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The Role of Port of Chittagong on the economy of Bangladesh

by

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Abstract

The Role of Port of Chittagong on the economy of Bangladesh

Aim of this study is to find out the performance of Port of Chittagong and its importance on the Bangladesh economy. In addition to this, an attempt has been made to understand the future position of Port of Chittagong in this region with current capacity.

More than 92% of exported and imported cargoes are transported through Port of Chittagong. Due to this reason, Port of Chittagong is called the "Gateway of Bangladesh". Most importantly Chittagong is the one and only major sea port of the country. Without any confusion, Port of Chittagong playing a key role in turning the wheel of Bangladesh economy since the birth of the nation. During 2014-2015, CPA handled 18.67 million TEUs and 617.26 million tons of cargoes. During the same year CPA has provided services to 2566 vessels. More than 8,000 people are directly employed by the port itself. City of Chittagong became the commercial hub of Bangladesh due to the presence of this port.

Day by day with the increase of the population of Bangladesh, pressure on CPA is also mounting. Despite of being a very important part of the national economy, it was unfortunate that there was no significant improvement in the port performance and development due to lack of master plan. CPA ranked 76th among major 100 ports in the world.

A quantitative approach has been followed in order to analyse and understand CPA performance and its importance on the nation's economy. Conducted a research on CPA performance in the past and CPA performance compared with local and regional ports. Also, study conducted to understand the future demand in CPA.

From this study, it is found that performance of CPA is considerably low. There will be shortage in the capacity in near future without creating new capacity and performance improvement. Average ship turnaround time is 4.26 days and dwell time for a container is 17.48 days. Moreover, port has some natural limitations and because of this reason port cannot provide services to larger vessels. CPA is severely lacking with the use of IT system and as a result casing lots of mismanagement and unnecessary delays. Another two main issues are lack of skilled labour and lack of modern cargo equipment at the port.

However, from this analysis it is found that present government is showing interest to improve the CPA performance and develop new facilities in order to cope up with the future demand. Government and ADB is working together to develop a master for CPA.

It is understood that CPA will lose some of the market share to the other local ports but will still remain in the key position in future as well.

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Chapter 1- Introduction

Trade is the one of the most important factor of a nation's economic growth. Where sea port is the gateway of facilitating the trade among the nations. A modern and efficient sea port is very important for smooth economic development (Irwin and Tervio, 2002; Hu and Zhu, 2009). According to UNCTAD (2009). Modernization of sea ports has accelerated the globalization process by connection the different parts of the world and creating access to regional economic hubs. Which has been possible due to low transportation cost through sea in comparison to land and air transportation. Sea ports plays a vital role by transporting maritime goods, foreign currency, direct and indirect employment within the area, development of internal infrastructure facilities and various transportation mood in the region. Due to these reasons countries have been considering sea port development programs as their basic infrastructure development policy. Sea ports started becoming more regionalized since the beginning of the industrial revolution in eighteenth century. Due to the industrial revolution trade volume started to increase and after the container revolution port become management become more significant. Which has increased competition among the nations and technological developments has added a new dimension to the efficiency of the modern sea ports. Authorities are heavily investing in the ports development in order to get connected with the global supply chain process. Today more than 90 per cent of the global trade are accomplished by sea (International Chamber of Shipping).

Bangladesh is situated in the north-west part of the Bay of Bengal and a population rich nation. It's blessed with a vast sea area which is 1.5 times larger than the land area. Around 36,000 sq. km areas are situated near the coastal area which accounted for the 25% of the country's total land mass. There are more than 200 rivers are in the country with an area of 22,155 sq. km which is almost 11% of the total land area. So, maritime sector is a core of the Bangladesh economic progress. Bangladesh's sea ports are highly important in the South Asia region due to this geographical location the Bay of Bengal and which can be a connecting route for the neighbouring nations. Understanding the importance of the port for the Bangladesh economy and for the regional economy a modern port infrastructure is very much essential at this very moment. Currently, Port of Chittagong is the one and only major sea port of Bangladesh. Which has been providing meeting the playing a significance role in Bangladesh international trading activities. Due to its presence, the city of Chittagong became an export oriented industrial hub for Bangladesh. Port of Chittagong is considered the heart of the Bangladesh economy by the people of Bangladesh. It's a natural sea port and its cheap labour has made the city more attractive to the manufacturing companies. But lack of planning and bad management has made it less competitive day by day in comparison to the modern international port standard. For increasing the port efficiency in both operational, inland transportation and port governance have long been a major concern for Bangladesh government, world bank, Asian development bank and other private investors such as China, and Japan. In this paper, we shall discuss about the importance of port of Chittagong for Bangladesh economy and we shall try to analyse the recent development initiatives by port authorities and by

government. Also, we shall try to assess the possible role of the port of Chittagong to the Bangladesh economy in future.

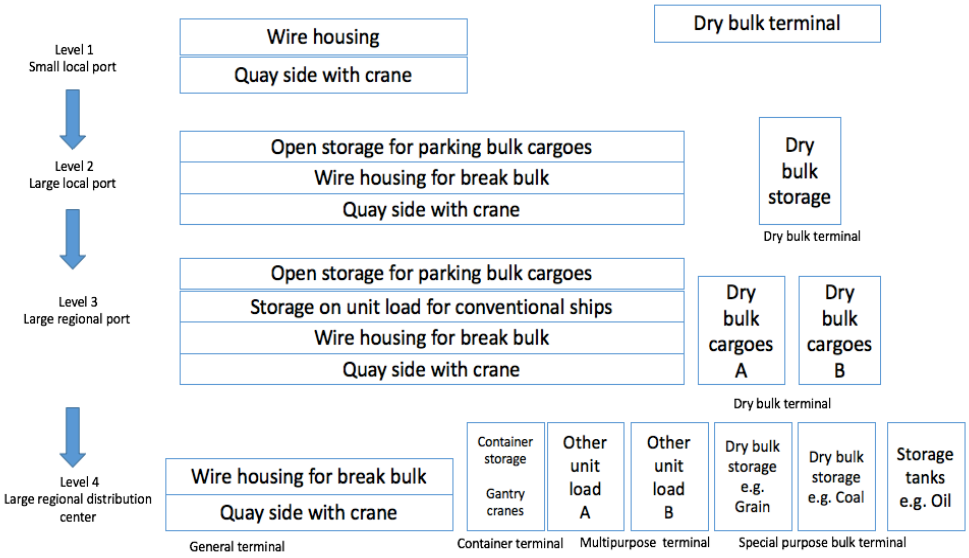
Ports

Ports play a multiple role in the maritime industry. Ports is a linkage between sea transport and land transport. There are many definitions of port. “A geographical area where ships are brought alongside land to load and discharge cargo- usually a deep-water area such as a bay or river mouth” (Stopford,2009, pp81). Ports plays a significant role in the global supply chain which is explained in the Hal et al studies in 2011. Physical manifestation of the logistical functions that these locations serve in the overall global trade in commodities.” (Hall et al, 2011, p.83). In 2010 Port of Antwerp annual report it is mentioned as “The port as a link in an interconnected foreland to the continental hinterland, in a continuous flow of goods without borders.” Ports provides integral services for base production, trading, logistics and information transfer. Ports also gives a competitive advantage to the region (Lam and Yap, 2011). Ports creates a competitive economic environment in the region for achieving market shares. There are three level of port competition: competition between port ranges, competition between ports in the same range and competition between operators in the same port (Goss, 1990). Huybrechts et al (2002) mentioned five factors which address the trade balance between import and export, the integration between industries and operators, the level of competency of operators and their rivals and the structure of the port authorities.

Port development and structure

With time, globalizations have become more intensified and thus port also developed in respect to infrastructure, operation and management system. Ports need to facilitate trade according to the customer requirements for different cargo segments (Lee and Cullinane, 2005). According to Branch (2007, pp.396) port development mainly derives by the market research, shipping lines, port authorities need to adjust their business plan according to the change in the market. Level of infrastructure determined by the level of operation incurred in the port and level of operation determined by the density of the customer in the region. There are four level of port development described in the Stopford maritime economics book- small local ports, large local ports, large regional ports and regional distribution ports.

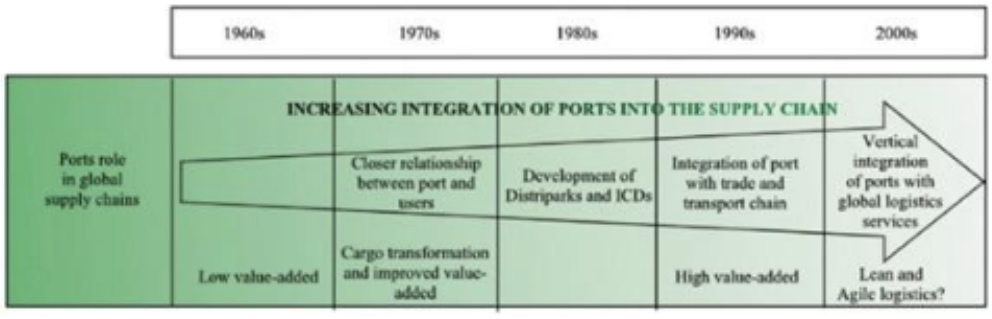
Figure 1: Four levels of port developments



Source: Stopford, 2009

Due to the force of globalization ports also shifted from gateway towards logistics hubs integrating more in the supply chain. Same studied in the Pettit and Beresford (2009) article "From gateways to logistical hubs."

Figure 2: Port integration into supply chain



Source: Pettit and Beresford

This integration of ports has made supply chain more competitive and improved productivity.

Chapter 1.1- background of the study

Bangladesh is going to celebrate her 50th Independence Day in the year 2021. Prime minister Sheikh Hasina expressed her desire to turn the vision 2021 into vision 2041 as a long-term development plan and titled their election manifest as "Bangladesh marching ahead". In 2041, Bangladesh will be a peaceful, prosperous, happy and developed nation comparable with the developed world as she mentioned during her speech in the parliament. Although, government didn't specify their plan for achieving the goal "vision 2041". In the year 2021, Bangladesh government set an economic development plan called "vision 2021". Bangladesh vision 2021 was to set a framework for the future which will reflect the hopes and aspirations of the nation economically and politically. The vision was set with eight identified goals by 2021 –"to become participatory democracy, to have an efficient, accountable, transparent and decentralised system of governance, to become poverty free middle-income country, to have a nation of healthy citizens, to develop a skilled and creative human resources, to become totally integrated regional economic and commercial hub, to be environmentally sustainable, and to be a more inclusive and equitable society." The economic objective was to raise the nation per capita income up to $2000 by 2021. Proper implementation of vision 2021 will lay out the foundation for vision 2041 and paves the way to become a developed nation by 2041. According to world bank total population was 161 million and total GDP was 195.1 billion with a growth of 6.6% in 2015. Bangladesh is in the Goldman Sach's list of the "Next 11" as emerging economies of the 21st century with an expected GDP growth of 7.1%. Foreign trade accounts for 38% of the nation's GDP and 87% of the countries' trade carried out through sea ports. Port of Chittagong is considered the heart of Bangladesh economy being the only major sea port of the nation (Goldman Sach, 2007). In the year 2014-15 port of Chittagong has handled over 1.8 million TEU containerised cargo. The port has seen a container traffic growth of 14% in the recent years against the nation's average 6% GDP growth and expected to be topped up by 2018. In this present situation govern planned to develop a deep-sea port off the cost of Chittagong and another new sea port in the south west part of the country in order to keep pace with the countries trade volume growth.

Chapter 1.2 - History and back ground of the port of Chittagong

From 4th to 9th century this port was known as "Shetgong". During that period, the port was important to the Arabic and Yemeni traders and their fleets used to call port of Chittagong. The modern history of port of Chittagong started from 9th century when Portuguese landed here in 16th century and named the port "Porte Grande" (a great port). Present location of the port was selected in 1887 and 04 jetties were built in the year of 1910 in order to handle 0.5 million tons of cargo annually (CPA overview report, 20014-2015). Chittagong port trust was established in 1960 to manage port rail. During that time port was governed by port rail way and port commissioners. After the liberation war Chittagong port trust was dismantled and Chittagong port authority was established in 1976. Since then port has been governed by Chittagong port authority (Port of Chittagong annual report, 2014-2015).

Chapter 1.3- motivation of the study and relevance of the research

During the time of independence, total number of population of Bangladesh was around 70 million and now it is around 160 million. During this period, neither the government have built a new port facility nor the government have carried out necessary reforms in the port of Chittagong in order to increase foreign trade and attract more foreign investment in the region. We also have missed the opportunity to take advantage from its strategic location due to poor infrastructure and miss management in the port. Although, almost 80-85% of the total trade are conducted through the port of Chittagong. In a recent study, it has been found that with a good infrastructural facility garments export would increase up to 30% more from the current volume (Halima, 2003). Where garments are the largest exported item of the country. With the high growth demand, it is a matter of urgent attention to make the port of Chittagong as efficient as possible and ensure maximum utilization of the port infrastructural facility. Bangladesh can be greatly benefitted by providing transit for the logistic transport through port of Chittagong to the countries like India, Bhutan, Nepal and Myanmar. Bangladesh should analyse the potentiality of the port and its strategic value to take necessary steps to capture values from its strategic geographical location. More importantly, to meet the local demand for growing consumers and export oriented industrial manufacturers. So, in this research we shall try to analyse the important and this port and also what role can it play in this region.

Chapter 1.4- problem statement

As part of the economic development programs government also want to develop a strong maritime sector in Bangladesh to support countries' foreign trades. In the recent years, we have seen government has dissolved sea boundaries India and Myanmar in The Hague international court. Government has also given permission to Indian ships to call Bangladesh ports and granted transit route to North-East part of India through Bangladesh. In addition, Bangladesh get access to Nepal and Bhutan through India so that they can use port of Chittagong for their international exports and imports. Which is definitely a good step and will boost the Bangladesh economy. But port of Chittagong has its own limitation with shallow drafts, siltation, bad governance, political influence, inadequate infrastructure and capacity, congestion which is resulting low performance of the port. All these factors are having negative impacts on the port productivity and also ultimately in the economy. Maximum depth of the channel is only 9 meters and maximum 187 meters length ships can only call port of Chittagong. Most of bigger vessels have to discharge at the outer anchorage and which is costing another extra $15,000 euros for an operation. Moreover, if they do not take necessary steps surely, they will fall out of competition in this region and Bangladesh will lose the opportunity to be a transit hub for the South Asia. On the other hand, government is trying to build a deep-sea port 25 miles off the port of Chittagong. In addition, government has already stared a small-scale port in the South West coast of the country. From these new ports development port of Chittagong can be beneficiary and also can experience

a negative impact as well which to be determined by the actions taken by the port of Chittagong. Any failure to carry put necessary reform in the port and its hinterland connectivity will hamper government economic development progress.

Chapter 1.5- scope of the research

During this study, we shall try to make an assessment on the port of Chittagong capacity and then asses the future capacity in respect to the GDP growth of Bangladesh. We shall try to make a determine the impacts of new deep-sea port and inland port on POC. Also, we shall study dry bulk, liquid and container all three of them. Also, what are the necessary steps to be carried out in order to meet the increasing demand. We shall also look at the port hinterland connection within the region.

Chapter 1.6- research question and sub research question

Research Question

What will be the impact on the port of Chittagong due to economic development in Bangladesh?

Relevance

This research question is very relevant to our study. By answering this question, we would be able to find out the impact on the port and to what extend port authority should carry out its reform in order to facilitate international trade for Bangladesh.

Research Objectives

To answer the main research question, we have following sub research question:

1. What is the present capacity and level of efficiency of the port of Chittagong?
2. How will be the competition of market share in future in this region?
3. What will be the forecasted volume in the port of Chittagong in 2043? considering the having impact of deep sea port fully operational?
4. What are the infrastructural reforms and strategies to be taken to have good market share and what are the advantages can CPA gain from the new development of ports in the region?

Chapter 1.7 – port capacity and limitations

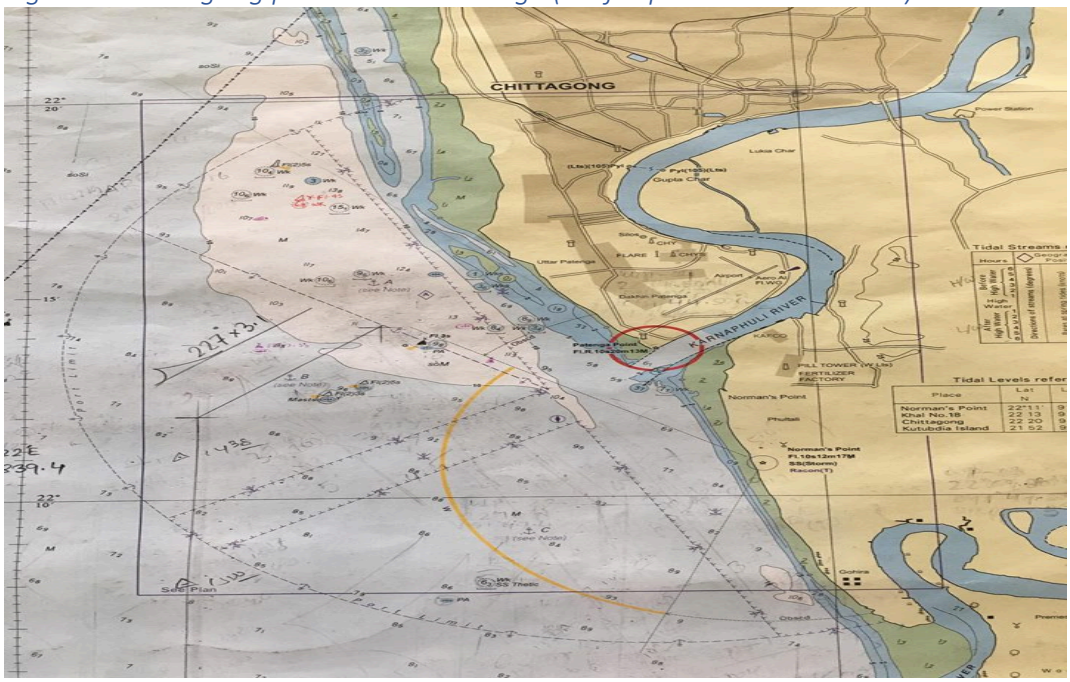
The port handles with general cargo vessels, container vessels and also with small oil tankers. The port has both draft and length restriction for ocean going vessels. The maximum draft for this port is 9.2 meters which varies from jetty to jetty. Due to the draft and length restriction, all the bigger vessels discharge bulk cargoes at the outer anchorage with STS operation. Due to the Gupta band (a band in the karnafully river channel) at the entrance of the channel maximum length of 186 meters vessel can enter inside the port. Vessels more than 9 meters draft discharge

at the port of Chittagong outer anchorage and vessel more than 11 meters draft discharge at the Kutubdia outer anchorage where deep drafted mother vessels can drop anchor.

