :

- International movement of goods and services involve cost of transporting them across national borders. There are also freight cost and other related costs e.g. Insurance, handling, storage cost etc. Exports are recorded as "free on Board" excluding all transport costs. The value of imports on the other hand, includes all costs of transport and it is recorded as "Cost - insurance - freight"
- The theory of Location and of Profit Maximization show how the transport cost affects trade and economic activity.
- Transport costs can "distort" the trading pattern and direction of trade.
- Transport cost may lead to no trade or reduced value of trade between the countries of the world, as in the situation of high transport cost, but no difference in production cost, could not induce trade.
- Transport costs could deny countries from experience gains from trade.

Transport cost could reduce the economic welfare of the countries.

- Man-made Obstacles to Trade are essentially the Commercial policy. These measures are tariffs and custom union or common markets.
  - The Balance of Payments is a systematic record of all economic transactions between the residents of a given country and of the residents of the rest of the world in an accounting period i.e. a year.
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M s. C. I. PEREIRA

resources, and encourages the growth of regions and stability of the economy.

- Adam Smith (1723 - 1790) Theory of Absolute Advantage<sup>(172)</sup> another well-known classist is David Ricardo (1772-1823). This became known as the Classical Theory of Trade, showing the supply side only.
- The new theory of International trade shown demand and supply equilibrium. Yet another, John Stuart Mill, (1806-1873) added demand considerations in the Comparative Advantage model. F. Y. Edgeworth and Alfred Marshall developed the Theory of Offer Curves.
- Next, The Heckscher - Ohlin Theory that a country has comparative advantage which uses more intensively the country's relatively abundant factor of production,
- In a country in which capital is relative cheaper and labour is relatively more expensive, is regarded as capital abundant country.
- In this theory, both the supply and demand conditions for the two factors of production in the two countries.
- The difference in the Classical Theory and the modern Hecksher-Ohlin, is that the Classical Theory emphasises the gains from trade while the other Hecksher Ohlin Theory focus or on structures of trade and factor prices.
- There are natural barriers to trade, and man-made barriers due to policies of various countries.

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(172) Manmar H.G. International Economics theory & Policy issues  
New Delhi 1903, pp 67

P A R T - D  
C H A P T E R - II  
THE THEORIES OF FOREIGN TRADE

1) The Classical Theories of Foreign Trade :

The Classical Theory of "International Trade" was founded by Adam Smith. The father of political economy, followed by David Ricardo and John Stuart Mills, afterwards it was built up by many economists such as Alfred Marshall.

Changes and problems of foreign trade was dealt with by Jacob Viner, Von Haberlate etc.

Arguments whether international trade differed from domestic or inter-regional trade took place between the classical economists. (173)

Different regions are differently endowed with facilities for the production of various commodities because they are differently supplied with the productive factors.

The fundamental cause of trade, whether domestic or foreign, is that all factors are not alike.

Adam Smith Free Trade Doctrine of 'Laissez faire' was applicable to domestic and foreign trade.

The focal point of Adam Smith argument free trade depended upon the advantages of division of labour, in order to specialise in the commodities that have a Comparative Advantage.

Adam Smith developed the theory of International Trade based on absolute difference in costs.

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(173) *ibid* M.C. Vaish and S.Singh, International Economics, N.Delhi 5th Ed., 1989, p.13.

The Mercantilist policy inspired David Ricardo to develop the "Principle of Comparative Advantage", "the value of any commodity is determined by its labour cost".

According to this doctrine, "a country will specialise in the production of that commodity for which its labour cost is comparatively low cause different exchange rate," International trade will emerge. <sup>(174)</sup>

Gains from trade is possible when there is a comparative difference in costs.

Country	Amount of labour hours needed to produce	
	A unit of cloth	A unit of wine
Portugal	90	80
England	100	100

i.e.  $\frac{80}{120}$  and  $\frac{90}{100} = \frac{2}{3} : \frac{1}{1}$

Economist J.S. Mill, first indicate the demand conditions in the Comparative Advantage model. Alfred Marshall determines "the Offer Curve" theory, Country A demand for B's product and Country B demand for A's product.

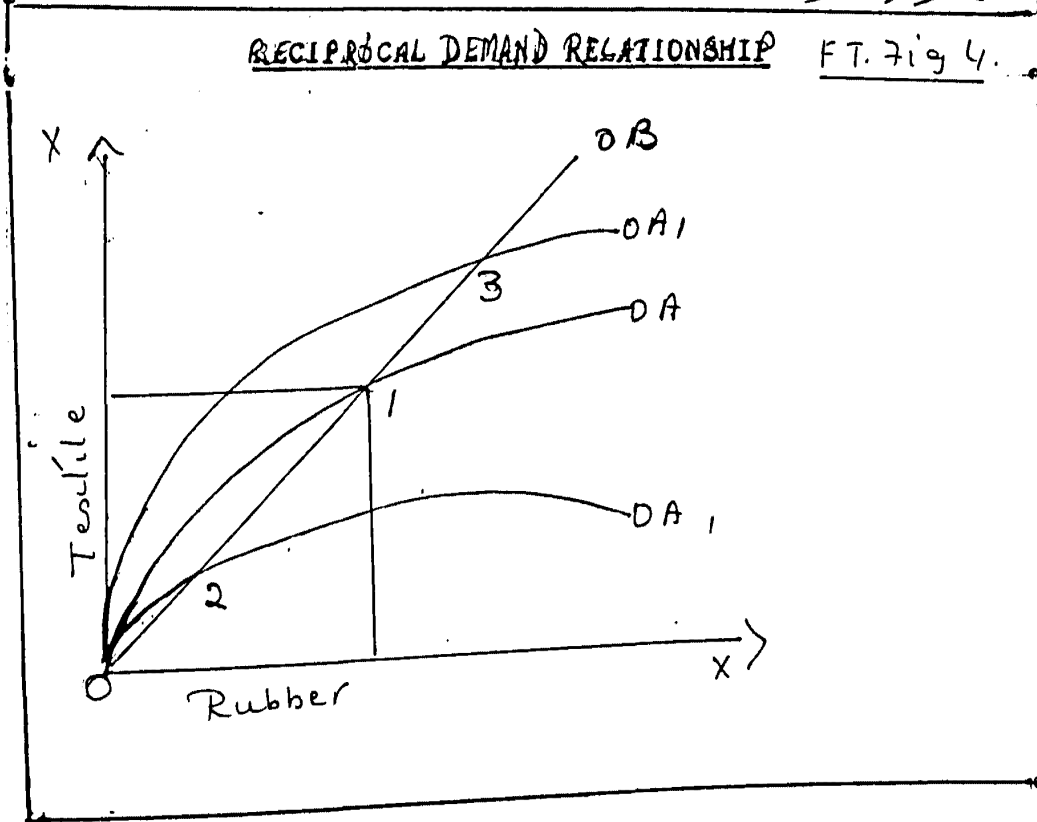
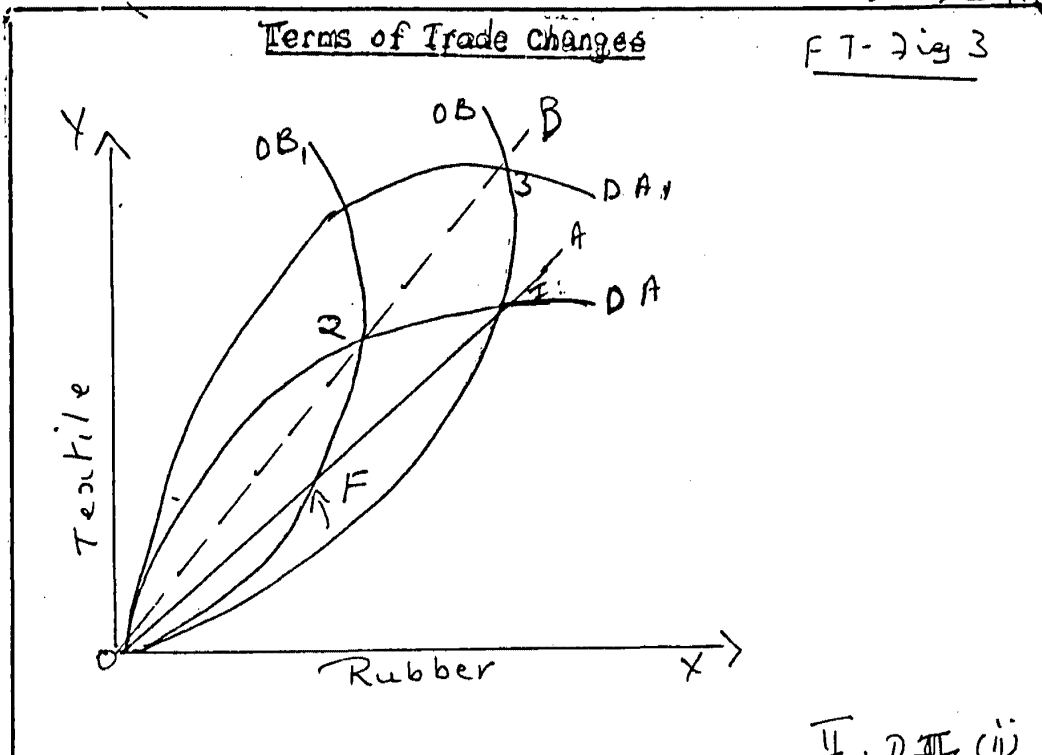
ii) The Theory of Offer Curves

The Theory of Offer Curves followed the law of diminishing utility for the purchased goods.

Technological breach causes shifts in the terms of trade, either increase in trade or decrease.

The Classical Economist assumed that "the value of a good depended only on the amount of labour that went into producing it".

(174) M.C. Vaish and Singh S.  
Reprint, 1989, p. 35.



The Theory of Reciprocal Demand Curve by J.S. Mill determines the "actual ratio at which goods are traded will depend upon the strength and elasticity of each country's demand for the other country's product as upon the Reciprocal Demand."

The economist Eli Heckscher and Bertil Ohlin explanation became the basic structure of international trade, "due to price differentiation, demand and supply factors of production in the two regions".

### iii) The Box Diagram Theory

F.Y. Edgeworth Neo-Classical Economist (1845-1926) brought together two isoquant diagrams for the two goods in a diagram called the Edgeworth box. The sides of the box showed the quantities of the 2 factors of production available in the economy L = Labour, K = Capital, export good, X and Import good Y.

Country A is a labour surplus country, and country B is a capital surplus country, good X is labour surplus, good Y is capital surplus.

Francis Y. Edgeworth, economist showed the most efficient (optimum) combination of inputs used in the production of outputs of the two commodities. The vertical axis = total quantity of capital, while the horizontal axis shows the total quantity of labour available in the country.

The distance OWL (=OCL) shows the total supply of labour and OWL (=OCK) measures the total supply of capital.

OW = point of origin.

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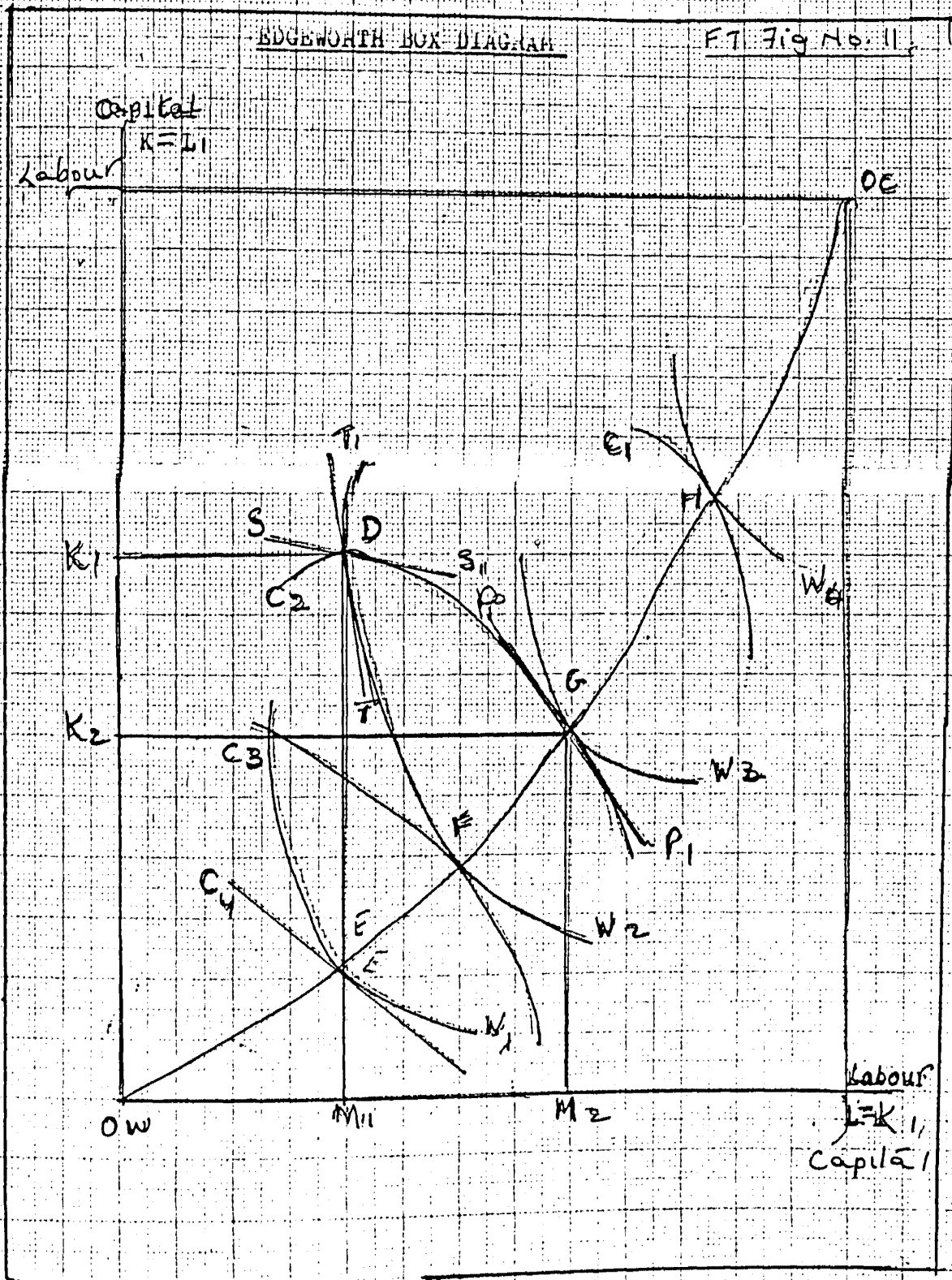
(175) John Williamson, The Open Economy and the World Economy, 1937, p.33.



Illustration No. 1

EDGEWORTH BOX DIAGRAM

FT Fig No. 11



Source: International Economics. - M.C. Varsh & S. Singh  
1988 pages. 79.

$W_0 W_1 W_2 W_3 W_4$  set of isoquants for wheat point OC, upper right hand corner, a set of isoquants  $C_0 C_1 C_2 C_3$  &  $C_4$  for cloth. Tangent points on the isoquants represent technologically most efficient combination of inputs.

Thus the line joining such points is called the contract curve or efficiency. Locus i.e. points E F G H, at point D, labour is more than point G. Tangent  $T T_1$  at point is steeper than tangent  $PP_2$  at point G shows more labour than capital employed. At point G, ratio of factor prices equals the ratio of factor marginal products.

Obstacles to trade and trade restrictions are natural barriers and man-made barriers.

Exports are 'Free on Board', Imports are C.I.F. cost + insurance + freight.

Transport cost increases the prices and volumes of internationally traded goods. Problems arise as to which country should bear the transport cost. Transport cost can distort the trade pattern and cause price differentiation, deny the gains from trade, reduce the economic welfare of the countries in which the trade takes place. Tariffs are man-made barriers to trade. Quantitative restrictions and monetary restrictions are imposed in order to control the volume of trade. Tariffs are also imposed as a degree of protection for the infant industry of the developing country. Commercial policies cause Custom Union and discrimination in commodity and country.

This has a price effect, or production effect in the country. A domestic production, reduces the consumption, and can have a welfare creation of reducing effect in country. Trade division effects tends to reduce welfare in country.

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(7) *ibid* Vaish MC & Singh S. International Economics, 5th Ed. 1989, N.Delhi. pp.78-79

iv) The Balance of Payment Theory

The balance of payments (BOP) is a systematic record, of all economic transactions, between the residents of a given country and the residents of the rest of the world.

The balance of payment of an economic unit is an accounting accord of the transfer of goods, services, claims and gifts between the unit and generally the rest of the world over a period of time.

On the one hand, the balance of payments lists credit, receipts or plus items, this is the export side listing exports of goods, services, securities and gold. (also receipts of gifts). On the other hand, there are debit payments or minus entries - the import side. Each transaction is a two-way exchange, there is a trading of assets with something received for every import and with payment made for every import. On the credit side, there is listed the assets which the nation transfer to the rest of the world.

Capital movements, that exports are listed on the credit side and imports make up the debits for so called "capital exports" are debits are "capital imports" are credits.

The theory has certain points, it is compatible with the general theory of value to state. It brings, the determination.

- 1) If the foreign exchange rate within the purview of the General Equilibrium theory. The Theory emphasises that there are :
  - 2) Many significant forces besides those of exports of goods in the balance of payments influencing the supply of and the demand for foreign exchange affect the F.E. Rate.
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P A R T - D  
C H A P T E R - III

a) Data and Historical Development of India's Foreign Trade

During the First Plan, the production of immediate consumer goods was given top priority in order to remove shortages caused by the Second World War crisis.

During the Second, Plan, the export performance of the economy deteriorated further. This pattern of development called, Import Substitution, industrialisation with very high content of import and non-shift ability of capital, changed the outlook of investment mix and output mix. Because of economic development more and more capital was needed. The exports remained stagnant during the Second Five Year Plan (Rs.576 crores in 1958-59, Rs. 642 crores in 1960-61).

As India exported less than she imported in 1956-57 the adverse balance of payment was Rs. 236 crores which increased to Rs. 478 in 1960-61.

The Third Five Year Plan (1961-62 to 1965-66) was a period of break through. A planned investment of Rs.7,500 crores was proposed to achieve a 6 percent per. annum rate of growth.

The export objectives<sup>(177)</sup> was "Having regard to the over-all national interest the highest possible priority has to be given to exports and larger burdens within the domestic economy have to be accepted for the next 10-15 years as a price which must be paid for rapid economic development". Exports rose to Rs. 850 crores in 1965-66 (nearly 5.5 per

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(177) Tripathy B.N. Exports & Economic Growth Mittal Pub. 1985, pp.231-236

cent) annual average growth. The Third Plan also achieved some structural changes and diversification in exports e.g. chemicals.

The exports started picking up in 1968-69 during the annual plans, in spite of devaluation in 1969. Indian exports rose to 1,834 million US dollars in 1968 from 1,754 million US dollars in 1968. The world exports rose to 28 percent per annum. The Indian export stood as 0.73 percent in 1968 to world export.

The Fourth Five Year Plan was launched to achieve export diversification. Sizeable comparison of export earnings and creation of export surplus by restraining the growth of consumption of certain commodities and by creating additional capacity in others. In 1965-73 India's export was 9.2 percent in dollar terms.

In order to raise the competitiveness of Indian exports export promotion scheme such as Duty Exemption Scheme; Concessional Rate of Interest; Cash Compensatory Support and Duty Drawback Credit Schemes were introduced.

The fifth Five Year Plan consisted of three sub-models (1) macro economic mode, (2) input-output model and (3) consumption model.

Certain improvements have been made in the export strategy of the Sixth Plan.<sup>(178)</sup> Foreign trade was recognised for technological improvement, capital formation and employment generation or endowment basis, 11 percent growth in the first three years of the Sixth Plan (1980-81 to 1982-83) have pushed the economy to some extent out of the balance of payment difficulties.

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5(178)B.N. Tripathy, Export and Economic Growth, Mittal Pub., 1985, pp. 231, 236.

M s. S. S. FERREIRA

During the Seventh Five Year Plan (1985-86 to 1991-92), exports were Rs. 32,553.38 crores and imports rose to Rs. 43,192.66 crores. In 1992-93 exports rose to Rs. 53,350.54 crores and imports to Rs. 62,922.86 crores.

Direction of foreign trade 1980-81 showed a widening trade gap due to increased in imports of POL, fertilizers, non-ferrous metals, etc. Trade continued with ECM by 6.8 per cent, EFTA by 27.2 percent, N.America by 5.4 percent, to ESCAP by 13 percent, rest of Asia by 7.9 percent, Africa by 4.4 percent, Latin America by 18.9 percent.

India's exports registered an increase of 19.4 per cent in 1993-94, over the previous year. Imports increased by 7.6 percent. Trends in India exports are tea, coffee, rice, spices, tobacco, sugar, oil cakes, marine produce, ore and minerals etc. Imports were crude oil, and petroleum products, fertilizers, edible oil, iron & steel, capital goods, chemicals etc.

Financial assistance for foreign trade was from IMF, World Bank, IBRD and under GATT negotiations were carried on.

#### b Monetary Events since 1971

Towards the end of world War II many of the World most experts officials on commercial and monetary affairs, with many of the highly qualified academics in the field, were engaged on a new and challenging exercise, the deliberate planning of institutional arrangements that would together constitute a viable framework for the re-establishment of a liberal international system of trade and payments. The Bretton Woods negotiations as they were

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called, after the location of the exercise in the United States produced two institutions. The International Monetary Fund (IMF) was established as a means of improving the system of payments and currencies. In order, to augment the flow of capital from rich to poor countries, there was also established the International Bank for Reconstruction and Development (IBRD), otherwise known as the World Bank. Almost concurrently negotiations in Geneva produced in place of the originally intended International Trade Organisation, the General Agreement on Tariffs and Trade (GATT) as an instrument for pursuing the liberalisation of World Trade.

