

# Readiness of the Port of Colombo as a Mega Hub Port for Transshipment Containers

Praneeth Gunawardena<sup>a\*</sup>, R G Ariyawansa<sup>b</sup>,  
and U Anura Kumara<sup>c</sup>

<sup>a</sup> Faculty of Graduate Studies, University of Sri Jayewardenepura, Sri Lanka

<sup>b&c</sup> University of Sri Jayewardenepura, Sri Lanka

---

## Abstract

The Colombo Port has become a hub port for transshipment containers in the South-Asia region mainly due to its location advantage and have further carved out a niche linking feeder connections in the Indian sub-continent trade to main sea routes on the back of its access to the Indian Ocean. During past couple of decades major ports around the world have faced significant challenges due to rapid evolution in marine technology and international logistical system. Primarily there were two major thrusts have been impacting the seaports which identified as 'Increased specialization of ship design' and the 'Growth in ship size'. These two aspects of ship specialization and capacity enhancement that were continued to progress resulted a greater demand in Ports and container terminals to invest on improvements to equipment and ports infrastructure. Each subsequent generation of containership which evolved has not only created new challenges to ports around the world, but also limited the number of port calls. Presently only one deep water container terminal available in Port of Colombo to handle modern day Ultra large container carriers (ULCC's).

© 2023 The Authors. Published by Department of Estate Management and Valuation, University of Sri Jayewardenepura

*Keywords: Mega-Hub Ports, Feeder Network, Ship Design, Ultra Large Container Carriers*

---

## Introduction

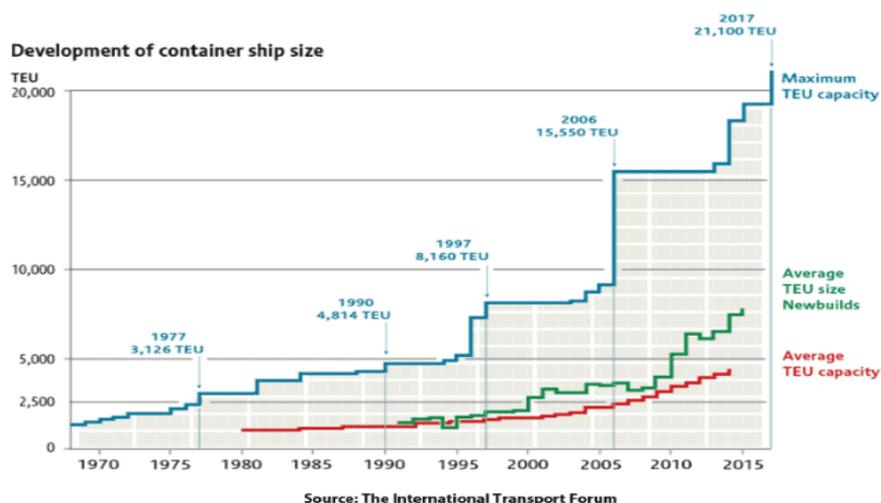
In the late 90's Government of Sri Lanka (GOSL) identified as expansion of Port of Colombo is the way forward to cater to the increased demand of services in the international shipping industry due to volumes growth in containerized cargo globally and the recorded annual throughputs performed by Port of Colombo during same period. After a comprehensive study of the proposed development project which called 'Colombo Port Expansion Project (CPEP)' was embarked in the year of 2008. The project situated west to the existing port of Colombo comprising an area of approximately 600 hectares. The new port was designed to have 3 container terminals namely South terminal, East Terminal, and West Terminal and each of it having 1,200m length and relevant facilities to accommodate 3 alongside berths. The Port of Colombo which had the annual throughput capacity of 4.5 million Twenty-foot Equivalent Units (TEUs), under this development plan it was expected to increase the capacity by another 7.2 million TEUs in 03 phases. Furthermore, the proposed expansion project was necessary and deemed advantageous at that time due to the trends of building larger containerships which increased the cargo carrying capacity by 03 times more than the existing designs which prevailed at that time. As many experts envisioned at that time the following generation of mega-size container carriers with a carrying capacity above 20,000+ TEU's have now become reality and already on the waters in present day. The concept of 'Mega Carriers' planned to serve only a limited number of deep waters "Transshipment hub ports" located in main sea routes. In that context, Port of Colombo had the

---

\* Corresponding author: [gunawardenepraneeth@gmail.com](mailto:gunawardenepraneeth@gmail.com)

potential to become a successful transshipment onshore Mega-hub port considering its geographical locational advantage.