Figure 3: Karnafuly river channel (maximum draft up to 9 meters)

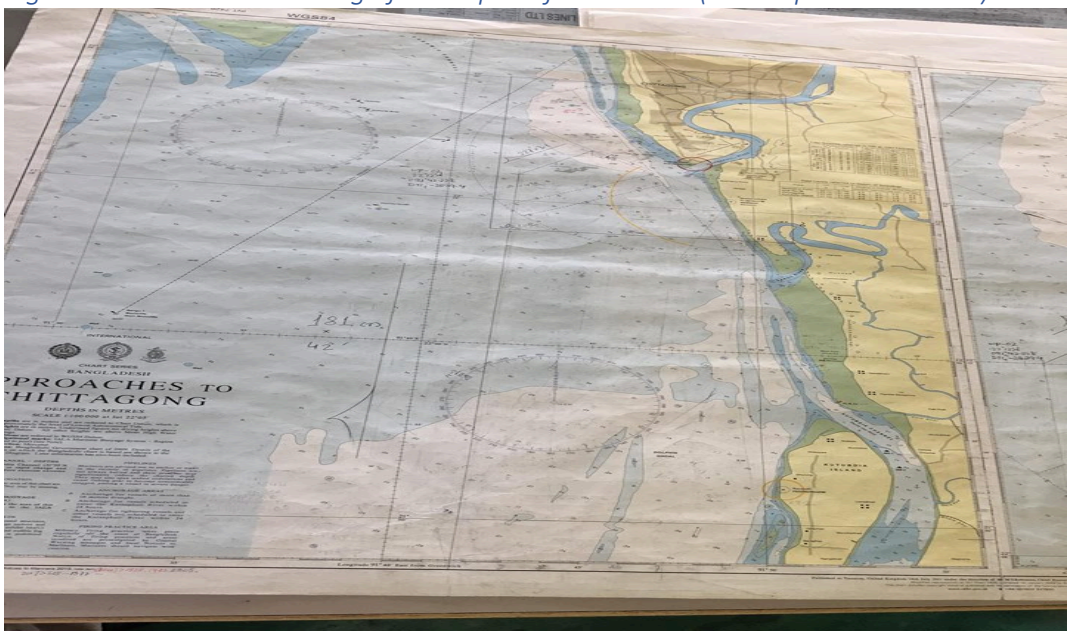
Source: Collected from local navigators.

Figure 4: Chittagong port outer anchorage (draft up to max. 10 meters)



Source: Collected from local navigators.

Figure 5: Kutubdia anchorage for deep drafted vessels (max. up to 15 meters)



Source: Navigational Charts (collected from local navigators)

Table 1 : **For ocean going vessels**

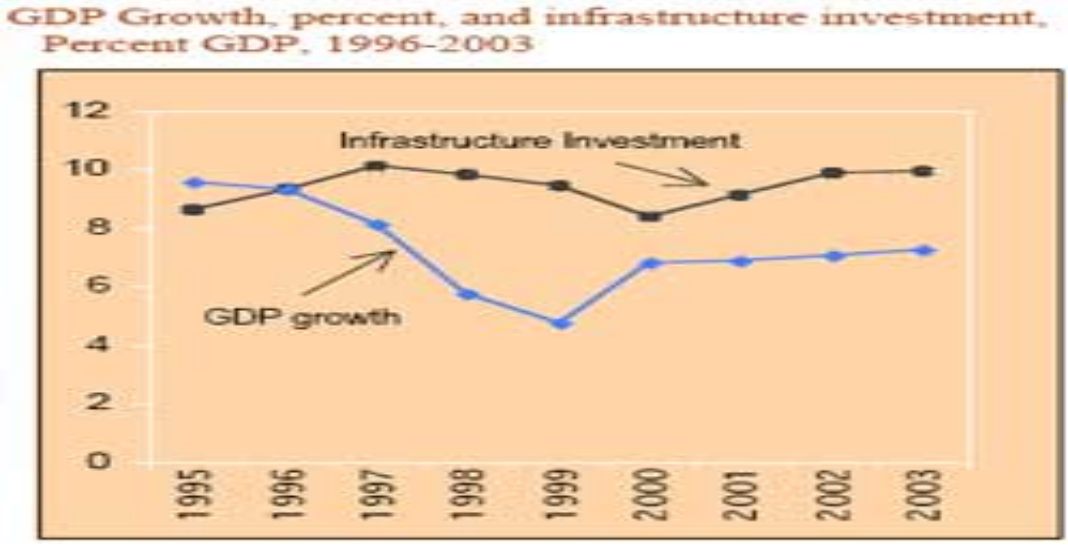
Name of the jetties	Berth no.
General cargo	06
Container terminal	11
Dolphin jetty for oil tankers	03
Grain silo jetty	01
CUFL jetty	01
TSP jetty	01
KAFCO urea jetty	01
Ammonia jetty	01
Total	**31 Nos.**
Repair berths	
Dry dock jetty	02
Moorings	03
For inland vessels	
Jetty berth for POL	01
Concreate berth for grain handling	01
Pontoon berth for POL	03
Pontoon berth for cement	01
One single point moorings	19
Total	**25 Nos.**

Source: Port of Chittagong website

Chapter1.8 – relationship between macroeconomics, port economics and port performance

Relation between port economics and economy of a country are closely related to each other. Port performance straight way determines the country's economic development progress. Therefore, governments are investing heavily in the port infrastructure development and as well as in the hinterland connectivity within the port area. In the present world port plays a vital role for domestic and international trades.

Figure 6: Infrastructural investment and GDP growth



Source: http://www.imf.org/en/News/Articles/2015/09/28/04/53/sonew061815a

Chapter 2 – literature review

In the past, there have been lots of study carried out related to port management, port development and measuring the importance of ports in the economic developments. From the previous studies, in most of the literature forecasting throughput was the main element to measure the port efficiency. Some of the literature will be discussed below. Also, there are some other determinants of measuring port performance such as economic developments, investment strategy, geographical location, port capacity and limitations, political stability etc. In our literature review, firstly, we shall look at the literatures regarding of measuring port performances. Secondly, we shall look at the determinants of port performance. Thirdly, we shall discuss on the impact of economic developments on the port performance. Fourthly, we shall discuss the relation of port development and economic development.

Chapter 2.1- Measuring the port performance

There are several ways to measure port performance and most widely used method is the throughput calculation. However, there are other methods can also be applied to determine the port performance (Langen, Nijdam & Horst, 2007). Usually, actual throughout is compared with the optimal throughout of the port to check the port's improvement or declining. Another way is to compare throughput with any other standard performance in the region by taking into account prevailing circumstances. However, sometimes it is also practiced that the profitability is compared with the actual throughput of the ports (Talley, 2006). Basic performance indicators are added value in the GDP as percentage, value added in the sea ports, generation of employment, profitability of the firms (Langen, Nijdam & Horst, 2007).

Chapter 2.2- Determinants of port performance

Port competitiveness is not easy to measure and there have been lots of attempts made in order to define port competitiveness. Many authors have made attempts to determine port competitiveness by productivity and efficiency. However, there are more to be taken into account. Ports boost interaction, cooperation, coordination and collaboration within the supply chain network in the global market (Song et al, 2008). The OECD has made series of attempts to summarise the determinants of port competitiveness. Four determinants were chosen among them three are directly related to the supply china sector: called foreland, the port node and hinterland. On the foreland side well connected maritime location, easy nautical access, strategic positioning are important factors. On the port node side, efficient maritime operators, good planning, equipment maintenance, service quality, competitive labour costs, information system are mandatory. On the hinterland side, extensive connectivity with the other modes of transports, competitive freight corridors are more important. Finally, the fourth determinants are related to the citizens of the region. Ports need to involve themselves in various community welfare activities with involving local citizens.

Chapter 2.2.1- Location and hinterland capacity

Malchow & Kanafani (2004) conducted a research on the importance of port geographical location. Where they have shown that distance from the inland have a very strong relation with the port performance. Also, oceanic distance has a significant negative impact on the port performance. Caldeirinha, Felfcio and Coelho (2009) shown that port distance from urban cities have a positive relation the port financial performance. On the other hand, location near sea or the city doesn't have any major impact on the port. They have concluded that location is an important factor for determining port performance. Singapore, Hong Kong, Rotterdam has a better geographical location advantage than Melbourne and Sydney. Singapore, Hong Kong and Rotterdam works as a transhipment port while Melbourne and Sydney work as a local port for the local economy. There are also offshore hub ports due to technological improvement. For instance, Malta and Freeport are good example for such kind of ports. So, the location of the port are as important as the throughput volume (Garcia-Alongso & Sanchez-Soriano, 2009).

Chapter 2.2.2- Hinterland accessibility

According to Langen and Chouly (2004) hinterland access is very important for throughput volume specially it has huge role in the transhipment transit ports. For example, Rotterdam, Antwerp and Amsterdam enjoys better hinterland access than the other European ports due to their aces to the river Rhine (Langen, Meijeren & Tavasszy, 2012). These types of ports also require quality infrastructure for the better transport capacity locally and internationally.

Chapter 2.2.3- Draft restrictions and accessibility

Draft of the port and accessibility in the navigable channel has a greater impact on the port performance now a days. Due to economic of scale, we have seen larger ships are moving across the sea to reduce transport cost and maximize the profits. The deeper navigational ports can accommodate larger vessels and they have more throughput (Caldeirinha et al, 2009). Insufficient draft can reduce the port activities and thus prevent the ports to become transhipment hub (Tongzon & Heng, 2005). For instance, port of Rotterdam has the highest geographical advantage than its rival Antwerp and Hamburg. Port of Rotterdam enjoys the deepest draft, much closer to the sea and efficient hinterland connectivity. This is why Port of Rotterdam has the highest throughput in the region in all segment of cargo (Langen er al, 2012).

Chapter 2.2.4- Presence of industrials firms in the port

There has been tendency among the export oriented manufacturers that to locate their firms as close as to the sea ports. So that they can reduce the transport cost including wire housing cost and to make the trade easier. Another benefit is that they used to get benefits from the good relationship with the port authorities and other actors involved in the port area by integrating with various port activities. We have seen emergence of maritime clusters during the last centuries. Such as, Dutch maritime cluster, Norwegian maritime cluster, Danish maritime cluster, etc. Dutch maritime cluster consists of port, shipping lines, industries, inland water ways, logistics companies, terminals, ship building firms, maritime services, dredging firms, yatch industries, maritime suppliers, navy, offshore firms etc. The port is the largest sector within the cluster and it is the center of all activities which connect each other (Nidjm & Langen, 2003). A cluster is a group of geographically concentrated and related business units, associations and organizations (Langen, 2004). Here firms can be homogeneous and they clustered around an economic specialization, for a common product process (Nidjm & Langen, 2003). Among the other activates, cargo generating is the main activities for these firms. Transport, wire housing, logistics, manufacturing, trade and cargo handling are the main activities (Langen & Chouly, 2004).

Chapter 2.2.5- Port and terminal efficiency

One of the most influential part is the of the port efficiency is the terminal efficiency (Tongen, 1995 & Heng, 2005). It is the number of container loaded or discharged from the terminal. In other words, it is called moves per hour. This reflects the productivity of the labour and capital in the port. With the increase of efficiency, port throughput also increases (Tongzon & Heng, 2005). Port performance and terminal efficiency are positively correlated with each other and port efficiency also determined by few factors such as container mix, dwell time, moves per hour, vessel size, crane efficiency and any other equipment efficiency (Tongen, 1995).

Chapter 2.2.6- Port charges

Port charges are also an important factor for port performance. This is the service charges charged by the port authorities against the facilities provided. Shippers like

to choose a port with low charges. But shippers are seeming to be less concerned with the port charges than delays and inefficiency of the ports. Port charges are a smaller part of the total port cost (Tongen, 1995). In a competitive geographical port range port charges plays a very less role in determining port performance. Liu & Park (2011) found very low effects of port charges in Korean and Chinese ports during their research.

Chapter 2.2.7- Economic activities and developments

Level of the activities in the ports determined with the volume of export/import and transhipment activities. Regional economy consumes products which is produced in various parts of the world. This is why it is reasonable to discuss about macroeconomic condition. To be more precise, GDP growth should be taken into account as a determinant of port performance. The value of export and import are the most important for determining port performance (Seabrooke et al, 2003). Chou, Chu and Liang (2008) researched on the relationship between export container volume and economic growth by taking into account economic data, volume of export/import containers, populations, industrial production index, GNP, GDP, the whole sale price, agricultural GDP, Industrial GDP, and service GDP for the period of 1989-2001. Their findings were that there was a significant relationship between these variables and macroeconomic conditions are very important for port performance. Caldeirinha et al (2009) showed that economic development is significantly related to the port performance and port expansion. In macroeconomics labour regulations also have influence on the port performance. The more flexible the labour regulation is the more port performs. Labour is the main and most flexible component of the transport cost, time and risk (Barton & Turnbull,2002). Operating costs consists of 60-70% of labour cost. Labour flexibility regulations are the main determinants of the difference among port pf London (marked based approach), Le Havre (socially regulated approached) and port of Antwerp (Barton & Turnbull, 2002). But due to be technological development these costs are gradually reducing now a days. Development of container industry have made shipping much cheaper than before. Therefore, labour cost and labour regulations are not as significant as before. So, the port performance is more dependent on the other economic variables. However, not only the port but also the hinterland economy plays a role in determining port performance.

Chapter 2.2.8 - The direction of link between the port activities and port development

It can be argued that economic activities have impacts on the port development process or port have an impact on the local or national economy. Jung (2011) explained that both direction can be correct. The impacts of port on the economy have changed over the years due to its involvement in the hinterland connections. Due to this extra activities port's impacts have increased on the local or national economy but on the other hand, due to technological development employment have reduced in the port. Also, ports become more capital intense due to larger vessels.

Chapter 2.2.9 - Port economic impact

Chai (2005) carried out a research about the port contribution to its geographic region economic development where he took Kenyan ports as a case study. In his study, the author has discussed about the historical back ground of ports and maritime dependency of world trade, basic port model and port evaluation, an overview of Kenyan economy, importance of Kenyan ports, SWOT analysis of Kenyan ports, forecasting economic growth and forecasting container through, then determining required facilities for the port to meet future demand and also provided few solutions and recommendations.

According to Vleugels (1969) the economic impact studies of port within a regions they serve is done to,

1. To what extend port contribute to the social economic value and prosperity.
2. To influence the community and possibly the higher authorities with the results of the research.

According to Cariou (2004), the port economic impact means results of the economic activities on the environment. Here environment means physical or natural, human labour and economic and social factors. Physical factors are infrastructure in the region, development in port area. Human labour includes knowledge, technology, training. Economic and social impacts indicate income, cost efficiency, trade, financial activities, investments etc.

Port contribute in two ways- port has an impact in the region and specifically in the national economy in a macro-economic way. Meanwhile, port also contribute to trade and supply of hard currencies (Cariou, 2004, p33).

The extend of port hinterland depends with the nature of port such as local port, inland port, international port or transhipment port. Port economics also depends on the presence the of consumers within the port range.

Kind of port impact

The economic impact of port can be three types: direct, indirect and induced type.

Direct impact:

Direct impacts relate to the firms working in the port such as shipping lines, agents, terminal companies, manufacturers. It is the initial employment and spending with in the port area. Firms and personnel are directly dependent on the port activities. They generate the trade flow and thus most of the revenue for the port. It usually involves the companies who are responsible for moving cargoes, investment in the port infrastructure (Cariou, 2004, p34 & Marad, 1987, p 29).

Indirect impact

This includes firms who are economically involves with the primary activities of the port. This counts labour, services, material supply chain activities etc. Firms who imports basic raw materials and exports finished goods, distribution centres, wire houses, traders (Cartensen et al, 2001, p29, & Cariou, 2004, p34).

Induced impact

Induced impacts created by both direct and indirect impacts on the port. Which relates to the industry professionals, consultants, law firms, banking systems, insurance providers, cars, internet facility, power supply unit, construction companies, catering services or any other services generated by the port activities.

Chapter 2.2.10- Measurements of the port impact on the economy

This measurement mostly based on the estimation. In order to calculate the overall impact, we shall have to look at both the direct and indirect impacts. The two methods can be used to calculate the port impact: the value-added approach and based contribution to the general efficiency or inefficiency of the economy (Chai, 2005).

The value-added measurements

In quantifying the value added it is usually the aggregate employment level and aggregate value added has to be calculated. The difference between total outputs less total inputs is the value added. Factors, such as, salaries, wages, profits from the industry originates the added value (Vleugles, 1969, p244).

Direct impact measurements can be done through direct interview, or published official statistical data. Here problem lies with the responses in direct interviews and published statistical data doesn't show any sharing of time or value added among the different activities (Cariou, 2004, p.36).

Indirect impacts can also be calculated through direct interview with companies related to port activities. But it is often very difficult to do such an assessment because of the lack of different level of involvement with the companies. It is also very expensive to conduct such a mass survey. Also, firms may not be located within the port area. Co-operation from the public authorities determines the value quality of the research. According to Vleugels (1969) following things must be taken into account.

According to Vleugels (1969) the followings should be investigated,

1. Income earned by the employees from the port
2. The geographical distribution of the employees
3. Comparison between income earned by the employees from port and from other sectors.
4. Total profit from port related activities.

Contribution to general inefficiency or efficiency

Too much attention to increase added value may have negative impact on the port total efficiency outcome. This may lead other sectors towards less efficiency. This

can have a negative impact on the port economy and thus reduce the national export and import volume.

Impact on the export and import prices

Global trade greatly dependants on maritime sector. Port efficiency determines the competitiveness of the trade sector. Efficient supply chain management leads to low transport cost. Port contributes about 10% of the total supply chain cost (Chai, 2005). Port inefficiency increase waiting time, delay in vessel operations, increase dwell time, increase freight rate and demurrage etc. increased cost reduces firm earnings and overall national income.

Insufficient human resources and equipment

Over 8,000 people work in the port of Chittagong where 31.9% posts port and 33.3% post in customs are vacant in the port. In both the department has very low education standard, lack of training. Most of the employees are not familiar with basic operations of computer and commonly used software. Chittagong custom house cannot verify documents without C&F cooperation (Transferency international Bangladesh).

Chapter 2.2.11 - Ports as an engine for economic development

In 2013, OECD conducted a series of analysis on different ports-cities regarding positive and negative impacts of the ports in their respective cities (Merk, 2013). Their findings were that ports works as a trade facilitator for the regional economy between regional ports, hinterlands and the rest of the world. Regional economy gets access to the global market through ports. Which increases export and import and thus reduces transport costs. Ports helps regional economies to be more competitive worldwide by attractive new industrial activities, importing raw materials, transferring knowledge. Overall, ports created an indirect positive effect across the connected hinterland. In the meantime, level of this effects differs with the nature of activities. Export/import creates more added value in the regional economy than the transhipment activities. In addition, ports also create some other activities such as fishing, ferries, cruising or any other recreation activities (Rodrigue, 2013). Port always have positive impacts on the employment side which creates direct job scope for the local population but with the technological development number of jobs have been reducing. It's becoming more capital intense. Only few thousand jobs are accommodated in a big port now a days. On the other hands, there have been increasing number of indirect jobs in its hinterland. According to OECD report with the increase of one million throughput per port can increase only 0.0003% of total employment from the region. Which means only 3000 works can be generated with the increase of ten millions throughout for a port. On the other hand, port activities also generate negative impacts on its environment polluting its air and ocean.

Chapter 2.2.12 – Port performance and equipment productivity

Shahjahan (2000) wrote a thesis on the cargo handling equipment productivity of port of Chittagong and the findings was poor maintenance culture of the equipment as well as lack of skilled man power. The author also analysed about the cargo handling productivity of port of Chittagong, Bangladesh. He has discussed about the port's equipment management and inventory system, an analysis of equipment performance and productivity, port performance indicators of Chittagong port authority (CPA), cost-benefit analysis of CPA equipment's, short comings and factors directly affecting the maintenance operation. PEST analysis, future container volume forecasted in the region, a comparison with local and regional ports, annual operating cost comparison with EU ports, SWOT analysis with local and regional ports. Shahjahan (2000) discussed in details on cargo handling management system and its impact on the port productivity. The author analysed the current management of the port of Chittagong equipment, available facilities and maintenance practice are in practice. Also analysed the maintenance performance, operational performance and cost benefit analysis of the equipment. There are three categories of maintenance – preventive, corrective and designing out maintenance (Shahjahan,2000). In most of the ports only preventive and corrective maintenance are carried out but the designing correction are rarely in practice. Cargo handling is the integral part of the port operation. Poor equipment inventory, too old equipment, no standard system in maintenance, non availibity of spare parts, poor leadership, long chain of command, lack of control in the supervision, lack of skilled manpower, corruptions, bad budget implementation, poor working environments, government interference.

