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FEASIBILITY APPRAISAL OF DAMIETTA PORT PROJECT
A Case Study On Financial Profitability Analysis

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1. INTRODUCTION

As a result of the congestion probelm in the Egyptian ports and the identified need for additional port capcities, the Ministry of Development and New Communities on behalf of the Egyptian Government, has requested in April 1977 the services of a foreign consultant* to carry out a master plan for the establishment of a new port facility at Damietta. In July 1979 a five volume study was submitted and subsequently approved by the Government.

Upon investigating possible investment policies, the Government was seeking answers to several queries. Chief among these was the question on the profitability of the project and consequently whether it would be attractive for foreign investors if the project is implemented and the port is operated on concessional terms. This report was prepared to serve this end. Although it might had little impact on the final decision concerning this project, yet it is presented here as an apprpriate case on appraisal of the financial profitability aspects of port projects.

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* Frederic R. Harris.

2. BACKGROUND

2.1. Project Idea

In 1977, the Consultant, upon a request from the Ministry of Housing & Reconstruction, carried-out a study to forecast the size of the Egyptian foreign trade in the period from the year 1980 through 2000 and allocate such trade to the Egyptian ports. One of the main recommendations of this study was to establish a new port including a container trans-shipment facility to serve the international trade on the Mediterranean Sea somewhere near the entrance of the Suez Canal. Damietta was suggested as a possible location for the proposed new port.

2.2 Demand Projections

In this previous study which focused only on dry cargo and excluded liquid cargoes, commodities have been classified into 4 main groups namely; containerizable, neobulk, special handling, and dry bulk commodities. Cargo allocations to the individual ports were decided upon through somesort of an idealized procedure wherein a zonning system has been adopted for both Egypt as well as the outer world. Origin-destination matrices were then established for both imports and exports. A non-constrained least-cost algorithm was applied to find-out the optimum route for each commodity under consideration and consequently the allocation of these commodities to the various ports of Egypt including the proposed new port at Damietta.

The above procedure have resulted in delineating the service area for each port. A service area for a particular port is defined as the group of domestic zones which are best served by this port for a certain group ofhomogeneous commodities. Damietta port service areas are shown in Figures 2.3 & 2.4[1]/

1/ Tables and figures of the consultant study referred to in this report retain their original numbering and are reproduced in Appendix (B) for easy reference.

Detailed throughputs (imports & exports) of the port are given in table (3.1). Total throughputs are estimated to be 5,591,010 and 16,460,350 metric tons in 1985 & 2000 respectively.

On the other hand, transshipment cargoes, are projected for 1985 and 2000 in three different variants; high, medium and low as shown in table (3.2). Transshipment cargo using the port are recommended to have a preferential treatment upon transiting the Suez Canal. Imports-exports as well as transshipment forecasts up till the year 2000 are assumed to follow approximately a straight line pattern(!). These lines are extrapolated till the year 2010 to obtain further forecasts for the years 2005 & 2010 as shown in table (3.3) & Fig (3.3) .

2.3. Projected Traffic

In the early stages of port operations, container traffic is expected to be in medium-size ships, 1600 DWT, carrying on the average 2000 tons per voyage. Container ship traffic is expected to increase gradually. By the year 2000, 40000 DWT ships with an average load of 10.000 tons per voyage are expected. For other cargo, traffic is estimated as given by the following table:-

	Early Years of Port Oper.		Year 2000	
	Ships DWT	Load/voyage (tons)	Ships DWT	Local/voyage (tons) -
Break Bulk Cargo	10,000-15,000	500	up to 20,000	1,000-1580
Neobulk Cargo	12,000-16,000	5000-10,000	up to 20,000	-
Special Cargo	8,000-10,000	-	up to 20,000	-
Dry Bulk Cargo	up to 70,000	25,000	up to100,000	40,000-50,000

2.4. Port Configuration

In order to outline the main configurations of the intended part, 5 alternatives, (Fig 6.1 through 6.5) , have been considered. A weighted point rating system has been applied to select the best alternative against several criteria (table 6.1). Eventually, the final configuration of the port became as outlined in figure (6.11) . One immediate observation on such layout is the limited space for future expansion. A detailed listing of the part component as stated in the master plan is given on pages 6.22; 6.24 and 6.25 . These components are briefly reviewed hereafter:

(1) Navigational Components:
Which include a 300 meter wide, two way entrance channel, a 4.5 sq. km offshore anchorage, a 800 meter turning area, a barge basin, a fishing boats channel, and a marine services harbor.

(2) Coastal Protection and a Breakwaters.