**Figure 01: 50 Years of Container Ship Growth**



Source: The International Transport Forum: Container Ship Growth

### Objective of the Study

Ministry of Finance and Planning of Sri Lanka in the year 2010 has published a national policy document titled as “The Development of Policy Framework” with the objective of transforming Sri Lanka into a strategically important economic center of the world. Document describe that GOSL has identified Port of Colombo to be positioned as Modern Technological Transshipment Hub in Asia by 2020 having increased its net assets from Rs. 78 billion to Rs. 200 billion. Framework document further elaborates that Port of Colombo will have the capacity to receive the largest ships in the world and private sector participation in port related industrial activities will be a dominant feature of SLPA, under the government policy of creating a supportive climate for enterprises, thus Port sector is expected to be a key priority area for PPP based investments.

Problem identified as SLPA is not responding to the growing demand of the container industry since 2013. For an instance, as per the Alphaliner (proprietary database which reflecting decades of data collection) the average global throughput growth was 4.1 percent from 2013 to 2018. Annual volume growth of Port of Colombo was recorded as 5 percent for the same corresponding period. CICT during 12 months of the 2018 calendar year have handled 2.65 million TEU’s (SLPA Website). However, since 2013 to date, phase 2 and 3 of the Colombo Port Expansion Project (CPEP) has not implemented. Therefore, Port of Colombo lacks the necessary infrastructure to tackle this growth objective effectively. To maintain the consistency of the volume growth target, technically both remaining two phases (west Container Terminal and East Container terminal) should have been completed by year 2023.

**Table 01:** The Vessel Order Book in January 2020

Cellular Orderbook Fleet Breakdown						January 2020
Size Range TEU	All cellular ships		Of which chartered			Orderbook/ Existing %
	Units	TEU	Units	TEU	% Chrt	
18,000-24,000	37	860,900	1	23,756	2.8%	37.2%
15,200-17,999	0	0	0	0	0.0%	0.0%
12,500-15,199 NPX	47	689,374	29	419,374	60.8%	19.9%
10,000-12,499	34	402,350	26	306,350	76.1%	22.8%
7,500-9,999	0	0	0	0	0.0%	0.0%
5,100-7,499	2	10,590	2	10,590	0.0%	0.4%
4,000-5,099	1	4,011	0	0	0.0%	0.1%
3,000-3,999	13	39,788	1	3,100	7.8%	4.5%
2,000-2,999	106	260,933	35	86,866	33.3%	15.1%
1,500-1,999	57	102,841	44	79,136	76.9%	9.9%
1,000-1,499	41	47,366	9	11,340	23.9%	5.8%
500-999	9	5,824	0	0	0.0%	1.0%
100-499	2	420	0	0	0.0%	0.7%
<b>TOTAL</b>	<b>349</b>	<b>2,424,397</b>	<b>147</b>	<b>940,512</b>	<b>38.8%</b>	<b>10.4%</b>

Source : *Alphaliner – Jan 2020*

Primary objective of this study was to examine the obstacles and barriers which are affecting Port of Colombo to become a mega hub port for transshipment containers. Further, this research is focused without prejudice, to identify factors which are influencing the development of a Port into a mega hub for transshipment cargo and to examining and aligning those factors in the context of Port of Colombo on a self-conceptualized frame work. Outcome of this research will also help and benefit policy makers to take development initiatives that are needed to attract transshipment container volumes which are not presently moving through Port of Colombo and also to harness and leverage the advantages of the islands strategic geographic position to allow Port of Colombo as a Mega hub port to serve tomorrow's container trade in an effective and efficient manner.

## Literature Review

International trade is one of the main elements of globalization. Aspect of globalization and its different phases impacting the global economy due to ports and shipping development was described by Caldeirinha and Augusto (2013) stating that containerization itself a stimulated shipping services and rapidly evolving with the globalization through an emergence of alliances and acquisitions in the liner shipping industry (horizontal integration). Yap and Notteboom, (2011) says that same way liner shipping evolved with strategic partnerships, inter-modality also has led to powerful global logistic door-to-door and other value-added services as vertical integration.

Valentine and Park (1998) in a study undertaken for UNESCAP explicit that there are significant economies of scale for shippers in building larger and larger ships, but the introduction of mega-sized vessels will require new investment in infrastructure to support these ships. Ports infrastructure and resources related investments are exorbitantly expensive and long term. On the other hand, risks involved in this kind of long-term investments are rated extremely high and needs a proven risk assessment and mitigation plan. Rodrigue and Sculman (2017) extensively describes in their research that ports as capital intensive infrastructures that are associated with a wide array of economic impacts. This is particularly apparent and researcher in this study is focused to establish that port development and world trade are closely interrelated.

