THE ECONOMIC IMPACT OF POOR TERMINAL OPERATIONAL EFFICIENCY IN THE PORT OF DURBAN

By

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DECLARATION

This research has not been previously accepted for any degree and is not being currently submitted in candidature for any degree.

Signed.....

Date.....29 August 2003.....

STATEMENT

"Teach me, O Lord, to follow your decrees; then I will keep them to the end." Psalm 119 verses 33 (The New Testament Student Bible)

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I hereby would like to thank my wife Lulu for all her love and support. To my children Wendle, Marcel and Kyle, I am more than grateful.

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ABSTRACT

What is the role of a port? It is a place that handles ships and cargo with operational efficiency. For this reason, ports must be seen as elements in value-driven chain systems or in value chain constellations. They deliver value to shippers and to third party service providers; customer segmentation and targeting is on the basis of a clearly specified value for itself and for the chain in which it is embedded.

Ports no longer operate in an insulated environment. They face the same competitive forces that companies in other industries experience. There is rivalry among existing competitors, continuing threat of new entrants, potential for global substitutes, presence of powerful customers and powerful supplies.

Since the early 1980s, moves to rapidly liberalise trade and foreign direct investment (FDI) have strongly influenced policy makers in many developing countries in their thinking about this challenge. Openness to international market forces and competition was expected to allow those countries to alter both the pace and the pattern of their participation in international trade, thereby overcoming balance-of-payments problems and accelerating growth, to catch up with industrial countries.

Today, the Port of Durban is the clear African leader in total container throughput. In the world port league for 2000 established by Containerisation International Yearbook 2001, Durban was in 44th position.

The Port of Durban is an important gateway with regards to general cargo flows especially since the port's goal is to become a hub port in the Southern Africa. It has great economic value for the city and the country at large. It can be seen that the poor economic and operational efficiency of the port leads to poor overall economic growth for the nation. It is therefore desirable to ensure that the terminal is always operating at optimum operating efficiency with the required infrastructure and capacity in place.

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CHAPTER ONE

1.1. INTRODUCTION

This paper aims to show that the impediments to the growth of the economy at large are partly as a direct result of the lack of performance of our ports (it will confine the argument to the Port of Durban) with regards to general cargo flows (inbound and outbound).

Bulk and break bulk cargo flows have always been able to compete successfully and for this reason, the arguments will focus mainly on the general cargo flows i.e. containerisation. The Port of Durban has, over the past few years, been severely criticised and penalised for the low productivity levels achieved at the container terminals, therefore this paper will attempt to examine some of the shortfalls experienced at the terminals in greater detail.

It must be borne in mind, however, that the port system does not operate in isolation but within a broader logistical framework. For this reason, this paper will not cover all the contributing factors hindering a port's performance and may therefore not be truly reflective of the holistic port scenario. Nonetheless, it will endeavour to reflect the current problems experienced by the container terminal in Durban and probe its causes.

What is the role of a port? It is a place that handles ships and cargo with operational efficiency. For this reason, ports must be seen as elements in value-driven chain systems

or in value chain constellations. They deliver value to shippers and to third party service providers; customer segmentation and targeting is on the basis of a clearly specified value for itself and for the chain in which it is embedded (Robinson: 2002). A brief history of containerisation and the need for greater port efficiency will now be examined.

Containerisation is the technique or practice of stowing freight in reusable containers of uniform size and shape for transportation. The freight may sometimes be oddly shaped and in different quantities, but when stowed and shipped in containers, it can be handled as a single piece thus making it a lot easier to transport. This reduces the time and costs factor. Containerisation also enables intermodal transport, i.e. the total movement from the origin to the destination, using different modes en route likes roadways, railways, shipping, airlines etc. via a combination of several or just two of these modes.

Before containerisation, cargo would have had to be loaded on a truck piece by piece and driven to a port and there, at the dockside, each piece would be individually unloaded and then hoisted onto the ship. This was a cumbersome and time consuming process. Ships often needed to be in port for 10 days to complete the process of unloading and loading. Containerisation is thought to be a modern conception. Nothing could be farther from the truth. There are records of containers being used in pre-railway tramways of England, Silesia and America as early as the 1830s. They were used for the transportation of Ores, Limestone, and Coal etc. These containers were much like the ones seen today, but were much smaller and most had a capacity of 5-10 tons (Fleming and Hayuth: 1994).

The marine containers that we see today originated in the second half of 1950. They were the brainchild of Malcolm McLean, considered to be the father of containerisation. Containerisation has brought about a revolution in the transport industry, giving rise to significant economies throughout the transport chain, permit freight to be transported more cheaply and over greater distances than ever before. This is what geographers refer to as transferability and it has given shipping lines much greater freedom to serve markets from a wider choice of ports. Markets that were once seen to be in the exclusive hinterland of a particular port can now be served by many gateways. Individual ports no longer have exclusive control over inland markets, and they can no longer be sure that trade even in their own local areas is secure.

Today many of the developing countries are taking up the challenge of developing their ports. In practice this amounts to eliminating as much as possible the X-inefficiency, which is so typical of large and complex public (port) institutions (Winkelmans: 2002). The port sector has radically changed over the past two centuries. During the 19th century and the first half of the 20th century ports tended to be instruments of state or colonial powers and port access and egress were regarded as a means to control markets. Competition between ports was minimal and port-related costs were relatively insignificant in comparison to the high cost of ocean transport and inland transport (Goss: 1968). As a result, there was little incentive to improve port efficiency. How times have changed! Most ports today are competing with one another on a global scale and, with the tremendous gains in productivity in ocean transport achieved over the past several

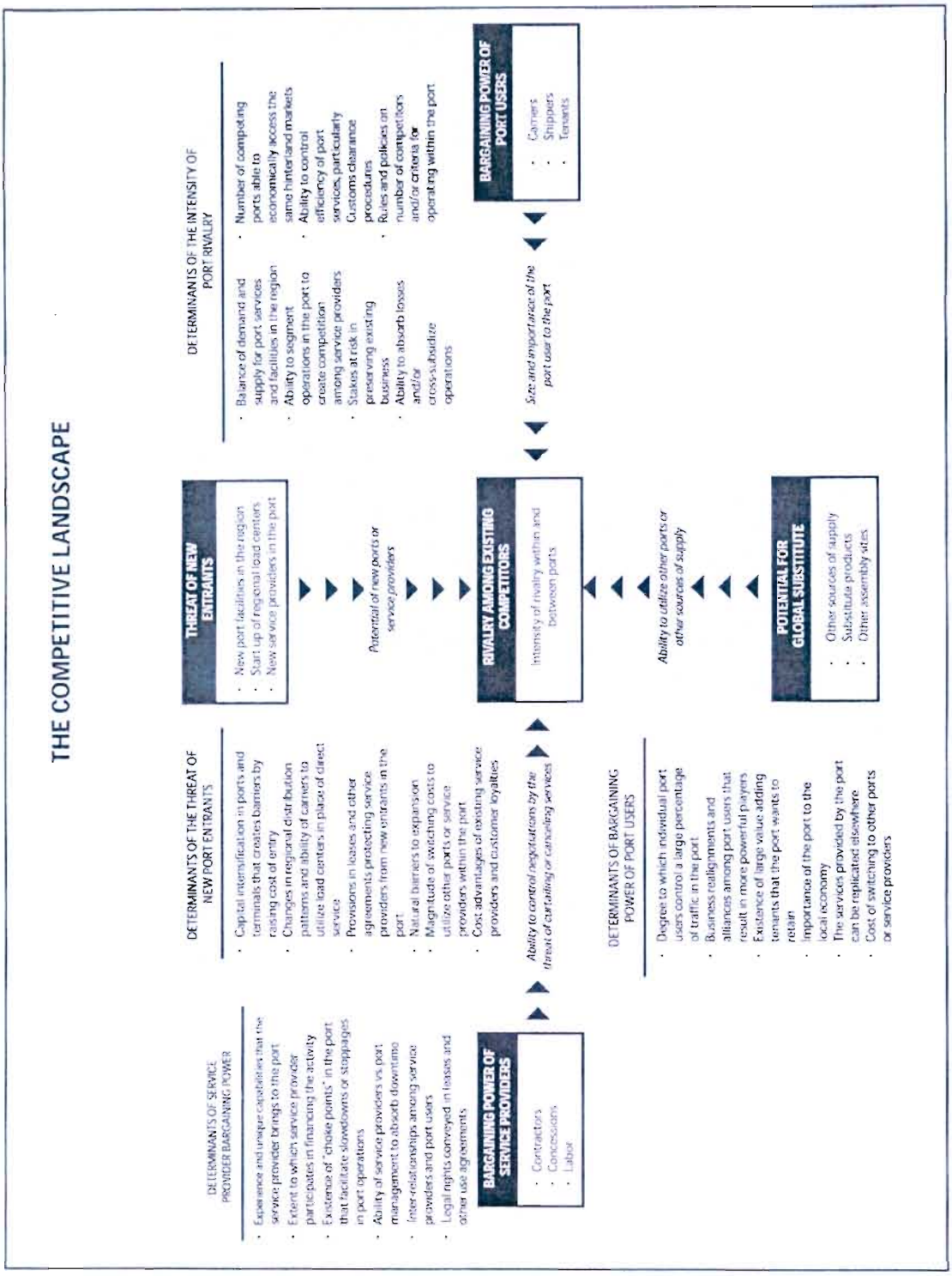
decades, ports are now perceived to be the remaining controllable component in improving the efficiency of ocean transport logistics.

This has generated a drive today to improve port efficiency, lower cargo-handling costs and integrate port services with other components of the global distribution network. Because of the capital intensity of such efficiency improvements, these have also generated the drive to unbind ports from bureaucratic control of public entities and encourage private sector operation of a wide range of port-related activities.

Ports no longer operate in an insulated environment. They face the same competitive forces that companies in other industries experience. There is rivalry among existing competitors, continuing threat of new entrants, potential for global substitutes, presence of powerful customers and powerful supplies (see box one).

In a free market environment there is no reason that governments have to be the service providers not even of so-called public interest in order to acquire port efficiency. Consequently, the state should not determine the individual port strategies, management and operations; its core competency should be to stimulate, to co-ordinate, and to facilitate port development, port investment, etc. This is not just a difference in words, it is a whole world of difference, viz. in mentality and attitude (Winkelmans: 2002).

The following chapters will focus on specific areas. **Chapter Two** focuses on trade in developing countries and covers the development of the international seaborne trade. The primary thrust of this dissertation is containerisation and therefore the major discussion of



BOX ONE: PORTER'S FIVE FORCES MODEL

Source: World Bank Port Reform Toolkit

this chapter covers the developments of the liner trade. Other focus areas are the production of the port service and measuring port performance. The unbundling of state-owned enterprises and the "dreaded" privatisation case are explained. The problem here is whether such interventions are prudent for the South African economy. The initial cash boosts raised from the proceeds of privatisation are not necessarily beneficial over the long term. Therefore, we will take a balanced approach to the privatisation issue and try to establish a possible path that the government should adopt regarding the concessioning of the port terminals.

Chapter Three deals with trade reform in South Africa (SA). With the changes in the way the global economy operates and the role of globalisation, SA needs to realign its trade mechanisms so as to not lag behind the rest of the world. The main problem here is that the trade liberalisation reforms that are expected to be undertaken by developing nations do not necessarily benefit them but enrich the more advanced developed nations. The World Trade Organisation (WTO) and the International Monetary Fund (IMF) need to rethink their strategies in forcing developing nations to open up their economies until they can compete on an equal footing or subject to some trade spin-offs. This chapter also looks at role of the South African transport network and the various legislative frameworks that have been devised to deal with the inefficiencies in our transport system with emphasis on the Port of Durban.

Chapter Four contains the concluding remarks. The implications of poor port performance will be reviewed and also some of the progresses made in addressing some

of these inefficiencies. The port development framework for the Port of Durban will be discussed as well the roadmap for the concessioning process.

CHAPTER TWO

2.1. DEVELOPING COUNTRIES IN WORLD TRADE

Fundamentally, the basic policy challenge facing most developing countries remains how best to channel the elemental forces of trade and industry to wealth creation and the satisfaction of human wants. Shifting away from their dependence on the export of primary commodities towards greater production and exports of industrial products has often been viewed as a means of their participating more effectively in the international division of labour. Manufactures are expected to offer better prospects for export earnings not only because they allow for a more rapid productivity growth and expansion of production, but also because they hold out the promise of greater price stability even as volumes expand, thereby avoiding the declining terms of trade that have frustrated the long-term growth performance of many commodity-dependent economies (Trade and Development Report: 2002).

Since the early 1980s, moves to rapidly liberalise trade and foreign direct investment (FDI) have strongly influenced policy makers in many developing countries in their thinking about this challenge. Openness to international market forces and competition was expected to allow those countries to alter both the pace and the pattern of their participation in international trade, thereby overcoming balance-of-payments problems and accelerating growth, to catch up with industrial countries. Since the beginning of modern economics the literature concerning the determination of living standards has been interested in trade (Smith: 1776). The lack of initial consensus among researchers

on the relationship between trade and growth has been mirrored by differences in the actual trade strategies of developing countries. Despite some lingering controversy, empirical studies show a positive relationship between trade and growth.

Frankel and Romer (1999) claim that "...trade has a quantitatively large, significant, and robust positive effect on income " (Ades and Glaeser: 1999). During the 1960s and into the 1970s, many countries adopted import substitution policies to protect their infant industries, though a few economies in East Asia took a different approach. By the 1990s many developing countries, including most of the large ones, had shifted to an outward-oriented strategy and had seen accelerations in their growth rates (Dollar and Kraay: 2001). These recent liberalisations have reduced tariffs and, in some cases, non-tariff barriers too. For instance, Asia reduced its average tariff rate from 30% at the beginning of the 1980s to 14% by the end of the 1990s, and Latin America reduced its average tariff rate from 31% to 11% (World Bank Report: 2002). These reductions in artificial trade barriers have implied that the relative importance of transport costs as a determinant of trade has increased.

During this period, the exports of developing countries have, indeed, grown faster than the world average and now account for almost one third of world merchandise trade. Much of that growth has been in manufactures, which today account for 70% of developing country exports; for some products developing country exports account for around half or more of world exports (Trade and Development Report: 2002). More importantly, many developing countries appear to have succeeded in moving into

technology-intensive manufactured exports, which have been among the most rapidly growing products in world trade over the past two decades, notably electronic and electrical goods.

However, on closer examination, the picture is much more nuanced. With the exception of a few East Asian first-tier newly industrialising economies (NIEs) with a significant industrial base, which were already closely integrated into the global trading system, developing country exports are still concentrated on products derived essentially from the exploitation of natural resources and the use of unskilled labour, which have limited prospects for productivity growth and lack dynamism in world markets. Statistics showing a considerable expansion of technology-intensive, supply-dynamic, high-value-added exports from developing countries are misleading. Such products indeed appear to be exported by developing countries, but in reality those countries are often involved in the low-skill assembly stages of international production chains organised by transnational corporations (TNCs).

Most of the technology and skills are embodied in imported parts and components, and much of the value added accrues to producers in more advanced countries where these parts and components are produced, and to the TNCs, which organise such production networks.

The globalisation of manufacturing processes has been sparked by the search among Organisation for Economic Co-operation and Development (OECD) industries for

countries, which afford lower factor cost and offer other conditions of comparative advantage. These corporate objectives have already induced substantial outsourcing of intermediate manufacturing and assembly tasks to a variety of developing countries during the 1980s. A World Bank survey (Peters: 1992) not only confirmed these developments but also projected much further expansion of such industrial practices. Owing to such trends the demand for long-haul ocean transport of many primary commodities from developing to industrialised countries can be expected to diminish. On the other hand, however, there will be an increasing need for small high-value shipments in short time intervals. The observation reflects changes in production techniques and organisation, which have evolved for a number of reasons.

Firstly, growing integration of the acquisition, production, and marketing processes through cost-minimising supply chain management techniques has induced a trend towards inventory reduction. These developments have already led to very specific demand for speedy and highly reliable maritime transport services, which are fully integrated with land transport systems to enable streamlined door-to-door delivery arrangements.

Secondly, many industries are seeking out and have started to use alternative, more cost-effective materials. For instance, modern car manufacturing incorporates 40% less steel than only 10 years ago. The value of goods shipped continues to increase, but they need far less raw materials to be produced and less space for transportation. Thus many of the

customary cargoes in ocean transport are losing importance and are replaced by others, requiring very different types of packaging and transport.

The relocation of industries phenomenon is demonstrated by the fact that in some OECD economies industrial enterprises move entire production complexes to other countries in order to bypass quota restrictions and other regulatory market constraints. Japanese car manufacturing in the United States (US) and Europe is an example.