(3) Berthing system
Container, RO/RO - General Cargo - Neobulk - special Handling - Grain & Cement.

(4) Port Buildings
Sheds - Warehouses - Container repair station - Raliroad station - Mech Maintenance - Customs - Adminstration ..etc.

(5) Grain & Cement Silos.

(6) Power and utilities.

(7) Port supporting facilities.
Fire station - First aid - Mosque - Roads - Entrances Parking areas - .. etc.

(8) An Industrial Area.

2.5. Berth Requirements

In order to find out the number of berths required for each cargo handling group, berth productivity figures have been decided upon by means of the consultant's "in-house" simulation model. The model assumes a Poisson arrival pattern and a negative exponential service time. Although no adequate details are given, this model seems to be a standard queuing-simulation model. The productivity figures derived from such a model are as follows:

Container berth	6750	tons/day.
General Cargo	600	tons/day.
Neobulk	1200	tons/day.
Special Handling	2000	tons/day.
Grain	1000	tons/hour.

The number of hours and/or shifts per day are not quiet clear. However, the decided upon berth requirements are shown in tables 4.2 & 4.3 for the years 1985 & 2000 respectively. In addition, one berth for the navy is also included in the plan. Berth-related facilities are given in table (4.4) .

2.6. Location and Site Selection:

The selected location of the new port at Damietta has been one of the findings of the consultant's previous study "Development policy for the Ports of Egypt". Such a port is estimated to introduce a saving of almost L.E. 10 million in 1985 over the next least-cost foreign trade allocation on the Egyptian ports*. Therefore the second study has focused on determining the exact site of the new port. Several field survey tests have been conducted to locate the

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* It is not clear whether the savings induced by another alternative location outside the Suez Canal area; has been tested or not.

required site. One of the major draw-backs, however, of this area is the erosion phencmenon of the shore-line. Coast erosion in the next 200 years is estimated and reproduced in figure 5.22 . This explains to a certain extent the relatively long inland entrance channel of the port.

2.7. Construction Schedule

Port construction is suggested to be carried out in 3 phases as follows:

Phase I:

Ends by 1985 when port operations can be partially started. This phase comprises dredging of the entrance channel, turning area and harbour basin in addition to the construction of the breakwaters, 12 berths, and some administrative buildings.

Phase II:

Extends from 1985 till the end of 1986 during which 9 additional berths are constructed.

Phase III:

Extends from 1989 till the end of 1996. Construction works in the respective phases are shown in Figures (8.7) through (8.9) . A bar-chart of the whole schedule is given in Fig. (8.1) .

2.8. Project Capital Investment Costs:

Project investment costs amounts to U.S.$ 484.710 million and L.E. 75.586 million. total costs are made-up of the following items:

(1) Construction costs:

Which in-turn are classified into:

- Port superstructure
- Port infrastructure
- Miscellaneous
- 20% contingency

(2) Land

(3) Equipment

Construction quantities and costs by item and construction phase are shown in table (8.1) . Land value contour map is given in Fig. (5.2) . Equipment list and estimated costs are shown in table (9.1) . Year by year distributions of the above 3 cost items in local and foreign currencies are shown in tables (11.10) & (11;11) for phase I and Phase II respectively.

All cost items are expressed in constant prices of 1979. Construction cost items do not include construction management, design and some necessary additional field inspections. Prices of imported equipments are CIF Alexandria. No estimates have been made for container chasses. The assumption is that container liner companies using the terminal will provide them.

2.9. Operating Costs:

It should be noted here that in section 11.6 of the consultant's study, an upper limit on the operating and maintenance costs for the new port at Damietta was arbiterarily fixed as equal to the cost of handling its throughput through the other ports of Egypt in the absence of Damietta port. Based on this concept, an estimate of the operating and maintenance costs of the new port is obtained which includes the costs of operating the transshipment facility as shown in table (11.2). The cost side of the subsequent cost-benefit analysis, table (11.12), however, considered only the operating cost of the transshipment terminal.

In a subsequent section (section 11,10,3) another estimate of the operating costs is given in the proforma operating statement. Operating costs are estimated on a per/ton basis. It is divided into direct operating costs (labour, equip., spare parts, supplies, ...etc) and indirect oper, costs (power, fuel, O.H regular maintenance,..etc). The average operating cost on a per ton basis is estimated to be L.E. 5.21 for direct costs and L.E. 1.07 for indirect costs. The five-year proforma operating statement is given in table (11.4) .However, the cargo throughputs on which this statement is based do not match exactly with the throughputs of table (3.1).