C. International Finance Corporations

The International Finance Corporation (IFC) was established in 1956 as an affiliate of the World Bank to assist less developed member countries in furthering their economic development by means of encouraging the growth of productive private enterprises, IFC's activities supplements those of the World Bank.

d. Organisation

The Corporation is organised into four departments two of them (Department of Investments) operating on a geographical basis and two others (the Legal and Engineering Departments) on the functional lines.

e. United Nations Conference on Trade and Development (UNCTAD)

Apart from these international financial bodies. Whose function is to provide financial assistance for economic development of the poor areas of the globe other

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**M s. C. I. PEREIRA**

international bodies including UNESCO, FAO, W.H.O and UNCTAD have been created under the banner of the United Nations organisations UNCTAD is the result of U.N. resolution on 'Development Decade of 1961. This organisation is a forum of nations for finding and resolving the various knotty international problems of trade and development. The Board is composed of 57 members elected on the basis of equitable geographical distribution.

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PART - DCHAPTER - IVFOREIGN TRADE FINANCIAL PERFORMANCEFOREIGN TRADE EARNINGSVALUE IN CRORES

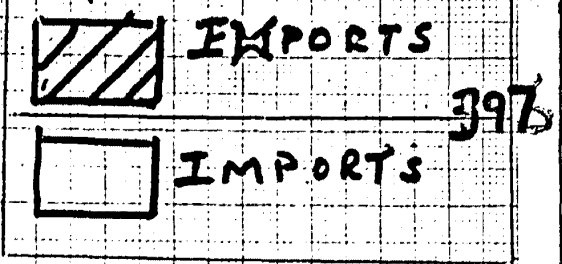
Years	Exports Rs. Excluding Re-exports	Imports Rs.	Balance of Trade Rs.
1980-81	6710.71	9142.58	(-) 2724.25
1985-86	10894.59	19657.69	(-) 8763.10
1989-90	27681.47	35411.88	(-) 7730.41
1992-93	53350.54	62922.80	(-) 9572.26

# FOREIGN TRADE, FINANCIAL INDICATORS.

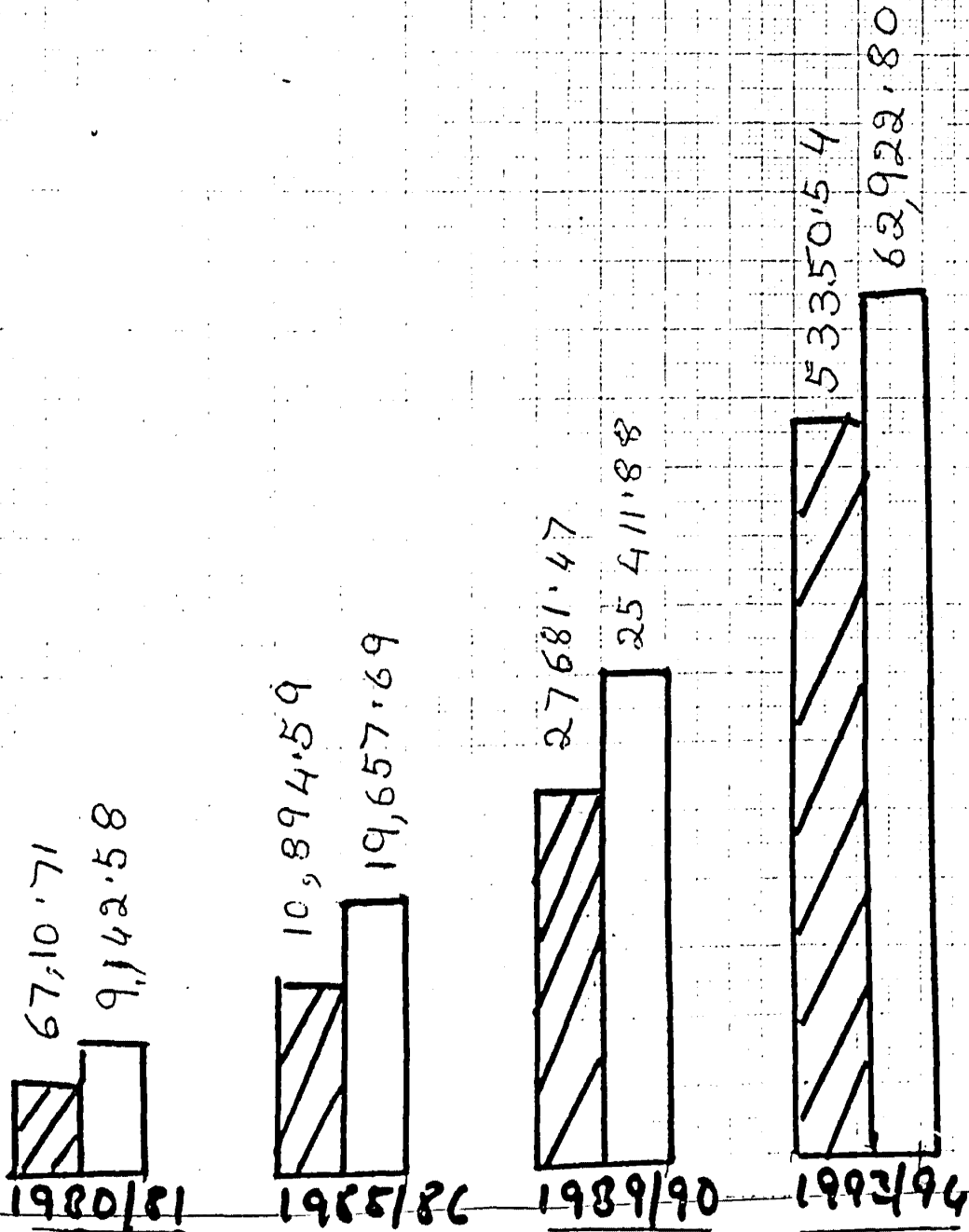
PART D IV 14 VALUE IN 000 CRORES

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M.S. G. FERREIRA



397



P A R T - C  
C H A P T E R - IV  
FOREIGN TRADE PERFORMANCE

1980-81 :

The role of foreign Trade in Economic Development is considerable and both are closely connected "Trade can encourage growth", the primary stages of a developing country is importing requirements, to keep pace with economic development and satisfying the demands requirements.

Indian exports earnings during the years from 1961-67 to 1984-85 increased to 17% world exports increased about 15 times.

The basis of international trade then is the existence of differences in the prices of goods and services between the countries. Price difference arises due to differences in demand conditions. Difference in supply conditions may arise due to several factors are endowments of economic resources, the degree of efficiency with which these factors are employed the level of technology used in production labour skills factor abundance.

1980-81 :

Exports in 1980-81 was 6710.71 and Imports were Rs. 9142.58 crores.

Trends in Trade was increase in exports of textiles, including garments, pearls, precious and semi-precious stones and handicrafts.

Direction of Foreign Trade :

The year 1980-81 showed a widening trade gap due

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to increased in imports of POL, fertilizers nonferrous metals, rough precious and semi-precious stones vegetable oil etc. Trade continues with ECM by 6.8% EFTA by 27.2% N.America by 5.4%, ESCAP by 13%. Rest of Asia by 7.9% Africa by 4.4 percent, Latin America by 18.9 per cent.

A number of important measures have already been taken recently or being taken in the spheres of industrial licensing and promoting industrial exports, setting up EXIM Bank, reducing delays in disbursement simplification of procedures, adjustment in export duty. The Sixth Five Year Plan strategy aims at a substantial growth in the exports of agricultural commodities, viz marine products, processed food, fine rice, plantation crops etc. and other items of industries textiles, gems & jewellery.

1985-86 :

India's export for 1985-86 were Rs. 10894.59, and imports Rs. 19657.69 crores a decline in overall exports due to the stoppage of crude oil during 1985-86.

Trends in Trade :

The higher rate of growth of imports is largely due to increase in imports of non-ferrous metals, iron and steel and machinery and transport equipment, which were essential to maintain higher level of investment, Production and technological upgradation in the economy. India's Foreign Trade had shown an improvement during the current financial year.

Direction of Foreign Trade :

Total Exports & Imports in 1985-86, ESCAP accounted for 24.0% of India's total exports, East Europe at 22.3%.

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1989-90 :

India's exports during 1989-90 amounted to Rs.27681.47 crores which were higher by 36.5% as compared to 1988-89. India's imports during 1989-90 amounted to Rs. 35411.88 crores higher by 27.9% than 1988-89. There was a decline of Rs. 273.31 crores in the trade deficit from Rs.8003.72 crores in 1988-89 to Rs. 7730.41 crores in 1989-90. Trends in India's principal exports was Chemicals and related products, agriculture and allied products, ores, and minerals, leather and leather manufactures, handicrafts, carpets, Gems & Jewellery, Marine Products and sports goods.

Direction of Trade :

During 1989-90 Asia & Oceania accounted for 31.4% of India's total exports, It was followed by West Europe at 28.4%, East Europe at 19.8% America at 17.9% and Africa at 2.50%.

On the Import side during 1989-90, Asia and Oceania was the largest supplier of goods and accounted for 37.5% followed by West Europe at 36.1%. America at 15.4% East Europe at 8.4% and Africa by 2.6%.

1993-94.

India's exports registered an increase of 19.4% over the previous year. Imports registered an increase of 7.6%. There was a decline in the trade deficit, due to the improved and revised Exim policy and the supporting fiscal and financial measures have contributed to the healthy performance on the export front. Trends in India's exports were Tea, Rs. 598.96 crores, Coffee, Rs. 279.71 crores, Rice Rs. 331.47 crores, spices, Rs.

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Rs.250.80 crores, etc. other were Tobacco, Sugar, Oil Cakes, marine products, ores & minerals, Leather and leather manufacturers, Gems & Jewellery Chemicals, Engineering goods, Electronics and Computer Software, Textile and handicrafts.

Direction of Trade.

Imports were crude oil & Petroleum products, Fertilizers, Edible Oil, Iron & Steel, Non-Ferrous metals pearls, jewellery, capital goods, Chemicals and Chemicals Materials.

Direction of India's trade in Asia & Oceania 32.2% West Europe at 28.2%, America at 19.6% East Europe at 17.7% Africa at 2.3% for exports and imports. N America ESCAP & ECM.

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PART - D  
CHAPTER - V  
NATIONAL OBJECTIVES AND POLICIES

These policies and objectives are made yearly to suit the changing trends in Foreign Trade.

The principal objectives of the Exim Policy.<sup>(179)</sup>

- a) To establish the framework for globalisation of India's foreign trade.
- b) To encourage the attainment of high and internationally accepted standards of quality and thereby enhance the image of Indian products abroad.
- c) To promote productivity, modernisation and competitiveness of Indian industry and thereby enhance its exports capabilities.
- d) To augment India's exports by facilitating access to raw materials, intermediates, components, consumables and capital goods from the international market.
- e) To promote efficient and internationally competitive import substitution and self-reliance under a deregulated framework for foreign trade .

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10 (179) Ministry of Commerce, Directorate General of Foreign Trade, 60 GOI, Annual Reports year 1991-92 1992-93 p.34

- f) To eliminate or minimise quantitative licensing and other discretionary controls in the framework of India's foreign trade.
  - g) To foster the country research and development (R & D) and technological capabilities.
  - h) To simplify and streamline the procedures governing exports and imports.
  - i) To provide efficient import substitution and self-reliance.
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PART - D  
CHAPTER - VI  
EMPIRICAL RESULTS

1) The Classical Theories of Foreign Trade

The analysis deals with trade and development in economy stabilising and the gains from trade, and transportation problems.

The basis of international trade then is the existence of differences in the prices of goods and services between the countries. Price difference arises due to :

- i) Difference in demand conditions, taste patterns or combinations of both.
- ii) Difference in supply conditions, arise due to several factors, natural endowments of economic resources, degree of efficiency, level of technology labour skills of factor abundance.

What is the role of foreign trade? The role of foreign trade and economic development is closely connected or linked foreign trade can encourage growth.

In order to bring about accelerated growth in exports necessary to have import substitution and export pro-

The determinants of exports and imports are price  
. world's income, increase in domestic demand,  
tion policies.

'irect relationship between the primary ex-  
agricultural production.

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311

Mrs. G. I. PEREIRA

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Manufactured exports are effected by industrial production.

ii) The Theory of Offer Curves

Foreign trade of a country is analysed by

- 1) Trend analysis and
- 2) Multiple regression analysis.

The Ricardian theory of comparative cost advantage is a labour factor of production, and labour cost value.

- 1) Homogeneity of labour units.
- 2) Mobility of labour within the country
- 3) Production functions with constant returns to scale i.e. cost ratios of 2 countries are (constant)
- 4) Trade takes place between 2 countries is assumed and only two goods, and a single factor of production.
- 5) There are no transport cost.
- 6) Prices of goods are based on real cost of production (Labour).
- 7) Perfectly competitive are product and factor (Markets).

iii) The Box Diagram Theory

The Hechsher Ohlin theory has become the basis of the modern theory of International Trade and shows the basic trade is the relative difference in prices of those commodities which are traded.

The maximum attainable output rise, of say, wheat and

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cloth with full employment is situated on the curve. This shows the different possible combinations of wheat and cloth which are attainable with the optimum utilisation of given available resources of the theory.

Factor intensity shows the relative quantities of two or more inputs used in the production of two or more commodities say capital and Labour K and L.

Factor endowment of any country consists of the available supplies of different factors of production used in the production of goods and services

The foreign exchange rate is defined as price of one unit of foreign currency expressed in terms of the units of home currency.

There is a demand and supply of foreign exchange at different rates of foreign exchange in the foreign exchange markets.

#### iv) The Balance of Payment Theory

The balance of payment of a country consists of the payments made within a stated period of time, between the residents of two countries, A country's Balance of payment is merely a way of listing international receipts and payments.

The primary stages of a developing country is importing requirements to keep pace with economic developments and satisfy the domestic requirements.

#### C. Foreign Trade Multiplier

The rate which is changed in income bears to the change in exports responsible for this change in income.

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M. S. C. L. REIRA

If e.g. a country experience a rise in exports to the value of \$ 100 million its national income will rise by a multiple of this until withdrawals in the economy i.e. savings imports and taxes, sum to \$.100 million.

In the first round factors in the export industry will receive an increment in Income of \$.100 million. Of this part will be list in taxation, part will be spent on imports, part will be saved and only that used to buy home produced goods will guarantee further income because it is a demand upon demoestic resources.

In the next round income will be allocated in like manner and again only that part spent on Income of home goods will generate from other income.

The formula is  $K = \frac{1}{1-MPC}$ ; K - multiplier

MPC is the marginal propensity to consume

$K = \frac{1}{MPS - MPP - MPM}$

Where MPS is marginal propensity to save.

MPPT - marginal propensity to Pay taxes.

MPM - Marginal propensity to Import.

The Foreign Trade Multiplier has a role to pay in the Balance of Payments equilibrim mechanism. A rise in exports will improve the balance of payments, set in train forces which will tend to reverse this improvements for out of the higher income brought about by the Multiplier movements will be induced while the other side of the coin, is that countries which have taken the extra imports will experience a reduction in income which will use an eventual fall in exports thus tending to restore balance by action

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on two side. In this way, the process, countinues and may affect a third country and so on.

b, Trade has certain effects.

It has an impact on growth of an economy of a country. Trade can encourage growth, when the demand is right and the supply is right. The simplest illustration of the stabilising action of foreign trade is assume an internal boom. Without foreign trade, supplies of goods would be shorter, money income and prices go up higher. But the foreign trade mechanism also applies brakes to the internal boom, through the adverse Balance of Payments.

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CHAPTER VII - Summary

A country is said to be an exporting or importing country depending upon the volume of trade, that flows in and out of the country. This kind of economy is called the 'Open Door Economy'.

There is a difference in terms of natural resources endowments, climatic conditions, mineral resources, and mines, labour and capital resources, technological capabilities, entrepreneurial and management skills, which determine the capacities of countries to produce goods and services.

All these differences in production possibilities, lead to situations where some countries can produce some goods and services more efficiently than other countries,

A country which specialises in the production and exports of these goods and services, in which it has an 'Absolute or a Comparative Advantage and imports other goods and services in the production of which it has an absolute or a comparative disadvantages over the other countries of the world.

Trade takes place due to price differences.

Trade takes place due to different demand conditions.

Trade takes place due to different supply conditions.

Trade takes place due to profits or gains obtained from trading.

The reasons for trade is essentially the gain or profit from trade.

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2) Theoretical Arguments.

Transport plays a vital role in trade, demand for ocean going vessels, inland transport like railways, and road, air transport, inland water ways transport.

Adam Smith's theory (1723-1790) of Absolute Advantage, David Ricardo's (1772-1823) the Classical Theory of Trade showing the supply side.

John Stuart Mill (1806-1813) added the demand considerations in the classical theory.

F. V. Edgeworth, Alfred Marshall developed the 'Theories of Offer Curves' and 'Reciprocal Demand'.

Next, Hechsher & Ohlin shows the differences in Factor Prices in the two countries. The supply factor determines the relevant factor prices in a country.

There are natural barriers to trade and man-made barriers due to policies of various countries.

The gains from exchange and gains from specialisation, two together constitute, gains from trade.

The Balance of Payments is a systematic record of all economic transaction of two countries.

Policy instruments are :

1. Monetary and fiscal policy,
2. Devaluation,
3. Exchange controls

International borrowing facilities are available

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from the International Monetary Fund, World Bank, International Board Reconstruction and Development.

General Agreement on Trade and Tariffs (G.A.T.T.) was established in 1947.

India's exports earnings, during the year from 1961-67 to 1984-85 increased 17 per cent to 60 crores. World exports increased by 15 times.

By 1992-93, India's exports <sup>(180)</sup> were valued at Rs. 53,350.54 crores and imports Rs. 62,922.80 crores.

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(180) Ministry of Commerce, Annual Report, 1992-94, Directorate General of Foreign Trade, Government of India, pp 3.



PART - D  
CHAPTER - VIII  
CONCLUSIONS

- 1) Effects of Foreign Trade on Port Development Shipping Productivity and Regional Coverage.
    - 1) Demand for imports and exports.
    - 2) More investments in ports and ships.
    - 3) Large scale turnover for large ports and ships, raising the wages rate, which then raise the per capita income of the hinterland region.
    - 4) Favourable balance of trade, and leads to favourable Balance of payments.
    - 5) More employment opportunities in the regions.
    - 6) Competition for the port uses and services and increases the Shipping Productivity.
    - 7) Profit maximisation in port pricing and improvement in technological cargo handling and latest trends in the shipping designs and industries.
    - 8) Open-door Economy, leading to high productivity, and Higher Port Development for communications and administration.
    - 9) Benefits of gains from trade, high technological capabilities, leading to skilled work, capital intensive based industries and agricultural units.
-

11) Links of Foreign Trade to Port Development  
Shipping Productivity and Regional Coverage

From the above study we find that Foreign Trade is linked to regional development covering all territories of the state, and the country at large. Foreign Trade is also linked to internal transportation of goods, and has an effective imports on shipping productivity, which leads to Ports Higher Development, to ensure the growth and stability of the National Economy.

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### The General Conclusions

The location of the ports, in the origin and destination chain, type of facilities available, the order of investments made, will be the deciding factors for the ports utilisation.

There is considerable scope for improvement of productivity and utilisation of berths, facilities and human resources, training and professionalism in are required in all Indian ports, to meet the challenge of the heavy flow of trade traffic.

The Rochdale Committee<sup>(181)</sup> hold the opinion that ports should be considered as commercial undertakings, be made to pay their way and should also provide funds for their development schemes, even if this means an increase in port charges.

### The Advantages of Larger Ports :

- 1) The larger the port, the lesser the cost.<sup>(182)</sup>
- 2) Over building, the port is quite rational in the cost conditions.
- 3) With the growing level of traffic, through time, it may be best to over-build the port, and experience for a short time the excess cost due to low volumes of traffic.
- 4) The life of a port is around 50 years, it may become difficult to expand later on.
- 5) It may be best to build the large port with a consideration of a few more thousand berths in all major ports in the country, when traffic volumes are less, to enjoy the low cost on the increased traffic in later years.

(181) Col. R.B. ORAM, "Cargo Handling and Modern Ports", 1965, p. 143.

(182) Bennatham E & Walters A. Port Pricing and Investment Policies, 1979, N.York pp.7

The economies of scale in larger ports are :

- 1) The overcrowded port cities could be expanded gradually, as reclamation of land from the sea, setting up new manufacturing units and refineries with the latest developments.
- 2) Keeping pace with technological advancement.
- 3) Ports gain by growing bigger, they attract more traffic, their performances improve.

Disadvantages of Larger Ports

- a) More supervision required,
- b) More documentation, facilities and manpower are required,
- c) More costs and expenses are made.

Advantages of Specialisation

More specialisation of labour, facilities and berths,  
More utilisation of capacity,  
More profitability, speed, competition and more economies of scale experienced.

While concluding, we do agree

- 1) That countries trade with each other because of various measures, such as certain goods, climatic conditions, lack of special skills, etc.
  - 2) Discovering a cheaper method of producing the commodity.
-

- 3) Regional background of the hinterland of the port can be improved, by applications of capital, for drainage, congestion etc.
- 4) Different goods require different combinations of factors for their production.
- 5) Transportation cost be allowed for assessing the advantage of trade.

The development of ports is the whole process of agricultural and industrial growth and social development.

A comparison between two ports - a big port and a small port, depends upon the cost of the port site, whether it is same cargo process e.g. general cargo to containerisation, which is more expensive.

Lack of funds for port development, hence the choice for smaller ports, e.g. developing countries.

Large ports find it easier to raise capital, as the business of large ports grows at a faster rate e.g. New York, Bombay.

A large port may have specialisation divisions in the accounting systems, supervision and managerial departments in rationalising and standardising of large ports charges and fees.