Indeed, while the share of developing countries in world manufacturing exports, including those of rapidly growing high-tech products, has been expanding, the income earned from such activities by these countries does not appear to share in this dynamism. On this score, a comparison between the developed and developing countries over the past two decades raises some initial worries. Although developed countries now have a lower share in world manufacturing exports, they have actually increased their share in world manufacturing value added over this period. Developing countries, by contrast, have achieved a steeply rising ratio of manufactured exports to gross domestic product (GDP), but without a significant upward trend in the ratio of manufacturing value added to GDP. Accordingly, the increase in the shares of developing countries in world manufacturing exports has not been accompanied by concomitant increases in their shares in world manufacturing value added, and in several countries the two ratios have tended to move in opposite directions.

Certainly, few of the countries that pursued rapid liberalisation of trade and investment and experienced a rapid growth in manufacturing exports over the past two decades achieved a significant increase in their shares in world manufacturing income (Trade and Development Report: 2002).

The value adding at source represents growing efforts by many developing countries to obtain better income from indigenous products, which were once shipped in their raw state but are now increasingly processed prior to shipment. For instance, several economies within the Organisation of Petroleum Exporting Countries (OPEC) group have started to develop their own petrochemical industries close to the source of crude oil. The obvious implication of these trends is reduced demand for bulk transport of crude, and increased volumes of petroleum derivatives, which are carried in product and chemical tankers. Similar observations apply to other raw materials in the mining and agricultural sectors, and the related effects on long-term demand for ocean transport (Peters: 1992).

Clearly, for many developing countries, getting the most out of the international trading system is no longer just a matter of moving away from commodity exports. At the same time, many of the same forces that adversely affected price and productivity dynamics in the primary sector, including the competitive structure of markets, income elasticities and technological weaknesses, need to be re-examined in the light of recent trends associated with the increased participation of developing countries in the international trading system. Transport costs, customs and excise duties and other services have come to be recognised as a major determinant of competitiveness (TIPS: 2002).

Maritime transport costs have a profound influence on international trade. In some cases, their trade-inhibiting effect dwarfs that of customs duties (Samson and Yeats: 1977). More generally, economic research has highlighted the role of transport costs in determining geographical patterns of trade, production, industrial structure, and income (Venables and Limao: 1999). Interesting new work even suggests that transport costs (as an element of trade costs) help explain a variety of puzzles in the field of international macroeconomics, such as the well-known home biases in consumption and investment, and the excessive volatility of exchange rates (Obstfeld and Rogoff: 2000). These observations are interesting from a policy point of view, however, only if something can be done about these costs. Are transport costs exogenously determined by technological developments or can they be influenced by policy?

It has been argued that maritime transport costs are kept high by restrictive trade policies, notably the cargo reservation schemes and monopoly rights granted to providers of port and auxiliary services (Bennathan: 1989). It has also been argued that private anti-competitive practices, primarily, but not exclusively on the part of maritime conferences, are responsible for keeping costs high (Francois and Wooton: 2000). However, most observers also argue that both public and private trade-restrictive policies are becoming less and less important (Franck and Bunel: 1991). Yet the available evidence suggests that transport costs, especially for liner trade, are not falling despite dramatic improvements in technology, especially in the form of containerisation (Hummel: 1999). Could it be that the disappearance of restrictions, like the demise of Mark Twain, has been prematurely announced?

2.2. DEVELOPMENT OF INTERNATIONAL SEABORNE TRADE

During 2001 the growth of world output fell to 1.3% from the remarkable 3.8% achieved in 2000 (see table 1) and, for the first time since the oil price hike of the late 1970s, virtually all regions of the world experienced a simultaneous economic slowdown. The growth of economic output for developing countries was 2.1%, well above the world average. The highest growth occurred in African countries, which repeated their performance of 2000, expanding 2.7%. SA managed to expand output by 2.1% (Maritime Transport Review: 2002).

Overall, the rate of economic growth of African countries over the last three years has exceeded the average growth rate of the last decade.

Table One: World output, 1990-2001 (% change)

World output, 1990–2001
(percentage change)

Region/grouping	Average 1990-2000	1999	2000	2001[a]
World	2.2	2.6	3.8	1.3
Developed economies	2.0	2.4	3.4	1.0
of which:				
United States	2.8	3.6	4.1	1.1
Japan	1.1	0.2	2.2	-0.3
European Union	1.7	2.4	3.4	1.6
of which:				
Euro area	1.7	2.4	3.5	1.4
Germany	1.6	1.5	3.2	0.6
France	1.4	2.9	3.5	1.9
Italy	1.2	1.4	2.9	1.8
United Kingdom	1.9	2.1	2.9	2.4
Developing economies	4.3	3.4	5.4	2.1
of which:				
Africa	2.2	2.6	2.7	2.7
Latin America	2.9	-0.2	3.9	0.4
Asia	4.4	4.6	5.8	1.2
Economies in transition	-3.0	2.7	6.0	4.3
China	9.3	7.1	8.0	7.3

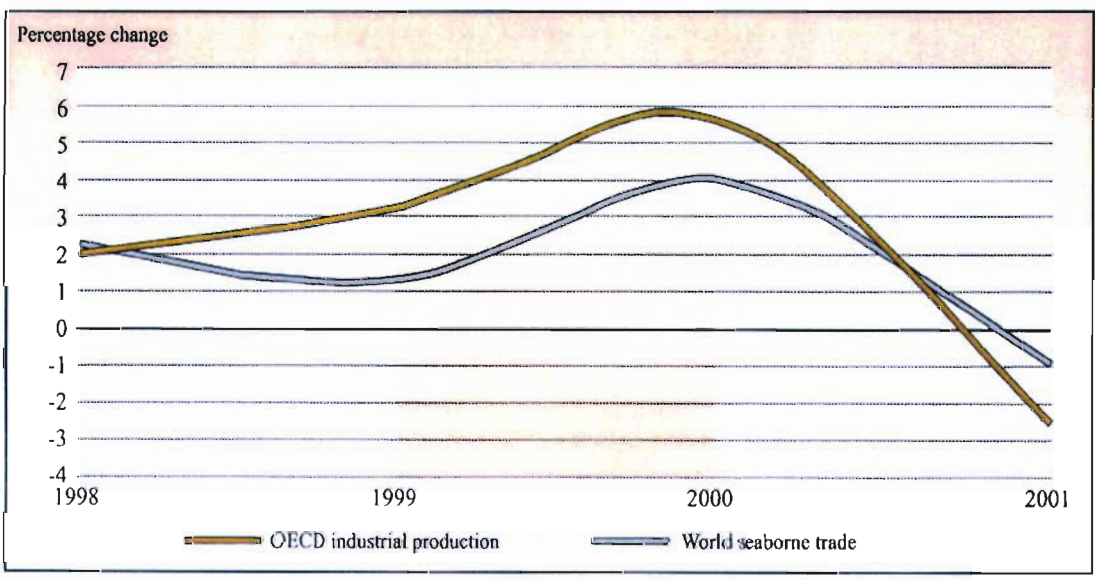
Source: Calculations by the UNCTAD secretariat based on data in 1995 dollars, as published in UNCTAD (2002), *Trade and Development Report 2002*, United Nations publications, Sales No. E.02.II.D.2, New York and Geneva, table 1.1.

[a] Estimates.

The industrial production index (1995=100) for the OECD, another fundamental indicator for the global maritime transport sector, averaged 117.7 in 2001, a decrease of 2.6% from the average index for 2000 (see figure one). This decrease contrasts with the 5.6% increase achieved in 2000, when the index reached 120.8.

Figure 1

Annual change in OECD industrial production and world seaborne trade, 1998–2001



Source: OECD (2001), *Main Economic Indicators*, April.

The long-term view is that the overall market with regards to containerisation is that the market will display consistent growth (see table 2), increasing by between 6% and 7% over the coming decade (Drewry Shipping Consultants).

Table 2: Container Ports' Throughput By Regions-1999 to 2015 (millions of TEUs)

REGION	1999	2015		2015 INCREASE	
		Slow growth	Fast growth	Slow growth	Fast growth
North Europe	29	63	71	117%	145%
South Europe/Mediterranean	22	48	55	118%	150%
Middle east/Indian Subcontinent	13	32	51	146%	292%
Sub-Saharan Africa	4	8	12	100%	200%
Far East	93	243	292	161%	214%
Australasia/Oceania	4	9	12	125%	200%
North America	28	58	67	107%	139%
Latin America	16	44	52	175%	225%
TOTAL	210	505	611	140	191%

Source: American Shipper, January 2001, page 74

Adapted from Muller: Global Trends and Perspectives

2.3. OPERATIONAL PRODUCTIVITY

The main indicators of operational productivity for the world fleet in tons and ton-miles per deadweight ton (dwt) are shown in table 3 and figure 2. Tons of cargo carried per deadweight ton in 2001 maintained a level similar to that of 1999 at 7.06, while

thousands of ton-miles performed per deadweight ton decreased to 29.48. The decrease in productivity measured in tons of cargo carried per deadweight ton reflects the reduction of cargo carried relative to the fleet expansion. The decrease in productivity measured in ton-miles per deadweight ton results from the slowdown of seaborne trade from the peak reached in 2000 and the expansion of the world fleet.

Table 3: Cargo carried and ton-mile per deadweight ton (dwt) of the total world fleet, 1999-2001

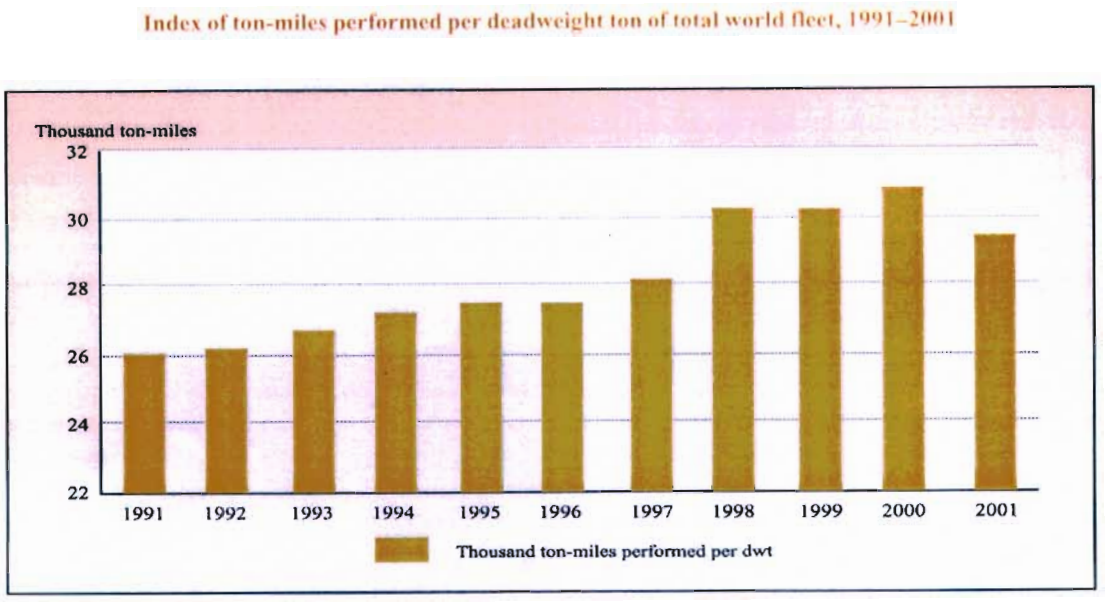
Cargo carried and ton-miles performed per deadweight ton (dwt) of the total world fleet, 1990–2001

Year	World fleet (million dwt)	Total cargo (million tons)	Total ton-miles performed (thousands of millions of ton-miles)	Tons carried per dwt	Thousands of ton-miles performed per dwt
1990	658.4	4 008	17 121	6.1	26.0
1991	683.5	4 120	17 873	6.0	26.1
1992	694.7	4 220	18 235	6.1	26.2
1993	710.6	4 330	18 854	6.1	26.5
1994	719.8	4 485	19 461	6.2	27.0
1995	734.9	4 651	20 188	6.3	27.5
1996	758.2	4 758	20 810	6.3	27.4
1997	775.9	4 953	21 825	6.4	28.1
1998	788.7	5 598	23 822	7.1	30.2
1999	799.0	5 668	24 114	7.1	30.2
2000	808.4	5 890	22 947	7.3	30.9
2001	825.7	5 832	24 338	7.1	29.5

Sources: World fleet: Lloyd's Register – Fairplay (mid-year data for 1990, year-end data for 1992–2000); total cargo carried: UNCTAD secretariat; ton-miles: Fearnley's, *Review*,various issues. Data compiled by the UNCTAD secretariat.

What is interesting from the above table, is that the tons carried per dwt over the last decade, has steadily been increasing. This steady increase is assumed to carry on in the coming years, which is indicative of growth in the global economy as a whole.

Figure 2: Index of ton-miles performed per dwt of total world fleet, 1991-2001



Source: UNCTAD calculations.

Except for 2001, the ton-mile performed per dwt has seen a steady increase. The slowdown in 2001 is thought to be the result of a global slowdown in trade. This is not deemed to last long because the predictions are that the world economy is in a recovery phase with most developing economies experiencing good growth rates.

2.4. DEVELOPMENTS IN THE LINER TRADE

Globalisation has brought about changes in the structure of the world economy and the shipping and port industries have had to respond to the challenges and opportunities that have arisen as a result of the structural changes. Container shipping lines have been faced with intensified competition in the liner market over the last two decades. They have had

to adopt innovative, productivity-enhancing and cost-cutting strategies. Seeking further economies of scale, shipping lines continue to rationalise services, deploying larger ships to call at a limited number of ports with extensive, integrated feeder networks connected to regional hinterlands.

Due to the size of the investments made by shipping lines, it is an increasing challenge for developing economies within a region to maintain competitiveness in the area of providing maritime services.

Global container shipping lines are under intense pressure to provide shippers with services that include fast transit times, high frequency and lower costs. This has given rise to two trends: (a) deployment of increasingly large vessels to achieve economies of scale and (b) alliances and mergers/acquisitions of carriers as an approach to rationalising investment, spreading risk and reducing administrative costs. Maritime carriers enter various types of agreements, which help them enjoy advantages that arise from cooperation on technical or commercial matters. Far from being a recent phenomenon, carriers' collusive habits are deeply rooted in the history of maritime transportation, and the first shipping conferences, covering the routes between UK and Calcutta, date back to 1875. By joining carrier agreements, shipping companies retain their jurisdicial independence, but consent to common practices with the other members regarding pricing, traffic distribution and/or vessel capacity utilisation. Examples of carrier agreements that were recognised in US regulation by the end of 1998 were conference agreements, co-operative working agreements, joint services agreements, pooling

agreements, space charter agreements, and transshipment agreements (Fink, Mattoo and Neagu: 2000).

Conference agreements are made between two or more ocean common carriers, and provide for the fixing of and adherence to uniform tariff rates, conditions of service, etc. among them. Conferences are the most widespread type of rate-binding agreement. In the US, conferences are required by law not to restrict the entry and exit of any shipping company. Therefore, shipping conferences in the US foreign trades are "open", while those covering other routes may be closed to outside carriers (Levitt: 2000). Co-operative working agreements are defined in the US Shipping Act of 1984 as agreements, which establish exclusive, preferential, or co-operative working relationships, but which do not fall precisely within the arrangements of any specifically defined agreement. Only some of the carrier agreements have a rate-binding clause, i.e. they declare that they engage in unique price setting for transport services provided by all members.

The high incidence of conferences and other types of carrier agreements in maritime transport is due to the fact that the US, the European Union (EU) and many other countries exempt shipping conferences from antitrust regulation on the ground that they provide price stability and limit uncertainty regarding available tonnage (Francois and Wooton: 1999). The exemption from antitrust law is compounded by the Federal Maritime Commission's (FMC) role in helping police price-fixing arrangements. In recent years, there has been an erosion in the power of conferences for two reasons. The first is the entrance in the market of strong and efficient outside shipping companies.

Containerisation and other technological progresses have made it possible for outsiders to supply the same services as the conferences at lower costs to consumers. A second development is the change in regulations affecting international shipping, notably the United States' Ocean Shipping Reform Act (OSRA) of 1998, amending the Shipping Act on 1984, entered into force in May 1999. While preserving the antitrust immunity of the rate-setting conference system, OSRA allows for the confidentiality of key terms (prices are included in this category) in contracts between shippers and carriers. This amendment is bound to create greater scope for price competition (Fink, Mattoo, Neagu: 2000).

