

No. LD-10-01
November 2010



INDIAN INSTITUTE OF FOREIGN TRADE

Working Paper

A Multi Dimensional Approach to
Management of Port Life Cycle:
The Case of Major Ports in India

Deepankar Sinha



INDIAN INSTITUTE OF FOREIGN TRADE (IIFT)

Working Paper Series

Aim

The main aim of the working paper series of IIFT is to help faculty members share their research findings with professional colleagues in the pre publication stage.

Submission

All faculty members of IIFT are eligible to submit working papers. Additionally any scholar who has presented her/his paper in any of the IIFT campuses in a seminar/conference will also be eligible to submit the paper as a working paper of IIFT.

Review Process

All working papers are refereed

Copyright Issues

The copyright of the paper remains with the author(s).

Keys to the first two digits of the working paper numbers

GM: General Management

MA: Marketing Management

FI: Finance

IT: Information and Technology

QT: Quantitative Techniques

EC: Economics

LD: Trade Logistics and Documentation

Disclaimer

Views expressed in this working paper are those of the authors and not necessarily that of IIFT.

Printed and published by

Indian Institute of Foreign Trade

Delhi Centre

IIFT Bhawan, B-21, Qutab Institutional Area, New Delhi – 110016

Kolkata Centre

J1/14, EP & GP Block, Sector –V, Salt Lake, Kolkata - 700091

Contact

workingpapers@iift.ac.in

List of working papers of IIFT

See end of the document

Series Editor

Ranajoy Bhattacharyya

A Multi-dimensional Approach to Management of Port Life Cycle: The Case of Major Ports in India

Deepankar Sinha*

Abstract

This paper aims at understanding the different dimensions of life cycle of a seaport enabling the port-planners to decide on their strategies. There are different stages in the life cycle of an organization. The course of action would vary from stage to stage of the life cycle. This paper aims at identifying the different dimensions of port business. This has been accomplished using factor analysis, a multivariate data analysis technique. This paper further explores the relevance of these dimensions in the context of major Indian ports at the different stages of the lifecycle. The results of analysis show that primarily four dimensions impact the life cycle. The paper finally recommends a strategic framework for planners to respond to the management needs in the different stages of the life cycle.

Key words: Ports, ships, cargo, dimensions, lifecycle, strategies, factor analysis

* Indian Institute of Foreign Trade, Kolkata Campus, J1/14 EP & GP Block, Sector V, Salt Lake, Kolkata 700091, India. E-mail: dsinha@iift.ac.in. Readers should send their comments on this paper directly to the author.

A Multi-dimensional Approach to Management of Port Life Cycle: The Case of Major Ports in India

1. Introduction:

Seaports act as an interface between land and sea or other waterways. It is a part of transportation network through which cargoes are routed to different destinations. It provide facilities for loading and unloading of cargo, passenger terminal, repair of ship, breaking of ships, warehousing and acts as a point for multi-modal transport. It has location rigidity and has expansion limitations. Like any other industry its activities are influenced by:

- + External environment: social, political, economic and technological
- + Task environment: Importers, exporters, clearing and forwarding agents and other users of port
- + Competitive environment: Other ports and other modes of transport
- + Public environment: Government and other public bodies

A port may serve as multipurpose, special purpose, regional or trans-shipment hubs. Their planning must uniquely recognize their specific function (Frankel, 1990). The ports across the world were mostly Government controlled operating under protected (regulated) environment of the country. Hence, they enjoyed a natural monopoly for a long time. The obvious drawbacks of monopoly had crept into the port system over a period of time. The ports that were old, suffered from the limitations of being inflexible to the changes. It followed the "bureaucratic" model of business (Kent and Hochstein, 1998). Every approach was based on precedence and resource constraint. An activity could be taken up only if the existing resources were adequate and the

requirement fitted into the rule and regulation framework. The requirement of ports' customers took the back seat. Customers did not get what they needed, but had to satisfy themselves with what ports provided them. Charges were based on method of 'absorption' costing and the port users had to pay for the port's inefficiency. No metric was defined for "quality of service" at ports. The planning process at port was based on forecast of cargo movement through ports and capacity computation (Sinha, 2005a). There were no attempts to integrate the competitive, qualitative, technological, economic and financial dimensions into the planning process of the ports through analytical models based on an integrated information system.

The factors such as globalisation of world economy and rapid change in transportation, information and related technology led to customer service explosion and time compression. Technological changes in ship building industry led to construction of ships of larger size. At the same time the industry witnessed scaling up of bulk cargoes. Thus, there was a need for the ships to achieve the required economies of scale. Larger options on modes of transportation (and their combination) and the choice of service provider were available to the port customers. The competition amongst the ports increased manifold. Ports were not able to sustain its growth. This led to the change in the role of the ports. This resulted in the evolution of various alternatives, such as the "landlord", "service" and "tool" ports (NCAER, India, 2001). The concepts of these roles are as follows: -

- + A **landlord port** is a port, where the port owns and manages the infrastructure. The private firms are able to own superstructure, and provide services as well as rent port assets by concessions and licenses,
- + A **service port** is a port that owns the superstructure and provides all required services.

+ **A tool port** owns the superstructure, while the management of the activities is the responsibility of other agencies.

Ports tried one or more combinations of these options to remain competitive. The maritime industry meanwhile witnessed several structural changes in business operations. There were concentration, alliances and mergers (Ryoo and Thanopoulou, 1999; Graham, 1998; Zan, 1999). The shipping lines penetrated in terminal operations, and ports privatized their operations. Ports opted for the choice of co-operation as well as competition (Song, 2004). Besides, ports resorted to various quality measures such as ISO certification, quality circle and productivity based awards. In some cases the ports reduced the charges and controlled the productivity parameters to remain attractive (Suykens and Voorde, 1998). Thus, the shift from paradigm of operational efficiency to the paradigm of customer satisfaction made the port planner's job complex.

2. Framework for Port Reform

The main drivers for port reforms include external forces of competition and technology from the shipping industry, the financial and operational benefits of private participation in infrastructure and service delivery and the diversification and globalization of investors and operators as identified by the existing framework of port reforms.

It suggests extensive participation of private operators in meeting the challenges by the port authority. In addition to paying for superstructure, equipment and systems, private operators play an increasing role in funding infrastructure development. The framework recommends introduction of new legislation for transformation of port structures. It professes the port authority to play a new role. In other words it enables an active involvement of the private sector in port development and operations.

3. Ports in India

There are around 200 ports along the 6000 km coastline of India (TRW, 2008). Of these, there are 12 major ports that come under the Major Ports Trust Act 1961. In the year 2008-09, the major ports in India handled 531 million tons of cargo (IPA, 2009). Figure 1 shows the trend in growth of cargo in the major ports in India.

