V. MANAGEMENT AND OPERATION SYSTEM

A. CURRENT SITUATION OF MANAGEMENT & OPERATION OF THE SUEZ CANAL

SUEZ CANAL OUTLOOK

(i) Physical Feature of the Canal

291. Since its opening, the Suez Canal has been playing an important role both in the world economy and in Egyptian economy by connecting the economies of the east and west.

292. The Canal connects the Mediterranean Sea with Red Sea over a distance of 162km and it is the world longest channel without locks. The channel has been widened and deepened to meet the demand of international shipping.

293. North and South Approaches are set at both ends of the Canal. Timsah Lake, Great Bitter Lake and Little Bitter Lake are situated along the Canal. Layout of the Canal and historical development are shown in Table 48 and Table 49.

Table 48 Outline of the Suez Canal

Overall length	190.250km
From Port Said to Port Tewfic	162.250km
From Port Said to Ismailia	78.500km
From Ismailia to Port Tewfic	83.750km
From the fairway buoy to Port Said lighthouse	19.500km
From the waiting area to the southern entrance	15.000km
The length of doubled parts	78.000km
Width at water level (North/South)	345/280m
Width between buoys (North/South)	210/180m
Maximum permissible draught for ships	58ft
Cross section area (North/South)	4,500/3,900m^2
Cross section after expansion	4,700/4,000m^2
Permissible speed for tankers group	11-15km/hr
for other vessels	13-16km/hr

Source: SCA

Table 49 Historical Development of the Suez Canal

Item	1869	1956	1962	1980	1994	1996	2000
Overall Length (km)	164	175	175	190.25	190.25	190.25	190.25
Doubled Parts (km)	-	29	29	78	78	78	78
Width at 11m depth (m)	-	60	90	160	210/180	210/180	210/200
Water Depth (m)	10	14	15.5	19.5	20.5	21	21
Max. Draft of Ship (feet)	22	35	38	53	56	58	58
Cross Section Area (m^2)	304	1,100	1,800	3,600	4,300 /3,800	4,500 /3,900	4,500 /4,100
Max. Tonnage (DWT)	5,000	30,000	80,000	150,000	180,000	185,000	195,000

Source: "Yearly Report 1999", SCA

294. The depth of the main channel, including the eastern branches of the by-pass sections, is 21.0m (permissible ship draught is 58ft), while that of the western branches is 15.5m (partially 14.5m). The depth of the main channel, including the eastern branches of the by-pass sections, will be 22.5m (permissible ship draught is 62ft) in 2001. The Canal cross sections are trapezoidal in shape, having side slopes of 4/1 in the northern part up to Km.61.00 and 3/1 in the southern part.

295. The Canal is provided with five by-passes;

- **Port Said By-Pass:** This by-pass starts at Km.17.00 and extends north to join the existing Port Said roadstead at Hm.94.90 and continues till Hm.195. It is fitted with bollards on the Western side, spaced every 100 meters.
- **Ballah Loop:** Between Km.51 and Km.61, the Canal is doubled in the East by a branch. The zone comprising the 2 branches of the Canal limited by the North and South ends where the 2 branches meet is called "Ballah Loop". The length of the East Branch is 8.490 Km.

	West Branch	East Branch
✧ - Kilometric marking of North end	51.477	51.449 E
✧ - Kilometric marking of South end	60.333	59.943 E

  In the West branch, 15 mooring berths are situated on the Eastern bank.
- **Timsah By-Pass:** This by-pass situates between Km. 76.580 and Km 81.700 E. The length is 5.110 Km, counted at right angle from Km. 76.578 to Km. 81.700. The by-pass is used by North-bound and South-bound vessels.
- **Deversoir By-Pass:** This branch begins at Km.95.000 and joins

the main East channel in Great Bitter Lake at Km.104.160. The length is 9.160 km.

- **Kabrit By-Pass:** The By-Pass begins at Km.114.957 and ends at Km.122.100. The by-pass is separated from the west branch by a submerged island at a depth between 2 and 6 meters. The width of the island varies between 200 meters in the North and 66 meters in the South.

296. Anchorage area in Lake Timsah and Great Bitter Lake, waiting areas in the Port Said, Port of Suez and in the Canal other than the channel and bypasses are the other main facilities.

(ii) Economic Features of the Canal

297. The Canal was closed from 1967 to 1974. This came at a time when the world economy was rapidly growing, in particular, there was an increasing demand for crude oil transport. Hence, the impact which the closure of the Canal had on the world economy was very severe as is mentioned in the latter section of this chapter.

298. Although the Canal's relative share in terms of cargo transiting the Canal versus world sea-borne cargo and its economic contribution to the Egyptian economy have been decreasing, it is still playing an important role both in the Egyptian economy and in the world economy.

299. About 6% of the world's sea-borne cargo is now transiting the Canal compared to 3-4% for the Panama Canal.

300. As to the short cut effect, the distance via Suez Canal route is 29% of distance via the Cape route in traveling between the port of Mumbay and port of Ismir and 71% in case between Singapore and Rotterdam. Considering the maritime shipping trunk line connecting the west and the east of the Canal, it can be said to constitute the artery of world economic activity.

301. The role the Canal plays in the Egyptian economy is also important. The importance of the Canal toll revenue in the national economy can be identified by looking at its share in the national government's current revenue and in the foreign currency earnings in the balance of payment.

302. In the national budget account, the contribution is allocated to tax revenue which the SCA pays in the form of industrial and commercial tax (42% of net profit) and to fees in the form of royalty (5% of toll revenue) and to profit transfer in terms of surplus. Tax and fees are not explicitly denoted in the

statistics but the profit transfer is explicitly denoted as 2,914 million LE in 1998/99 (around 5% of the current revenue of the state budget). Although the share in the national budget is decreasing relative to that of tax revenue, the amount of transfer from SCA is still almost equivalent to that from other major authorities (Petroleum Authority of Egypt and Central Bank of Egypt).

303. Looking at the foreign currency earning in the balance of payment account, Suez Canal revenue accounts for 9% of the total, almost twice that of petroleum exports in 1998/99. Considering the negative current account balance of Egypt, the Canal is still an important source of foreign currency revenue.

Table 50 Suez Canal Toll as a GDP share

(Lemn)

GDP at Factor Cost (1996/97 prices)	97/98	share	growth rate	98/99	share	growth rate
GDP	253,090	100%	5.7	268,398	100%	6
Commodity Sector	126,209	50%	6.5	133,335	50%	5.6
Productive Service Sector	81,242	32%	4.8	87,024	32%	7.1
Transport & Communication	17,300	7%	6.8	18,355	7%	6.1
Suez Canal	***6,502***	***3%***	***0.1***	***6,519***	***2%***	***0.3***
Trade	44,015	17%	6.2	46,670	17%	6
Finance	10,340	4%	10	11,550	4%	11.7
Insurance	202	0%	11	221	0%	9.4
Restaurants & Hotels	2,883	2%	−24.7	3,709	1%	28.7
Social Seervice Sectors	45,639	18%	5.1	48,039	18%	5.3

Table 51 Suez Canal Toll in the State Budget Revenue

(Lemn)

The State Budget Revenue	96/97	97/98	98/99	share97	share98	share99
total revenue	**64,498**	**67,963**	**71,295**			
current revenue	**60,753**	**63,889**	**66,626**			
central government	**57,179**	**60,035**	**62,449**			
tax revenue	***40,518***	***43,962***	***47,149***	***67%***	***69%***	***71%***
Non tax revenue	***16,661***	***16,073***	***15,300***	***27%***	***25%***	***23%***
profit transfers from;	11,423	10,780	9,802			
The petroleum authority	4,788	3,870	2,227	8%	6%	3%
Suez Canal authority	***2,828***	***2,940***	***2,914***	***5%***	***5%***	***4%***
Central Bank of Egypt	2,587	2,617	3,222	4%	4%	5%
Others	1,220	1,353	1,439			
Fees	1,427	1,483	1,532			
Miscellaneous	3,811	3,810	3,966			
Local Government	**2,354**	**2,426**	**2,601**	**4%**	**4%**	**4%**
Service Authorities	**1,220**	**1,428**	**1,576**	**2%**	**2%**	**2%**
Capital Revenue	**3,745**	**4,074**	**4,669**			

Table 52 Suez Canal Toll in the Foreign Currency Earnings

(Lemn)

	92/93	93/94	94/95	95/96	96/97	97/98	98/99
Transfers	19,127.8	13,651.7	14,251.4	11,957.0	14,070.3	15,613.4	16,541.7
share	32%	25%	22%	19%	20%	23%	24%
Suez Canal	**6,472.8**	**6,714.5**	**6,986.6**	**6,397.9**	**6,276.1**	**6,029.4**	**6,015.6**
share	**11%**	**12%**	**11%**	**10%**	**9%**	**9%**	**9%**
Travel	7,918.3	6,001.6	7,802.5	10,215.8	12,377.1	9,979.8	10,989.6
share	13%	11%	12%	16%	18%	15%	16%
Petroleum	7,040.8	5,977.3	7,383.2	7,555.0	8,749.8	5,866.2	3,396.0
share	12%	11%	12%	12%	12%	9%	5%
Others	18,767.2	21,792.8	27,065.6	27,580.2	28,899.4	31,015.7	32,117.0
total	**59,326.9**	**54,137.9**	**63,489.3**	**63,705.9**	**70,372.7**	**68,504.5**	**69,059.9**

304. It is therefore urgent to have a tool to forecast the toll revenue based on an accurate estimation of transit demand and more profitable toll structure as well as to diversify revenue sources both for SCA and the Egyptian Government.

MANAGEMENT SYSTEM OF THE SUEZ CANAL

305. The Suez Canal is managed and operated by the Suez Canal Authority. According to the SCA Act, SCA is a public organization having an independent legal status and its own budget. Most of the regulations of the Government which are applicable to public enterprises and private business firms do not apply to SCA, however, SCA's annual budget must undergo the examination of the Ministry of Finance and the Ministry of Planning and be approved as prescribed by Presidential Decree.(For details, refer to the *ANNEXII, CHAP.6)*

306. SCA has its head office in Ismailia, liaison offices in Cairo and Alexandria and branches in Port Said and Port Tewfik (Suez) for handling field works.

307. SCA is managed by a Board of Directors consisting of a chairman and directors. The chairman concurrently assumes the managing directorship, assisted by thirteen directors of the various service and operational departments, and is responsible for day to day management and operations.

308. The organization of SCA consists of 13 departments which are directly responsible to the Chairman. At present, there are about 14,500 employees and workers within the SCA.

309. Management Dept. consists of one director, four deputy directors

and four sub-directors. The department inspects all that is submitted to the SCA Chairman from different departments, and acts as the general secretariat that receives all issues from other SCA departments. The Director of management is in charge of all the consultative activities such as activities of the technical office, public relations and security, follow up and control and organization, administration and training.

310. Legal Dept. consists of one director, one deputy director and two sub-directors and is involved in the following;

- Preparation of draft internal regulations and penalties, as well as other draft regulations and decrees.
- Providing legal opinion to SCA companies.
- Looking after all cases filed by or against SCA.
- Follow up of procedures following a case won by SCA.
- Giving legal counsel to SCA departments on various issues.
- Conducting administrative investigations with SCA staff referred to the Legal Dept.
- Revising laws and regulations of SCA to make sure they do not contradict applicable public regulations.
- Designing the legal wording of adjudication and tenders and participation in related procedures.
- Legal preparation of contracts and agreements between SCA and other parties.
- Registration of SCA belongings.

311. Financial Dept. consists of one director, five deputy directors and ten sub-directors and is in charge of the following

- Participation in setting the overall plan of the SCA and ways to achieve the set plan.
- Performing all jobs related to financial affairs (accounts, costs, statistics, revenues, expenses, banks and treasuries).
- Setting the finance policy of the SCA.
- Participating in the preparation of SCA projects plan as well as preparing the necessary studies and finding sources of finance in either local or hard currency. Preparing financial and monetary balance in relation to SCA current activities and future projects.

- Preparing necessary financial and accounting studies to safeguard proper financial and accounting performance at SCA, as well as studying the existing financial and accounting systems and developing them.
- Participating in setting categories for transit dues, berthing dues and service charges.
- Participating in specifying the hire value of SCA units.
- Participating in specifying categories for the rent of land and building.
- Participating in setting the policy for purchasing and storage.
- Implementing financial and accounting regulations and instructions.
- Setting programs for internal auditing and systems for internal control, as well as necessary inspection for all SCA activities.

312. Personnel Dept. consists of one director, three deputy directors and six sub-directors and is in charge of the following;

- Setting administrative systems and programs, and supervising their implementation by SCA departments.
- Setting programs and instructions for the implementation of personnel affairs regulations and solving problems that may stand in the way.
- Specifying the manpower requirements at different levels in coordination with the concerned departments.
- Preparation of the estimated job balance with relevant incurred expenses.
- Regulating recruitment at SCA departments.
- Regulating the payment of wages and financial entitlements for officials and workers.
- Implementing the laws and regulations of social insurance.
- Studying and regulating increments prior to decision-making.

313. Services Dept. consists of one director, two deputy directors, four sub-directors and four medical sectors and is in charge of the followings;

- Providing medical supervision and treatment to SCA personnel.

- Setting the budget of the sector.
- Setting a work plan for the sector and defining its requirements (workmanship and supplies).
- Follow up and implementation of treatment programs.

314. Procurement Dept. consists of one director, four deputy directors and twelve sub-directors and is involved in all purchasing transactions. It stores and provides all raw materials and production requirements as well as equipment needed by the SCA. Purchases have to be made in accordance with required standards and specifications and at competitive prices either through general adjudication or direct orders as per valid regulations. Items have to be supplied at proper times and have to be properly stored in order to avoid accumulation. The department has to make sure to satisfy and meet all requirements and has to look after customs clearance on provisions.

315. Affiliated Dept. consists of one director, two deputy directors and two sub-directors and can well be considered an advisory office through which the Chairman (SCA Chairman) can implement and follow up the general policy of the state so far as the companies affiliated to SCA are concerned.

316. Transit Dept. consists of one director, two sector chiefs, six deputy directors and twelve sub-directors and is involved in the following;

- Planning and coordination of vessel traffic, and the arrangement of convoys transiting the Canal, berthing location and all matters related to the good operation of the waterway.
- Implementing the pilotage regulations.
- Planning and implementing safety program for transiting ships of different tonnage, especially for ships carrying dangerous cargo.
- Inspecting the transiting ships and registering all particulars and details, determining the ship's tonnage and deciding the transit dues payable upon transit, and collecting the dues in accordance with set regulations.
- Providing navigational services and trouble shooting assistance for transiting ships that suffer any sort of problems, thus keeping and maintaining regular and smooth traffic.
- Planning and implementing salvage works for damaged floating units due to accidents, and combating pollution along the waterway.

- Supervising work related to the lifting of sunken units and equipment.
- Planning and implementing the installation, maintenance and operation of telecommunication sets for all SCA facilities.
- Installing and operating the VTMS for ship-to-ship communication.

317. Engineering Dept. consists of one director, three deputy directors and seven sub-directors and is in charge of the following;

- Preparation of documents and implementation of drawings for the Suez Canal development projects (dry excavation works, building of new revetments, dredging works).
- Design and implementation of the projects related to the operation of the navigable channel (quays, platforms, ferry berths, signal stations, pilotage towers).
- Design, implementation and maintenance of the service quays at the SCA shipyards and workshops in the three canal cities.
- Architectural and structural design as well as supervision over various projects necessary for the operation of the Suez Canal (workshops, stores, training centers, offices etc.)
- Maintenance works for canal revetments, quays, platforms and berths along the Canal.
- Design and implementation of various projects for the extension of high power and communication cables as well as siphons under the canal to serve the development projects in Sinai.

318. Dredging Dept. consists of one director, four deputy directors and six sub-directors and is in charge of the following;

- Execution of the Suez Canal Development projects, as well as work related to the Canal waiting areas and berths.
- Maintenance work for the navigational channel.
- Looking after the annual schedule for the operation of SCA dredgers and follow up of such schedules.
- Follow up of day-to-day reports on dredgers' operation, and drawing necessary plans that illustrate the work which has been carried out.
- Participation in dredging works for third parties where the department

prepares the relevant studies, design and technical specifications prior to implementation by using SCA dredgers.

- Carrying out the necessary maintenance and minor over-hauls for dredgers and floating units, as well as works for schools and clubs that can be done at the department's work shops.
- Operation and maintenance works for ferry boats along the Canal.
- Preparation of necessary over-hauls schedule for the dredgers to be carried out at various shipyards with due supervision and follow up.
- Preparation and implementation of over-hauls schedules for tug boats, floating cranes sand barges, water tankers etc. either at the department's workshops in Ismailia or the SCA companies and shipyards.
- Supporting the on-shore equipment by introducing new units such as bulldozers, pipe and sand carriers etc. and maintaining such equipment.

319. Shipyards Dept. consists of one director, four deputy directors and ten sub-directors and is in charge of the following:

- Maintenance and repair of SCA floating units.
- Maintenance and repair of SCA mechanical and electrical equipment.
- Manufacture of special items/spare parts for SCA units and facilities.
- Repair works for various departments of SCA.
- Shipbuilding including tugs, dredgers and cranes for both the SCA and third parties.
- Ship repair for third parties.
- General repair works for third parties.
- Management and operation of ferry boats between Port Said and Port Fouad.
- Management and operation of the 2 power plants in Port Fouad and Raswa.
- Management and operation of the high pressure networks in Port Fouad.
- Management and operation of the floating units belonging to the

shipyards.

- Management of the SCA vocational training center.
- Conducting studies for the mechanical and electrical projects provided by the SCA.
- Supervision over the maintenance and repair of SCA equipment sent to SCA companies in Port Said.

320. Works Dept. consists of one director, five deputy directors and five sub-directors and is in charge of the following;

- Implementation of all civil, architectural and offshore construction works needed by SCA such as projects of Port Said Harbor, revetments of the Canal banks, roads and bridges and housing projects.
- Maintenance for all SCA installations and facilities.
- Setting all operation and maintenance programs and implementing them for various facilities such as the power plants, potable water plants, machinery and equipment as well as services rendered to quarries and Port Said Harbor.
- Effecting laws and regulations related to lands owned by the SCA and keeping relevant documentation and registration.
- Supervision and maintenance of SCA gardens and green areas.

321. Planning, Research and Studies Dept. consists of one director, four deputy directors and nine sub-directors and is involved in tasks of the Engineering Research Center, Planning section, the Economic Unit, Information and Documentation Center. Among them, the Economic Unit is responsible for the following;

- Conducting studies on the economics of maritime transport and the world market,
- Conducting studies on the SCA toll structure,
- Conducting feasibility studies on the Suez Canal development projects.
- Participation in conducting the feasibility studies for some national projects.

322. Main functions of SCA relating to the management of the Canal

are the transit control in the Canal and the maintenance and improvement of the Canal and ports. Vessels transiting the Canal organize convoys at Port Said or Suez, in accordance with the Rules of Navigation, the schedule set by SCA, and the directions of the SCA officials (harbor master, port officer, pilot, signalman etc.). When navigating in the two Ports and the Canal, they take on a SCA pilot for obtaining advice on maneuvering. Operation of a convoy is controlled by the transit control in Ismailia.

323. The maintenance work for the Canal consists mainly of maintenance dredging. In addition to the management of the Canal itself, equally important is the management of Port Said. Being in a close relation with the transit control of the Canal, the management of this port has been treated on a unified basis.

324. SCA has established several committees for the effective management of SCA and the Canal.

325. The Long-haul Committee—SCA has a special committee to treat the rebate of Long-haul called the "Long-haul Committee" headed by the Director of the transit dept. and comprising representatives from SCA departments. The committee aims at attracting ships which do not use the Suez Canal due to lack of incentives. The Long-haul rebate system is explained in more detail in the latter part of this chapter (refer to Toll Structure and Rates).

326. Purchase Planning Committee — Each department specifies its requirements of capital goods (dredgers, tugs boats, motor boats, cranes, etc.). Such requirements are submitted to a special committee called the "Purchase Planning Committee" headed by the director of the procurement dept., and comprising representatives from all SCA departments. Once the committee is satisfied with the feasibility study enclosed with the purchasing request, approval is duly given and the value is estimated. A time table is then estimated for the supply of the required equipment and allocations are suggested to cover the period of time needed. The purchase planning committee presents its report to the SCA chairman for approval. Once approved by the SCA chairman, the requesting department sets forth detailed specifications. The specifications are to be sent to the procurement Dept. to be duly revised prior to purchasing. The procurement Dept. specifies the proper way of purchase either through a general adjudication to be published in local and international newspapers, or a limited adjudication, or through direct order to a specific company. In case of adjudication, two committees—

Envelope opening committee, and Study and decision making committee— are formed by decree from the SCA chairman. The first committee gets the bids (technical and financial) and refers them to the second committee for necessary study. The second committee produces a report to the relevant authority (Director of procurement—Chairman or Board of Directors). Once approved the procurement dept. signs the relevant contract with the company of the best bid.

327. Computer Committee—The committee undertakes the following tasks;

- Setting a general time plan for the optimum use of computers and development of such plan, as well as distributing computer terminals among SCA departments and automation of administrative and technical work.
- Providing information services and maintaining the communication network for the complete connection of computers.
- Setting regulations for the exchange of data among SCA departments with due consideration to confidentiality.
- Maintaining a library for keeping documents and software and adding whatever is deemed necessary by heads of departments.
- Making a full inventory of required equipment and the best method for maintenance, and meeting such requirements in coordination with the "Purchase Planning Committee", and following up of the latest developments in such equipment.
- Description of the required staff for operation and maintenance works in coordination with the organization and training section.

The committee may add other tasks to its activities and may seek the assistance of certain individuals to achieve its objectives. Recommendations of the committee should be presented to the Chairman for approval.

328. There are additional sections such as Marine salvage section and the Engineering Research Center.

329. Marine salvage section—As mentioned above both Port Said and Port Tewfik shipyards have a "Marine Salvage Section" manned with a team of engineers and divers. Each section is equipped with a floating crane of 500ton capacity and is credited with undertaking various marine salvage works, in

addition to under water inspection, welding and cutting operations.

330. SCA Engineering Research Center — This center is under the Planning, Research and Studies Dept. as mentioned above and is in charge of conducting studies and researches connected with the development of the Canal itself, beaches, harbors, in addition to conducting experiments on traffic in general, testing of materials and soil mechanics. It is equipped with the specialized laboratories necessary for its researches including a *reduced* dredging volume model in the Canal. In recent years, this center has carried out a study on the measurement of siltation at Damietta port.

331. Other services necessary for ship operation are provided by private companies. Fresh water supply, garbage collection and service are executed by ship chandler, and fuel supply, etc. are provided by private firms under the permission of the Ministry of Transport. SCA is only managing these ships enter the Canal area for its services.

332. Other activities which SCA is extending over the Canal zone cover a wide range of businesses, such as the management of Port Tewfik, provision of sweet water to Port Said, Ismailia and Suez, 3 cities located along the Canal, management of schools and hospitals, and operation of ferry services crossing the Canal.

333. Further, SCA has affiliated companies which are engaged in shipbuilding, ship-repairing, port services and/or other businesses and to which SCA is extending investment, and joint-venture or dispatch of a supervisor or director. These affiliated companies are as follows:

- In Ismailia—Timsah Shipbuilding Co., Suez Canal Investment Co., The Canal Company for Harbors and Great Projects.
- In Port Said—The Canal Company for Mooring and Searchlights, The Canal Company Ropes, Natural and Synthetic Fiber Products, The Canal Naval Construction Co., The Port Said Engineering Works Co., The Canal Harbor Works.
- In Suez—The Suez Shipbuilding Co.

OPERATION SYSTEM OF THE SUEZ CANAL

334. Passage through the Canal is operated on a convoy system. The S-bound and N-bound convoys are usually timed so that they will pass the Great Bitter Lake. Northbound convoys consist of two groups;

- Group A — (i) Naval ships, 4th Generation container ships, 3rd generation container ships over and similar, LASH vessels over 40,000 SCGT, LPG and LNG (loaded or non gas-free), loaded chemical carriers with the transit speed of 11 to15 km/hr (6 to 8.1 kn), (ii) Loaded VLCC's, conventional loaded tankers and heavy bulk carriers (draught over 11.6 m (38 ft) or length over 289.7 m (950 ft) between perpendiculars) with the transit speed of 11 to 15 km/hr (6 to 8 kn).

- Group B—Cargo and other vessels anchored in Suez anchorages with transit speed of 13 to 16 km/hr (7 to 8.6kn).

335. Times for arrival and departure are;

- 0100—Vessels in Group A (i) and (ii) should have anchored in the anchorage and be declared ready for transit by their agents. Vessels anchored and ready by 0300 can also be accepted in the tanker group, for an additional charge of 3% of the Canal dues. Vessels arriving between 0300 and 0330 can also join the tanker group for an additional charge of 5% of the Canal dues.

- 0300—Vessels in group B must have anchored in waiting area S of Newport Rock Channel and be declared ready for transit by their agents. Vessels arriving between 0300 and 0400 can join Group B for an additional charge of 3% of the Canal dues. Vessels arriving 0400 and 0500 can join the convoy against a surcharge of 5% of the Canal dues.

- 0600—Vessels of Group A (i) headed by container ships enter the Canal at Km 160. Group A (ii) follows the last vessel of Group A (I) at about 0700: Group B follows the last vessel of Group A (ii) up to about 1130. A third group may precede Group A (i), if the traffic situation warrants it, entering the Canal between 0300 and 0430.

336. The N-bound convoy usually proceeds without stopping via El Kabrit East Branch (Km 122 to Km 115), Great Bitter Lake East Branch, Deversoir East Branch (Km 103 to Km 95), Lake Timsah By-pass, El Ballah East Branch 'Km 61 to Km 51), Port Said By-pass and Port Said By-pass Approach Channel. If the N-bound convoy has to stop in the Bitter Lakes , vessels anchor in the Great Bitter Lake East Branch or in the anchorages E of the channel, or make fast in El Kabrit East Branch, where three berths are available for emergency use.

337. South bound convoy (N1) consists of three groups;

- *Group* A—Vessels in Port Said Harbour,

- Group B—Vessels anchored in the Northern Anchorage Area consisting

of 4th generation container ships, 3rd generation container ships, VLCC's in ballast, vessels over 12.8 m (42 ft) draught, LPG, LNG and non gas-free vessels in ballast or loaded and LASH vessels over 40,000 SCGT,

- Group C—Vessels anchored in the Southern Anchorage Area that will enter through Port Said West channel in due time to join Group B at Km 17. Vessels of Group B headed by the container ships enter Port Said By-pass Approach in due time to join Group A at Km 17. The speed of transit of both groups is 14 km/hr (7.6 kn).

338. Vessels of the S-bound convoy proceed via El Ballah East Branch, Lake Timsah By-pass, Deversoir West Branch with the exception of vessels with draught greater than 12.8 m (42 ft), which use Deversoir East Branch, Great Bitter Lake anchorage W of the channel. When the last ship of the N-bound convoy has passed El Kabrit, the S-bound convoy, headed by Naval ships and Group B, proceeds through El Kabrit West Branch. Vessels in both Group A and B joining the S-bound convoy must have arrived at the anchorage by 1900. For an additional charge of 3% of the Canal dues, vessels arriving between 1900 to 2100 may join the convoy (N1). Vessels arriving between 2100 to 2200 may also join the convoy (N1) for an additional charge of 5% of the Canal dues.