In response to these developments, two types of arrangements have begun to emerge. First, shipping lines now sometimes enter "discussion agreements". These allow conference and non-conference carriers serving a particular trade lane to discuss and share information about rates, costs, capacity, and service. The members may adopt voluntary rate, capacity, and service guidelines. Another recent tendency is for shipping companies and conferences to enter more wide-ranging organisations, such as consortia, alliances and global alliances. Some major shipping lines such as P & O Nedlloyd also control international terminal networks. This is done to streamline their service offering and to ensure quick turnaround times.

The effect of containerisation on the liner trade is larger than that implied by the size and growth of the container ship fleet. Total seaborne container carrying capacity during 2001 rose by 0.63 million twenty foot equivalent units (TEUs) to 7.41 million TEUs – an increase of 9.2%. Container ships increased their share of this total from 68.9% to 71.4%

at the beginning of 2002, for a total of 5.3 million TEUs. The share of general cargo ships reached almost 20%. Single-deck vessels accounted for 0.81 million TEUs (about 11%) while multi-deck ships added 0.66 million TEUs (about 8.9%). During the year, single-deck tonnage increased 4% while multi-deck tonnage actually decreased 5.4%. During 2001, the number of vessels engaged in the North-South trades increased from 549 to 579. These trades link Africa, Australia–New Zealand and Latin America with the major east-west routes running along the northern hemisphere. More significant is the fact that the size of these vessels is increasing. The number of vessels with capacity of more than 2,500 TEUs increased from 50 to 83 and the number of those in the range 1,500–2,499 TEUs increased from 320 to 344. Conversely, the number of vessels in the range 1,000–1,499 TEUs decreased from 179 to 152 (Maritime Transport Review 2002).

As mentioned earlier, the global container trade is anticipated to grow by about 6%-7% annually over the coming decade. These rates of growth appear extremely promising. However, history suggests that supply nearly always exceeds demand and rates are, therefore, expected to remain under pressure (see table 4).

Table 4: Forecast Global Supply/Demand Balance and Average Revenue/Teu

	Estimated Effective Capacity* ('000 teu)	% Change	Net Cargo Slot Moves ('000 teu)	% Change	Moves per Effective Slot	Supply/ Demand Index**	Weighted Average Revenue/ Teu	% Change
2000	6,044	11.2%	92,921	12.5%	15.37	95.8	1,420	2.5%
2001	6,425	6.3%	95,879	3.2%	14.92	92.9	1,267	-10.8%
2002	7,093	10.4%	103,931	8.4%	14.65	91.3	1,165	-8.1%
2003	7,543	6.3%	109,569	5.4%	14.53	90.5	1,140	-2.1%

* After adjustments for market factors (i.e. box supply, differential vessel productivity, deadweight/slot ratio, vessel routing factors, vessel speed and port productivity).

** Index 1980 = 100.

Source: Drewry Shipping Consultants Ltd

Liner shipping is characterised by a unique set of economic and political features which, taken together, can produce unstable cycles with respect to both rates and space availability.

These characteristics include:

- High fixed costs to operate a regular service.
- Relatively inelastic demand for services (meaning that rate reductions very rarely can increase the market demand or the aggregate quantity demanded in the market for services). In the case of most commodities, industry rate reductions do not induce additional volumes and associated revenues.
- Significant mismatches in demand arising from chronic bi-directional trade imbalances (import and export volumes often differ widely) and significant fluctuations in demand.
- Inelastic supply (carriers must maintain supply at constant levels sufficient to meet peak demand, yet are very limited in their ability to rapidly "flex" supply because of their large fixed sunk costs and the nature of the liner shipping which requires regular service and strings of vessels that call numerous different ports in a single voyage). This argument is mitigated to some extent by the significantly larger role now played by the liner operators in the charter market. It is now far easier than before for an operator to "flex" supply (except in the case of mega ships).

- "Lumpy" supply (capacity must be added or withdrawn in large units – namely entire strings of vessels, unlike a railroad which can add or subtract cars from a train based on variation in demand).
- No regulatory barriers to new entry or capacity expansion.
- Distortive government subsidisation of shipping and shipbuilding (World Shipping Council: 2001).

While other industries may share with liner shipping one or even several of these characteristics, a combination of all of them is unique and produces an industry that is subject to chronic market instability.

The complex operation and management of container systems encompassing different types and sizes of ships and their containers, sea and inland terminals and inland transport networks require considerable skill and flexibility. The constant adaptation of transport activities to serve the large number of customers making use of liner shipping services having different and changing trading needs is transforming sea carriers and transport operators into logistics operators better attuned to the needs of the trade.

With the increase in global liner shipping, carriers have sought efficiency in ports to maximise revenue. In order to achieve cost efficiency, ship owners require their vessels to spend more time delivering cargo than waiting to load/unload cargo. Ports have had to compete for business from other ports never previously considered as a competitor. For example, Felixstowe in the United Kingdom (UK) competes with Rotterdam in the

Netherlands for transshipment cargo from the liner shipping companies looking at a one-stop European port. Liner shipping companies want to be able to offer a global service. This global service involves large ships covering large distances with few stops. This leads to an increase in transshipment cargoes thus making the port a place of temporary storage or logistical center for onward transportation (IAME Panama: 2000). This phenomenon has led to the hub and spoke operations that are now evident in shipping patterns.

2.5. THE PRODUCTION OF THE PORT SERVICE

There is no single thing that could be adequately described by the mere word 'port' and no two ports are alike. A port could be from a small sheltered patch of sea that protects fishermen from the roughness of the sea, allowing them to moor their boats and trade their wares in safety somewhere in the South Pacific, to the huge industrial complex of the city-port of Rotterdam, embracing in its expanse hundreds of companies, roads, railway lines, distribution centres, refineries and other industrial and manufacturing activity.

Regardless of how it is developed and organised, however, a port's main function is to enable, hopefully in a safe and cost effective manner, the transfer of goods from sea to shore and *vice versa* (Goss: 1990). As such, a port is an interface between sea and land; a node in a transport chain; a point where goods change mode of transport. Cargo handling is thus a port's core business. In order to do this, a port has to organise a large array of

other services, all equally important in the facilitation of cargo transfers: it has to provide (dredge) sea channels and turning basins of adequate depth (draft) to enable the approach and manoeuvres of vessels; navigational aids, breakwaters, pilots, tugs and linesmen to allow vessels to moor and unload safely; equipment to handle goods in port and move them around; warehouses to store them until they are picked up by their owners; electricity; water; security; customs; administrative offices and many more.

Port competition is of a very complex nature that has changed considerably since the introduction of multimodal transport. Often there is no longer a direct transactional relationship between a customer and a port, as expenses are matters that are under the control of the shipowner. Shippers need not be interested in a specific port or its handling capabilities as the multimodal transporter relieves them of this concern by providing a door-to-door service. The port has simply become a point transited on the way to a final destination. Although the total distribution costs affect the shipowners' choice of ports, their decisions are based upon providing a door-to-door service rather than port-to-port (De Langer: 1999).

Possible savings in inland transportation costs induce container carriers to seek economies of scale in the inland movements of containers by concentrating the traffic to a limited number of ports, which have superior access to major inland transportation corridors. The conclusion is that containerisation, port concentration and intermodality having reached a high operational and technical stage and have brought a significant change in marketing structure and hinterland relations (Hayuth: 1982).

2.6. MEASURING PORT PERFORMANCE

Understanding performance is a concept fundamental to any business, whether it is the measuring of achievements against set goals and objectives or against the competition. Ports are no exception and it is only by comparison that its performance can be evaluated. Ports are, however, a complex business with many different sources of inputs and outputs, which makes direct comparison among apparently homogeneous ports seem difficult.

In public ports, expressions of port performance are based on data recorded by port authorities, which traditionally tend to focus on traffic recordings and parameters used in tariffing of port services. Most available and reliable data are related to the maritime interface where information is more easily collected than on the land interface. Port Authorities usually monitor berth occupancy and dwelling time of ships, characteristics of calls, performance of ship-to-shore cargo handling and availability of the main pieces of handling equipment. Additional, but often less reliable data, may be available as regards landward operations: dwelling time of cargo in ports' warehouses and storage areas, characteristics of customs and other administrative procedures and, rarely, performance of handling for pick-up and delivery of goods. These indicators are often used to forecast port productivity and assess future capacity. Computerised simulation systems can give accurate estimates of berth capacity and ships' waiting time. Various statistical programs designed for all-purpose process modeling or specialised in transportation and port logistics may be used.

These expressions of performance display mainly a technical capacity. But shippers and ship-owners have additional requirements; they are also looking for:

- reliability: a steady and predictable performance adapted to shipping lines' schedules;
- cost: a high performance at a competitive and predictable cost;
- quality: no overage, no wastage or pilferage or any damage registered during handling and storage operations. Progressively, producers and transporters have to comply with international standards (ISO 9000 or equivalent) and get their process certified; ports, at least those operating in a competitive environment, have to catch up with this trend;
- adaptability: a capacity to listen to their problems and needs, negotiate and propose solutions (Fourgeaud: 2000).

A port is also a link in the transport chain and, of course, similar requirements apply as regards capacity, performance and quality of connections with short-sea and feeder shipping lines, and with inland transportation networks: road, rail, barges. High performance is observed in private terminals and poorest performance is often associated with ports run by public Port Authorities, still in charge of cargo handling and maintenance of equipment. Beyond such a statement, explaining a poor or a good performance may require a more thorough analysis.

Exceptionally high performances occur when all parameters concur positively: as far as containers are concerned, the typical high-performing terminal is dedicated to one or a few shipping lines and privately run, processes regular and well timed calls of large ships,

with economies of scale allowing it to be geared with the most high-performing gantry cranes, and handles shipments representing the major part of the ship capacity. Similar parameters can be mentioned in the case of bulk (freighted) traffic.

Conversely, in poor performing ports, many causes, often interrelated, may be mentioned:

- Physical characteristics, mainly nautical access: dredging backlog and other factors narrowing the access time-slot; land access: ill-maintained pavements, restricted access to land-transportation networks; and port capacity: lack of berths and storage areas, insufficient room for modern ship to shore operations;
- Organisational parameters, related to ships: old ships with narrow hatches, large tween decks, slow moving derricks, spending too long idle time at berth; cargo: ill packaged, non unitised, damaged goods, organisation of lashing-unlashing of containers; handling capacity: unsuitable and ill-maintained handling equipment, poorly trained work force, not enough crane drivers, unsuitable, congested and poorly managed storage areas; organisation: non-productive methods, ill prepared calls, too restricted working time, unwillingness of port operators to work at night, commercial operations interfering with ship-to shore operations, excessive dwelling time of cargo for commercial motives, documentation delays; procedures: lengthy customs and other administrative procedures and controls, corruption. Public port authorities but also other administrations, port operators, ship-owners, and shippers, involved in this process with their own objectives, may be partly responsible for these shortcomings (Fourgeaud: 2000).

The various types of port ownership and organisational structures that exist throughout the world further complicate the subject. During the last two decades in many countries the ownership of one of the most important trade entry points into any country, the seaport, has changed from being solely in the hands of national or local governments into, either wholly or partially, private hands.

2.7. PRIVATISATION

Privatisation is a concept rather than an actual definable process. The word came into being during the late 1960s and was later attributed to the UK government's reforms to ownership and operation of numerous companies managed by the state. Chapman (1990) has accredited Drucker (1969) as the author of the word 'privatisation', in its American spelling. The actual process of implementing privatisation is not, however, a new concept. Neither can it be said to have originated in the United Kingdom (UK). It was rather a christening of an established process, a renaissance of an earlier idea on the ownership and management of a company.

Privatisation refers strictly speaking to ownership, but it is a word that has come to be used to cover a range of different policy proposals. At least three different strands of privatisation may be distinguished:

- There is a policy of liberalisation or deregulation where certain activities, which were either reserved to state monopoly or were subject to restricted entry, are opened to competition from the private sector.

- There is a policy of contracting out where services previously provided within the public sector are offered for tender to the private sector.
- There is a transfer of ownership of assets from the public to the private sector. This is the best-known form of privatisation and involves the sale or partial sale of state enterprises to the private sector, normally in the form of a share flotation.

2.7.1. ADVANTAGES OF PRIVATISATION

Privatisation in developing countries is often the first phase in a process of industrial liberalisation and a move towards industrial progression (IAME Panama: 2002). Viewed as this first step towards creating free trade it has therefore not surprisingly been a high priority for developing countries. It begins with the transfer of absolute control of industry away from the government to private partners with particular expertise. The reasons for this change are numerous but can be summarised as follows:

- improvements in efficiency through private sector management skills;
- enhancement of service quality through improved commercial responsiveness;
- reduction in the fiscal burden of loss-making state enterprises or the need for the future subsidy;
- a reduction in fiscal demands on central and local government through access to private sector capital; and
- additional revenue streams (Port Development International: 1999).

Figure 3 in essence sums up the total benefits of privatisation to the economy at large. Cass (1996) in his study of world port privatisation concluded that there were only really three types of port ownership, public, private or joint public/private. He points out that the most common type of port privatisation are (1) the sale of operating concessions, (2) joint public/private ventures, (3) private orientated but port authority controlled operating subsidiaries, (4) the 'corporatisation' of government port agencies or (5) the dissolution of government owned cargo-handling monopolies. The 'lock, stock and barrel' approach of Great Britain and New Zealand are exceptions.

2.7.2. THE DISADVANTAGES OF PRIVATISATION

A World Bank report in 1998 stated: "The performance of State-Owned Enterprises (SOE) can be improved without changing ownership, but evidence from both developed and developing countries shows that on average good performance has been difficult to implement and even harder to sustain."

The hoped-for benefits of privatisation do not always occur in practice. Most of the perceived benefits derive from increased competitive pressures to be found in the private sector. In many cases privatisation has meant the replacement of a public with a private monopoly. Newly-privatised firms have been able to charge higher prices leading to super-normal profits and high dividend payments for shareholders. Such prices have often been higher than would have been charged in the public sector due to the absence of state regulation of prices. Privatised companies are often natural monopolies, for example

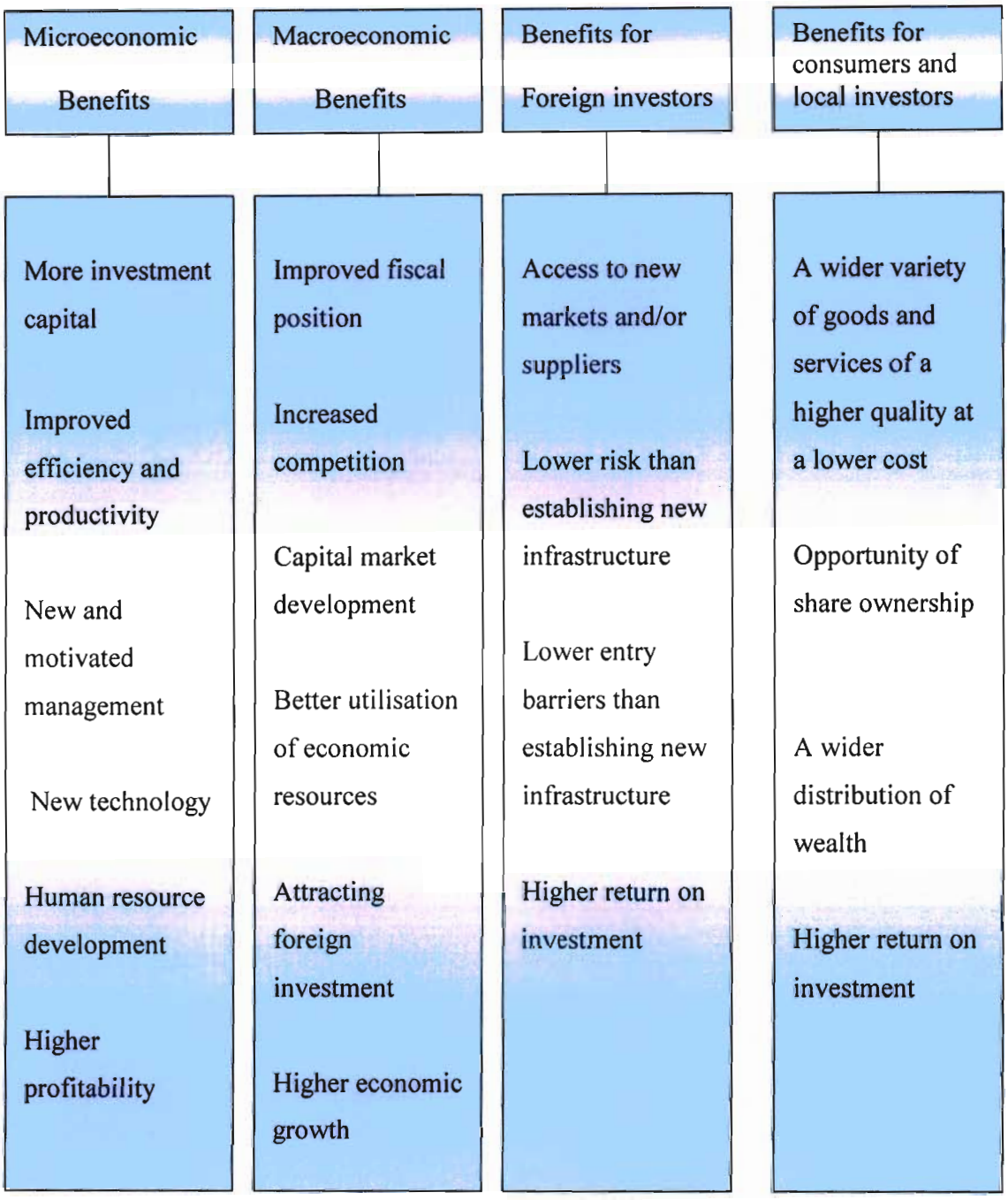


Figure 3: Potential benefits of privatisation

Source: Du Toit-Structure of the South African Economy, 1999

the public utilities, and as such, need to be large in order to gain the available economies of scale. This tendency towards natural monopoly impinges on the benefits to be derived from competition and can negate any improvements in resource allocation hoped for from privatisation. Ports are 'pawns in the game' of what is in fact a 'global transportation system'. Shipping lines have the power to influence port development policies and contribute to '...the plight of public monopoly ports in a highly competitive environment' (Slack: 1993).