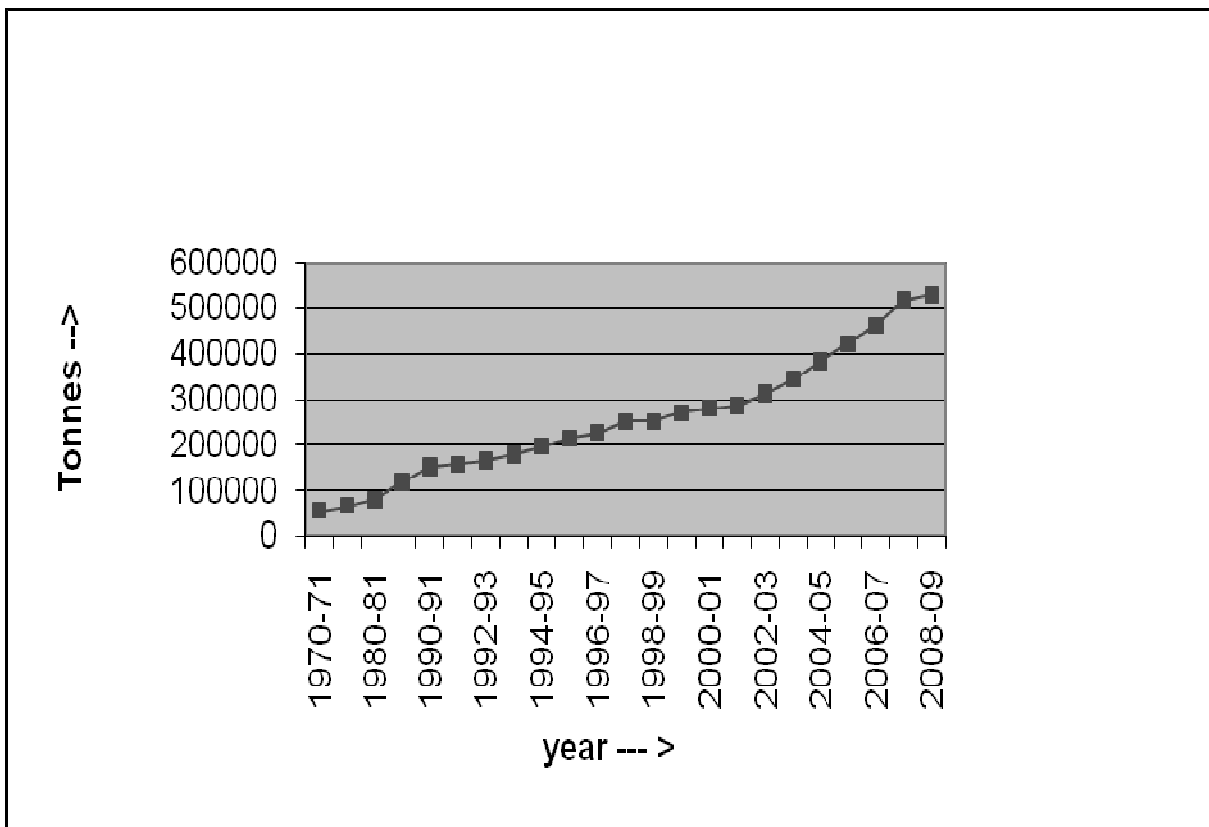


Fig 1: Growth of cargo in major ports in India

Source: IPA (2009), pp-99



Fig 2: Share of sea borne trade to total foreign trade

Source: Basic Port Statistics, TRW, MOSRTH – 2001-02

The shares of these ports were around 72% of the total throughput in the year 2008-09 (IPA, 2009). Figure 3 shows the share of major ports in India vis-a-vis other ports in the country.

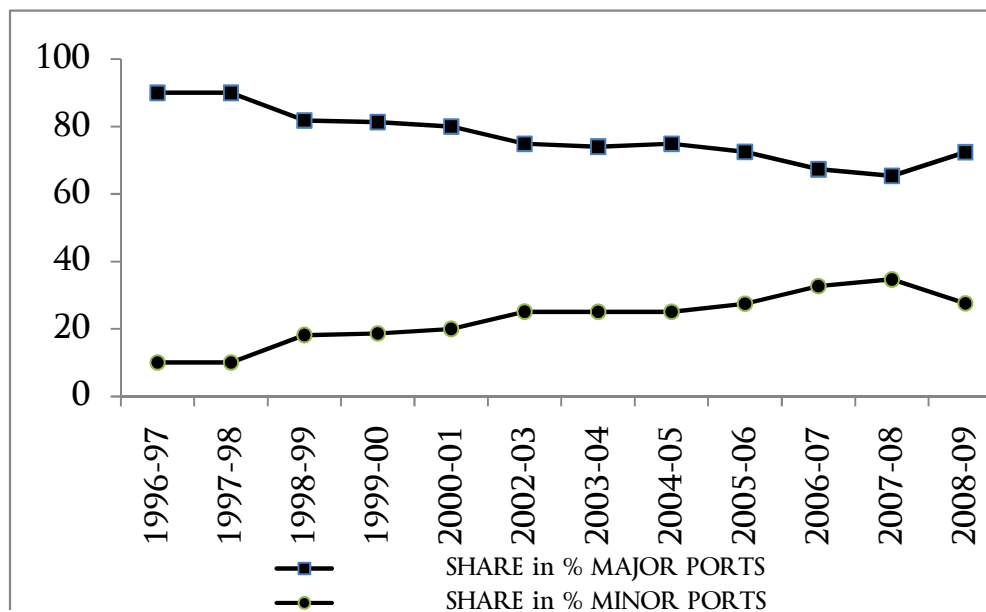


Fig 3: Share of major ports in India

Source: IPA (2009), pp-99

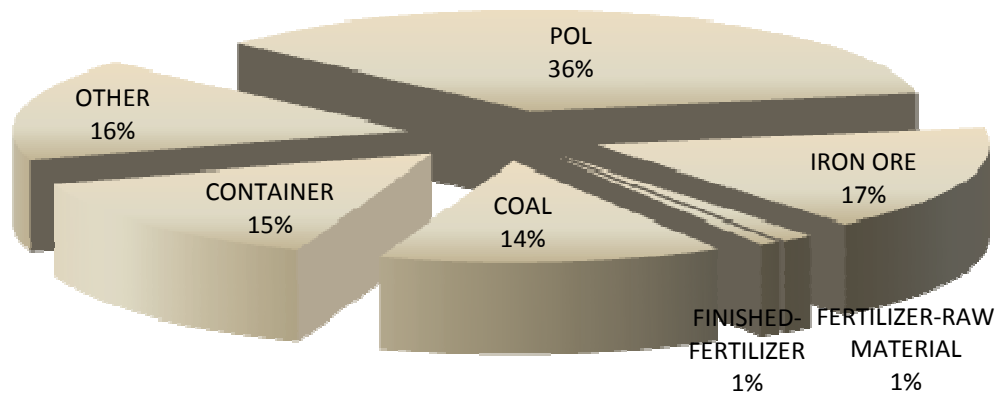


Fig 4: Cargo composition of major ports in India

Source: IPA (2009), pp-31

Figure 4 shows the composition of cargo handled in major ports in India. The ports generally handle two to three types of cargo (Major Ports of India – A Profile: 2007-08, IPA New Delhi). These can be observed from Table 1.