339. A second convoy (N2), S-bound, is sometimes formed if the density of traffic justifies it. This convoy leaves Port Said between 0630 and 0900 and makes fast in El Ballah West Branch until the last vessel of the N-bound convoy has entered El Ballah East Branch at Km 60.

340. The latest time for vessels joining the second convoy to arrive at the Port Said anchorage is 0300. Providing that the Canal capacity permits, and for an additional charge of 3% of the Canal dues, vessels arriving between 0300 and 0400 may join the second convoy; vessels arriving between 0400 and 0500 can also join the second convoy for an additional charge of 5% of the Canal dues.

341. The Suez Canal Vessel Traffic Management System (SCVTM) provides continuous monitoring of a vessel's position and speed, her deviation from the planned track and her separation from other vessels, by means of radar tracking stations at Port Said, Port Tewfik and Great Bitter Lake and a dedicated Loran-C chain covering the Canal and its approaches.

342. Vessels approaching Port of Suez from S should report by radio to the harbor office at Suez for instructions, 5 miles before reaching SC No 1 Light-float in the position shown on chart 5501. A vessel approaching Port Said

or Suez is identified on radar from information given in her arrival message and tracked thereafter. On entering the Canal, the pilot brings on board a Carry On Receiver Transmitter which receives Loran-C signals continuously and transmits them to the movement center ashore.

343. Pilotage is compulsory for all vessels when entering, leaving, moving berth or transitting in Canal waters or Port Said and Port Suez Harbours. Only certain Egyptian vessels under 300 SCGT authorized to work in Canal and/or its approaches are exempt; any other exemptions must be explicitly authorized by the SCA. Vessels which undertake any movement in waters under SCA's jurisdiction without employing a pilot are liable to pay extra dues of US$ 21,500, and additional charge of US$ 3,200 in Port of Suez.

344. The Canal is well marked throughout its length by buoyant light-beacons, details of which are marked on the charts. These light-beacons may be temporarily removed, displaced or changed during dredging or other operations.

345. Other detailed rules are specified in the Rules of Navigation issued by the SCA

346. The advance notification of transit, which shall reach the SCA not later than four days prior to the scheduled day (Art. 12), still remains in the Rules of Navigation. However, SCA now allows arriving vessels to join a convoy even 2 hrs before the starting time of the convoy if the conditions permit. The rule of advance booking was effective during the 80's through the beginning of the 90's, when the annual transit volume was 18,000 to 20,000 vessels (daily average 50 -60). But with a declining traffic volume since 1994, SCA has adopted a more flexible approach. In connection with this, the imposed charges for canceling and altering a booking described in Art. 12 are not being applied. Further, the additional charges for late arrival described in Art. 50 (2-a) and (2-b) were reduced from 5 % to 3 % and 10 % to 5 % respectively.

TOLL STRUCTURE AND RATES

347. Tolls are set by the Suez Canal Authority and revenue—about US$ 2 billion in 1998/99 of which toll revenue accounted for US$ 1.77 billion—in the form of Royalty fee, industrial and commercial tax is paid to the central government and a part of it is transferred to the local Government.

348. Any surplus is also transferred to the central government; funds cannot be reserved by SCA.

349. The Suez Canal toll rate structure is based on vessel earning capacity. It differs from the Panama Canal toll structure by differentiating among ship types, cargo carried by the ship, and, within a ship-type and cargo combination, size intervals of the ship's earning capacity.

350. As shown in Table 53, the toll rate per Suez Canal net ton declines as the ship's earning capacity increases. Suez Canal tolls are expressed in Special Drawing Rights (SDR), the unit of currency of the International Monetary Fund, because the SDR represents a basket of currencies. Although Suez Canal rates fluctuate when converted to U.S. dollars, tolls are payable in one of the designated hard currencies according to its exchange rate in relation to SDR.

Table 53 Rates of Tolls to be Applied as from 1st January 2000

(SDR/SCNT)

	Vessel Type	SC Net Tonnage											
		First 5000		Next 5000		Next 10000		Next 20000		Next 30000		Rest	
		L	B	L	B	L	B	L	B	L	B	L	B
1	⁎ Tankers of Crude Oil Only ⁎ Combined Carriers of Crude Oil Only	6.49	5.52	3.62	3.08	3.25	2.77	1.40	1.19	1.40	1.19	1.21	1.03
2	* Tankes of Petroleum Products * Combined Carriers carrying petroleum products * Combined Carriers carrying more than one kind of cargo	6.75	5.52	3.77	3.08	3.43	2.77	1.93	1.19	1.93	1.19	1.93	1.03
3	* Dry Bulk Carriers * Combined Carriers carrying dry bulk cargo only	7.21	6.13	4.14	3.52	2.97	2.53	1.05	0.90	1.00	0.85	1.00	0.85
4	* Other Bulk Liquid Carriers * LNG Carriers * Chemical Carriers (1) * Combined Carriers carrying other bulk liquid	7.50	6.38	4.14	3.56	3.81	3.24	2.68	2.28	2.68	2.28	2.68	2.28
5	* Liquified Petroleum Gas LPG Carriers	6.75	5.75	3.77	3.21	3.43	2.92	2.42	2.06	2.42	2.06	2.42	2.06
6	* Containerships * Vehicle Carriers	7.21	6.13	4.10	3.49	3.37	2.87	2.42	2.06	2.42	2.06	1.83	1.56
7	* Special Floating Units	7.21	-	4.14	-	3.77	-	2.63	-	2.63	-	2.63	-
8	* Other Vessels	7.21	6.13	4.14	3.52	3.77	3.21	2.63	2.24	2.63	2.24	2.63	2.24

Note: (1) If in ballast, chemical/oil tankers are to be charged at the same rate of oil tankers.
Source: SCA Circular

351. Exemption of toll may be given for such vessels as those belonging to the Egyptian Government, United nations, Multi-National troops, vessels under 300SCGT etc. on some conditions.

352. Additional transit dues are levied on slow vessels as shown in Table 54. A surcharge of transit dues is to be applied for container vessels or lash

vessels carrying containers or lashes over weather deck based on SCA circular No. 6/1993 as follows;

Table 54 Additional Tolls on Slow Vessels

Ship's speed is less than the speed of the vessels of her group in the convoy, by not more than	Additional Tolls
1 Km/H	10 % of the tolls
2 Km/H	20 % of the tolls
3 Km/H	30 % of the tolls
4 Km/H	40 % of the tolls
5 Km/H	80 % of the tolls
6 Km/H or more	160 % of the tolls

Source: Rules of Navigation, 1995, SCA

- 6%: up to 3 tiers of containers or lashes
- 8%: 4 tiers of containers or lashes
- 10%: 5 tiers of containers
- 14%: more than 5 tiers of containers

353. Toll rates are to be revised and announced in the SCA circular each year, although rates have remained almost unchanged since 1994. Prime Minister approves rates drafted by the Economic Unit and agreed to by the tolls committee and board of directors within SCA.

354. Some reductions of toll are offered to certain kinds of vessels in the form of the Long Haul Rebate, reduction for VLCC in ballast and Segregated Ballast Tankers, rebate for vessels with special O-D and cargoes, volume incentives for crude oil tankers and so on.

355. A rebate request form has been designed and distributed to ship owners and ship agents. The said form includes all the ship particulars as follows,

1) Name of ship, date of building and its call sign
2) DWT and SCNT (dead weight tonnage and Suez Canal net tonnage)
3) Speed: , from to
4) Time charter
5) Fuel consumption
6) Fuel price: Diesel Oil and IFO
7) Average SDR rate
8) Weather conditions
9) Distance between Ports of loading and discharge via Suez Canal and other alternative routes
10) Date of sailing, date of deviation point and date of arrival

356. The long-haul committee of the SCA studies the case in accordance with the data sent by the owner (base case). Other cases are similarly studied by SCA with due consideration to market factor for old ships. The best possible rebate is then decided and the decision becomes final.

357. The agent/owner is then notified of the rebate. The ship then transits the Canal with full dues, and the rebate is later refunded once the relevant documents have been verified by SCA. The verification of documents usually covers such information as origin, destination, cargo quantity that had been loaded at the port of origin and discharged at the port of destination. However, if the ship stops at any ports between O/D, the rebate is restudied.

358. Documents should be presented not later than 6 months from the date of transit, otherwise the rebate will be cancelled. The case can be restudied after the elapse of 2 months from the first response of SCA regarding the suggested rebate.

359. Other dues and charges besides toll are levied for towage, berthing, pilotage, tugboats, trial transit and some penalties are charged for certain kinds of actions (see section 5.2 Annex II).

B. BASIC POLICY ON MANAGEMENT AND OPERATION OF THE SUEZ CANAL

360. From the analysis on the importance of the Canal and the effects of the toll revenue in the national economy, the basic policy on the administration, management and operation of the Canal should be based on the wider aspects of its role, namely, from the viewpoints of its impact on global economy and national economy, as well as the socio-economy of the region which depends much on the operation of the Canal.

361. The policy deals with the issues not only related to the toll setting but also to the future development.

362. The Canal as *global infrastructure* was a concept first introduced in the era of President Sadat. As evidenced from the analysis on the effect of the Canal closure, the impact of the Canal on the global economy is so immense that it can change both the world maritime transport structure and the world trade structure. Therefore, the administration and management should be under an organization which is responsible for the world economy as well as to the national economy.

363. As to the policy on the development of the Canal, careful analysis should be conducted from various view points such as the impact on regional, national and global economy. It is also necessary to carefully assess the socio-political impact since a drastic structural change in maritime transport can severely damage regions such as the Red Sea region where economies are highly dependent on the maritime trade through the Canal. This in turn could jeopardize the political stability of the region.

364. To date, studies on the Canal development have mainly been conducted from the viewpoints of technical, economic and financial feasibility. As a global infrastructure, however, it is more important to assess the feasibility from the viewpoint of global socio-politics as well as national socio-politics.

365. Therefore, basic policy should be based on the balance of power in global politics.

366. *Secondary policy* should focus on the security of maritime transport, not only the physical safety of the transiting vessels but also the security of free trade. Namely, it is better to work as a kind of *safety-net for the world maritime transport.*

367. *Thirdly*, the policy should also involve the assessment on the profitability not only of the SCA and the maritime transport sector but also of the shippers/ consignees, since the benefit of the Canal transit is shared by both shipping companies and shippers through the mechanism of the maritime transport market. Therefore the *policy* should be based on a concept of *co-prosperity for both users and SCA.*

368. *Fourthly,* the management and operation system should be *transparent and fair to promote competitive and free world trade*. In the maritime transport sector, equilibrium condition among prices (toll, dues, fare and commodity prices) and quantities (number of vessels and amount of commodities) is achieved through the transactions carried out among three players - shipping lines, shippers/consignees and port/canal authorities. Hence, it is ideal that the toll of the Canal as a global economic infrastructure plays the role of moderator between two players - shipping lines and shippers - to maximize the total benefit for global society, while maintaining the financial soundness of the authority.

C. TARIFF SYSTEM

TARIFF SETTING PRINCIPLES, STRUCTURE AND THEIR RATIONALE

369. The general approach consists of the following four steps. First, the study team reviewed toll policy theory and concepts. Second, on the basis of past studies we evaluated the theoretical dimensions and performance of the current Suez Canal toll policy, structure, and rates, and conducted a comparative analysis of toll policies and rate schedules of other canals. Third, we analyzed alternative Suez Canal toll structures and rates and set the basic principles on toll setting. Finally we developed the optimal structures and rates comparing the current rates and proposed rates in terms of revenue earning capability.

1.Review of toll policy theory and concepts
-review influences of past closure of the Canal
-review maritime shipping market
-theoretical review of toll on the shipping lines

↓

2.Review of toll structure of Panama Canal, St. Lawrence Seaway
-comparative analysis on alternative toll structures
-evaluation of Suez toll structure
-evaluation of currency unit pegged

↓

3.Analysis of toll structure and rates
-sensitivity analysis of standard toll levels
-review and set the toll setting principle
-analysis of classification of toll

↓

4.Development of optimal toll schedule and rates
-comparative analysis of toll revenue, current and revised rates
-assessment of future toll revenue
--recommendation on toll revision in the near future

370. A toll policy represents a set of principles underling the objectives

to be achieved by a given toll rate structure. Basic objectives include revenues expected to be generated by the toll rates and traffic volume, equity or fairness, which can be measured by whether the toll rates reflect the cost of providing service through the waterway, value of service to the user, and user's ability to pay, which can be measured by cubic cargo capacity, quantity of cargo and value of cargo, and promotion of traffic growth, and efficiency or capacity utilization of the waterway and administrative simplicity.

(i) Macro-Scopic Influence of Toll

371. The influences of the high toll level on the users and trades can be macro-scopicly grasped through the past bitter experience during the closure of the Suez Canal and micro-scopicly through the behavior of shippers and shipping lines. Through these analyses, basic toll policy for the Suez Canal can be developed.

372. The Suez Canal has been playing a very important role as a major maritime transport route between the countries east of the Canal and those west of the Canal for more than one century. The Canal offers amazing savings in transport distance when compared to the Cape route. For instance, the voyage distance between Tokyo and Rotterdam via Suez Canal is 1/4 shorter than via the Cape route and the distance between Bombay and Odessa is cut by 2/3.

Table 55 Shortening Effect of Maritime Distance by the Suez Canal

(nautical miles)

Journey	Maritime Distance		Shortening Effect	
	via Suez Canal (S)	round the Cape of Good Hope (C)	Difference	S/C
Rotterdam - Ras Tanura	6,436	11,169	4,733	57%
- Bombay	6,337	10,743	4,406	59%
- Singapore	8,288	11,755	3,467	71%
- Darwin	9,377	11,319	1,942	83%
New York - Ras Tanura	8,281	11,794	3,513	70%
- Darwin	11,222	11,954	732	94%
Ismir - Bombay	3,422	11,694	8,272	29%

Source) "World Shipping Encyclopaedia V.9.3", Oct.2000, Fairplay

373. Shortening of the transport distance will be reflected in the transport cost and time reduction and has a great influence on the various cost items of maritime transport. Through these effects, the Suez Canal has contributed to the development of maritime transport between the regions

connected by the Canal.

374. The volume of cargo transiting the Canal once grew at a rate comparable to that of the total volume of world maritime transport. Seventy three million tons of cargo passed through the Canal in 1950 and 169 million tons of cargo (around twice that in 1950) was transported via the Canal ten years later. In 1966, one year before the closing of the Canal, 242 million tons of cargo (176 million tons of oil and 66 million tons of dry bulk cargo) transited the Canal, representing 14% of the world maritime transport volume. The Canal's share of the world maritime transport volume declined, however, due to the Canal's closure in 1967.

375. In 1990 the volume through the Canal recovered to its 1966 level. Although the share of tanker cargo had fallen, the total volume amounted to 272 million tons, which was 7% of the world sea-borne cargo. Moreover, the growth rate of Canal transit cargo was a remarkable 7.9% per annum compared to a 0.8% growth rate for world sea-borne cargo during the same period. From 1990 to 1999, average annual growth rate of total transit cargo (1.4%) was less than that of world sea-borne cargo (2.9%), mainly due to the decreasing share of tanker cargo transiting the Canal (5% in 1990 and 1% in 1999).

376. Although the share of Canal transit cargo in the world sea-borne cargo has decreased, the growth rate of dry cargo transit is still higher than that of world sea-borne cargo. Between 1990 and 1999, the annual growth rate of dry cargo transiting the Canal was 4.4% while that of world sea-borne cargo was 3.0%. On the other hand, tanker cargo transit has decreased since the opening of the SUMED pipeline running parallel with the Canal and Iraq-Turkey pipeline. As a result, total cargo transit has shown a lower growth rate than that of world sea-borne cargo.

Table 56 Cargoes carried through the Suez Canal

(million metric tons)

Year	Journey	Cargoes carried through the Suez Canal			International Sea-born trade (I)	S/I
		Southbound	Northbound	Total (S)		
1966	Tanker Cargo	9	167	176	950	19%
	Dry Cargo	39	27	66	820	8%
	Total	48	194	242	1,770	14%
1980	Tanker Cargo	14	28	42	1,871	2%
	Dry Cargo	26	59	85	1,883	5%
	Total	40	87	127	3,704	3%
1990	Tanker Cargo	14	66	80	1,755	5%
	Dry Cargo	103	89	192	2,253	9%
	Total	117	155	272	4,008	7%
1999	Tanker Cargo	5	18	23	2,223	1 %
	Dry Cargo	148	136	284	2,950	10 %
	Total	153	154	307	5,173	6 %

Notes: Tanker Cargo in this Table means Crude Oil and Petroleum Products.

Source: "Suez Canal Yearly Report", SCA and "Review of Maritime Transport", UNCTAD

377. The use of the Canal has traditionally played an important role for certain cargo and transport between certain regions. In 1966, for instance, 36% of oil loaded at the ports in the Arabian Gulf was transported via Suez route and 1/3 of the oil imported by west European countries passed through the Canal.

378. In 1966, the volume of dry cargo passing through the Canal reached 66 million tons, equivalent to 1/4 of total transit cargo. Most of this dry cargo was handled in ports of Europe and America. However, this represented only 5% of the total dry cargo handled at the ports of both regions. On the contrary, dry cargo transported via the Suez route has great importance for the countries south and east of the Canal. For instance, 41% of the dry cargo handled in the ports of the Arabian Gulf and 32% of the dry cargo handled in the ports of the Red Sea and East Africa and 24% of that handled in the ports in South and South-East Asia passed through the Canal.

379. Table 57 shows regional distribution of cargo transited through the Canal in 1999. North of the Canal, North, West Europe and U.K. is the region with the largest share (34% of the total) followed by North Mediterranean (23%) and West, South West Mediterranean (15%). South of the Canal, South-east Asia and Far East has the largest share (42%) followed by Red Sea (22%), South Asia (15%) and Arabian Gulf (12%). At the time of this study, a comparison of shares of transited cargo by each region with that of world maritime cargo

could not be made, however, it can be said that regions affected by a higher toll would be much wider than in 1966, because of the high growth of dry cargo, especially by container carriers, in spite of the drastic decline in tanker cargo (compare with Table 58).

Table 57 O-D of Cargoes carried through the Suez Canal in 1999

(million metric tons)

Origin	Region	Destination	Total Share
Through SC		Through SC	
15	East & S.E. Mediterranean	31	15%
32	North Mediterranean	40	23%
12	West & S.W. Mediterranean	18	10%
23	Black Sea	5	9%
51	North, West Europe & U.K.	53	34%
7	Baltic Sea	1	3%
10	America	5	5%
3	Others	1	1%
153	(Southbound) - Total - (Northbound)	154	100%
25	Red Sea	43	22%
5	East Africa & Aden	2	2%
18	Arabian Gulf	19	12%
20	South Asia	25	15%
65	Southeast Asia & Far East	64	42%
22	Australia	1	7%
-	Others	-	-
154	(Northbound) - Total - (Southbound)	153	100%

Source: "Suez Canal Report December 1999", SCA

Table 58 O-D of Dry Cargoes carried through the Suez Canal in 1999

(million metric tons)

Origin	Region	Destination	Total Share
Through SC		Through SC	
15	East & S.E. Mediterranean	30	16%
31	North Mediterranean	35	23%
10	West & S.W. Mediterranean	14	8%
22	Black Sea	5	10%
50	North, West Europe & U.K.	47	34%
7	Baltic Sea	1	3%
10	America	3	5%
3	Others	1	1%
148	(Southbound) - Total - (Northbound)	136	100%
18	Red Sea	42	21%
5	East Africa & Aden	2	2%
7	Arabian Gulf	19	9%
20	South Asia	24	15%
65	Southeast Asia & Far East	61	44%
22	Australia	1	8%
-	Others	-	-
136	(Northbound) - Total - (Southbound)	148	100%

Source: "Suez Canal Report December 1999", SCA

380. The closure of the Canal in 1967 brought severe consequences to the world maritime transport, especially in the form of higher transport cost. The severest influence was on oil transport and the maritime foreign trade of the countries of East Africa and South and Southeast Asia. The influence on oil transport was especially great and that on oil transport from the Middle East to Europe was, inter-alia, immense. At the same time, it caused a sudden increase in the demand for the world tanker fleet. Additional supply of the oil tanker fleet to meet this increased demand was not so difficult, though it linked with the enlargement of vessel size.

381. Sudden change in the maritime transport condition for the countries south and east of the Canal made various trade relations messy. Additional increase in the trade cost such as transportation, insurance and other trade related cost items led to a loss in competitive power of export goods in the existing market and also to a price increase of the imported goods. Major industries of certain countries such as banana production in Somalia were seriously damaged. Moreover, the change in the maritime transport routes by the closure of the Canal affected various fields of economy and resulted in an economic slowdown in the countries of the related regions.

382. Total loss in the export to Europe incurred by East Africa and Southeast Asia was said to amount to 560 million US$ and the loss in 1969 and 1970 was estimated as around 13% of the total export from these regions to Europe.

383. The closure of the Canal resulted in oil exports being switched from the Middle East to regions closer to the consumption countries such as oil production areas in North Africa and West Africa. Total amount shifted was around 40 million tons per annum at a value of 500 million US$/year for the years up to 1970.

384. Other various economic impacts were felt with the closure of the Canal. Insurance and commercial credit costs were raised due to the longer delivery time of products and goods. The ports nearby the Canal such as Aden, Djibouti and Port Sudan experienced a severe decline in port activities.

385. If the project to deepen the Canal to 40ft by the end of the year 1967 could have been completed, fully laden 60,000 DWT vessels would have been able to transit the Canal and 200,000 DWT ballast vessels would have been able to transit the Canal. By 1967, 90% of the tankers and oil/bulk carriers in operation and/or under construction could transit the Canal at least in ballast. At the end of the year 1971, almost 1/2 of these vessels in operation and/or under construction were larger than 200,000 DWT. Therefore, these vessels could not transit the Canal whether in laden or ballast condition.

386. Thus the closure of the Canal added a new factor to be considered in the construction of the large tankers. Large tankers with rather low construction and operation costs such as the vessels which prevailed in the late 1960s showed scale merit in comparison with smaller vessels. As a result, in the case of oil transport from the Arabian Gulf to Europe, transport cost by large tanker via the Cape route, in spite of the much longer voyage distance, became less than when transported by smaller tanker via the Suez route before the closure.

387. Since 1970, however, both the construction cost and operation cost of vessels, especially for large tankers, increased to a large extent. Therefore the cost advantage of the large tanker had decreased and transport by large tankers over longer distances might have lost its advantage over transport by smaller tanker over shorter distances. It was reported that if it were realized, then oil transportation cost from the Arabian Gulf to Europe, especially to the ports in Mediterranean Sea would decrease after reopening of the Canal.

388. As a result of the Canal closure, capacity of the pipelines to transport Middle East oil to the east Mediterranean base (both under operation and planned) has largely increased. Since some of these pipelines ran or planned to run parallel to the Canal, large tanker can load and unload oil at the pipeline base without restriction by the Canal. If these pipelines are used in combination with the Canal, it will be possible to, (a) increase the oil transport capacity by decreasing the voyage distance of large tankers and (b) avoid the cost increase involved in long distance oil transportation.

389. Tendency to construct larger dry bulk carriers was observed both before and after the closure of the Canal. Transportation of dry bulk cargo and liner cargo would enjoy the benefit of reopening of the Canal to large extent, since all dry bulk carriers currently under operation and under construction could transit the Canal.

390. Increase of transport cost must be borne by the traders and countries which enjoy the benefit of the Canal. The competitiveness of products should not be affected.

391. Thus the effects of the Canal toll can be roughly grasped through an analysis of its past closure. The composition of the transiting vessels has changed compared with the pre-closure composition. Number of oil tankers transiting the Canal has decreased with the appearance of VLCC and ULCC and also due to the pipelines. These days, the appearance of large container vessels has also changed the composition by decreasing the number of general cargo vessels. Hence, a new toll system will be necessary to meet these changing shipping circumstances. In devising the new toll system the effects experienced after the Canal closure had to be considered.

392. Higher toll will not always increase the revenue of SCA. It will cause the decrease in transit demand as vessels divert to the route via the Cape. And an extremely high toll would be similar in effect to the closure of the Canal, namely, it would result in a structural change in world trade and a decline in SCA revenue. Therefore, optimal toll should be carefully considered to balance the revenue maximizing motivations of SCA and the traders reflecting the possible trends in world trade patterns. In this context, timely restructuring of toll system is indispensable for the better management of the Canal.

393. Toll revenue is important not only for the SCA but also for the national economy of Egypt since it is one of the major sources of revenue for the central government, especially foreign currency. Toll revenue becomes

the revenue of the central government through industrial and commercial tax (42% of net profit) and royalty fee (5% of toll revenue) and surplus transfer. In 1999 industrial and commercial tax paid is estimated as around US$ 770 million, royalty fee as US$ 89 million, and surplus is US$ 858 million (or LE 2,914 million).

394. In this context, toll system to maximize net profit rather than to maximize toll revenue is more important from the central government's view. Therefore, expenditure by SCA for management and operation of the Canal including project investment cost and interest payment as well as the dividend from the affiliate company, all of which are the determinants of the profit of the SCA, are other important factors in deciding the optimal toll system.

395. Hence, investment in the development of the Canal such as widening and/or deepening should only be done after considering the factors which affect the world trade pattern including possible toll level as well as the necessary period of development within the foreseeable future time span in the world maritime market.

396. Together with the analysis on the effects of the past closure of the Canal, theoretical derivation of the effects of higher toll (refer to Annex V) shows the following results;

- Obs. 1 If the canal toll is raised and ocean freight rate exclusive of port charges and toll is unchanged, then maximum distance of trade becomes shorter. Namely, the shipper will change its trade partner to nearer countries, or lose his market if there is not any nearby demand (such trade as of countries south and east of the Suez Canal which were seriously damaged during the closure of the Canal)
- Obs. 2 For the shipper that trades a higher valued commodity (higher value of P) and has a lower level of shut down price (lower value of Ps), higher toll can be tolerable (for such commodities as containerized cargo).
- Obs. 3 Time sensitive cargo will change to a more speedy mode or a trade partner will be found if the toll becomes higher than tolerable. (in case that net discounted revenue becomes less than its shut down price)

(ii) Basic Characteristics of Maritime Shipping Market

397. A toll level has an influence on the vessel's route choice, namely, via Suez or via other routes than Suez. The vessel's route choice is based on the

comparison of the profits via Suez and via other routes. The profit perceived by a shipping line or shipper/consignee differs with the type of vessel and shipping contract.

398. Ocean going shipping activities are mainly carried out by commercial shipping lines. These shipping lines earn revenue in the form of freight charges or vessel charter charges by carrying the cargo of shippers. However, a limited portion of the world's international sea-borne trade is carried out by shippers themselves, using either their own or chartered vessels. This type of vessel is referred to as a "Private Carrier". Further, "Private Carrier" can be divided into two categories; a "Merchant Carrier" where a shipper owns/charters and operates a ship in order to carry its own goods to its market to sell at a destination, and an "Industrial Carrier" where a shipper owns/charters and operates a ship in order to carry raw material/energy resources to a destination.