A country prosperity depends to a great extent on the efficiency of its ports. The speed of loading / unloading cargo through the transit area.

The quality and effectiveness of port services has a direct impact on cost of goods.

Port users determine the port through which their cargo should go, by considering the economies and speed as the vital factors.

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The effects of Port development in Shipping Productivity, is encouraging the latest technological in ship design and outlay, building up a greater flow of traffic avoiding small congested ports, gaining more economies of scale, helping the national economy encouraging more competition in shipping industry, ship building etc.

The effect on Regional Coverage in locating the most advantageous location for siting a port, seeking production possibilities of raw resources, developing the manpower for specialised employment.

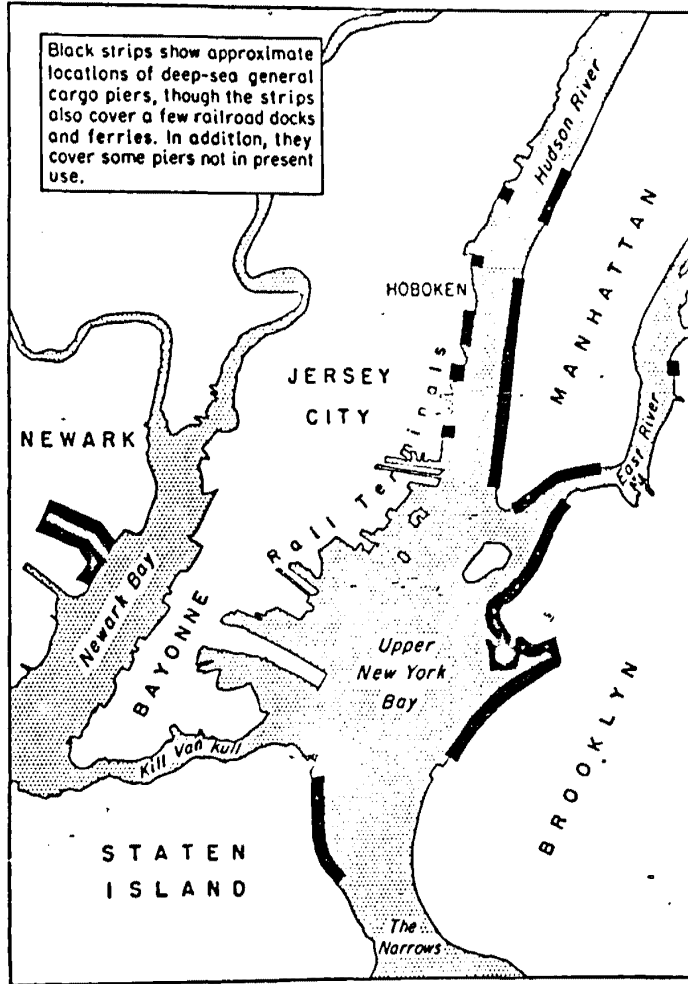
On foreign trade, the effects are, a promoting a stable balance of payments, and gains from trade, with a Comparative Advantage in trading with specialised traffic of goods.

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PART-A.  
Appdx. MAP-1  
MAP.

I.1

Chart 1  
General Cargo Waterfronts of the New York Port



This map does not show facilities for bulk cargo. For example, there are extensive petroleum facilities on the Kill Van Kull, and also on the Arthur Kill, which is off the picture to the left. According to the Port of New York Authority, more than 400 vessels can be berthed simultaneously at the Port's general cargo and bulk cargo piers.

• Chintz B. Freight & Metropolis  
1960, N.Y.

PAGE

MAP

I. 11

Part-A-Appendix

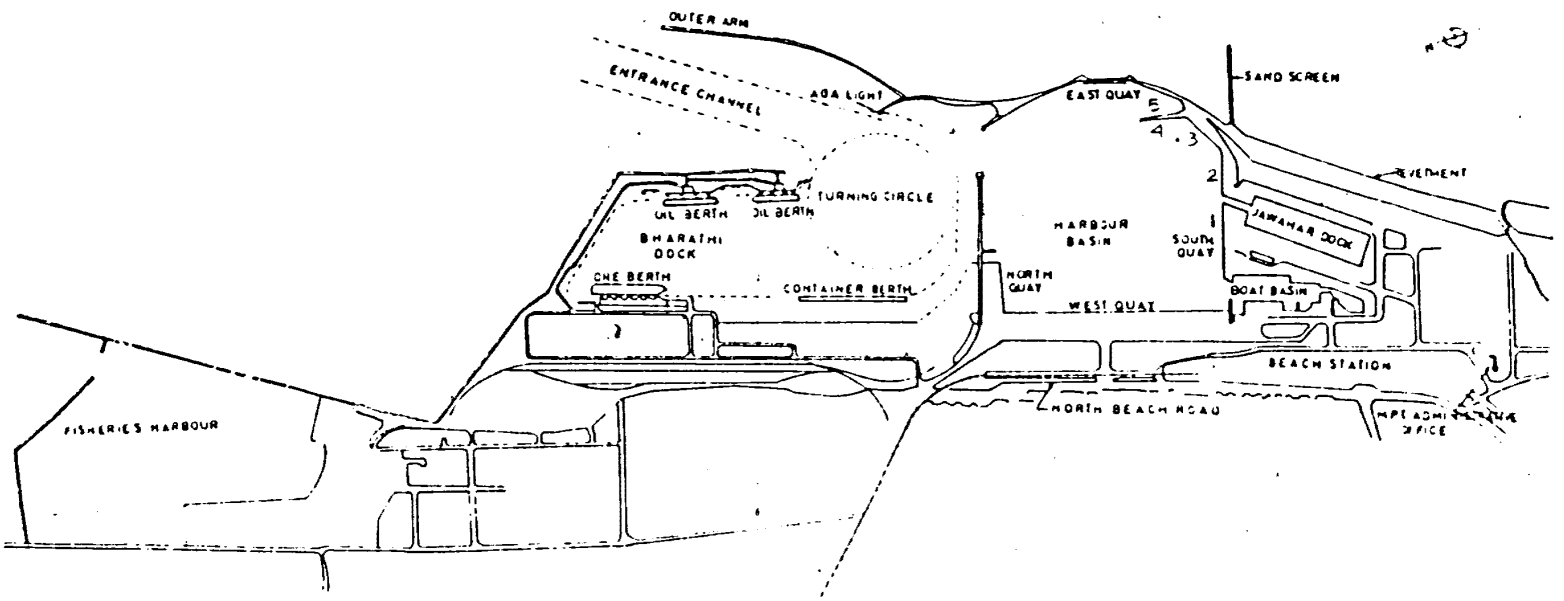


Fig. 3. Madras Port



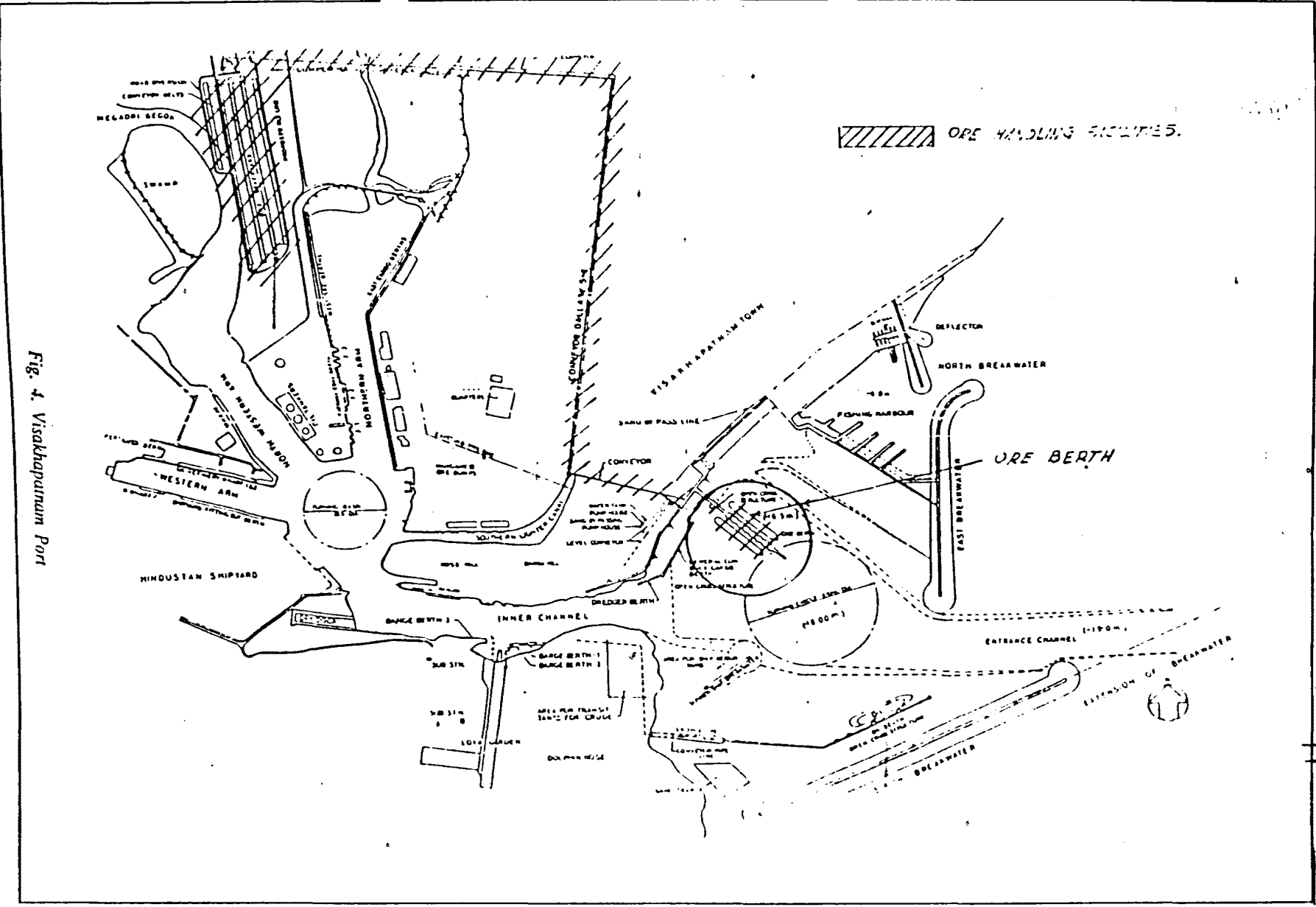


Fig. 4. Visakhapatnam Port

MAP

PART-A. Appendix

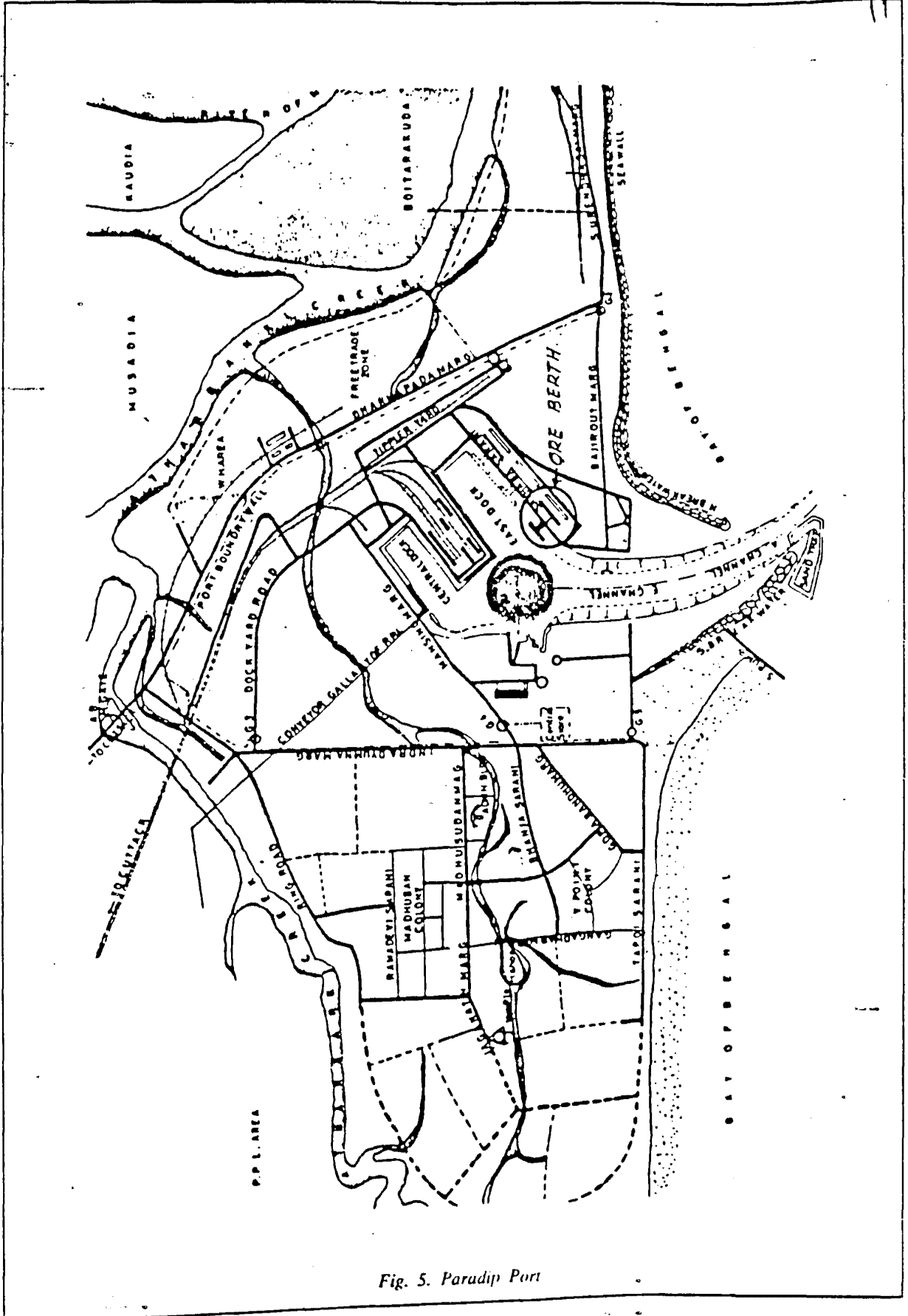


Fig. 5. Paradip Port

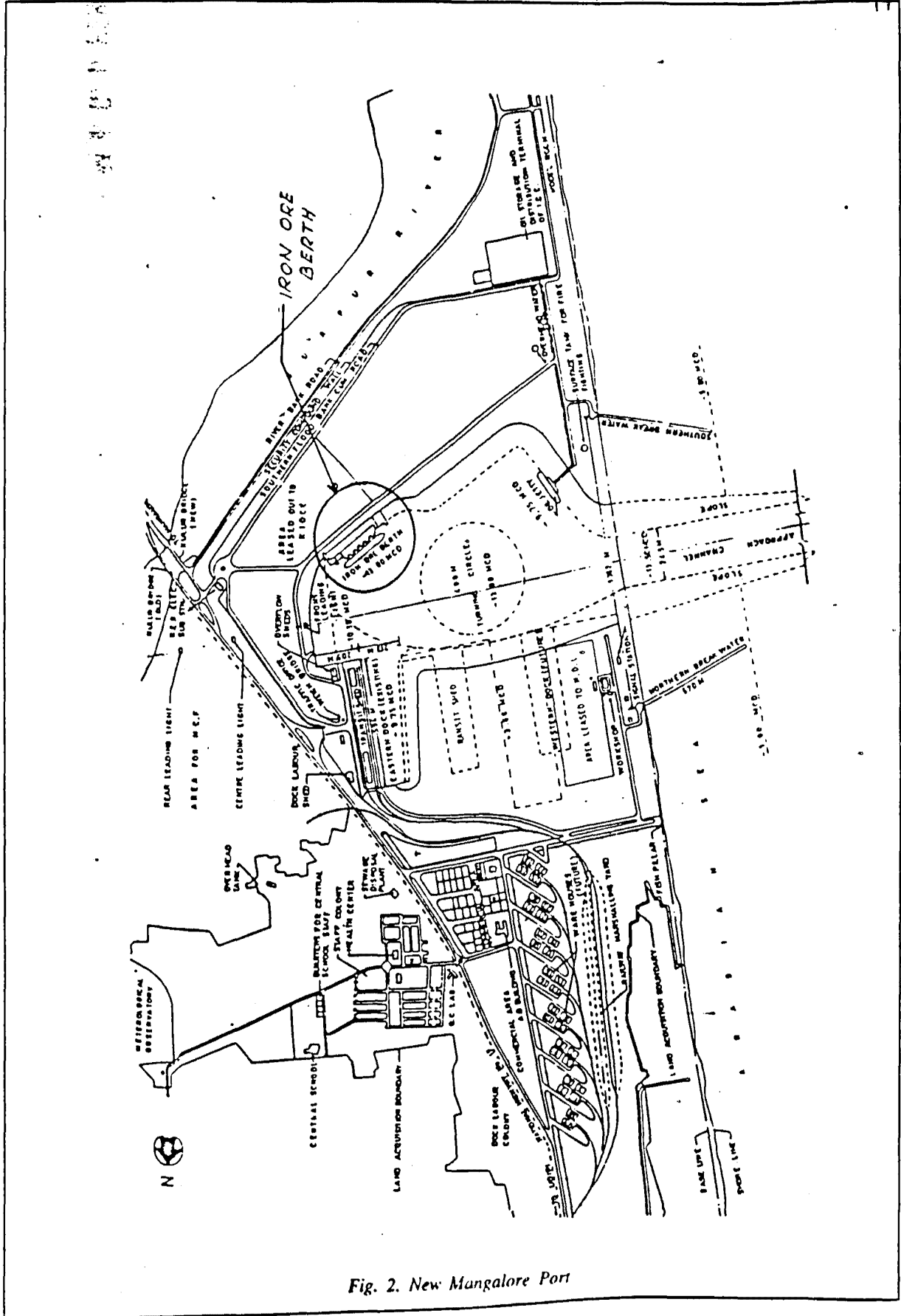


Fig. 2. New Mangalore Port

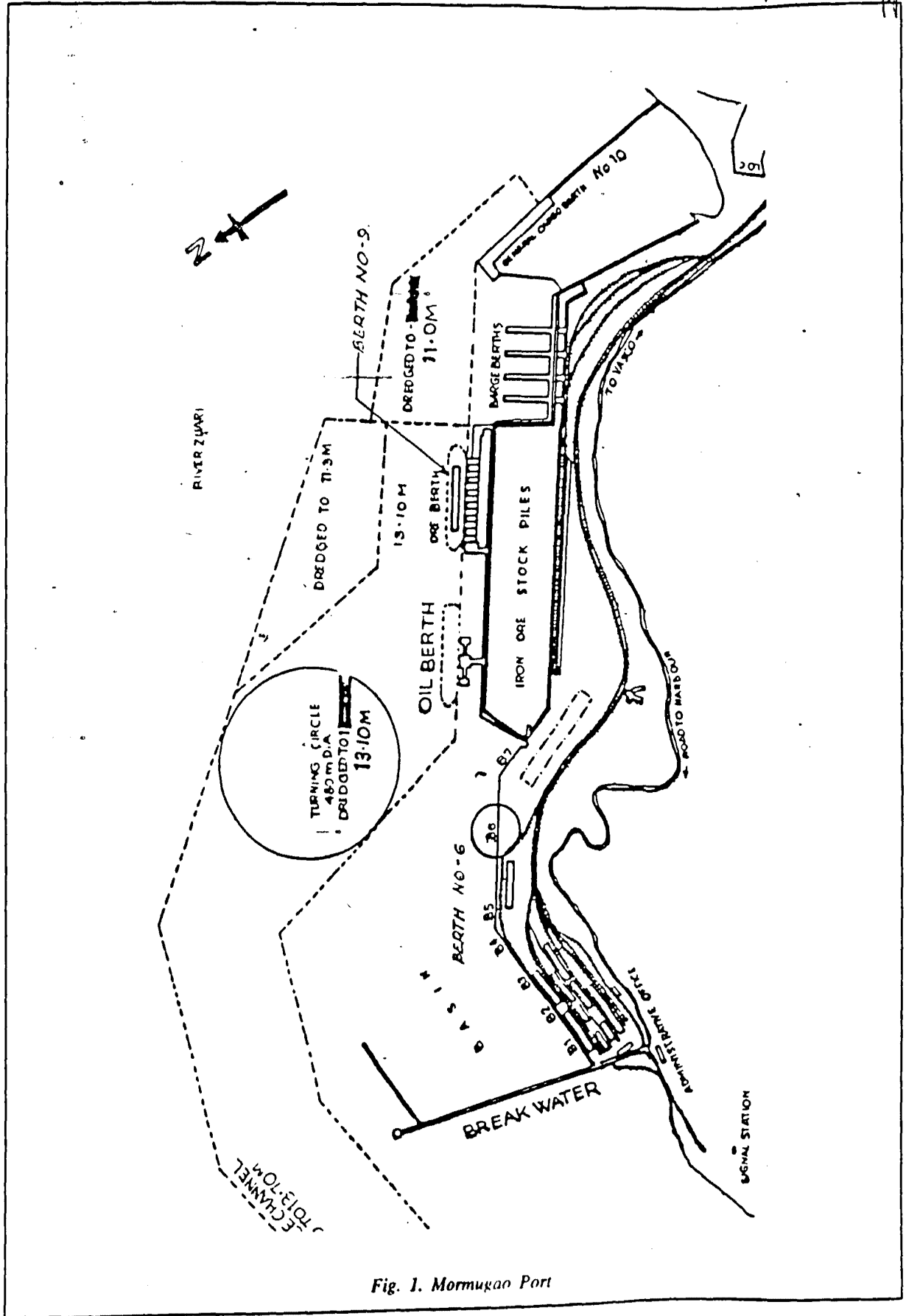


Fig. 1. Mormugao Port

PART A  
Chapter II

APPENDIX: A.I.