The gains from privatisation may also be checked by the social responsibilities, which formed part of the remit of the previous state monopolies. They often have to adopt non-profit maximizing behaviour in order to continue to meet social obligations such as the need to run unprofitable rural railways and postal services. Elements of cross-subsidisation, therefore, remain within their pricing strategy, which again prevents a completely efficient use of their resources.

Finally, the government may not always gain by the sell-off of state assets. The revenue from privatisation is a once only addition to government finances, whereas the profits of the newly privatised concerns are no longer available to finance public expenditure. Future taxation levels may, therefore, need to be higher or future public expenditure plans reduced. The government will also not be able to use privatised concerns as a way of conducting economic policy. For example, they will not be able to hold down public utilities' prices to check inflation or direct their production plans to boost investment or reduce imports. Instruments for macroeconomic policy can, therefore, be constrained

following a programme of privatisation and this may reduce the efficiency of the way the economy is run.

However, the longer-term view that it creates efficiency; profitability and growth are not issues that are considered by those faced with the prospect of redundancy. But SOEs are under considerable pressure to perform against a backdrop falling tariffs and increased trade liberalisations. For this reason, governments deem it fit to let private enterprise operate and manage firms while they facilitate trade and policy implementation.

CHAPTER THREE

3.1. TRADE REFORM IN SA

The South African government, and the Department of Trade and Industry (DTI) in particular, have embarked on a policy framework in order to ensure that the South African economy becomes competitive. In an increasingly traded global economy, it is recognised that national economic welfare will be enhanced by both greater efficiency, brought about by liberalisation, and the need to enhance SA's exports in the world economy.

The State of Trade Policy in SA aims to develop a rigorous approach to the analysis of trade reform and the impact it has had on aspects of SA's economy, namely the overall macro-economy, export behaviour, labour markets, resource allocation and growth.

3.2. WHY TRADE REFORM IN SA?

The South African economy has undergone a gradual process of trade reform in the last two decades; trade reform is necessary in order to ensure that the economy becomes more efficient. At the most basic level, trade reform is seen as the key to efficient resource allocation. Indeed, a growing body of literature (TIPS: 2002) shows that trade reform is more important in terms of its distributional effects than it is directly on growth; the main reason for this being that resources are re-allocated from one sector to another as the economy is opened up to international competition.

A useful starting point would be to place the parameters of SA's trade regime in perspective in order to precisely determine the level and configuration of protection currently prevailing in the economy. More important is the development of a rigorous approach to the analysis of the impact of trade policy reform so far on the following aspects of SA's economy: the overall macro-economy; labour markets; export behaviour; and economic growth. The basic logic behind trade liberalisation is as follows: reduction of import protection reduces the anti-export bias and enables resources to flow from poorly competitive sectors to sectors with a comparative advantage.

Is this happening in the South African economy? To what extent is this efficiency and allocative effect dependent on other factors such as transport logistics, the mobility of labour market and other factors? Moreover, the impact of trade liberalisation on the economy remains a contentious issue. Although there is no easily identifiable impact, what is clear is that the rationale for liberalisation is based on the fact that major inefficiencies exist in the economy and trade reform, along with a series of accompanying measures, can play a critical role in spurring growth, albeit indirectly.

A particularly complex problem that researchers face is how best to disentangle the impact of tariff liberalisation, specifically, from a range of other factors such as exchange rate movements, transport logistics, growth rates in importer and exporter countries and other factors. SA is classified as an upper middle-income developing country, and GDP (at market prices) at the end of 2000 was worth R874 billion, at current prices. Real GDP

has grown annually by approximately 2.6% between 1995-2000 (SA Reserve Bank: 2001).

The issue that will be pursued is the transport logistics factor mainly within the port domain.

3.3. THE TRANSPORT SECTOR IN SA

"*The world that we have made as a result of the level of thinking we have done thus far creates problems that we cannot solve at the same level as they were created*"(Albert Einstein).

The principal economic goal of a nation, like SA, is to provide a high and rising standard of living for its citizens. This goal depends on the nation's ability to achieve high and rising levels of capital, labour and management productivity in the activities it performs. Sustained productivity growth requires that the economy continually upgrade itself, by improving productivity in existing activities, moving into higher productivity segments of the industries in which it currently competes, and entering entirely new industries that offer the prospects for high productivity.

As a result of changes in the political context that have opened SA to the world, economic reality for SA has evolved dramatically in the last few years. For the first time in decades, SA has been exposed to the forces of globalisation and, as a result, has become far more linked into patterns occurring in the larger global economy. This

manifests itself in nearly every aspect of the economy, from currency valuation to transport technologies. Globalisation encompasses four particular phenomena, among others, that are especially relevant to SA's transport sector, given the role of transport as the key facilitator of international trade:

- Falling tariff barriers to international trade,
- Diminishing non-tariff barriers to trade,
- Reintegration into the global economy,
- Changes in the South African economy.

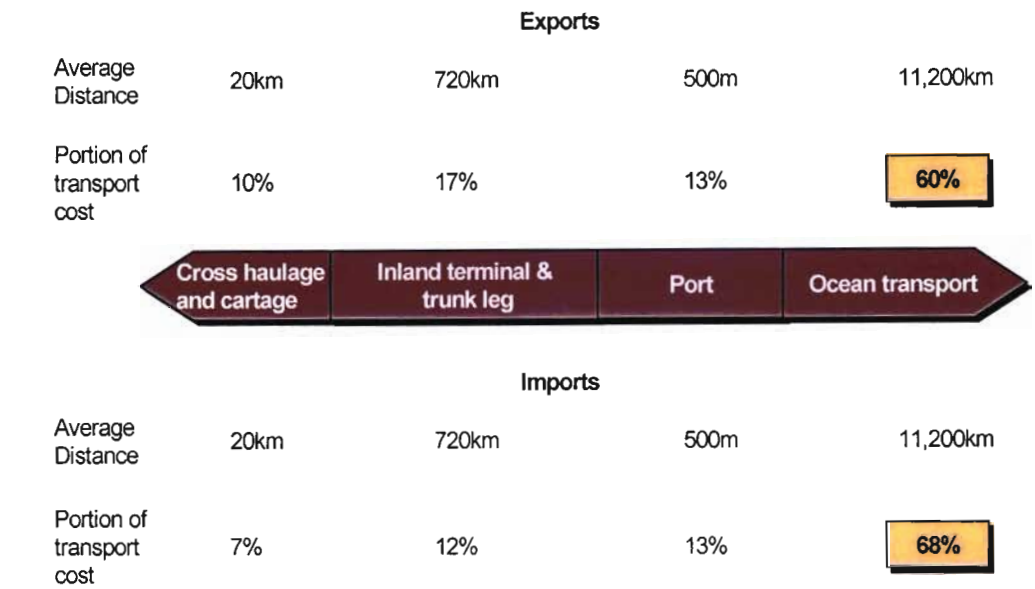
These factors create new and challenging circumstances for the transport sector.

Classic macroeconomic theory suggests that productive infrastructure, including transport assets, is one of several key preconditions for national economic growth (*Moving America*, US Department of Transportation, 1990). The theory holds that by investing in assets like bridges, roads, ports, or even telephone lines, a nation can structure development by reducing transport and communications costs, thereby facilitating further trade and creation of wealth. Indeed, transport is generally seen as an engine of growth and a guarantor of national integration, both internally and with the external global economy.

The ocean freight portion of the containerised transport chain accounts for 83% of the travel time and 60%-68% of the cost of shipping. This is driven principally by an average distance of over 11,000 km from international markets. In comparison, inland

transport requires only 11% of total travel time and 19%-27% of costs, as demonstrated in Figure 4 [Moving SA Policy Document (MSA): 1999].

Figure 4: Distribution of Transport Costs Along the Value Chain



Note: Based on case studies
Source: Industry interviews, Portnet, Spoornet, MSA Analysis

Thus, the majority of the system costs and transit time occur in the maritime portion of international container trade. Given the competitiveness of the international ocean freight business, there are three cost drivers available to manage the costs of containerised ocean freight: number of stops per ship, distance travelled per ship, and size of ship. The container industry is in dynamic change. Changes in container ship line dynamics include:

- **Reduction in port calls** - the continuing increase in average vessel sizes is leading to a stagnation, and even reduction, in the absolute number of ship calls at

main container ports, in spite of continued strong growth in liner shipping volumes;

- **Shrinking customer base** - slot charters, alliances and mergers and acquisitions are all reducing the number of commercial entities calling at ports;
- **Hub ports** - selected hub ports are winning important roles as connection and relay points;
- **Fierce pressure on prices** – (see table 4 i.e. falling weighted average revenue/teu from 2000-2003) container ocean freight rates will continue to fall, further squeezing the already thin margins, which will put pressure on ports to reduce rates.

Another reason to consolidate at fewer ports is to enable ship lines to operate fewer small ships and more large ships, which have substantially lower operating costs per TEU due to much better economies of scale (MSA: 1999).

Some of the benefits in the increase in vessel size would be offset by two factors: volume growth could lead to increased frequency, and hence continued use of small vessels. Also, smaller ships serving niche markets would somewhat dilute the full increase in vessel size. This growth in container ship size could also affect requirements for port navigation channels, terminal infrastructure, and service levels, although these depend on maximum vessel size, not average vessel size. Random vessel arrivals and low levels of capital funding are the key system-level forces influencing poor performance, but there are also substantial operating inefficiencies at the firm level. These inefficiencies include

structural concerns like terminal configurations, and operational issues such as low crane productivity, low crane intensity, inefficient links between customers agents and ship lines, and constraints on systems and equipment. Substantial improvement will require a concerted effort by ship lines, ports, and infrastructure investors. Consolidation would also assist in lowering transit times by reducing ports of call (MSA: 1999).

3.4. COMMERCIAL PORTS POLICY

"Today, globalisation pressures make it essential that nations integrate their transport systems into the global logistics network. Ports are naturally being incorporated into this changing system and have to adjust to the new challenges and environment. Government recognises the strategic value of the commercial ports system in SA, in the context of international trade initiatives and the changing global transport environment. It is for this reason that it needed to formulate this policy in support of the efforts to improve the functioning of commercial ports" (Commercial Ports Policy: 2002).

Ports are integrated and crucial nodal points in a transport system, and play a strategic role in the country's economic growth and social development. By being part of the transport network, port activity facilitates the meeting of the demand of the international market with means of production available in the country. In other words, the ports system, by virtue of being a set of nodal points in the transport system, facilitates trade, which in turn fosters greater national economic activity. To maximise these benefits, the

aspects of efficiency and effective management have to be introduced to the transport system.

"Government implemented the first stages of port reform with the establishment of the National Ports Authority of SA (NPA) and the National Ports Operations Division (NPOD) in 2001. It has since become clear that the economic impact of Durban's inefficiencies need urgent attention. Thus, we aim to fast-track the inclusion of the private sector in the operations of the Durban Container Terminal whilst the land and port estate remains under state ownership" (Minister of Public Enterprises, Jeff Radebe, MP: 2000).

Note: the National Ports Operations Division is now called the South African Port Operations (SAPO).

3.5. PORT OF DURBAN

3.5.1. INTRODUCTION

"*A port is the lifeblood of a city and also acts as an economic barometer. (...) A port is also a kaleidoscope of events, characters and legends – a richer history one cannot find*" (Port Manager, Port of Durban, in: Pearson, 1995).

The port of Durban is the largest port in Southern Africa. Due to the good infrastructural facilities (road and rail) and reliable service position, it also functions as a container hub for countries such as Mozambique and Zimbabwe, which border on SA to the North. The

port entrance channel has a depth of 12,8 meters below chart datum and an entrance width of 122 meters. The water surface covers 892 hectares at high tide and 679 hectares at low tide. The distance around the port is 12 kilometers with the total land and water area covering 1854 hectares.

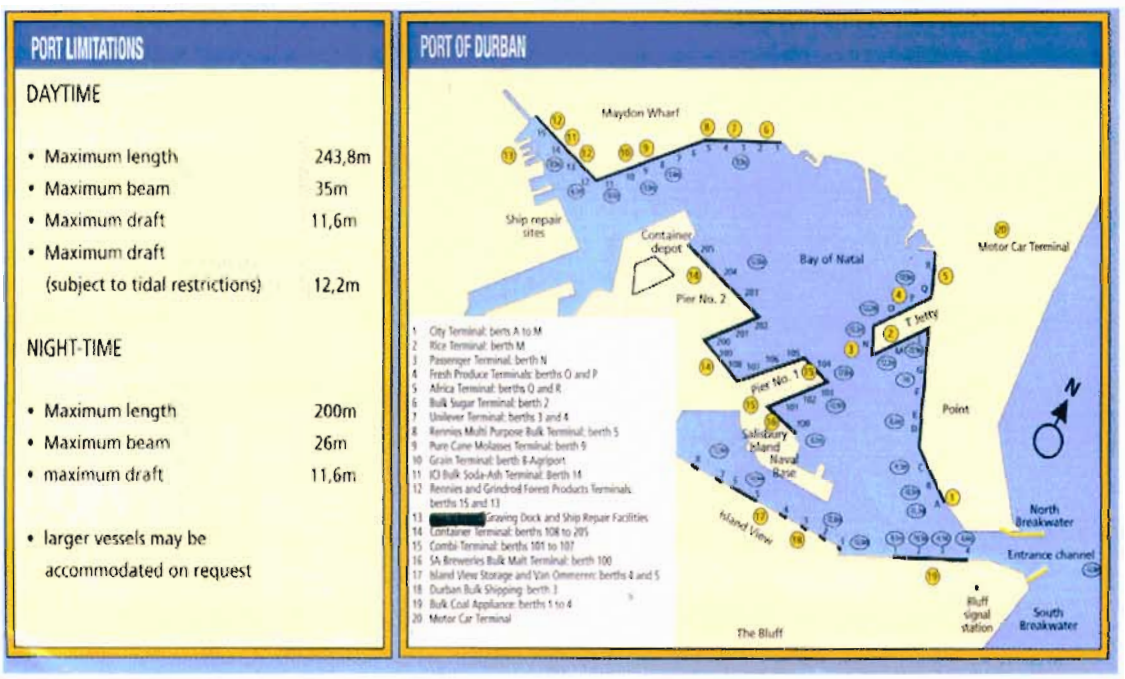


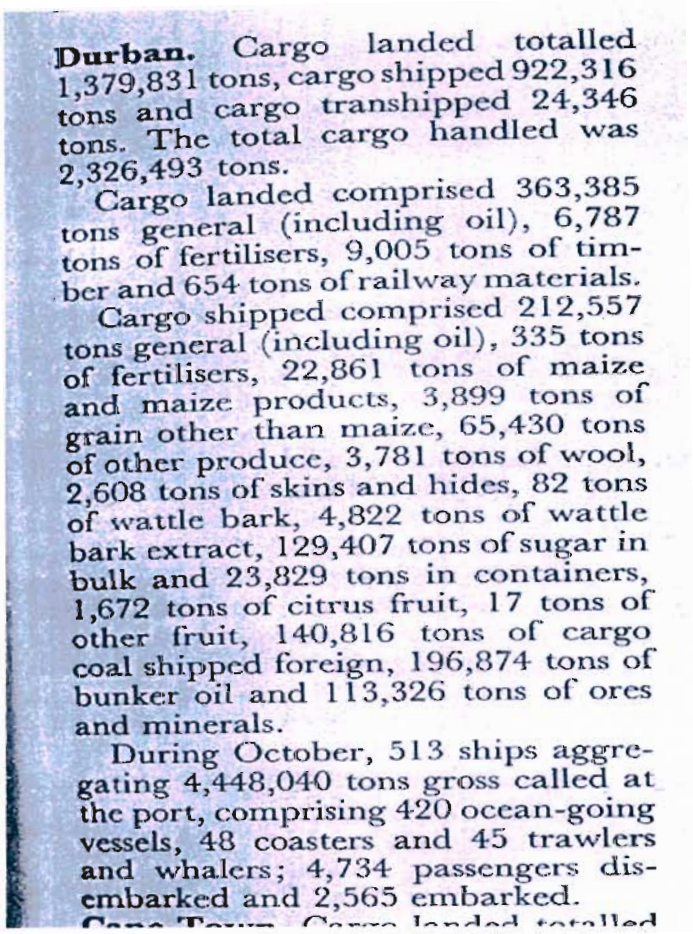
Figure 5: The layout of the Port of Durban

Source: NPA Public Relations Department

Apart from being Africa's largest general cargo and container port, Durban offers shippers and shipowners a full range of berthing, cargo handling, and repair, victualling and bunker facilities (see figure 5).