Chapter 2.2.13 – Port efficiency and productivity

Begum (2003) discussed about the impact of port efficiency and productivity on the economic development of Bangladesh. The author took port of Chittagong as a case for her research. In this study, author showed the relationship among macro-economics, port economics and port performance. Overview of Bangladesh economy and nations maritime dependency discussed, role of port of Chittagong and its importance on Bangladesh economy, SWOT analysis performed to show the weakness and strength of the port authority locally and within in the region, a comparative analysis conducted to analyse the port competitiveness. Short-term and long-term solutions have been recommended in order to improve the present condition.

Modest (1999) has made a research on restructuring of the port industry in Tanzania, he discussed about privatization of the port authority and the impacts on port efficiency. Realization of the study was- effective management of the privatization process and privatize enterprise. A well-developed capital market, investment code, flexible labor market, adequate infrastructure facility, effective managerial practice is vital to achieve the efficiency.

Adhitama (2009) completed a study to find the relationship between economic growth and port development and shown the importance of port as a major infrastructure support for economic development and also noted that ports are

developed ahead of the national growth as they are planned beforehand to support the future infrastructural needs. It is also shown that ports are various types such as load center, global pivot, regional ports, minor ports etc. Also found that international trade directly affects port growth.

Jansen (2014) tried to forecast container cargo throughput in ports using various models and scenarios. The purpose of the thesis was to determine the various factors which has impacts on forecasting container throughput. According to the research there are three essential elements to be determined while forecasting container throughput namely good estimation of GDP growth, port competition in the region, other factors which cannot be quantified but counted with the help of qualitative method. For instance, port market share can be affected by the shipping lines decisions which actually cannot be forecasted.

Syafaaruddin (2011), tried to evaluate the container terminal efficiency and future investment. Found that efficiency score is not only the indicator of the resource utilization levels, capacity analysis was conducted to obtain the ratio demand and capacity as an indicator of capacity utilization level.

Brox (2014) studied about the port of Valencia as a case study to show the importance of competitive ports for regional economic development. In this study, ports are shown as an engine for the global economic development. In this qualitative study, it has been shown that the port of Valencia has the great opportunity for becoming an engine for the regional economic developments and its hinterlands. But there are some future challenges has also been pointed out.

Chapter 3 – Research Methodology

In order to analysis this thesis, a quantitative method of analysis to be carried out for different part of the study. We shall try to answer our sub research questions in order to answer our main research question.

Step 1. A qualitative analysis shall be carried out to determine the present port berth capacity, efficiency and limitations of the present capacity. This will be done through port authority website and discussion with the port authorities.

Step 2. A qualitative assessment shall also be carried to determine port performance measurements. Which will be done through various reports regarding port performance and activities.

Step 3. An analysis shall be performed on the organization structure and management efficiency of the port of Chittagong.

Step 4. An attempt shall be made in order to forecast the port future outlook. We will accomplish this analysis by investigating various government sources and port future investment policies for the port of Chittagong. In this study, we shall also take

into account government various development programs which have already in place and which is in the pipeline at the moment to find an impact on the port of Chittagong.

Step 5. Finally, we shall try to analyse the strategic importance of the its geographical location in the South Asian region and how port of Chittagong can be benefitted from its lucrative position. In order to complete this analysis, we shall look at the geographical context of the port position and also, we shall analyse the neighbouring ports competency.

Data collection process

This section will discuss about the data collection process, research steps and the problem addressed. The study includes public documents (newspapers, journals, formal studies on port of Chittagong), internal documents, phone interview to authorities and stakeholders and other actors involved in the port, interaction with researchers and professionals. A question set shall be prepared in order to conduct interviews. To conduct interview, we shall identify the main stakeholders of the port such as port authority, shipping lines, freight forwarders, consignees can be our target. Other stakeholders such as stevedoring companies, trade unions, port research institutions shall also be contacted. Before conducting the interview, a brief idea shall be gathered regarding the company and email communication shall be established.

Chapter 4 - Qualitative analysis

In this chapter, CPA performance in the recent past, contribution in the national economy and port efficiency matters will be analysed. Port activity and its growth are directly related with the global economic performance. Furthermore, overall seaborne trade and its relation with the global economic growth will be discussed. It will give us an idea of gradual growth of CPA and its performance over the recent past.

Chapter 4.1aOverview of global seaborne trade and relation with economic growth

World seaborne trade has exceeded 10 billion tons in 2015 and increased by 2.1% than the previous year. On the other hand, world GDP growth was expanded by 2.5 % in 2015. From the historical data, we can see that world seaborne trade has a strong positive relation with world GDP growth. Container throughput is approximately double than the GDP growth. (UNCTD, 2016).

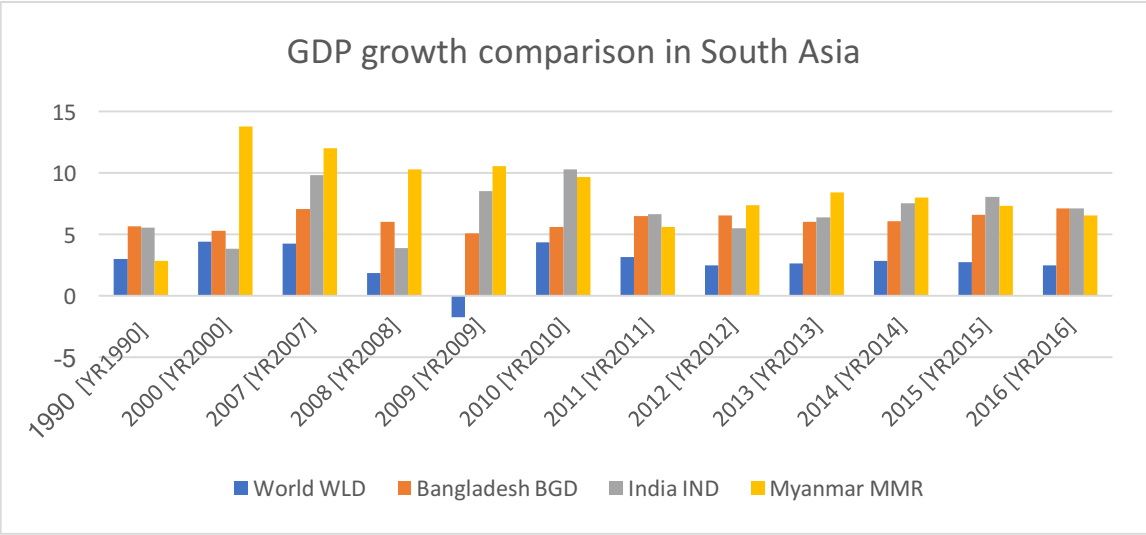
Figure 7: Trade growth and GDP growth relation

Source: World Bank and UNCTD

With the global economic downturn port industry also experienced slow growth during this decade specially container industry suffers the most. By volume approximately 85% loss experienced by the top 20 container ports which was 6.3% and 0.9% respectively in 2015 and 2014 (UNCTD, 2016). In 2008, world GDP growth was recorded 1.819% and total seaborne trade was 8286.287 million metric tons. On the other hand, in 2009, GDP growth was -1.73% and consequently seaborne trade reduced to 7831.99 million metric tons.

GDP growth comparison in the region of Port of Chittagong (%):

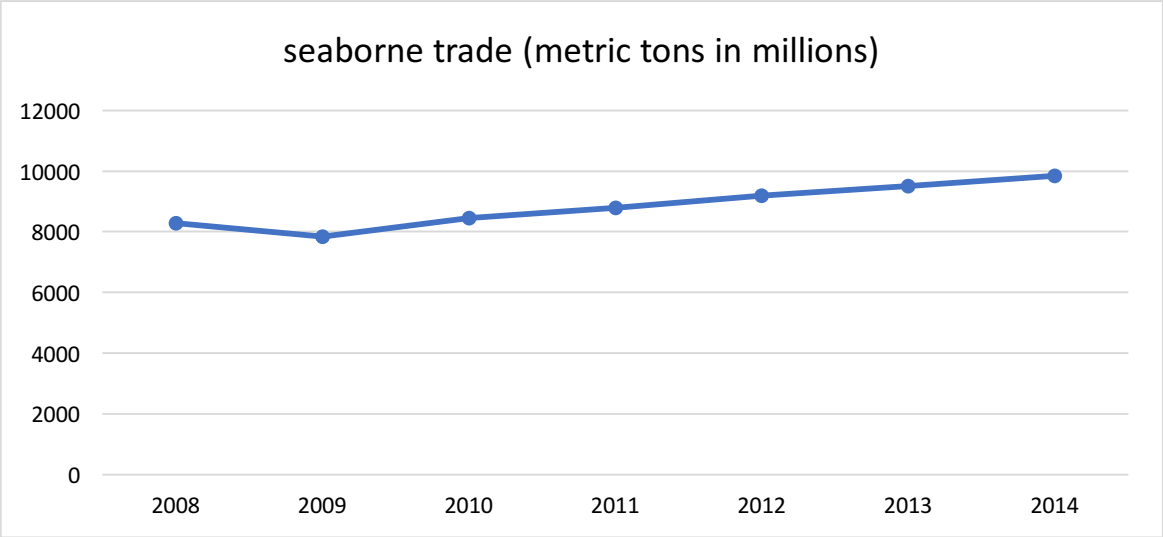
Figure 8: GDP growth comparison in South Asia



Source: world bank data base.

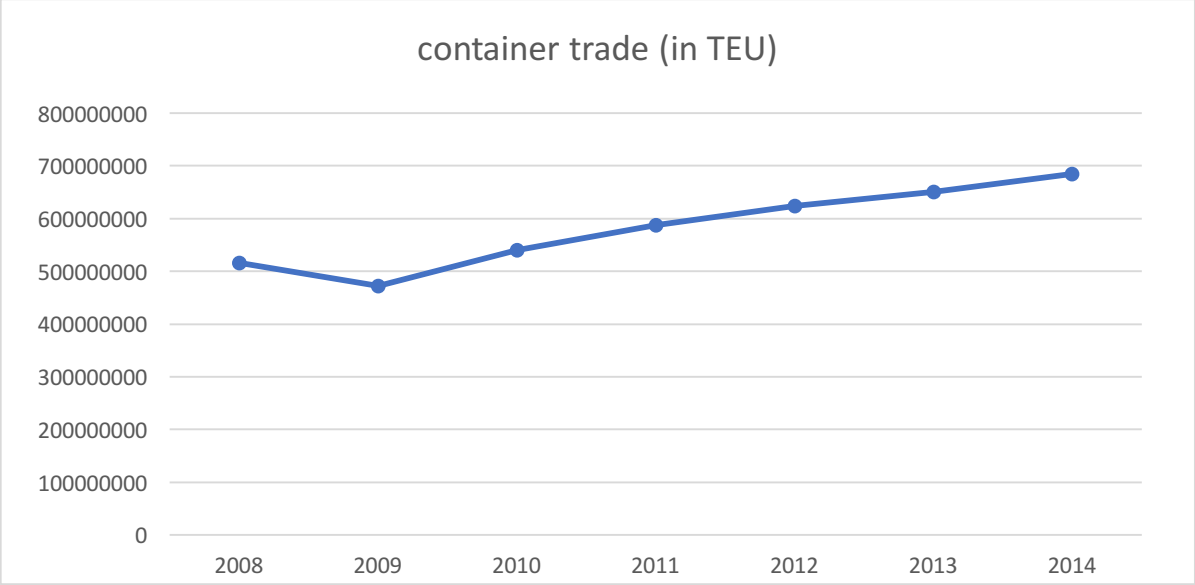
In terms of GDP growth developing nations are having higher growth than the world average growth. Last year Bangladesh, India and Myanmar had 7.1%, 7.10% and 6.5% while world GDP growth was 2.4%.

Figure 9: Worldwide seaborne trade from 2008-2014



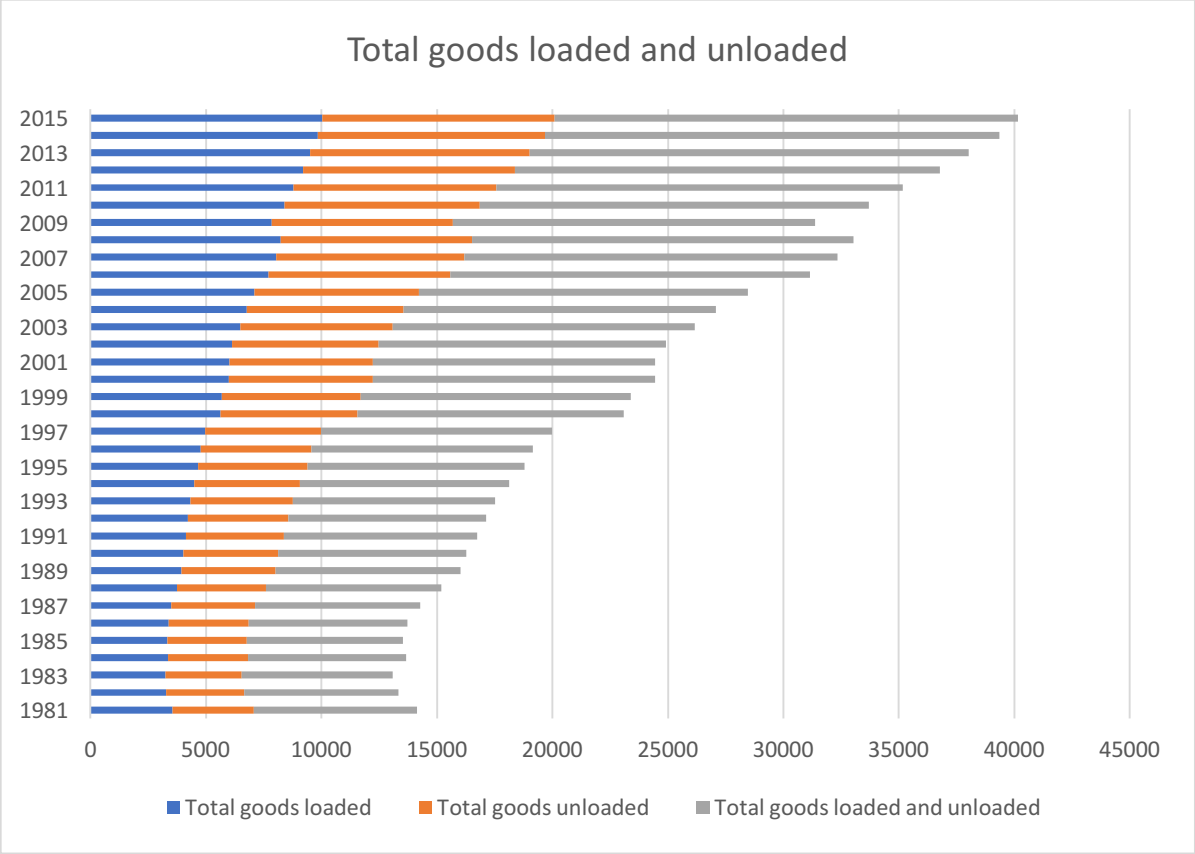
Source: UNCTD.

Figure 10: Global container throughput in TEUs



Source: UNCTD.

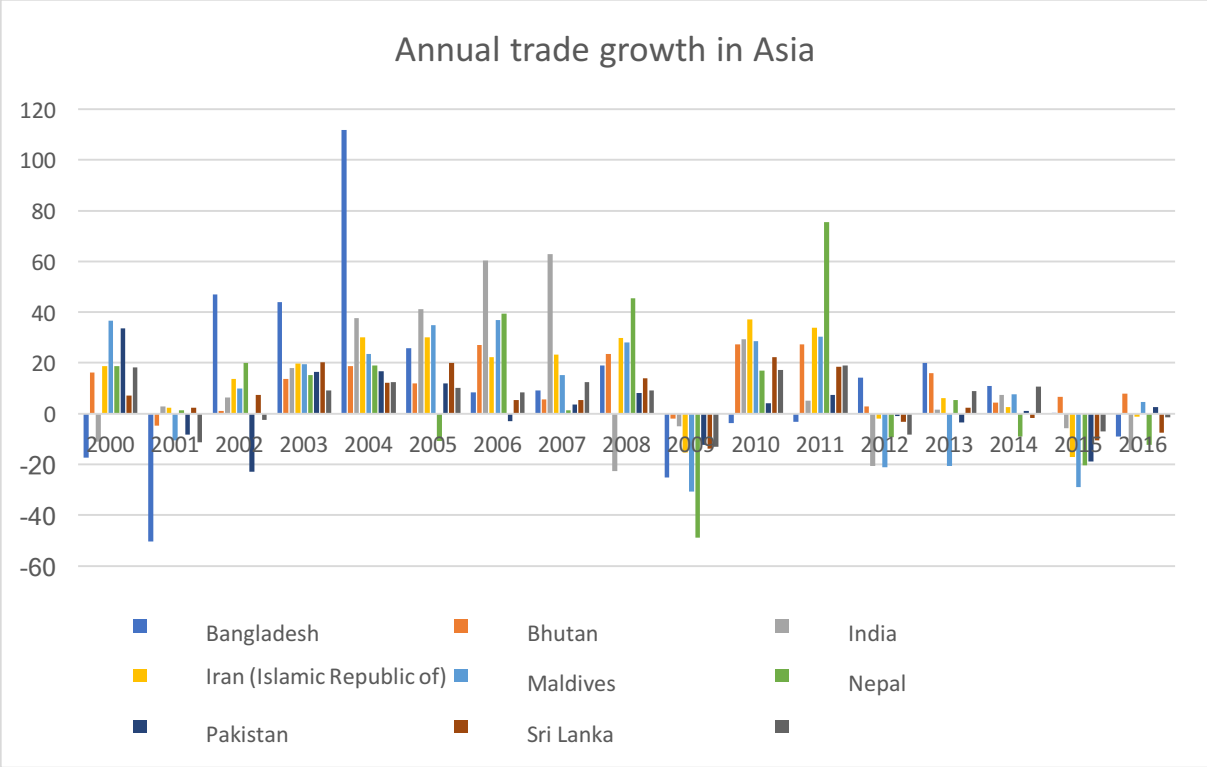
Figure 11: Trend of global cargo trade 1970-2014 (million in metric tons)



Source: UNCTD.

Despite of few economic slowdown there has been a steady growth in the global trade volume. In 1970, total cargo traded 2,529 million metric tons and in 2015 reached to 10033.37 million metric tons.

Figure 12: Annual Trade growth rate in South Asia:



Source: UNCTD

Chapter- 4.1b Port functions and actors:

Commercial ports grew around mega cities with a suitable geographical location, available work force and dense markets. Before 1950, it used to take several weeks to load and unload a vessel whereas now-a- days it can be done within one or two days only even for bigger vessels. Maritime ports also involve multi segments of maritime operations such as piloting, towing, mooring, stevedoring, bunkering, surveying, insurance, environment, engineering, terminal operations, repairs, trucking, rail, freight forwarders, storage facilities, security, customs, shipping lines etc. (Rodrigue 2013). Port function involves many different actors. Port authorities are the in charge of port organization, economic exploitation, implement taxes and fees for using the port facilities. Port authority also approve tariffs, authorise concessions and contracts. They also plan for port development, environmental protection and port related research for further strategic policy making. Harbour maters office is responsible for maritime operations within the territorial water. they control the movements of ships, grant permission for entrance, control and regulate shipping activities, exercise maritime security measures, maritime search and rescue operations and environmental pollution control operations etc. there are several transport operators in the maritime supply chain process. Shipping lines carries the cargo

for their clients while agents facilitate transport in the port. In the terminal, terminal operators are responsible for loading/unloading of container, manage and storing the container within the terminal. They are equipped with cranes, forklifts and other cargo equipment. They usually operate terminal with long term lease from the port authority. Consignees are the private organisations designated by the ship owners. They announce vessel arrival, helps captain in local administrative process for loading or unloading cargoes. Freight forwarders is a private firm which organises, controls, coordinate international shipments by air, land and sea. They carry out administrative procedures for import/exports, clearance, wire housing, insurance and banking services for their clients.