Table 1: Composition of cargo handled at different individual major ports

SL. NO.	MAJOR PORT	PRIMARY CARGO	% OF TOTAL CARGO HANDLED BY THE PORT
1.	Calcutta	Pol / Container	50% / 30%
2.	Haldia	Pol / Coal	50% / 30%
3.	Paradip	Coal / Pol+Iron Ore	50% / 30%
4.	Visakhapatnam	Pol / Iron Ore + Coal	40% / 40%
5.	Chennai	Coal / Pol+Iron Ore +Container	30% / 50%
6.	Tuticorin	Coal /Containers +Others	50% / 50%
7.	Cochin	Pol / Container	70% / 10%

Table 1: Composition of cargo handled at different individual major ports (contd)

8.	New Mangalore	Pol / Iron Ore	60% / 30%
9.	Mormugao	Iron Ore	80%
10.	Mumbai	Pol / Container	60% / 20%
11.	Jnpt	Container	80%
12.	Kandla	Pol / Others	70% / 20%

Source: IPA (2009), pp-31

Initially when the number of ports was less and other modes of transportation (of especially bulk cargo) were not so developed, the major ports of the country had specified cargo movement from its neighboring states that served as their hinterland. But with the setting up of Inland Container Depots, construction of National Highways, laying of pipelines and development of other ports (also under state Governments) the hinterland was no more captive. Thus, ports had to compete with other ports and other modes of transport. Besides, partial privatization of ports' infrastructure has given rise to intra-port competition.

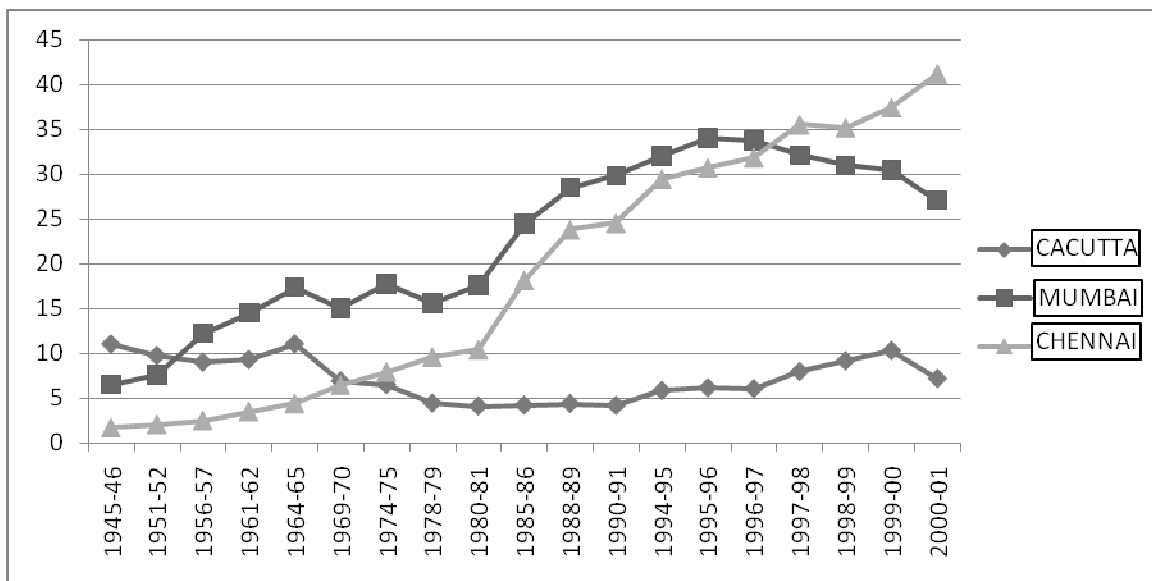


Fig 5: Cargo handled by 3 oldest major ports in India

Source: IPA (2009), pp-99

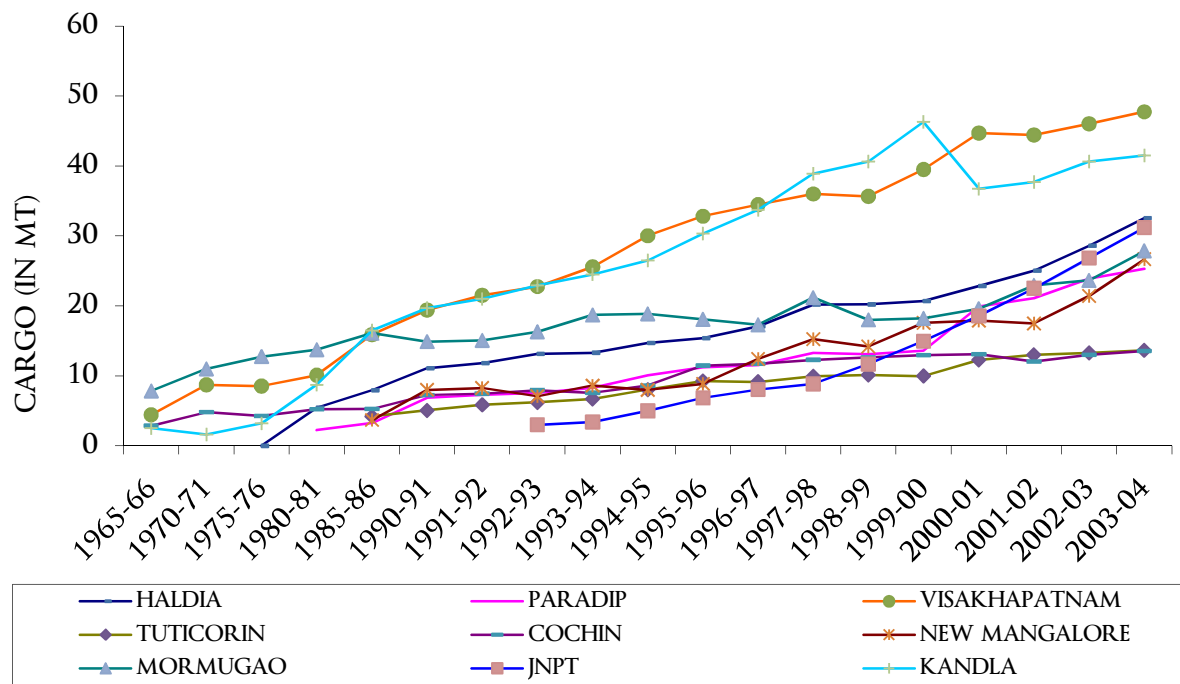


Fig 6: Trend of cargo handling by major ports of India

Source: IPA (2009), pp-99

Port of Tuticorin, New Mangalore and Cochin appears to be in matured stage of cargo-handling life cycle while the ports of Visakhapatnam, Haldia and Paradip appear to be in growth stage. The Kandla port is unable to maintain its sustained growth. This is primarily because minor ports under Gujarat State Government are flourishing at a faster rate. The minor ports under Gujarat State that handled only 3.1 million tons of cargo in 1975-76, have handled 202 million tons in 2008-09. That is, the cargo handling increased by 49 times during the last 28 years or so, as against 10 times increase in cargo handling in Kandla port during the same period. There are around 40 minor ports in Gujarat state.

4. Factors Affecting the Growth of Ports

- ✦ Since the ports are cargo specific, its growth is dependent on the type

of cargo and it's potential to flow through the port.

- ✦ Effectiveness of ports with respect to its competitors
- ✦ Effectiveness of supply chain in which port is a part of the network
- ✦ Total cost of handling cargo at the port

The major ports of India are facing competition with minor ports (its share decreased by 15% during the last 7 years), their performance are not at par with other ports in the region, and an investment of Rs 2,000 million is expected to be made by the end of the 10th plan (planning commission.nic.in). The existing planning process is based on trend in cargo handling, its relationship with macro economic indicator such as GDP and capacity computation and not on principles of port demand, and supply chain management (Bichou and Gray, 2004). According to Alderton (1994), the demand for the commodity is not the same as demand for transport. The supply chain approach considers the effectiveness of port logistics as well as integrates with the cargo transport network. A planning model incorporating these factors, and based on causal mechanism explaining the relationships and linkages with various factors is desired. It entails understanding the relationship and causality associated with the structure-strategy-performance paradigm (Bowen and Wiersema, 1999). According to this paradigm, it is necessary to determine the underlying structure that govern the behaviour of the port, and find the link between the strategies of the firm with its performance. The understanding of structure would enable the port planners to decide on effective policies and strategies that would enhance the performance of the port. This paradigm would enable the port planners to make structural changes, if required, and implement effective strategies.