**2.3.1 PASSENGER TRAFFIC AT MAJOR PORTS IN INDIA (CONTD.)**

(In '000)

M. S. G. I. PEREIRA

Year	OVERSEAS			COASTAL			TOTAL		
	Embarked:	Disembarked:	Total:	Embarked:	Disembarked:	Total:	Embarked:	Disembarked:	Total:
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>MAJOR PORTS</b>									
1960-61	116.2	125.3	241.5	487.0	465.6	952.6	603.2	590.9	1194.1
1965-66	95.6	158.9	254.5	425.5	393.6	819.1	521.1	552.5	1073.6
1970-71	76.0	90.3	166.3	299.1	290.0	579.1	375.1	370.3	745.4
1975-76	98.2	52.1	150.3	117.2	103.0	220.2	215.4	155.1	370.5
1980-81	34.1	36.1	70.2	163.1	154.9	318.0	197.2	191.0	388.2
1985-86	8.6	9.6	18.2	190.0	191.7	381.7	198.6	201.3	399.9
1986-87	8.0	7.9	15.9	197.0	193.1	390.1	205.0	201.0	405.0
1987-88	6.7	8.2	14.9	199.2	199.6	398.8	205.9	207.8	413.7
1988-89	6.3	7.0	13.3	94.3	85.7	180.0	100.6	92.7	193.3
1989-90	9.4	9.8	19.2	72.8	67.8	140.6	82.2	77.5	159.8

Source: Basic Ports Statistics of India, 1993-94, N. Delhi.

PART A  
Chapter II

TABLE - I

Number of Major and Minor Ports  
in the Maritime States -- 1993-94.

Appendix A, II

M. G. I. PEREIRA

State / U.T.	Number of Major Ports	Number of Minor Ports	Total Number of Ports
<b>West Coast</b>			
Gujarat	1	39	40
Maharashtra	2	52	54
Goa	1	6	7
Karnataka	1	13	14
Kerala	1	13	14
<b>East Coast</b>			
Tamil Nadu	2	8	10
Pondicherry	-	2	2
Andhra Pradesh	1	9	10
Orissa	1	1	2
West Bengal	1	-	1
Lakshadweep Islands	-	1	1
Andaman & Nicobar Islands	-	19	19
<b>TOTAL</b>	<b>11</b>	<b>163</b>	<b>174</b>

Source: Basic Ports Statistics of India, 1993-94, N. Delhi.  
Min. of Surface Transport.

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PART A.  
Chapter VI

Appd. No. A. III.

**Table 4**      Queueing time:service time ratios

	Number of berthing points.															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
.050	0.053	0.003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.050
.100	0.111	0.010	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.100
.150	0.176	0.023	0.004	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.150
.200	0.250	0.042	0.010	0.003	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.200
.250	0.333	0.067	0.020	0.007	0.003	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.250
.300	0.429	0.099	0.033	0.013	0.006	0.003	0.001	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.300
.350	0.536	0.140	0.053	0.023	0.011	0.006	0.003	0.002	0.001	0.001	0.0	0.0	0.0	0.0	0.0	.350
.400	0.647	0.190	0.078	0.038	0.020	0.011	0.006	0.004	0.002	0.001	0.001	0.001	0.0	0.0	0.0	.400
.450	0.773	0.254	0.113	0.058	0.033	0.020	0.012	0.008	0.005	0.003	0.002	0.002	0.001	0.001	0.001	.450
.500	1.0	0.333	0.158	0.087	0.052	0.033	0.022	0.015	0.010	0.007	0.005	0.004	0.003	0.002	0.002	.500
.550	1.222	0.434	0.217	0.126	0.079	0.053	0.037	0.026	0.019	0.014	0.010	0.008	0.006	0.005	0.004	.550
.575	1.333	0.494	0.254	0.151	0.097	0.066	0.047	0.034	0.025	0.019	0.014	0.011	0.009	0.007	0.005	.575
.600	1.500	0.562	0.296	0.179	0.118	0.082	0.059	0.044	0.033	0.025	0.020	0.016	0.012	0.010	0.008	.600
.625	1.667	0.641	0.344	0.213	0.143	0.101	0.074	0.056	0.043	0.034	0.027	0.021	0.017	0.014	0.012	.625
.650	1.857	0.732	0.401	0.253	0.173	0.124	0.093	0.071	0.055	0.044	0.035	0.029	0.024	0.020	0.016	.650
.675	2.077	0.837	0.468	0.301	0.209	0.152	0.115	0.090	0.071	0.057	0.047	0.038	0.032	0.027	0.023	.675
.700	2.333	0.961	0.547	0.357	0.252	0.187	0.143	0.113	0.091	0.074	0.061	0.051	0.043	0.037	0.031	.700
.725	2.636	1.108	0.642	0.426	0.305	0.229	0.178	0.142	0.115	0.095	0.080	0.067	0.058	0.049	0.043	.725
.750	3.0	1.286	0.757	0.509	0.369	0.281	0.221	0.178	0.147	0.123	0.104	0.089	0.076	0.066	0.058	.750
.775	3.444	1.506	0.899	0.614	0.451	0.347	0.276	0.225	0.187	0.158	0.135	0.117	0.102	0.089	0.079	.775
.800	4.0	1.774	1.079	0.746	0.554	0.431	0.347	0.286	0.240	0.205	0.176	0.154	0.135	0.119	0.106	.800
.825	4.714	2.131	1.311	0.917	0.689	0.543	0.441	0.367	0.311	0.267	0.232	0.204	0.181	0.161	0.145	.825
.850	5.667	2.604	1.623	1.149	0.873	0.693	0.569	0.477	0.408	0.353	0.310	0.274	0.245	0.220	0.199	.850
.875	7.0	3.267	2.062	1.476	1.132	0.908	0.751	0.635	0.547	0.478	0.422	0.376	0.338	0.306	0.278	.875
.900	9.0	4.263	2.724	1.969	1.525	1.234	1.028	0.877	0.761	0.669	0.594	0.533	0.482	0.439	0.402	.900
.925	12.333	5.926	3.829	2.796	2.185	1.782	1.497	1.285	1.122	0.993	0.886	0.802	0.729	0.668	0.614	.925
.950	19.0	9.256	6.047	4.457	3.511	2.885	2.441	2.110	1.855	1.651	1.486	1.348	1.233	1.134	1.049	.950
.975	38.999	19.252	12.708	9.451	7.504	6.211	5.291	4.602	4.068	3.642	3.295	3.006	2.762	2.553	2.373	.975

*Source* : Calculated by UNCTAD secretariat from queueing theory formula with poisson arrivals and exponential service times with first-come, first-served queue discipline.

M. S. G. I. PEREIRA

Source: INDIAN PORTS, IPA, N. DELHI  
Vol. 16-18 1983-84, Jan 1984  
pp 15.

## PART - A.

## Chapter VI

## Appendix A IV

Port Facilities—Berths.		Table IV	
Drafts and Lengths of Berths			
As on 31-3-83			
Port	Berths	Details	
	Type of berths	Draft (In mtrs.)	Length (In mtrs.)
Kandla	Cargo Jetties (6)	9.45	*
	Oil Jetty (1)	9.15	92
	Ore Jetty (1)	10.37	78
	SBM Vadinar ( )		
Bombay	Indira Dock (3C)	7.92-10.06	130-244
	Victoria Dock (13)	7.32	100-152
	Princess Dock (9)	6.71	73-212
	Butcher Island (4)	10.97	244
		8.84	174
Mormugao	Quay berths (5)	4.30-8-.50	92-160
	Oil berth (1)	11.00	116
	Ore berths (2)	8.50, 12.00	222, 223
New Managalore	G.C. berths (3)	9.45-10.10	192
	Oil Jetty (1)	9.75	62
	Iron-ore berth (1)	12.50	300
Cochin	Open berths (9)	9.14	*
	Coal berth (North)	9.14	183
	Coal berth (South)	9.14	192
	Boath Train Pier (1)	9.14	183
	Tanker berth (North)	9.14	218
	Tanker berth (South)	9.14	198
Tuticorin	Berths (4)	8.85	168-192
	Oil Jetty (1)	8.25	226
	Coal Jetty (Mech.)		
Madras	Berths (12)	7.92-9.50	157-246
	Jawahar Dock Berths (6)	10.40-11.00	173
	Bharathi Dock Berths (2)	14.60	223-339
Visakhapatnam	Inter Harbour Berths (8)	9.45-10.21	169-235
	Fertilizer berth (1)	10.06	168
	Oil refinery berths (2)	9.75-10.06	183
	West Jetties (3)	9.45	168-183
	Outer Harbour:		
	Ore berths (2)	15.30	263
Paradip	G.C. berth (1)	10.67	291
	Iron-ore berth (1)	11.89	155
Haldia	G.C./Container berths (2)	10.20	
	Finger Jetty (2 sides)	East 9.30-9.60 West	235
	Phosphate Berth (1)	9.70	243
	Coal berth (1)	11.30	284
	Iron-ore berth (1)	11.60	338
	Oil Jetty (1)	10.70	299
Calcutta	Kidderpore Dock (21)	7.40-9.30	108-229
	Netaji Subhas Dock (9)	6.00-9.00	152-200
	Garden Reach (2)	7.10-7.50	180-210
	Buk Buj Oil Jetty (6)	7.70-9.00	85-220

\*Berth wise lengths not available.  
In brackets: Number of berths

Source Reference: 1.



PART A  
CHAPTER VI

APPENDIX A. V

2.2.2 TREND OF CARGO TRAFFIC HANDLED AT VARIOUS MAJOR PORTS

(In Million Tonnes)

Year	P O R T S												Total
	Kandla	Bombay	J.L. Nehru	Mormu- gao	N.Manga- lore	Cochin	Tuti- corin	Madras	Visakha patnam	Paradip	Calcutta /Haldia		
	1	2	3	4	5	6	7	8	9	10	11	12	13
1951-52	-	7.50	-	-	-	1.61	-	2.05	1.14	-	9.45	21.75	
1955-56	0.15	9.68	-	-	-	1.64	-	2.34	1.29	-	8.01	23.11	
1960-61	1.57	14.35	-	-	-	2.01	-	3.04	2.76	-	9.39	33.12	
1965-66	2.51	17.91	-	7.87	-	2.87	-	4.87	4.46	-	9.73	50.22	
1970-71	1.61	14.37	-	11.01	-	4.81	-	6.92	8.73	2.16	5.97	55.58	
1975-76	3.20	16.65	-	12.77	0.34	4.26	1.36	7.88	8.55	3.33	7.66	66.00	
1980-81	8.76	16.98	-	13.77	0.96	5.23	2.56	10.38	10.12	2.24	9.27	80.27	
1981-82	9.69	19.40	-	14.98	1.64	5.50	2.67	11.41	10.99	2.23	9.47	87.98	
1982-83	12.36	23.21	-	12.81	2.27	5.71	3.23	12.07	10.22	1.57	10.25	93.70	
1983-84	14.16	23.39	-	12.84	2.84	5.00	3.55	12.84	9.88	1.37	10.01	96.38	
1984-85	15.74	26.94	-	14.30	3.38	4.07	3.77	14.13	11.08	2.14	10.27	105.82	
1985-86	16.49	24.31	-	16.12	3.69	5.28	4.22	18.15	15.91	3.33	12.13	119.63	
1986-87	16.19	25.08	-	14.92	5.43	6.88	4.13	19.78	15.04	4.85	12.07	124.37	
1987-88	18.08	29.57	-	13.33	6.11	6.80	4.26	22.82	15.37	5.19	13.07	134.60	
1988-89	17.81	29.34	-	15.39	7.09	7.82	5.13	23.86	20.37	6.03	14.22	147.06	
1989-90	18.92	27.75	0.70	14.17	7.66	7.12	5.32	23.94	21.12	6.18	14.69	147.57	
1990-91	19.69	28.90	2.02	14.91	8.02	7.28	5.08	24.52	19.42	6.88	14.95	151.67	
1991-92	21.00	26.26	2.79	15.10	8.27	7.48	5.87	25.05	21.52	7.30	16.00	156.64	
1992-93	22.91	28.31	3.01	16.31	7.09	7.98	6.22	25.33	22.76	7.60	18.34	165.86	

Source: Basic Ports Statistics of India  
1993-94, N. Delhi.

M. S. G. I. PEREIRA

PART A  
CHAPTER VI

PORT LOCATIONS AND EXISTING INFRASTRUCTURE

APPENDIX VII

PORT	LOCATION		NUMBER OF BERTHS				TYPE OF DOCK/PORT	
	LATITUDE	LONGITUDE	LIQUID BULK	MECHANISED IRON ORE/ COAL	EXCLUSIVE CONTAINER	OTHER CARGO		TOTAL
CALCUTTA	22° 33' N	88° 19' E	7	-	3	23	33	Riverine with impounded docks & river side jetty
HALDIA	22° 12' N	80° 6' E	2	2	1	4	9	(d)
PARADIP	22° 15' N	86° 40' E	-	1	-	5	6	Artificial Lagoon Port
VISAKHAPATNAM	17° 41' N	83° 18'	-	-	-	-	-	-
-INNER HARBOUR			2	-	-	11	13	Natural Harbour
-OUTER HARBOUR			2	2	-	1	5	
MADRAS	13° 6' N	80° 18' N	2	2	2	17	23	Artificial Harbour with wet docks
TUTICORIN	8° 45' N	78° 13' E	1	1	-	6	8	Artificial Harbour
CUTTACK	9° 58' N	76° 14' E	3	-	2	10	15	Lagoon Port
NEWMANGALORE	12° 55' N	74° 48' E	1	1	-	7	9	Artificial Lagoon Port
MORMUGAO	15° 25' N	73° 47' E	1	1	-	8	10	Open Harbour protected by break water
J.N.P.T.	18° 56.5' N	72° 57.5' E	-	-	3	2	5	Open Harbour
BOMBAY	18° 54' N	72° 49' E	5	-	3	47	55	Natural Harbour and Impounded Wet Docks
KANDLA	23° 01' N	70° 13' E	3	-	-	10	13	Lagoon Port
VADINAR			1 (SBM)	-	-	-	1	Single Buoy Mooring (Off Shore Oil Terminal)

PART A

Chapter VI

PART A

APPENDIX VIII

4.1.5 OUTLAY / EXPENDITURE IN PORTS DURING SEVENTH/EIGHTH PLAN  
AND ANNUAL PLAN/EXPENDITURE

(Rs. Crores)

PORTS	VIITH PLAN		1990-91		1991-92		VIIIITH PLAN		1992-93		1993-94@	
	Out- lay	Expdr.	Out- lay	Expdr.	Out- lay	Expdr.	Outlay	Out- lay	Expdr.	Out- lay	Expdr.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
Kandla	28.15	32.89	31.49	10.85	55.00	8.89	226.00	40.00	11.08	37.78	8.52	
Bombay	106.13	71.03	43.12	12.19	40.00	21.73	413.00	70.43	23.79	86.00	38.45	
J.L. Nehru	402.36	813.81	112.10	38.80	65.00	22.08	215.00	53.30	20.32	63.00	15.12	
Mormugao	25.30	16.09	5.76	3.52	7.10	1.59	123.00	11.76	8.24	13.00	16.32	
New Mangalore	18.40	20.32	5.48	2.02	8.56	4.45	98.00	4.91	2.22	6.00	2.51	
Cochin	56.25	49.54	50.00	26.78	37.03	32.42	117.00	42.17	18.92	47.00	15.07	
Tuticorin	18.75	12.56	6.10	2.10	8.95	6.13	65.00	17.05	7.00	19.00	11.08	
Madras	67.15	76.32	41.88	33.38	55.00	7.15	570.00	34.89	18.24	23.56	19.87	
Visakhapatnam	50.95	50.39	40.00	14.85	59.79	20.64	250.00	65.57	40.10	71.00	40.17	
Paradip	42.40	45.29	9.61	8.45	40.00	18.29	486.00	67.00	28.35	75.00	39.22	
Calcutta*	138.95	85.15	126.44	33.15	113.00	56.42	421.00	130.58	39.86	143.00	37.77	
Others.**	150.00	68.14	48.80	24.21	30.57	9.63	232.00	72.30	20.45	37.20	43.40	
TOTAL	1104.79	1341.53	520.78	210.30	520.00	209.42	3216.00	609.96	238.57	621.54	287.50	

@ Provisional.

\* Includes Haldia, B.HRTW and Jiggharkhali flat.

\*\* Constitute DCI, ALHW, NIPM, MPSO, R &amp; D, C D O and Minor Ports and C.T. Research

Source: Documents of MOST on plan for Port Sector and IPA statements.

Based on Port Statistics of India 1993-94 N.A.

PART A  
Chapter VI

Appendix A, IX

2.2.21 CONTAINER TRAFFIC HANDLED FROM MAJOR PORTS

Item	1985-86	1986-87	1987-88	1988-89	1989-90
(1)	(2)	(3)	(4)	(5)	(6)
1. Export (in million tonnes)					
i) Indian Lines	0.28	0.32	0.25	0.32	0.38
ii) Foreign Lines	1.57	2.27	2.59	2.64	3.14
iii) Total	1.85	2.59	2.84	2.96	3.52
2. Import (in million tonnes)					
i) Indian Lines	0.57	0.54	0.48	0.45	0.54
ii) Foreign Lines	1.75	2.12	2.57	2.75	3.28
iii) Total	2.32	2.66	3.05	3.20	3.82
3. Total (Export + Import) (in million tonnes)					
i) Indian Lines	0.85	0.86	0.73	0.77	0.92
ii) Foreign Lines	3.32	4.39	5.16	5.39	6.42
iii) Total	4.17	5.25	5.89	6.16	7.34
4. General Cargo (Break Bulk & Container) (in million tonnes)	13.73	14.07	14.58	14.50	16.66
5. % of Containerised cargo to General Cargo.	32.0	37.3	40.4	42.5	

Source: BASIC PORTS STATISTICS  
OF INDIA, 1993-94, N. DELHI.

( 90 )

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PART B VI  
WORLD FLEET (BY FLAG)  
(AS ON 1ST JULY)

TABLE- 4.1.1

Appdx. B. I

M. S. G. I. T. AIRA

F L A G	1987			1988			1989			1990		
	No. of: Ships	GRT : ('000 : Tons)	Tonnage: as % to: World	No. of: Ships	GRT : ('000 : Tons)	Tonnage: as % to: World	No. of: Ships	GRT : ('000 : Tons)	Tonnage: as % to: World	No. of: Ships	GRT : ('000 : Tons)	Tonnage: as % to: World
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1. Liberia	1574	51412	12.74	1507	49734	12.33	1455	47893	11.67	1638	54700	12.51
2. Panama	5136	43255	10.72	5022	44604	11.06	5121	47366	11.54	4748	39298	9.26
3. Japan	9822	35932	8.90	9804	32074	7.95	9830	28030	6.83	10000	27078	6.59
4. U.S.S.R.	6705	25232	6.25	6741	25704	6.39	6555	25854	6.30	7383	26737	6.31
5. Greece	1948	23560	5.84	1874	21979	5.45	1839	21324	5.19	1814	20522	4.84
6. U.S.	6427	20173	5.00	6442	20832	5.16	6375	20588	5.02	6348	21328	5.03
7. China	2367	16854	4.18	2458	17551	4.35	2548	18683	4.56	2608	19665	4.64
8. Cyprus	1341	15850	3.88	1352	18391	4.56	1278	18134	4.42	1270	18336	4.33
9. Bahamas	469	9105	2.25	572	8963	2.22	724	11579	2.82	807	13629	3.22
10. Philippines	1394	8681	2.15	1483	9312	2.31	1424	9385	2.29	1420	8515	2.01
11. U.K.	2165	8505	2.11	2142	8260	2.05	2053	7646	1.86	1998	6716	1.59
12. Hongkong	409	8035	1.99	394	7329	1.82	366	6151	1.50	375	6565	1.55
13. Italy	1571	7817	1.94	1583	7794	1.93	1571	7602	1.85	1616	7991	1.89
14. Korea(S)	1899	7214	1.79	1930	7334	1.82	1974	7832	1.91	2110	7783	1.84
15. Singapore	700	7098	1.76	715	7209	1.79	712	7273	1.77	774	7928	1.87
16. India	803	6726	1.67	797	6161	1.53	834	6315	1.54	855	6476	1.59
17. Norway	1979	6359	1.57	2078	9350	2.32	2304	15597	3.80	2557	23429	5.53
18. Brazil	718	6324	1.57	719	6123	1.52	716	6078	1.48	691	6016	1.42
19. Germany	1791	5812	1.44	1802	5360	1.33	1557	5467	1.33	1179	4301	1.02
20. France	954	5371	1.33	930	4506	1.12	921	4413	1.07	900	3832	0.90

Source: Indian Shipping Statistics,  
 N. Delhi.

## Annexure IV(A)

## Quantity Carried and Percentage Share of Indian Flag Vessels in Major Commodities During 1989-90, 1990-91 and 1991-92

Sl. No.	Commodity group	Export & Import			Percentage share of Indian flag vessels		
		Quantity carried			Percentage share of Indian flag vessels		
		1989-90	1990-91	1991-92	1989-90	1990-91	1991-92
1.	POL (Crude)	18789	18742	19204	96.80	87.47	81.56
2.	POL (Products)	4597	4614	4799	41.80	35.79	31.27
3.	Edible oils	67	154	6	13.30	20.32	1.91
4.	Other liquid	247	319	648	8.60	10.57	14.84
5.	Iron ore	7187	6695	5621	21.70	21.20	18.66
6.	Other ore	315	358	475	17.50	18.42	22.45
7.	Fertilisers	1293	1518	1577	49.10	65.77	66.07
8.	Fert. raw materials	1436	1982	1741	42.60	56.29	55.71
9.	Foodgrains	31	121	340	2.90	11.68	27.89
10.	Coal	2623	3420	3448	51.00	55.88	52.79
11.	Iron & steel	186	239	349	5.30	6.37	15.46
12.	Sugar	—	—	33	—	—	7.91
13.	Cement	33	—	2	29.20	—	1.82
14.	Salt	—	37	19	8.25	8.25	5.57
15.	Newspprint	11	25	28	30.60	58.14	40.00
16.	Containers	661	537	364	10.40	7.79	6.16
17.	Other cargo	1535	1558	1595	19.00	20.19	27.25
	ALL CARGO	39017	40319	40249	39.10	38.99	38.72

Source: Transport Research Division; Ministry of Surface Transport.