Chapter- 4.1c Globalization and port transformation

With the acceleration of globalization, decentralization of production, emergence of global market has come into play. Distance production of products have increased seaborne trade and reduced cost significantly due to low transport costs. Thus, increased number of consumers which indeed has demanded rapid growth of sea ports and change of infrastructures. Improved communication system, technological developments greatly helped this transition process. Due to these facts we have seen new developments of sea ports in the important maritime routes and trying to attract cargo volumes. Vertical integration of logistic services has reduced required time and cost involved. With the increase of trade volumes there have been a tendency to achieve economic of scale. The sizes of vessels is increasing day by day especially for the container vessels which demanded bigger quay, jetty and deeper navigational channels, and more efficient cranes for fast cargo operations. This trend has benefited larger companies in the market. The 20 largest shipping companies controlled 26% of the seaborne trade in 1980, 42% in 2003 and 81% in 2013 (*Rodrigue, Notteboom and Slack, in Rodrigue 2013*). Largest shipping lines are forming alliances and controlling trade routes. Such as 2M (Maersk and MSC), P3 (APM, Maersk and CMA CGM), G6 alliances (HapagLloyd, APL, MOL, OOCL, NYK Line and Hyundai MM). Some of the shipping lines have merged with terminal operators, freight forwarders on choosing port of calls in order to increase market share.

Chapter- 4.2 Port of Chittagong

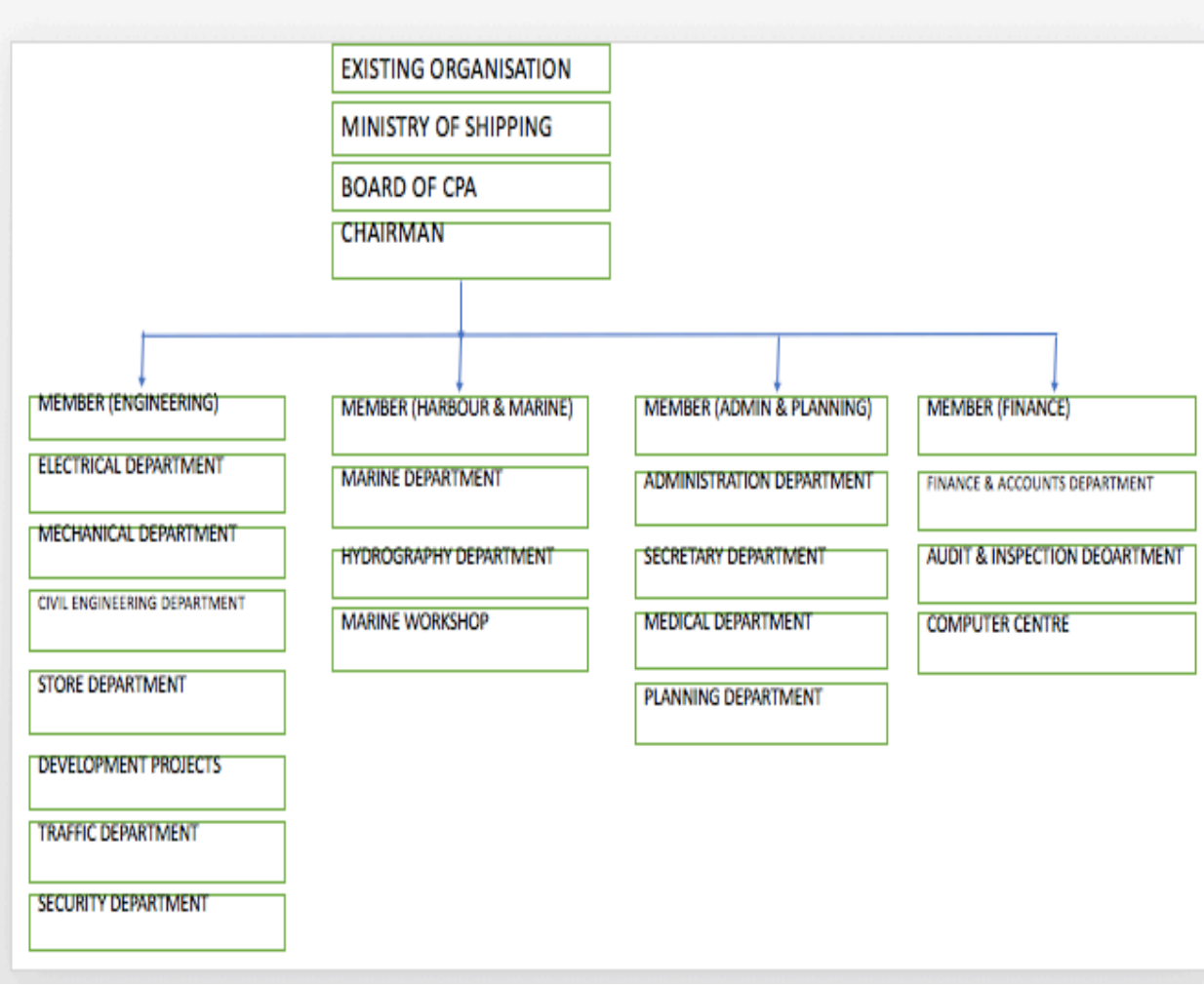
CPA handles almost 41 millions of tons of cargo per year.
Chittagong port is the principle port of Bangladesh and play most significant role in Bangladesh export-import activities. It situated in the estuary of the Karnafully river. It's main berths and terminals are located within 08 miles range from the outer anchorage. Chittagong port authority (CPA) is a service organization under Ministry of shipping, Government of people's republic of Bangladesh. CPA was established under the ordinance

No. LII of 1976 in September, 1976 which was amended in 1995. Which provides authority for the management, maintenance and development of the port of Chittagong.

Chapter 4.2a- Organizational structure of port of Chittagong

CPA is administered by a board of directors. There are 15 departments and 8,679 manpower. CPA is led by a chairman and not more than four members. The chairman and four members are appointed by the government.

Figure 13: Organizational structure of CPA



Source: Chittagong port authority annual report 2014-2015

Other than the management and maintenance activities CPA also provides port services, regulate berthing, control movement of the vessels, construct, operate docks and terminals.

Objectives:

- To provide international standard services to port clients and stakeholders within shortest possible time.
- To manage, maintain and develop the port facilities and capacities.
- To develop highly skilled work force to cope up with the global change.
- To ensure international safety and security standard

Chapter- 4.2b Planned capacity and cargo handling of CPA

The planned maximum capacity of CPA is 1,90,000 TEUs and 8,000,000 metric tons of cargoes. There are 19 jetties and two of them are dedicated for container operation. Container berth are mounted with 04 gantry cranes, 09 jetties are equipped with shore cranes which is used to unload general cargoes, 05 jetties are facilitated with railway tracks, transit shades are available in 10 jetties. Maximum allowable length of the sea going vessel is 186 meters and draft 9.2 meters for the main jetties.

The main port area of CPA consists of berthing facilities and their operational areas. These areas are –

General Cargo Berths (GCB): GCB was constructed during 1954-1979 and it has 13 berths for general cargo ships a bulk cargo ships. There are 21 shades and warehouses for different types. There is a central workshop also in the GCB area.

Chittagong Container Terminal (CCT): CCT was built in 1987 and it has 450 meters long quay for container cargo operation.

New Mooring Container Terminal (NCT): NCT was built in 2007 and it has 1000 meters long quay for container cargo operation.

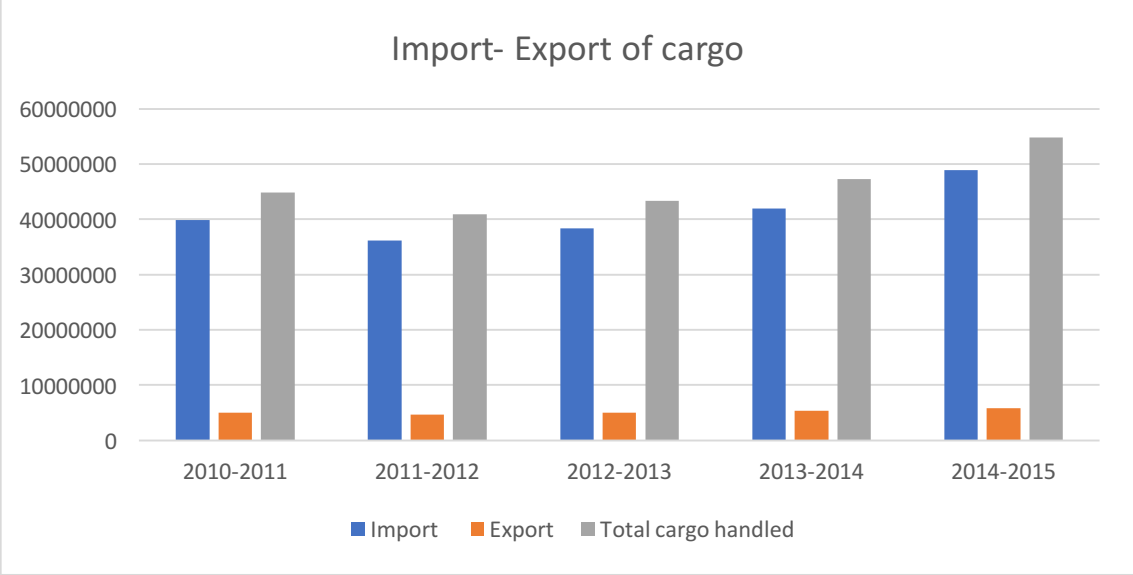
Chapter- 4.2c Total export-import of cargo through port of Chittagong:

Table 2: Export-import handled (fiscal year):

Year	**Import (MT)**	**Export (MT)**	**Total (MT)**
2010-2011	39,914,145	4,980,375	44894520
2011-2012	36184936	4716374	40901309
2012-2013	38312028	5059640	43371668
2013-2014	41960170	5338377	47298547
2014-2015	48941406	5839986	54781392

Source: CPA

Figure 14: Export-Import of cargo through CPA:



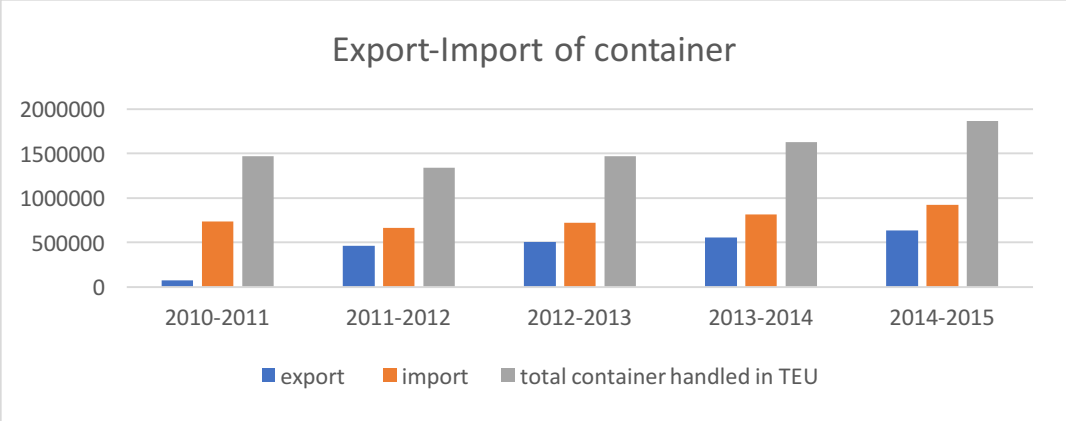
Source: CPA

Table 3: Total container handled:

year	Import (TEU)	Export (TEU)	Total (TEU)
2010-2012	72963	739221	1468914
2011-2012	463520	667612	1343408
2012-2013	508545	725166	1468713
2013-2014	556125	812591	1625509
2014-2015	639206	926235	1867062

Source: CPA

Figure 15: Total number of container handled through CPA:



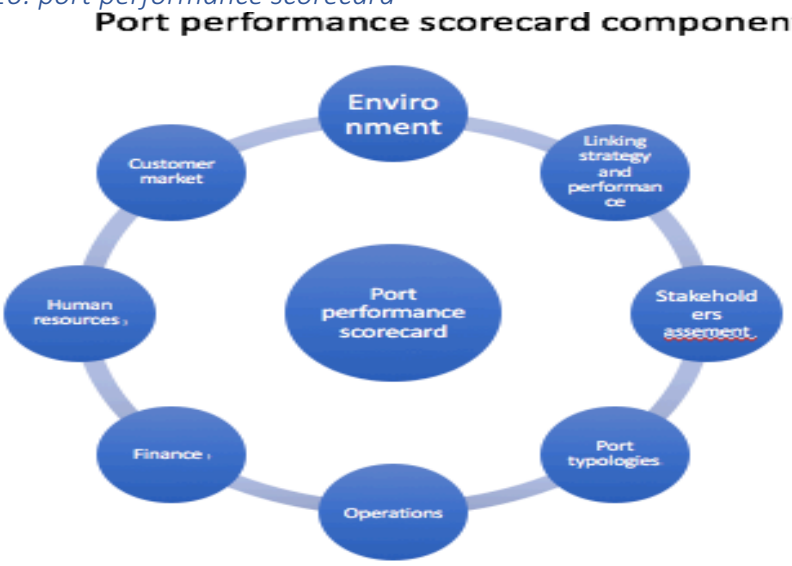
Source: CPA

The port is connected with inland water ways, rail ways and by roads deep into Bangladesh. From the three modes of cargoes total dry clearance of dry cargoes were

564159 metric tons, 17730708 metric tons and 361315 metric tons respectively during the year 2014-2015.

Chapter- 4.2d Efficiency analysis of CPA

Figure 16: port performance scorecard



Source: UNCTD port management series: volume-4.

Table 4: Efficiency indicators:

SL. No.	Indicators	2013-2014	2014-2015
A	Ship's turn-around time (days)	4.23	4.26
B	Dwell time of container (days)	15.64	17.48
C	Berth occupancy (in %)	57.75	65.04
D	Equipment availability (in %)	64.55	60.63

Source: CPA

Financial status:

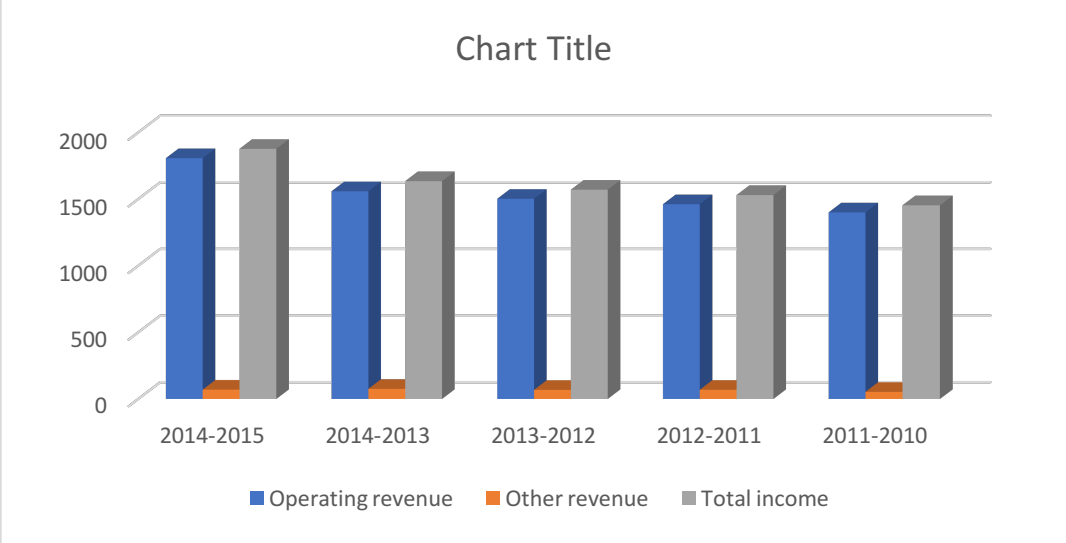
CPA generates its own revenue and carry out operational activities from the earned revenue. Main income of the CPA from vessel and cargo dues.

Table 5: (Taka in crore)

Revenue	2014-2015	2014-2013	2013-2012	2012-2011	2011-2010
Operating revenue	1806.81	1558.61	1502.15	1461.17	1400.02
Other revenue	70.02	75.71	68.22	68.75	53.13
Total income	1876.83	1634.32	1570.37	1529.92	1453.15

Source: CPA

Figure 17: Revenue details of CPA:

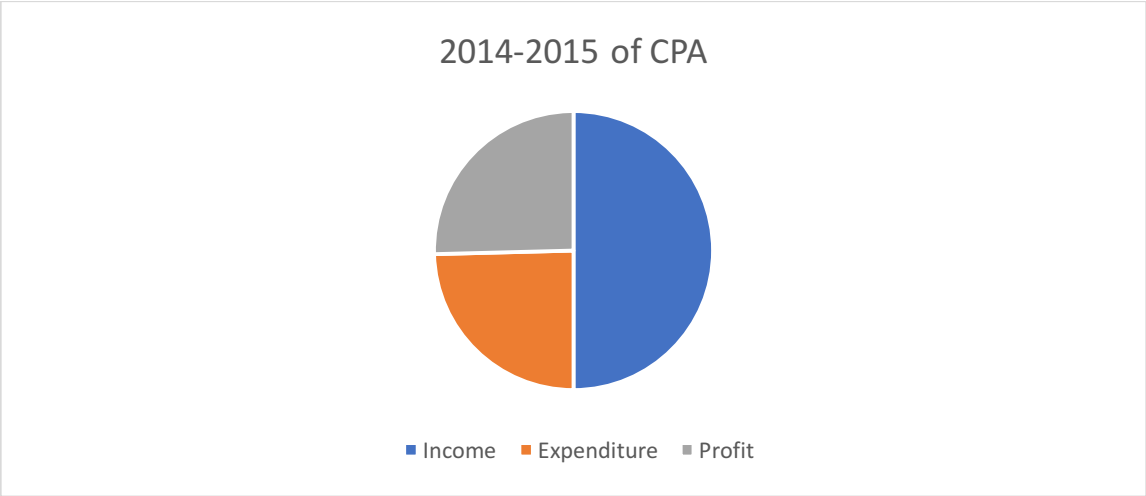


Source: CPA annual report.

Table 6: Income, expenditure and profit: (Taka in crore)

Year	2014-2015	2013-2014
Income	1706.52	1634.32
Expenditure	839.30	818.67
Profit	867.22	815.65

Figure 18: Income, expenditure and profit ratio:



Source: CPA Annual report.

Port is a good source of foreign direct currency as tariffs on cargoes and vessels which is charges on US dollars. Chittagong port earned approximately $42.33 million during 2002-

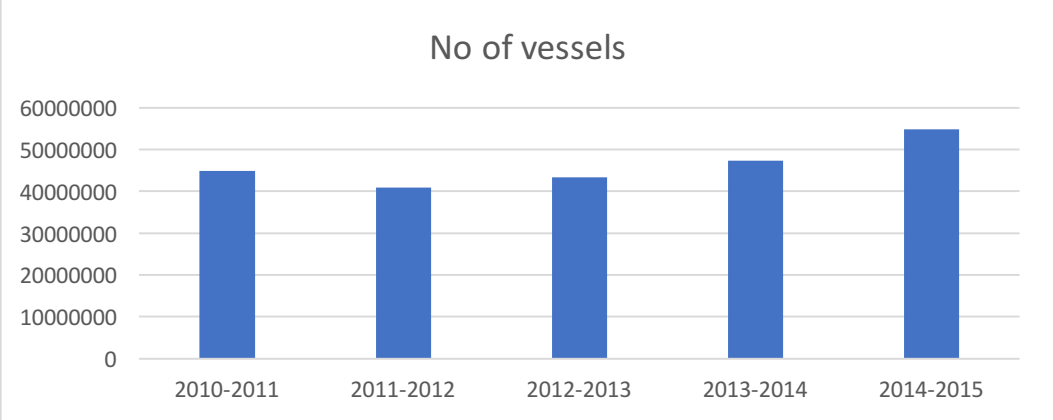
2003 years from piloting, tug hires, berthing/unberthing, loading/discharging of container and stowage of containers.