5. The Problem

The major ports in India have also adopted the global port reform framework in their effort to improve their performance and continue with growth. The process of reform started more than a decade ago, whilst the status of Indian ports continue to remain relatively unchanged in the world map of ports. There is no sign of Indian ports being closer to the regional foreign ports of Singapore or Colombo or Hong Kong or Port of Shanghai, in terms of cargo handling and efficiency.

The framework in vogue does not describe the underlying dimensions and their causality to enable the port planners to be effective. It instead suggests traditional strategic implementation such as cost control, prices reduction, survival on subsidies and grants and creation of assets based on forecast. The approach should have been market driven, and customer focused. It aims at dealing with different variables instead of identifying and managing the underlying dimensions.

The framework proposed in the ensuing sections gives a direction towards effective management decisions which is based on the concept of dimensions of business lifecycle.

6. The Business Life Cycle:

Adizes (1988), in his Life-Cycle model broadly divides the lifecycle into two stages, namely, the growing and aging stages. During the Growth stages labeled Courtship, Infant, Go-Go, Adolescence and Prime, the organisation is vulnerable to several risks labeled Affair, Infant Mortality, Founder or Family Trap, Unfulfilled Entrepreneur, and Premature Aging. The Aging stages are labeled Aristocracy, Early Bureaucracy, Bureaucracy, and ultimately, Death. The Stable stage sits on the cusp between Growth and Aging.

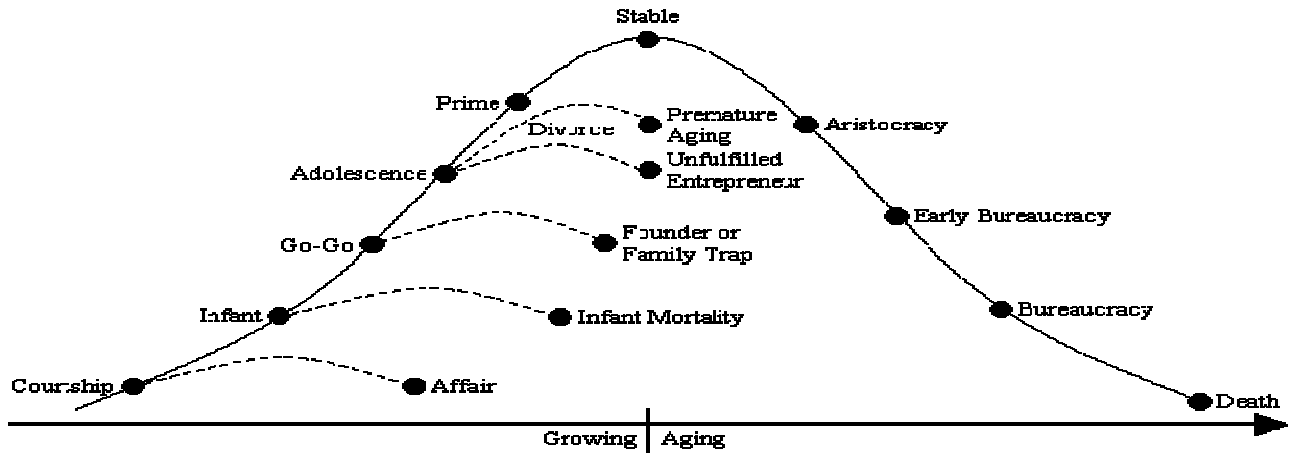


Fig 7: Organisational life cycle

A summary of the characteristics of each of the stages in the Adize’s model is provided in Table 2 below. The italicized words highlight the organic metaphor.

Table 2: Characteristics of the stages in the Adize’s Model

Stage	Characteristics
Courtship	During the courtship stage, the organisation exists only as an idea. The founder must fall in love with the idea before making a commitment to its execution. If the courtship is only an affair, the entrepreneur will lose interest before executing the idea. The idea of the organisation is focused on the founder's conception of the product or service.
Infant	Once the organisation is born it is immediately vulnerable and in need of constant care and attention to keep it going. The nature of the organisation is transformed from that of an idea to that of action. A lack of commitment or of capital may result in infant mortality.
Prime	Prime is the optimal point in the lifecycle curve. The organisation achieves a balance of control and flexibility. A Prime organisation is not at the top of the lifecycle curve - it still has room to grow, limited only by its ability to attract and train enough skilled people.

Table 2: Characteristics of the stages in the Adize's Model (contd)

<p>Stable</p>	<p>The Stable stage marks the beginning of the Aging process. The company is still strong, but is starting to lose the flexibility, creativity and innovation that made it into a Prime organisation. Increasing complacency results in decreasing conflict. The number of meetings and committees starts to increase and short-range profitability considerations start taking over. The importance of the Finance department relative to that of the Marketing or Research departments increases. Return on Investment (ROI) becomes the dominant measure as measures in general gain importance.</p>
<p>Aristocracy</p>	<p>In an Aristocracy, form supersedes function. The organisation is focused on how things get done, and organisational protocol and tradition dominate. Challenges to the status quo are frowned upon, thus stifling innovation. Individual dissatisfactions remain unvoiced, and conflicts are swept under the carpet. The organisation is cash rich, making it prone to acquire or to be acquired.</p>
<p>Early Bureaucracy</p>	<p>Early Bureaucracy is characterised by witch-hunting. The writing is on the wall for the organisation. Each area seeks evidence to blame some other area. Paranoia freezes the organisation. Energy is spent on in-fighting and the customer is seen as a nuisance.</p>
<p>Bureaucracy</p>	<p>The purpose of the Bureaucracy is to support its continued existence. The internal systems acquire a life of their own. The organisation becomes dissociated with its original purpose. Artificial life-support systems are required to keep the organisation from its ultimate Death. Bureaucratic systems may survive for a long time in a protracted coma.</p>

Table 2: Characteristics of the stages in the Adize’s Model (contd)

Death	Death occurs as commitment to the organisation dissipates. Clients desert the organisation, followed by employees, until nothing remains.
--------------	---

The problem with **Adizes' Organisational Life Cycle model** (see figure below) is that it is not, in fact, cyclic, and therefore it implies the inevitableness of decline. This leaves us with a rather defeatist view of organisational development.

Veale (2006) also based his interpretations of business life cycle on Adizes’s model. According to him, Ichak Adizes (1988) in his book, "Corporate Life Cycles," illustrated the growth cycle of a business. His illustrations related to the process all businesses must pass through and the issues that must be solved to attain profitability and sales growth.

In growing, highly competitive businesses, the life cycle's predictable patterns help CEO's and their managers develop insight as to what problems need to be corrected first. These problems may be both operational and cultural, which is very normal during the growth side of the cycle. These "conflicts" are akin to a natural process, much like growing up through the terrible 2's or teen years. Management's ability to solve problem and create new market opportunities differentiates successful from unsuccessful businesses. To understand the value of the Life Cycles graph depicted below, an explanation of the terms is required.