## PART B VI Table 1

Table  
Appdx B. II

## Indian and World Shipping Tonnage

(Ships of 100 GRT and above)

Year	World Tonnage		Indian Tonnage		% share of Indian Tonnage
	No. of Ships	G.R.T Million	No. of Ships	G.R.T Million	
1951	31226	87.25	103	0.34	0.45
1955	32492	100.57	125	0.48	0.48
1960	36311	129.77	172	0.84	0.65
1965	41865	160.39	217	1.46	0.91
1970	52444	227.49	250	2.40	1.05
1975	63724	342.16	330	4.46	1.30
1980	73832	419.91	383	5.68	1.35
1985	76395	416.27	368	5.95	1.43
1990	78336	423.63	418	6.03	1.42
1991	83030	436.07	415	5.94	1.36
1992	79845	444.30	441	6.29	1.42

Note: The data reflects the position as on 1st July.  
Source: Indian Shipping Industry  
1993, Delhi-16.

S. G. I. PEREIRA

III

PART B.VI Table 2

Growth of Indian Shipping

Year	Coastal		Overseas		Total	
	No. of Vessels	GRT ('000)	No. of Vessels	GRT ('000)	No. of Vessels	GRT ('000)
1947	48	119	11	73	59	192
1955	92	221	33	255	125	476
1960	98	315	74	529	172	844
1965	101	338	116	1122	217	1460
1970	69	250	181	2147	250	2397
1975	70	371	260	4093	330	4464
1980	58	253	325	5426	383	5679
1985	95	296	273	5654	368	5950
1990	162	523	256	5504	418	6027
1991	169	560	246	5380	415	5490
1992	187	640	254	5647	441	6287

Note: The data reflects the position as on 31st December.

Source: Indian Shipping Industry  
Asian Institute of Transport  
Development - N.O.-16.

Table 3 PART B.VI

Growth of Overseas Fleet by Type

(000 grt/000 dwt)

Ship Type	1980	1985	1990	1991	1992	1993 *
<b>1. Dry Cargo Liner</b>						
No.	170	111	75	62	75	71 **
GRT	1493	1133	818	698	928	953
DWT	2135	1624	1165	972	1322	1385
<b>2. Dry Cargo Bulk Carrier</b>						
No.	113	109	115	115	113	108
GRT	2043	2188	2470	2438	2546	2489
DWT	3482	3742	4166	4103	4291	4270
<b>3. Tanker (crude carriers &amp; oil tankers)</b>						
No.	22	38	48	48	48	59
GRT	1026	1510	1608	1608	1608	2042
DWT	1851	2580	2807	2807	2807	3533
<b>4. Ore/Oil Bulk Carrier</b>						
No.	16	14	9	9	8	3
GRT	815	806	543	543	488	172
DWT	1485	1483	991	991	889	312
<b>5. Passenger-cum-Cargo Liner</b>						
No.	4	1	1	1	1	1
GRT	49	17	8	8	8	8
DWT	29	14	9	9	9	9
<b>6. Timber Carriers</b>						
No.	-	-	5	5	5	3
GRT	-	-	22	22	22	11
DWT	-	-	30	30	30	20
<b>7. Other (LPG/Acid Carriers/cellular container)</b>						
No.	-	-	3	6	4	9
GRT	-	-	35	63	47	117
DWT	-	-	58	96	79	175
<b>All Types</b>						
No.	325	273	256	246	254	254
GRT	5426	5654	5504	5380	5647	5792
DWT	8982	9443	9226	9008	9427	9704

Note: The data reflects the position as on 31st December.

\* Provisional \*\* Includes 1 cellular container vessel.

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III

## PART B.VI Table 4

## Indian Shipping Tonnage - Companywise Deployment

Shipping Company	Coastal		Overseas		Total	
	No. of Ships	GRT ('000)	No. of ships	GRT ('000)	No. of ships	GRT ('000)
1 Shipping Corpn. of India (SCI)	21	145	107	2855	128	3000
2 Scindia Steem Navigation Co.	-	-	13	225	13	225
3 Great Eastern Shipping Co.	8	7	26	565	34	572
4 Chowgule Steam-Ship	6	29	6	208	10	237
5 India Steamship	-	-	18	235	18	235
6 Essar Shipping	22	138	10	288	32	426
7 Larsen & Toubro	-	-	6	107	6	107
8 Surendra Overseas	-	-	8	156	8	156
9 Varun Shipping	5	9	5	68	10	77
10 Poomphuhar Shipping	3	84	-	-	3	84
11 Garware Shipping	5	4	3	11	8	15
12 Century Shipping	-	-	13	159	13	159
13 O.N.G.C.	43	84	-	-	43	84
14 SPIC Ltd.	-	-	3	43	3	43
15 Others	74	140	36	727	112	867
Total	187	640	254	5647	441	6287

Note: i) Data covers vessels of 150 & above GRT.  
ii) The data reflects the position as on 31.12.1992.

## PART B.VI Table 5.

## Age Profile of Indian Overseas Shipping

Year	Proportion (%) to tonnage (grt)			
	Upto 5 years	6-15 years	16-20 years	over 20 years
1975	44.0	40.6	12.3	3.1
1980	25.0	58.3	10.1	6.6
1985	24.1	61.1	10.7	4.1
1990	12.5	55.6	27.3	4.6
1991	8.6	49.8	35.5	6.1
1992	8.7	52.6	34.6	4.1
1993	11.8	55.9	31.1	1.2
No. of vessels	(23)	(158)	(62)	(11)

Note: The data reflects the position as on 31st December.

Source: Indian Shipping Industry, N. Delhi, 16, Asian Institute of Transport Development.



India's Overseas Trade - 1992-93

(Million tonnes)

Trade	Indian Lines	Foreign Lines	Total
<b>GENERAL CARGO</b>			
Export	1.24 (15.3)	6.86 (84.7)	8.10
Import	1.23 (13.6)	7.81 (86.4)	9.04
<b>TOTAL</b>	<b>2.47 (14.4)</b>	<b>14.67 (85.6)</b>	<b>17.14</b>
<b>DRY BULK</b>			
Export	6.22 (17.3)	29.74 (82.7)	35.96
Import	7.57 (32.7)	15.59 (67.3)	23.16
<b>TOTAL</b>	<b>13.79 (23.3)</b>	<b>45.33 (76.7)</b>	<b>59.12</b>
<b>POU/PRODUCTS &amp; OTHER LIQUIDS</b>			
Export	0.23 (7.6)	2.83 (92.4)	3.06
Import	26.17 (60.9)	16.81 (39.1)	42.98
<b>TOTAL</b>	<b>26.40 (57.3)</b>	<b>19.64 (42.7)</b>	<b>46.04</b>
<b>GRAND TOTAL</b>			
Export	7.69 (16.3)	39.42 (83.7)	47.11
Import	34.97 (46.5)	40.21 (53.5)	75.18
<b>TOTAL</b>	<b>42.66 (34.9)</b>	<b>79.63 (65.1)</b>	<b>122.29</b>

Note : Figures in brackets indicate the percentage share.

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2. Ministry of Surface Transport (1992), *Report of the Committee on Maritime Education - Training - Volume I.*
3. Planning Commission (1992), *The Eighth Five Year Plan - 1992-97*, Government of India, New Delhi.
4. Planning Commission (1987), *Report of Planning Group on Shipping, Indian Shipping in the Time Perspective of 2000 AD.*
5. Planning Commission, *Mid-Term Review of Eighth Plan.*

TV

Appdx. C I

MAHARASHTRA

आलेख क्रमांक २

PART C.

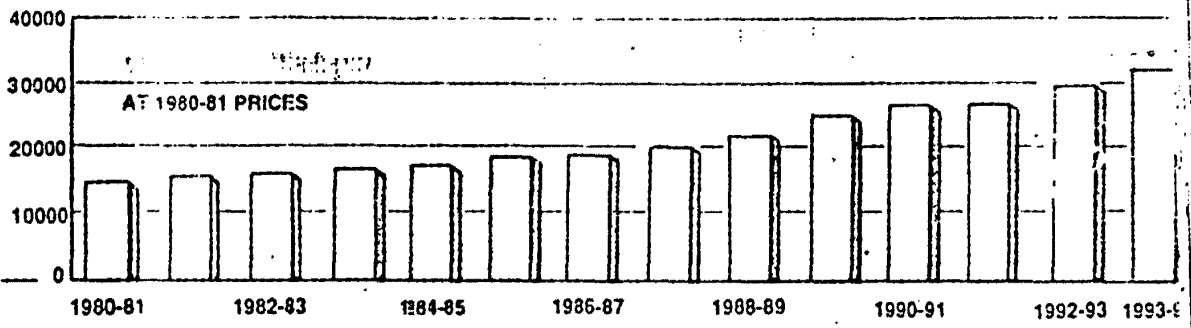
REGIONAL COVERAGE.

CHART

महाराष्ट्र राज्य MAHARASHTRA STATE

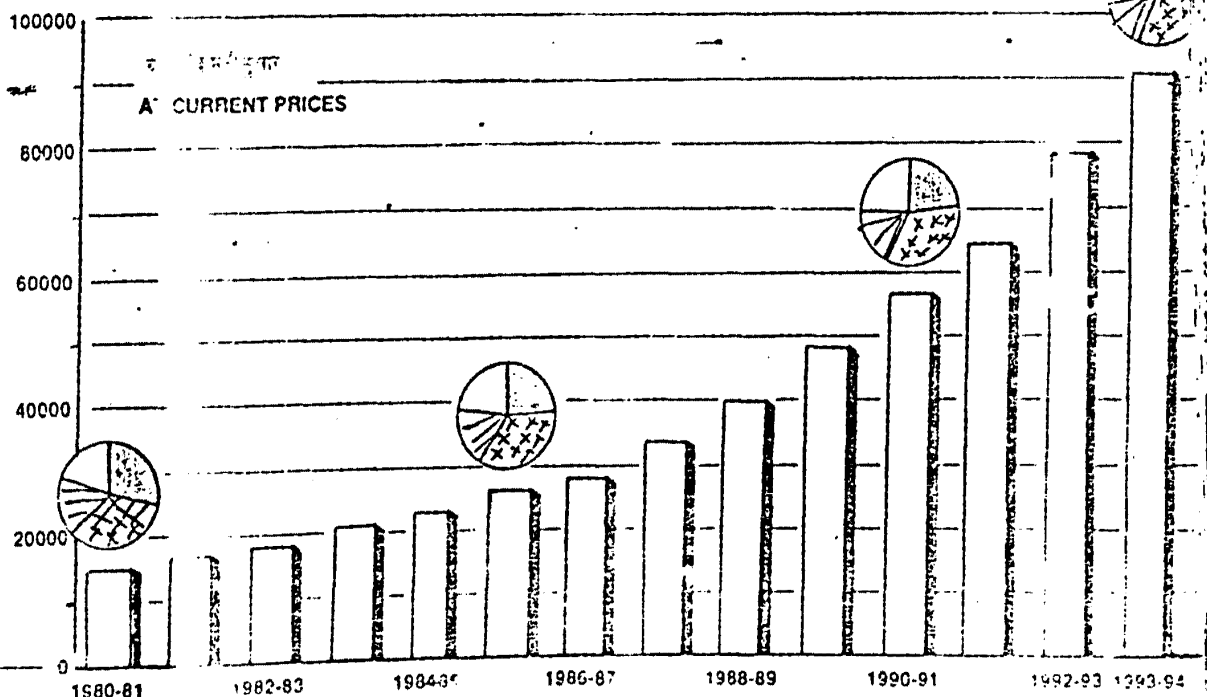
राज्य उत्पन्न  
STATE INCOME

कोटी रु.  
CRORE Rs.



- कृषि, पशुसंवर्धन, खणकाम वगैरे AGRICULTURE, ANIMAL HUSBANDRY, MINING ETC.
- उद्योग, पर्यटक्य, वीज वगैरे INDUSTRY, CONSTRUCTION, ELECTRICITY ETC.
- परिवहन आणि दूरधणकण, व्यापार वगैरे TRANSPORT AND COMMUNICATIONS, TRADE ETC.
- इतर OTHERS

कोटी रु.  
CRORE Rs.



राज्य उत्पन्न  
Total State Income

## ३. राज्य उत्पन्न

## 3. STATE INCOME

चालू आणि स्थिर (१९८०-८१) किमतीनुसार राज्य उत्पन्न

३.१. प्राथमिक अंदाजानुसार १९९३-९४ मधील राज्यांतर्गत निव्वळ उत्पन्न (राज्य उत्पन्न) चालू किमतीनुसार ९१,२०८ कोटी रुपये असून ते १९९२-९३ मधील ७८,३९४ कोटी रुपये राज्य उत्पन्नापेक्षा १६.३ टक्क्यांनी वाढले आहे. स्थिर (१९८०-८१) किमतीनुसार १९९३-९४ मध्ये राज्य उत्पन्नात ७.६ टक्के वाढ झाली तर १९९२-९३ मध्ये त्यात ११.५ टक्क्यांनी वाढ झाली होती. मार्गाल १३ वर्षात स्थिर किमतीनुसार राज्य उत्पन्न दुपटीहून अधिक झाले ही उल्लेखनीय बाब आहे.

३.२. १९९३-९४ मध्ये राज्याच्या अर्थव्यवस्थेत ७.६ टक्के वाढीची नोंद झाली. १९९३-९४ या वर्षात राज्यात नैऋत्य मान्सून पाऊस समाधानकारक होता आणि तो वेळेवर व सर्वत्र पडला. तथापि, ऑक्टोबर, १९९३ च्या पहिल्या आठवड्यात खूप पडलेल्या पावसाने कापणीसाठी योग्य झालेल्या खरीप ज्वारीचे मोठ्या प्रमाणात नुकसान केले. १९९३-९४ मध्ये अन्न-धान्याचे उत्पादन ३.५ टक्क्यांनी कमी होऊन १३६ लाख टन इतके झाले. १९९३-९४ मध्ये तेलयिया व तंतू पिकांच्या कृषि उत्पादन निर्देशांकात अनुक्रमे ०.५ टक्के व ४५ टक्के इतकी वाढ झाली. तथापि, उसाचे उत्पादन ९.६ टक्क्यांनी घटले. या सर्वांचा एकत्रित परिणाम म्हणून कृषि क्षेत्रातील मूल्यवृद्धीमध्ये १९९३-९४ मध्ये ९.१ टक्क्यांनी वाढ झाली. औद्योगिक आयाडीवर १९९१-९२ मध्ये दिसून आलेला मंदीचा कल १९९२-९३ मध्ये बदलून वाढता कल दिसून आला आणि वस्तुनिर्माण क्षेत्रात त्यावर्षी ४.४ टक्के वाढ झाली. वस्तु निर्माण क्षेत्रात १९९३-९४ मध्ये ४.९ टक्के वाढ अपेक्षित आहे.

३.३. १९९२-९३ च्या तुलनेत १९९३-९४ मध्ये राज्य उत्पन्नामध्ये (चालू किमतीनुसार) झालेल्या १२,८१४ कोटी रुपयांच्या एकूण वाढीमध्ये प्राथमिक क्षेत्राचा हिस्सा ३,३८० कोटी रुपये (२६.४ टक्के), द्वितीय व तृतीय क्षेत्रांचा हिस्सा अनुक्रमे ४,५४६ कोटी (३५.५ टक्के) व ४,८८८ कोटी रुपये (३८.१ टक्के) होता.

३.४. राज्य उत्पन्नाच्या क्षेत्रवार विभागणीवरून असे दिसून येते की, १९९३-९४ या वर्षाच्या राज्य उत्पन्नात प्राथमिक, द्वितीय व तृतीय क्षेत्राचा वाटा अनुक्रमे २२.८, ३३.३ व ४३.९ टक्के इतका होता. १९८०-८१ मध्ये याच क्षेत्रांचे तत्सम वाटे अनुक्रमे २८.१, ३५.१ व ३६.८ टक्के होते. यावरून असे दिसून येते की, या कालावधीत प्राथमिक क्षेत्राचा वाटा कमी झाला आहे, द्वितीय क्षेत्राचा वाटा कमी अधिक प्रमाणात स्थिर राहिला आहे तर तृतीय क्षेत्राच्या वाट्यात वाढ झाली आहे. अशा प्रकारे राज्य अर्थव्यवस्थेचे प्राथमिक क्षेत्रावरील अवलंबन हळू हळू कमी होत आहे.

३.५. स्थिर (१९८०-८१) किमतीनुसार १९९३-९४ मध्ये राज्य उत्पन्नाचा अंदाज ३२,३९१ कोटी रुपये आहे व हा अंदाज १९९२-९३ मधील ३०,०९१ कोटी रुपये अंदाजित उत्पन्नाहून ७.६ टक्क्यांनी वाढला आहे. ही वाढ (७.६ टक्के) प्राथमिक क्षेत्रातील व द्वितीय क्षेत्रातील अनुक्रमे ७.० टक्के व ८.१ टक्के वाढ व तृतीय क्षेत्रातील ७.६ टक्के वाढ यांचा एकत्रित परिणाम आहे.

State Income at current and constant (1980-81) prices

3.1. The preliminary estimate of Net S Domestic Product (i.e. State Income) at current prices is Rs. 91,208 crore for 1993-94 as against Rs. 78 crore for 1992-93, showing an increase of 16.3 per cent. At constant (1980-81) prices the growth was 7.6 per cent in the State Income during the year 1993-94 as against 11.5 per cent during 1992-93. It is worth noting that, in real terms, the State Income has more than doubled during the last 13 years.

3.2. The State's economy has registered a growth of 7.6 per cent during the year 1993-94. In the year 1993-94 south-west monsoon was satisfactory in terms of timeliness and spread in the State. However, heavy rains in the first week of October, 1993 caused severe damage to *kharif* jowar due for harvest. The foodgrains production decreased by 3.5 per cent in 1993-94 to 136 lakh tonnes. The index number of agricultural production for oilseeds and fibres increased by 0.5 per cent and 45 per cent respectively during 1993-94. However, there was a fall of 9.6 per cent in the sugarcane production. The overall effect was a 9.1 per cent growth in value added in the agriculture sector in 1993-94. On the industrial front, the recessionary trend observed in 1991-92 was reversed in 1992-93 with the manufacturing sector registering a growth of 4.4 per cent. In 1993-94 a growth of 4.9 per cent is expected.

3.3. In the total increase of Rs. 12,814 crore (at current prices) in the State Income in 1993-94 over 1992-93, the contribution of the primary sector was to the extent of Rs. 3,380 crore (26.4 per cent) and that of the secondary and tertiary sectors was Rs. 4,546 crore (35.5 per cent) and Rs. 4,888 crore (38.1 per cent) respectively.

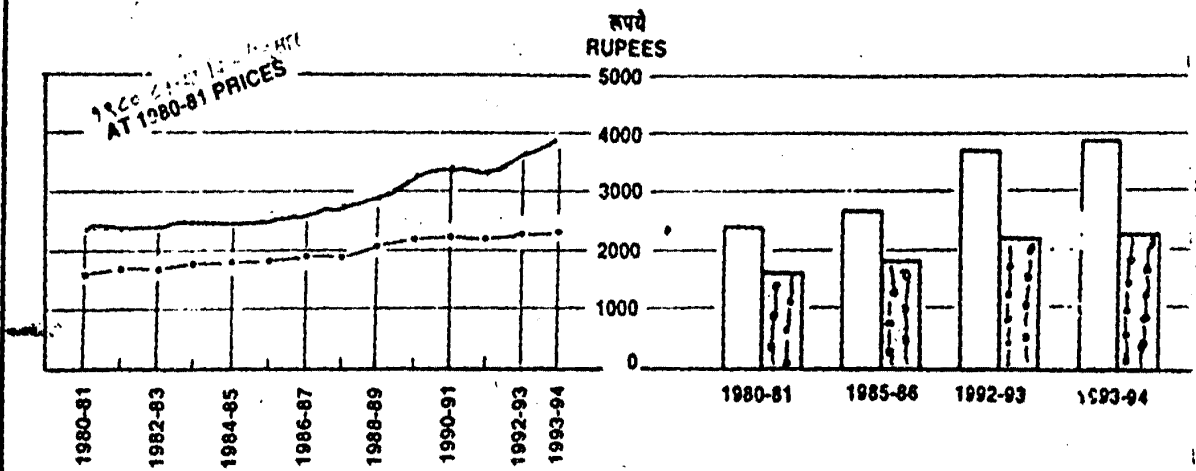
3.4. The structural composition of the State Income in 1993-94 indicates that the percentage shares of the primary, secondary and tertiary sectors were 22.8, 33.3 and 43.9 respectively. In 1980-81, the corresponding shares were 28.1, 35.1 and 36.8 per cent. Thus, the share of primary sector has declined over the period, that of the secondary sector remained more or less steady, while that of tertiary sector has gone up. The dependence of the State economy on the primary sector is thus gradually declining.

3.5. At constant (1980-81) prices, the State Income in 1993-94 is estimated at Rs. 32,391 crore showing an increase of 7.6 per cent over Rs. 30,091 crore in 1992-93. The overall increase in 1993-94 over 1992-93 (viz. 7.6 per cent) is the effect of an increase of 7.0 per cent in the primary, 8.1 per cent in the secondary and 7.6 per cent in the tertiary sectors.