3.5.2. CHANGING TRAFFIC BASE FOR THE PORT.

Figure six highlights the port traffic for October 1969. This was before the containerisation revolution and the main cargoes were general cargoes and oil as indicated below.



Durban. Cargo landed totalled 1,379,831 tons, cargo shipped 922,316 tons and cargo transhipped 24,346 tons. The total cargo handled was 2,326,493 tons.

Cargo landed comprised 363,385 tons general (including oil), 6,787 tons of fertilisers, 9,005 tons of timber and 654 tons of railway materials.

Cargo shipped comprised 212,557 tons general (including oil), 335 tons of fertilisers, 22,861 tons of maize and maize products, 3,899 tons of grain other than maize, 65,430 tons of other produce, 3,781 tons of wool, 2,608 tons of skins and hides, 82 tons of wattle bark, 4,822 tons of wattle bark extract, 129,407 tons of sugar in bulk and 23,829 tons in containers, 1,672 tons of citrus fruit, 17 tons of other fruit, 140,816 tons of cargo coal shipped foreign, 196,874 tons of bunker oil and 113,326 tons of ores and minerals.

During October, 513 ships aggregating 4,448,040 tons gross called at the port, comprising 420 ocean-going vessels, 48 coasters and 45 trawlers and whalers; 4,734 passengers disembarked and 2,565 embarked.

Figure 6: Port traffic for the Port of Durban in October 1969.

Source: The South African Shipping News and Fishing Industry Review-January 1970.

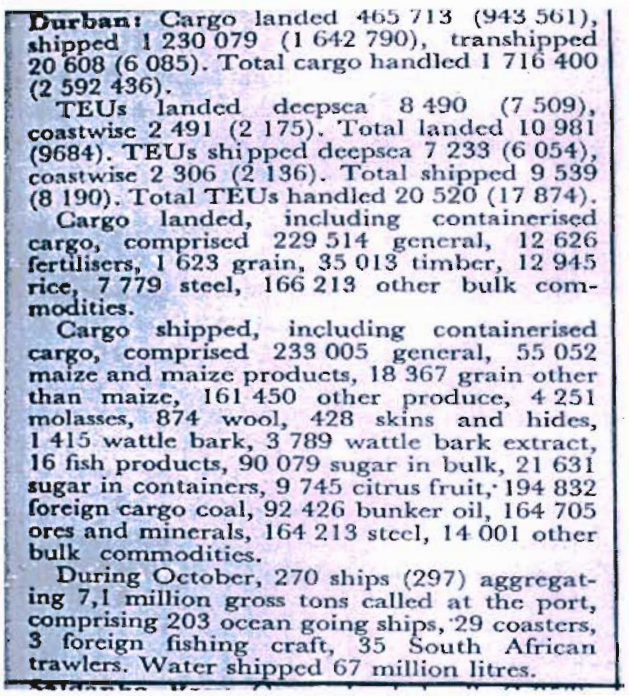
In October 1970, Prof. W.F.S. Steenkamp released a report on Containerisation via the Ministers of Economic Affairs and Transport. It was projected that by 1975 about 2.6

million harbour tons (or 30%) of imports and 3.1 million harbour tons (or 16%) of exports would be economically containerisable. On these findings, assuming two container harbours and three main depots as well five container ships carrying 1600 20 foot containers were needed, the investment in ships and various facilities needed in SA would total around R110 million made up of:

Five ships		60
Containers		27
Trailers, clip-on refrigerator units and alternators		1.6
Container Terminals		6.4
Depots at Durban, Capetown and inland		5
Facilities at Port Elizabeth and East London		1.8
Wool facilities		1.2
Miscellaneous requirements		4.6
Total	R millions	107.6

Source: SA Shipping News, 1970

It is clearly evident from the above report that as early as 1970, the South African government saw the potential of containerisation. By the third quarter of 1977, container ships started to operate between SA and the UK/Northwest Continent. Figure seven shows the changing port traffic by October 1979.



Durban: Cargo landed 465 713 (943 561), shipped 1 230 079 (1 642 790), transhipped 20 608 (6 085). Total cargo handled 1 716 400 (2 592 436).

TEUs landed deepsea 8 490 (7 509), coastwise 2 491 (2 175). Total landed 10 981 (9684). TEUs shipped deepsea 7 233 (6 054), coastwise 2 306 (2 136). Total shipped 9 539 (8 190). Total TEUs handled 20 520 (17 874).

Cargo landed, including containerised cargo, comprised 229 514 general, 12 626 fertilisers, 1 623 grain, 35 013 timber, 12 945 rice, 7 779 steel, 166 213 other bulk commodities.

Cargo shipped, including containerised cargo, comprised 233 005 general, 55 052 maize and maize products, 18 367 grain other than maize, 161 450 other produce, 4 251 molasses, 874 wool, 428 skins and hides, 1 415 wattle bark, 3 789 wattle bark extract, 16 fish products, 90 079 sugar in bulk, 21 631 sugar in containers, 9 745 citrus fruit, 194 832 foreign cargo coal, 92 426 bunker oil, 164 705 ores and minerals, 164 213 steel, 14 001 other bulk commodities.

During October, 270 ships (297) aggregating 7,1 million gross tons called at the port, comprising 203 ocean going ships, 29 coasters, 3 foreign fishing craft, 35 South African trawlers. Water shipped 67 million litres.

Figure 7: Port traffic for the Port of Durban in October 1979.

Source: The South African Shipping News and Fishing Industry Review Jan-1980.

Today, the Port of Durban is the clear African leader in total container throughput. In the world port league for 2000 established by Containerisation International Yearbook 2001, Durban was in 44th position (see table 5 below). The world ranking and the African ranking are over the last three years from 2000. Clearly the Port of Durban far exceeds other African ports in the number of containers handled. It is also interesting to note that SA has three ports in the top 10 of the African ranking table. However by world standards, all African ports lag behind in the world ranking.

World ranking	African ranking	Port	Country	1997	1998	1999	2000
40/52/44	1/1/1	Durban	South Africa	941 733	1 079 692	969 085	1 291 100
69/71/74	2/2/2	Alexandria	Egypt	397 327	515 963	628 724	601 987
116/80/75	5/4/3	Damietta	Egypt	606 973	309 008	432 329	583 060
122/100/83	6/5/4	Port Said	Egypt	415 694	269 915	410 728	527 596
115/91/89	3/3/5	Abidjan	Côte d'Ivoire	416 100	468 727	463 835	434 654
109/116/95	4/6/6	Cape Town	South Africa	316 383	329 428	331 766	394 913
134/125/104	8/7/7	Casablanca	Morocco	210 687	245 382	280 982	311 695
146/136/107	9/8/8	Port Elizabeth	South Africa	188 000	205 134	250 846	242 718
131/139/116	7/9/9	Mombasa	Kenya	230 047	248 451	232 510	236 928
161/151/121	11/12/10	Algiers	Algeria	120 836	162 454	190 325	216 052

Table 5: Container traffic for top ten African ports (twenty foot equivalents- TEUs)

Source: Port and Harbors April 2002 Volume 47 No.3 Page34

Containerised traffic is still limited in many African ports because of several factors such as the structure of the trade, limited investment, inadequate transport facilities and procedures and tariffs that penalise container traffic. Nevertheless, during the last five years, there has been significant growth of container traffic on the whole of the continent, whatever the level of development, and at a higher rate than the world level. Part of this can be attributed to positive economic growth in Africa. In the future, this tendency may be reinforced due to the growing trade and the increasing participation of the private sector in the management and the development of the ports (Ports and Harbors, 2002).

The added volumes of traffic have brought with it a host of problems that many African and South African ports battle with. Some of these inefficiencies namely structural concerns like terminal configurations, and operational issues low crane productivity, low crane intensity, inefficient links between customers agents and ship lines, and constraints on systems and equipment will be briefly explored.

3.5.3. INEFFICIENCIES IN THE DURBAN CONTAINER TERMINAL

3.5.3.1. TERMINAL LAYOUT

It has been argued that the terminal layout has been part of problem resulting in efficiencies at the terminal. The quays are Z-shaped (see figure 8) which makes it difficult to arrange the stacking areas between the various berths. The result of the design also means that the cranes cannot operate using the full length of the quays. This in turn means that cranes cannot be moved around as and when required. Another inefficiency is

that the reefer stacking areas are far removed from the quayside stacks and this causes long travel times when loading and discharging vessels.

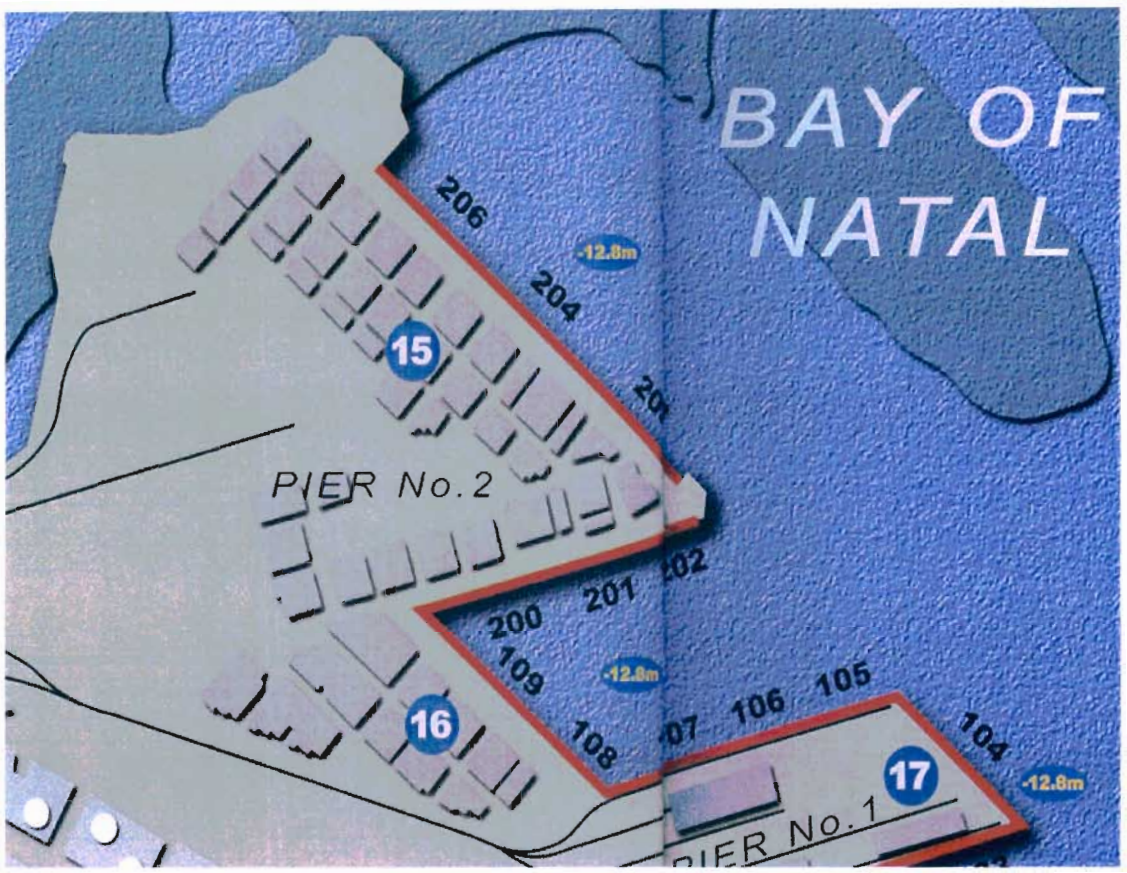


Figure 8: Layout of the Durban Container Terminal.

Source: NPA Public Relations Department

3.5.3.2. AVAILABILITY OF EQUIPMENT.

The following equipment is available at the DCT.

Ship to shore cranes

5 Demag cranes - commissioned around 1977/78 - Safe working load = 40 ton under the spreader.

8 Noell cranes - commissioned around 1992 to 1997 - SWL = 40 ton under the spreader; 65 ton using heavy lift beam.

Rail Transfer cranes

2 Demag cranes - commissioned around 1977/78 - Safe working load = 40 ton under the spreader

1 Morris - commissioned around 1997 - Safe working load = 40 ton under the spreader.

Straddles

25 Noell straddle carriers - commissioned around 1997/98

52 Kalmar straddle carriers - commissioned around 2001 to 2003, 8 to follow in the latter part of 2003.

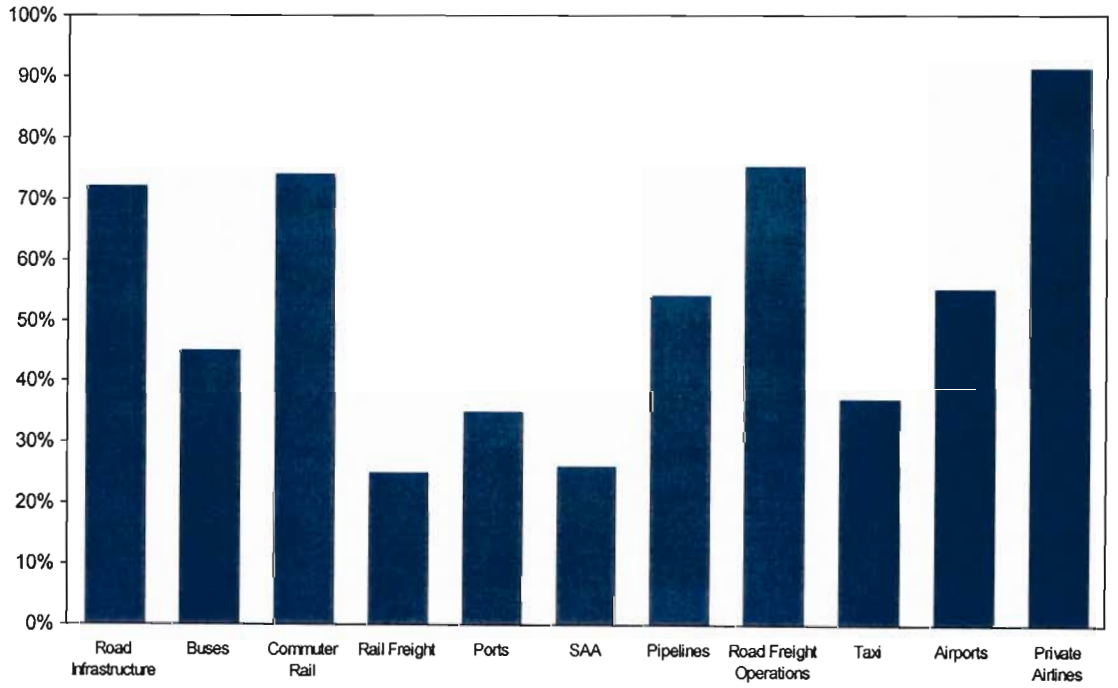
Reach stacker

1 Fantuzzi

What is apparent from the above is that a lot of the equipment is old. Although a renewal programme has started with the straddles, the equipment in use is prone to breakdowns and unforeseen downtime. The cranes in use are also not suited for the newer vessels that now utilize the terminal because of their height restrictions. The Moving SA policy document, 1999 highlights the need for infrastructure upgrades and renewals.

First, and foremost, it is important for meeting customer needs for cost, levels of service, capacity, and modal choice.

Second, sustainability is a necessary condition for upgrading, though it is not sufficient unto itself. Third, transport is a long-term industry – especially reinvestment in infrastructure, which requires advance planning and funding availability. And fourth, loss of one industry could destabilise other parts of the system, creating undesirable effects on customers, system costs, and service levels (MSA: 1999).