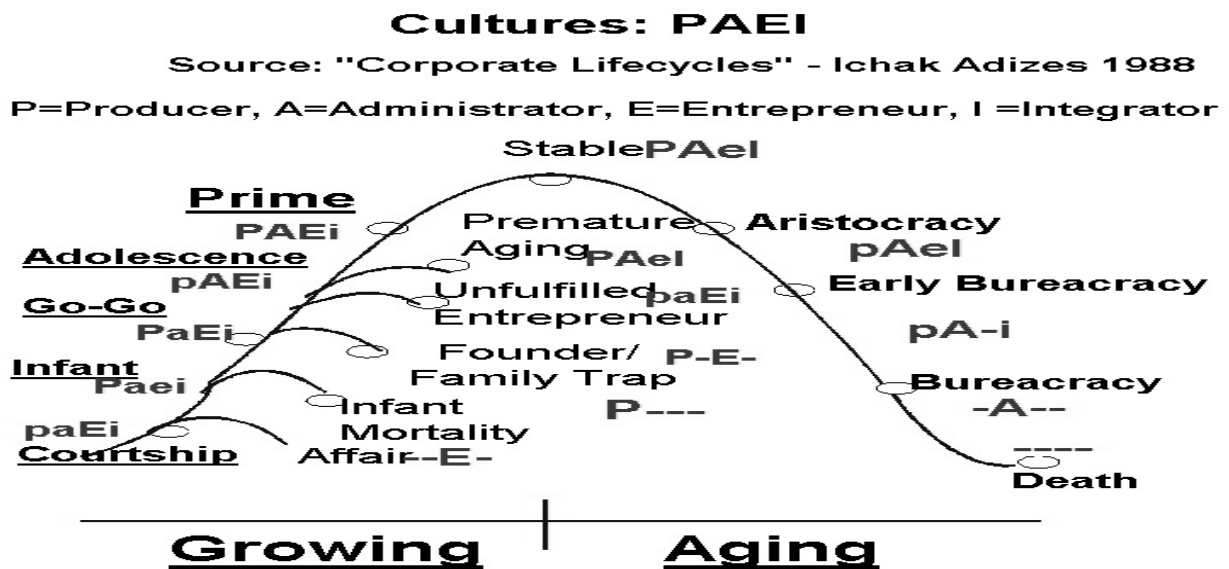


Fig 8: Corporate life cycles by Adizes

Veale (2006) also based his interpretations of business life cycle on Adizes's model. According to him, Ichak Adizes (1988) in his book, "Corporate Life Cycles," illustrated the growth cycle of a business. His illustrations related to the process all businesses must pass through and the issues that must be solved to attain profitability and sales growth.

The 'P' in PAEI stands for "Producer", 'A' stands for "Administrator," 'E' means "Entrepreneur," and 'I' refers to "Integrator." These are the four roles of management. That is: To produce a result, administer or control of doing things right, create new ideas, not fixing old ones, and to ensure that the organization has the values to sustain itself.

In the early stages of a business, entrepreneurs create products and services that should result in sales. As the business rises out of creating new products from the **Courtship Stage** it evolves into the **Infant Stage**, where producing more sales and orders to generate cash becomes the utmost focus. Passing through that stage, the company either creates cash or dies an early death. Once the cash

situation is under control the company moves into the **Go-Go Stage**, where it expands its product lines to acquire market share.

With growth, comes the problem of consistent profitability. Thus during the **Adolescence Stage** the company tries to professionalize management and develop consistency, training and service by using more administrative elements. If the company can survive these processes successfully, it will enter the **Prime Stage**, during which it will create many new infants or growth opportunities.

In further stages of the life cycle, the focus is much less on the entrepreneurial skills that are the future of sales growth, and more on profitability and the status quo, which emphasizes **integration**, not results. The loss of this entrepreneurial edge, which is the company's long term ability to create markets and later the sales production capacity, causes the organization to age quickly.

The ability to change a culture and rebuild a business requires a return to the "basics" or **Infant** and **Go-Go Stages**, thus revitalizing the entrepreneurial and essential sales efforts of the business.

The salient findings of Veale (2006) were quoted as follows: "I was asked by a client to assist his management team in a turnaround of his ailing company. I learned that the company had grown rapidly over the last 7 years, from start-up with 5 employees to over \$100 million in sales and 300 employees. As the company grew, the people who started with the CEO grew in responsibility and authority.

There were also new managers who came from larger, more experienced companies who were trying to make improvements that the "old guard" would not support. The company had three different chief operating officers in two years, all selected by the CEO with all but the last being from the "old guard." The new COO inherited a company with plummeting sales, new competition, very low morale and

the same problems the company fixed years ago.

Through our assessment process, We determined that the company was in the **Pre-Mature Aging Stage**, and prescribed a series of action plans to halt the aging process and move it back to the growth and excitement of the **Infancy Stage**. Those action plans resulted in a stabilization of employee turnover, an increase in sales and improved profitability.

Only one person was fired during this process and it wasn't the original person they thought to fire when we were asked to help them. Had they shown any other stage's symptoms, we would have prescribed a very different approach. The result was to rebuild the entrepreneur side of the business, and move it back to some of the issues of **Infancy or Go-Go Stage** in the life cycle.

Any change towards **Infancy** can be exhilarating, rewarding and very difficult. The reason the process is very painful is that it causes members of the organization to rethink their roles and skills. Corporate restructuring can sometimes be the result of this process and the development of good managers requires training and education.

Developing owners requires business experience, an understanding of risk and strategic vision. The CEO's fundamental charge is to assemble a management team that clearly understands the challenges of the company and has the ability to work to correct them with little involvement from the CEO. That's called structure and delegation. Small companies with dynamic, visionary CEOs who came from the sales area will have a very different approach to problems than a small company where the CEO was the CFO or administrator. The key to success is surrounding the CEO with people who can problem solve faster than the competition."

Management training is part of the continuous improvement process. Peter Drucker wrote in his 1954 book, "The Practice of Management," that the purpose of

a business is to "create customers," not profits. The purpose of management is to keep the business alive. Profit is a measurement system on management performance. Eli Goldratt's book, "The Goal," supports this premise, stating that the goal is to make money, not product. And W. Edward Demming's (1982) chain reaction, which begins with improving quality, is a focus on change from the customer's point of view. Therefore, change is driven as a result of focusing on the creation of customers.

It is very important for future managers to be sales or customer oriented. This is not about taking the best salesperson and making him/her a manager. It is about taking corrective action or solving problems based on the customer's point of view; not the income statement. If a change does not improve customer relations, sales or gross margins with new products, why do it? Cutting expenses is not a part of the growth or rising side of the cycle; it is in the downward side where the business is approaching **Death**. Management must be clear about the critical need to create customers and be measured on customer creation as well as profits.

If a marketplace is ripe with new entrants and competition, then management must continually improve, by creating new **Infants** and adding them to the product mix. Expanding existing product lines is one example of the types of ideas the management and ownership team should be reviewing. If a company is forced to reduce costs, they will have to shake up the status quo to do it and if that company is in the aging side of the lifecycle, flexibility and adaptability are not its strengths. As Peter Senge wrote in "The 5th Discipline," successful problem solving requires a deep understanding of the causes of the problem, not the symptoms.