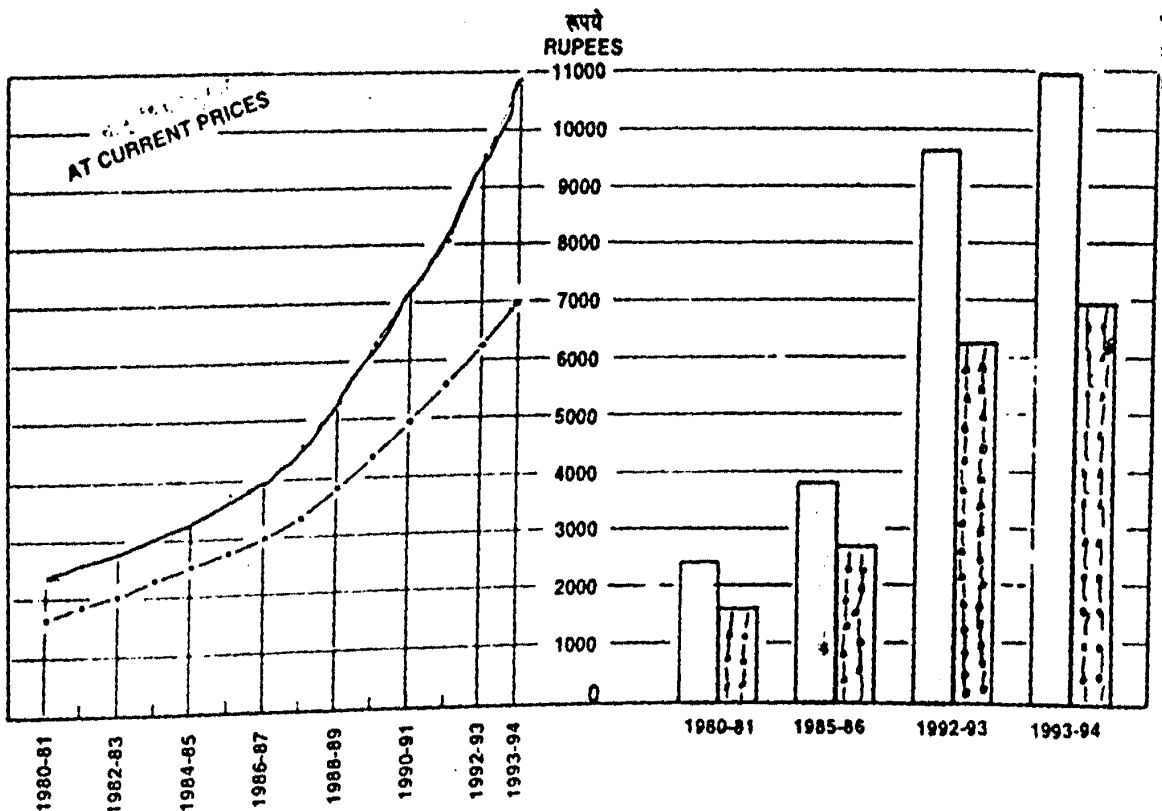
REGIONAL COVERAGE

CHART I

दरदोई उत्पन्न  
PER CAPITA INCOME



महाराष्ट्र — MAHARASHTRA  
भारत — INDIA



Source: Economic Survey of Maharashtra  
1994-95, Bombay.

### दरडोई उत्पन्न

३.६. १९९३-९४ या वर्षामध्ये चालू किमतीनुसार अंदाजित दरडोई राज्य उत्पन्न १४.१ टक्क्यांनी वाढून १०,९८४ रुपये झाले. १९९२-९३ मध्ये ते ९,६२८ रुपये होते. स्थिर (१९८०-८१) किमतीनुसार १९९२-९३ मध्ये दरडोई राज्य उत्पन्न ३,६९६ रुपये होते ते १९९३-९४ मध्ये ३,९०९ रुपयांपर्यंत ऋणजं ५.६ टक्क्यांनी वाढले.

### वाढीचा कल

३.७. १९८०-८१ ते १९९३-९४ या तेरा वर्षांच्या कालावधीत स्थिर (१९८०-८१) किमतीनुसार राज्य उत्पन्नाच्या वाढीचा वार्षिक दर ६.२ टक्के होता. याच कालावधीत दरडोई राज्य उत्पन्नाच्या वाढीचा वार्षिक दर ३.८ टक्के होता.

३.८. स्थिर (१९८०-८१) किमतीनुसार राज्य उत्पन्नाच्या वाढीचा कल, अर्थव्यवस्थेच्या तिन्ही क्षेत्रांत एकसारखा नाही. जरी प्राथमिक क्षेत्रातील उत्पन्न १९८०-८१ मधील ४,२६१ कोटी रुपयांवरून १९९३-९४ मध्ये ६,७६५ कोटी रुपयांपर्यंत वाढले असले तरी दरच्यानच्या काळात त्यामध्ये चढउतार झाले होते. वास्तविक पाहता १९८२-८३, १९८४-८५, १९८५-८६, १९८६-८७, १९९०-९१ आणि १९९१-९२ या वर्षांमध्ये या क्षेत्रात ऋणात्मक वृद्धीदर होता. प्राथमिक क्षेत्राच्या १९८०-८१ ते १९९३-९४ या तेरा वर्षांच्या दीर्घ काळातील वृद्धीदरावर प्रामुख्याने १९८२-८३, १९८४-८५, १९८५-८६, १९८६-८७ व १९९१-९२ या वर्षांतील अवयर्षणग्रस्त परिस्थितीमुळे प्रतिकूल परिणाम झाला होता. या १३ वर्षांच्या काळात प्राथमिक क्षेत्रातील वार्षिक वृद्धीदर ३.४ टक्के होता. द्वितीय क्षेत्राच्या बाबतीत तेरा वर्षांच्या काळात वार्षिक वृद्धीदर ६.४ टक्के होता. १९८१-८२, १९८४-८५, १९८७-८८ व १९९१-९२ ही वर्षे वगळता, द्वितीय क्षेत्रामध्ये मोठी वाढ दिसली. तृतीय क्षेत्रात १९८०-८१ ते १९९३-९४ या काळात, १९८७-८८ हे वर्षे वगळता, सातत्याने अधिक वाढ दिसून आली. या क्षेत्राच्या या काळातील वार्षिक वाढीचा दर ७.७ टक्के होता.

### राज्य उत्पन्न व दरडोई उत्पन्न यांच्या वृद्धीदरांची इतर राज्यांशी तुलना

३.९. १९८०-८१ ते १९९३-९४ या काळात महाराष्ट्रात राज्य उत्पन्न व दरडोई राज्य उत्पन्नाचा सरासरी वृद्धीदर अनुक्रमे ६.२ टक्के व ३.८ टक्के होता. १९८०-८१ ते १९९२-९३ या वर्षासाठी काही महत्त्वाच्या राज्यांची राज्य उत्पन्न व दरडोई उत्पन्नाची आकडेवारी उपलब्ध आहे. ह्या काळातील महत्त्वाच्या राज्यांचे राज्य उत्पन्न व दरडोई उत्पन्न यांच्या वार्षिक वाढीचा सरासरी दर व चालू किमतीनुसार १९९२-९३ या वर्षातील दरडोई उत्पन्नाची आकडेवारी खाली देण्यात आली आहे. या तक्त्यावरून असे दिसून येते की, दरडोई उत्पन्नाच्या बाबतीत महाराष्ट्र, पंजाब नंतर दुसऱ्या क्रमांकावर आहे. राज्य उत्पन्नाच्या बाबतीचा दर विचारात घेतल्यास मात्र महाराष्ट्राचा हरियाणा व राजस्थान नंतर तिसरा क्रमांक लागतो.

### Per capita income.

3.6. The per capita State Income at current prices is estimated at Rs. 10,984 for the year 1993-94 against Rs. 9,628 in 1992-93, showing an increase of 14.1 per cent. At constant (1980-81) prices, the per capita State Income increased by 5.6 per cent from Rs. 3,696 in 1992-93 to Rs. 3,901 in 1993-94.

### Growth trend

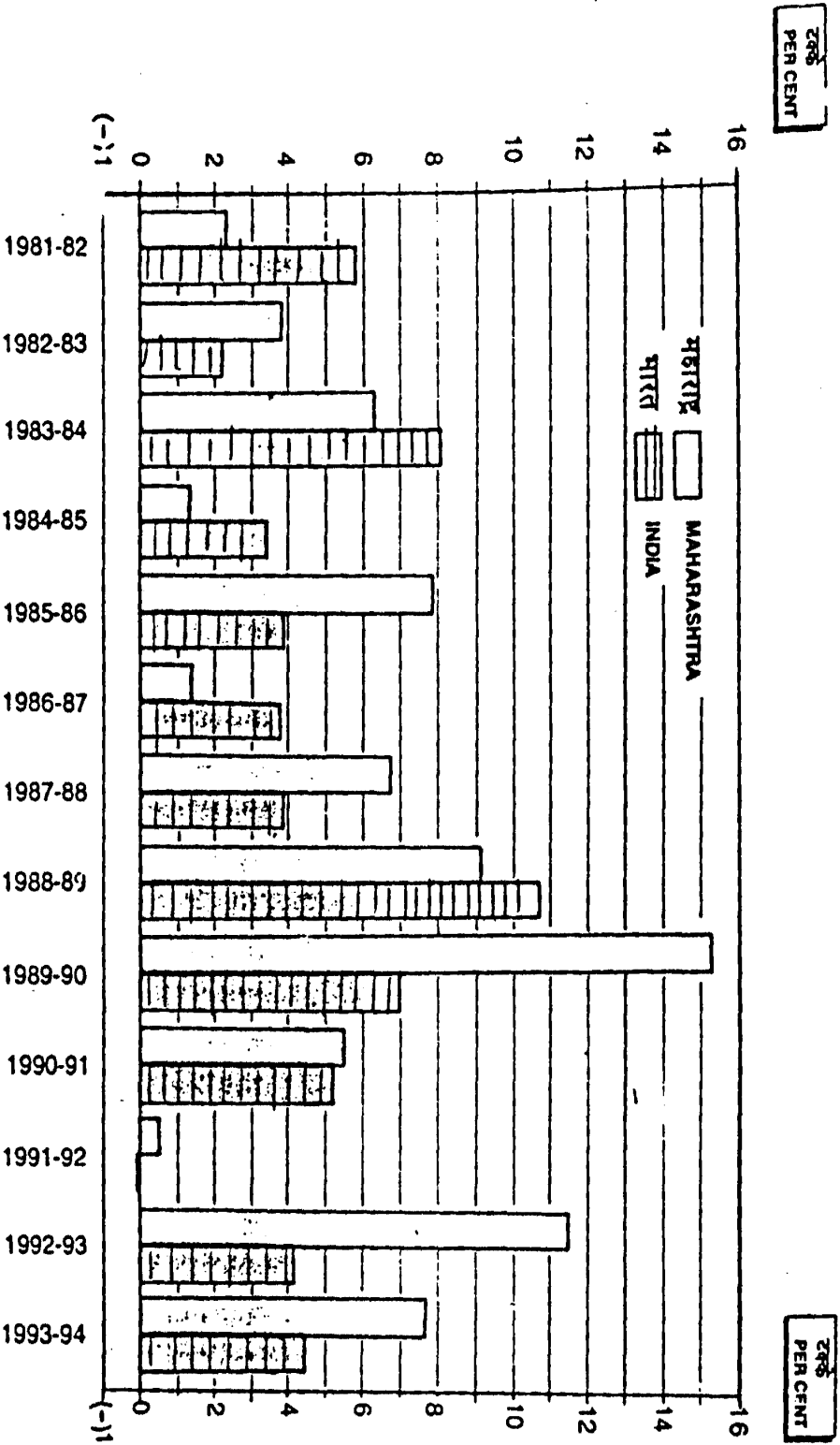
3.7. The growth rate of State Income at constant (1980-81) prices in the thirteen year period 1980-81 to 1993-94 was 6.2 per cent per annum. In this period the growth rate of per capita State Income per annum was 3.8 per cent.

3.8. The trend in the growth of State Income at constant (1980-81) prices is not uniform for all three sectors. Though the income from the primary sector increased from Rs. 4,261 crore in 1980-81 to 6,765 crore in 1993-94, it showed fluctuations in the intervening period. The years 1982-83, 1984-85, 1985-86, 1986-87, 1990-91 and 1991-92 in fact recorded negative growth rates. The long term growth rate of the primary sector in the thirteen year period 1980-81 to 1993-94 was adversely affected mainly due to the drought situation the State faced in 1982-83, 1984-85, 1985-86, 1986-87 and 1991-92. In this thirteen year period, the growth rate in the primary sector was 3.4 per cent per annum. As regards the secondary sector the growth rate in the thirteen year period was 6.4 per cent per annum. Except for the years 1981-82, 1984-85, 1987-88 and 1991-92, the secondary sector showed high growth. In the tertiary sector, there has been a steady high growth during the period from 1980-81 to 1993-94, except for the year 1987-88. The growth rate in this sector was 7.7 per cent per annum in this period.

### Comparison of growth rate of State Income at per capita Income with other States

3.9. In the period 1980-81 to 1993-94, the average annual growth rate of State Income and per capita income for Maharashtra was 6.2 per cent and 3.8 per cent respectively. Data of State Income and per capita income of some important States are available, for the period 1980-81 to 1992-93. The average annual growth rate of State Income and per capita income of important States during this period and per capita income at current prices for 1992-93 are given below. It can be seen from this table that in terms of per capita income, Maharashtra ranks second after Punjab, the growth rate of State Income is considered Maharashtra ranks third after Haryana and Rajasthan.

राज्य व राष्ट्रीय उत्पन्नातील वार्षिक वाढीचे दर  
 ( १९८०-८१ या किंमतींनुसार )  
 ANNUAL GROWTH RATES IN STATE AND NATIONAL INCOME  
 (AT 1980-81 PRICES)



Source: Economic Survey of Maharashtra 1994-95, Bombay.

तक्ता क्रमांक/TABLE No. 3.1

इतर राज्यांचे राज्य उत्पन्न व दरडोई राज्य उत्पन्नाचे १९८०-८१ ते १९९२-९३ या काळातील वृद्धीदर (स्थिर १९८०-८१ किंमतीनुसार)  
Per capita income and growth rates of important states during 1980-81 to 1992-93  
(at constant 1980-81 prices)

अनु- क्रमांक Serial No.	राज्य	वृद्धीदर टक्केवारीत / Growth rates in per cent		घालू किंमतीनुसार दरडोई उत्पन्न		
		राज्य उत्पन्न State Income	दरडोई उत्पन्न Per Capita income	१९९२-९३ (₹) Per capita income at current prices 1992-93 (Rs.)	State	
(1)	(2)	(3)	(4)	(5)	(6)	
1	पंजाब	...	5.2	3.3	10,857	Punjab
2	हरियाणा	...	6.3	3.8	9,609	Haryana
3	कर्नाटक	...	5.3	3.2	5,555 *	Karnataka
4	राजस्थान	...	6.3	3.7	5,035	Rajasthan
5	तामिळनाडू	...	5.4	3.9	6,205	Tamil Nadu
6	उत्तर प्रदेश	...	4.5	2.1	4,280	Uttar Pradesh
7	पश्चिम बंगाल	...	4.6	2.1	5,901	West Bengal
8	केरळ	...	3.3	1.5	4,432 @	Kerala
9	मध्य प्रदेश	...	4.5	2.0	4,725	Madhya Pradesh
10	गुजरात	...	4.3	2.3	7,586	Gujarat
11	महाराष्ट्र	...	6.0	3.7	9,628	Maharashtra

\* १९९१-९२ या वर्षासाठी.

\* Pertains to 1991-92.

@ १९९०-९१ या वर्षासाठी.

@ Pertains to 1990-91.

## राष्ट्रीय उत्पन्नाशी तुलना

३.१०. घालू किंमतीनुसार १९९३-९४ मध्ये राष्ट्रीय उत्पन्नाच्या अंदाज ६,१५,२७३ कोटी रुपये आहे. या वर्षी राज्य उत्पन्न ९१,२०८ कोटी रुपये होते. याच वर्षात घालू किंमतीनुसार दरडोई राष्ट्रीय उत्पन्न ६,९२९ रुपये होते तर दरडोई राज्य उत्पन्न १०,९८४ रुपये होते. दरडोई राज्य उत्पन्न अधिक. सण्ण्याचे प्रमुख कारण म्हणजे राज्यातील नोंदणीकृत कारखानदारी आणि तृतीय क्षेत्राचे (मात्र यार्तील बळंशी भाग मुंबई, ठाणे, पुणे या पट्ट्यातच एकवटला आहे) प्रामुख्यां हे होय. एकूण दरडोई उत्पन्नात नोंदणीकृत कारखानदारीचे व तृतीय क्षेत्राचे उत्पन्न यांचा वाटा पाहिला असता ही गोष्ट स्पष्ट होईल. दरडोई राज्य उत्पन्नाच्या बाबतीत असा वाटा ६,६५८ रुपये होता आणि दरडोई राष्ट्रीय उत्पन्नाच्या बाबतीत तो ३,६६१ रुपये होता.

३.११. १९९२-९३ च्या तुलनेत १९९३-९४ मध्ये स्थिर (१९८०-८१) किंमतीनुसार राष्ट्रीय उत्पन्नात ४.४ टक्क्यांची वाढ दिसून आली, तर राज्य उत्पन्नाने याच कालावधीत ७.६ टक्के वाढ झाली. १९९४-९५ मध्ये देशांतर्गत स्थूल उत्पन्नात ५.३ टक्क्यांनी वाढ अपेक्षित आहे व निव्वळ राष्ट्रीय उत्पन्नातील वाढ यादून फारशी वेगळी असणार नाही. १९९४-९५ करिता राज्य उत्पन्नाचा अंदाज इतक्यातच करणे रास्त होणार नाही. तथापि, कृषि व कारखानदारी क्षेत्रातील वृद्धीबाबत उपलब्ध आकडेवारी आणि इतर क्षेत्रातील अतिकडील वाढीचे कल यावर आधारित तात्पुरते पूर्वानुमान काढता येणे शक्य आहे व त्यानुसार १९९४-९५ मध्ये स्थिर किंमतीनुसार राज्य उत्पन्नात ७.५ टक्क्यांनी वाढ होईल.

३.१२. १९८०-८१ च्या स्थिर किंमतीनुसार मागील १४ वर्षांचे

## Comparison with National Income

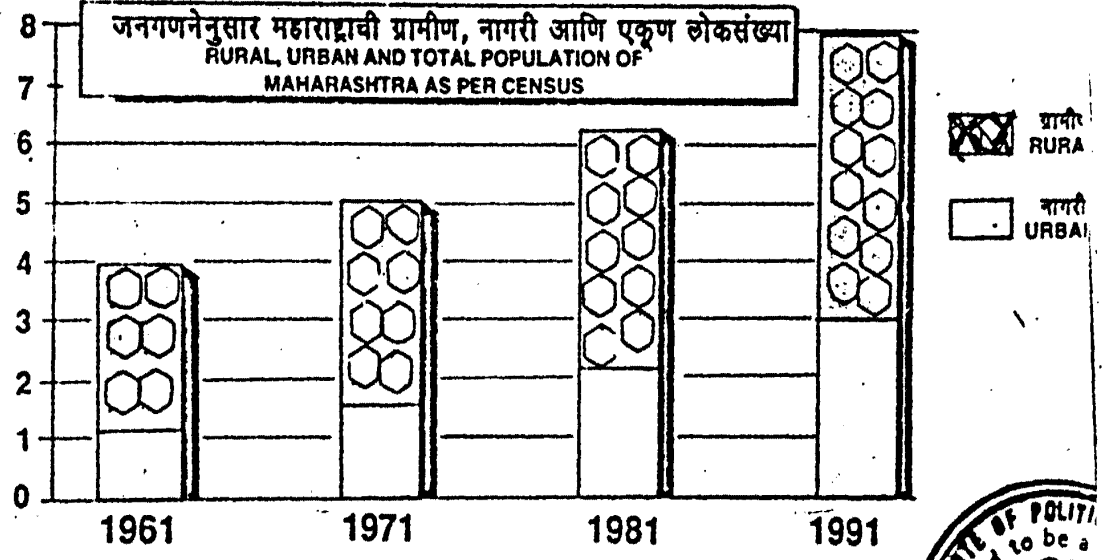
3.10. At current prices, the National Income is estimated at Rs. 6,15,273 crore in 1993-94. In this year, the State Income was Rs. 91,208 crore. The corresponding per capita National Income at current prices was Rs. 6,929 as against per capita State Income of Rs. 10,984. The higher per capita State Income is mainly the result of the prominence of organised manufacturing and tertiary activities in the State (a large part of which is concentrated in the Bombay-Thane-Pune belt). This can be seen from the per capita contribution of organised manufacturing and tertiary activities in the total per capita income. This contribution was Rs. 6,658 in the case of State Income as against Rs. 3,661 in the case of National Income.

3.11. While the National Income at constant (1980-81) prices showed an increase of 1.4 per cent in 1993-94 over that in 1992-93, the State Income registered an increase of 7.6 per cent. The growth in Gross Domestic Product in 1994-95 for the country is placed at 5.3 per cent which is not expected to be much different from the growth of National Income. It is too early to estimate the State Income for 1994-95. However, as per the tentative forecast, based on the available indications of the performance of agriculture and manufacturing sectors and recent growth trends in other sectors, the State Income at constant prices might go up by 7.5 per cent in 1994-95.