399. In the early stages of shipping, employing "Merchant Carriers" was a common way of owning/operating ships. However, as the "Common Carrier" (Commercial Shipping Lines) became popular, the "Merchant Carrier" quickly faded out and is now rarely seen in international sea-borne trade. In its place, the "Industrial Carrier" emerged. Some major oil refineries, steel and coal companies were already using a self-transportation system (prototype of the Industrial Carrier) even before World War II. But it wasn't until the 1960s that the "Industrial Carrier" became an important player. Generally, the portion of ocean freight in the import value of a cargo such as a raw material or energy resource is substantial, especially when the cargo is produced at a remote area and must be transported via a long distance route. The "Industrial Carrier" became an important tool in securing a reliable sea-borne traffic route.

400. "Industrial Carrier" activities by those ships owned and operated by industrial capital directly posed a challenge to the shipping industry. As a result, some shipping lines started offering their ships under the same conditions with foregoing "Industrial Carriers" around the mid 1960s, and succeeded in attracting a big part of the industrial cargo from shippers. Currently, *the word "Industrial Carrier" means both the Prototype Industrial Carrier and Commercial Industrial Carrier.*

401. In 1999, about 36% of the crude oil tankers were owned and operated by oil companies and the rest were owned and operated by shipping lines. And of the tankers owned and operated by shipping lines, many

of them are under long-term contracts. According to JAMRI, the industrialized rate of the world tankers is about 70%.

402. It is difficult to grasp the industrialized rate of dry cargo world wide, but JAMRI estimates the figure at approximately 60% while the rest is open for market. Therefore there is fierce competition among shipping companies to capture the dry cargo market. In exceptional cases, some steel mills still operate their own ships to carry raw materials from production points to mills, but a "Commercial Industrial Carrier" is employed in the majority of cases. Many of the "Prototype Industrial Carriers" were spun out from organizations of mills and are now commercial shipping lines.

403. "Shipping Market" consists of shipping lines and cargo. "Industrial Carriers" and "Cargo" carried by "Industrial Carriers" are not strictly part of the "Shipping Market". It must be remembered that the "Shipping Market" can be divided into "Liner Market" and "Tramp Market". The "Liner Market" is not confined to the shipping industry but belongs to a broader trade industry between shipping lines and shippers/consignees of cargo, while "Tramp Market" exists only among shipping lines/brokers and shippers of tramp cargo, where cargo freights, charterage, voyage charter contracts, trip charter contracts, in various period of terms and volumes are negotiated and contracted.

404. Today, the transportation of motor vehicles by sea forms part of a complex logistics chain. This has taken the carriage of cars from its early origins in the "Tramp Market" through to its current position where the spot market has all but disappeared. There are a number of people in the shipping industry who see this trend as the way forward. What looks certainly true in the case of car carriers is that shipping has moved from being a secondary activity into an integral part of the global car business. In this sense, *Pure Car Carriers are 100 % industrial carriers,* but some of them can be trip or voyage chartered subject to some conditions in a certain group of car producers and shipping lines.

405. There is no spot market in the LPG/LNG field, because they are project-oriented businesses. All LPG/LNG carriers are built as a part of each project to transport the output together with a pipeline system. Ship's building cost is included in the total project cost for a whole period of 20 to 30 years. In very rare cases, a charterer of LNG/LPG carriers (in most cases a project originator) will deploy ships for an extra voyage to utilize empty space. Strictly speaking, therefore, it is difficult to classify this category of ships as industrial

carrier.

406. "Shipping Market" can be divided into "Liner Market", "Tramp Market" and "Tanker Market" based on the kind of ships and cargoes. "Tanker Market" is rather independent from the other two markets due to the nature of liquid crude oil. "Liner Market" and "Tramp Market" both deal with dry cargo. The difference between the two lies in the characteristics of the cargo transported. Cargo which is cheap in value but transported in large volumes (e.g. raw materials for energy, for many industrial products and for food) is generally referred to as "Tramp Cargo". The first priority for this type of cargo is a "low freight rate", while "transport speed" or "care during transport" are not such important factors. "Liner Cargo", on the other hand, is time sensitive, market sensitive and interest sensitive. Transit time, regularity, frequency and freight rate level of sea-transportation are important factors for "Liner Cargo".

407. "Low freight" is a prerequisite for both markets. If a shipping line can provide a low freight rate, it can play a role in the market. A new ship is not necessary; an older ship or a chartered ship is sufficient on condition that the ship is sea-worthy. Because of the openness of the two markets, number of buyers and sellers is numerous, thus the market share of an individual shipping line is quite limited. There is no dominant player in either market.

408. Also, it is difficult for certain members to work together and control the market because the size and nature of each shipping line widely differ. For these reasons, free competition is observed in these two markets. Freight rates and charterage are automatically decided in the markets through the so-called invisible hands of Adam Smith and those levels constantly change according to the balance of demand/supply of ships' space. For example, where there is an oversupply of space in one regional market, the freight level in that region will decrease.

409. However, a shipping line will generally not carry cargo if the freight level is insufficient to reach the break-even point of operation cost. As a result, after a certain period, the freight rate level will recover to a normal level. Both markets have an automatic adjusting function regarding freight level and ships' space. In these markets, cost/profit margins are rarely satisfied for the sake of competition. The range of these markets is worldwide but a level of freight rate at a given time for a given commodity of cargo can be applied to any voyage of any other route as far as they are applied to the same type of ship and same kind of cargo.

410. "Liner Market" is completely different from "Tramp Market" and

"Tanker Market". The value per ton of liner cargo is high while the portion of freight charges in the CIF value is small, thus freight paying power is strong. Typical liner cargoes are: finished goods, semi-finished goods, fresh food, other high value cargo and postal goods. These cargoes are sensitive to transit time, commodity market changes and interest as already explained before. The transportation needs for these cargoes are, therefore, safety, speed, and frequency of shipping. Freight rate level itself is one of the most important concerns of shippers/consignees but the quality of services is as important as freight.

411. Higher operation cost is needed to transport "Liner Cargo" and naturally higher freight rate is quoted to shippers/consignees who accept it as far as the quality of transportation service meets the level they request. General cargo of this kind (often called Break-bulk cargo) is traded usually in a smaller volume compared with "Tramp Cargo" but a stream of cargo flow and places of origin are comparatively fixed. Because the direction and volume of the cargo flow are stable, it is possible for shipping lines to maintain a regular liner route by consolidating a small amount of cargo.

412. Shipping lines in liner services make a public notice regarding "Sailing Schedule" and "Itemized Freight Rate (Freight Tariff)" to shippers/consignees. The service operated under these advertised schedules and freight rates by regular calling vessels are called "Liner Services". An abstract name of "Liner Market" is given to these liner operations between shipping lines and shippers/consignees. Liner vessels, once announced and deployed, are generally fixed to a particular service route and seldom changed. As a result, the service line itself becomes a market in the region, consisting of the shipping lines, the shippers and the consignees.

413. Further, to maintain a regular frequency and safe and speedy service, a fleet of ships, "Fleet Line", is needed. In addition, a large investment is required to set up a cargo-canvassing network and cargo handling systems, especially in this era of containerization. Nowadays, there are only few liner operators and the "Liner Market" is a typical oligopoly.

414. "Liner Market" does not have an automatic space-adjusting function as in the "Tramp Market" and "Tanker Market". It is a non-elastic market, although the basic nature of the "Liner Market" has been in a transition period since OSRA-Ocean Shipping Reform Act of 1998, USA. In this market, competition between shipping lines tends to become very severe due to the lack of an automatic adjusting mechanism.

415. Generally, liner operators are expected to maintain a once started service route and they usually find it extremely difficult to suspend their services or even reduce service frequency. Consequently, liner operators' final and only means to counter decreasing market shares is strengthening marketing and canvassing power. And the only way to achieve this is to draw business away from a competitor. Once a rate-war begins, rate levels fall drastically. As each player in the market is more or less similar in scale marketing power, a rate-war can be financially devastating to all involved.

416. To modify this non-elastic market, the international trading world has traditionally put the market beyond the anti cartel regulations. The international cartel of liner operators is called "Shipping Conference". The oldest of this kind is the Calcutta Shipping Conference established in August 1875 by the liner operating shipping lines between Great Britain and India. For more than one century, shipping conferences have played an important role in stabilizing trade. In 1990, there were 360 shipping conferences in the world. A careful observation is needed on what changes will come after the OSRA.

(iii) Microscopic Influence of the Toll

417. Shipping lines make their route choice after comparing the annual profit/loss figures that would result from using each of the possible routes. Annual profit/loss of a vessel via Suez and that via Cape can be expressed as Equation-1 and Equation-2.

$$Ps = (Fs - 2T' - 2ODs/S)Ns - (2MDs/S)Nsx \quad (1)$$

$$Pc = (Fc - 2ODc/S)Nc - (2MDc/S)Ncx \quad (2)$$

(Parameters)

Ps (US$/SCNT):	Annual profit/loss via the Suez
Pc (US$/SCNT):	Annual profit/loss via the Cape
Fs (US$/SCNT/voyage):	Freight revenue of round voyage via the Suez
Fc (US$/SCNT/voyage):	Freight revenue of round voyage via the Cape
T' (US$/SCNT/transit):	Costs (toll, other charges and loss) at the Suez
M (US$/SCNT/day):	Managing cost
O (US$/SCNT/day):	Operation cost (= fuel cost by Assumption-a.)
Ds (miles):	Distance of origin-destination pair via the Suez
Dc (miles):	Distance of O-D pair via the Cape
S (miles/day):	Speed
Ns:	Annual number of round voyages via the Suez
Nc:	Annual number of round voyages via the Cape
Nsx, Nsc:	Maximum value of Ns or Nc

(Assumptions)

a. Days and costs at Ports are assumed to be neglected.
b. Effect of costs at the Suez on trade O-D and on its volume is assumed to be neglected.
c. Speeds are assumed to be constant regardless of laden or in ballast.
d. Costs at Suez of in-bound and out-bound are assumed to be the same.
e. Vessels are assumed to call only O-D ports.

418. Shipping line chooses the route via Suez when annual profit/loss of a vessel (or a fleet of vessels) via Suez is not less than that via Cape, namely, Ps-Pc>=0 (or Ps/Ns-Pc/Nc>=0). Therefore, the maximum bearable cost at Suez Canal under the condition that supply equals demand is expressed in general form as follows:

(Maximum bearable cost at Suez) =
(Freight difference) + (Savings in shipping cost) **(3)**

Note) shipping cost at sea = managing cost + fuel cost

419. In case of common tramp carrier, the freight difference can be neglected. Maximum bearable cost at the Canal is equal to savings in shipping cost. However, savings in managing cost are not perceived or not fully perceived depending upon the shipping market condition (when the vessel is not fully operated, or during the time of market depression as is indicated by the lay-up point theory, for example).

420. In case of liner carrier, maximum bearable cost at the Canal is equal to the sum of the freight difference and savings in shipping cost. The freight difference can generally be regarded as the savings in inventory cost.

421. In case of industrial carrier, the least cost route is generally chosen. Then maximum bearable cost at Suez Canal is just equal to the savings in shipping cost.

422. Hence, the level of toll will affect directly the route choice of the carriers. Therefore it is important to decide the toll level considering the voyage cost and the maritime transport market condition.

(iv) Toll Setting Principles

(a) Alternative toll setting principles

423. Considering the various influences of the toll, basic policy on management of the Suez Canal should based on wider aspects of the impacts of Canal on global, regional and national socio-economy.

424. From the economic aspect of the Suez Canal , we can identify three categories of beneficiary ― regional, national and global. In the development and management of an infrastructure such as the canal, best policy is said to be the maximization of the economic benefit of the beneficiary. Pricing principle will vary according to the objective beneficiary.

425. In case of the Suez Canal, nearly all vessels that currently pass through the Canal and that will pass in the future have origins and destinations outside Egypt. Thus nearly all the direct beneficiaries are outside Egypt. In spite of this fact, maximum benefit will be achieved by applying *the marginal cost pricing* to the toll. This is the best approach based on the idea of *global infrastructure.*

426. As a result, SCA will obtain zero profit in the long run but the world economy will possibly enjoy maximum trade through the lowest transiting cost.

427. The second alternative is to apply *price discrimination* between the vessels that have origins and destinations within the interest region of Egypt and those vessels having origins and destinations outside the region based on the idea of *regional infrastructure*. In other words, marginal cost pricing is applied to those vessels for the region while maximum revenue toll is applied to those vessels outside the region.

428. However, this method is rather complicated and cannot be said practicable.

429. The third alternative is to set the toll that maximizes national benefit of Egypt based on the idea of *national infrastructure.* Since almost all the vessels transiting through the Suez Canal are those having origins and destinations outside the country, maximum benefit to the nation is exactly the same as maximum profit.

430. In order to get *the maximum profit*, best way of pricing is also applying a completely discriminating price to each group of vessels that have different origins and destinations, different size, different type and with different loaded cargoes.

431. However this is also complicated and not necessarily the best approach for the reasons stated in the following sections.

(b) Toll structure of other canals and evaluation of Suez toll structure

432. Toll structure applied by the Panama Canal is based on the idea of marginal cost pricing. Underlying policy on revenue requirement is that tolls

are required to be set at rates calculated to produce revenues to cover, as nearly as practicable, all costs of maintaining and operating the canal and related facilities and appurtenances and to provide capital for plant replacement, expansion and improvements.

433. The basic policy on toll structure of the Panama Canal is restrained by the Treaties of 1977. Article I of the Panama Canal Treaty of 1977 provides that "The Republic of Panama declares that the canal, as an international transit waterway, shall be permanently neutral in accordance with the regime established in this Treaty". Article III, Paragraph 1 (c), of the 1977 Treaty Concerning the Permanent Neutrality and Operation of the Panama Canal provides that for purposes of the security, efficiency, and proper maintenance of the canal " tolls and other charges for transit and ancillary services shall be just, reasonable, equitable and consistent with the principles of international law."

434. The U.S. Senate introduced an "Understanding" to the neutrality treaty, which reads as follows:

(a) Paragraph 1 (c) of Article III of the Treaty shall be construed as requiring, before any adjustment in tolls for use of the canal, that the effects of any such toll adjustment on the trade patterns of the Two Parties shall be given full consideration, including consideration of the following factors in a manner consistent with the regime of neutrality:

1. the costs of operating and maintaining the Panama Canal;
2. the competitive position of the use of the canal in relation to other means of transportation;
3. the interests of both parties in maintaining their domestic fleets;
4. the impact of such an adjustment on the various geographic areas of each of the two Parties; and
5. the interests of both Parties in maximizing their international commerce.

435. Tolls will be assessed on the earning capacity of the ship -Panama Canal net tons, and toll structure does not vary by merchant ship type or by ship size. It does, however, differentiate between laden and ballast merchant vessels.

436. This toll structure causes small vessels to pay less than the marginal cost of providing canal service and a disproportionately small share of the fixed cost based on the cost of service. The marginal cost of service is the cost that varies with the number of transits or size of the vessel. In contrast, the fixed cost of providing service does not vary with traffic. It is a sunk cost incurred to make the canal available to shippers.

437. According to the cost study on the Panama Canal, the marginal cost of service is about the same for a wide range of vessel sizes. Canal tolls, however, are assessed at a constant rate per unit of vessel size. As a result, larger vessels pay tolls higher than the marginal cost of service and smaller vessels pay tolls lower than the marginal cost of service.

438. Tolls of the Panama Canal are not necessarily proportional to the value of service provided by the canal. The current structure reflects ability to pay on the basis of earning capacity. Only indirectly, through a toll differential on laden versus ballast movements, does the structure reflect ability to pay on the basis of quantity of cargo carried. Only coincidentally — when dense cargoes are of low value — does the current structure reflect ability to pay on the basis of cargo value. Iron and steel, however, are dense, high value canal cargoes for which the current toll structure does not reflect ability to pay on the basis of cargo value.

439. Hence, traffic growth could be curtailed by significant increase of toll. It encourages use by small ships and discourages use by large ships. As a result, it discourages use by those who contribute most to recovery of fixed cost.

440. On the other hand, in case of the St. Lawrence Seaway, the toll structure is similar to that of the Suez Canal. The toll policy and rate schedule are determined jointly by the U.S. and Canadian governments by the amount needed to cover operation and maintenance costs and maximize traffic.

441. The St. Lawrence Seaway toll rate structure comprises a primary component based on cargo carried and a secondary component based on vessel earning capacity. The primary component differentiates among cargo types but not among cargo tonnage intervals. The rate charged per metric ton remains constant regardless of the total tons carried on any transit.

442. Like the Panama Canal toll and unlike Suez Canal toll, the St. Lawrence Seaway's secondary toll component, which is based on ship earning capacity, does not differentiate among vessel types or sizes. It is charged on

the basis of the ship's gross registered tons.

(c) Toll policy & principles—criteria on toll structure

443. A toll policy represents a set of principles underlying the objectives to be achieved by a given toll rate structure. These objectives are; 1) revenue expected to be generated by the toll rates and traffic volume; 2) equity or fairness, which can be measured by whether the toll rates reflect the cost of providing service through the Canal, value of service to the user, and user's ability to pay, which can be measured by cubic cargo capacity, quantity of cargo, and value of cargo; 3) promotion of traffic growth; 4) efficiency or capacity utilization of the Canal; and 5) administrative simplicity.

444. In the Study of Alternatives to the Panama Canal conducted in 1993, basic toll structure of the Panama Canal was generally inherited the current structure mainly because of the administrative complexity and costly implementation.

445. On the other hand, the Suez Canal toll structure contains various aspects of price discrimination such as laden versus ballast, type of ships, type of cargo with combined carriers and the Long Haul arrangement where the toll is linked directly to the value of service to the user.

446. Marginal cost and value of service vary with the size of ships. Larger ships cause more damage to banks and revetments and thus lead to more repair and dredging costs. Larger vessels have also a greater earning capacity and ability to pay, while the ability to pay is most likely to the price of a shipping service, which is less than proportional to the size of vessels.

447. In line with the basic objectives of the toll structure, the Suez Canal toll structure contains all the objectives but 5) mentioned in para. 443. Hence it can be said that current structure of the Suez toll is the most favorable structure, although there is room for some modification of rates reflecting the recent change in the maritime transport structure and improving the administrative simplicity.

(d) Structure of toll and rates

448. As is mentioned above, complete price discrimination by O-D, type of vessel and cargo and size of vessel will bring maximum revenue to the SCA. However, this system will cause administrative complication and will also make the users susceptive about correctness of the toll levied and then users feel difficulty with freight negotiation with shippers/consignees. It is, therefore,

recommended here to apply fixed rate tariff system.

449. Standard toll level is recommended to be set based on the saved shipping cost as follows;

$$Ts = S \times Rs = (B \times Ds - Esc) \times Rs \quad (1)$$

where, Ts: standard toll level (US$/SCNT)

S: saved cost by using the Canal (US$/SCNT)

Rs: ratio of supplier's receipt

B: shipping cost at sea per mile (US$/SCNT/mile)

Ds: saved distance (miles)

Esc: excess cost at the Canal (US$/SCNT)

(time loss cost + other charges)

450. As to the ratio Rs, it is necessary to be perceived by the users so that they can choose the route via Suez based on the apparent advantage of using the Canal. At the time of negotiation on the freight rate with the shippers/consignees, shipping company is said to require the level less than 90-80% of the voyage cost difference via Cape route in choosing the Suez route considering various risks. Hence, it is recommended to set the value of Rs at 80%.

451. Fixed tariff and rate is recommended to be set by the type and size of vessel and regardless of O-D, and the rate is recommended to be set as fixed accumulated price/SCNT for the same size class of vessels varied with size class as is currently set by SCA.

452. In the calculation of the fixed rate regardless of O-D, standard saved distance must be set. Under this method, the toll calculated with the set rate will favor the vessels with O-D pair having longer saved distance than the standard distance and less favor the vessels with O-D pair having less saved distance than the standard distance.

453. Hence, it will have the effect of safeguarding the trade in the region nearby the Suez Canal. In other words, it is favorable from the view point of the regional economic policy.

454. On the other hand, it will have an effect to divert the trade with

less saved distance than the standard saved distance to the route via Cape. In order to avoid the diversion of these vessels, it is recommended to apply rebate system to these vessels such as the Long Haul Rebate which is currently applied by SCA.

455. Alternative tariff structure would be to adopt that used by the Panama Canal, or a fixed unit price for a certain range of vessels varied with the size class. (**Alternative structure 1**). This alternative structure is easier to calculate than the current Suez Canal toll structure, but causes greater deviation from the actual saved cost curve and hence would result in either less revenue or fewer users.

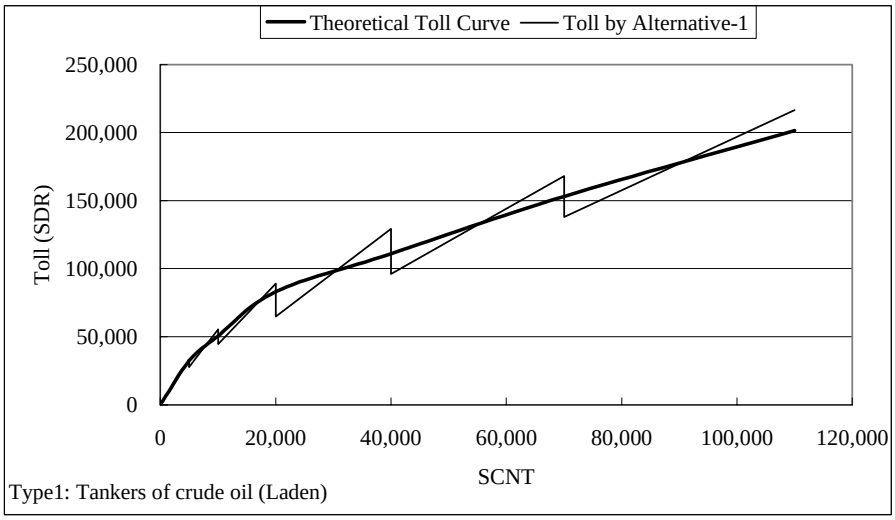


Figure 27 Applied Toll and Theoretical Toll
(Tariff Format Alternative-1)

456. Another alternative structure would be a fixed price system for vessels within a certain size range. (**Alternative structure-2**). Under this structure, it would not be necessary to calculate the amount of toll by each vessel, but deviation from the actual cost curve will become larger as with alternative-1.

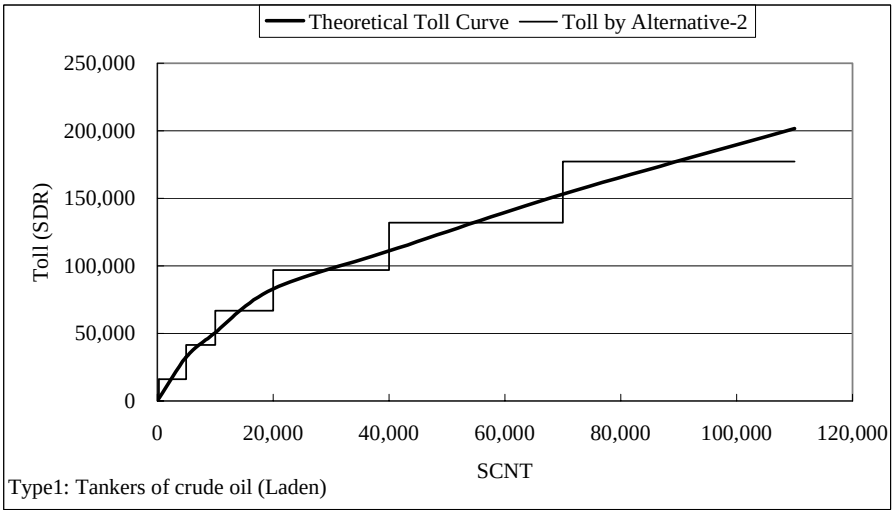


Figure 28 Applied Toll and Theoretical Toll
(Tariff Format Alternative-2)

457. As a conclusion, current toll and rate structure using fixed unit price tariff by vessel size ranks and type is the best way to satisfy the toll setting principles.

OPTIMAL TOLL LEVEL

(i) General

458. Without applying rebate/discount system, optimal toll level within the proposed toll structure is decided based on the standard saved distance. Considering the effect of standard saved distance mentioned in para. 452, relation between standard toll level and total toll revenue is shown in Figure 29 through Figure 37. These figures show that at a certain level of standard toll (saved distance), toll revenue per ton of cargo/vessel decreases to the level of (standard saved distance/maximum saved distance) x (maximum toll per ton of cargo/vessel which corresponds to the toll level of maximum saved distance) while total tons of transit increases to the sum of the tons of cargo/vessel from those with less than maximum saved distance to those with the standard saved distance. Hence total toll revenue will vary according to the amount of cargo with each saved distance.