Note: 1. Commuter rail reflects estimates for 1998, actual 1994-1997
2. Includes international carriers
Source: MSA Financial Model

Figure 9: Estimated Capital Spending as a Percentage of Long-term Capital Requirements

Figure nine highlights the capital injection required over the long term in order to provide and maintain world-class standards in our service delivery. Although the ports require a lot less capital injection than other transport sectors over the long term, the need to

Box 2: Strategic Actions in Port Infrastructure and Operations

Several key strategic actions emerge in the realm of ports in order to realise the vision of low cost, high reliability, short transit time service in the corridors and on the maritime leg of general cargo import and export. The key steps revolve around promoting the consolidation of higher volumes of container traffic into fewer ports. The highlights of these actions encompass the following:

✓ *Identify which ports are to be the core international container export/import ports of the future.* Also, decide which ports, if any, will serve as feeder ports to the core container ports. This process should be an inclusive one of consultation with ship lines, customers, existing port operators, and other entities co-ordinating ports with the connecting modal infrastructure in the remainder of the corridor.

- *Remove the capacity constraints in the port system and direct infrastructure investments in line with the strategy.* This step encompasses several subsidiary actions, including:
  - ✓ In the short-term, address the causes of vessel delays in Durban;
  - ✓ Undertake a long-term capacity exercise, or revise existing capacity planning in light of the new strategy. Currently, both Durban and Cape Town ports are forecast to experience capacity constraints, but decisions about consolidation will determine the impact of such constraints;
  - ✓ Invest in the expansion of the selected core ports;
  - ✓ Reduce spending in the non-core or feeder ports to basic requirement levels. It is important to keep feeder ports operating smoothly, if they are economically viable, since they form a key link into the core ports. However, capital spending priorities should begin with the core ports;
  - ✓ Stop spending on non-viable ports. Continued investment here will dilute the effectiveness of the rest of the port system.

- *Focus the role of ports.* Allowing ports to be self-sustaining on the basis of their own economics is critical to the ability to upgrade assets and service levels, particularly in entities as capital intensive as ports. The strategy requires three types of focus: among cargo types, among ports, and among origins and destinations.

At a more detailed level, proper signaling can be restored by:

- ✓ Retaining capital for reinvestment within the port
- ✓ Pricing to customers based on operating and capital cost recovery
- ✓ Focusing roles of individual ports by determining which will be core 'east-west' ports, which will be feeders, and which will serve differentiated needs of particular customer segments. The focusing is especially important for containerised general cargo ports.

- *Co-ordinate the ports system and integrate it with other modes.* This action requires both institutional reorganisation and changes in the accompanying regulatory environment. The next step is to consider what institutional form such co-ordination might take.

In all instances, an independent port regulator appears necessary. The key role of the regulator would be to manage the rates of return to the natural monopoly of port infrastructure.

In addition, one possible choice is for ownership to vest in a national port authority (NPA), which would ensure that a number of objectives are more easily and effectively accomplished. In particular, an NPA would allow the co-ordination and control of large infrastructure investments, preventing the squandering of scarce capital for sub-scale operations. Second, an NPA would allow for a co-ordinated level of control of terminals which could be either concessioned or opened to competition. And third, an NPA could ensure that terminals respond not just to customer needs but to national objectives.

- *Improve operational efficiencies.* The responsibility for this falls predominantly to the firms operating in the port environment.

Source: MSA,1999

upgrade infrastructure is imperative. The port system in SA has suffered from a lack of investment over the past few years. Box 2 highlights the government's intention with regard to port infrastructural development.

NPA estimates that over R10 billion a year over the next 10 years is required to upgrade our entire ports infrastructure to an acceptable standard. If current performance and utilisation levels of terminals are maintained, by 2007 the industry will need to have invested almost US$ 14 billion (see table 6) to provide infrastructure to meet the forecast global demand (Drewry Shipping Consultants).

Some of this can be met by filling spare capacity. However, the location and suitability of this capacity are critical. Not all current capacity is of the right nature, or in the right place, and will not get used therefore. This is evident in the Port of Durban where the marsh area near the terminal cannot be drained out and converted into terminal space due to the environmental concerns raised. Also the terminal itself needs to be reconfigured.

	Additional Throughput by 2007 (Million teu p.a.)	Investment Required for Quay, Yard and Cranes (US$ billion)
North America	8.3	1.56
West Europe	14.6	2.1
Far East	38.7	4.44
Se Asia	25.8	2.18
Mid East	4.1	0.48
Latin America	9.7	1.51
Oceania	1.2	0.23
South Asia	5.3	0.69
Africa	2.9	0.47
East Europe	0.8	0.19
World	**111.5**	**13.85**

* *Assuming unchanged terminal performance benchmarks and average utilisation levels.*
Source: Drewry Shipping Consultants Ltd

Table 6: Potential Container Terminal Investment Required by 2007

Source: Drewry Shipping Consultants Ltd

3.5.3.3. VARIATIONS IN EXPORT AND IMPORT LISTS.

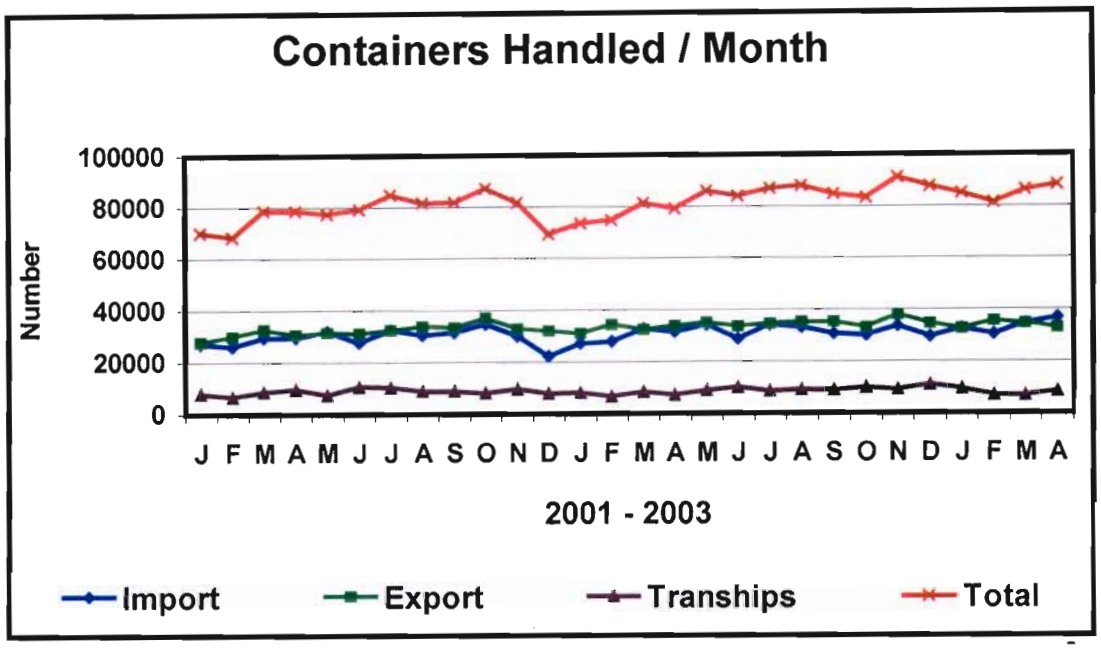


Figure 10: Total number of containers handled at the DCT during 2001-2003

Source: SAPO

The above figure shows the total number of containers that have been handled per month at the terminal over the last two years. The variations in the lists provided (see table 7) make it difficult for the berth planners to plan the loading/discharge of a vessel whilst at the terminal. Table 7 and 8 need to be read in conjunction with each other. This is an actual sample of data collected for the period 30 April to 07 May 2003. Table 7 provides conclusive evidence that the shipping lines/agents are not truthful with their declarations which results in vessel occupying a berth for longer than is planned for. Another interesting feature that we can extract from table 7 is the vessel arrival times. Here again, there is a discrepancy between the actual arrival time verses the estimated time of arrival

Table 7: Declared/Actual vessel containers landed/loaded between 30/04-07/05/2003

VESSEL	DIFF 7 DAY & ACT ETA (Hrs)	DISCH	LOAD	DIFF - 3 DAY & ACT ETA (Hrs)	DISCH	LOAD	CONT / S.W.H.	REQ TURN	ACT TURN	discharge discrepant	load discrepant	total discrepant
L.T. TRIESTE	0.2	3%	30%	0.2	0%	30%	30.7	36.2	30.8	28	31	59
L.T. GIANT	28.7	2%	6%	9.8	0%	7%	39.5	29.4	28.6	15	21	36
EVER GENIUS	1.0	1%	56%	1.0	0%	43%	23.3	26.8	29.9	2	647	649
CIMBRIA	1.8	1%	0%	1.8	1%	0%	18.5	11.7	9.5	1	58	59
CIMBRIA	22.3	0%	26%	22.3	0%	26%	34.3	11.3	4.8	0	31	31
ENGIADINA	1.0	8%	79%	0.0	0%	67%	30.8	38.3	32.8	43	275	318
JOLLY ORO	20.7	4%	21%	20.7	3%	21%	21.6	83.1	44.6	15	118	133
BUNGA TERATAI 3	0.8	1%	26%	0.8	1%	26%	21.7	36.5	65.0	10	180	190
MOL VOLTA*** 105	136.0	42%	3%	136.0	42%	3%	7.0	25.0	94.9	46	17	63
MOL OUEME	67.9	15%	4%	4.4	0%	65%	14.2	32.7	35.9	59	7	66
MSC KERRY	1.0	10%	19%	5.0	-10%	19%	28.4	66.3	100.7	125	302	427
MSC LAURENCE	11.8	1%	28%	11.8	1%	28%	35.3	46.4	58.3	7	249	256
MSC VIETNAM	64.0	54%	9%	64.0	54%	9%	23.9	28.2	44.6	430	52	482
MSC CHINA	96.5	24%	40%	84.5	34%	40%	29.2	41.0	61.4	222	674	896
KOTA JATI	2.1	6%	2%	2.1	6%	2%	31.3	35.0	49.8	46	12	58
KOTA HALUS	11.2	66%	33%	9.2	66%	33%	17.2	18.5	16.2	132	97	229
MARE IBERICUM	7.5	85%	16%	7.5	85%	16%	14.0	27.0	30.0	128	26	154
DURBAN STAR 3	84.2	3%	0%	72.2	3%	0%	16.4	20.3	14.8	6	0	6
MALACCA STAR	8.0	15%	44%	8.0	15%	44%	21.8	9.4	6.5	13	31	44
TOGO STAR	26.2	14%	21%	3.8	11%	31%	21.7	27.2	19.7	20	69	89
P&O NEDLLOYD AGULHAS	30.2	81%	17%	3.2	28%	38%	23.0	24.8	16.5	89	70	159
DAL EAST LONDON	32.4	2%	34%	32.4	2%	34%	32.6	26.1	20.3	8	120	128
MAERSK CONSTANTIA	10.3	26%	25%	10.3	1%	25%	34.3	37.0	40.7	225	199	424
MAERSK HONG KONG	20.8	5%	24%	20.8	90%	52%	13.2	40.1	77.7	25	143	168
BARRIER	39.5	29%	16%	16.5	14%	16%	14.9	29.4	53.3	88	57	145
INYATHI	14.6	13%	45%	3.4	4%	12%	15.5	41.7	30.3	39	156	195
AVERAGES	28	20%	8%	21	17%	26%	23.6	32.7	39.1	1,822	3,642	5,464
										16%	36%	25%

Source: SAPO DCT

Table 8: Actual vessel movements between 30/04-07/05/2003

Source: NPA Port Control

DELAYS PER BERTH

BERTH	VESSEL	SAILED /SHIFTED (CROSSED THE BAR)	Agent request Sailing (Final Request	Marine Delay	DELAY REASONS	VESSEL	BERTHED/SHIFTED (CROSSED THE BA	BERTHING DELAY (Hr	CCEPTAB DELAY (	XCEEDE BY (Hrs)	Reasons for delay
205	NORTHERN ENTERPRIS	30/04/03 13:25	30/04/03 12:00	0.4		L.T. GIANT	30/04/03 15:10	1.7	2	0.0	
205	L.T. GIANT	01/05/03 21:44	01/05/03 21:00	0.0		L.T. TRIESTE	01/05/03 22:20	0.6	2	0.0	
205	L.T. TRIESTE	03/05/03 10:05	03/05/03 09:00	0.1		DAL EAST LONDON	03/05/03 09:25	-0.7	2	0.0	
205	DAL EAST LONDON	04/05/03 11:10	04/05/03 10:00	0.2		MAERSK CONSTANTIA	04/05/03 11:32	0.4	2	0.0	
205	MAERSK CONSTANTIA	06/05/03 13:11	06/05/03 12:00	0.2		MSC MARIA LAURA	07/05/03 16:06	26.9	2	0.0	REQUESTED 16H00
204	KOTA HIDAYAH	30/04/03 03:10	30/04/03 02:00	0.2		EVER GENIUS	30/04/03 03:33	0.4	2	0.0	
204	EVER GENIUS	01/05/03 15:33	01/05/03 14:00	0.5		CIMBRIA	01/05/03 15:13	-0.3	2	0.0	
204	CIMBRIA	02/05/03 10:10	02/05/03 09:00	0.2		MSC VIETNAM	02/05/03 14:00	3.8	2	1.8	ARRIVED 13H20
204	MSC VIETNAM	04/05/03 14:46	04/05/03 14:00	0.0		BUNGA TERATAI 3	04/05/03 15:02	0.3	2	0.0	
204	BUNGA TERATAI 3	07/05/03 12:46	07/05/03 12:00	0.0		SAFMARINE AMAZON	07/05/03 13:11	0.4	2	0.0	
				0.0				0.0	2	0.0	
203	MSC LAURENCE	02/05/03 16:40	02/05/03 16:00	0.0		CIMBRIA	02/05/03 20:05	3.4	2	1.4	SHIFT CHANGE
203	CIMBRIA	03/05/03 19:15	03/05/03 17:00	1.3	SHIFT CHANGE	MALACCA STAR	03/05/03 18:55	-0.3	2	0.0	
203	MALACCA STAR	04/05/03 09:18	04/05/03 08:00	0.3		ENGIADINA	04/05/03 09:29	0.2	2	0.0	
203	ENGIADINA	06/05/03 00:35	06/05/03 00:00	0.0		DURBAN STAR 3	06/05/03 00:15	-0.3	2	0.0	
203	DURBAN STAR 3	06/05/03 19:06	06/05/03 19:00	0.0		MSC AURORA	06/05/03 19:34	0.5	2	0.0	
202	MSC KERRY	27/04/03 16:00	27/04/03 14:00	1.0	COMPLETED 15H00	BARRIER	30/04/03 12:42	68.7	2	0.0	REQUESTED 13H00
202	BARRIER	02/05/03 01:38	02/05/03 02:00	0.0		MOL OUEME	02/05/03 02:06	0.5	2	0.0	
202	MOL OUEME	03/05/03 20:40	03/05/03 19:00	0.7		KOTA HALUS	03/05/03 21:08	0.5	2	0.0	
202	KOTA HALUS	04/05/03 16:35	04/05/03 16:00	0.0		TUGELA	06/05/03 23:06	54.5	2	0.0	REQUESTED 22H00
				0.0						0.0	
200	MSC KERRY	30/04/03 23:07	30/04/03 22:00	0.1		KOTA JATI	01/05/03 00:02	0.9	2	0.0	
200	KOTA JATI	03/05/03 07:29	03/05/03 06:00	0.5		NEDLLOYD AGULHAS	03/05/03 07:10	-0.3	2	0.0	
200	NEDLLOYD AGULHAS	04/05/03 03:51	04/05/03 03:00	0.0		MSC CHINA	04/05/03 03:05	-0.8	2	0.0	
200	MSC CHINA	06/05/03 22:44	06/05/03 22:00	0.0		TOGO STAR	07/05/03 00:10	1.4	2	0.0	
200	TOGO STAR	07/05/03 00:00	08/05/03 00:00	0.0		MAERSK PLYMOUTH		-905952.0	2	0.0	
				0.0						0.0	
109	SOFALA	30/04/03 11:05	30/04/03 11:00	0.0		INYATHI	30/04/03 11:54	0.8	2	0.0	
109	INYATHI	01/05/03 23:22	01/05/03 23:00	0.0		MAERSK HONG KONG	03/05/03 14:50	39.5	2	0.0	REQUESTED 14H00
109	MAERSK HONG KONG	07/05/03 03:28	07/05/03 02:00	0.5		CAPE HENRY	07/05/03 03:50	0.4	2	0.0	
109	CAPE HENRY			0.0		DURBAN STAR 3	06/05/03 00:15	905928.3	2	0.0	
				0.0						0.0	
108	BARRIER	30/04/03 07:00	30/04/03 07:00	0.0		JOLLY ORO	02/05/03 03:26	44.4	2	0.0	REQUESTED 03H00
108	JOLLY ORO	04/05/03 19:58	04/05/03 19:00	0.0		MARE IBERICUM	04/05/03 20:25	0.5	2	0.0	
108	MARE IBERICUM	06/05/03 07:27	06/05/03 06:00	0.5		ARNIS	06/05/03 07:50	0.4	2	0.0	
108	ARNIS	08/05/03 07:20	08/05/03 06:00	0.3		MSC MALAWI	07/01/00 00:00	-905815.3	2	0.0	
				6.8						3.3	
										10.0	hrs
										1.44	hrs