Peters (2006) suggests using the three Hindu gods (figure 9) to help understand that birth, life and death can co-exist in a continual cycle of life. He combined the idea - as in the table below - to enable our understanding of how birth, life and death can co-exist in a cycle of creative destruction, sustaining an organisation indefinitely.

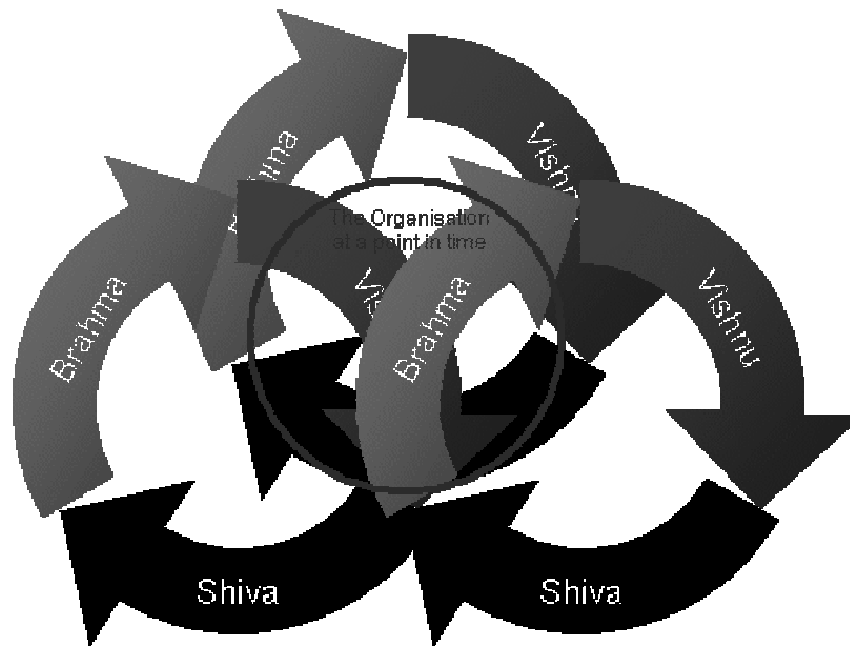


Fig 9: Comparison of organisational life cycle with Hindu Gods

Table 3: Comparison of organisational life cycle with Hindu Gods

Brahma				Vishnu			Shiva		
Keeper of the Flame of Creation				Keeper of the Flame of Preservation			Keeper of the Flame of Destruction		
Courtship	Infant	Go Go	Adolescent	Prime	Stable	Aristocracy	Early Bureaucracy	Bureaucracy	Death

7. Explaining the Life Cycle Dynamics

The above review indicates the different stages of business life cycle. The previous researchers have stressed on the effect of each stage on the organization's growth. It is necessary to know the dimensions of organizational life cycle and the CEO's attempt to focus on these dimensions to solve the problems and steer the organization ahead. Sinha (2005) showed that there are primarily 4 (four) dimensions of port's life cycle. These are namely the Financial, Infrastructure or capacity, Competitive, Efficiency and Ships' Economy Dimension. The cross impact

of these dimensions results in various stages of port life cycle. This can be explained with the example of a particular port or a dock system. In this paper the case of Kolkata Dock System has been illustrated to explain the dimensions of organizational life cycle.

8. The Case of Port of Kolkata

8.1 Kolkata Dock System

The port of Kolkata was institutionalized as Calcutta Port Commissioners in the year 1870. This port is a riverine port; which means that the port is located along side a river and not a sea. Since inception the port has been expanding its area of operation. Its cargo handling activities spread from within the heart of the city up to 30 KM downstream till the year 1969-70. The shift was witnessed southwards i.e. towards the sea to take advantage of the increasing depth of the river in order to accommodate larger ships. In the year 1969-70, the port created another dock system 'Haldia Dock Complex (HDC)'. The original port was identified as Kolkata Dock System (KDS). Both KDS and HDC functioned under purview of Kolkata Port Trust. The objective was to complement the port system enabling synergistic effect that would result higher growth to both Kolkata Dock System and Haldia Dock Complex. Instead the two dock system competed against each other. The study of KDS's cargo handling since inception provides an insight to the sinusoidal pattern of organizational life cycle.

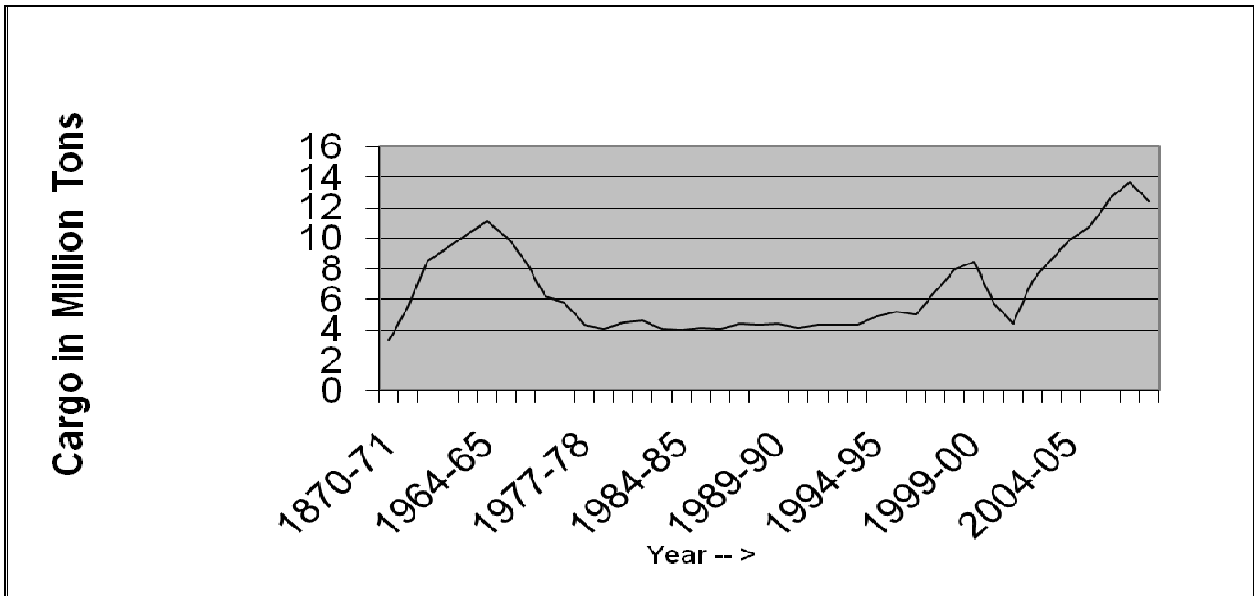


Fig 10: Cargo handled at Kolkata Dock System since 1870

Source: Basic Port Statistics, 2005, IPA (2009)

The cargo handling at KDS increased from 3.28 Million Tons from 1870 to 11.06 Million Tons in 1964-65. Thereafter, it decreased to 4 Million Tons in 1984-85. At this stage, the dock system witnessed almost a complete life cycle except that it did not wind off its business. There after the cargo handling remained in this level till 1993-94. That is, the renewed infancy continued for around 10 years before it witnessed its second round of growth. This may be due to the different delays, namely the decisional delay, capacity building delay, service improvement delay and perception delay. Perception delay refers to the time taken by the customers to perceive (realize) port's initiatives to improve its services and re-consider availing its services. Subsequently, the firm witnessed a second round of growth where the cargo handling again started increasing till it reached 8.48 Million Tons in 1999-00. But thereafter, the cargo handling started declining till it reached the figure of 4.42 Million Tons in 2001-02. This was primarily due to silting of navigational channel resulting in low parcel load and port became less attractive to the shipping world. Thus the organization witnessed another cycle of growth to decline. However, thereafter it again regained its growth path without further delay. This may be

because the port through its learning curve had been able to reduce the delays, focused on dredging to improve navigational depth and regain its customer base. This sinusoidal behaviour may be explained with the help of different dimensions of port life cycle.