In general, for a Hub-port the productivity and efficiency improvement studies are much more difficult and complex than many other sectors because seaport is not in product but rather in industrial services business. Wiegman and Dekker (2016) highlights that container terminal operators use different performance management techniques to obtain insight into the quality, cost-effectiveness, and profitability of their operations. Qianwen (2010) says that Mega carriers are directly challenges the efficiency of container ports. The competition between container ports was for a long time not very intensive because ports were location specific. However, with the increasing proportion of transshipment traffic within the total container port traffic, the geopolitically sensitive nature of container ports has been altered, and competition among ports has intensified.

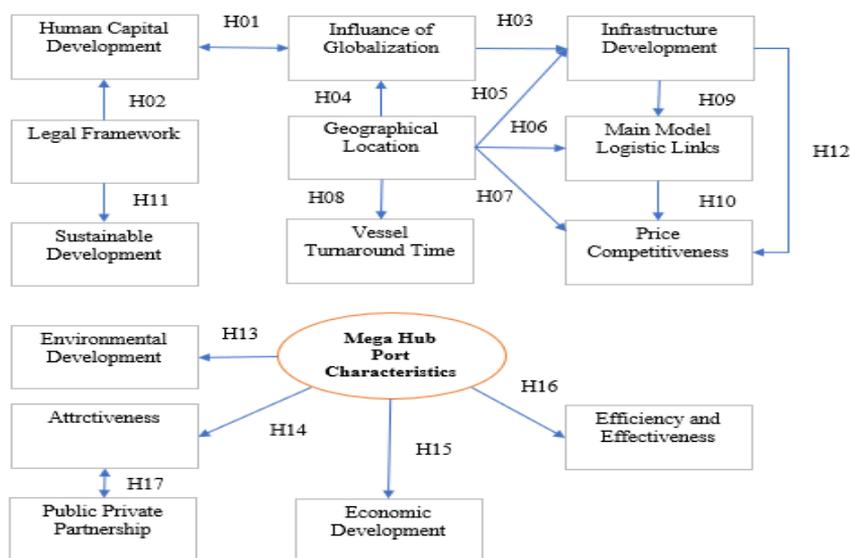
Economies of scale have led to larger and more specialized ships and as a result, seaports have become increasingly capital intensive. This change describes by Trujillo and Nombela (2000) and they say the competition between ports have started to grow rapidly. As a result, governments are reorganizing the way ports are run and permitting more private ownership and service delivery. To facilitate multiple services which seaports are offering, governments' needs to design an efficient legal and regulatory framework for private sector participation. Trujillo and Nombela (2000) pointing it is important to study objectively and evaluate the activities that needs private sector to get involved and engage the best approach for implementation as a partnership. Role of the private sector in port activities have forced ports to become more market-oriented, more innovative and more responsive to the needs of all actors involved in the trades which pass through the port. Barros and Athanassiou (2004) research on relative efficiency, study shows that privatization was advocated as the most appropriate method for achieving economic efficiency.

Protecting of biosphere is an essential precondition for social justice and economic development. The shipping industry has a direct impact on the biosphere through emissions to air and discharges to sea. According to OECD publication (2011) Shipping has an environmental impact both in ports, as well as in the immediate vicinity of the ports. Tubielewicz (2016) emphasizes that port expansions are involving dredging and land reclamation, increased handling, storage and processing of hazardous substances in ports, development of port industry can have a significant environmental effect in the marine and coastal areas. Hakam and Solvang (2013) argue even though, the sustainability development is a relatively a new concept and needs maturity especially in the field of Seaports and Maritime industry. Researchers' intention of relating empirical studies to emphasize that eventually the Ports are forced and compelled to pay increasing attention to environmental, sustainability and security issues as a result of stakeholder pressure especially from port users, clients, competition, public bodies, social interest groups and individual citizens.

## **Methods**

Researchers' intention was to illuminate the methodological framework applied to conduct the research. Considering research approach and literature affiliated with the research question, the researcher has designed a conceptual framework to map out the relevance of the identified variables. The relationships between each variable are explicated. The mega hub port concept is focused as the center stone in the framework and relationships of other variables are linked as depicted in the figure 02 below.