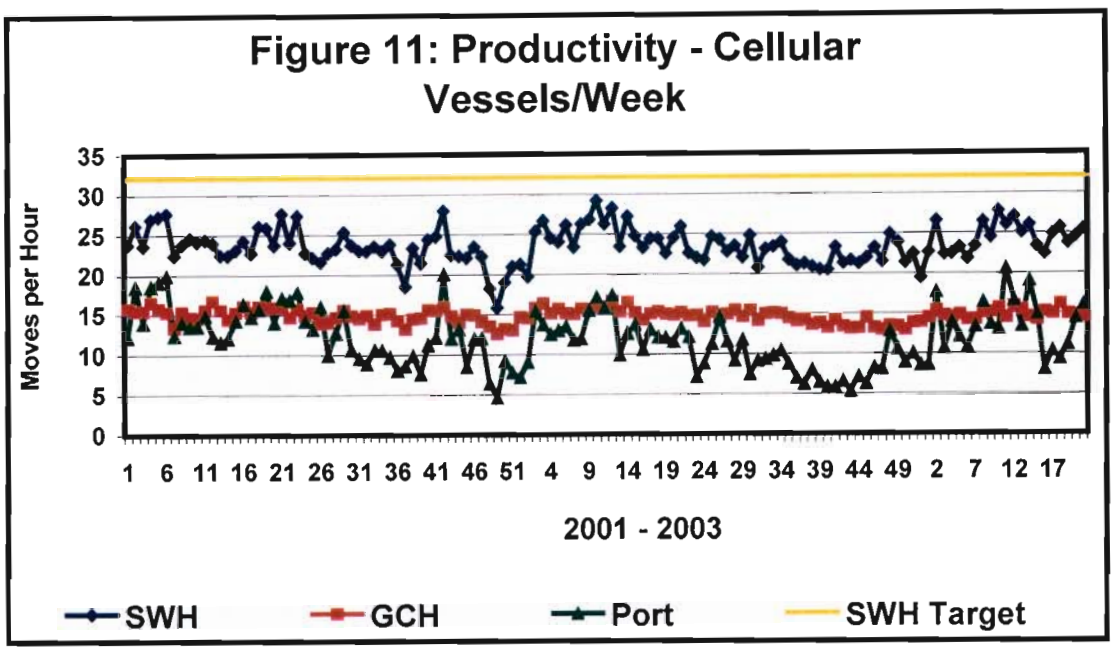
(ETA) given by the shipping lines/agents to the terminal. This inaccurate declaration sometimes leads to a number of vessels arriving at the port awaiting a berth.

This bunched arrival of vessels then creates the impression that there is congestion in the port and that the terminal is not operating at optimum efficiency. We will refer later to the cause of some of the marine delays (see table 9).

This then has a knock-on effect for other vessels waiting to occupy the berth because of extended stays by offending vessels. The result is further delays for a vessel at anchor awaiting a berth. This could also lead to vessels then congesting other ports e.g. Cape Town and Port Elizabeth. This has a reciprocal effect in other ports as well.

Another problem not reflected in the above figure is the number of stows and restows that occur during the loading/discharging of a vessel. Therefore the actual number of containers handled during loading/discharging could be far higher than what was actually planned. This is also not captured in the crane performance statistics indicated below (see figure 11 and 12).

As explained earlier, the crane operations vary depending on the type of vessel the cranes are working. It is clearly evident that the cranes work much more efficiently on cellular vessels than on other types of vessels (see figure 11 and 12). One of the main reasons for this is that there are no cranes or other obstructions on board the vessels that make it difficult for the cranes to work a ship.



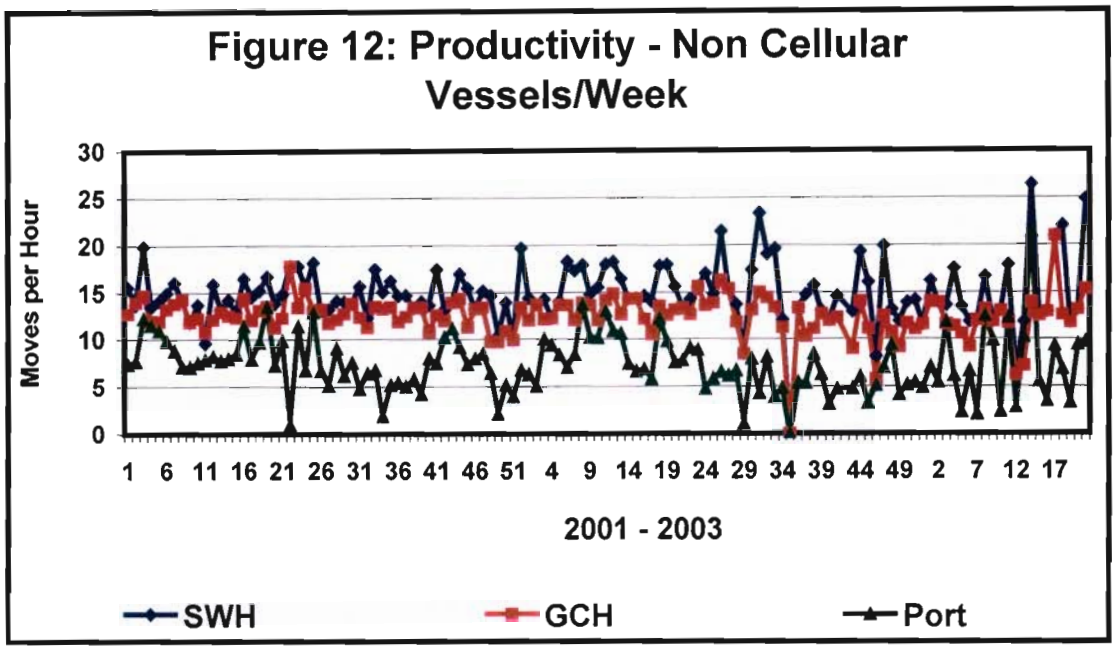
Notes: SWH -Moves per Ship Working Hour from the first lift to the last lift

GCH -Moves per Gross Crane Hour from the first lift to the last lift

Port -Moves per Hour from the time the vessel arrives at the port

Source: SAPO

From figure 11 it can be seen that the terminal is unable though, to maintain the moves per hour per ship's working hour target. This means that the operational efficiency of the terminal is lagging behind. The move per hour per gross crane hour appears to be quite constant for cellular vessels whereas this seems very erratic for the non-cellular vessels. This could mean that the gantry cranes working the cellular vessels are less prone to stoppages. Beyond what has been discussed, the ageing equipment at the terminal does seem to justify for this poor performance. Most of the equipment is over 20 years old and prone to continual mechanical and electrical breakdowns.

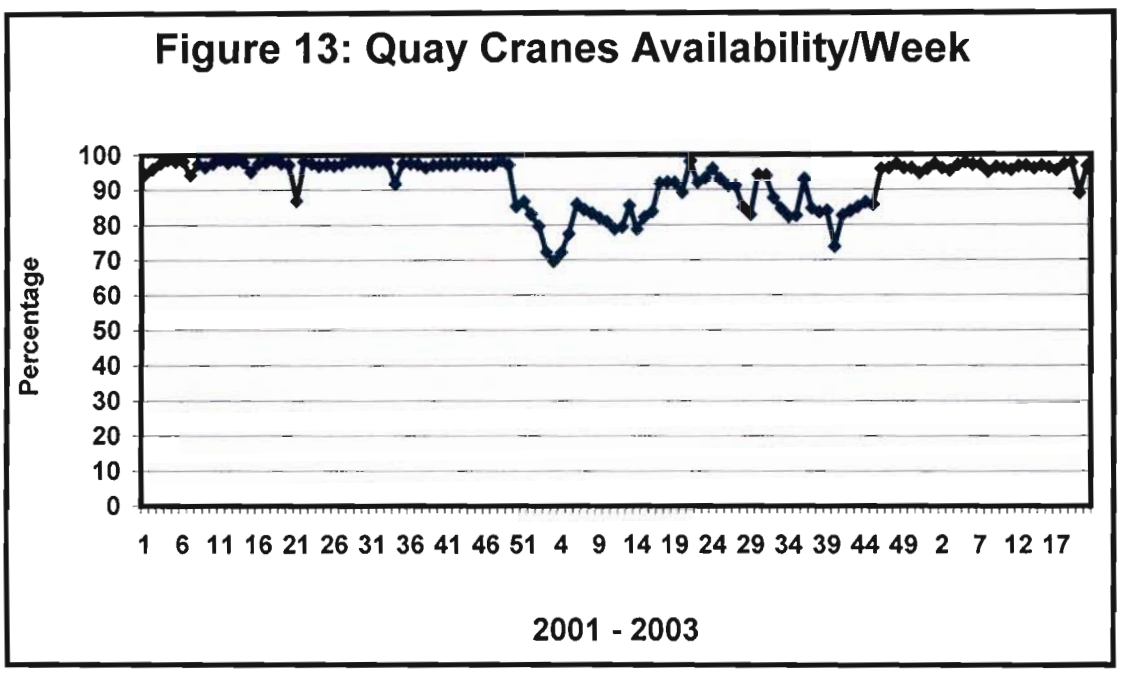


Source: SAPO

In figure 12 the productivity of the non-cellular vessels is far lower than for the cellular vessels. This is evident from the moves per hour/per ship working hour. The main reason for this, as was discussed earlier, is that it is more difficult for the cranes to work a non-cellular vessel that it is for a cellular vessel. The turnaround time for vessels as is reflected by the moves per hour from the time the vessel arrives at the port is also a worrying factor. This could be further skewed by long waiting times for a vessel to obtain a berth. It also appears evident that the priority for vessels obtaining a berth is given to the cellular vessels hence the lower turnaround time reflected.

As can be seen by figure 13, the availability of the cranes has been very erratic for much of 2002 and was starting to play up again towards the latter part of week 15 in 2003. This begs the question, why? This is mainly attributed to the lack of proper maintenance

schedules and poor handling of the equipment by the operators. This is therefore further evidence that the cranes are a major contributing factor to the inefficiencies experienced at the terminal.



Source: SAPO

Another explanation for the low percentages on crane availability for much of 2002 is that most of the availability is linked to planned maintenance stoppages. Because the stoppages were recorded as breakdowns rather than planned scheduled maintenance stoppages, this has affected the crane availability/week graph.

3.5.3.4. MARINE DELAYS AND PORT CLOSURES.

The Maritime Services within the NPA have been severely criticised over the last two years over the availability and numbers of marine pilots in the Port of Durban. A number

of vessel delays have been attributed to the lack/shortage of pilots to berth/sail vessels. The validity of these claims is difficult to ascertain. What is evident though, is that the new slot system, which was implemented during the latter part of 2002, has proved to be successful. This system allows shipowners and agents (at a premium negotiated tariff based on the service level agreements between the shipping lines and NPA) to book their vessels in a slot system to receive priority/premium service.

Another area of concern is that vessels keep changing their sailing times (see table 9), which affects planning. The reason the shipping lines/agents give is that due to terminal delays, the sailing times have to change. It almost becomes a cat and mouse game with the terminal wanting to shift blame away from itself.

The Port of Durban has in the last year (2002-2003) experienced a number of port closures on account of bad weather (see table 10). The number of closures experienced in October 2002 was exceptional for Durban. This had never happened in the last five years. There has been some doubt amongst the shipping lines/agents about the validity of these closures. Perhaps El Nino and other global warming phenomena could be the cause for the odd weather patterns experienced. This has resulted in a backlog of vessels awaiting a berth.

Table 9 must be read in conjunction with table 8 which shows the actual sailing times and when the vessel crossed the bar. What can be determined from table nine, is that a

number of delays in sailing times can be attributed to either a crane breakdown or the vessel awaiting cargo.

CHANGE OF ETDs - WEEK ENDING 08 MAY 2003				
BERTH	VESSEL	AGENT	CHANGE OF ETDs	REASONS FOR CHANGE
205	DAL EAST LONDON	SAFMARINE	06,07,09,10	GANTRY WORKING SLOW
205	MAERSK CONSTANTIA	MAERSK	9,121	GANTRY WORKING SLOW
205	LT TRIESTE	COSREN	01,04	GANTRY WORKING SLOW
204	BUNGA TERRATAI	BRIDGE	10,12	GANTRY BREAKDOWN
203	MSC LAURENCE	MSC	14,16	GANTRY WORKING SLOW
203	NORASIA ENGIADINA	SAFERT	20,22	GANTRY WORKING SLOW
202	MOL OUEME	MITSUI	16,19,18,20	AWAITING CONT.
202	BARRIER	UNICORN	01,02	GANTRY WORKING SLOW
200	TOGO STAR	POLARIS	20,21,22,06	GANTRY WORKING SLOW
108	MARE IBERICUM	FSA	02,04,06	GANTRY WORKING SLOW
108	ARNIS	UNITED	20,03,06	GANTRY WORKING SLOW
105	MOL VOLTA	MITSUI	18,22,00	WORKING SLOW

Table 9: Actual Sailing time changes for the period 30/04-07/05/2003

Source: NPA Port Control

TIMES THE PORT CLOSED FOR 2002				
DATE		**CLOSED/OPEN**		**TIME**
02-October		CLOSED		16:12
03-October		OPEN		11:30
05-October		CLOSED		06:45
		OPEN		13:00
		CLOSED		18:30
06-October		OPEN		07:20
11-October		CLOSED		18:40
12-October		OPEN		07:10
		CLOSED		23:30
13-October		OPEN		01:30
		CLOSED		09:30
14-October		OPEN		06:45

TIMES THE PORT CLOSED FOR 2003				
01-August		CLOSED		19:40
02-August		OPEN		07:30

Table 10: Port of Durban closures for 2002/3.

Source: NPA Port Control

3.5.3.5. TERMINAL MANAGEMENT.

Management of the terminal has been severely critisised for inadequately addressing problems. The main reason for this is the lack of skills and qualified trained personnel. This paper has indicated earlier that terminal operations are complex in nature. With the increasing container volumes and the decreasing number of vessels arriving at the port, it

is imperative that the terminal has systems and personnel equipped to handle any challenge.

The DCT has been hard hit by strike action over the last few years. This has really hindered the terminal's performance and has caused it to be unreliable to the needs of the shipping community. The last strike to affect the terminal was from the 29 November to 4 December 2001. The source of the dispute between management and labour emanated from the introduction of the incentive scheme for the management as well as an existing agreement for the payment of performance-based bonuses to employees within other Transnet divisions (Business Report, December 18 2001).

The second area of dispute related to protracted delays in the Grades Review process. Job grading delays have been the unfortunate result of the divisionalisation of Portnet. The general consensus is that proper planning and foresight on the part of SAPO management could have averted this industrial action. These strikes have indeed been a major cause of the backlogs of vessels awaiting berths (Business Report, December 18 2001).

Another area of concern is the fear of the privatisation of the terminal. Poor communication to all stakeholders of government's intention to concession the terminal has created a lot of uncertainty. Labour fear job losses and restructuring. This in turn, has caused the terminal's workforce to participate in "go-slows" and other negative actions (Business Report: December 18 2001). Once again, this has caused the productivity of the terminal to decrease even further.

CHAPTER FOUR

CONCLUSION

What is the effect of poor terminal efficiency on the greater economy? Is it justifiable for port terminals to underperform? The answer to the following can be seen in figure 14. The delays experienced by the shipping lines and the revenue lost as a result of this is now passed on to the buyers who in turn pass these extra costs onto the final consumers. The resultant negative impact of this is detrimental to a developing economy such as ours.

Shipping lines to tax Durban cargo

Ernest Mabuza and Kevin O'Grady

THE exports boom expected to go hand in hand with the plummeting rand has been dealt a damaging blow, with every major shipping line serving SA slapping a hefty congestion surcharge on cargo moving through SA's busiest harbour.