Cargo and container operation:

Table 7: No of vessel handled:

Year	No of vessel
2010-2011	2308
2011-2012	2079
2012-2013	2136
2013-2014	2294
2014-2015	2566

Figure 19: No of vessel calls:



Source: CPA Annual report.

Table 8: Cargo handling including inland & ICD (in metric tons):

Financial year	Inland	ICD	Total	Growth
2010-2011	47,72,786	5,32,053	5,01,99,359	24.78
2011-2012	65,48,490	5,72,141	4,80,21,940	-4.34
2012-2013	60,87,947	4,57,559	4,99,17,174	3.95
2013-2014	58,33,786	4,45,218	5,35,77,551	7.33
2014-2015	64,69,673	4,74,800	6,17,25,865	15.21

Chapter- 4.2e CPA operational efficiency indicators

Ship turnaround time:

Ship turnaround time is the indicators for determining port timings and service quality of port services. It is directly related to the transport cost of the ship. Waiting time and

service time together constitute ship turnaround time at any port. With 15% reduction in service time will reduce turnaround time by 28% and waiting time reduction will be 45%. (Francou, 2002, p.9). CPA ship's turnaround time for CPA or last two years given below:

Table -9

Name	2013-2-14	2014-2015
Ship turnaround time (days)	4.23	4.26

Dwell time:

Dwell time the time a cargo stays in the storage. If dwell time increases, storage capacity decreases. As a result, port faces congestion and causes delays at berth. Dwell time increases mainly due to delay in clearing documentations and customs formalities. Though port works for 24 hours but customs works only during the office hours and which cause significant increase of dwell time

Table 10: Dwell time of CPA

Name	2012-2013	2013-2-14
Dwell time (days)	15.64	17.48

Waiting time:

Chittagong port is a low drafted port and all the berths are located on the bank of the Karnafully river. Due to this facts CPA is dependent on tide. Ships need to wait for the high time in order to enter into the port. Also, waiting time can be due to bad weather, congestion, non-availability of cargo, non-availability of pilot, non-availability of tugs, clearing of documents, strikes and technical problems. Most of the delays occurs due to looking for berths and the rest occurs due to documentation process.

Service time:

Service time is the total time spent by a vessel at the port. Which includes waiting time, working time, shifting of vessels, time spent for documentations, lashing of cargoes, opening and closing of hatches etc. Almost 30% of the service time occurred due to idle time. This can happen due to shortage of equipment, coordination and shifting.

Berth utilization:

Berth utilization indicates the ratio of maximum uses of berth using best management technics. Efficient berth utilization depends on good planning and coordination, maximum uses of resources and facilities.

Berth output:

Berth output the total amount of cargo handled by a berth throughout the year. It gives an idea about a port capacity.

Ship output:

Ship output is the total number of cargo handled at the jetty to and from a vessel. This is a good indicators of berth productivity in a particular time frame. It also depends on the number of cranes or gangs are engaged for a particular ship and type of equipment used for the cargo operation.

Gang output:

This is an indicator of gang efficiency at any berth which is useful for monitoring labour performance.

Equipment utilization and availability:

Use of equipment is the pre-condition for the better port performance. Now a day's port operation is totally handled by various equipment. Therefore, availability of equipment is very vital of continuous port operation. Lower availability occurs with the higher downtime of equipment. Equipment availability will reduce idle time for ships at berth which will increase berth productivity. At the port of Chittagong availability of equipment is very low. Which happens due to lack of supply of equipment, lack of maintenance, lack of skilled operators and poor inventory management.

Table 11: Equipment availability of CPA:

Name	2013-2014	2014-2015
Equipment availability (%)	64.55	60.63

Downtime:

Downtime of equipment at Chittagong port is about 40% which is much higher than the other standard ports. Container handling equipment has better position than the general cargo handling equipment. Downtime occurs due to lack of training and innovation, unskilled operator, lack of control and supervision, poor inventory, old equipment, no standard maintenance, non-availability of spares.

Utilization of equipment:

Utilization of the equipment is the duration of time equipment is used during a specific year. Utilization hours depends on port to port and time to time. CPA is a 24 hours operational port but utilization of equipment is high during vessel's sailing period or berthing period. Utilization can be high during pick hours and week days. Low utilizations indicate that there is no need of new order and in case of high utilization may require to order new equipment. Which means planning of equipment purchasing depends on the level of utilization (Thomas and Roach, 1982.1989, p.50). usually average utilization of some of the equipment categories for container and general cargo handling equipment is around 45%. Low utilization occurs due to idle time which is mainly due to administrative process, bad weather, spending more time while operating equipment, labour launch/tea/praying breaks. It has been noticed that demand for equipment is always higher than the availability of equipment at the port. Which actually means that there is a shortage of equipment at the port or may be breakdown of equipment at the port.

Storage indicators:

Storage capacity and its proper management is vital for minimizing congestion at the port. A high proportion of cargo are kept at the storage for either export or import. Therefore, "the efficiency of the storage operation has a considerable influence on cargo handling performance at berth throughput" (Horck, 2003, p.18). efficiency of the storage greatly depends on the inventory management, types of equipment used, yard capacity, documentation process and coordination among ship, terminal, storage, receipt and delivery operation. "The realistic free storage period is in between 3 to 5 days" (Roach, 1982, unit 5, p.59). Storage capacity can better be utilized by using vertical space. "A better way to increase the storage capacity is to better use the vertical space and use appropriate equipment for the stowage" (Horck, 2003, p.21).

Quality of service indicators:

Quality of service indicators are also important as like physical service indicators due to high competition in the market. Client demand for high quality service are very much likely now a day. Quality of service is basically turnaround time, waiting time, idle time, dwell time, productivity, storage period and working hours at port. This greatly depends on the flexibility of working hours and labour performance.

Table 12: Tariffs and charges at CPA for a 5000 GRT

	Item details	Chittagong
1	Port dues : $0.241/GRT/entry	$20,746.89
	Vessel exceeding 200 GRT: Tk 5 /GRT	$1.54
2	Pilotage fees: $35.75/1000 GRT	$178.75
3	Tug charges: $632/movement/Tug	$632
4	Berthing/unberthing: $88.50/berthing/unberthing	$177
5	Berth Occupancy: $0.25/hour (for 48 hours)	$12
6	Mooring occupancy: $167/vessel	$167
7	Jetty crane charges: $42/8 hours	$252
8	Quay gantry crane charges Loaded: 22.50/move (500 moves) Empty: 11.25/move	$11,250
	Total	**$33,417.18**

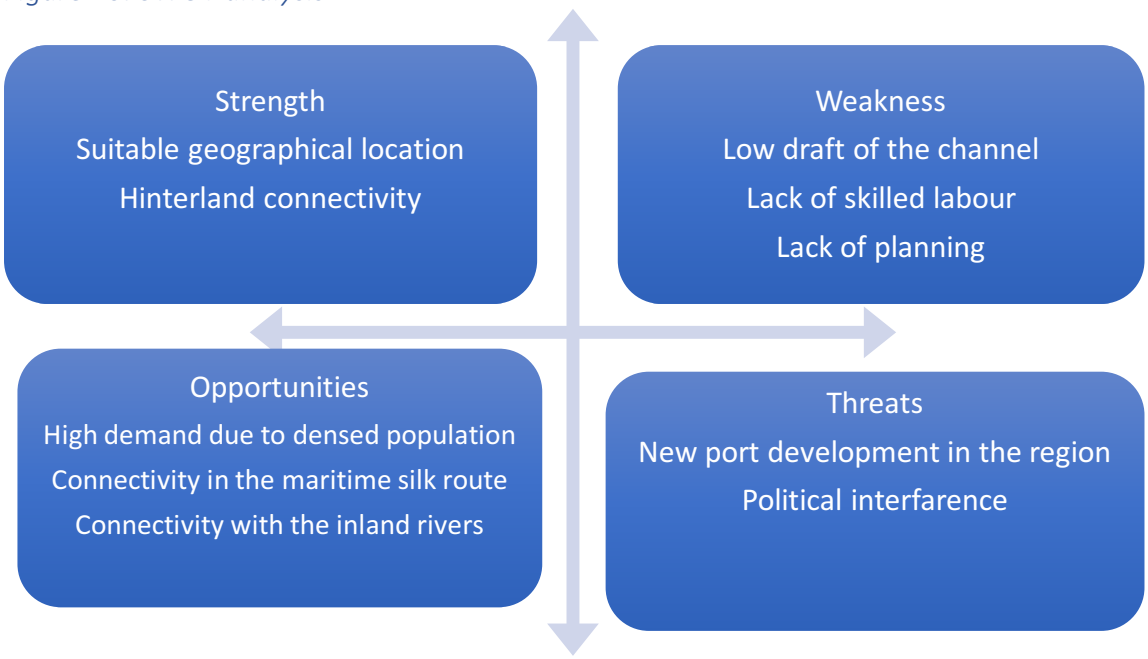
Above calculation shows an estimated cost involved with a vessel of 5000 GRT calling Port of Chittagong.

Chapter 5 – SWOT analysis of the Port of Chittagong

SWOT analysis is a useful way to analyse strength and weaknesses of any organization. In this chapter, we are going to analyse CPA strength and weakness through SWOT analysis.

SWOT Analysis of CPA:

Figure 20: SWOT analysis



Strengths:

- CPA handles more than 80% of national sea borne export and import cargoes.
- Average growth of cargo handling is 4% for general cargo and 11% for container.
- CPA has a good hinterland connection with land and sea.
- 05 Nos Export processing zones are close to CPA.
- It's a self-financing zone and generates its own revenue.
- It's a service providing port. It's has a long history in the port service.
- Suitable geographical location with around 500 million people living within this port region.
- Significant land area.
- Low competition in the region.

Weakness:

- Government control over port administration.

- Excessive labour and excessive old aged labour.
- Lack of technological development.
- Low drafted navigational channel.
- Less investment plan and lack of master plan.
- Bend in the navigation channel which restrict access of bigger vessels inside the port.
- Lack of gantry cranes and straddle carrier.
- Corruption within management of CPA.
- Congestion in the container terminal.
- Lack of skilled labour.
- Long chain of command within the Chittagong port Authority management.

Opportunities:

- CPA is located in the heart of country's commercial city. Which gives easy access to the internal market.
- India, Nepal and Myanmar showing interest to use CPA for their cargo transit. CPA has shorter piloting distance from the anchorage to the berth.
- There are lots of space under CPA which can be used for further development of the port.
- It's a natural port and limited maintenance will give better advantage over the other ports.
- With dredging in the inland rivers CPA can be linked to the deep into Bangladesh and thus cargo can be transported India's North-East part.

Threats:

- Bangladesh Government is building Pyra port in the South West part of the country which will be used by India as well. Fully operational Pyra port will have a negative impact on the port of Chittagong growth.
- Bangladesh Government is also building a deep-sea port near CPA which may also reduce growth in port of Chittagong.
- Several development initiatives have been taken to improve services of Mongla port and thus port of Chittagong will surely be negatively affected.
- Kolkata port is also developing their facilities and thus CPA will face high competition from the neighbouring country.
- Political instability is a major concern for CPA. Due to its presence near a major city, it always gets affected with strikes or any other political activities.

Chapter- 6 Impact of CPA on national economy

Since the beginning of Bangladesh port of Chittagong is playing vital role in reshaping country's economy gradually. In addition, CPA is having greater impact on the local labour employment market. Due to the presence of CPA many industries were developed within the area of port. There are two types of impact of CPA on Bangladesh economy- the primary effects and secondary effects. Primary impacts are basically direct impacts which is generated with the port activities. Secondary impacts are two types- indirect and

induced impact. CPA acts as the life line to the development of commerce and industry of Bangladesh (Halima, 2003). Approximately one in every sixth job was directly or indirectly involved with port of Chittagong (Chittagong port authority, 1987, p.167).

Direct impact:

Port of Chittagong handles about 92% export-import of Bangladesh, 90% of the country's trade and 98% of the total container trade. Total revenue income of CPA was 2208.66 crore BDT in the year 2016-2017. Total surplus was 1126.95 crore BDT in the same year. CPA earns direct foreign currency for the nation. Helping the local manufacturers to export their goods and import their raw materials using the CPA facilities. Which is adding direct value to the national economy and also generating direct employment opportunities locally. CPA collects tax for the government form its clients and users. More than 8000 people are employed in the port.

Indirect impact:

Several export processing zones have been established close to the port in order to have easy access to the sea port and export produced goods to outside. Karnafully EPZ and Chittagong EPZ are biggest in the area.

EPZs close to CPA:

Table - 13

Name	Distance from the port	Area	Employment	Export	Investment
KEPZ	6 km	209.06 acres 255 nos industrial plots	2,105.22	54,812	372.53
CEPZ	5.5 km	453 acres 501 nos industrial plots	21,803.099	1,90,815	1,355.54

Government provides lots of incentives for establishing factories in the EPZ areas. Major facilities are 10 years tax holidays for the factories before January, 2012 and different tax holidays for the factories after January, 2012 respectfully 100% for first 03 years, 50% for next t03 years and last 01 years 25%. There is also income tax exemption for first 03 years for foreign workers. Duty free import facilities for the machineries and duty free export-import facility for the goods produced in the EPZ area. 100% foreign ownership is allowed for the foreign investors. No ceiling on the extent of foreign investment. Offshore banking facilities and international banking facilities are made easily accessible. No permission is required to expansion of the project or product diversification. Law forbids any kinds of strikes or political activities. EPZ provides same day one stop service. Customs are cleared in the factory location. Permits are granted from the EPZ only. Easy documentation process is maintained. So, the investors only need to deal with the EPZ management not

with any other authorities. Due to these facilities, many export oriented factories are established and attracted foreign investments. C&F companies also get benefits from the CPA activities. Bangladesh shipping corporation has own fleets of ships which carries cargoes for the governments. Thus, government earn revenues and save lots of foreign currencies. They uses Chittagong port as their home port.

Induced impact:

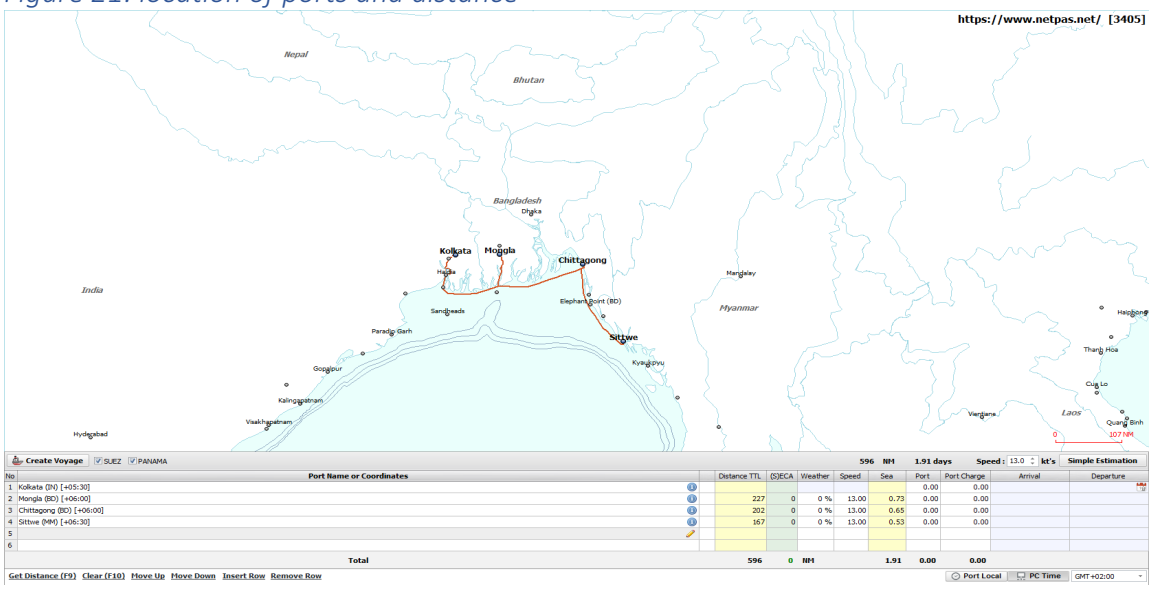
In France and other matured economy country has about 50% impact of induced impact on their economy (Francou, 2002). In case of Bangladesh the induced impacts of CPA still significant being a less developed economy. From the presence of the port there are many sectors have induced impact such as maritime professional's lawyers, insurers, port hospital doctors, teachers from the port schools. In addition, port helps to develop competitive hinterland connectivity in the region. It generates skilled man power within the trade sector.

CPA performance comparison with local and international ports in the region – Halima

It is understood that port of Chittagong plays a highly significant role in Bangladesh economy. In this chapter author shall try to identify and compare performance indicators of CPA with other ports in the region. It is important to analyse operational tools efficiency to identify performance of the port. Port inefficiency can hamper country's export and import flows and automatically slows down growth of the country. It is estimated that approximately 2/3 of the total maritime cost occurred in the port which includes dockage, wharfage, handling and storage (Francou, 2003, p.3). time delays cause additional costs for the shipping companies.

There are two local ports and two international ports are the main competitor of CPA in this area. This chapter will provide a general idea about port competition in this area by comparing port performance with each other ports. In order to do this, shipping operation (Berth occupancy, turnaround time, dwell time, productivity, no of vessels call etc.), administrative management, investment plan, shipping lines connectivity etc. will be taken into account.

Figure 21: location of ports and distance



Source: Netpas.

Chapter- 7 Performance competition with local ports:

Chapter- 8.1 Port of Mongla:

Port of Mongla is the one of the three-sea port in Bangladesh. It is situated in South-West part of Bangladesh approximately 71 miles inside from the Bay of Bengal and only 202 nautical miles away from the port of Chittagong. One of the major drawback it has from the Port of Chittagong its less deep navigational channel. Total number of employee in Port of Mongla is 2,796. There are 13 private and own jetties, anchorage facility for 15 vessels. The port has limited number of cargo equipment and marine services facilities. There have been lack of proper dredging capacity as well.