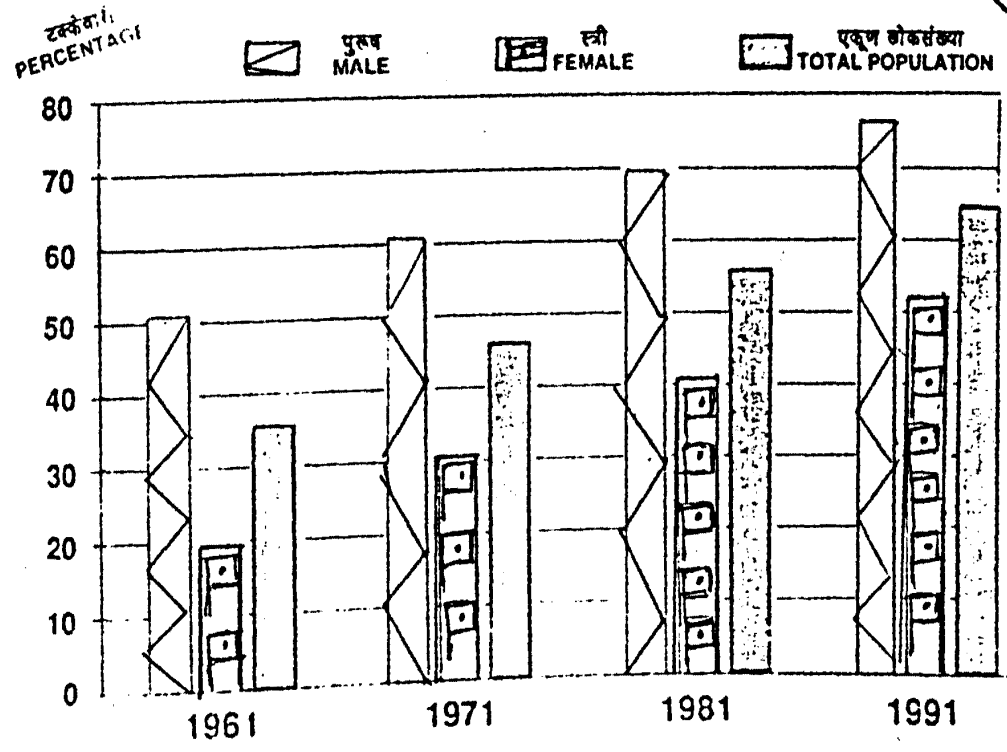
3.12. The estimates at constant 1980-81 prices

महाराष्ट्राची लोकसंख्या  
POPULATION OF MAHARASHTRA

लोकसंख्या कोटीत  
POPULATION IN CRORES



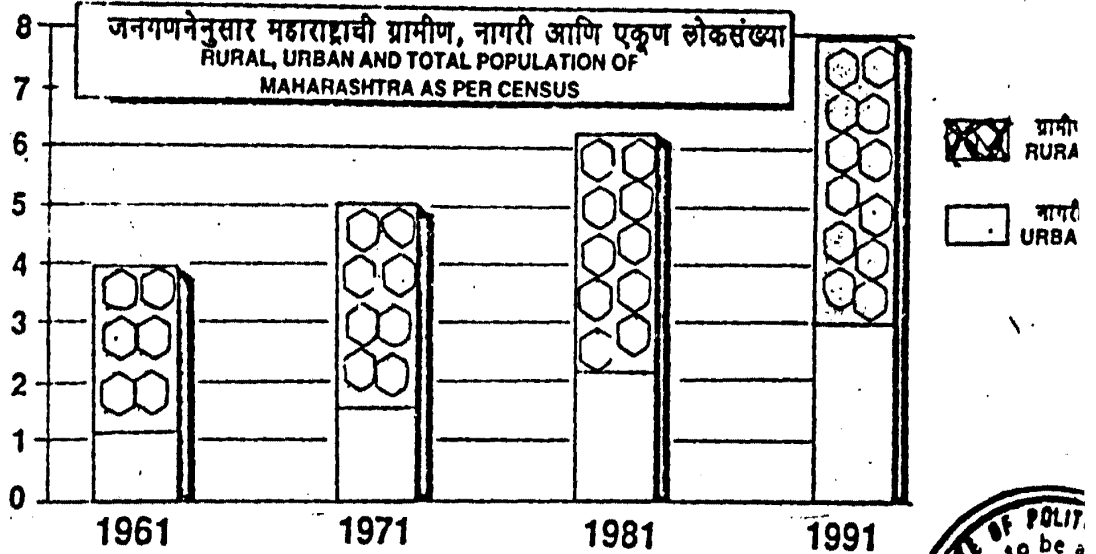
स्त्रिया, पुरुष व एकूण लोकसंख्येसाठी साक्षरतेचे प्रमाण  
LITERACY RATE FOR MALE, FEMALE AND TOTAL POPULATION





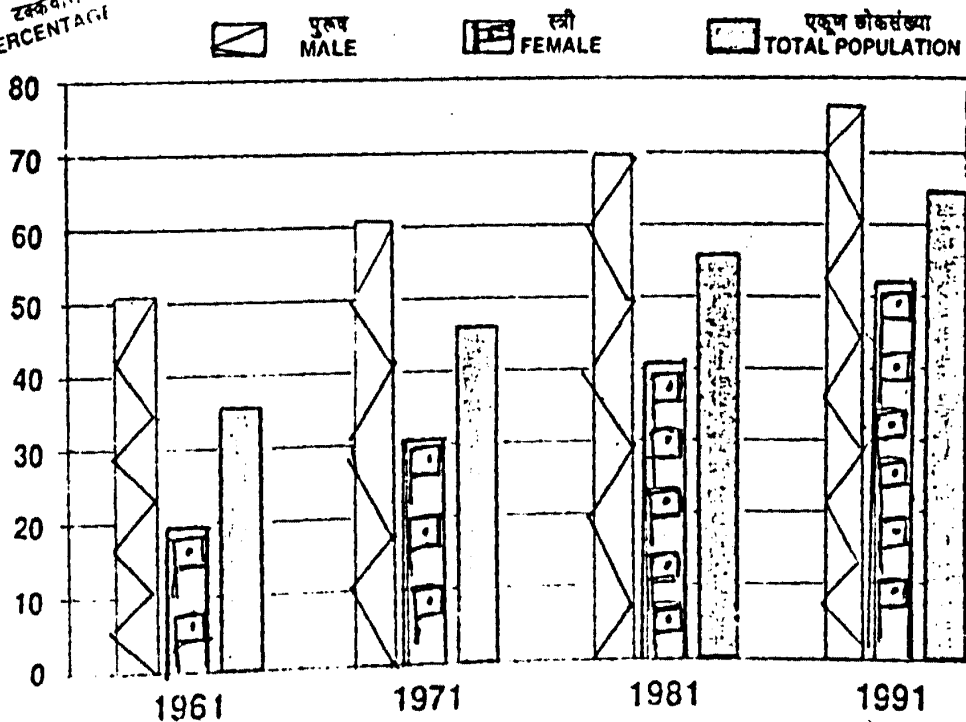
महाराष्ट्राची लोकसंख्या  
 POPULATION OF MAHARASHTRA

लोकसंख्या कोटीत  
 POPULATION IN CRORES



स्त्रिया, पुरुष व एकूण लोकसंख्येसाठी साक्षरतेचे प्रमाण  
 LITERACY RATE FOR MALE, FEMALE AND TOTAL POPULATION

टक्केवाट  
 PERCENTAGE



तक्ता क्रमांक/TABLE No. 5.2  
 महाराष्ट्र राज्यातील विविध उद्योगांचा रोजगारातील वाटा  
 Percentage share of employment in different industries in Maharashtra State

PART C  
 Appex. C. Va

उद्योग (1)	रोजगारावरील कामगारांची दैनिक सरासरी संख्या Average daily No. of workers employed			कामगारांची एकूण कामगारांशी टक्केवारी Percentage of workers to total workers			Industry (1)
	1961 (2)	1992 (3)	1993 (4)	1961 (5)	1992 (6)	1993 (7)	
1) खाद्यवस्तू .. .. .	55,065	1,21,870	1,25,075	7.0	10.5	10.3	Food products.
2) पेये .. .. .	1,080	6,335	7,260	0.1	0.5	0.6	Beverages
3) तंबाखू व तंबाखूचे पदार्थ .. .. .	34,045	4,254	4,173	4.3	0.4	0.3	Tobacco and tobacco products.
4) मूली कापड .. .. .	3,21,031	1,92,885	1,89,241	40.9	16.5	15.6	Cotton textiles.
5) लोहर, रेशीम व मनुष्यनिर्मित तंतूचे कापड .. .. .	34,899	39,087	44,023	4.4	3.4	3.6	Wool, silk and man-made fibre textiles.
6) कापडाच्या वस्तू .. .. .	13,227	24,251	26,811	1.7	2.1	2.2	Textile products.
7) लाकूड व लाकडाच्या वस्तू, फर्निचर .. .. .	10,873	14,799	14,892	1.4	1.3	1.2	Wood and wood products, furniture and fixtures.
8) कागद, कागदाच्या वस्तू, मुद्रण, प्रकाशन व संबंधित उद्योग .. .. .	38,982	50,104	57,270	5.0	4.3	4.7	Paper and paper products printing, publishing and allied industries.
9) कानडी, कपड्यांच्या आणि कंसाकड कातड्याच्या व पयांपी वस्तू .. .. .	1,052	3,144	3,377	0.1	0.3	0.3	Leather and products of leather, fur and substitutes of leather.
10) रसायने व रासायनिक पदार्थ .. .. .	34,048	1,21,129	1,32,786	4.3	10.4	11.0	Chemicals and chemical products.
11) रबर, प्लॅस्टिक, पेट्रोलियम व कोळसा यांचे पदार्थ व अणुसंधनाची प्रक्रिया .. .. .	17,379	46,636	51,592	2.2	4.0	4.3	Rubber, plastic, petroleum and coal products, processing of nuclear fuel.
12) अधातू खनिज पदार्थ .. .. .	28,351	42,147	42,215	3.6	3.6	3.5	Non-metallic mineral products.
13) मूलभूत धातू व मिश्र धातू, धातूच्या वस्तू व सुटे भाग (यंत्रे व सामग्री सोडून) .. .. .	49,853	1,26,582	1,31,349	6.3	10.9	10.9	Basic metal and alloys industries, metal products and parts (except machinery and equipment).
14) यंत्रसामग्री, यांत्रिक अवजारे (परिवहन सामग्री सोडून) .. .. .	59,396	1,61,617	1,68,562	7.5	13.9	13.9	Machinery and equipments (other than transport equipment).
15) परिवहन सामग्री व सुटे भाग .. .. .	46,867	80,635	73,289	6.0	6.9	6.5	Transport equipment and parts.
16) उत्पादन करणारे इतर उद्योग .. .. .	15,657	22,731	24,453	2.0	1.9	2.0	Other manufacturing industries.
17) इतर .. .. .	25,574	1,06,433	1,10,689	3.2	9.1	9.1	Others
	7,87,379	11,61,639	12,12,057	100.0	100.0	100.0	Total

Source: Economic Survey of Maharashtra 1991-92, Bomber.

S. I. PERRINA

जन्म, मृत्यू व बालमृत्यू दरांची त्रैवर्षीय सरासरी, १९८१-१९९३  
Three year moving average of birth, death and infant mortality rates, 1981-1993

कालावधी Period	महाराष्ट्र Maharashtra			भारत India		
	जन्म दर Birth rate (2)	मृत्यू दर Death rate (3)	बालमृत्यू दर Infant mortality rate (4)	जन्म दर Birth rate (5)	मृत्यू दर Death rate (6)	बालमृत्यू दर Infant mortality rate (7)
1981-83 ...	29.3	9.2	76	33.8	12.1	107
1982-84 ...	30.2	9.1	75	33.8	12.1	105
1983-85 ...	30.0	9.0	74	33.6	12.1	102
1984-86 ...	30.0	8.7	69	33.2	11.8	99
1985-87 ...	29.3	8.4	66	32.6	11.3	96
1986-88 ...	29.4	8.5	66	32.1	11.0	94
1987-89 ...	28.9	8.4	64	31.5	10.7	93
1988-90 ...	28.4	8.1	62	30.8	10.3	88
1989-91*	27.4	7.8	59	30.1	9.9	84
1990-92*	26.3	7.8	59	29.5	9.8	80
1991-93*	25.4	7.8	56	29.0	9.7	78

\* जन्म व कारभार वगळून/\*Excludes Jammu and Kashmir.

२.१४. महाराष्ट्रातील जन्म, मृत्यू आणि बालमृत्यू दर १९८१-८३ मध्ये अनुक्रमे २९.३, ९.२ आणि ७६ असे होते. ते अनुक्रमे १३ टक्क्यांनी, १५ टक्क्यांनी आणि २६ टक्क्यांनी घटून १९९१-९३ मध्ये २५.४, ७.८ आणि ५६ इतके झाले. १९९१-९३ मधील भारताच्या तत्सम दरांशी तुलना करता हे दर अनुक्रमे १३ टक्क्यांनी, २० टक्क्यांनी आणि २८ टक्क्यांनी कमी होते.

2.14. The birth, death and infant mortality rates in Maharashtra declined respectively by 13 per cent, 15 per cent and 26 per cent from 29.3, 9.2 and 76 during 1981-83 to 25.4, 7.8 and 56 in 1991-93. These rates were lower by 12 per cent, 20 per cent and 28 per cent during 1991-93 as compared with the corresponding rates for All-India.

उत्पन्न यांची आकडेवारी खालील तक्त्यात दर्शविण्यात आली आहे. तसेच निर्देशांक (१९८०-८१ = १००) मुद्रा सदा तक्त्यात कंसात दर्शविण्यात आले आहेत. १९८०-८१ ते १९९३-९४ या तेरा वर्षांच्या कालावधीत राज्य उत्पन्नात ११३.६ टक्के वाढ झाली म्हणजेच स्थिर किंमतीनुसार ते दुपटीहून अधिक झाले तर राष्ट्रीय उत्पन्नात ८३.१ टक्के वाढ झाली.

of National Income and *per capita* National Income for the last 14 years are given in the following table. The indices (1980-81=100) are also given in this table within the brackets. It can be seen that in the thirteen year period from 1980-81 to 1993-94 the State Income increased by 113.6 per cent. It shows that the State Income of Maharashtra has more than doubled in real terms while the National Income increased by 83.1 per cent.

तक्ता क्रमांक/TABLE No. 3.2

स्थिर (१९८०-८१) किंमतीनुसार राज्य उत्पन्न व राष्ट्रीय उत्पन्न यांचे कत  
Trends in State Income and National Income at constant (1980-81) prices

वर्ष Year (1)	महाराष्ट्र/Maharashtra		भारत/India	
	राज्य उत्पन्न State Income (कोटी रुपयात/Rs. in crore) (2)	दरहोई उत्पन्न Per capita income (रुपये/Rs.) (3)	राष्ट्रीय उत्पन्न National Income (कोटी रुपयात/Rs. in crore) (4)	दरहोई उत्पन्न Per capita income (रुपये/Rs.) (5)
1980-81	15,163 (100.0)	2,435 (100.0)	1,10,685 (100.0)	1,630 (100.0)
1981-82	15,519 (102.3)	2,441 (100.2)	1,17,140 (105.8)	1,693 (103.8)
1982-83	16,116 (106.3)	2,480 (101.9)	1,19,704 (108.1)	1,691 (103.7)
1983-84	17,128 (113.0)	2,579 (105.9)	1,29,392 (116.9)	1,790 (109.8)
1984-85	17,348 (114.4)	2,558 (105.0)	1,33,808 (120.9)	1,811 (111.1)
1985-86	18,714 (123.4)	2,705 (111.1)	1,39,025 (125.6)	1,841 (113.0)
1986-87	18,969 (125.1)	2,666 (109.5)	1,44,242 (130.3)	1,871 (114.8)
1987-88	20,248 (133.5)	2,781 (114.2)	1,49,787 (135.3)	1,901 (116.6)
1988-89*	22,105 (145.8)	2,966 (121.8)	1,65,750 (149.7)	2,059 (126.3)
1989-90*	25,485 (168.1)	3,340 (137.1)	1,77,315 (160.2)	2,157 (132.3)
1990-91*	26,868 (177.2)	3,438 (141.2)	1,86,469 (168.5)	2,223 (136.4)
1991-92*	26,995 (178.0)	3,381 (138.8)	1,86,418 (168.4)	2,178 (133.6)
1992-93*	30,091 (198.5)	3,696 (151.8)	1,94,093 (175.4)	2,226 (136.6)
1993-94	32,391 @ (213.6)	3,901 @ (160.2)	2,02,670 + (183.1)	2,282 + (140.0)

\* अस्थायी/Provisional.

@ प्राथमिक/Preliminary.

+ शीघ्र अंदाज/Quick Estimate.

३.१३. राज्य उत्पन्न व राष्ट्रीय उत्पन्न यांची चालू व स्थिर (१९८०-८१) किंमतीनुसार क्षेत्रवार आकडेवारी या प्रकाशनातील भाग-३ च्या तक्ता क्रमांक ५ ते ८ मध्ये दर्शविली आहे.

3.13. The sectorwise details of State Income and National Income both at current and at constant (1980-81) prices are presented in tables 5 to 8 Part-II of this publication.

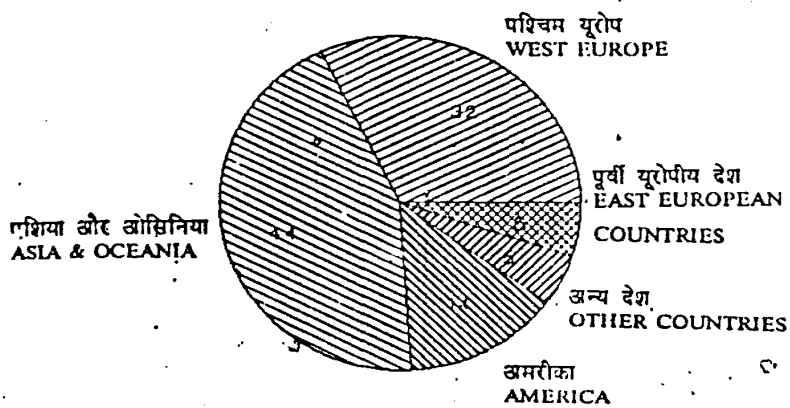
Source: Economic Survey of Maharashtra 1994-95, Bombay.

PART D.

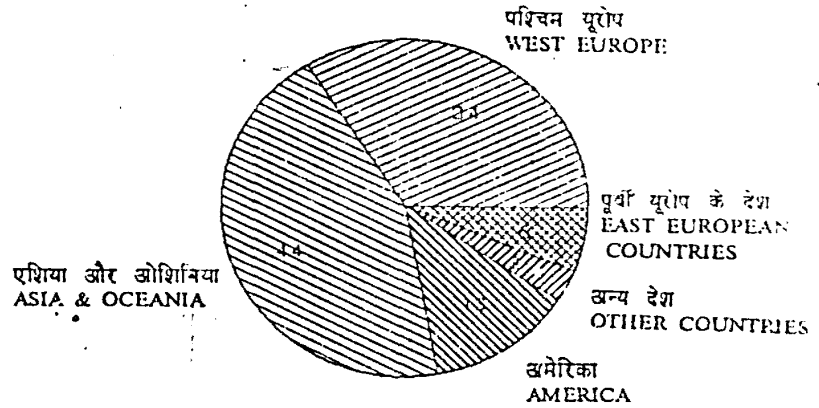
PART D.  
Appdx. D. I.