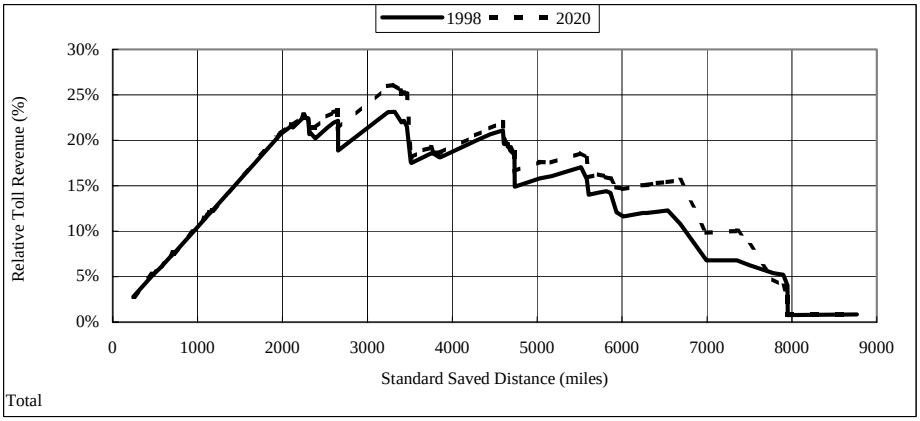


Figure 29 Relative Toll Revenue (Total)

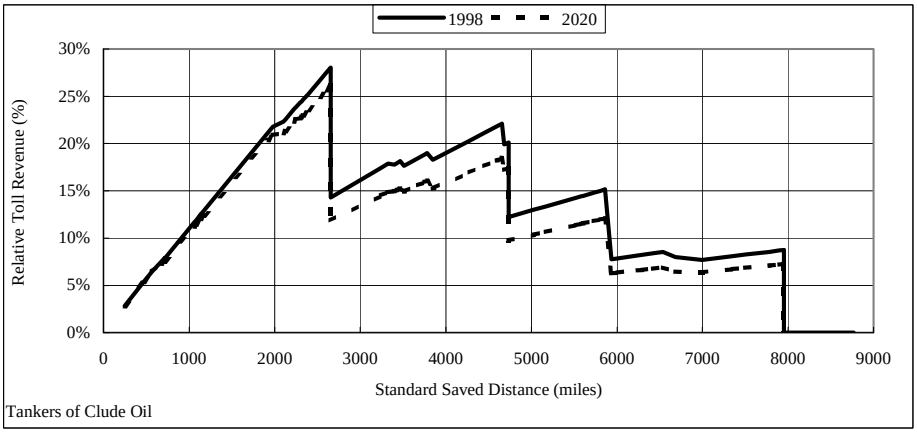


Figure 30 Relative Toll Revenue (Tankers of Crude Oil)

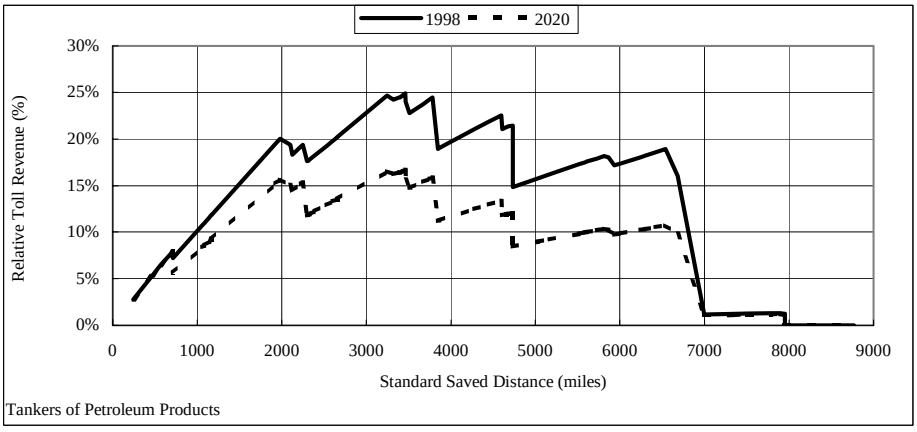


Figure 31 Relative Toll Revenue (Tankers of Petroleum Products)

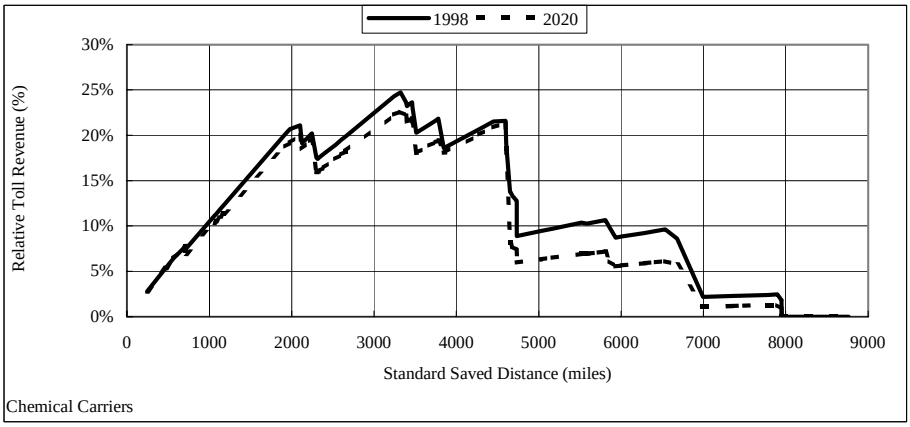


Figure 32 Relative Toll Revenue (Chemical Carriers)

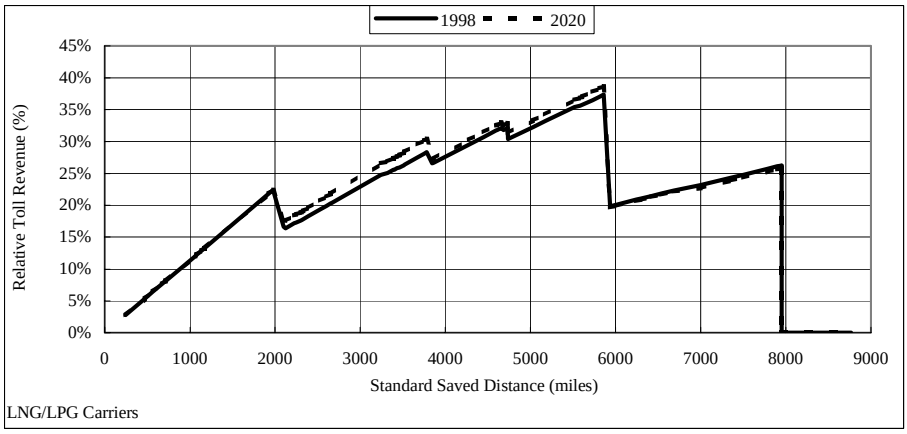


Figure 33 Relative Toll Revenue (LNG/LPG Carriers)

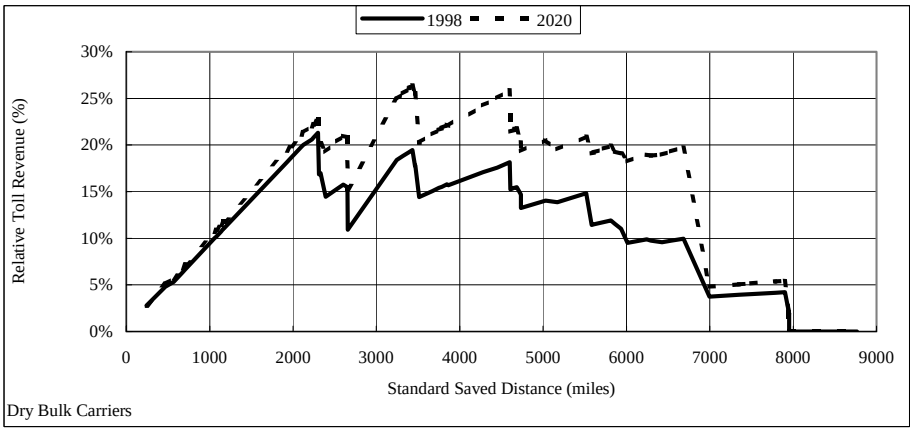


Figure 34 Relative Toll Revenue (Dry Bulk Carriers)

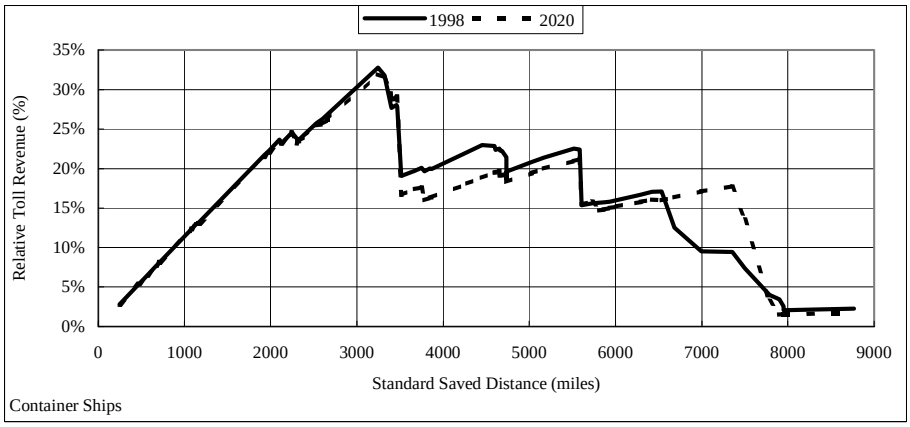


Figure 35 Relative Toll Revenue (Container Ships)

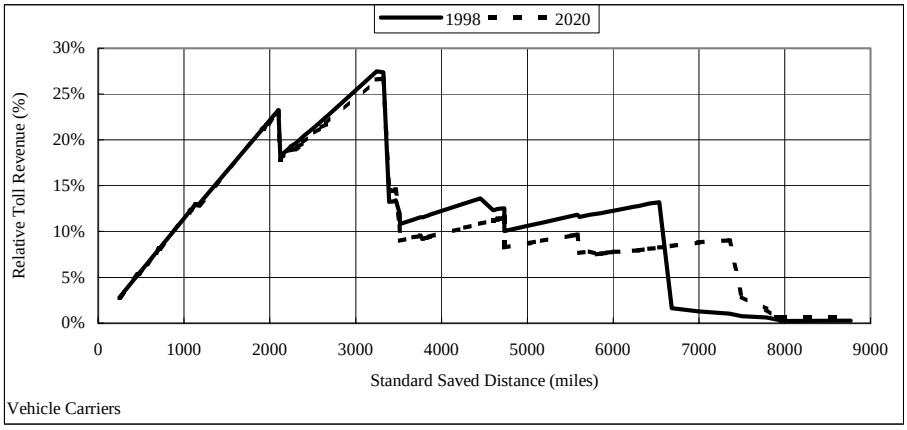


Figure 36 Relative Toll Revenue (Vehicle Carriers)

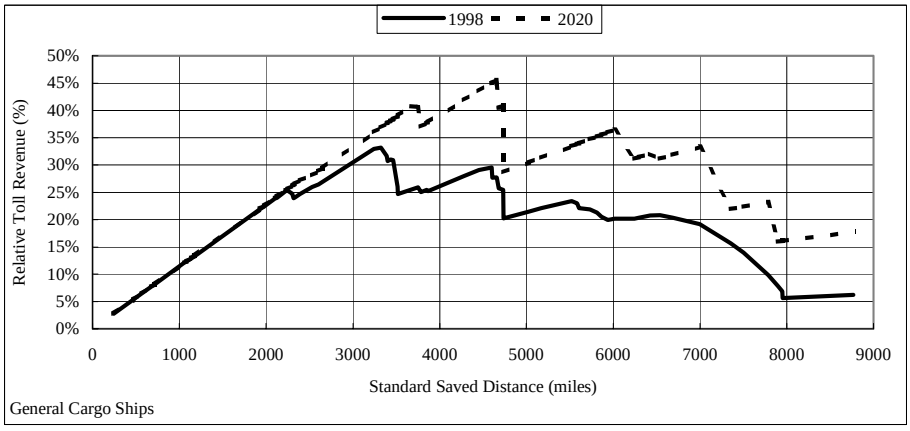


Figure 37 Relative Toll Revenue (General Cargo Ships)

459. Hence, expected toll revenue varies with the standard toll level, namely with standard saved distance under the fixed tariff system. In considering all kinds of cargoes as a whole, optimal toll level corresponds to the standard saved distance of around 3,300 miles for the potential cargo in 1998.

460. For each category of cargo, optimal toll level, saved distance and percentage of cargo that would potentially divert to the Cape route is shown in the following table.

Table 59 Optimal Toll Level, Save Distance and Percentage of Cargo

Vessel Type	OTL (miles)	PCD (%)	SOL (miles)	PCD (%)
Tankers of Crude Oil	2,654	7.4	4,657	58.4
Tankers of Petroleum Products	3,462	36.9	3,783	43.3
LNG and LPG Carriers	5,863	44.2	4,733	40.5
Chemical Carriers	3,321	34.7	4,597	58.8
Other Tankers	3,321	13.7	4,451	48.0
Bulk Carriers	2,302	18.8	3,432	50.3
Combined Carriers	3,321	26.6	3,787	46.2
General Cargo Ships	3,321	12.3	3,432	20.8
Container Ships	3,245	11.5	3,462	29.0
LASH	3,245	6.4	4,597	46.4
RoRo	3.245	10.0	4,597	49.7
Vehicle Carriers	3,245	25.8	2,101	3.0
Others	3,321	13.6	4,597	47.4
Total	3,321	38.9	4,597	59.8

Notes: OTL: optimal toll level saved distance

SOL: secondary optimal toll level saved distance

PCD: percentage of amount of cargo potentially to divert to the Cape route

Source: The Study Team

461. Percentage share in Table 59 means percentage share of cargo (vessel) which will be offered the Long Haul Rebate. Hence, it is desirable to set the standard saved distance to decrease this percentage, since large share of this type of vessels means increase of administrative complication by individual treatment of the toll charge.

462. These optimal levels will basically vary with the change of the amount of potential cargo of each O-D. They have, however, a tendency to

show the peak toll revenue at the same saved distance point as far as comparing the cases of 1998 and 2020.

463. Long saved distance trips are mainly those of O-D countries nearby the Suez Canal which were severely damaged by the past closure of the Canal. Hence, it is desirable to offer these countries a cheaper toll to protect the trade of these countries. This can be achieved by setting the standard saved distance at about 4,700 miles.

464. Therefore, it is recommended to set the standard saved distance (corresponding toll level) in between 3,300 miles and 4,700 miles with applying rebate/discount system.

OPTIMAL CLASSIFICATION OF TARIFF

(i) Classification of vessel size

465. Figure 38 through Figure 45 show the theoretically calculated toll curve based on current tariff for each type of vessel. It can be seen that the curve tends to become gentle as the vessel size becomes large. It is desirable to have a large number of classifications for the smaller-sized vessels in order to minimize the deviation between theoretical toll and set tariff as much as possible.

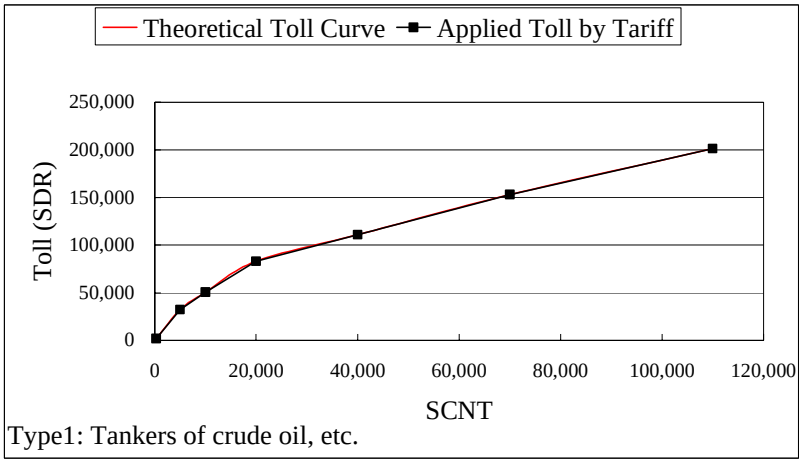


Figure 38 Applied Toll and Theoretical Toll (Type1)

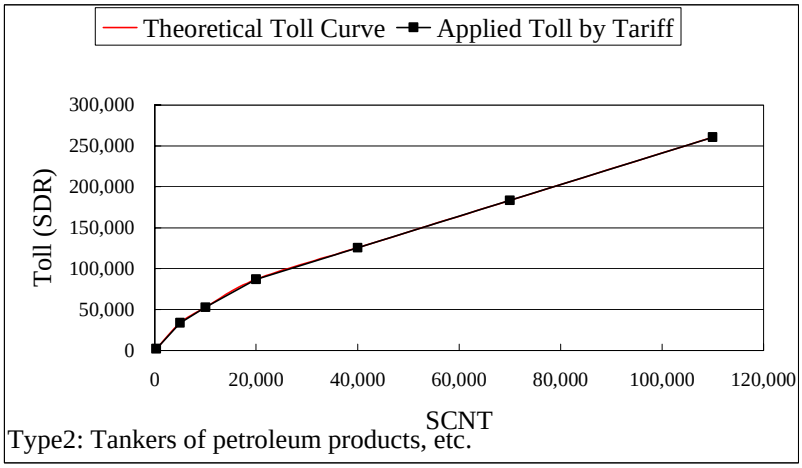


Figure 39 Applied Toll and Theoretical Toll (Type2)

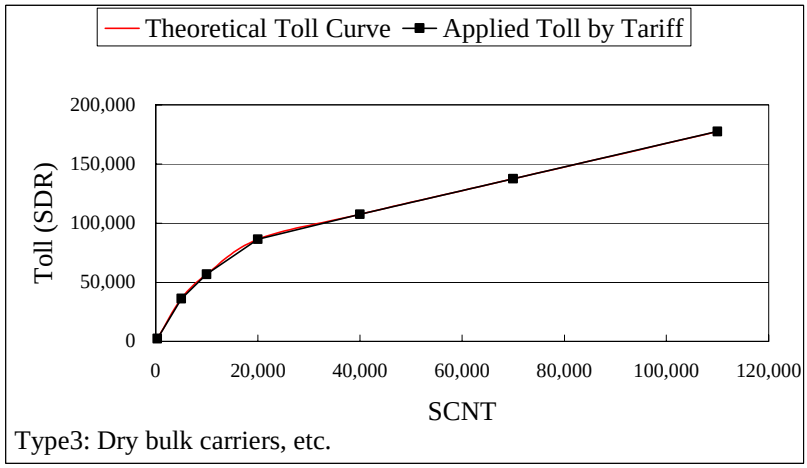
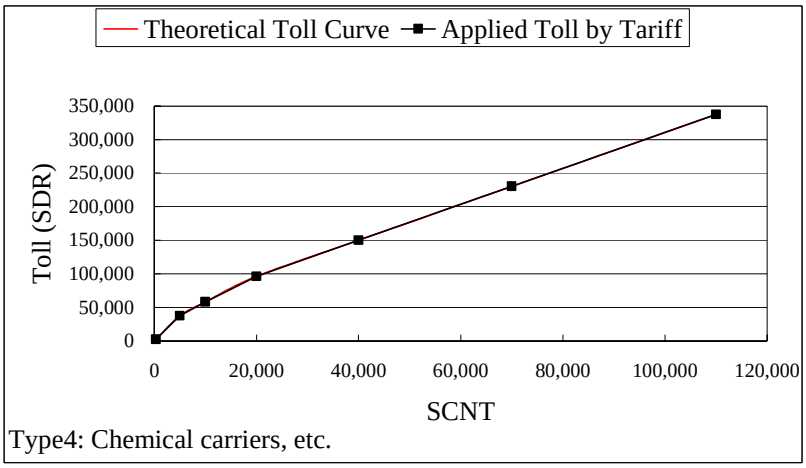
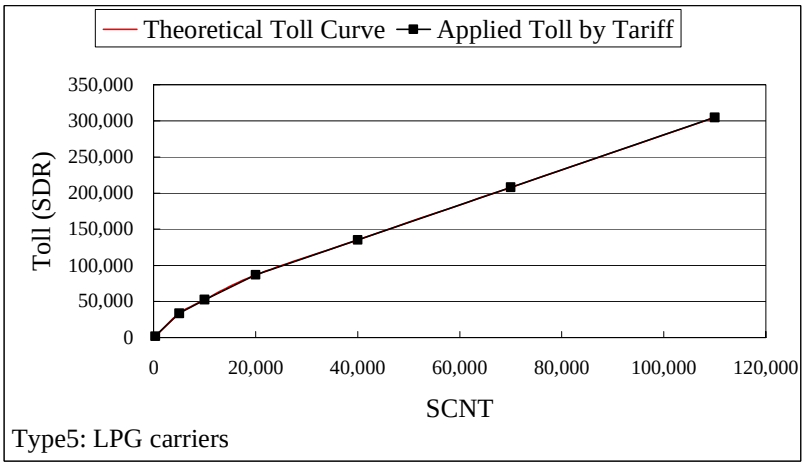


Figure 40 Applied Toll and Theoretical Toll (Type3)



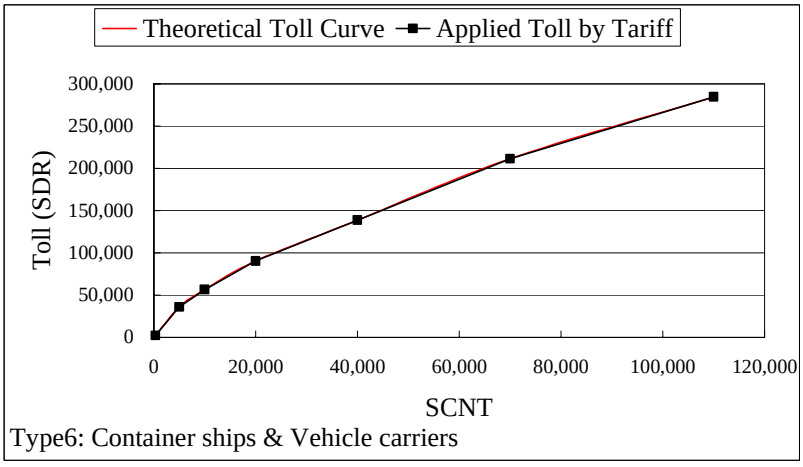
Type4: Chemical carriers, etc.

Figure 41 Applied Toll and Theoretical Toll (Type4)



Type5: LPG carriers

Figure 42 Applied Toll and Theoretical Toll (Type5)



Type6: Container ships & Vehicle carriers

Figure 43 Applied Toll and Theoretical Toll (Type6)

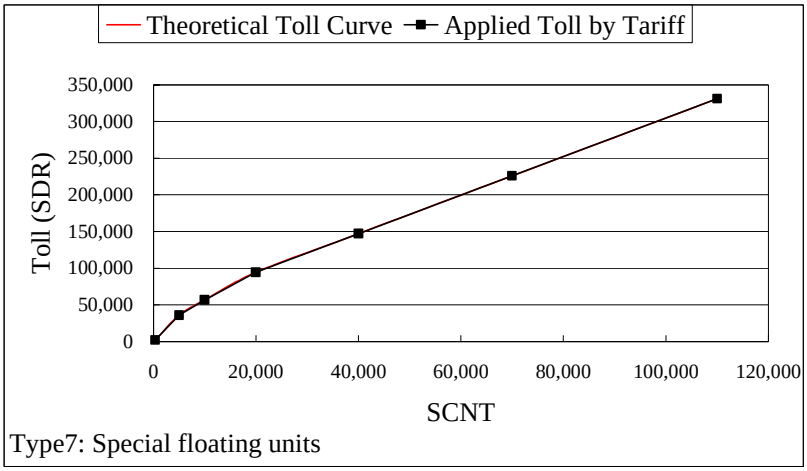


Figure 44 Applied Toll and Theoretical Toll (Type7)

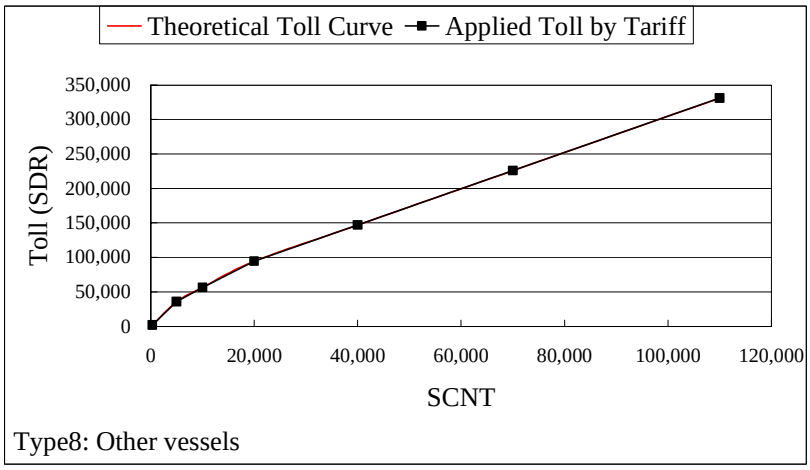


Figure 45 Applied Toll and Theoretical Toll (Type8)

466. Size classification of the current tariff table can be said reasonable from the viewpoint mentioned above. Size classification of the current tariff table is the same for all types of vessels and it might be said that it must varied with the type of vessel, partly because there is no vessel with classified size for certain type of vessel, and partly because there is a possibility that steepness of the theoretical curve changes with type of vessel.

467. From the figures shown above, it is not possible to identify any typical deviation between the theoretical curve and current classified tariff. From the viewpoint of simplicity of the tariff structure, the current structure of tariff table without differentiation by type of vessel is better than a differentiated tariff structure.

468. For vessels larger than 70,000 SCNT, current tariff table applies the

same size tariff. It may be possible to identify a deviation between theoretical curve and calculated value based on current tariff table. Hence it is recommended to add two more size classifications: next 40,000 SCNT and next 50,000 SCNT.

(ii) Classification of vessel type

469. Shipping cost varies by type of vessel, even for the same size vessel. Therefore, it is reasonable to set different tariff rates for different type of vessels as is applied in the current tariff of the Suez Canal.

470. Figure 46 shows shipping cost per SCNT-mile. As is seen from this figure, there is an apparent difference in the unit cost between chemical carrier and LNG carrier and between container ship and vehicle carrier, although these two different types of vessels are classified into the same category in the current tariff.

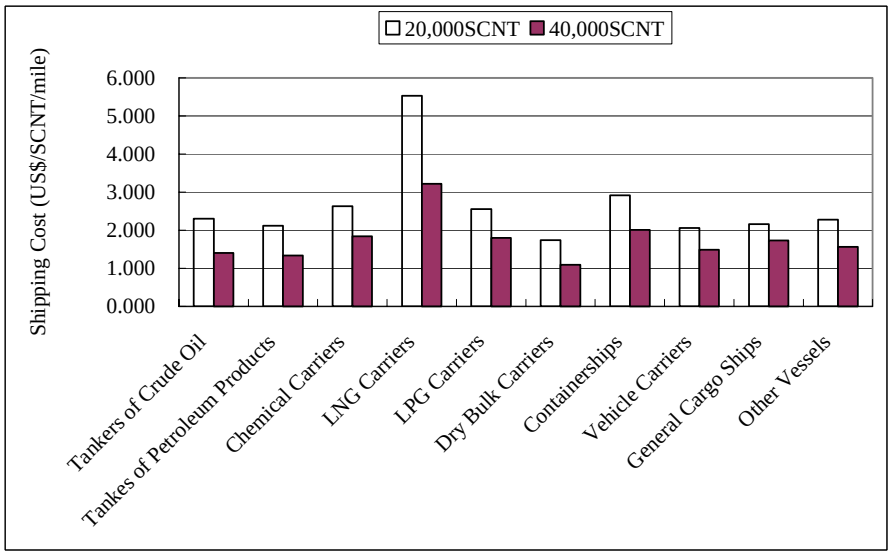


Figure 46 Shipping Cost by Vessel Type

471. It can also be identified that there is no significant difference between unit cost of crude oil tanker and that of petroleum products tanker, and between unit cost of chemical carrier and LPG carrier, although they are listed under different categories in the current tariff.

472. Hence, it is recommended to classify chemical tanker and LNG carrier into two separate categories and to classify container ship and vehicle carrier also into two separate categories. It is also recommended to classify chemical carrier and LPG carrier into the same category and crude oil tanker

and petroleum product tanker into the same category for the simplification of the toll calculation.

(iii) Classification of laden and ballast

473. Vessel's speed in the ballast condition is said to become 10-20% higher than that in fully laden condition and the shipping cost can be saved to 90-80% because of the increased turn-around number. Therefore, currently applied classification of tariff for laden and ballast can be said appropriate.

474. In the case where a vessel has no plan of next voyage or free time till the next voyage, only the fuel cost in the shipping cost is perceived as savings by shipping lines. Therefore, it is recommended to set the rate based on only the fuel cost savings in the above case in applying the Long Haul Rebate for ballast ships.

FLEXIBLE CHARGING SYSTEM

475. To cope with fluctuations in the shipping market and to complement the tariff table which is based on the standard saved distance, current Long Haul Rebate system based on individual savings of each trip should be kept. The Long Haul Rebate system is an excellent tool in order to prevent vessels from diverting to other routes.

476. However, some shipping lines operating Dry Bulk Carriers are using the route via the Cape, even though they are well aware of the Long Haul Rebate system. This seems to happen for the following reason:

- A shipping line calculates the shipping cost of one voyage or one term to propose a freight rate to a shipper/consignee.
- In the calculation, the shipping line sets the rebate rate lower than the actual level, because they do not want to undertake a risk.
- As a result, calculated shipping cost via the Cape becomes lower than that via the Canal.
- After the freight rate and route are fixed by contract, the shipping line cannot change the route without the consent of the consignee because this would possibly generate additional inventory cost for the consignee.

477. It could be possible to prevent the vessels from diverting to other routes if shipping lines or shippers/consignees could know in advance the fixed figure of the rebate rates.