Table 14: Equipment for cargo operation:

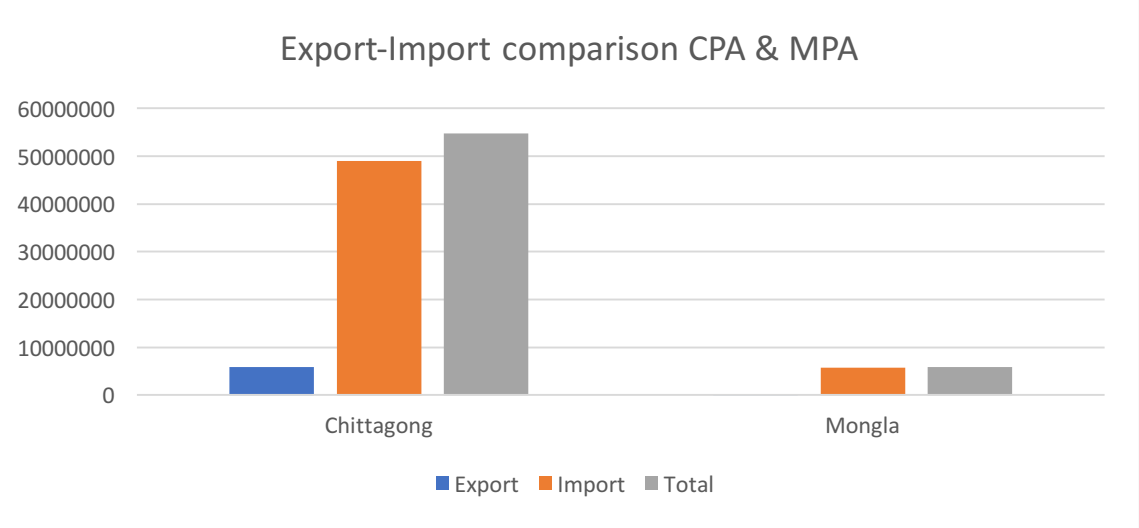
Straddle carrier	06
Forklift	18
Tractor and trailer	16
Mobile crane	06
Reach tractor	02
Empty container handling	03

Table 15: Export-Import comparison locally:

Name	Chittagong	Mongla

import	48941406	5709664
export	5839986	87857
total	54781392	5797521

Figure 22: Export-Import comparison in 2014-2015:

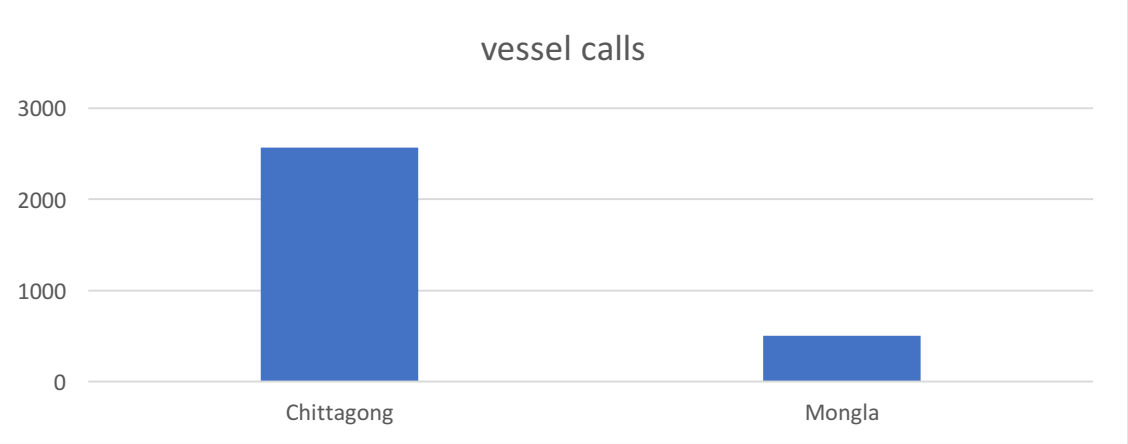


Source: CPA and MPA

Table 16: vessel calling comparison locally:

	Chittagong	Mongla
vessel calls	2566	502

Figure 23: No of vessels called in 2014-2015:

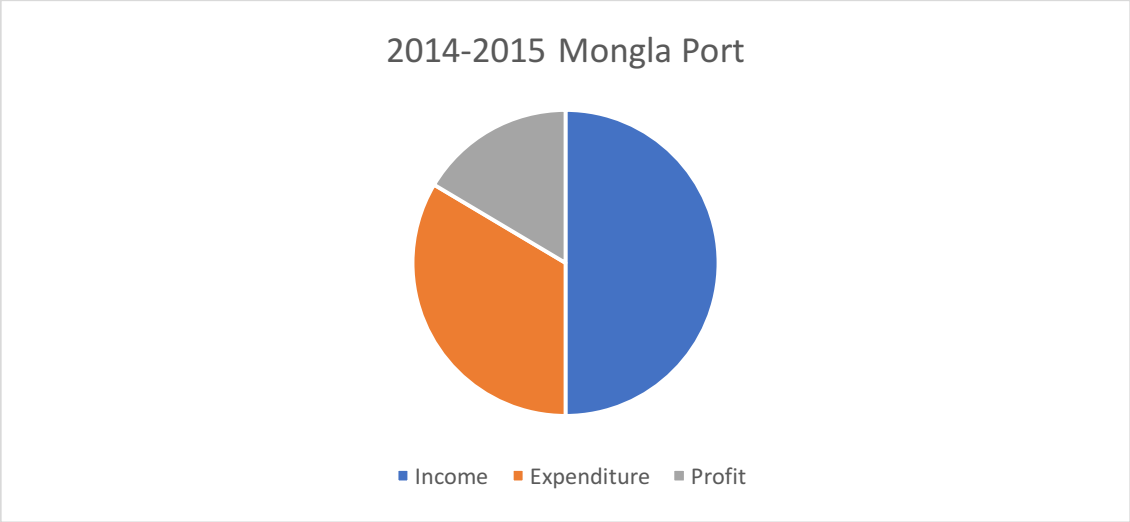


Source: CPA and MPA

Table 17: Revenue comparison:

Year	2014-2015
Income	19661.98
Expenditure	13190.2
Profit	6471.78

Figure 24: Income, expenditure and profit ratio:



Source: CPA and MPA

In 2014-2015 financial year Port of Mongla has registered a profit of 6,471.78 lakhs Taka and on the other hand, Port of Chittagong gained a profit of 81,565 lakhs Taka.

Chapter 7.1a Pyra Sea Port:

Pyra Sea Port is the third sea port of Bangladesh which started operation since last year only. It is location near the Port of Mongla situated in Potuakhali district. The port was inaugurated by prime minister Shiekh Hasina in 10th November 2013. The government has three step development plans for the port- short, mid and long term. Under the short-term plan port will be able to carry out cargo operation in the outer anchorage with mother vessels and later on cargo is to be transhipped inside the port. Mid-term plan is to berth at least one deep drafted vessel with 16 meters draft in 2018. Finally, in 2023 port will be fully operational with 16 meters depth, 10 km long container and other terminals berths. Which will be accompanied by the establishment of Exclusive economic zone (EEZ), airport, port city, dockyard/shipyard, eco-tourism etc. This port is well connected with inland rivers deep into Bangladesh and enjoys strategic advantage being located near Indian border. It has direct connection with the Capital city of Dhaka through inland rivers. India also showing significant interest using this port for its North-East region. Government has already given out a contract for dredging navigational channel up to 16 meters to a Belgium based company named Jan De Nul which is expected to be completed in 2023.

Additionally, 03 coal power plant of each 1,320 MW capacity and 02 LNG terminal is to be built. At the presence of shipping minister Shajahan Khan, Commodore M Saidur Rahman BN acting chairman of the Pyra sea port, MI Zeng Nanhai CHEC joint managing director and Li Shujiang CSCEC managing director signed an MOU to carry out construction of the sea port. Under $600 million deal, China Engineering company (CHEC) responsible for developing main port structure and China state construction (CSCEC) will develop accommodation, healthcare and education facilities at the port.

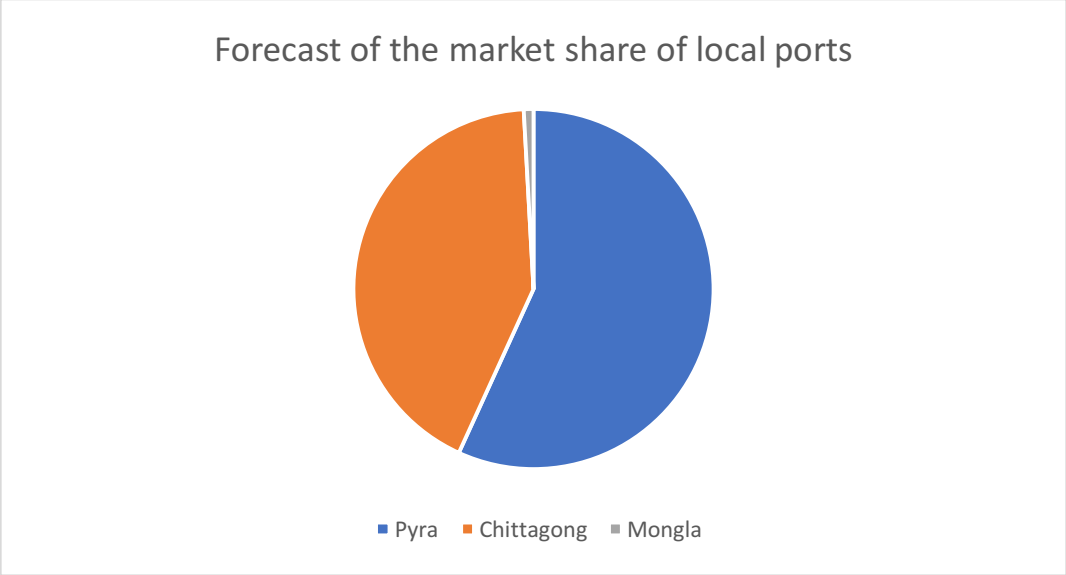
Table 18: Estimated cost structure of Pyra Sea Port:

Project name	Cost in USD
Channel dredging	2 billion
Conservancy	30 million
Container terminal	300 million/ phase
Multi-purpose terminal	200 million
Dry bulk terminal	300 million/ phase
LNG terminal	250 million
Railway	7.5 billion
ICD at Pyra	50 million each

Table 19: Market Share of Pyra port in 2028 (TEU):

Pyra	Chittagong	Mongla	Total
3002247	2236431	46000	5284678

Figure 25: Estimated Market share in 2028:



Source: A presentation by Farhan, 2017

According to present estimation and based on government development plan Pyra port will gradually gain market share.

Chapter- 7.1b Deep Sea Port dilemma:

With the growing demand present ports capacities are unable to cope up and due to this fact government is planning to build first deep-sea port in Bangladesh which will be used for deep drafted vessels. During the China visit prime minister Sheikh Hasina gave a green signal to Chinese authority to build a deep-sea port in Sonadia Island but it was later scrapped due to political lobbing from India, japan and USA. "Some countries including India and United States, are against the Chinese involvement," Planning minister A.H.M Mustafa told the Bloomberg reporters in 23 June 2015. Later on, Bangladesh government granted a contract to Japan to build a deep-sea port in matarbari which is not so far from the Sonadia island. Japan International Cooperation Agency (JICA) will develop this project along with LNG terminal, 04 coal power plant of 600 MW. One of the main reason government gave the contract to JICA due it's lucrative financial proposal. Under the proposal JICA will provide a loan of $3.7 billion out of $4.6 billion with 0.1% interest for 30 years. On top pf that 10 years grace period will be granted, planning minister Mustafa Kamal said on a telephonic interview with Reuters on 10th September 2015. In addition, he mentioned that an LNG terminal and a port will also be developed long this facility. As part of the plan this will be the biggest power plant of Bangladesh and this port facility will be used to import coal for the power plant. Power plant will be operational in 2023. Gradually, this facility will be developed to export-import multipurpose cargoes. Assistant engineer Rubel Skhider of the project mentioned to Ekoshey TV "coal will be transported for 2600MW power plat and in future this port will be a multifunctional port".

Figure -26: matarbari deep-sea port

Source: http://bdnews24.com/bangladesh/2015/06/24/matarbarhi-deep-sea-port-work-to-start-next-year.

Chapter- 7.2 CPA performance competition with International Ports in the region:

South Asia is not a major player in the world of maritime trade but it's importance in the industry is growing gradually. Market share of South Asia was 2.1% in 2001 and increased to 2.9% in 2013 in the world container market. In 2013, share distribution of container throughput among South Asian nations was: India- 55.3%, Srilanka- 22.6%, Pakistan- 13.5%, Bangladesh- 8.3% and Maldives- 0.3% (Maldives port authority).

Not only CPA is facing competition from the local ports but also from India and Myanmar ports. Kolkata port trust from Indian West part and Sittwe port from Myanmar port are direct competitor of CPA. This chapter will analyse the performance comparison among these ports in this region.

Figure -27: location of ports

Source: ADB report (HPC 2013).

Chapter- 8.2a Kolkata Port trust:

Port of Kalkata is located West part of India and considered a gateway for Indian Western region. It has a long historical back ground. This port was the most important port in India and still manages to be an important player in the port industry of the nation. In the recent past Kolkatta port was awarded as the best managed port in the country. It has 232 kilo meters of navigational channel. Arguably Kolkata port is the biggest competitor of CPA in this region and a major player in this part of the Bay of Bengal. Haldia dock complex (HDC) and Kolkata dock system (KDS) are the two-main part of Kolkata port trust. Cargo traffic at Kolkata Port was 50.289 million tons compared to 46.293 million in 2014. KDS handled 16.782 million tons and HDC handled 33.507 million tons in 2015. Container traffic increased by 5.21% last year which was highest growth among the all Indian ports where

the average growth was registered only 2.98%. Several development projects are being under taken by the government of India such as fly ash handling jetty at HDC, floating cargo handling facility at HDC, upgradation of world class storage and handling facility for lube oil and vegetable oils and refurbishment of caisson at lock entries at HDC.

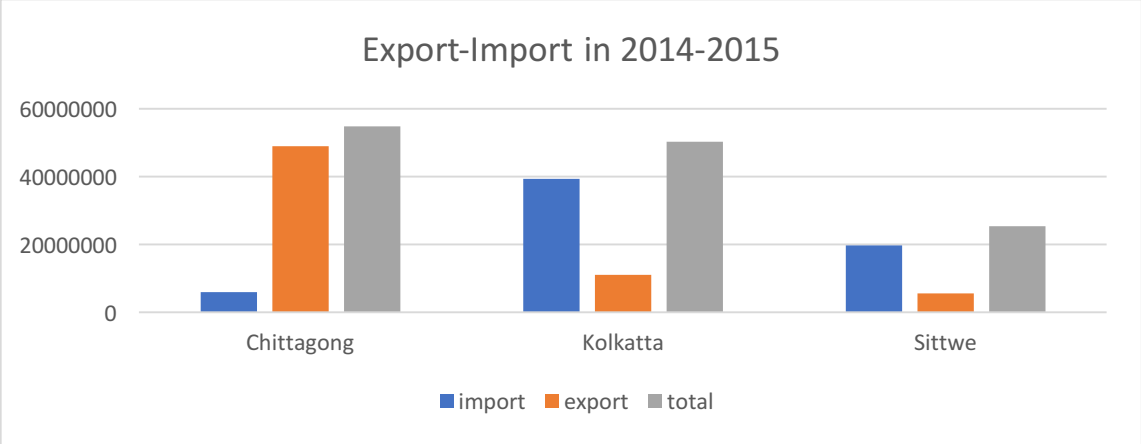
Chapter- 8.2c Port of Sittwe:

Port of Sittwe is located Eastern part of Myanmar and only 167 nautical miles away from the Port of Chittagong. Draft of 22 feet vessels can enter the port following a narrow channel. Vessels have to wait for high tide in order to enter inside the port due to shallow inner bar at the entrance of the port. During low tide depth of the inner bar is about 12 feet. The average wide of the river route is 1500-2000 feet and in some places its 1000 feet. Depth of the inner anchorage is 18 feet and suitable for maximum 10,000 metric tons capacity vessels. Average depth of Phaung tawgyi and Mingan Jetty is 12-15 feet. Total 1,026,216 TEU container and 22,256 metric tons cargo handled in 2016.

Table 20: Export- import comparison:

Name	Chittagong	Kolkatta	Sittwe
import	5839986	39377000	19727994
export	48941406	10989000	5558200
total	54781392	50289000	25286194

Figure – 28: Export-import in 2014-2015

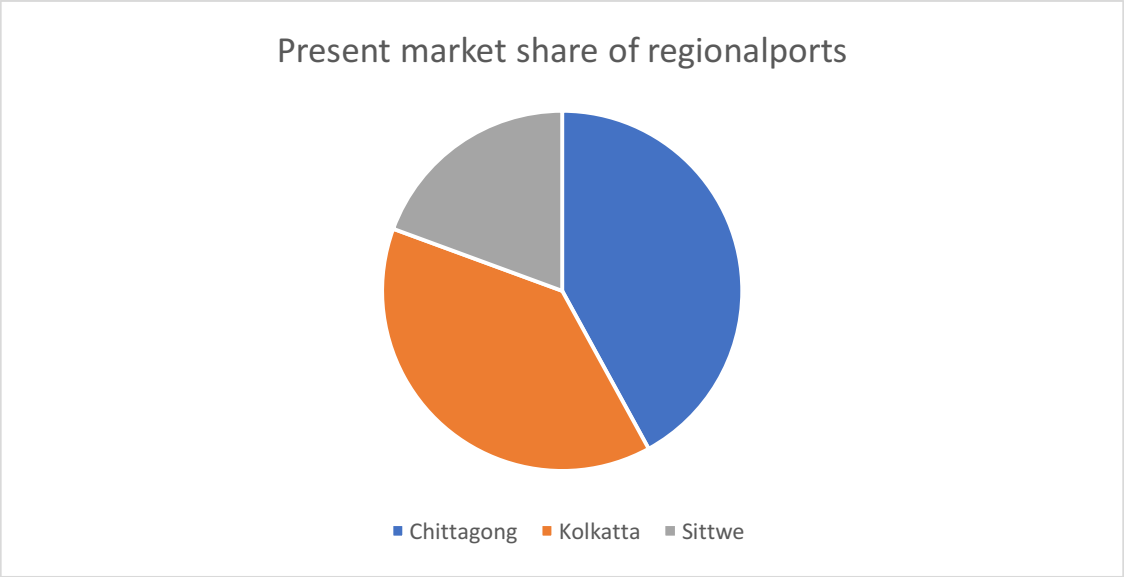


Source: CPA, KPT and MPA

Table 21: Market Share:

Name	Chittagong	Kolkata	Sittwe
Total cargo handled	54781392	50289000	25286194

Figure- 29: Present market share

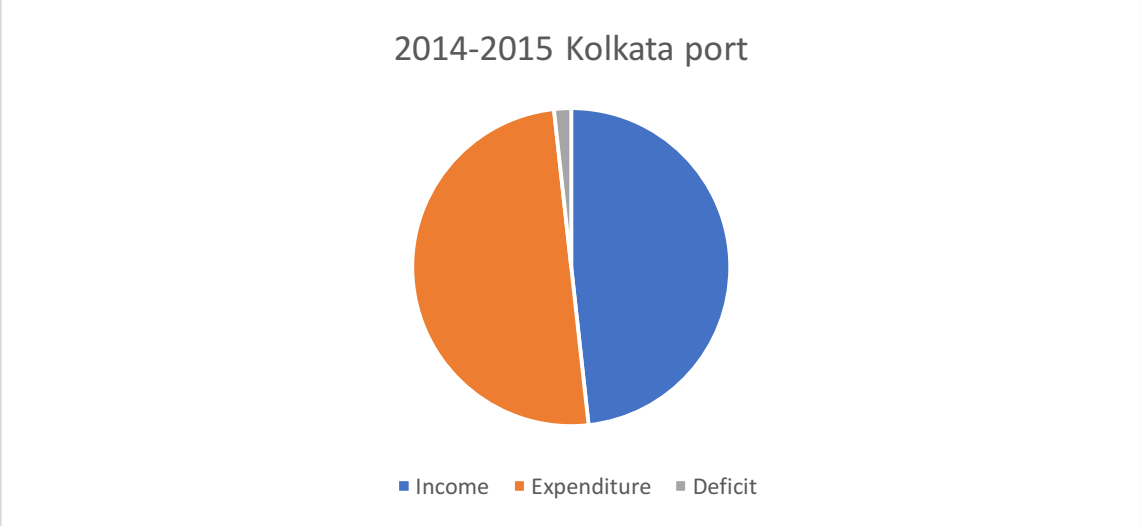


Source: CPA/MPA/KPT

Table 22: Kolkatta

Year	2014-2015
Income	1896.14
Expenditure	1964.6
Deficit	-68.46

Figure- 30: Kolkata port revenue

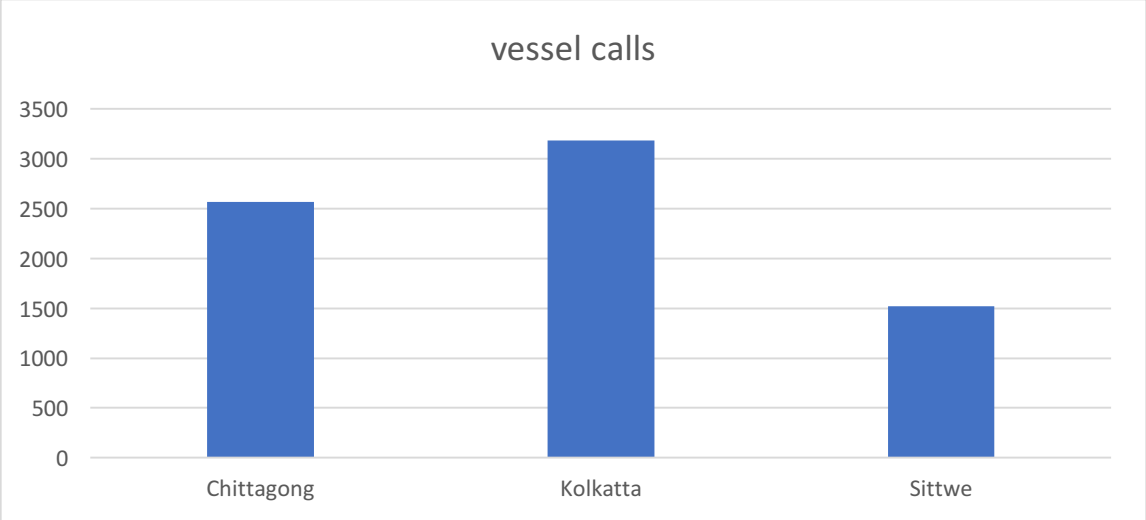


Source: KPT

Table 23: Vessel calling comparison:

	Chittagong	Kolkatta	Sittwe
vessel calls	2566	3183	1523

Figure- 31: vessel calls

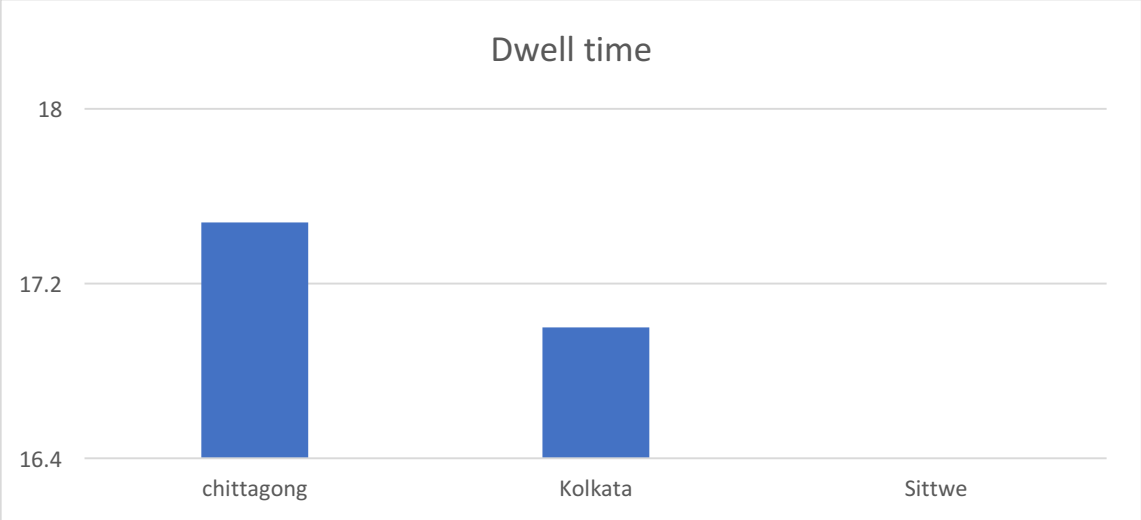


Source: CPA, KPT and MPA

Table 24: Comparison with other ports in the region in 2015:

Name	Chittagong	Kolkata	Sittwe
Dwell time	17.48	17	

Figure- 32: dwell time

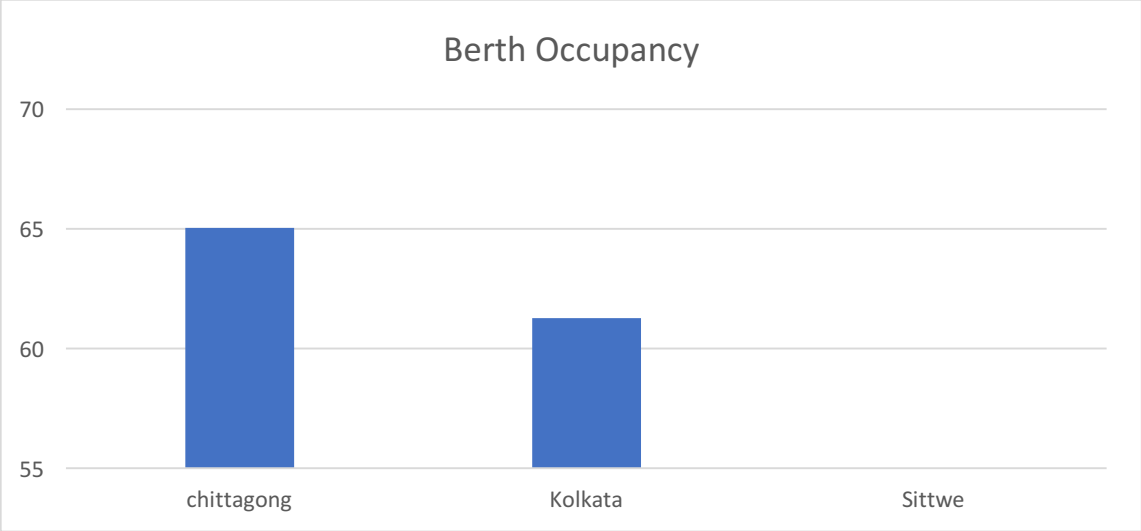


Source: CPA, KPT and MPA

Table 25: Berth occupancy comparison in 2015:

Name	Chittagong	Kolkata	Sittwe
Berth Occupancy rate	65.04	61.28	

Figure 33: berth occupancy

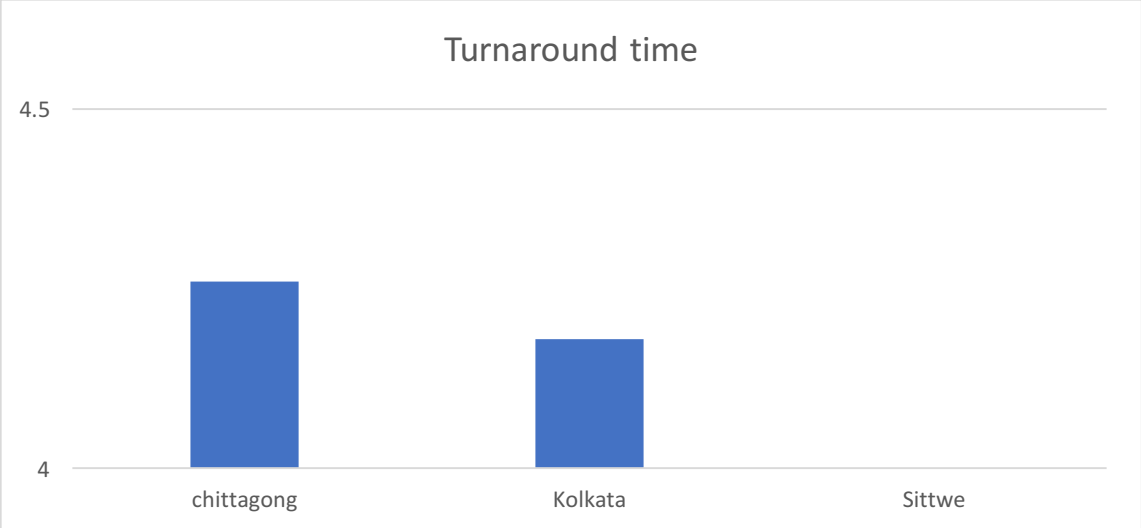


Source: CPA, KPT and MPA

Table 26: Comparison with other ports in the region:

Name	chittagong	Kolkata	Sittwe
Turnaround time	4.26	4.18	

Figure- 34: Turnaround time



Source: CPA, KPT and MPA

According to world bank logistic performance report India is in the 35th place, Bangladesh and Myanmar ranked 87 and 113 respectively.

Table 27: Logistic performance Index 2016:

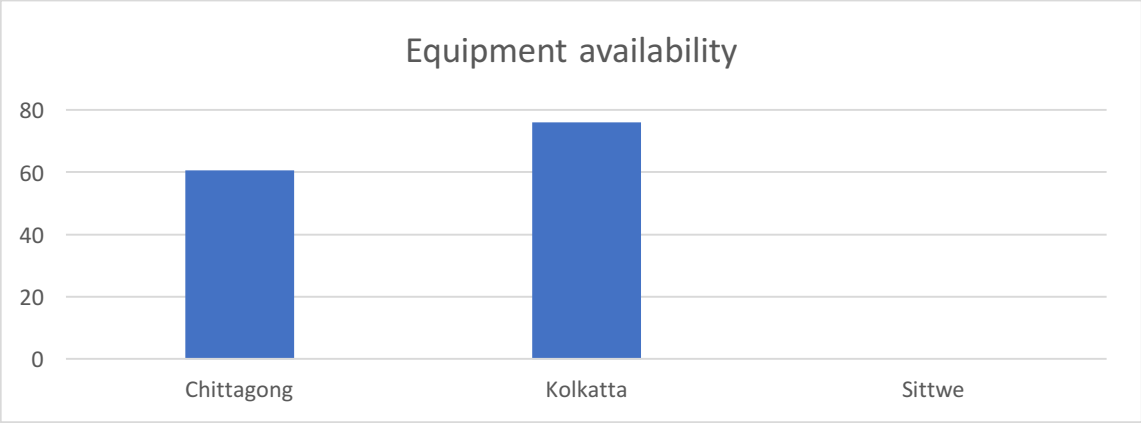
Name	Ranking	Score
Bangladesh	87	2.66
India	35	3.42
Myanmar	113	2.46
Pakistan	68	2.92

Source: World bank

Table 28: Equipment availability comparison:

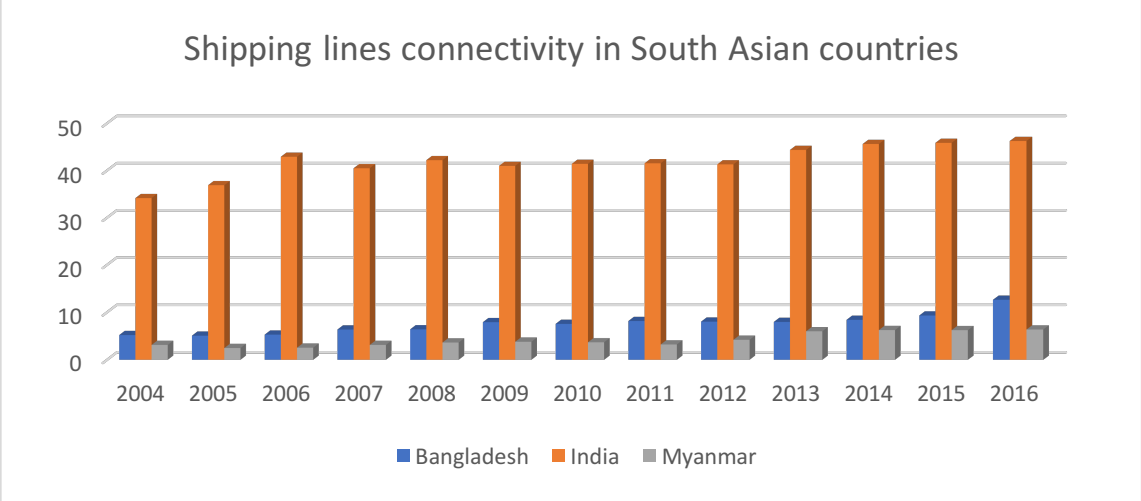
Name	Chittagong	Kolkatta	Sittwe
Equipment availability	60.63	76	

Figure-35: equipment availability



Source: CPA, KPT and MPA

Figure 36: Shipping lines connectivity in South Asian Countries:



Source: UNCTD

Chapter- 8 Further development programs in CPA:

Present government of Bangladesh is giving significant importance to the maritime infrastructure development. In line of the government planning several administrative and infrastructural reform is going on in the port of Chittagong.

Recent development programs of CPA

Under the Chittagong trade facilitation project construction of back up facilities berth#4 and 5 of new-mooring container terminal, vessel traffic management (VTMIS) will be upgraded, new navigational aids will be procured among them high power tug, sea going water supply vessel, 29 nos container and cargo handling equipment, 03 reconditioned container vessels for Chittagong Pangaon route will be purchased.

Ongoing projects of CPA

Government has taken initiatives for dredging the port area and inland rivers in order to facilitate water way transportation within the country. Government has already started procuring new dredgers for this project. Karnafully bridge to Sadarghat jetty channel area will be dredged as part of the plan. New surface water treatment plant will be installed. Modern survey boat and new vehicles for warehouses also will be purchased.

Capital dredging and bank protection with jetty facilities in the Karnaphuli rover from Sadarghat jetty to 3rd Karnaphully bridge.

Upcoming and future development programs of CPA

There are few upcoming projects of CPA as part of the long-term planning. New trailing suction dredger, 02 nos. gantry crane for Pangaon inland container terminal, 02 nos. shore crane, residential buildings, new tug boats for port operations, heavy duty pilot boats, multi-purpose terminal at Laldia, overflow yard for new-mooring terminal, a single beamed eco-sounder for global positioning, modern hydrographic equipment for surveying, new container terminal, fast moving security boats for security patrolling, new water supply boat, construction of fly over near the port area in order to reduce traffic flow in the port area and installation of 30 MW power plant which can be upgraded up to 50 MW in future.

New container terminals:

As part of 30 years development plan for Chittagong port- new container terminals will be built in order to handle excess demand of containers. With the new 10 ships to shore gantry crane new-mooring terminal handling capacity will be 2,360,000 TEUs in 2019 and according to experts view in that year demand will be around 2,460,00 TEUs and in 2022 this shortage will be almost 1,520,000 TEUS (Bandar batra, 2016). In order to meet this shortage there is a need for new container terminals. So, government has taken initiatives to build new terminals to meet this growing demand as well.

Bay terminal:

Bay terminal is located 6 kilo meters from the CPA and very close to the open sea. Being open to the sea it will be very convenient for bigger vessels to call Bay terminal rather than calling inside Chittagong port. Draft of the bay terminal will be around 12 meters, breadth of the channel will be around 800-1200 meters and 5,000 TEUs vessels can call this terminal easily. One time 35 vessels can be berthed at the bay terminal. Operational area will be 6th times larger than the present CPA terminals which is almost 2500 acres of land. This project will be completed in two parts- first parts will be completed in 2023 and second part will be completed in 2028.

Karnafully container terminal (KCT):

KCT terminal will also be completed in two parts- after first completion of the first part in 2018 terminal will be operational and final part will be completed in 2024. Total area of operational land will be 228 acres with 12 jetties and total length of the terminal will be 2,320 meters. Annual capacity of KCT will be 1 million TEUs.

Inland container terminals:

To reduce congestion at the port area and to minimize logistic cost Bangladesh government started building inland container terminals at various locations. Recently completed Pangaon inland container Terminal started operation with small feeder vessels from Chittagong to Dhaka. There are 17 private inland container terminals are operational in Bangladesh with a total capacity of 10,000,000 million sq. feet container capacity.

Bangladesh-India transit agreement:

India and Bangladesh signed an agreement Standard operating procedure (SOP) on 15th November 2015. Which will allow both the country to use their coastal shipping routes to transport goods to third country. This will allow India to transport goods to North-East regions "seven sister states" of Araunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Which will increase ships calls at Bangladeshi sea ports and increase their revenue.

Maritime silk route:

As like China's One Belt One Route through the land, China also trying to build a maritime silk route for securing its trade future. China has already made agreement with Srilanka and Pakistan in South Asia to develop and use their sea ports. In the mean-time China also trying to develop a sea port in Bangladesh which will connect China in the Bay of Bengal. But due to Indian lobby China still didn't manage to secure significant success in Bangladesh. Still China is developing Pyra sea port on a joint venture with India, Japan and USA rather than doing it alone.

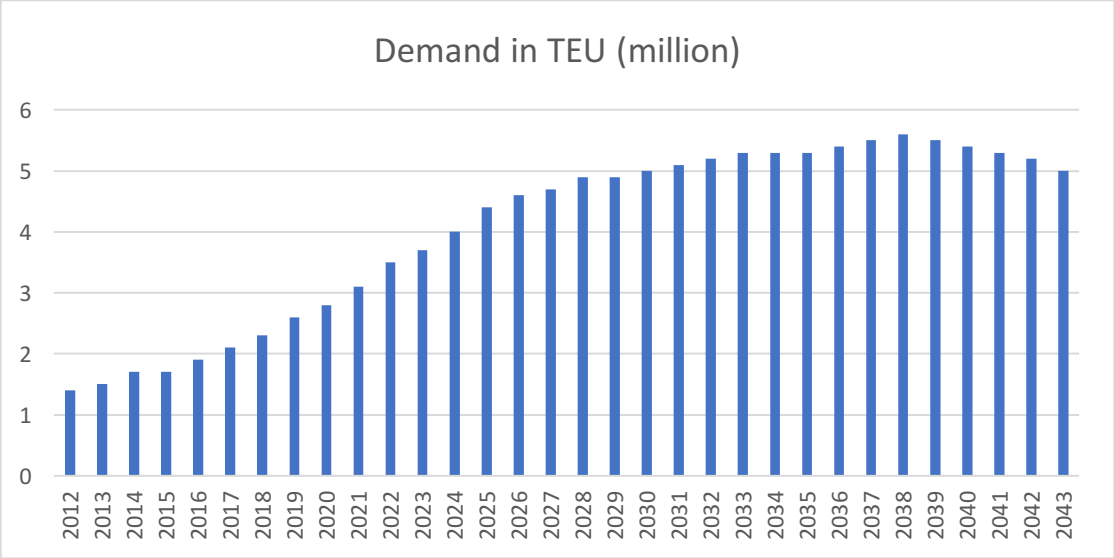
Figure – 37: Maritime silk road

Source: http://www.chinausfocus.com/finance-economy/chinas-silky-indian-ocean-plans

Trade forecasting in the Port of Chittagong:

According to expert's total container demand at CPA will be 2.9 million TEUs, in 2036 it will be 5.6 million TEUs and it will gradually go down to 5.0 million TEUs when deep-sea port will be operational from 2036 In 2043, deep-sea port will be handling 50% of the container almost 5.1 million TEUs (Bandar Barta, 2016).

Figure 38: CPA container demand in TEUs (million)



Source: Data source HPC 2016.

Chapter- 9 Major constraints of efficient performance of CPA:

Port administration

CPA is controlled by the department of ministry of shipping and chairman directly appointed by the government. There has always been a vacancy of minimum 500 posts years after years due to long recruitment process and every recruitment has to be approved by the government. Usually, it takes 2-3 years for one recruitment. Most of the time chairpersons are appointed from the civil service and he possess significantly less knowledge about maritime trade and shipping activities. After 3-4 years he might go for retirement as well. Due to these reasons Port of Chittagong had no long-term

development program since long time. According to Mishbah Uddin Khan (1990) ex-commissioner of port of Chittagong "The present facilities and layout of CPA would have been much different than today if the responsibilities of port development were given to the port administration".

Tariff

With the global change of trade CPA also revue its tariffs policy on a regular basis. Every year CPA need to spend 40% of its earnings on the maintenance operation of the existing old equipment. So, it's important to procure new equipment it always take years before any tariff proposal to be approved by the ministry.