Dr. G. I. PERSHMA

वर्ष 1991-92 एवं 1992-93 के दौरान  
भारत के आयात व्यापार की दिशा  
**DIRECTION OF INDIA'S IMPORT TRADE**  
DURING 1991-92 & 1992-93



1991-92



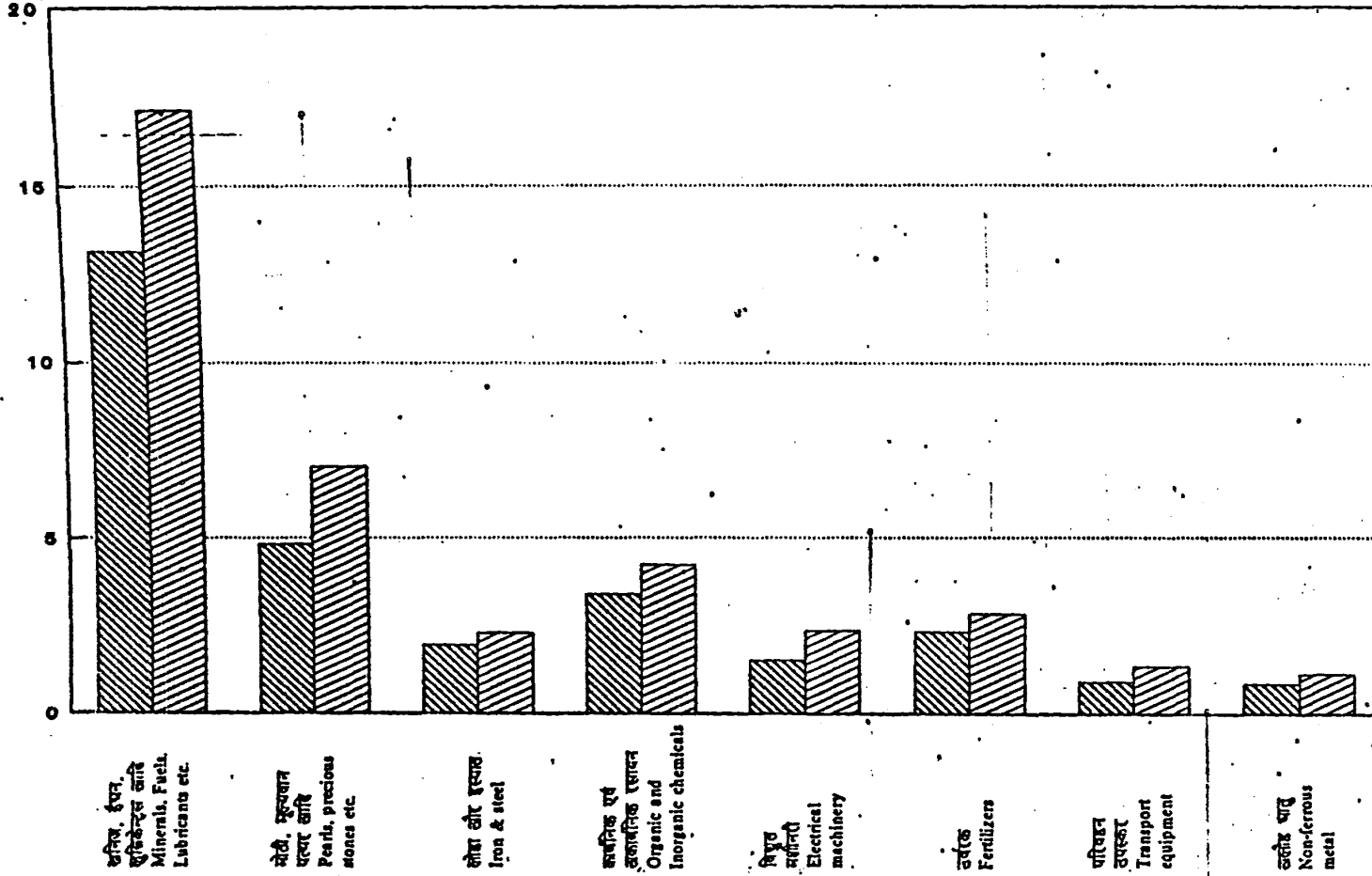
1992-93

वर्ष 1991-92 और 1992-93 के दौरान  
प्रमुख वस्तुओं का आयात  
IMPORT OF PRINCIPAL COMMODITIES  
DURING 1991-92 & 1992-93

PART D  
Appdx D. II

मूल्य : हजार करोड़ रुपए  
Value in Rs. Thousand Crores

1991-92 1992-93



Ms. G. I. PEREIRA  
Source: Annual Report, Ministry of Commerce, Govt. of India, 1992-93

118.0

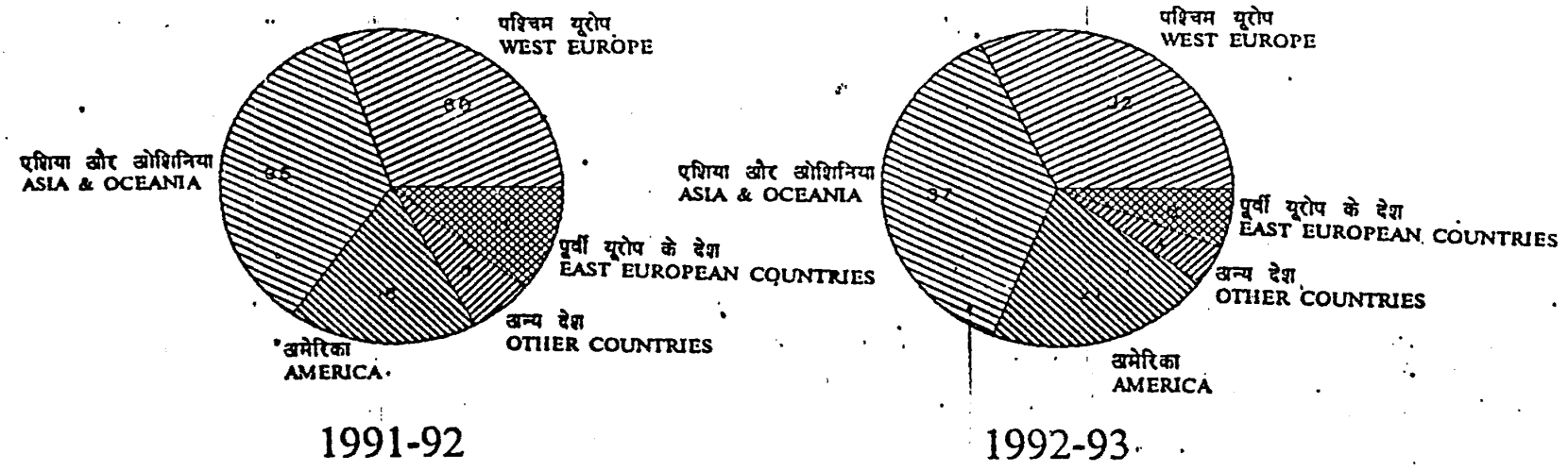
PART D

Appendix D IV

177

S. G. I. PEREIRA

1991-92 और 1992-93 के दौरान भारत  
के निर्यात व्यापार की दिशा  
**DIRECTION OF INDIA'S EXPORT TRADE**  
**DURING 1991-92 & 1992-93**



Source: Annual Report 1992-93, Ministry of Commerce, Govt. of India, pp. 45.

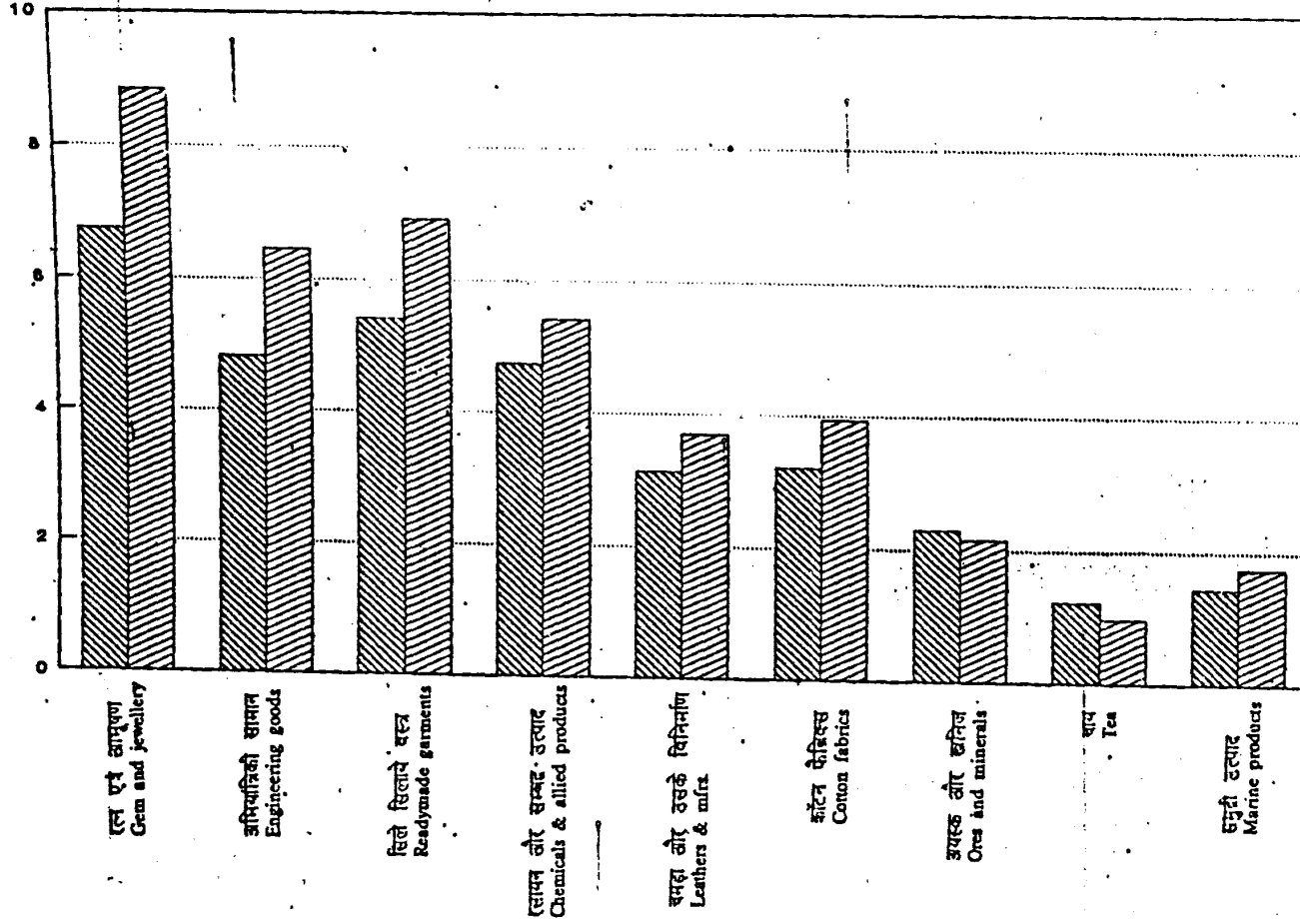
PART D

Appdx. D III

वर्ष 1991-92 और 1992-93 के दौरान मुख्य वस्तुओं  
का निर्यात निष्पादन  
EXPORT PERFORMANCE OF PRINCIPAL COMMODITIES  
DURING 1991-92 & 1992-93

मूल्य : रुपये हजार करोड़  
Value : Rs. Thousand Crores

1991-92 1992-93



Source: Annual Report, Min of Com. 1992-93

Col. N. Selhi

40. GENERAL



INDIA'S EXPORTS (INCLUDING RE-EXPORTS) IMPORTS AND  
BALANCE OF TRADE DURING 1981-82 TO 1992-93

Value: Rs. Crores

Y E A R	Exports (including Re-exports)	Imports	Balance of Trade
1981-82	7805.90	13607.55	(-) 5801.65
1982-83	8803.36	14292.74	(-) 5489.38
1983-84	9770.71	15831.46	(-) 6060.75
1984-85	11743.68	17134.20	(-) 5390.52
1985-86	10894.59	19657.69	(-) 8763.10
1986-87	12451.95	20095.65	(-) 7643.70
1987-88	15673.67	22243.74	(-) 6570.07
1988-89	20231.50	28235.22	(-) 8003.72
1989-90	27681.47	35411.88	(-) 7730.41
1990-91	32553.38	43192.86	(-) 10639.48
1991-92	44041.81	47850.84	(-) 3809.03
1992-93 (P)	53350.54	62922.80	(-) 9572.26

P - Provisional Figures

Source :- Directorate General of Commercial  
Intelligence and Statistics, Calcutta.

## PART. D.

Appendix D VI

## 4.1.3 ESTIMATED SHARE OF FOREIGN TRADE BY SEA IN TOTAL FOREIGN TRADE OF INDIA BY ALL MODES OF TRANSPORT DURING 1980-81 TO 1992-93

(Value in Rs.Crores.)

Year	Total exports including Re-exports	Share in Exports (in percentage)	Total Imports	Share in Imports (in percentage)	Share of Sea borne trade to total Foreign Trade (in percentage)
(1)	(2)	(3)	(4)	(5)	(6)
1980-81	6711	79.1	12549	90.8	86.7
1981-82	7806	79.2	13606	91.9	87.2
1982-83	8803	79.0	14293	86.5	83.7
1983-84	9771	74.4	15831	85.4	81.2
1984-85	11744	77.3	17134	87.7	83.6
1985-86	10895	71.7	19658	87.9	82.2
1986-87	12569	65.8	20201	82.7	76.1
1987-88	15674	62.1	22244	77.2	71.0
1988-89	20232	59.7	28235	72.9	67.4
1989-90	27681	59.5	35416	69.6	65.2
1990-91	32553	67.3	43193	81.1	75.1
1991-92	44042	66.6	47851	80.8	74.0
1992-93	34821	64.9	49457	78.0	72.0

(Source: i) Ministry of Commerce.  
ii) RBI Publication, Report on Currency and Finance.

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PART D.

No. 31 — FOREIGN TRADE  
A : ANNUAL

M. S. G. I. PEREIRA

Appdx. D VII a

Year	In Rs. Crore			In US \$ million		
	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance
1	2	3	4	5	6	7
1970-71	1,535	1,634	-99	2,047	2,179	-132
1971-72	1,608	1,825	-217	2,161	2,453	-292
1972-73	1,971	1,867	104	2,566	2,431	135
1973-74	2,523	2,955	-432	3,239	3,793	-554
1974-75	3,329	4,519	-1,190	4,193	5,691	-1,498
1975-76	4,042	5,265	-1,223	4,657	6,066	-1,409
1976-77	5,142	5,074	68	5,726	5,650	76
1977-78	5,408	6,020	-612	6,296	7,008	-712
1978-79	5,726	6,811	-1,085	6,958	8,275	-1,317
1979-80	6,418	9,143	-2,725	7,924	11,287	-3,363
1980-81	6,711	12,549	-5,838	8,486	15,868	-7,382
1981-82	7,806	13,608	-5,802	8,704	15,173	-6,469
1982-83	8,803	14,293	-5,490	9,108	14,788	-5,680
1983-84	9,771	15,831	-6,060	9,449	15,311	-5,862
1984-85	11,744	17,134	-5,390	9,878	14,412	-4,534
1985-86	10,895	19,658	-8,763	8,905	16,067	-7,162
1986-87	12,452	20,096	-7,644	9,745	15,727	-5,982
1987-88	15,674	22,244	-6,570	12,088	17,156	-5,068
1988-89	20,232	28,235	-8,003	13,970	19,497	-5,527
1989-90	27,658	35,328	-7,670	16,612	21,219	-4,607
1990-91	32,558	43,193	-10,635	18,145	24,073	-5,928
1991-92	44,042	47,851	-3,809	17,866	19,411	-1,545
1992-93	53,688	63,375	-9,687	18,537	21,882	-3,345

- Notes: 1. The foreign trade data relate to total sea, air and land trade, on private and Government accounts. Direct transit trade, transshipment trade, ships' stores and passengers' baggage are excluded. Data include silver (other than current coins), notes and coins withdrawn from circulation or not yet issued, indirect transit trade and trade by parcel post. Exports include re-exports. Imports include dutiable articles by letter post and exclude certain consignments of foodgrains and stores on Government account awaiting adjustment, diplomatic goods and from October 1979 defence stores. Imports and exports are based on general system of recording. Imports are on c.i.f. basis and exports on f.o.b. basis inclusive of export duty. The export figures for the period November 1970 to March 1973 are based on original copy of the shipping bills whereas the figures for the rest of the period are based on the finally passed shipping bills.
2. In the case of rupee data, monthly figures may not add up to the annual total due to rounding off. In the case of data in dollar terms, monthly data may not add up to the annual total also due to exchange rate factor.

January 1994

## RESERVE BANK OF INDIA BULLETIN

No. 31 — FOREIGN TRADE  
B : MONTHLY

R. S. I. PEREIRA

S 93  
Appendix D. 11/16

Month	1992-93						1993-94 (PR)					
	In Rs. Crore			In US \$ million			In Rs. Crore			In US \$ million		
	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports	Trade Balance
1	2	3	4	5	6	7	8	9	10	11	12	13
April	4,009	5,173	-1,164	1,387	1,789	-402	5,638	5,480	+158	1,801	1,750	+51
May	3,789	5,224	-1,435	1,327	1,829	-502	5,321	5,503	-182	1,898	1,758	+140
June	3,887	5,717	-1,830	1,364	2,008	-642	5,298	6,242	-944	1,887	1,988	-101
July	4,052	5,647	-1,595	1,421	1,981	-560	5,723	6,060	-337	1,824	1,932	-108
August	4,519	4,933	-414	1,591	1,736	-145	5,480	5,108	+354	1,740	1,628	+112
September	4,323	5,406	-1,083	1,527	1,904	-377	5,227	5,918	-689	1,866	1,888	-220
October	4,449	4,773	-324	1,567	1,682	-115	5,600	5,745	-145	1,785	1,831	-46
November	4,310	5,294	-984	1,517	1,863	-346	5,349	5,182	+167	1,705	1,652	+53
December	4,274	5,542	-1,268	1,480	1,919	-439	5,568	6,242	-676	1,774	1,990	-216
January	4,544	4,659	-115	1,566	1,608	-40						
February	5,310	5,518	-208	1,768	1,834	-68						
March	6,224	5,493	+731	1,974	1,743	+231						

Note : Figures for December 1993 are provisional.

(PR) — Partially Revised.

Source : Directorate General of Commercial Intelligence &amp; Statistics, Calcutta.

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M.S. C. PEREIRA

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LIST OF TERMS & ABBREVIATIONS

1. Load line: The outer line on the body of a ship upto which she submerges in water with safety. It varies according to the seasons and waters in which she plies.
2. Draft: The Draft necessary to submerge a ship to their load lines.
3. Dead Weight Tonnage (DWT). It is the number of tons of (2240)pounds stores, fuel and cargo, that a ship can transport. This, representative the actual carrying capacity of a ship.
4. Gross Registered: It applies to the vessels and not to cargo. It is the weight of the volume occupied by the closed in spaces of a ship taking 100 cubic fuel of such closed in spaces, as equivalent to one vessel ton. It thus refers to the cubic capacity of the vessel.
5. Net Registered Tonnage (NRT): It refers to the earnings space capacity of a ship available for the storage of cargo and accommodation of passengers. It is obtained by deduction from GRT the cubic capacity.
6. Ore/Oil & Bulk Carrier: A bulk cargo ship designed to carry ore and oil enabling thereby to be loaded in both directions.
7. Tankers: Cargo ships constructed or adopted for the carriage in bulk of liquid cargoes of an inflammable nature.
8. Sailing Vessels: Any description of vessel provided with sufficient sail areas for navigation under sail alone.

whether or not fitted with mechanical means of propulsion and includes a rowing boat or crane, but does not include a pleasure craft.

9. Roll on - Roll Off: (Ro-Ro) It is frequently called a vehicle ferry. It is designed for the conveyance of road vehicles and private cars. At each terminal port, a ramp of link span is provided enabling the vehicles to drive on or off the vessels, thereby eliminating cranes and cargo handling (and also pilferage) and permitting a quick turn round of the ships.
10. A day of occupation of a berth (quay or mooring) by a ship.: (Berth day)
11. Ship Day: A day spent in harbour by a ship.
12. Turn-Round Time: Total time spent by a ship since its entry till its departure.
13. Port Dues: A levy of ports Authority on a ship.
14. Pilotage: A port charge for guiding a ship in or out of a harbour through channels, passages or other waters by an authorised pilot.
15. Output per Berthday: Total tonnage handled distributed over the total number of berthdays.
16. Idle time: Non waiting time of a ship (without loading or unloading of cargo) at berth.
17. Pre-berthing detention: The time which a ship waits before getting entry into a berth.
18. Berth Occupancy: The time which a berth is occupied (by ship).



## M. G. I. PEREIRA

19. Export : Loaded overseas traffic.  
Import : Unloaded overseas traffic
20. Traffic: A scalar with only magnitude but no direction such as the total of exports and imports or loaded and unloaded cargo.
21. Traffic Flows: A vector with magnitude and direction such as passengers embarked/disembarked or cargo exports/imports.
22. Gang: Gang is a group of workers formed as one unit for the purpose of handling cargo in the act of discharging from or loading on to the ship inside the hatch-hold of the vessel or in the deck as per necessity.
23. Gang shift: Refers to a gang (irrespective of number of persons in the gang) working in one shift.
24. Gang Hours: Number of hours per shift multiplied by number of gang shifts
25. Craneage: The hire charges for providing a port crane for crane handling.
26. Wharfage: A port charge on the ships for all cargo conveyed on over or through a wharf/berth.

### B. Terms Relating to Type of Ships:

1. Passenger ship. A ship carrying more than twelve passengers.
2. Unberthed Passenger Ship: A ship carrying more than Twelve passenger.

## MICHAEL PEREIRA

3. Cargo Ship: A ship which is not a passenger ship.
4. Liner - Ship that plys on a regular scheduled service between groups of ports. The ships of liner company are common carriers, offering cargo space or passenger accommodation to all shippers and passenger require them. A liner company is generally engaged on trade routes where large volume of cargo or passenger traffic is available.
5. Tramps : Cargo ships operating all ports of the world without a fixed route and sailing schedule in search of primarily bulk cargo carried generally in ship loads.
6. Ore/Oil and Bulk Carriers: A bulk cargo ship designed to carry ore and oil enabling thereby to be loaded in both directions.
7. Collier: Generally a coastal ship designed to carry coal.
8. Tankers: Cargo ships constructed or adopted for the carriage in bulk of liquid cargoes of an inflammable nature.
9. Sailing Vessels: Any description of vessel provided with sufficient sail area for navigation under <sup>5</sup>ails alone, whether or not fitted with mechanical means of propulsion, and includes a rowing boat or canoe but does not include a pleasure craft.
10. Fishing vessels: A ship fitted with mechanical means of propulsion which is exclusively engaged in sea-fishing for profit.

11. Sea-Going: In relation to a vessel. It means a vessel proceeding to sea beyond inland water or beyond waters declared to be smooth or partially smooth waters by the Central Government by notification in the Official Gazette.
12. Coasting Ship: A ship exclusively employed in trading between any port or place in India and any other port or place on the continent, of India or between ports or places in India and other places.
13. Home Trade Ship:- A ship not exceeding three thousand tons gross which is employed in trading between any port or place in India, or any other port or place like Sri Lanka, Maldives Island etc.
14. Foreign going ships: A ship not being a home trade ship employed in trading between any port or place in India and any other port or place or between ports or places outside India.
15. Terms relating to Rates:
  - i. A. Liner Conferences: An organisation whereby a number of shipowners offer their services on a given sea-route on conditions agreed by the members. A Conference line ship is a vessel of a shipowner belonging to such Shipping conference.
  2. Voyage and Time Charter Rates: A voyage charter is a contract for a specific voyage while a time charter is one for a period of time which may cover several voyages. A voyage charter rate is thus a short term rate and the time charter rates, a long-term one.

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Source: Basic Port Statistics, and Shipping Statistics of India. Ministry of Surface Transport. Govt Press N. Delhi. (annually) -