478. Hence, it is recommended to introduce a fixed rebate rate system regarding saved distance. It should be noted, however, that such a fixed rebate rate system should not apply for Container Ships and Tankers of Crude Oil. Proposed applying method is as follows:

Fixing rebate rates by main O-D pairs

SCA fixes and announces rebate rates by main O-D pairs like current reduction for VLCC in ballast coming from America to Arabian Gulf. SCA can revise the rebate rates every six months to reflect changes in fuel price. Users can apply current Long Haul Rebate instead of the fixed rebate system to reflect changes in the shipping market.

479. This assessment can be done through comparison between calculated value and past claimed value which the SCA possesses.

480. When the shipping market experiences a recession, ocean freight decreases to the point where the revenue of shipping lines is unable to cover shipping costs. Nevertheless, shipping lines cannot stop their services up to the so called Laying-Up Point, namely not in service.

481. In case that carrying capacity of fleet is more than its demand and/or that the freight rates in the shipping market are very low, the managing cost would not be regarded as a savings by shipping lines provided the annual number of trips via Suez does not exceed that via the Cape, since the managing cost must be borne daily even if a vessel is at a laying-up condition.

482. Therefore, to prevent vessels from diverting to other routes (except liners) in this case, toll should reflect only savings in operation cost.

CALCULATION OF NEW TOLL AND REBATE RATE

483. Based on the proposed toll structure, new toll and rebate rates are calculated. These calculations are based on the following premises and need to be assessed based on the past actual data of the vessels which transited the Canal.

(Premises)

- In the calculation based on the equation-1, Rs (ratio of supplier's receipt) is taken as 0.8.
- Indirect managing cost is based on the contract price of newly built vessels and capital cost and depreciation cost (for 15 years with fixed

rate) are counted

- Fuel price is set as US$ 100/ton and speed and fuel consumption rate of the vessel are based on the world vessels' data.
- For Container Ships, the inventory cost and the container box capital cost are considered.
- For the Vehicle Carriers, the inventory cost is considered.
- Standard saved distance is taken as 4,700 miles.
- Excess cost for managing and banker cost is based on the about 1day time loss.
- Excess cost of other charges is the sum of port dues, agency fees etc. and tug charge.
- Shipping cost for 5,000SCNT and 10,000SCNT is calculated by linearly extending those for 20,000SCNT and 40,000SCNT.
- Toll is calculated based on the exchange rate of US$ 1.3/SDR.

484. The ratios of calculated tolls based on above mentioned premises to current tolls are shown in Table 60. It can be said that current tolls are basically same level as the calculated tolls. It should be noted, however, that these premises (exchange rate US$/SDR in particular) directly affect the results in this table and following recommendations.

Table 60 Ratio of Calculated Toll to Current Toll

	Vessel Size (SCNT)							
Vessel Type	5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000
* Tankers of Crude Oil	1.06	1.39	1.47	1.33	1.22	1.13	1.11	1.10
* Tankes of Petroleum Products	0.90	1.20	1.28	1.12	1.01	0.89		
* Chemical Carriers	1.00	1.33	1.45	1.30	1.20	1.10		
* LNG Carriers	3.47	4.54	4.72	3.46	2.64	2.08		
* LPG Carriers	1.06	1.41	1.54	1.35	1.27	1.21		
* Dry Bulk Carriers	0.69	0.91	1.05	1.06	1.08	1.04		
* Containerships	1.09	1.39	1.54	1.36	1.17	1.04		
* Vehicle Carriers	0.79	1.04	1.18	1.11	1.05			
* General Cargo Ships	0.81	1.07	1.21	1.26	1.28	1.24		
* Other Vessels	0.90	1.18	1.27	1.11	1.00	0.90		

Note) Current tolls for Container Ships are applied the weather deck surcharge of 9.7%
Source) The Study Team

485. Hence it is recommended to raise the rates by 3% for the classes where the ratio of calculated toll to current toll is more than 1.10 (except LNG Carriers) as the first step and to monitor the reaction to this increase. The threshold criterion of 10% is set considering validity of used premises in toll calculation.

486. On the other hand, for the classes where the ratio of calculated toll to current toll is less than 0.90, it is recommended to leave the rate as it is since there is no firm evidence that reducing the toll would increase toll revenues. Additional comments and recommendations by vessel type are as follows:

(i) Tankers of Crude Oil

487. Currently basic rates of tariff are set as in Table 61 and Ballast VLCC discount, SUMED integration discount, Supertanker/Suez max combination discount, SBT discount, Long Haul Rebate and volume discount are applied.

Table 61 Current Tariff (Tankers of Crude Oil)

(SDR/SCNT)

Vessel Type	SCNT					
	First 5000	Next 5000	Next 10000	Next 20000	Next 30000	Rest
1 (L)	6.49	3.62	3.25	1.40	1.40	1.21
1 (B)	5.52	3.08	2.77	1.19	1.19	1.03

Source) SCA.

488. Basic rates are calculated on the basis of World Scale which represents the tanker freight market value. Standard O-D is set as Arabian Gulf and North-West Europe.

489. For common carrier tankers, current rates calculated based on the World Scale can basically be said appropriate. Vessels toward Europe are enjoying a more than 20% surplus compared with Cape route, while vessels toward U.S. are enjoying a less than 10% surplus in case of high World Scale Rate.

490. In case of low World Scale Rate, advantage of using the Suez Canal decreases. For the vessels bound for U.S., Cape route becomes more advantageous than the Suez route.

491. Hence, it is recommended to raise the tariff for vessels bound for Europe and give a greater discount to the vessels bound for the U.S.. In case of low World Scale Rate, further discount is necessary.

492. Only 30% of crude oil carriers are common carriers. The remaining 70% are industrial carriers which are almost insensitive to the world scale rate. Hence, basic rates for the industrial carriers should be set based on the shipping cost savings. In applying the standard saved distance of 4,700 miles (maximum toll revenue distance without rebate/discount is 2,600 miles), saved cost ratio to standard saved distance is calculated as 49% for the vessels bound for the Mexican Gulf (saved distance 2,600 miles) and 35% for those bound for the Caribbean Sea (saved distance 2,000 miles). These ratios are smaller than those applied respective current toll ratios of 55% (=100%-45%)

and 45% (=100%-55%) and hence discount rates should be set higher than current rates.

Table 62 Toll Comparison (Tankers of Crude Oil, Laden)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	42,185	65,715	107,965	144,365	198,965	261,885	340,535	434,915	
Calculation	4,700	b	44,863	91,405	159,013	192,328	242,300	295,200	378,486	478,428	
	2,600	c	19,816	45,106	81,590	98,188	123,082	142,547	184,037	233,826	
	2,000	d	12,660	31,877	59,469	71,290	89,020	98,931	128,481	163,940	
Comparison		b/a	1.06	1.39	1.47	1.33	1.22	1.13	1.11	1.10	1.23
		c/a	0.47	0.69	0.76	0.68	0.62	0.54	0.54	0.54	0.60
		d/a	0.30	0.49	0.55	0.49	0.45	0.38	0.38	0.38	0.43
		c/b	0.44	0.49	0.51	0.51	0.51	0.48	0.49	0.49	0.49
		d/b	0.28	0.35	0.37	0.37	0.37	0.34	0.34	0.34	0.35

Note) Exchange rate = 1.30 US$/SDR
Source) The Study Team

493. In conclusion, current rates are recommended to be raised 3% as the first step provided that the standard saved distance is reset to 4,700 miles. The discount rate for Mexican Gulf is recommended to be raised to 51% (=100%-49%) and that for Caribbean Sea to 65% (=100%-35%) and discount rates should be applied to all vessels, not only VLCC in ballast.

(ii) Tankers of Petroleum Products

494. The maximum size of Tankers of Petroleum Products is almost 70,000SCNT and vessels less than 40,000 SCNT shares 82%. Basic toll rates do not greatly differ from the values calculated based on standard saved distance of 4,700 miles, though it is a little bit higher for the 5,000SCNT and lower for the 10,000-40,000SCNT.

Table 63 Toll Comparison (Tankers of Petroleum Products, Laden)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	43,875	68,380	112,970	163,150	238,420	338,780			
Calculation	4,700	b	39,591	81,938	144,673	182,302	239,780	302,200			
	3,800	c	29,863	63,884	114,171	143,725	188,893	234,992			
	2,200	d	12,569	31,787	59,945	75,143	98,426	115,512			
Comparison		b/a	0.90	1.20	1.28	1.12	1.01	0.89			1.07
		c/a	0.68	0.93	1.01	0.88	0.79	0.69			0.83
		d/a	0.29	0.46	0.53	0.46	0.41	0.34			0.42
		c/b	0.75	0.78	0.79	0.79	0.79	0.78			0.78
		d/b	0.32	0.39	0.41	0.41	0.41	0.38			0.39

Note) Exchange rate = 1.30 US$/SDR
Source) The Study Team

495. Therefore, as a conclusion, it is recommended to raise the rates for 10,000-40,000SCNT 3% as the first step. It will then be necessary to monitor the reaction to this increase.

(iii) Chemical Carriers

496. Current rates for Chemical Carriers are set lower than the calculated rates for the standard saved distance of 4,700 miles. There is room to raise the rate for the vessels above 10,000SCNT.

Table 64 Toll Comparison (Chemical Carriers, Laden)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	48,750	75,660	125,190	194,870	299,390	438,750			
Calculation	4,700	b	48,692	100,293	181,014	252,531	358,873	484,296			
	3,300	c	30,597	66,335	122,028	170,274	241,989	322,028			
	2,100	d	15,087	37,229	71,468	99,767	141,802	182,942			
Comparison		b/a	1.00	1.33	1.45	1.30	1.20	1.10			1.23
		c/a	0.63	0.88	0.97	0.87	0.81	0.73			0.82
		d/a	0.31	0.49	0.57	0.51	0.47	0.42			0.46
		c/b	0.63	0.66	0.67	0.67	0.67	0.66			0.66
		d/b	0.31	0.37	0.39	0.40	0.40	0.38			0.37

Note) Exchange rate = 1.30 US$/SDR
Source) The Study Team

497. It is recommended to raise the rate 3% for the vessels more than 10,000 SCNT as the first step.

(iv) LNG Carriers

498. LNG Carriers receive the 35% discount applied to vessels as a means to bolster the competitive power of Arabian Gulf LNG against Algeria LNG in the European market.

499. LNG price in the major trading countries are shown in the following table. Based on this limited data, FOB price of LNG in Quatar tends to be higher than that CIF price in Spain and this is caused by the relatively lower price of LNG in Algeria. Hence, it can be said that even with free transit of the Canal, increase of LNG export from Gulf area cannot be expected.

Table 65 LNG Price at Exporting and Importing Countries

Country			Year						
			1992	1993	1994	1995	1996	1997	1998
Algeria (FOB)	Quantity	(million MT)	15.56	14.97	14.62	10.84	15.07	18.28	
	Value	(million US$)	1,899.5	1,690.0	1,314.6	1,096.7	1,624.9	2,428.3	
	Price	(US$/MT)	122.1	112.9	89.9	101.2	107.8	132.8	
Qatar (FOB)	Quantity	(million MT)	1.39	1.21					
	Value	(million US$)	242.6	178.8					
	Price	(US$/MT)	174.5	147.8					
Spain (CIF)	Quantity	(million MT)	4.58	4.45	5.05	5.64	5.82	4.85	4.67
	Value	(million US$)	617.4	572.1	600.0	690.1	778.1	733.0	577.1
	Price	(US$/MT)	134.8	128.6	118.8	122.4	133.7	151.1	123.6
Japan (CIF)	Quantity	(million MT)	39.06	40.35	41.63	42.92	45.89	47.66	49.15
	Value	(million US$)	7,297.5	7,163.80	6,940.30	7,679.2	8,643.0	9,560.8	7,783.8
	Price	(US$/MT)	186.8	177.6	166.7	178.9	188.3	200.6	158.4

Note) Quantities in 1993 & 1994 of Japan are inserted using data of 1992 & 1995 by the Study Team.

Source) International Trade Statistics, UN

500. Current level of toll is the result of the negotiation between SCA and related countries and there is no room for discussion.

(v) LPG Carriers

501. Current rates for the LPG Carriers are almost the same level for the 5,000SCNT as the calculated rate based on the standard saved distance of 4,700 miles and a little less for the vessels more than 10,000SCNT.

Table 66 Toll Comparison (LPG Carriers, Laden)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	43,875	68,380	112,970	175,890	270,270	396,110			
Calculation	4,700	b	46,489	96,218	174,260	237,812	342,247	478,566			
	2,600	c	20,236	46,903	88,388	117,106	169,820	238,487			
	2,000	d	12,736	32,813	63,854	82,618	120,555	169,894			
Comparison		b/a	1.06	1.41	1.54	1.35	1.27	1.21			1.31
		c/a	0.46	0.69	0.78	0.67	0.63	0.60			0.64
		d/a	0.29	0.48	0.57	0.47	0.45	0.43			0.45
		c/b	0.44	0.49	0.51	0.49	0.50	0.50			0.49
		d/b	0.27	0.34	0.37	0.35	0.35	0.36			0.34

Note) Exchange rate = 1.30 US$/SDR

Source) The Study Team

502. It is recommended to raise the rate 3% for the vessels more than 10,000SCNT. It will then be necessary to monitor the reaction to this increase.

(vi) Dry Bulk Carriers

503. Current rates for Dry Bulk Carriers are almost the same level for the

vessels more than 10,000SCNT and a little higher for the vessels of 5,000 SCNT than the calculated rates with standard saved distance of 4,700 miles.

Table 67 Toll Comparison (Dry Bulk Carriers, Laden)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	46,865	73,775	112,385	139,685	178,685	230,685			
Calculation	4,700	b	32,204	66,965	118,323	148,385	193,478	239,876			
	3,500	c	21,557	47,218	85,013	106,498	138,725	167,968			
	2,300	d	10,911	27,472	51,703	64,611	83,972	96,061			
Comparison		b/a	0.69	0.91	1.05	1.06	1.08	1.04			0.97
		c/a	0.46	0.64	0.76	0.76	0.78	0.73			0.69
		d/a	0.23	0.37	0.46	0.46	0.47	0.42			0.40
		c/b	0.67	0.71	0.72	0.72	0.72	0.70			0.70
		d/b	0.34	0.41	0.44	0.44	0.43	0.40			0.41

Note) Exchange rate = 1.30 US$/SDR
Source) The Study Team

504. Dry bulk carriers are the major type using the Long Haul Rebate system and major O-Ds of which saved distance are less than 4,700 miles are Oceania-NW Europe (saved distance = 2,300 miles), SE Asia-NW Europe (saved distance = 3,500 miles) and E Africa(south)-Mediterranean Sea (saved distance = 2,300 miles).

505. Decrease of toll revenue expected when toll decrease does not affect the increase of transit vessels is estimated as 0.6 million SDR. Hence, it is recommended to leave the rate as it is.

506. Long Haul Rebate for those vessels of major O-Ds are recommended to be set as follows;

- Oceania-NW Europe 59% (=100%-41%)
- SE Asia-NW Europe 30% (=100%-70%)
- E. Africa (south)-Mediterranean Sea 59% (=100%-41%)

(vii) Container Ships

507. Current toll levels (after weather deck surcharge) are a little less for the vessels of 10,000-70,000SCNT than the calculated level for the standard saved distance of 4,700 miles and almost the same level for the vessels of 5,000SCNT and 110,000SCNT.

Table 68 Toll Comparison (Container Ships, Laden, Case-4)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	46,865	73,515	117,325	180,245	274,625	369,785			
		b	51,411	80,646	128,706	197,729	301,264	405,654			
Calculation	4,700	c	56,261	112,036	198,294	269,409	353,235	423,014			
	3,500	d	38,983	79,664	142,283	192,319	250,941	295,067			
	3,200	e	34,663	71,571	128,280	173,046	225,367	263,080			
Comparison		c/a	1.20	1.52	1.69	1.49	1.29	1.14			1.39
		d/a	0.83	1.08	1.21	1.07	0.91	0.80			0.98
		e/a	0.74	0.97	1.09	0.96	0.82	0.71			0.88
		c/b	1.09	1.39	1.54	1.36	1.17	1.04			1.27
		d/b	0.76	0.99	1.11	0.97	0.83	0.73			0.90
		e/b	0.67	0.89	1.00	0.88	0.75	0.65			0.81
		d/c	0.69	0.71	0.72	0.71	0.71	0.70			0.71
		e/c	0.62	0.64	0.65	0.64	0.64	0.62			0.63

Note) Case-4: with considering container box capital cost & inventory cost (cargo value: 1,000US$/ton)
Current toll (b) show toll after weather-deck surcherge of 9.7%.
Exchange rate = 1.30 US$/SDR
Source) The Study Team

508. There is a room to raise the rates for the vessels of 10,000-70,000 SCNT. However, it is recommended to increase rates by only 3% as the first step. It will then be necessary to monitor the reaction to this increase.

509. It should be noted, however, that there are some direct services between Singapore and NW. Europe of which saved distance is 3,500 miles and careful attention should be paid to such services, though the Long Haul Rebate is not applied for Container Ships.

510. Currently applied weather deck surcharge forces the shipping line to reset the boxes before/after passing the Canal to decrease the weather deck boxes and gives them the impression that they are being excessively charged. Hence new tariff base is recommended in the Annex V to raise the basic rate with a discount system based on TEUs by calculating the earning capacity of vessels not only by SCNT but by TEU and including the inventory cost of cargoes. However, it would be difficult at present to detect false declarations by the shipping line concerning TEUs without an EDI system. For the time being, therefore, it is considered desirable to apply the current system.

(viii) Vehicle Carriers

511. Virtually 100% of the Vehicle Carriers are said to be industrial carriers. Therefore in the absence of a spot market, standard tariff level should be set based on the shipping cost savings.

512. As the vehicles carried are high priced goods (US$10,000/car FOB on average), inventory cost savings should also be considered.

513. Size of vehicle carriers transiting the Suez Canal is less than 70,000SCNT and those of more than 40,000SCNT represent 82% of the total. Major O-D is Far East-N. Mediterranean and NW. Europe.

514. Current tariff rates are almost the same level as the calculated rates with inventory cost savings for the standard saved distance of 4,700 miles for the sizes of 20,000-40,000SCNT.

Table 69 Toll Comparison (Vehicle Carriers, Laden, Case-2)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	46,865	73,515	117,325	180,245	274,625				
Calculation	4,700	b	37,054	76,338	138,800	199,313	288,428				
	3,300	c	23,143	50,113	92,745	132,785	191,683				
	2,100	d	11,218	27,634	53,270	75,761	108,758				
Comparison		b/a	0.79	1.04	1.18	1.11	1.05				1.03
		c/a	0.49	0.68	0.79	0.74	0.70				0.68
		d/a	0.24	0.38	0.45	0.42	0.40				0.38
		c/b	0.62	0.66	0.67	0.67	0.66				0.66
		d/b	0.30	0.36	0.38	0.38	0.38				0.36

Note) Case-2: with considering inventory cost
Exchange rate = 1.30 US$/SDR
Source) The Study Team

515. Saved distance which brings the maximum toll revenue is 3,300 miles corresponding to Far East-Mediterranean and shows typical peak point. Hence it seems to be rational to apply fixed rebate rate for this O-D of 34% (=100%-66%).

516. The Long Haul Rebate for the ballast ships should be set based on only fuel cost savings when vessel has no plan of next voyage or has free time till next voyage, and should be based on shipping cost savings if it has a fixed plan of continual voyage.

517. Currently, vessels are said to use the Canal even with smaller rebates than their claimed rates. Therefore, there is a possibility to decrease the toll revenue if fixed rebate rate is applied. However, current behavior of vessels can be considered a temporary phenomenon caused by the constraints of available capacity.

(ix) General Cargo Ships

518. Current level of the rates are a little higher for the vessels of 5,000SCNT and lower for those more than 20,000SCNT than the calculated

rates for the standard saving distance of 4,700 miles, and almost the same level for the vessels of 10,000SCNT.

Table 70 Toll Comparison (General Cargo Ships, Laden)

(US$)

Toll	Standard Saved Distance (miles)		Vessel Size (SCNT)								Average
			5,000	10,000	20,000	40,000	70,000	110,000	160,000	220,000	
Current Toll		a	46,865	73,775	122,785	191,165	293,735	430,495			
Calculation	4,700	b	38,165	79,144	149,115	241,110	374,686	533,740			
	3,300	c	24,317	52,638	100,866	163,657	254,744	358,732			
Comparison		b/a	0.81	1.07	1.21	1.26	1.28	1.24			1.15
		c/a	0.52	0.71	0.82	0.86	0.87	0.83			0.77
		c/b	0.64	0.67	0.68	0.68	0.68	0.67			0.67

Note) Exchange rate = 1.30 US$/SDR
Source) The Study Team

519. It may be possible to increase the toll revenue by raising the rate for the vessels of more than 20,000SCNT. It is, however, recommended to increase the rate by only 3% as the first step. It will then be necessary to monitor the reaction to this increase due to the ambiguity of the analyzed data.

520. For the vessels less than 5,000SCNT, it is recommended to leave the rate as it is, though there is a possibility that toll revenue could be increased if the current rate were lowered. In the absence of necessary data and information, it is difficult to precisely evaluate the effect of lowering the current rate.

CHARGING CURRENCY

521. From the viewpoint of the foreign currency earning function of the Canal, it is an important issue to which currency unit the toll should be pegged. Currently it is pegged to SDR and paid by US$ applying the exchange rate of US$ to SDR.

522. In the past, this issue was discussed from the viewpoint of purchasing power of US$ and SDR (refer to 2.2 of the Final Report Annex E on Development of the Suez Canal by Suez Canal Study Consortium). It developed, however, into a somewhat messy discussion.

523. The issue of which currency the toll should be pegged to can be discussed in various ways. Questions raised by the SCA staffs are as follows;

- Which currency is more favorable to purchase commodities in the foreign market?

- Which currency is more favorable in terms of getting stable revenue? For instance, this year's revenue decreased against that of last year in spite of the same level of transit volume. This would seem to suggest that the US$ is more favorable.
- Since most user's accounting is based on the US$, wouldn't the US$ be more welcomed by users?
- Most expenditures of SCA are in US$. Does this again indicate that the US$ is preferable to SDR?

524. The study team's answers to these questions are as follows based on the analysis shown in APPENDIX V CHAP.4.

525. The issue of charging currency can be discussed from the viewpoint of a risk hedge against changes in the US$/SDR exchange rate. There are 3 interested parties: 1) users who pay tolls, 2) SCA who sets tolls, 3) Egyptian national treasury (including SCA) who gets toll revenue.

526. For users who pay tolls, US$ pegged toll is preferable since almost all transactions of international maritime transport are now conducted in US$.

527. For SCA who sets tolls, US$ pegged toll is preferable since toll setting is now originally made in US$.

528. For Egyptian national treasury (including SCA) who gets toll revenue, it depends upon the purpose of use: 1) payments for purchasing goods, 2) repayments of the foreign debt.

529. Purchasing power of the currency solely depends on the exchange rates of SDR at the time of purchase and the fixed toll. There is no difference by the currency pegged as far as it is required to pay in respective currency after exchange of $ currency SCA owns.

530. Actual toll is paid in US$ currency even though the toll is pegged to SDR. Then, it is natural to have different revenue in US$ by the exchange rate change of SDR to US$. Then the issue should be discussed from the view point of the purpose of revenue, in other words, for what purpose will SCA use the revenue? Basically the answer to this question is the same as the answer to the 4th question: The US$ pegged toll is more favorable because the payments are directly linked with the US$ and there is no risk arising from the variation of exchange rate.

531. If the major purpose of getting revenue from the toll is to improve

the debt service ratio of Egypt, in other words, to be used for repayment of the foreign debt, then it is better to peg the toll to the currency which is more favorable from the view point of repayability of national debt.

532. In order to judge which currency is more repayable, we can introduce an index to evaluate the sensitivity of revenue and total debt of the nation evaluated in US$ to the fluctuation of SDR value against US$. If the sensitivity of the toll revenue ($value change of toll revenue by the change of SDR value in US$ compared with the value before SDR value change) is more/less than that of total national debt ($ value change of total national debt by the change of SDR value in US$ compared with the value before SDR value change), it can be said that repayability of the toll revenue is more sensitive. In other words, it is more risky. Then the optimal solution depends on the % share of the debt in US$. To find the break point which is more risky, evaluation table is shown in Table 71.

Table 71 COMPARISON OF ELASTICITY

Sd	0		0.2		0.4		0.445		0.5		0.6		0.8		1	
r	Es	Ed	Es	Ed	Es	Ed	Es	Ed	Es	Ed	Es	Ed	Es	Ed	Es	Ed
0.5	**0.789**	**0.526**	**0.872**	**0.581**	**0.974**	**0.649**	1.000	**0.667**	1.034	**0.689**	1.103	**0.735**	1.271	**0.847**	1.500	1.000
0.4	**0.814**	**0.581**	**0.888**	**0.634**	**0.977**	**0.698**	1.000	**0.714**	1.029	**0.735**	1.087	**0.776**	1.224	**0.874**	1.400	1.000
0.3	**0.844**	**0.649**	**0.908**	**0.698**	**0.982**	**0.755**	1.000	**0.769**	1.023	**0.787**	1.069	**0.822**	1.173	**0.902**	1.300	1.000
0.2	**0.882**	**0.735**	**0.931**	**0.776**	**0.987**	**0.822**	1.000	**0.833**	1.017	**0.847**	1.049	**0.874**	1.119	**0.933**	1.200	1.000
0.1	**0.932**	**0.847**	**0.961**	**0.874**	**0.993**	**0.902**	1.000	**0.909**	1.009	**0.917**	1.026	**0.933**	1.062	**0.965**	1.100	1.000
0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
−0.1	1.098	1.220	1.052	1.168	1.009	1.121	1.000	1.111	**0.989**	1.099	**0.970**	1.078	**0.934**	1.037	**0.900**	1.000
−0.2	1.251	1.563	1.124	1.405	1.021	1.276	1.000	1.250	**0.976**	1.220	**0.935**	1.168	**0.862**	1.078	**0.800**	1.000
−0.3	1.524	2.176	1.233	1.762	1.036	1.480	1.000	1.429	**0.959**	1.370	**0.893**	1.276	**0.785**	1.121	**0.700**	1.000
−0.4	2.148	3.581	1.417	2.362	1.057	1.762	1.000	1.667	**0.938**	1.563	**0.843**	1.405	**0.701**	1.168	**0.600**	1.000
−0.5	5.045	10.091	1.790	3.581	1.088	2.176	1.000	2.000	**0.910**	1.820	**0.782**	1.563	**0.610**	1.220	**0.500**	1.000

Es=(1+r)/(1+(1−Sd)∗(1+0.5821/P)∗r)
Ed=1/(1+(1−Sd)∗(1+0.5821/P)∗r)
E=△TR/TR／△D/D

533. This table shows that non-shadowed zone is less elastic to the $ value change of SDR and darker shadowed zone is more elastic, in other words, more risky to the value change of SDR. As a whole, we can say that in the case where the share of USD currency debt is more than 80% of the total debt, USD-pegged toll is more favorable than SDR-pegged toll against the fluctuation of USD value to SDR.