Duration of project approval and implementation time

It usually takes 2-3 years to approve a project from the ministry. Purchasing of new equipment and any structural modification or new construction required ministry of shipping approval. This creates unnecessary delays implementing projects plan. Thus, CPA losses valuable time and loose revenue and consequently become less competitive over the years. In addition to that CPA has a long chain of command with multi-layer decision making system which is also causes delays in implementation of work plan. To get a decision approved a file has to move through 7/8 tables.

Lack of skilled human resource

There has always been a shortage of skilled labour in the port. Lack of training and knowledge making the port less competent. Equipment operators to administration personnel all have very less knowledge in their respective department. As a result, they can-not make timely valuable decision. There is also lack of sufficient funds to train the workers, lack of training equipment, no training need assessment system for organizing training and no feedback/evaluation process are available.

Working hours utilization

CPA losses many working hours due to political strikes, union activities, holidays and sick leaves of workers. Some of the workers are usually occupied by the union activities and they can't give time to official job. There are five registered union in CPA and each team has a member of 30 who does only union related activities in other word mostly political activities.

Over aged labour

A large number of CPA employees are over aged and comparatively low number of people under 30. According to a study carried out by ADB in 2008, among 5,712 employees, 26%

of the of them are over 50 or above and only 5% of the employees are less than 30 years old.

Table- 29

Department	Class I/II	Class III/IV	Over 50	CPA personnel	
				Under 30	Total
Secretariat	5	50	13	1	55
Admin/planning	15	166	64	9	181
Traffic	37	1341	561	Nil	1378
Marine	23	650	113	38	673
Medical	30	318	75	16	348
Finance (inc. audit)	19	201	64	1	220
Security	10	694	162	72	704
Mechanical	55	691	98	111	746
Electrical	32	373	135	14	405
Stores	5	102	22	1	107
Marine & Hydro	37	417	108	13	454
Civil engineering	44	397	84	13	441
Total					5712

Source: CPA

Large gang size

CPA always has a issue with large gang size. Usually, a container ship will have 18 labours, a bulk cargo ship will have 25 labours, a general cargo ship with bags will have 50 labours and break-bulk cargo ship will have 15 labours. Thus, reduces labour productivity and cause cost inefficiency. Labours always bargain with payment terms and demand for extra wage which is called speed money. In case of less speed money labour will go for slow work policy.

Limitation in the vessel LOA and draft

Limitation of the draft and adequate space in the navigational channel are major constraint for the port of Chittagong. Hence, outer anchorage area also not too deep for the bigger vessels. Sometimes, lack of adequate dredging causing navigational constraints in the channel. Due to channel draft and length constraints mother vessels need to discharge cargo at the outer anchorage and then lighterage inside the port. Which causes an additional $15000 for each transhipment.

Inadequate inland distribution facility, Hinterland and storage capacity

Inland distribution facility is inadequate for the cargo handling at the port. Only recently government is trying to establish new inland facility in order to make smooth transportation and reduce congestion at the port. Which will reduce transport cost and

cargo damage or loss. Hinterland connection through roads and sea are poor as well. Most of the roads are not adequate or heavy enough to facilitate cargo vehicles movements. During the rainy seasons roads get broken and causes extra time in the logistic process. On top of that there is no enough storage capacity for the cargo at port and inland terminals.

Lack of IT development

Collection of data, analyze and develop new strategy is very much important for every industry. CPA lagging behind in terms of IT sector development. Still now most of the work done via paper work. Due to this reason, many information goes lost and in future there is no data to analyze any specific problem. As a result, it is very difficult to follow up the performance and progress of the CPA. There have also been lack of communication among the departments of CPA which is causing mismanagement in various port activities. Same mistakes are repeating again and again.

Condition of port facility and operation

General cargo berth (GCB): There are 13 berths with a length of 2,100 meters which was constructed during the period of 1954-1979. In general, cargo gear and marine structure condition are in bad condition. Poor traffic system and many parts of the roads and logistics areas are damaged (ADB report, 2015).

Customs operations:

Customs is a division of Bangladesh National Board of Revenue (NBR). Customs generates lots of revenue for the NBR by implementing tariffs and taxes. Annual growth of the custom revenue is almost 15% which is even higher than BIP growth. Which means customs are acting a money generator not trade facilitator. Chittagong custom house handles 50% of the internationally traded volume (ADB report, 2015).

Doing Business in Bangladesh:

According to World Bank Doing business ranking, position of Bangladesh is ranked at very low position. Which also shows how CPA is getting affected with the general business condition in Bangladesh. Bangladesh ranked 176 while Bhutan, Nepal, India and Myanmar ranked 73, 107, 130, 170 respectively.

Table- 30

Items	Bangladesh	India	Myanmar
Ranking of ease of Doing Business	176	130	170
Time to export	247	143	288
Time to import	327	372	280

Cost to export	633	462	572
Cost to import	1664	685	667
Documents to export	13	5	12
Documents to import	9	7	9

Source: World Bank Doing Business

Chapter- 10 Results and analysis:

In this chapter, author will analyse the outcome of above qualitative research. From the qualitative research based on data collected from various source shows that there is a steady growth in the world seaborne trade and CPA also grown along with the world growth. While world GDP growth was 2.4% in 2016, Bangladesh GDP growth was recoded 7.1% and CPA growth was at a rate of 12% in the last year despite of poor hinterland connectivity, poor human resources, navigational restrictions, lack of IT facility and lack of adequate equipment availability. It has also been noticed that there is a slow process in decision making and long chain of order for implementing any operational instruction as well as long process to recruit employees. Total number of export-import goods through Chittagong port were 54781392 metric tons and 47298547 metric tons in 2015 and 2014 respectively. On the other hand, CPA handled total 1625509 TEUs container in 2014 and 1867062 TEUs in 2015. Although, CPA shown considerable improvement in term of operational efficiency but last year slight downgrading was noticed which is mainly due to congestion at the port than the previous year. Ship turnaround time was increase from 4.23 days to 4.26 days and dwell time of container increased from 15.64 days to 17.48 days. Besides these impacts, CPA has increase its profit from 815.65 crore Taka to 867.22 crore Taka in 2014-2015 financial year. where most of the revenue came from operating revenue. Likewise, there was gradual increase of vessels calls at the port. It is noticeable that operating cost for a 5000 GRT vessel is slightly higher than any other port in the developed country. Strategic geographical location is a strength of CPA but there are several strong weaknesses like navigational limitations. Locally new ports developments will reduce market share of CPA in future but we believe that CPA can take advantage from these new port developments as well. This can be possible by mutual sharing of vessels and cargo and CPA can be a service provider from these ports by improving its hinterland connectivity. Recently operational Port of Pyra may take over the position of highest market share in future. If deep-sea ports become operational, theoretically CPA will lose market share as well. But CPA can attract these ports by improving its operational efficiency and hinterland connectivity and be a domestic logistic service provider. Among the international ports, Kolkata port trust (KPT) is a strong competitor of CPA without any doubt in terms of capacity. It is to be mentioned that CPA has no reason to compete with KPT due geographical location of each ports and hinterland connectivity. However, KPT either need to use Pyra Sea Port or Port of Chittagong in order to transiting cargo to the North-Eastern border of India. Unfortunately, it was not possible to assess the port performance of the Port of Switte due to lack of data availability but Due to significant navigational limitations port of Sittwe cannot be a strong competitor of CPA. It is

understood that international ports are not competing with each other in this region but they need each other for logistic supports and access to third party nations. So, it is obvious that CPA will face completion only from the local ports such as recently started Pyra Sea Port and Deep-Sea ports if built. From the above analysis couple of significant negative factors were found. There is a need for IT system implementation in each sector, inter-department communication and sharing of information, community welfare activities, procurement of new equipment for both container terminal and general cargo terminal.

Chapter- 11 Conclusion:

With high unemployment and possibility of high GDP growth CPA has a strong potential to grow further by improving its service quality and hinterland connectivity. In the current global logistic supply chain scenario, shipping companies are influencing for more ports with larger capacity and thus increasing number of ports in the maritime supply chain. CPA is also experiencing the similar effects in its region.

This research was carried out based on the present and past statistics and tried to visualize the future trend of maritime trade in CPA and in the region. In this study infrastructure capacity and operational efficiency were given main focus. Building on the present research on CPA, as well as research under taken by Halima (2003) and Shajahan (2000), further research could focus on how a port can be made more productive, what are the factors are influencing port development and port governance for better efficiency. In addition, it is also important to analyse how global companies select their ports and how CPA can attract more shipping lines.

It is very much clear that capacity and efficiency of port of Chittagong are highly important for the further growth of Bangladesh economy. Therefore, in order to remain competent in the market CPA need to modernize and carry out several reforms in the administration and operation. In this study author tried to figure out the importance of port of Chittagong in Bangladesh economy and how it can upgrade its competency and remain in future as importance as today. This study has enable the author to better understand the port efficiency of CPA, its importance on Bangladesh economy, a comparative position of CPA in this region in terms of port performance and also helped author to understand necessary measures to be taken into account by CPA in near future. With our qualitative analysis, we found that CPA still remains a gate way to Bangladesh international trade. In near future, CPA present status will be challenged by local and international sea ports. To deal with these factors CPA need to visualize the upcoming issues, analyse and make a master plan in order to adjust with the change of trade competition. The ultimate aim of CPA should be such that they can present themselves in the market as a most competent trade facilitator in the region in terms of operational efficiency and cost involved. In accomplishing this goal hinterland connectivity of CPA will play a vital role and which is also considered to be the most challenging sector as well due to the lack of communication

among government inter-department agencies and long-term planning. One basic thing is clear that CPA need more infrastructural development within its port limit and its hinterland capacity through which CPA would be able to attract shipping lines for regular calls.

Considering the present situation, it is a just a matter of time that demand of maritime trade in Bangladesh will growth much high than today. Government of Bangladesh also under taking various economic and infrastructural reforms to stimulate economic growth in order to meet the growing demand. In this transition economic period, CPA will have a comprehensive share without any doubt due to its geographical presence. But furthermore, CPA will no longer enjoy monopoly situation in Bangladesh maritime trade due to some other sea ports developments within its vicinity. If we look at the geographical context, in future mutual collaboration among sea ports in this region will be much needed. This is why, CPA also need to think about mutual port collaboration with other sea ports as well. It is clearly understood that in this region collaboration among sea ports would be the more preferred choice than competition. Which will enable everyone to benefit from each other and global maritime trade as well.

Chapter- 12 Recommendation and future strategy of CPA:

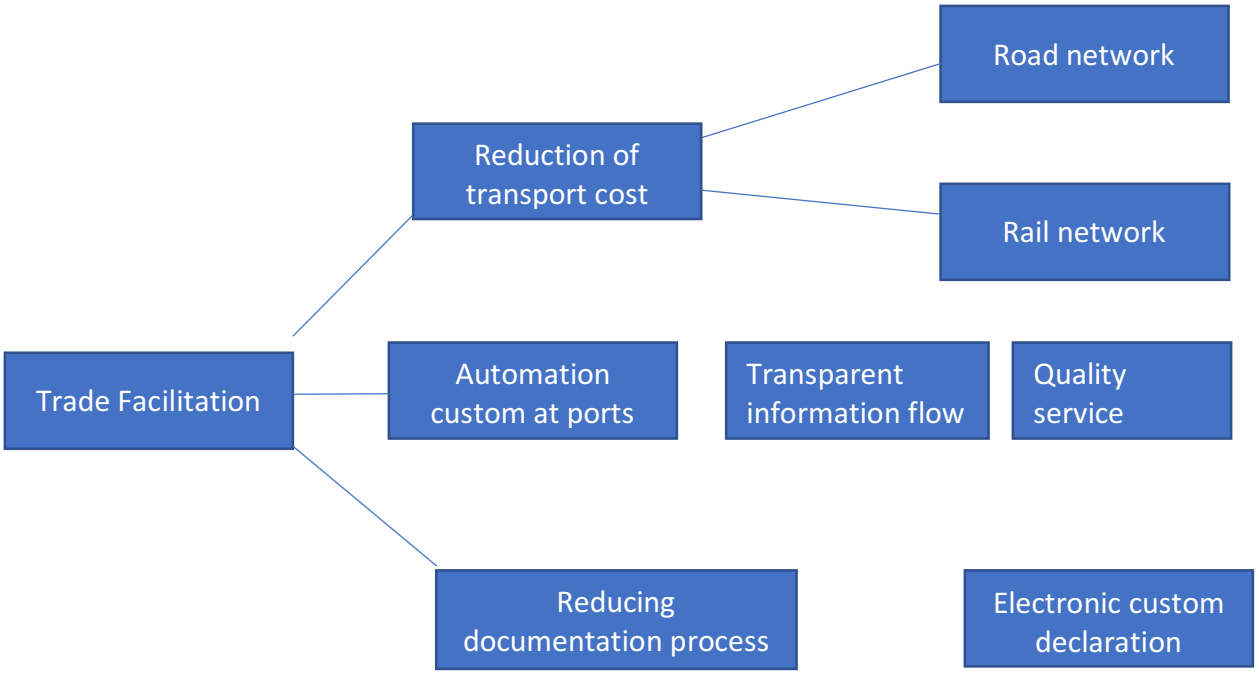
In order to be more efficient and remain as a dominant port in the future CPA must under-take necessary reforms and upgradation of its operational and administrative process. Reforms can be short and long terms. As part of the short-term reform following terms should be looked into-

- Operational efficiency should be improved by utilizing labour working hours and regular training of labour.
- Recruitment process should be simplified and vacant posts should be filled with young team of labour. Reduction of over aged labour should be taken into consideration.
- Long chain of command should be avoided and specific department should be able to deal with the new decision making regarding planning and development activities.
- Political influence should be removed from the CPA.
- Department of planning should be strengthened and employees should have operational, engineering, economics and statistics knowledge. Which will increase capacity of the planning department.
- Training institute should be well equipped and well organized.
- Various welfare activities should be organized in order to have a good working culture within CPA organization.

Administrative reforms to be carried out-

- Port authority should be given maximum possible authority for managing, operating, recruiting, developing, strategic planning and implementing master plans. This will make decision making easier and CPA will be able to take necessary decision without any delay.
- CPA should follow a landlord model for managing the port and involve more private investors in the port activities. Most importantly CPA should change from their authority type approach to trade facilitator. Inter-department communication should be improved. In doing this a new name could also be a good option in order to change the port approach towards trade facilitation.

Figure- 39- Trade facilitation process:



IT system improvement

- CPA should use a centralized data base for the whole port and all the IT activities should be led by the chief information officer.
- Electronic booking system should be implemented. Container traffic management system (CTMS) is not fully efficient because of lack of information. Loading process should be modernized with the help of modern equipment.
- CTM system is very old and should be upgraded. SQL database should be changed to ORACLE.

- Gate operation should be IT oriented. Truck announcement, check in, check out to be controlled electronically controlled and this will be integrated with CTM system. This will reduce congestion at the gate.
- Port security and safety system should be integrated with IT in order to control and monitor access inside the port and cargo flow.

Integrated Hinterland operations-

According to ADB master plan in 2015, the importance of an integrated hinterland planning was emphasized. A join coordinated planning is required among roads, and high way department, Bangladesh rail way department and Bangladesh inland water transport authority. Following suggestions were made in the ADB report-

- Construction of container terminals at Dhirassram near Dhaka, off-dock container terminal at CGPY and Khanpur ICT. Immediate operation of Pangoan container terminal.
- Convert Akhaura-Laksham railway section in double track.
- Railway connectivity to Bay container terminal to deal with port traffic efficiently.

Customs regulation and practices-

- Both export and import cases, it is to be made a good practice that of the container screened outside the port which will reduce port timing and at the same time reduce the cost involved at the port.
- Customs should jointly work with CPA for the traffic flow inwards and outwards movements in the port.
- Paper work has to be reduced and export-import documentation process should be done online. Asycudas system should be fully implemented.

Container handling operations-

- CPA should not assign berth and terminal operators has to be allowed to compete freely for vessels calls and port tariff.
- Private container operators need to involved in the terminals. This will benefit the port by increasing competition within the terminal operators. Typical concession duration could be 20-25 years.
- There should be a dedicated at least 02 berths for inland water vessels with a quay length of 187 meters (ADB master plan report, 2015).
- NCT and CCT terminals must be upgraded with new STS gantry cranes and other modern equipment.

Additional terminal capacity-

- GCB area should be converted into fully independent container terminal and this can be licensed to private operators.
- During the period of 2018-2022, there will be a capacity shortage of approximately 751,000 TEUs. This shortage can be dealt with some temporary measures such as feeder barge system. similar system was introduced by port of Hamburg in order to reduce work load from the container terminals during pick hours.
- New multi-purpose terminal required with a capacity of 4.7 million tons for handling general cargo and break-bulk cargoes.

Long-term measures:

- An approach should be taken to commercialize the port operation in order to increase competition. More coordination among local and international ports are required.

Appendix:

List of cargo handling equipment at Port of Chittagong:

Table 1: Existing container handling equipment (April, 2016):

SL. No.	Type of Equipment	Capacity (Tons)	Total nos.
1	Quay gantry crane	40	04
2	Rubber tyre gantry crane	40	19
3	Straddle carrier (04 high)	40	36
4	Straddle carrier (02 high)	40	02
5	Reach stacker	45	15
6	Mobile harbour crane	84	02
7	Fork lift truck	42	05
8	Fork lift (spreader)	16	19
9	Reach stacker	07	06
10	Container mover	50	05
11	Terminal tractor	50	43
12	Terminal trailer	50	55

Table 2: Existing cargo handling equipment (April 2016):

SL. No.	Type of Equipment	Capacity (Tons)	Total nos.
1	Mobile crane	10-50	45
2	Fork lift truck	10-20	06
3	Fork lift truck	03-05	91
4	Industrial tractor	25	11
5	Heavy trailer	25	05
6	Lighter trailer	06	30

Table 3: Equipment being procured under revenue budget (2014-2015):

SL. No.	Type of Equipment	Capacity (Tons)	Total nos.
1	Rubber Tyre gantry crane	40	08
2	Rail mounted gantry crane	40	02
3	Straddle carrier (04 High)	40	07
4	Container mover	50	05
5	Forklift truck	16	04
6	Mobile crane	10-100	39
7	Forklift truck	03-05	28
8	Industrial tractor	25	14
9	Trailer	06	14
10	Log carrier	40	04
11	Tele handler	40	04

12	Weighing and bagging machine		04
13	Pneumatic conveyor		04
14	Car carrier		05
15	Man lifter		03
16	Forklift track	10-20	10

There are 06 nos. lighter jetties for small inland vessels including small bulk and small oil tankers.

Table 4: Wire house capacities:

A. Shed	2436.80	1048.80
B. Shed	277.81	1196.00
D. Shed	1108.73	477.20
F. Shed	8696.63	3742.60
G. Shed	9409.85	4050.00
H. Shed (CFS)	1543.40	664.28
L. Shed	1911.33	822.64
M. Shed	8084.10	3479.40
N. Shed (CFS)	8084.10	3479.40
O. Shed (CFS)	8084.10	3479.40
P. Shed	2822.95	1215.00
R. Shed (CFS)	1881.97	810.22
Shadarghat Shed	3808.00	5428.00
Total	**60,650.77 sq. metres**	**29,892.94 M. Tons**

List of people interviewed:

Name	Rank	Institution
Captain Kazi ABM Shameem	Deputy Commandant	Bangladesh Marine Academy
Captain Mohiuddin	Master Mariner	Omamarine International
Captain JashimUddin Sarker	Chief Nautical Surveyor	Department of Shipping Bangladesh
Md Zafar Alam	Member of Admin and Planning	Chittagong port Authority

Questionnaire format:

No	Question
1	What is the future outlook for CPA?
2	Is there any government plan for further development?
3	What are the current issues CPA facing?
4	What are the measures to be taken to solve this problem?
5	What are they thinking about Pyra sea port and deep-sea port?
6	What is the effects of hinterland connectivity?

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