Data Analysis: The yearly data during the period 1986-87 to 2002-03 (Table 4) on variables namely cargo handled, number of ships that visited the port, productivity (output per ship day), ship's turn round time (TRT), waiting time (w. time), non-working time (nwt), berth occupancy (b.o), stay time at berth (sab), man days lost, operating income (op income), expenditure (expdr), port charges, cargo per ship (parcel) and ship-size were collected to study the life-cycle of the port – Kolkata Dock System. Factor analysis of the data during infancy, growth and decline stages were carried out separately.

Table 4: Yearly data for the Kolkata Port

Year	Ships	Size	Cargo	TRT	SAB	W. Time	PBD	NWT	Parcel	Output	B.O	Op Income	Expdr	Days Lost	Charge
1986-87	898	65	3410	11.4	11.4	8.14	0.61	3.37	3800	796.3	0.72	81.61	52.57	1247	23.93
1987-88	933	65.6	3930	10.8	7.69	4.59	0.66	3.1	4209	547.23	0.68	78.79	53.98	746	20.05
1988-89	837	60.0	3690	9.62	6.99	4.19	0.44	2.8	4405	629.96	0.58	103.44	59.91	9301	28.03
1989-90	790	59.1	3600	10.5	7.71	4.54	0.72	3.17	4561	591.98	0.59	110.92	62.2	112860	30.81
1990-91	785	55.9	3540	11.2	7.85	4.5	1.11	3.35	4513	574.8	0.57	116.61	64.78	1962	32.94
1991-92	697	53.9	3330	10.3	7.69	4.54	0.88	3.15	4784	621.75	0.57	106.02	63.16	7636	31.84
1992-93	764	62.5	4320	10.1	7.2	3.89	0.94	3.31	5657	786.16	0.54	122.59	69.84	21515	28.38
1993-94	736	60.5	4320	9.31	6.32	3.42	1.02	2.9	5875	928.42	0.49	150.15	66.56	25275.6	34.76
1994-95	755	61.6	4840	9.17	6.15	3.27	0.92	2.87	6405	1042.18	0.54	206.28	81.94	13552	42.62
1995-96	805	67.3	5180	8.63	5.42	2.8	1.39	2.62	6438	1188.43	0.52	180.65	84.68	4859.5	34.87
1996-97	874	67.6	4970	7.71	4.78	2.41	1.05	2.37	5685	1188.32	0.54	190.87	89.38	4686	38.4
1997-98	1009	91.9	6500	7.37	4.86	2.53	1.11	2.34	6444	1325.27	0.57	211.53	93.36	2635	32.54
1998-99	1041	100	7970	6.68	4.51	2.5	1.04	2.01	7652	1697.08	0.48	224.94	109	0	28.22
1999-00	922	106	8480	6.59	4.26	2.38	1.03	1.88	9194	2156.84	0.49	219.9	113.2	48721	25.93
2000-01	687	74.8	5760	5.5	3.64	2.09	0.61	1.55	8379	2304.87	0.41	201.21	136.4	174	34.93
2001-02	644	64.5	4420	4.71	3.1	1.82	0.58	1.28	6857	2215.32	0.38	188.57	123.3	0	42.66
2002-03	677	70.1	5950	4.37	2.99	1.83	0.53	1.16	9260	3099.48	0.45	176.61	118.1	0	29.68

Source: Basic Port Statistics, DTR, 2005-06, IPA (2009)

8.2. Introduction (Infancy) Stage

The cargo handling in the port since inception (Figure 10) shows that the port experienced the different stages of business cycles during the period 1870 to 1984-85 i.e. it declined to 4 (four) million tons from 11 million tones. However, growth was again witnessed thereafter in the port. Data during the period 1987-88 to 2005-06 was collected on performance parameters to analyse the behaviour of the port. Cargo handling remained in the level of 4 Million Tons during the period 1986-87 to 1996-97, indicating a renewed infancy that continued for a longer period than usually witnessed in case of birth of a new organization. This is perhaps because the firm had already witnessed decline and further growth had taken longer duration compared to a newly introduced organisation.

At this stage, two factors namely *Efficiency* dimension (comprising all variables excepting ships and its size) and the *Ship's economy* dimension (comprising variables namely, ships and its size) played a significant role. This indicated that bigger and larger number of ships is likely to visit a port only if conditions at port, that is, port services are economical to the ships. Thus port's efficiency is the most important factor for the port to renew its growth.

8.3. Growth Stage

Factor analysis of the variables for the period 1996-97 to 1999-2000 indicate that all variables cluster together to give rise to two dimensions namely the *Financial* dimension and *Capacity* dimension. The Financial dimension included variables, namely, cargo, charges, expenditure, turn round time, stay at birth, size of ship, and operating income. The port earns revenue from three different means, namely, the size of ship it handles, quantum of cargo that each ship loads or unloads at port and the number of days it stays at berth. Thus bigger ships, greater quantity of cargo and more stay at port are likely to enhance the income of the port. At the growth stage the firm earns revenue at an increasing rate and this is primarily

owing to higher efficiency it has demonstrated since infancy stage.

The second dimension, viz. Capacity dimension comprised variables, namely, days-lost, waiting time of a ship, its pre-berthing detention and number of ships. In the growth stage increase in number of ships visiting the port would result in more working time (due to more cargo handling) as well as pre-berthing detention (waiting time). Ships would not prefer to spend idle time due to waiting as it results in operational and opportunity losses. As such, with increase of capacity the waiting time as well as working time is expected to decrease.

8.4. Decline Stage

At this stage all variables except output per ship day (productivity) and expenditure cluster together to give rise to *Customer* dimension. Cargo and ship are the two variables that determine the preference of services of a port. At the decline stage, customer's preference decreases due to various reasons. These may be either because of better services by competitors, higher cost of services (port charges), poor infrastructure or inadequate capacity resulting in increased waiting time and non-working time, poor management resulting in increase in number of days lost and related causes.

The second dimension comprises variables namely, output per ship day (productivity) and expenditure. This can be labeled as *Efficiency* dimension. Output per ship day (productivity) is a measure of efficiency of a port. Expenditure is a surrogate measure of port's efficiency as inefficient organizations incur higher expenditure compared to efficient firms.

At this stage, the customers' satisfaction, operational and managerial efficiency becomes the key factor for sustaining growth of the organization.