534. Hence it is recommended that this issue be deeply discussed within the Egyptian Government.

D. MARKETING SYSTEM

MARKETING POLICY

535. The basic objective of marketing is to take any necessary measures to increase the number of customers. As far as the marketing strategy is a part of cooperate management strategy, it is affected by the higher concept of corporate management, namely by the management principle and vision.

536. Accordingly, it is effective to publicize the basic policy on the management of the Suez Canal, namely purpose of the existence of the SCA and how to realize the policy, to the outsiders and to show explicitly the norm of behavior to the insiders.

537. For example, the article 310 of Political Constitution of the Republic of Panama-title XVI prescribes that the Panama Canal Authority shall be exclusively in charge of the administration, operation, conservation, maintenance, and modernization of the Panama Canal and its related activities.....in order that it may operate the Canal in a manner that is safe, continuous, efficient, and profitable.

538. Basic management policy of the Suez Canal is not clearly stated. However, as proposed in section B above, it should consist of the following objectives: 1) to consider a balance of power in the global politics, 2) to be a safety net for the world maritime transport market, 3) to promote co-prosperity for both users and SCA, and 4) to secure transparency and fairness. And marketing process should involve all the departments concerned to meet the basic policy mentioned above and to meet users' needs.

539. Hence, the basic policy on marketing also corresponds to that of management and operation.

540. On the other hand, marketing theory has been shifting its weight to the customer retaining type from the customer creating type, since customers who mostly contribute to the providers' profit are those with high relationship and with high royalty.

541. In order to retain customers, it becomes more and more important to secure transparency and fairness in management and operation of the Canal.

542. Since securing the transparency and fairness in management and

operation of the Canal is most basic factor not only to sustain the world trade to be in fair and free competitive condition for the consumers to enjoy cheaper consumption goods, but also to build the reliable relationship with the customers and to learn the customers' needs including high quality service from them through the reliable relationship.

543. So far SCA seems to have been made contact and discussion mainly with the agents, and those with the shipping lines or shipper/consignees have been rather few.

544. Frequent contact and discussions with customers based on reliable relationship would bring SCA accurate information on customers' needs which must be useful for the business management of SCA and to get ideas and opportunities to create the diversified services or new business chances.

MARKET MANAGEMENT SYSTEM

545. A concrete approach to marketing consists roughly of the following five steps; 1) analysis of marketing environment and identification of market opportunity/threat, 2) market segmentation and selection of target market, 3) positioning, 4) strategy formulation of marketing mix and 5) marketing management

546. As part of the first step, it is necessary to identify what the Canal's advantages and disadvantages are in comparison with other transport modes. This step includes the analysis on the international maritime transport market and trade environment as well as complaints from users.

547. Currently, some parts of this process are conducted by the Economic Unit and the members of the Economic Unit are well aware of the importance of the analysis. It can be said, however, that due to a lack of systematic skills as well as information and data, sufficient analyses have not been conducted. In order to get systematic skills, it is necessary to have a sufficient number of specialists in the organization or to have an outsourcing system for the periodical analysis.

548. The second step is the selection of the target market. Even if a marketing opportunity for the Canal is found, there remains the question how to approach such a market. Should the whole market be approached in the same manner or should the market be accessed from its easiest segment? Generally, it is necessary to focus on the most favorable segment where the Canal enjoys a superior position compared to other modes.

549. Shipping lines are direct users of the Canal but shippers and consignees of cargoes are behind them as influential indirect users. The degree of influence on shipping lines exercised by shippers/consignees varies according to the kinds of ships. For example, in the case of container ships, shipping lines are more independent from shippers or consignees than in the case of tankers or car carriers because shippers are numerous and generally not united in a single organization for each shipment. Therefore, for the revision of the Suez tollage tariff, the principal counterparts are shipping lines, not users or consignees. On the other hand, for crude oil tankers, especially for VLCC or ULCC, shippers are more influential than shipping lines, because it is shippers/consignees who hold shipping rights as well as routing decision rights through long term shipping contracts; shipping lines are just nominal operators. It is the same with car carriers and most chemical tankers such as LNG, LPG ships.

550. Ships deployed in the world shipping market can be divided into two categories, i.e. common carriers and industrial carriers (including semi-industrial carriers). Common carriers are open to all break bulk shippers through signing a simple contract or even without a contract for container ships and for bulk cargo shippers through public shipping markets such as the Baltic Exchange. On the other hand, industrial carriers are strictly for specific shippers. For example, seven sisters are for VLCC/ULCC and major car manufacturers for car carriers. The breakdown of common carriers/industrial carriers parity by ships' types is as follows:

- Container ships —100% common carriers,
- Car carriers —100% semi-industrial carriers,
- VLCC/ULCC —95% industrial carriers for Japanese flag ships, and 80% industrial carriers for other flag ships,
- Other tankers —70% industrial carriers,
- LPG/LNG —100% semi-industrial carriers,
- Bulk carriers —60% industrial carriers and 40% common carriers.

551. In considering the factors analyzed above, it is appropriate to set the target segments as follows:

- Segment I (Shippers/Consignees Segment)—General Cargo Trade or Bulk Cargo Trade,

- Segment II (Shipping Lines Segment)—Common Carrier or Industrial Carrier (and semi-industrial carrier)

552. Objective of product positioning is to make customers acknowledge the superiority of the product of the company compared with that of another company, in this case, the superiority of the Canal compared with other routes or transport modes. After fully grasping customers' needs, it is important to identify areas where the Canal has a competitive edge over other modes.

553. Next step is to decide the marketing mix. Marketing mix refers to the various controllable means that can be employed to achieve the marketing target. In the case of merchandise, most typical means are the product, price, place and promotion. In the case of the Canal, the marketing mix consists of quality of transit service (product), transit due (price), communication with users (place) and sales promotion.

554. As to the communication with users, it is necessary to approach two segments mentioned in para. 551 above.

555. Shipping rights of a large portion of tankers, car carriers, chemical carriers (including LPG and LNG carriers) are in the hands of shippers or consignees. Shipping lines propose to shippers (sometimes consignees) their freight ideas together with service routes, and when both parties agree, shipping contracts are signed. Therefore, the phenomenon of ships passing or not passing through the Canal is merely the result of contracts. In order to attract those ships which are not using the Canal, some measures must be taken well before shipping contracts are signed, or even before planning between shippers/consignees and shipping lines takes place.

556. Container ship operators are typical common carriers. They decide their service routes, frequency and service charge level. They compete in the big container cargo market and each container cargo shipper chooses the best service out of the various competing container ships. In this sense, container ship operators as common carriers act as free players of sea-traffic business who decide whether their ships go through the Canal or not. They build or charter their ships and grasp all the shipping and operation costs including the Suez Tollage.

557. It is, however, difficult to contact each shipping line or consignee/shipper individually. Therefore it is recommendable to approach such major associations of shipping lines and shippers/consignees as the

International Chamber of Shipping (ICS), European Shippers' Council, European Community Ship-owners' Association (ECSA), Asian Ship-owners' Forum, Baltic and International Maritime Councils (BIMCO), International Association of Dry Cargo Ship-owners (INTERCARGO) and International Association of Independent Tanker Owners (INTERTANKO). Details of these associations are mentioned in section 2.4 of ANNEX V.

558. For marketing activities to be effective, the last and most important element is the marketing management system. Marketing management system consists of three sub-systems — marketing plan and budgeting, marketing information system, and marketing organization.

559. In the current SCA, there is no such concrete centralized organization focusing on marketing. To make marketing activities more effective and efficient, it is necessary to build up the Plan-Do-See-Feedback system within the organization. This system is called the marketing management system.

560. Actual marketing activities are conducted by the staff of the SCA. No elaborated plan or tactics can be activated without such an organizational structure, task specification of each staff and proper assignment of capable staff. One idea is to change the business unit of the Economic Unit from the current four sections for tankers, containers, bulkers and others to regional sections such as Europe, Asia and Australia, North and South America, and Africa and the Gulf area corresponding to regional segmentation of the market.

561. It will require, however, time and discussion from more wider aspects to change the organizational structure. More detailed analysis should be conducted by the SCA itself based on various data on such as personnel qualifications, past performance of each department and sections on current day to day works and so on.

SOME IDEAS ON IMPROVING MARKETING ACTIVITIES

562. Some ideas on the improving marketing activities are suggested here. However, as some important data was withheld from the Study Team form the managerial reason of the SCA, it is difficult to assess the effectiveness or appropriateness of such ideas.

563. First, it is necessary to make sure customers are familiar with the policy and system of the SCA on management and operation. It is, hence,

recommended to create an inter-net homepage at least similar to that provided by the Panama Canal Authority.

564. Customers should also be able to voice their opinions through the inter-net, and have their views reflected in management.

565. As a part of the marketing mix, it is necessary to have seminars regularly on the Suez Canal services including development plan for shipping lines and for shippers/consignees at major maritime centers including London and Singapore and at major export/import countries.

566. A minimum of three to four regional offices abroad (for example, Tokyo, New York, London and Singapore) will also be necessary to promote the Canal internationally. The main job descriptions of these offices are as follows:

- To comply with requests and complaints of existing users,
- To contact and solicit prospective and potential users,
- To organize an annual Canal Sales Seminar in collaboration with the Egyptian Embassy in the respective city.

567. If it is financially difficult to open an office abroad from the start, an alternative option would be to name an agent instead. However, regional offices would be the best places to train young SCA staff.

568. It would also be effective to dispatch middle or young staff as trainees to foreign shipping industries and relevant organizations to help them understand customers' needs and complaints.

569. To instill in the younger generation awareness of the important function of the Canal, it is proposed to establish the SCA Chairman's Award. Students in maritime training institutes throughout the world would be invited to submit essays on some aspect of the Canal; for example, "the Suez Canal and World Economy", "the Suez Canal and Sea Transportation". Such an award would also have a positive effect on SCA staff, some of whom could serve on the selection committee. Others could take pride in reading award winning essays about their own Canal.

570. It is also recommendable to strengthen the functions of marketing and information. It is needed to keep interrelationship between marketing division and other divisions within the organization. The Panama Canal Authority, for example, has in its organization the departments of "corporate planning and marketing" and of "Information management".

571. It is also recommended to use the data-base more effectively. SCA could understand the basic principle of the customer's behavior, for example, on choice of the route and mode by analyzing the data-base.

E. SOME IDEAS ON IMPROVEMENT OF MANAGEMENT AND OPERATION

CANAL TRANSIT SERVICE

572. The Suez Canal has made effort to improve its transit service and attained safe navigation and reduced transit time for the vessels through continuous effort of deepening and widening of the Canal together with the improvement of the transit system.

573. It is, however, a common desire of not only users but also SCA itself to attain further safe and speedy transit even under current physical conditions of the Canal. Hence the Study Team re-examined current transit system from three key points—the operating speed of vessels, interval between transiting vessels and the starting time of convoys.

(i) Operating speed

574. Transit speeds observed from the recent records of transit vessels (diagram) for three representative days (heavy, average and light traffic days) show that they exceeded the prescribed values of in between 11km and 16km in the Rules of Navigation of the SCA. Actual speeds are as follows;

	average	fastest	slowest	sample #
N-bound	15.2km/h	16.8km/h	12.1km/h	54 vessels
S-bound	15.5km/h	16.7km/h	13.0km/h	67 vessels

575. Current operating speed can be said reasonable, considering the factors affecting the optimal navigable speed such as necessary speed to maintain good maneuverability of vessels, necessary distance between vessels for the safe navigation and so on. Under current operating speed, so far, the issue of bank erosion by the ship wave does not seem to be substantial.

(ii) Interval between vessels

576. Necessary interval between vessels on the same lane is not stipulated in the SCA's regulations. There is, however, a bylaw to manage the issue taking the form of required time interval of 6 to 25 minutes corresponding to the vessels' dead weight tonnages. These time intervals can be translated to distance from 1,400m (for the vessels up to 30,000 DWT.) to 5,800m (for the vessels over 259,000 DWT.).

577. The rather long time interval between vessels mentioned above is set considering mainly the stopping distance of very large laden crude oil

tankers which continues to maintain her headway for around 15 times of her length until it achieves zero speed after the issue of crash astern, and leaving some additional allowance for possible emergency measures.

578. In recent years, however, there has been a rapid increase in container vessels and a decrease in large tankers transiting Canal. Accordingly the concept of vessels' interval seems to have a room to be reconsidered given the high-maneuverability of container vessels as well as PCC, general cargo, passenger and naval ship.

579. In general, those vessels have high performance engines, which enable them to stop within three to four times of their lengths assuming the original speed is about 8 knots (15 km/h).

580. In the event that a preceding vessel has any accident or suddenly loses her headway, the follower should accordingly reduce her headway to avoid collision with her follower by using the engine crash astern.

581. The issue caused by this action is not the matter of the distance between the preceding vessel but the tendency of the follower to swing towards starboad and to fall into an uncontrollable course keeping condition.

582. Therefore, attention should be focused on the loss of course control and its resultant running aground or collision with bank. Currently applied escorting tugs are generally very suited to prevent this kind of accident, though more training in this area should be conducted.

583. In addition, some examples of excessive time intervals of over 25 min. are found in the three days' diagrams mentioned above (11 examples among 121 transiting vessels), though almost all vessels follow the bylaw standard of the interval. Therefore time adjustment for entering the Canal would have to be carefully conducted to avoid exceeding the standard intervals, excluding minor cases of huge tankers and those with similar performance. As a result, the time adjustment would effectuate to shorten the total length of a convoy.

(iii) Starting time of the convoy

584. The transit system in the Suez Canal such as grouping of vessels, arrival time limit off Port Said or off Suez, passing time at point 0 km (Southbound) or 162 km (Northbound), and following maneuver is summarized in Table 72 for the North-bound Convoy System and Table 73 for the Southbound Convoy System.

585. The transiting vessels are forced to wait in the Canal for 1 hour and 24 minutes in case of North bound convoy and for 4 hours and 6 minutes in case of south bound convoy on average

586. Revision of the starting time of convoys is proposed to reduce the waiting time for the cases of 40 transits and 52 transits (+30%). The conceptual image of the diagrams is shown in the following figures comparing diagrams both for current convoy system and the revised one.

Table 72 Northbound Convoy System

Convoy	North-Bound Convoy			
Group	A (i)	A (ii)	B	Third Group
Arrival Time	0100 (+0%) 0300 (+3%) 0330 (+5%)		0300 (+0%) 0400 (+3%) 0500 (+5%)	Same as A or B
Arrival Point	Off Suez Anchorage Areas			
Entering Point	Km 160			
Entering Time	0600	Follows A (i) (about 0700)	Follows A (ii) (up to 1130)	0300 - 0430
Note				Rare case (Precedes A-i until Great Bitter Lake, and then follow B)

Table 73 Southbound Convoy System

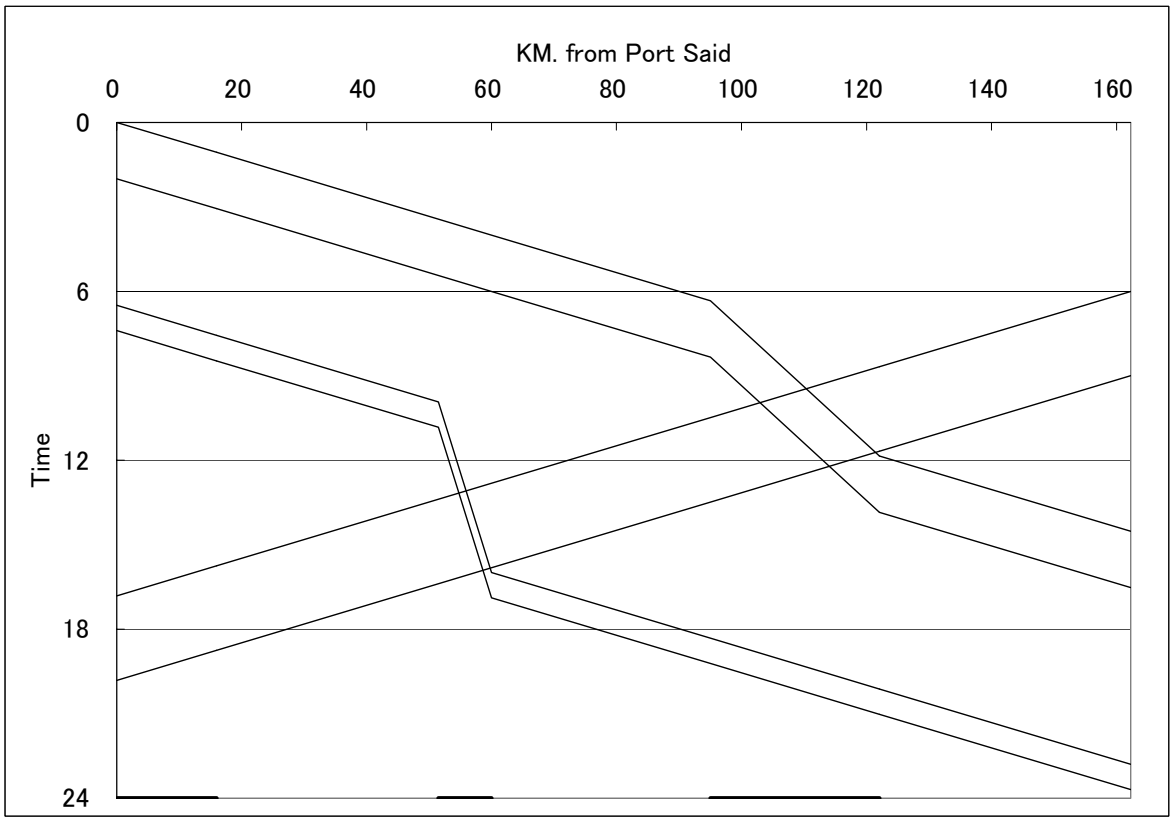
Convoy	N1			N2
Group	A	B	C	-
Arrival Time	1900 (+0%) 2100 (+3%) 2200 (+5%)		-	0300 (+0%) 0400 (+3%) 0500 (+5%)
Arrival Point	Port Said Harbor	Northern Anchorage Area	Southern Anchorage Area	
Entering Point	Port Said West Channel	Port Said Bypass	Port Said West Channel	
Entering Time	0000 - 0500			0630 - 0900
Waiting point	Bitter Lakes			Ballah Loop for max 15 vessels, and Timsah for max 2 vessels
Note	-			The forming and depths of this convoy is subject to traffic situation and time limit. Exclusion of vessels to join N2 is detailed in Art. 49-C-(5).

Table 74 Current Diagram Calculation (at 40 standard ships per day)

Day	Convoy	Data Input Field			Calculation Field							
		Speed	Width	Start T.	Port Said BP		Ballah Loop		Deversoir to Kabrit		Suez	Transit T.
		(km/hr)	(hrs)		0.000	16.000	51.500	60.000	95.000	122.100	162.250	(hrs)
Yesterday	Northbound Top				-7.2	-8.3	-10.6	-11.2	-13.5	-15.3	-18.0	
	Rear				-4.2	-5.3	-7.6	-8.2	-10.5	-12.3	-15.0	
	Southbound (I) Top				-24.0	-22.9	-20.6	-20.0	-17.7	-12.2	-9.5	
	Rear				-22.0	-20.9	-18.6	-18.0	-15.7	-10.2	-7.5	
	Southbound (II) Top				-17.5	-16.4	-14.1	-8.0	-5.7	-3.9	-1.2	
	Rear				-16.6	-15.5	-13.2	-7.1	-4.8	-3.0	-0.3	
Today	Northbound Top	15		6.0	16.8	15.8	13.4	12.8	10.5	8.7	6.0	10.8
	Rear		3.0		19.8	18.8	16.4	15.8	13.5	11.7	9.0	
	Southbound (I) Top	15		0.0	0.0	1.1	3.4	4.0	6.3	11.8	14.5	14.5
	Rear		2.0		2.0	3.1	5.4	6.0	8.3	13.8	16.5	
	Southbound (II) Top	15		6.5	6.5	7.6	9.9	16.0	18.3	20.1	22.8	16.3
	Rear		0.9		7.4	8.5	10.8	16.9	19.2	21.0	23.7	

Notes) 1. Width of Southbound (II) must be under 2.5 hours based on waiting area restriction.
2. Traffic is 40 standard ships per day. (including 2 standard ships using Timsah Anchorage)
3. Diagram of 2 standard ships using Timsah Anchorage is omitted, but is included in the traffic (see Note 2).
4. Crossing points: KM 51.500:
KM 60.000: Southbound (II) top vessel passes this point just after Northbound rear vessel passes.
KM 72.000:
KM122.100: Southbound (I) top vessel passes this point just after Northbound rear vessel passes.

Source) The Study Team



Note) Vessels of Southbound (I) and (II) stop at Great Bitter Lake and Ballah Loop respectively regardless of the diagram.

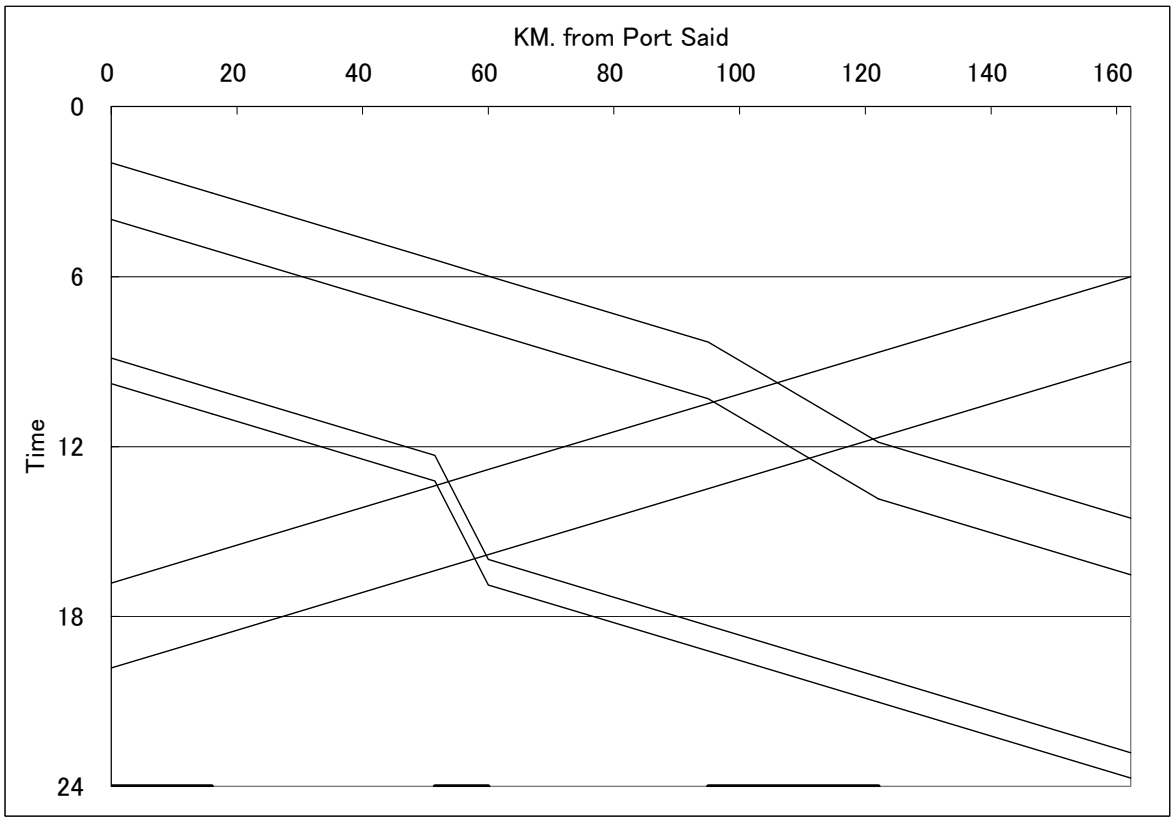
Figure 47 Current Diagram (at 40 standard ships per day)

Table 75 Proposed Diagram Calculation (at 40 standard ships per day)

Day	Convoy	Data Input Field			Calculation Field							
		Speed	Width	Start T.	Port Said BP		Ballah Loop		Deversoir to Kabrit		Suez	Transit T.
		(km/hr)	(hrs)		0.000	16.000	51.500	60.000	95.000	122.100	162.250	(hrs)
Yesterday	Northbound Top				-7.2	-8.3	-10.6	-11.2	-13.5	-15.3	-18.0	
	Rear				-4.2	-5.3	-7.6	-8.2	-10.5	-12.3	-15.0	
	Southbound (I) Top				-22.0	-21.0	-18.6	-18.0	-15.7	-12.2	-9.5	
	Rear				-20.0	-19.0	-16.6	-16.0	-13.7	-10.2	-7.5	
	Southbound (II) Top				-15.1	-14.1	-11.7	-8.0	-5.7	-3.9	-1.2	
	Rear				-14.2	-13.2	-10.8	-7.1	-4.8	-3.0	-0.3	
Today	Northbound Top	15		6.0	16.8	15.8	13.4	12.8	10.5	8.7	6.0	10.8
	Rear		3.0		19.8	18.8	16.4	15.8	13.5	11.7	9.0	
	Southbound (I) Top	15		2.0	2.0	3.0	5.4	6.0	8.3	11.8	14.5	12.5
	Rear		2.0		4.0	5.0	7.4	8.0	10.3	13.8	16.5	
	Southbound (II) Top	15		8.9	8.9	9.9	12.3	16.0	18.3	20.1	22.8	13.9
	Rear		0.9		9.8	10.8	13.2	16.9	19.2	21.0	23.7	

Notes) 1. Width of Southbound (II) must be under 2.5 hours based on waiting area restriction.
2. Traffic is 40 standard ships per day. (including 2 standard ships using Timsah Anchorage)
3. Diagram of 2 standard ships using Timsah Anchorage is omitted, but is included in the traffic (see Note 2).
4. Crossing points: KM 51.500: Southbound (II) rear vessel passes this point just before Northbound top vessel passes (effective use).
KM 60.000: Southbound (II) top vessel passes this point just after Northbound rear vessel passes (the same as current system).
KM 72.000: Southbound (I) rear vessel passes this point just before Northbound top vessel passes (effective use).
KM122.100: Southbound (I) top vessel passes this point just after Northbound rear vessel passes (the same as current system).

Source) The Study Team



Note) Vessels of Southbound (I) and (II) stop at Great Bitter Lake and Ballah Loop respectively regardless of the diagram.