Notice to Shippers
SOUTH AFRICAN PORT CONGESTION

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JAPAN AND HONG KONG / SOUTH AFRICA SHIPPING CONFERENCE
Notice to Shippers
SOUTH AFRICAN PORT CONGESTION
SURCHARGE (DURBAN)

U.S. / SOUTHERN AFRICA CONFERENCE
CAPE TOWN - SOUTH AFRICA
17th Floor, Safmarine House
Riebeek Street, CAPE TOWN 8001
Notice to Shippers
SOUTH AFRICAN PORT CONGESTION

SOUTH AFRICA / FAR EAST SHIPPING CONFERENCE
Notice to Shippers
SOUTH AFRICAN PORT CONGESTION
SURCHARGE (DURBAN)

Figure 14: Surcharge on containers handled at South African ports

Source: Business Report 17 January 2002

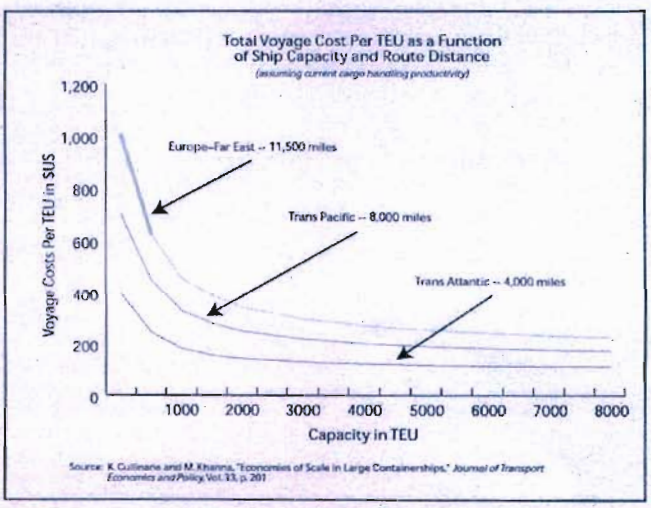
The ocean transport costs within the transport chain are being maintained at low levels by trying to achieve economies of scale. But port productivity can go a long way by trying to achieve lower voyage cost per TEU. This can be seen in box 3.

Impact of Port Productivity of Unit Voyage Cost of Large Containerships

A recent study of economies of scale in large containerships gives an indication of the unit cost benefits that can be obtained by use of increasingly larger containerships — and the benefits that can be achieved by increased cargo handling productivity that reduces port time. The study prepared by K. Cullinane and M. Khanna and published in the Journal of Transport Economics and Policy models the impact of using containerships with nominal capacity to 8000 TEU, assuming current cargo handling rates and rates that would be 100 percent higher.

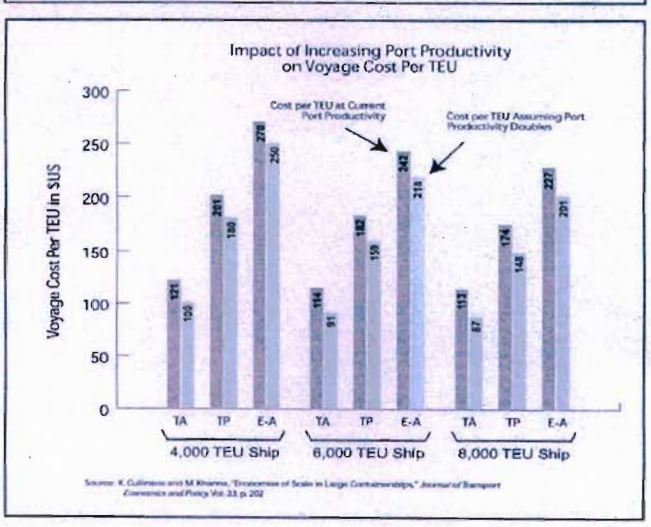
Declining Unit Cost With Larger Ships

To the right is a chart taken from the study that shows the relationship between voyage cost per TEU, ship capacity and route distance on three major linehaul routes. Unit cost declines at a decreasing rate as ship capacity increases. In deriving these unit costs, the authors assume that port time for various size ships reflects current cargo handling productivity, which in turn is a function of the number of cranes assigned to a ship and the handling rate per crane. Based on a questionnaire by the authors, current practice is to typically employ one to two cranes on ships under 1000 TEU capacity, three to four cranes on ships 3000 to 4000 TEU capacity and five cranes on ships of 6000 TEU capacity. Crane productivity under current practices is assumed to average about 22 moves per hour. On this basis, five cranes working a 6000 TEU containership can load and discharge 2000 20 ft. boxes and 2000 40 ft. boxes at a rate of 110 moves per hour, and the ship can be fully discharged and loaded in 72 hours.



Increasing Port Productivity

The authors then examine the sensitivity of reducing port time through increased cargo handling rates. They show that a cargo handling rate double that of the current rate will significantly reduce the unit cost, as the ship will be able to carry more containers in a given time period. For example, doubling the cargo handling rate will reduce the unit cost of a 6000 TEU ship from $114 to $91 per TEU on a trans-Atlantic voyage. The unit cost of a similar ship on a trans-Pacific voyage would drop from $182 to $159 per TEU and on a Europe-Far East voyage from $242 to $218.



Box 3: Achieving economies of scale and lowering handling costs.

Source: Worldbank Port Reform Toolkit

As we have seen earlier, the Port of Durban can only operate more efficiently if the necessary infrastructure upgrades occur to ensure the port offers world-class facilities with high operating and economic efficiencies. To meet this challenge, the NPA is investing over one billion rand in infrastructure upgrades in the Port of Durban. The project, known as the Port Development 2005 Project, has already commenced in 2003 (see figure 15). The Port of Durban has not achieved its full potential for the transshipment of containers due to capacity constraints and inconsistent service levels. From the port's perspective, it is believed that with the future expansion possibilities within the port, it should be developed further as the regional hub in the medium term. The aims and the philosophy of the project are in line with the Moving SA Policy document.

"**Strategic Actions in Port Infrastructure and Operations**

Several key strategic actions emerge in the realm of ports in order to realise the vision of low cost, high reliability, short transit time service in the corridors and on the maritime leg of general cargo import and export. The key steps revolve around promoting the consolidation of higher volumes of container traffic into fewer ports. The highlights of these actions encompass the following:

- *Identify which ports are to be the core international container export/import ports of the future.* Also, decide which ports, if any, will serve as feeder ports to the core container ports. This process should be an inclusive one of consultation with ship lines, customers, existing port operators, and other entities co-ordinating ports with the connecting modal infrastructure in the remainder of the corridor.

- *Remove the capacity constraints in the port system and direct infrastructure investments in line with the strategy.* This step encompasses several subsidiary actions, including:
  - In the short-term, address the causes of vessel delays in Durban;
  - Undertake a long-term capacity exercise, or revise existing capacity planning in light of the new strategy. Currently, both Durban and Cape Town ports are forecast to experience capacity constraints, but decisions about consolidation will determine the impact of such constraints;
  - Invest in the expansion of the selected core ports;
  - Reduce spending in the non-core or feeder ports to basic requirement levels. It is important to keep feeder ports operating smoothly, if they are economically viable, since they form a key link into the core ports. However, capital spending priorities should begin with the core ports;
  - Stop spending on non-viable ports. Continued investment here will dilute the effectiveness of the rest of the port system " (MSA: 1999).

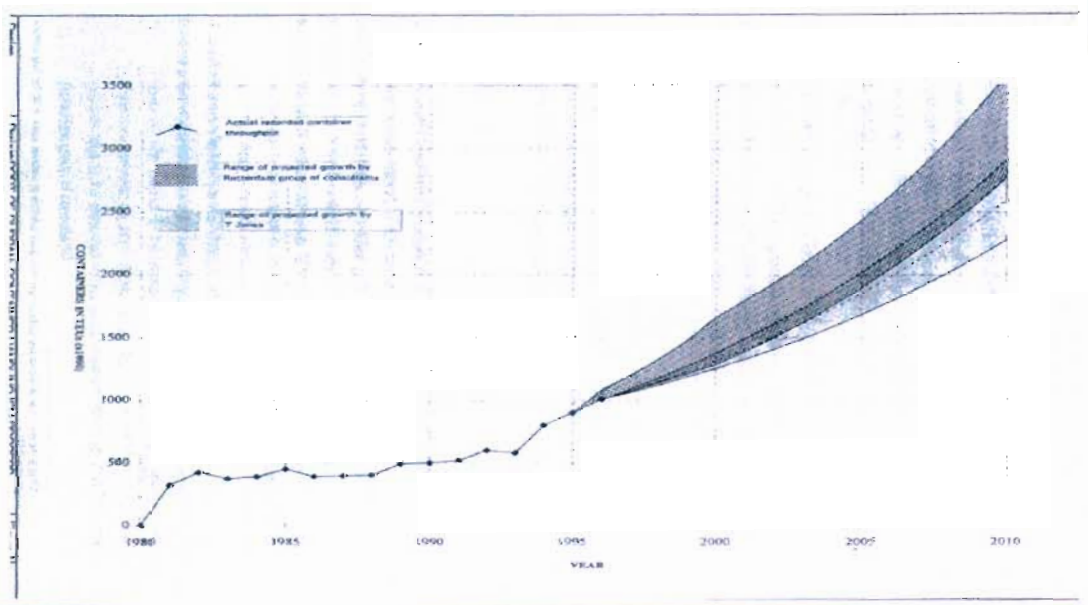
However, it would appear that the current development underway in the port is only going serve as a medium term relief with regards to capacity constraints experienced by the terminal. The Port Development 2005 Project aims to achieve a two million TEU throughput capacity in the Port of Durban container terminal. The realisation is that this extra capacity being added to the terminal will only last up until 2007/8. This can be seen in box 4, which highlights the growth rates that are actual and projected.

1980 – 1990's

- Average annual growths in East Coast container traffic about 6% p.a.

1992 – 1995

- Average annual growth in East Coast container traffic between 15% and 20% p.a. between 1992 and 1995.
- In 1995 the Rotterdam consultants predicted that such high levels of growth could persist through 1996, levelling of to between 9% and 11% p.a. by 2000, and stabilising thereafter at 7% to 8% p.a. "High road" and "Low road" growth scenarios were predicted (See Figure 1)
- The dramatic increase in container traffic experienced in 1994 and 1995 was largely a response to South Africa's emergence from trading isolation. This unprecedented growth did not persist into 1996.
- Based on a 7% p.a. growth rate, it is likely that short term measures to increase container-handling capacity in Durban to 1.1million TEU's p.a. will suffice until 1997-1998. Building an additional container terminal of this capacity would probably satisfy demand until 2007-2008.



Box 4: Actual and projected growth rates for containerised traffic in the Port of Durban

Source: NPA Port Engineers Department

However, several roleplayers, including the Association of Shipping Lines, which represents about 90% of all shipowners operating in SA ports, say that by coupling the current development with improved productivity and other efficiencies gains the port, capacity can rise to 3,25 million TEUs (The Mercury: October 16 2001).

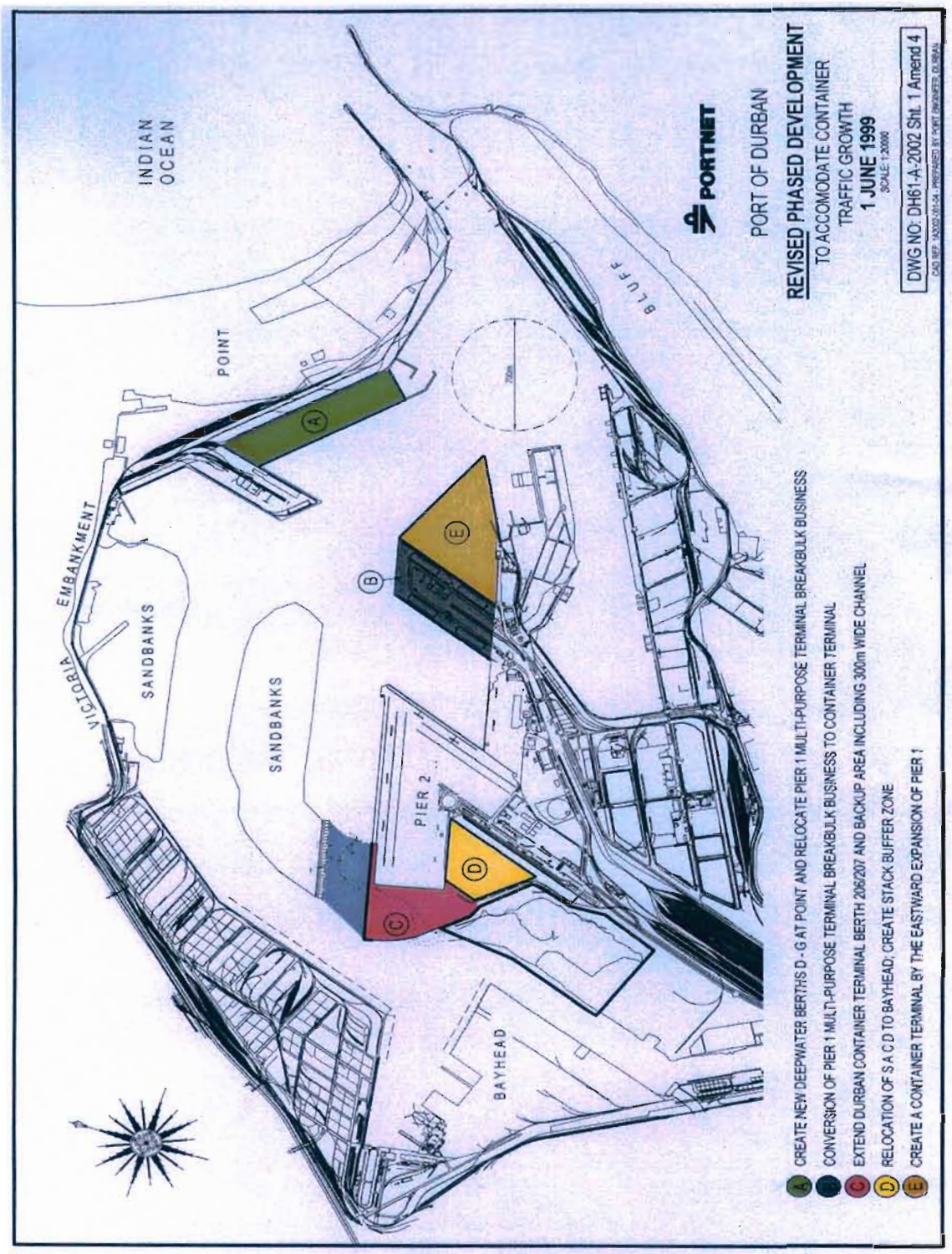


Figure 15: Proposed port expansion plans for the Port of Durban

Source: NPA Port Engineers Department

The much-anticipated draft National Ports Authority Bill, 2002 sets out the framework for the concessioning process due to begin at DCT at the end of 2003. The following is an abstract from the Port Bill with regards to concessioning.

"**Agreements and partnerships in terminal operations and services**

34. (1) The Authority may enter into a concession agreement or a public-private partnership agreement with any person in terms of which that person, for the period and in accordance with the terms and conditions of the agreement, is authorised to—

(a) design, construct, rehabilitate, develop, finance, maintain and operate a port terminal and provide services relating thereto; or

(b) provide any other service within a port designated by the Authority for this purpose. "

Privatisation in developing countries is often the first phase in a process of industrial liberalisation and a move towards industrial progression.

Viewed as a first step towards creating free trade it has therefore not surprisingly been a high priority for developing countries. It begins with the transfer of absolute control of industry away from the government but can be summarised as follows: improvements in efficiency through private sector management skills; enhancement of service quality through improved commercial responsiveness; reduction in the fiscal burden of loss-making state enterprises or the need for the future subsidy; a reduction in the fiscal demands on the central and local government through access to private sector capital; and additional revenue streams (Port Development International: 1999).

There is general consensus with most of these arguments and support of the concessioning of the DCT because it would lead to greater private sector participation not only in the port but also the Ethekwini Metropolis.

The Port of Durban is an important gateway with regards to general cargo flows especially since the port's goal is to become a hub port in the Southern Africa. It has great economic value for the city and the country at large. It can be seen that the poor economic and operational efficiency of the port leads to poor overall economic growth for the nation. It is therefore desirable to ensure that the terminal is always operating at optimum operating efficiency with the required infrastructure and capacity in place.

Random vessel arrivals and low levels of capital funding are key system-level forces influencing poor performance, but there are also substantial operating inefficiencies at the firm level. These inefficiencies include structural concerns like terminal configurations, and operational issues. These are low crane productivity, low crane intensity, inefficient links between customers agents and shipping lines, and constraints on systems and equipment. Substantial improvement will require a concerted effort by shipping lines, ports and infrastructure investors.

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