9. Strategy Recommendations

9.1. Introduction (Infancy) Stage

Two dimensions namely the Efficiency and the Ship's Economy dimension have impact at this stage of port's life cycle. The basic strategies recommended for this stage are as follows:

- ✦ **Improvement of quality of service:** The firm should focus on the quality of service to attract customers. In a port, customers' choice is manifested through number of ships calling at the port and the quantum of cargo it loads or unloads at the port. Quality of service is measured through quicker turn round time (TRT), lower stay at berth, minimum waiting and non-working time. Ports should take necessary steps to enhance its efficiency that would lead to improvement of quality of service.
- ✦ **Aggressive marketing:** Economy is achieved by a ship when it carries enough cargo to recover its total cost of operation. The quantum of cargo per ship would increase when the same is requested by the importers and the exporters. Ports have to resort to aggressive marketing to convince them to route their cargo through the port.

9.2. Growth Stage

Two dimensions namely the Financial and the Capacity dimensions have impact at this stage of port's life cycle. The basic strategies recommended for this stage are as follows:

- ✦ **Enhance competitiveness:** At this stage ports earn revenue through increased cargo handling. Ports need to focus on pricing of its services, so that it remains price-competitive and sustain its growth. Ports may also think of providing additional benefits and value addition to remain competitive. The basic assumption at this stage is that the quality of service does not decrease

and awareness of its services remains with the customers.

- ✦ **Increase capacity:** At the growth stage more ships calling at the port may result in waiting of ships due to non-availability of berths. Availability may be enhanced by increasing the productivity and/or construction of new facilities. Productivity may be enhanced through increase in capacity of equipment and upgrading the skills of manpower. Thus ports need to replace, modernize and create its infrastructure to meet the growing demand of its services.

9.3. Decline Stage

This stage is the outcome of the port's inability to sustain its growth. It has lost its competitiveness and as a result flow of cargo and ship has decreased. Thus, it has to take renewed initiatives to begin the life cycle. It needs to stress on all the dimensions of business lifecycle. The strategies would be as follows:

- ✦ **Rejuvenate services:** Ports should assess its shortcomings in its quality of services compared to customer's expectations and take measures to uplift its services to the desired level. It should enhance its productivity.
- ✦ **Strengthen its supply chain and optimize resource utilization:** The port should undertake fresh initiatives to build partnerships with its supply chain partners instill confidence in them and work towards achieving organizational goal.
- ✦ **Renovate infrastructure and facilities:** Ports need to renovate its facilities to ensure value addition in its services
- ✦ **Remove bureaucracy:** Ports need to simplify its rules, de-regularize the controls, bring in transparency in its functioning, and assign responsibility with authority. It needs to carry out business process reengineering and introduce IT enabled services.

- ✦ **Reduce cost:** Ports should carry out activity based review and costing so as to reduce cost of its services.
- ✦ **Create new customer base:** Ports should make efforts to create new customer base through direct marketing of its renewed services, explaining its sincere efforts to provide best services to them. It needs to remove the perception of poor quality of services from the minds of the customers. There is always a perception delay i.e., customer will take some time to perceive the seriousness of the port to provide the desired level of services. Thus the velocity of effort in this direction will determine the ability of a port and the time taken to transit from infancy to the growth stage.

10. Conclusion

The above study clearly reflects the different dimensions of port's life cycle. It shows the impact of each dimension on each stage. This aids the strategic planner to take different strategies at different stages. The study introduces the concept of perception delay in life cycle management. It refers to the time taken by the customer to perceive organizational efforts to provide enhanced quality of services. The study reveals that the time lag of transition from infancy to growth in case of renewed life may be higher compared to initial life cycle. This may be due to the perception delay. The dimensional analysis enables the decision maker to quickly identify the cause of the problems by study of dimensions' impact on lifecycle instead of looking into all the individual variables simultaneously. The study also exemplifies the phenomenon of learning organization. An organization which has experienced more than one decline stages would be able to take the right and effective decision at lesser time causing the organization to regain its growth stage at a quicker interval of time. It further substantiates the theory of cyclic nature of business lifecycle.

References

- Adizes, Ichak, (1988), "Corporate Life Cycles: How organizations grow and die, and What to do about it", *Adizes Institute*
- Alderton.P.M. (1994),"Sea Transport Operations and Economics", *Thomas Reed Publications*.
- Basic Port Statistics (2002), *TRW, MOSRTH, 2001-02*
- Basic Port Statistics (2006), *TRW, MOSRTH, 2004-05*
- Bowen, H.P, and Wiersema, M.F, (1999), "Matching method to paradigm in strategy research: Limitations of cross-sectional analysis and some methodological alternatives", *Strategic Management Journal*, 20, pp. 625-636.
- Deming, Edwards. W (1982), "Quality, Productivity and Competitive Position", *Massachusetts Institute of Technology*
- Frankel, Ernst. G, (1990),"Port planning and Development" *John Willey and Sons*.
- Goldratt, E, and Cox, J, (2006), "The Goal (A process of ongoing improvement)", *Productivity and Quality Publishers*
- Hair, JR. J. F, Anderson, R. E., Tatham, R. L, and Black, W. C, (1998), *Multivariate Data Analysis*, 5th Edn, *Pearson Education*.
- IPA (Indian Port Association), (2001), "Guidelines for Capacity Computation", New Delhi
- IPA (Indian Port Association), (2009), "Major Ports of India - A profile: 2008 – 2009", New Delhi
- Kent, P. E, and Hochstein, A, (1998), "Port reform and privatization in conditions of limited competition: The experience in Colombia, Costa Rica and Nicaragua", *Maritime Policy and Management*, 25(4), pp.313-333
- NCAER (National Council of Applied Economic Research)., (2001), *Questionnaire on Maritime Transport* , New Delhi, 2, May .
- Peter, F, Drucker,(1954), *Practice of Management*, *Harper & Row Publishers Inc*.
- Peters, Tom, (2006), www.chrisfoxinc.com / www.tompeters.com, August, 2006
- Ryoo, D. K, Thanopolou, H. A, (1999), "Liner alliances in the globalization era: A strategic tool for Asian container carriers", *Maritime Policy and Management*, 26(4), pp 349-367.
- Senge, P. M, (1990), "The fifth discipline: The art & Practice of the Learning organization," *Double Day Currency, N.Y.*
- Sinha, D., (2005a), "The dimensions of Indian port industry", paper accepted for *Indian Maritime Award, 2005, Ministry of Shipping, Roads and Highways, Department of Shipping, Government of India*.
- Song Dr Dong-Work, (2004), *Port Co-opetition*, *Ports and Harbours Journal*, November
- Song, D.K, Cullinane, K, and Roe, M.S, (2001), "The Productive Efficiency of Container Terminals: An Application to Korea and the UK", *Aldershot: Ashgate*.

Sukyens, F, and Van De Voorde, E, (1998), "A quarter of a century of port management in Europe : Objective and Tools", *Maritime Policy and Management*, 25(3), pp. 251-261

TRW (Transport Research Wing), *Basic Port Statistics*, 2002-03, GOI, New Delhi

Veale, Jack, (2006), *The Business life Cycle*, www.ptcfo.com

Zan Y, (1999), "Analysis of container port policy by the reaction of an equilibrium shipping market", *Maritime Policy & Management*, 26(4), 369-381



List of working papers of IIFT

Sinha, Deepankar (2010), "Multi-Dimensional Approach to Management of Port Life Cycle: The Case of Major Ports in India" Working Paper No: LD-10-01, Indian Institute of Foreign Trade, New Delhi and Kolkata. This paper can be downloaded from <http://cc.iift.ac.in/research/Docs/WP/01.pdf>