2.10. Benefits:

The benefits considered in the Consultant's study are broadly classified into direct benefits and developmental Benefits.

2.10.1. Direct Benefits:

These include: -

- Transport Cost savings
- Reduced ship waiting time
- Reduced cargo holding Cost
- Income from the transshipment terminal and its related activities.

2.10.1.1. Transport Cost Savings:

are derived from cost differentials taken from the computerized study of commodity flows for the "with" and "without" Damietta cases. The costs are the least-cost transportation path between orignins & destinations taking into account the load factor on the various modes. These flows were not constrained by port capacities conditions. Transp. Cost savings in L.E. thousands/ year are as follows:

Cargo Handling Group	1985	2000
A	6682	7533
B	924	1959
C	266	794
D	1763	2832
	9635	13118

After the year 2000, the consultant estimates that transport cost savings will remain constant in spite of the increasing cargo ghroughput. (page 11-7). This assumption, however, violates the figures of table (11, 12)

2.10.1.2. Reduction in Ship Waiting Time

The amount of such reduction was obtained using an "in-house" model. The method assumed increases in berth productivity as given by table 11.3. Waiting time savings resulted from such analysis is given in table (11.4). The corresponding cost savings are shown in table (11.5). Figures of this later table are based on the following cost per day in port of a standard "representative" ship for each cargo handling group:

Cargo-Handling Group	Representative Ship	ship in port/day
Containerized	1595 TEU	$ 14 000
General Cargo	(not given)	8 000
Neobulk	15000 DWT	8 000
Special	15000 DWT	8 000
Drybulk	36000 DWT	7 000
	100000 DWT	10 000

2.10.1.3. Reduction in Cargo Holding Cost

That is the value of the capital tied up in commodities held in the port while waiting service (exports & imports).
These Figures are computed as follows:

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A = Commodity annual throughput, tons

B = Average vessel waiting time, h/s

C = Average commodity value per ton, L.E.

D = Opportunity cost of capital = 12%

E = Working hours per year = 8760

$$\text{Holding Cost} = \frac{A \times B \times C \times D}{E}$$

2.10.1.4. Transshipment Terminal Revenue & Its Related Activities

Two types of benefits are accounted for:

(1) Revenue of operating the terminal, table (11.6), and

(2) Revenue from container maintenance and repair, It is assumed in the first year that 31 containers per day would be repaired at a rate of L.E. 250 per container. The net revenue is assumed to be 30% of the previous results.

2.10.2. Developmental Benefits:

Among 16 developmental benefits, listed by the consultants the following 3 main items were quantified and incorporated in the benefit-cost analysis: -

(1) Promoting exports of fresh vegetables.

(2) Creation of fish processing, freezing and packaging industry.

(3) Creation of a containers manafacturing activity.

Promotion of exports of fresh vegetables is stated to be linked with a system of inland ports and upgrading of technology. On the other hand the issue of whether the port will induce an increased vegetable production or merely divert certain amount from the local market to exportation is not clear in the analysis. The price level assumed for vegetable products 510 LE/ton. Net revenues are assumed to be 0.25 of this price. Due to the cost of an inland port system, only 40% of the net revenue was considered as a benefit due to the project. Table 11.7 gives the estimated amount of such benefits.

Benefits from the creation of fish processing industry are computed in a way similar to the computations of vegetables exportation. The assumtions used are:

L.E. 550/ton	Sales price of frozen Fishes
25%	net revenue of the activity
60%	of the above product is attributed to the port.

Fishing benefit stream is shown in table (11.6)

likewise, the benefits of the container manufacturing activity (table 11.9) is computed in a similar way based on the following assumptions.

L.E. 4250	1979 price of a dry cargo container
L.E. 6375	1979 price of a refregirated container

30% of the net revenue is a port benefit.

2.11. Port Revenues

The cost-Benefit analysis did not account for the total port revenue. Revenue of the transshipment terminal only were considered. However in the financial proforma of table (11.14) an estimate pf sicj revenue for the period 1985-1989 is given. Based on estimates per ton, operating, capital, and depreciation costs are given. A probable rate that exceeds the break-even point is then suggested and consequently the total revenue is computed. Again the basis for estimating the cargo throughputs in this table is not clear.

2.12. Structure of Finance:

The study proposed a financing structure to be secured official concessionary aids, private commercial banks, and export promoting agencies in the developed countries. The proposed

loan sizes, terms, and repayments are illustrated on table (9) of this report.

2.13. Port Operation

Upon operation, an organization structure as that shown in figure (10.11) is suggested. The port outhority is in charge of almost all port functions.