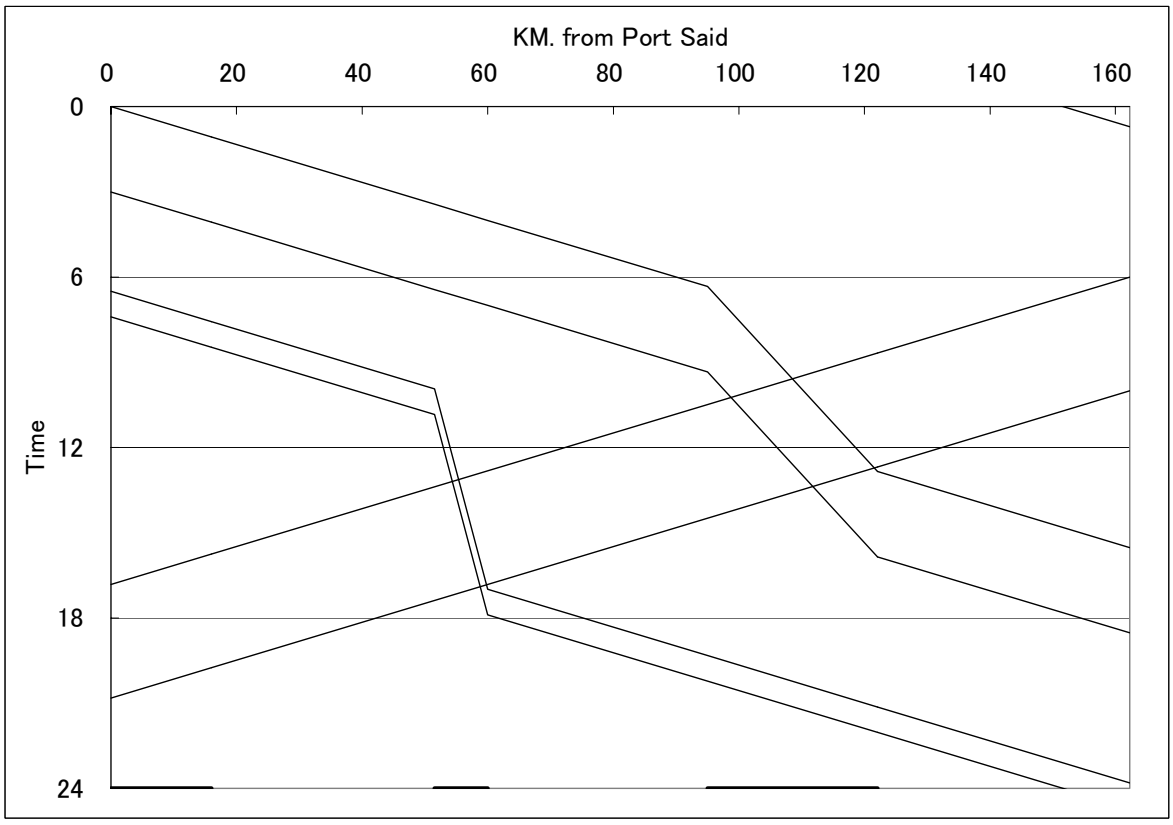
Figure 48 Proposed Diagram (at 40 standard ships per day)

Table 76 Current Diagram Calculation (at 52 standard ships per day)

Day	Convoy	Data Input Field			Calculation Field							
		Speed	Width	Start T.	Port Said BP		Ballah Loop		Deversoir to Kabrit		Suez	Transit T.
		(km/hr)	(hrs)		0.000	16.000	51.500	60.000	95.000	122.100	162.250	(hrs)
Yesterday	Northbound Top				-7.2	-8.3	-10.6	-11.2	-13.5	-15.3	-18.0	
	Rear				-3.2	-4.3	-6.6	-7.2	-9.5	-11.3	-14.0	
	Southbound (I) Top				-24.0	-22.9	-20.6	-20.0	-17.7	-11.2	-8.5	
	Rear				-21.0	-19.9	-17.6	-17.0	-14.7	-8.2	-5.5	
	Southbound (II) Top				-17.5	-16.4	-14.1	-7.0	-4.7	-2.9	-0.2	
	Rear				-16.6	-15.5	-13.2	-6.1	-3.8	-2.0	0.7	
Today	Northbound Top	15		6.0	16.8	15.8	13.4	12.8	10.5	8.7	6.0	10.8
	Rear		4.0		20.8	19.8	17.4	16.8	14.5	12.7	10.0	
	Southbound (I) Top	15		0.0	0.0	1.1	3.4	4.0	6.3	12.8	15.5	15.5
	Rear		3.0		3.0	4.1	6.4	7.0	9.3	15.8	18.5	
	Southbound (II) Top	15		6.5	6.5	7.6	9.9	17.0	19.3	21.1	23.8	17.3
	Rear		0.9		7.4	8.5	10.8	17.9	20.2	22.0	24.7	

Notes) 1. Width of Southbound (II) must be under 2.5 hours based on waiting area restriction.
2. Traffic is 52 standard ships per day. (including 2 standard ships using Timsah Anchorage)
3. Diagram of 2 standard ships using Timsah Anchorage is omitted, but is included in the traffic (see Note 2).
4. Crossing points: KM 51.500:
KM 60.000: Southbound (II) top vessel passes this point just after Northbound rear vessel passes.
KM 72.000:
KM122.100: Southbound (I) top vessel passes this point just after Northbound rear vessel passes.

Source) The Study Team



Note) Vessels of Southbound (I) and (II) stop at Great Bitter Lake and Ballah Loop respectively regardless of the diagram.

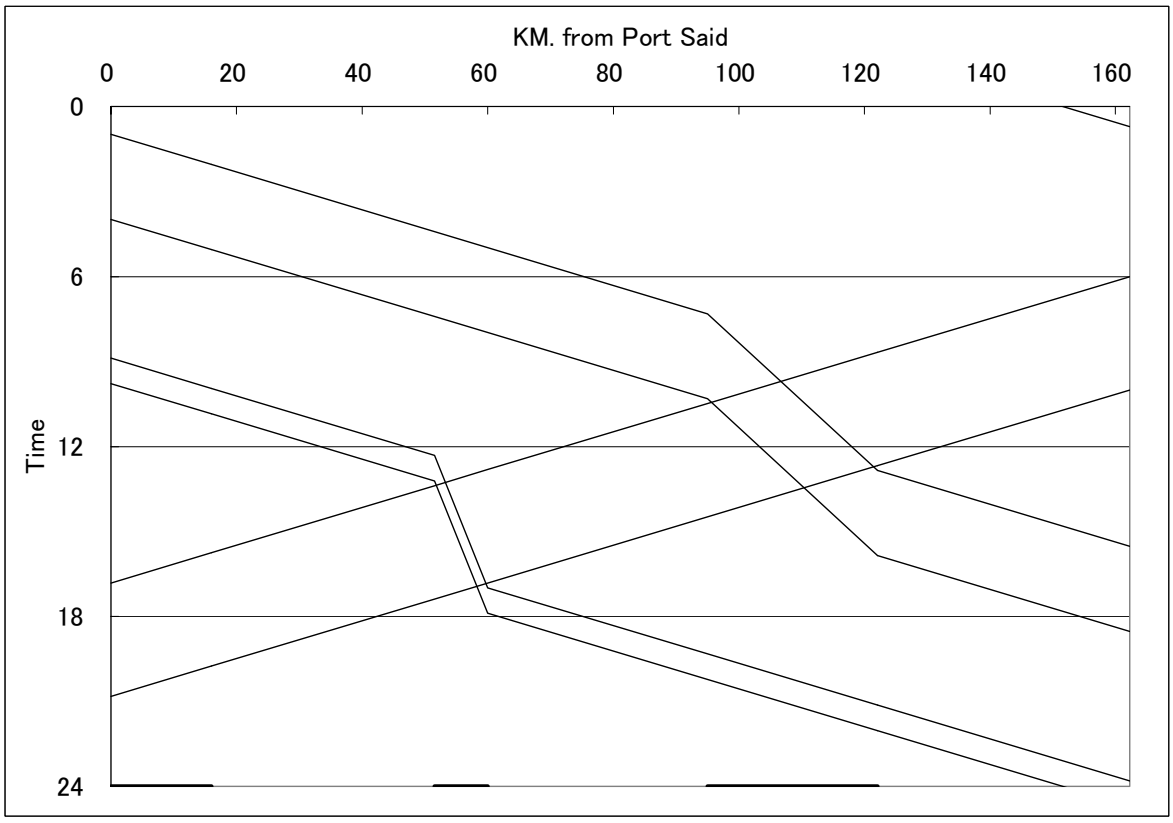
Figure 49 Current Diagram (at 52 standard ships per day)

Table 77 Proposed Diagram Calculation (at 52 standard ships per day)

Day	Convoy	Data Input Field			Calculation Field							
		Speed	Width	Start T.	Port Said BP		Ballah Loop		Deversoir to Kabrit		Suez	Transit T.
		(km/hr)	(hrs)		0.000	16.000	51.500	60.000	95.000	122.100	162.250	(hrs)
Yesterday	Northbound Top				-7.2	-8.3	-10.6	-11.2	-13.5	-15.3	-18.0	
	Rear				-3.2	-4.3	-6.6	-7.2	-9.5	-11.3	-14.0	
	Southbound (I) Top				-23.0	-22.0	-19.6	-19.0	-16.7	-11.2	-8.5	
	Rear				-20.0	-19.0	-16.6	-16.0	-13.7	-8.2	-5.5	
	Southbound (II) Top				-15.1	-14.1	-11.7	-7.0	-4.7	-2.9	-0.2	
	Rear				-14.2	-13.2	-10.8	-6.1	-3.8	-2.0	0.7	
Today	Northbound Top	15		6.0	16.8	15.8	13.4	12.8	10.5	8.7	6.0	10.8
	Rear		4.0		20.8	19.8	17.4	16.8	14.5	12.7	10.0	
	Southbound (I) Top	15		1.0	1.0	2.0	4.4	5.0	7.3	12.8	15.5	14.5
	Rear		3.0		4.0	5.0	7.4	8.0	10.3	15.8	18.5	
	Southbound (II) Top	15		8.9	8.9	9.9	12.3	17.0	19.3	21.1	23.8	14.9
	Rear		0.9		9.8	10.8	13.2	17.9	20.2	22.0	24.7	

Notes) 1. Width of Southbound (II) must be under 2.5 hours based on waiting area restriction.
2. Traffic is 52 standard ships per day. (including 2 standard ships using Timsah Anchorage)
3. Diagram of 2 standard ships using Timsah Anchorage is omitted, but is included in the traffic (see Note 2).
4. Crossing points: KM 51.500: Southbound (II) rear vessel passes this point just before Northbound top vessel passes (effective use).
KM 60.000: Southbound (II) top vessel passes this point just after Northbound rear vessel passes (the same as current system).
KM 72.000: Southbound (I) rear vessel passes this point just before Northbound top vessel passes (effective use).
KM122.100: Southbound (I) top vessel passes this point just after Northbound rear vessel passes (the same as current system).

Source) The Study Team



Note) Vessels of Southbound (I) and (II) stop at Great Bitter Lake and Ballah Loop respectively regardless of the diagram.

Figure 50 Proposed Diagram (at 52 standard ships per day)

587. Summary of the revised time schedule is as follows;

① in case of 40 transiting vessels (20 N-bound and 20 S-bound)
- N-bound; there is no revision in starting times, and also no difference in each time required for transiting Canal,
- S-bound (I); with a 1.7 h late starting, the time required for transiting Canal could be reduced 1.7h (from 14.9 h to 13.2 h),
- S-bound (II); with a 2.3 h late starting, the time required for transiting Canal could be reduced 2.2h (from 16.6 h to 14.4 h),

② in case of 52 transiting vessels (26 N-bound and 26 S-bound)
- N-bound; there is no revision in starting time, and also no difference in each time required for transiting Canal,
- S-bound (I); with a 0.7h late starting, the time required for transiting Canal could be reduced 0.7 h (from 15.9 h to 15.2 h),
- S-bound (II); with a 2.3 h late starting, the time required for transiting Canal could be reduced 2.2 h (from 17.6 h to 15.4 h).

588. It is clear that the revision of the current starting time of S-bound convoy is effective to shorten the time required to transit Canal between 0 km and 162.5 km for southbound vessels. However the total time required between both off port anchorages would not be reduced if the current arrival time limit off anchorage were maintained.

589. Consequently it is indispensable to revise the present arrival time limit off Port Said anchorage according to revised starting time. For Canal users convenience, however, the arrival time limit should be set for a fixed period of time, thus revising timetable to meet with possible heavy traffic day, namely 52 vessels transit, is desired.

(iv) Transit procedure

590. Under the present Rules of Navigation, transit formalities such as booking for transit, notice of arrival and necessary contact with port officials are often duplicated.

591. Although some of those complex formalities have not been applied in recent years due to the decrease of transit vessels, efficient formation of convoys and improved communication devices, the rules could be further improved.

592. By introducing the EDI system which has been widely adopted among major ports in recent years, the transit procedures could be simplified and communication gaps between SCA and users would be minimized.

BUSINESS DIVERSIFICATION

593. One of the major goals of the present policy of the Egyptian Government is to promote the restructuring and privatization of public enterprises, reform of financial relationships between public enterprises, the banking system and the Egyptian Government.

594. SCA is a public organization having an independent legal status and its own budget. It has played a very important role for the national finances of Egypt since its foundation. However, in order to create new income sources for SCA, the following potential field of business diversification is suggested from the viewpoint of maximum utilization of the existing resources of SCA and affiliated companies while still maintaining consistency with the privatization policy of the Egyptian Government

(i) Maritime Construction Works

595. Objective is the establishment of a maritime construction company in Egypt that will eliminate the need to use foreign currency to undertake such construction works.

596. Rationale lies in the following facts. No maritime construction company exists in Egypt and potential demand in Egypt is still large considering the port development projects planned. Operational skills are sufficient in the field of dredging work given the experience obtained through Canal Dredging. However, productivity is unknown and needs to be checked.

597. Necessary process is as follows. Necessary data and information on past port construction works in Egypt and nearby countries should be gathered and then it must be determined whether the dredging force of SCA can undertake such kinds of work under the same contract conditions in the Engineering Department and/or Dredging Department. Legal possibility should also be checked.

(ii) Consulting Work within the Capacity of Research Center

598. Objective is to establish technical independence of Egypt in the field of Maritime Engineering and to contribute to the establishment of technical standards in Egypt from the viewpoint of effective utilization of national resources and to reflect local conditions in the design and construction work.

599. Rationale lies in the following facts. Research Center has sufficient experimental instruments and equipment for laboratory tests and experience

in analyzing soil mechanics, hydraulics and so on. The number of consulting firms in Egypt and neighboring countries capable of carrying out engineering consulting work independently is insufficient. Potential market seems to be large enough considering the port development projects in the region.

600. Reference should be made to the consulting work contracts in the region, especially in instances when local consultants jointly worked with European consultants. Potential capacity and productivity are unknown for these kind of work and inquiries should be made to past clients of the Research Center.

601. Necessary processes are as follows. Data and information on the past experience and ongoing works should be gathered to evaluate the productivity and skill levels.

(iii) Leasing Equipment

602. Objective is to effectively utilize the idle equipment such as floating dock and to decrease the financial burden of SCA as well as to increase job opportunities.

603. Rationale lies in the following facts. Maritime construction works in Egypt and nearby countries are technically very limited because of the lack of facilities and equipment and because of the high cost involved in mobilizing such equipment from other countries.

604. Necessary process is as follows. It is necessary to assess whether the existing facilities and equipment can be converted for other purposes. Assessment should be made by simulating the situation where these equipment and facilities are applied to past construction works such as port construction and bridge construction.

(iv) Diversification of shipbuilding companies activities

605. Objective is to increase the profitability of the shipbuilding companies and to spawn potential industries such as bridge frame assembly and caisson assembly for tunnel and quay wall, etc.

606. Rationale lies in the following facts. There are few companies capable of assembling parts for large-scale infrastructure such as bridges, tunnels and harbor facilities. It is also necessary to expand the downstream industries to utilize products of basic industries such as iron and steel mill and cement mill. This will increase job opportunities and the competitive power of industry in the region and reduce foreign currency expenditure.

607. Necessary processes are as follows. It is necessary to assess whether the human resource, facilities and equipment of shipbuilding companies are capable of undertaking these works. It is also necessary to establish a system that can introduce advanced technology to these companies.

(v) Prospects and assessment

608. According to the potential field of business diversification mentioned above, the prospect on business diversification of SCA is summarized in Table 78.

609. The engineering business includes all necessary acts and activities of planning, design, construction and implementation for the facilities and the system which relates to industrial development, resource energy development and social development etc.

610. Therefore, the business diversification of SCA mentioned above belongs to the construction field of the engineering industry and means the advancement of engineering business. However, the engineering business requires a high degree of technology and experience.

611. In order to realize the advancement of the construction business of SCA, it is necessary to establish a core department. Therefore the six departments of SCA as Engineering Dept., Dredging Dept., Works Dept., Transit Dept., Shipyard Dept., Engineering Research Center of P. R. & Studies Dept. and four affiliated companies should play major roles in the advancement of the construction field of the engineering industry for the business diversification of SCA.

612. However, there is no independent department which assumes responsibility for the advancement of the construction business in SCA at present. Therefore, it is necessary to establish a core department within SCA.

Table 78 Prospect on Business Diversification

Field of Business	Area of Markets	Component of Organizations
Maritime Construction Works	Dredging	Dredging Dept. Works Dept. Engineering Dept. The Canal Harbor & Great Projects Co. The Canal Naval Construction Co
	Reclamation	
	Construction of Breakwater	
	Construction of Quay-wall	
	Construction of Slip-way	
	Pavement	
	Setting of Offshore Structures	
Consulting Work of Research Center	Field Surveys (Tide, Current, etc.)	Engineering Research Center Engineering Dept.
	Environmental Survey	
	Soil Boring and Tests	
	Water and Material Tests	
	Echo Sounding (Sounding Chart)	
	Siltation and Sedimentation Studies	
	Hydraulic Model Tests	
	Hydraulic Studies	
	Environmental Impact Assessment	
	Design of Maritime facilities	
	Supervising	
Leasing Equipment	Floating Docks	Transit Dept. Shipyards Dept. Works Dept The Port Said Engineering Works Co. The Canal Naval Construction Co. Timsah Shipbuilding Co.
	Floating Cranes	
	Tugs	
	Deck Barges	
	Mobil Cranes	
	Other Construction Equipment	
Diversification of shipbuilding Activities	Pipe Processing Works	Shipyards Dept. The Port Said Engineering Works Co. The Canal Naval Construction Co. Timsah Shipbuilding Co.
	Bridge Materials Works	
	Steel Works of Offshore Structures	
	Steel Caisson Production	
	Precast Concrete Production	

613. The purposes of establishing a core department can be explained from the external and internal points of view.

614. From the external point of view, the purposes of the department will collect the information on construction business' requirements and to disseminate such information to the advantage of advancing the construction

field and attracting new customers.

615. From the internal point of view, the department can function as an advisory body to other departments from the viewpoint of system of the construction management, based on the collected information of the requirements of management at the construction stage. Such a cross-departmental function can vitalize the activities of SCA and affiliated companies as a whole.

616. In addition to this, establishing a core department should also be given high priority in order for employees to acquire the attitude and skills needed to operate both commercially and competitively.

PROJECT EVALUATION

(i) Development Plan to be evaluated

617. There are three development plans related to the Suez Canal (see section 7.3 of Chapter 7, ANNEX II).

618. The first one is the Feasibility Study on the Second Stage Development Project of the Suez Canal which was carried out by JICA study team from 1979 to 1980. In this study, the transit demand is forecast as 140 ships/day for the target year of 2000 and the following two plans to be implemented continuously after the First Stage Development Project are studied.

- A Canal doubling plan geared to handle the increasing vessel traffic
- A Canal doubling and widening plan not only to handle the increasing vessel traffic but also to handle very large tankers in ballast up to 500,000 DWT by widening the west cannel

619. The second plan is the plan currently undertaken by the SCA. The 62 Feet Plan with -22.5m depth was started after the completion of the 58 Feet Plan and will be completed in 2001. SCA is considering further deepening in a step-by-step basis up to the 72 Feet Plan with -27.0m depth to accommodate 300,000 DWT tankers fully laden and 500,000 DWT tankers in ballast.

620. The third one is the Deversoir By-Pass Extension Plan, in which the existing Deversoir By-Pass is extended directly northward from the northern end of the existing by-pass (Km.95.000) to north of the Timsah Lake (Km.72.000). The route of the plan is the same route as a part of Step 1 of Phase I proposed in

the said Feasibility Study on the Second Stage Development Project of the Suez Canal. The objectives of the plan are as follows.

- to shorten the total transit time including waiting time
- to increase the transit capacity
- to improve navigational safety by straightening the curved section around Timsah Lake

621. Future traffic through the Canal is estimated as shown in Table 79 (see ANNEX IV) and the concept of standard ship is introduced in order to compare the transit demand and the transit capacity of the Canal.

Table 79 Forecast of Transit Demand

(Ships/day)

	1999	2005	2010	2015	2020
Real Ships	37	46	55	66	78
Standard Ships (case-1)	37	47	58	71	86
Standard Ships (case-2)	37	49	61	76	94

Note: Numbers of standard ships are converted from those of real ships assuming that future average time interval of real ships in 2020 is 11 minutes (case-1) and 12 minutes (case-2) and increases year by year linearly.
Source: The Study Team

622. The time interval of the standard ship is set at 10 minutes which is the current average time interval of ships. Future average time interval of ship shall increase to some extent with the enlargement of average vessel size.

623. Namely, it is thought that future occupancy of the Canal is longer than current occupancy, even if the future number of vessels transiting the Canal is the same as the current one.

624. To accommodate future traffic, the transit capacity of the Canal should be increased. However, the forecast transit demand in the Feasibility Study on the Second Stage Development Project of the Suez Canal is far beyond the demand forecast in the current study.

625. Hence the Second Stage Development Project is considered to be too early to be implemented and need not be evaluated at this moment.

626. Hence only the Deversoir By-Pass Extension Plan is re-evaluated in this study.

(ii) Capacity evaluation of the Deversoir By-pass Extention Plan

627. Physical transit capacity of the present Canal is thought to be around 86 vessels per day under the current transit system. The physical transit capacity could be increased up to around 96 vessels per day by fully effective use of the Port Said East Branch through the change of the convoy system.

628. Physical transit capacity is roughly estimated at about 106 vessels per day after completion of the Deversoir By-Pass Extension Plan based on the following diagram.

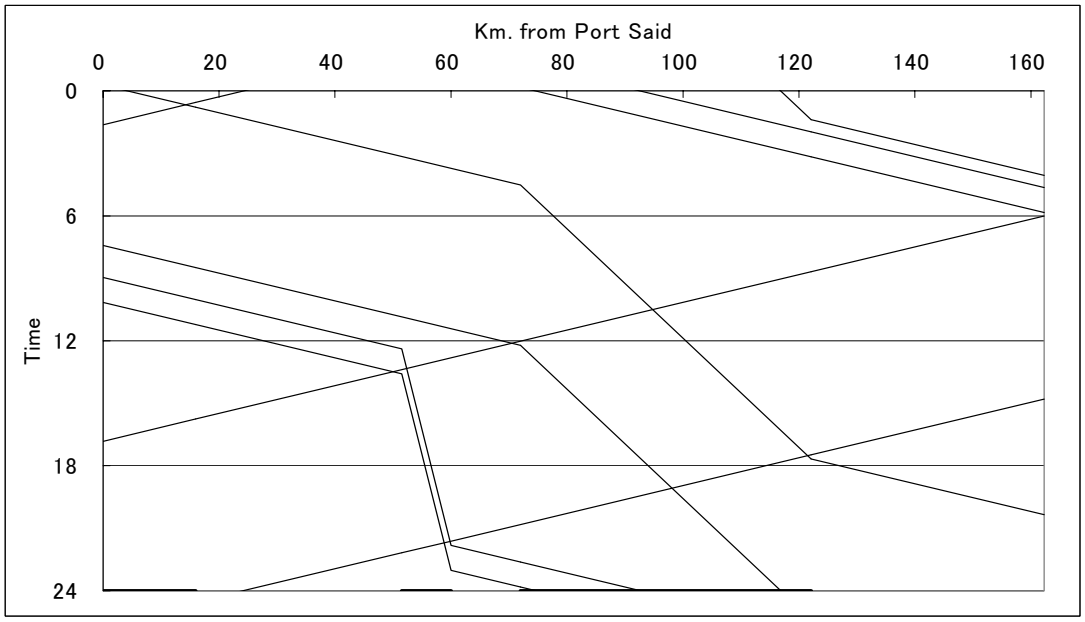


Figure 51 Diagram after Deversoir By-Pass Extension Plan is completed

629. Actual transit capacity, however, decreases with the existence of slow speed vessel. The effect of the existence of slow speed vessel is estimated to decrease the transit capacity by 9 to 32 vessels per day when the speed of the slowest vessel is less than the speed of the vessels of her group in the convoy by 1km/h vessels (latest speed of 14km/hr) to 3km/h. (latest speed of 12km/hr).

Table 80 Decrease of Transit Capacity by Slow Speed Vessels

(ships/day)

		Northbound	Southb.(N1)	Southb.(N2)	Total
Max Non-Stop Lane (km)		162.25	56.00	102.25	
		(KM0.00-162.25)	(KM16.00-72.00)	(KM60.00-162.25)	
Normal Speed (km/h)	15	0.0	0.0	0.0	0.0
Slowest Speed (km/h)	14	-4.6	-1.6	-2.9	-9.2
Slowest Speed (km/h)	13	-10.0	-3.4	-6.3	-19.7
Slowest Speed (km/h)	12	-16.2	-5.6	-10.2	-32.1

Note) Maximum non-stop lanes for southbound (N1) and (N2) are considered to 40.15 km (KM 122.100 - 162.250) under the condition that slowest vessel can make fast and wait at KM 16.000 and KM 51.500.

(Decrease of Capacity) = (MNSL/NS - MNSL/SS)*6

MNSL: maximum non-stop lane, NS: normal speed, SS: slow speed

Source) The Study Team

630. Moreover, the effective transit capacity is thought to be 80% - 90% of the actual transit capacity since the number of daily transit is considered to be subject to Poisson's distribution, and the waiting ratio will increase in case that the traffic in standard ships is more than 80% - 90% of the actual transit capacity.

Table 81 Comparison of Transit Capacity

Arrival Ratio to Capacity	95%	90%	85%	80%
Average Daily Arrival	79.8	75.6	71.4	67.2
Arrival Vessels for 10 years	292,092	276,101	260,231	246,110
Waiting Vessels for 10 years	24,558	5,053	1,092	351
Waiting Ratio	8.4%	1.8%	0.4%	0.1%

Note) Daily transit capacity is assumed to be 84 vessels.
Daily arrival is assumed to subject to Poisson's distribution.
Waiting Ratio = (Waiting Vessels) / (Arrival Vessels)
Standard ships are converted from real ships in terms of a time interval of 10 minutes.

Source) The Study Team

631. The financial evaluation of the Deversoir By-Pass Extension Plan is carried out under the assumption that future traffic of 2020 is 86 standard ships per day and that the effective transit capacity of the Canal with current layout and that with the Deversoir By-Pass Extension Plan are 78 (=(96-9)*0.9) vessels and 87 (=(106-9)*0.9) vessels per day respectively.

632. It is proposed that the Deversoir By-Pass Extension Plan should be completed before the Canal traffic in standard ships reach 69 (=(96-9)*0.8)

vessels per day to provide users with high quality service with no waiting.

Table 82 Transit Capacities of Current and Future Layout of the Canal

Canal Layout	Transit System	Kind of Transit Capacity	Daily Capacity
Current	Current	Physical Capacity	86
		Actual Capacity	77 (= 86 - 9)
		Effective Capacity	69 (= 77 * 0.9)
	Effective Use	Physical Capacity	96
		Actual Capacity	87 (= 96 - 9)
		Effective Capacity	78 (= 87 * 0.9)
		with No Waiting	69 (= 87 * 0.8)
with Extension	Effective Use	Physical Capacity	106
		Actual Capacity	97 (= 106 - 9)
		Effective Capacity	87 (= 97 * 0.9)

Note: Actual capacity is calculated including slow speed vessels. Effective capacity is calculated considering the waiting time decrease under Poisson arrival
Source: The Study Team

(iii) Financial evaluation of the project

633. Total cost and the period of construction works of the Deversoir By-Pass Extension Plan are estimated by SCA at about US$ 500 million and five years respectively. The Plan is now under detailed investigation at SCA.

634. The viability of the project is analyzed using the Discount Cash Flow Method and appraised by the Financial Internal Rate of Return (FIRR). The evaluations for the financial soundness of SCA using financial indices can not be conducted since necessary data are not provided by SCA.

635. The revenue and cost items taken into account for the FIRR calculation are summarized in Table 83 and those excluded from the FIRR calculation are summarized in Table 84.

Table 83 Revenue and Cost employed in the FIRR Calculation

Revenue	Cost
1) Additional toll revenues by the plan	1) Initial investment to the plan 2) Additional operating expenses such as maintenance, repair, personnel, etc.

Table 84 Revenue and Cost excluded from the FIRR Calculation

Revenue	Cost
1) Fund management income	1) Depreciation cost 2) Repayment of the loan principal 3) Interest on loans

636. Project life of up to 2030 for the financial analysis is adopted. The year 2001 is set as the base year for the analysis. The base year means the starting year of the analysis.

637. All revenue and costs are expressed in prices as of August 2000 (US$1.30=SDR1.00). Neither price inflation nor increases in nominal wage are considered during the project life. Additional revenue will occur from year 2018, since the forecasted traffic in terms of standard ships will reach the effective transit capacity of the Canal with current layout in 2017.

638. Initial investment will be done from year 2010 to year 2014 for the high quality service without waiting. The annual operating expenses are calculated in the following manner.

- Personnel, administration and other costs: Personnel cost is estimated based on the number of increased personnel required to manage and operate the Canal. Administration and other costs are allocated in accordance with the relating activity's share of personnel cost. These costs are not covered in the analysis here because of SCA's managerial reason.
- Maintenance and repair cost: The annual maintenance and repair cost for constructed facilities are calculated as 1.0% of the original construction cost
- Depreciation cost: The annual depreciation cost for equipment and facilities are calculated by the straight line method based on their service lives. Residual values after all depreciation are estimated as zero. Depreciation cost is excluded from the viability analysis of the plan. Depreciation cost of the existing and planned facilities is included in the financial soundness analysis. The annual depreciation cost of facilities and equipment are calculated as 1.0% of the original construction cost

639. Fund for the initial investment is assumed to be raised with the condition of 12% interest rate per annum corresponding to the domestic funds.

640. The result of the FIRR calculation is 25% (up to 2030), which exceeds commercial interest rate of around 12% in Egypt (see Table 85) in case that construction works start in 2010. Accordingly, the Deversoir By-Pass

Extension Plan is thought to be financially viable.

641. On the other hand, the result of the FIRR calculation is 13% (up to 2030) for the case where construction works start in 2002. This case seems to be risky since construction works start without confirmation of transit demand increase.

642. In the baseline scenario, the future world fleet-mix was set based on the scenario that the recent delivery would be the future fleet-mix. Another additional scenario was considered based on the idea that the much larger Container Ships and Vehicle Carriers would be used in the future as shown in Table 46. The result of the FIRR calculation of this case is 12% (up to 2030) and this case also seems to be risky.

643. Accordingly, it is recommended to conduct again the demand forecast and project evaluation before average daily transit reaches around 55 vessels.

Table 85 FIRR of the Deversoir-Bypass Extension Plan (Work Start in 2010)

Year	Forecasted Daily No. of Real Ships	Average Time Interval (min.)	Daily No. of Standard Ships	Event	Estimated Toll Revenue million US$	Additional Toll Revenue million US$ (a)	Investment million US$ (b)	Additional Ope. Exp. million US$ (c)	Financial Difference million US$ (a-b-c)	FIRR	Reference		
											Additional Users' Benefit (d)	Difference (a-b-c+d)	IRR
1999	37	10.0	37		1,723						14		
2000	39	10.0	39		1,800						15		
2001	40	10.1	40		1,881						16		
2002	41	10.1	42		1,966						16		
2003	43	10.2	44		2,054						17		
2004	45	10.2	46		2,147						18		
2005	46	10.3	47		2,243						19		
2006	48	10.3	49		2,344						20		
2007	50	10.4	51		2,450						20		
2008	51	10.4	54		2,560						21		
2009	53	10.5	56		2,675						22		
2010	55	10.5	58	Work Start	2,795		100		-100		23	-100	
2011	57	10.6	60		2,921		100	1	-101		24	-101	
2012	59	10.6	63		3,053		100	2	-102		25	-102	
2013	61	10.7	65		3,190		100	3	-103		27	-103	
2014	63	10.7	68	Waiting Start	3,334		100	4	-104		28	-104	
2015	66	10.8	71		3,484			5	-5		29	24	
2016	68	10.8	74		3,640			5	-5		30	25	
2017	71	10.9	77	Effective Capacity	3,804			5	-5		32	27	
2018	73	10.9	80		3,975	171		5	166		33	199	
2019	76	11.0	83		4,154	350		5	345		34	380	
2020	79	11.0	86	End of Forecast	4,341	537		5	532	10%	36	568	13%
2021	79	11.0	86		4,341	537		5	532	15%	36	568	18%
2022	79	11.0	86		4,341	537		5	532	18%	36	568	20%
2023	79	11.0	86		4,341	537		5	532	20%	36	568	22%
2024	79	11.0	86		4,341	537		5	532	21%	36	568	24%
2025	79	11.0	86		4,341	537		5	532	22%	36	568	25%
2026	79	11.0	86		4,341	537		5	532	23%	36	568	25%
2027	79	11.0	86		4,341	537		5	532	24%	36	568	26%
2028	79	11.0	86		4,341	537		5	532	24%	36	568	26%
2029	79	11.0	86		4,341	537		5	532	24%	36	568	26%
2030	79	11.0	86		4,341	537		5	532	25%	36	568	26%

Notes) Number of ships and toll revenue in 2021 through 2030 are assumed to be equal to those in 2020.
Additional users' benefit is savings in managing cost by shortning the transit time (southbound: 3 hours).
Source) The Study Team

Table 86 FIRR of the Deversoir-Bypass Extension Plan (Work Start in 2002)

Year	Forecasted Daily No. of Real Ships	Average Time Interval (min.)	Daily No. of Standard Ships	Event	Estimated Toll Revenue mill. US$	Additional Toll Revenue mill. US$ (a)	Investment mill. US$ (b)	Additional Ope. Exp. mill. US$ (c)	Financial Difference mill. US$ (a-b-c)	FIRR	Reference		
											Additional Users' Benefit (d)	Difference (a-b-c+d)	IRR
1999	37	10.0	37		1,723						14		
2000	39	10.0	39		1,800						15		
2001	40	10.1	40		1,881						16		
2002	41	10.1	42	Work Start	1,966		100		-100		16	-100	
2003	43	10.2	44		2,054		100	1	-101		17	-101	
2004	45	10.2	46		2,147		100	2	-102		18	-102	
2005	46	10.3	47		2,243		100	3	-103		19	-103	
2006	48	10.3	49		2,344		100	4	-104		20	-104	
2007	50	10.4	51		2,450			5	-5		20	15	
2008	51	10.4	54		2,560			5	-5		21	16	
2009	53	10.5	56		2,675			5	-5		22	17	
2010	55	10.5	58		2,795			5	-5		23	18	
2011	57	10.6	60		2,921			5	-5		24	19	
2012	59	10.6	63		3,053			5	-5		25	20	
2013	61	10.7	65		3,190			5	-5		27	22	
2014	63	10.7	68	Waiting Start	3,334			5	-5		28	23	
2015	66	10.8	71		3,484			5	-5		29	24	
2016	68	10.8	74		3,640			5	-5		30	25	
2017	71	10.9	77	Effective Capacity	3,804			5	-5		32	27	
2018	73	10.9	80		3,975	171		5	166		33	199	
2019	76	11.0	83		4,154	350		5	345		34	380	
2020	79	11.0	86	End of Forecast	4,341	537		5	532	4%	36	568	7%
2021	79	11.0	86		4,341	537		5	532	7%	36	568	10%
2022	79	11.0	86		4,341	537		5	532	9%	36	568	11%
2023	79	11.0	86		4,341	537		5	532	10%	36	568	12%
2024	79	11.0	86		4,341	537		5	532	11%	36	568	13%
2025	79	11.0	86		4,341	537		5	532	11%	36	568	13%
2026	79	11.0	86		4,341	537		5	532	12%	36	568	14%
2027	79	11.0	86		4,341	537		5	532	12%	36	568	14%
2028	79	11.0	86		4,341	537		5	532	13%	36	568	15%
2029	79	11.0	86		4,341	537		5	532	13%	36	568	15%
2030	79	11.0	86		4,341	537		5	532	13%	36	568	15%

Notes) Number of ships and toll revenue in 2021 through 2030 are assumed to be equal to those in 2020.
Additional users' benefit is savings in managing cost by shortning the transit time (southbound: 3 hours).
Source) The Study Team

Table 87 FIRR of the Deversoir-Bypass Extension Plan (Alternative Fleet Mix)

Year	Forecasted Daily No. of Real Ships	Average Time Interval (min.)	Daily No. of Standard Ships	Event	Estimated Toll Revenue million US$	Additional Toll Revenue million US$ (a)	Investment million US$ (b)	Additional Ope. Exp. million US$ (c)	Financial Difference million US$ (a-b-c)	FIRR	Reference		
											Additional Users' Benefit (d)	Difference (a-b-c+d)	IRR
1999	37	10.0	37		1,723						14		
2000	39	10.0	39		1,799						15		
2001	40	10.1	40		1,880						16		
2002	41	10.1	42		1,964						16		
2003	42	10.2	43		2,052						17		
2004	44	10.2	45		2,143						18		
2005	45	10.3	47		2,239						19		
2006	47	10.3	48		2,339						20		
2007	48	10.4	50		2,444						20		
2008	50	10.4	52		2,553						21		
2009	52	10.5	54		2,667						22		
2010	53	10.5	56		2,786						23		
2011	55	10.6	58	Work Start	2,911		100		-100		24	-100	
2012	57	10.6	60		3,041		100	1	-101		25	-101	
2013	59	10.7	63		3,177		100	2	-102		27	-102	
2014	61	10.7	65		3,319		100	3	-103		28	-103	
2015	63	10.8	67	Waiting Start	3,467		100	4	-104		29	-104	
2016	65	10.8	70		3,622			5	-5		30	25	
2017	67	10.9	72		3,784			5	-5		32	27	
2018	69	10.9	75		3,953			5	-5		33	28	
2019	71	11.0	78	Effective Capacity	4,130			5	-5		34	29	
2020	74	11.0	81	End of Forecast	4,314	185		5	180		36	216	
2021	74	11.0	81		4,314	185		5	180		36	216	1%
2022	74	11.0	81		4,314	185		5	180		36	216	5%
2023	74	11.0	81		4,314	185		5	180	4%	36	216	8%
2024	74	11.0	81		4,314	185		5	180	6%	36	216	10%
2025	74	11.0	81		4,314	185		5	180	8%	36	216	12%
2026	74	11.0	81		4,314	185		5	180	9%	36	216	13%
2027	74	11.0	81		4,314	185		5	180	10%	36	216	14%
2028	74	11.0	81		4,314	185		5	180	11%	36	216	15%
2029	74	11.0	81		4,314	185		5	180	12%	36	216	15%
2030	74	11.0	81		4,314	185		5	180	12%	36	216	16%

Notes) Number of ships and toll revenue in 2021 through 2030 are assumed to be equal to those in 2020.
Additional users' benefit is savings in managing cost by shortning the transit time (southbound: 3 hours).
Source) The Study Team

FINANCIAL MANAGEMENT

644. Business management of an organization is responsible for planning and controlling its operations. Efficient operation necessitates wise planning and control, based upon adequate and accurately kept, properly analyzed and interpreted records. Financial management plays an important role within business management, since business management is deeply concerned with costs and profits.

645. Main purposes of financial management are as follows:

- To evaluate the efficiency of each activity or segment
- To make financial plan for the future
- To estimate the degree of contribution of new activities to financial soundness
- To persuade financial institutions or investors to furnish funds or loan

646. Accounting is a tool of business and financial management and is classified into financial accounting, managerial accounting and cost accounting.

647. Primary purpose of financial accounting is reporting to outsiders concerning the financial condition and profitability of the organization as a whole. Main financial statements are the Balance Sheet and Income (or Profit and Loss) Statement. The Balance Sheet shows the assets, liabilities, and net worth for a specified day, and the Income Statement shows the revenues and expenses for a specified term.

648. Organizations produce financial statements usually according to the accounting principles of their home countries. SCA is said to adopt the Unitary Accounting System which is presented by the Egyptian Ministry of Finance. However, accounting is preferable to be conducted in accordance with the International Accounting Standard, since only a standard accounting system is useful in comparing different organizations.

649. In managerial accounting, segment-wise profit and loss statements for insiders are produced by considering interdepartmental costs and profits which are useful in evaluating the efficiency of each activity or segment. Managerial accounting serves planning and controlling operations of an organization.

650. Cost accounting serves the determination of costs and also

planning and controlling operations of an organization.

651. Auditing involves the inspection and verification of accounting records. Auditing may be internal that is done by an employee within the organization, or it may be external done by a public accountant of public accounting firm. Auditor's responsibility is to express an opinion on the accounting records.

652. The Study Team has not been provided with the financial statements of the SCA. Hence it is difficult to assess not only the financial soundness of the activities of the SCA as a whole, but also productivities of each activity of the SCA.

653. The analyses on the revenue earning capability and financial liability on the projects in this study are based on the data created by the study team from available data and information such as fiscal statistics of the Government.

654. As to these purposes, as the current revenue is far beyond the expenses of the SCA, the results can be said appropriate to the extent necessary for the first estimates.

655. The SCA, however, must bear in mind that credibility of the SCA's announcements on financial issues including toll revision and the requests on the financial loans solely depend on the accuracy of the financial statements and the reliability on the SCA's skills in financial management.

656. Currently, almost all the independent organizations which manage international economic activities issue annual financial reports including income statement, balance sheet and cash flow statement. With these financial reports, the maritime shipping market can assess the economic condition and reflect the rational behavior.

657. Hence it is very important for the users of the Canal to be able to assess the stability of the conditions on which the route choice is judged by them.

658. Apart from the users' convenience, it is also important for the SCA to keep and analyze the financial conditions of the SCA for the better improvement of its activities including the assessment of the productivity of each activity.

659. For these purposes, financial evaluation should based on the well acquainted method using various financial indexes such as rate of return on

fixed asset, debt service covering ratio and operating ratio.

660. SCA is recommended to evaluate by itself using these method, since the Study Team could not reach necessary data for these analysis because of the managerial reason of the SCA.

661. Rate of return on net fixed asset is used for the evaluation of the profitability of the investments in terms of Net Fixed Assets. It is necessary to keep the rate higher than the average interest rate of various funds for investments, which have different interest rates. The ratio is desirable to be higher than 7% (World Bank recommendation), when interest rate is 8%.

662. This rate is calculated by the following formula;

$$\textbf{Rate of Return on Net Fixed Asset} = \frac{\textbf{Net Operating Income}}{\textbf{Total Fixed Assets}} \times 100\% \quad (1)$$

663. Debt service covering ratio shows whether the operating income can cover the repayment of both the principal and the interest on long-term loans. The ratio should be higher than 1.0 and is desirable to be higher than 1.75 (World Bank recommendation).

664. This rate is calculated by the following formula;

$$\textbf{Debt Service Coverage Ratio} = \frac{\textbf{Net Operating Income + Depreciation Cost}}{\textbf{Repayment and Interest on Long-term Loans}} \quad (2)$$

665. The Operating Ratio shows the operational efficiency of the organization as an enterprise, while the Working Ratio shows the efficiency of the routine operations. When the Operating Ratio is less than 70~75% and the Working Ratio is less than 50~60%, the operation of the organization is assessed to be efficient.

666. These ratios are calculated by the following formula;

$$\textbf{Operating Ratio} = \frac{\textbf{Operating Expenses}}{\textbf{Operating Revenues}} \times 100\% \quad (3)$$

Working Ratio =

$$\frac{\text{Operating Expenses - Depreciation Expenses}}{\text{Operating Revenues}} \times 100\% \qquad (4)$$

MODIFICATION OF THE RULES OF NAVIGATION

667. As to the regal issues on the management and operation of the Suez Canal, there are potentially many points to be clarified or re-considered which are from policy matters of Canal management to be included in the presidential decree on the regulation of the Suez Canal Authority to the rules on financial management and navigations including convoy system.

668. It needs, however, more time and further discussion before reforming or establishing the regulations considering wider aspects such as conformity with the constitutional laws and commercial laws. Hence, the proposed modification here is limited to the rules of navigation and the issues considered to be possible to modify without further assessment.

669. The first modification is on the definition of container ships. Container ships have been evolving over the past decades and fifth/sixth generation ships have already been deployed in world main routes. Accordingly, the word "4th Generation Containerships and 3rd Generation Containerships" described in the present rules of navigation should be replaced by "container ships not smaller than the third generation ships ". Pertinent articles are Art.8 B (2) b) i, Art.11 B (1) a), Art.11C (1) a), Art.49 A (1) a) i, Art.49 B (1) b), Art.49 B (3), Art.49 C (2), Art.50 A (1), and Art.50 B (1))

670. The second modification is proposed on the articles related to section II (maximum dimensions of the vessels authorized to transit). With the recent completion of the SCA's development plan, 58' draught vessels have been able to transit the Canal. Accordingly, BEAM AND DRAUGHT TABLE II in the Art.52 (2) should be amended as follows:

Table 88 Amendment of Beam and Draught

Loaded Vessels (Southbound & Northbound)

B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D
175'-4 53m44	58'-00	182'11 55m75	55'-07	191'-3 58m29	53'-02	200'-4 61m06	50'-09	210'-4 64m10	48'-04	221'-5 67m48	45'-11	233'-9 71m24	43'-06	247'-6 75m43	41'-01
175'-7 53m51	57'-11	183'-2 55m82	55'-06	191'-7 58m39	53'-01	200'-8 61m16	50'-08	210'-9 64m23	48'-03	221'10 67m61	45'-10	234'-2 71m37	43'-05	248'-0 75m59	41'-00
175'10 53m59	57-'10	183'-6 55m93	55'-05	191'10 58m47	53'-00	201'-1 61m26	50'-07	211'-1 64m33	48'-02	222'-3 67m74	45'-09	234'-8 71m52	43'-04	248'-6 75m74	40'-11
176'-1 53m67	57'-09	183'-9 56m00	55'-04	192'-2 58m57	52'-11	201'-4 61m36	50'-06	211'-6 64m46	48'-01	222-8 67m86	45'-08	235'-1 71m65	43'-03	249'-0 75m89	40'-10
176'-4 53m74	57'-08	184'-0 56m08	55'-03	192'-5 58m64	52'-10	201'-8 61m46	50'-05	211'10 64m56	48'-00	223'-1 67m99	45'-07	235'-7 71m80	43'-02	249'-6 76m04	40'-09
176'-7 53m82	57'-07	184'-4 56m18	55'-02	192'-9 58m75	52'-09	202'-0 61m56	50'-04	212'-2 64m66	47'-11	223'-6 68m12	45'-06	236'-0 71m93	43'-01	250'-0 76m20	40'-08
176'10 53m89	57'-06	184'-7 56m26	55'-01	193'-1 58m85	52'-08	202'-4 61m67	50'-03	212'-7 64m79	47'-10	223'11 68m24	45'-05	236'-6 72m08	43'-00	250'-7 76m37	40'-07
177'-1 53m97	57'-05	184'10 56m33	55'-00	193'-4 58m92	52'-07	202'-8 61m77	50'-02	212'11 64m89	47'-09	224'-4 68m37	45'-04	236'11 72m21	42'-11	251'01 76m53	40'-06
177'-4 54m05	57'-04	185'-2 56m43	54'-11	193'-8 59m02	52'-06	203'-0 61m87	50'-01	213'-4 65m02	47'-08	224'-9 68m50	45'-03	237'-5 72m36	42'-10	251'-7 76m68	40'-05
177'-7 54m12	57'-03	185'-5 56m51	55'-10	194'-0 59m13	52'-05	203'-4 61m97	50'-00	213'-8 65m12	47'-07	225'-1 68m60	45'-02	237'10 72m49	42'-09	252'-1 76m83	40'-04
177'10 54m20	57'-02	185'-9 56m61	55'-09	194'-3 59m20	52'-04	203'-8 62m07	49'-11	214'-1 65m25	47'-06	225-6 68m73	45'-01	238'-4 72m64	42'-08	252'-8 77m01	40'-03
178'-1 54m27	57'-01	186'-0 56m69	54'-08	194'-7 59m30	52'-03	204'-0 62m17	49'-10	214'-5 65m35	47'-05	226-0 68m88	45'-00	238'-9 72m77	42'-07	253'-2 77m16	40'-02
178'-5 54m38	57'-00	186'-3 56m76	54'-07	194'11 59m41	52'-02	204'-5 62m30	49'-09	214'10 65m48	47'-04	226'-5 69m01	44'-11	239'-3 72m92	42'-06	253'-8 77m31	40'-01
178'-8 54m45	56'-11	186'-7 56m87	54'-06	195'-3 59m51	52'-01	204'-9 62m40	49'-08	215'-2 65m58	47'-03	226'10 69m13	44'-10	239'-9 73m07	42'-05	254'-3 77m49	40'-00
178'11 54m53	56'-10	186'10 56m94	54'-05	195'-6 59m58	52'-00	205'-1 62m50	49'-07	215'-7 65m70	47'-02	227'-3 69m26	44'-09	240'-2 73m20	42'-04		
179'-2 54m61	56'-09	187'-2 57m04	54'-04	195'10 59m69	51'-11	205'-5 62m61	49'-06	216'-0 65m83	47'-01	227'-8 69m39	44'-08	240'-8 73m35	42'-03		
179'-5 54m61	56'-08	187'-5 57m12	54'-03	196'-2 59m79	51'-10	205'-9 62m71	49'-05	216'-4 65m93	47'-00	228'-1 69m51	44'-07	241'-2 73m50	42'-02		
179'-8 54m76	56'-07	187'-9 57m22	54'-02	196'-6 59m89	51'-09	206'-1 62m81	49'-04	216'-9 66m06	46'-11	228'-6 69m64	44'-06	241'-7 73m67	42'-01		
180'-0 54m86	56'-06	188'-0 57m30	54'-01	196'10 59m99	51'-08	206'-5 62m91	49'-03	217'-1 66m16	46'-10	228'11 69m77	44'-05	242'-1 73m78	42'-00		
180'-3 54m94	56'-05	188'3 57m37	54'-00	197'-1 60m07	51'-07	206'10 63m04	49'-02	217'-6 66m29	46'-09	229'-4 69m90	44'-04	242'-7 73m93	41'-11		
180'-6 55m01	56'-04	188'-7 57m48	53'-11	197'-5 60m17	51'-06	207'-2 63m14	49'-01	217'11 66m42	46'-08	229'-9 70m02	44'-03	243'-1 74m09	41'-10		
180'-9 55m09	56'-03	188-10 57m55	54'-10	197'-9 60m27	51'-05	207'-6 63m24	49'-00	218'-3 66m52	46'-07	230'-3 70m18	44'-02	243'-7 74m24	41'-09		
181'-0 55m16	56'-02	189'-2 57m65	54'-09	198'-1 60m37	51'-04	207'10 63m34	48'-11	218'-8 66m64	46'-06	230'-8 70m30	44'-01	244'-0 74m37	41'-08		
181'-4 55m27	56'-01	189'-6 57m75	53'-08	198'-5 60m47	51'-03	208'-3 63m47	48'-10	219'-1 66m77	46'-05	231'-1 70m43	44'-00	244'-6 74m52	41'-07		
181'-7 55m34	56'-00	189'9 57m83	53'-07	198'-9 60m57	51'-02	208'-7 63m57	48'-09	219'-5 66m87	46'-04	231'-6 70m56	43'-11	245'-0 74m67	41'-06		
181'10 55m42	55'-11	190'-1 57m93	53'-06	199'-1 60m68	51'-01	208'11 63m67	48'-08	219'10 67m00	46'-03	232'-0 70m71	43'-10	245'-6 74m82	41'-05		
182'-1 55m49	55'-10	190'-4 58m01	53'-05	199'-4 60m75	51'-00	209'-3 63m77	48'-07	220'-3 67m13	46'-02	232'-5 70m84	43'-09	246'-0 74m98	41'-04		
182'-5 55m60	55'-09	190'-8 58m11	53'-04	199'-8 60m85	50'-11	209'-8 63m90	48'-06	220'-8 67m25	46'-01	232'10 70m96	43'-08	246'06 75m13	41'-03		
182'-8 55m67	55'-08	190'11 58m19	53'-03	200'-0 60m96	50'-10	210'-0 64m00	48'-05	221'-1 67m38	46'-00	233'-4 71m12	43'-07	247'-0 75m28	41'-02		

671. Speed of the vessels is also stipulated in the article 54 as is shown below. In the pilotage of a vessel in the Suez Canal, one of the most important regulations is the speed. The time required for a vessel to safely transit the Canal has, however, been greatly reduced since the opening of the Canal in 1869. In other words, vessels have been able to maintain fairly high speed owing to unremitting efforts of dredging/widening the Canal together with various improvements to the transit system.

Table 89 Transit Speed of the Vessels

Station	Tanker's Group	Other Vessels
Port Tewfik - Geneva. head current	11 Km/hr	13 Km/hr
Port Tewfik - Geneva. stern current	14 Km/hr	15 Km/hr
Geneva – Kabret	14 Km/hr	15 Km/hr
Kabret – Deversoir	15 Km/hr	16 Km/hr
Deversoir – Port Said	14 Km/hr	15 Km/hr

672. Furthermore, prevailing transit speed is currently a little faster than the speed stipulated in the rule. Hence, considering the currently applied flexible speed, transit speed is better to be regulated in a qualitative manner rather than stipulating the quantitative figures as follows;

Vessels shall at all times proceed at a safe speed so that they can take proper and effective action to avoid collision and be stopped within a distance appropriate to prevailing circumstances and conditions.

In determining a safe speed the following factors shall be among those taken into account:

1) the state of visibility;
2) the distance from the preceding vessel;
3) the maneuverability of the vessel with special reference to stopping distance and turning ability in the prevailing conditions;
4) the state of wind, tidal current, and the proximity of navigational hazards;
5) the draught in relation to the available depth of water;
6) and the characteristic, efficiency, and limitation of the operating

673. Other minor modifications are proposed in the following table.

Table 90 Comparison of Minor Modifications

Article	Present content	Supplement/Replacement/Deletion
12 (1)	name of vessel	(add) previous name if any and SCID
	draught	(add) and beam
	deadweight	(add) and SCA net tonnage
13 (1)	name of vessel	(add) previous name if any and SCID
	deadweight	(add) and SCA net tonnage
20 (2)	One mooring boat or	(delete)
49 C (4)	,excluding Tankers over 90,000 Tons SCGT	(delete)
49 C (5) d)	Vessels carrying Radioactive substance Group I	(replace) Vessels carrying un-containerized radioactive substance Group I
57 (5) b	Vessels over 1,000 SCGT	(replace) Vessels over 1,500 SCGT