Figure 02: Conceptual Framework



Source: Self conceptualized by the author

The proposed research is involved in testing hypothesis. Therefore, the most suitable approach for the research is deductive approach. On the other hand, conclusive and exploratory (Bell et al., 2019) could be listed as the designs that are available for the research. Below table depicts an examples of some of the relevant hypothesis that will be testing

Table 02: Example of Hypothesis developed for testing

Area of testing	Hypothesis
Relationship between human capital development and legal framework (H2)	H2a – There is no relationship between human capital development and legal framework
	H2b – There is a relationship between capital development and legal framework
Relationship between influences of globalization and infrastructure development (H3)	H3a – There is no relationship between influence of globalization and infrastructure development
	H3b – There is a relationship between influence of globalization and infrastructure development
Relationship between geographical location and influences of globalization (H4)	H4a – There is no relationship between geographical location and influence of globalization
	H4b – There is a relationship between geographical location and influence of globalization

Relationship between geographical location and infrastructure development (H5)	H5a – There is no relationship between geographical location and infrastructure development
	H5b – There is a relationship between geographical location and infrastructure development

---

*Source: Extracted from list of hypothesis developed by the author*

The proposed research is expected to take a conclusive design which will have definite conclusions of the study. Further, conclusive research design will help to support the statistical tests and this is essential for the hypothesis testing. The archival is designed to examine the secondary information and to summarize the important information. On the other hand, survey is designed to collect information through primary information sources as conducting the proposed research, it is expected to use both primary and secondary information. When selecting secondary information sources, the reliability of such information will be considered. For example, if the volume that handled by Port of Colombo is reviewed, only the information published by the Sri Lanka Port Authority will be considered. On the other hand, primary data will be collected through the industry survey and such information will be turned into quantitative information using statistical software.

## **Results and Discussion**

At this stage of the study (only up to chapter 3). since the hypothesis were not tested the researcher wish to conclude the findings after the Literature Review carried out that as Globalization, Public Private Partnerships could be highlighted as the areas that are showing interdependencies and has significance towards the economic development for Sri Lanka. Improvements and technological advancement in the international trade were observed as benefits that can be enjoyed by many economies due to the globalization process. To facilitate the international trade and to become a major player in the global shipping industry, having robust Ports, Multimodal transport connectivity system, and inland logistics infrastructure is considered as vital aspects. Since Sri Lanka is aspiring to position Port of Colombo as a major transshipment hub, country need to embark more on projects that are aimed at developing Ports and related infrastructure and these projects require significant capital investment, and in some situations government of Sri Lanka may not be able to provide the required finance in a timely manner.

## **Conclusion**

The present-day global investors and multi-national corporations seek and demand faster and efficient shipping and logistics links. Therefore, Sri Lanka has to be a hub for more than South Asia to realize the full potential of its valuable ports and shipping links and such developments shall boost and support the countries efforts in an international trade and investments to ensure consistent economic growth. It took approximately 5 years since the decision was taken in 2008 to complete the Phase I of the CPEP. During this 5-year period, shipping industry have been evolved rapidly and many newly introduced Ultra Large Container Carriers (ULCC) were already in the waters. Delayed implementation of the stage 2 of CPEP is the nearest example as described in the ‘key problem’ section of this study. As a solution, Public private partnerships can be recommended to pursue which is prevalent and effective.

## **References**

Caldeirinha, V., Felico, J. & Dionsio, A. (2013). Effect of the container terminal characteristics on performance’, Module Paper 2013/13, School of Economics and management; Technical University of Lisbon Available on

- [http://www.cefage.uevora.pt/en/content/download/3752/47899/version/1/file/2013\\_13.pdf](http://www.cefage.uevora.pt/en/content/download/3752/47899/version/1/file/2013_13.pdf)
- China International Container Terminal Ltd website, Available on [http://www.slpa.lk/colombo\\_south\\_harbour.asp?chk=4](http://www.slpa.lk/colombo_south_harbour.asp?chk=4),
- Colombo Port Expansion Project website, Available on [http://www.slpa.lk/colombo\\_south\\_harbour.asp?chk=4](http://www.slpa.lk/colombo_south_harbour.asp?chk=4),
- Rodrigue, J., & Schulman, J. (2019). The Economic Impacts of Port Investments. Retrieved 29 August 2019, from [https://transportgeography.org/?page\\_id=9435](https://transportgeography.org/?page_id=9435)
- Valentine, V. & Park, J. (1998). Free Trade Zone and Port Hinterland Development; An article published by the Korea Maritime Institute for United Nations under the program of Economic and Social Commission for Asia and the Pacific. <https://repository.unescap.org/bitstream/handle/20.500.12870/2920/ESCAP-2005-RP-Free-Trade-Zone.pdf?sequence=1>
- Hakam, M. & Solvang, W. (2013). Container ports sustainability - a literature review: Published in IEEE 4th International Conference on Cognitive 2013 available on <https://www.semanticscholar.org/paper/Container-ports-sustainability-a-literature-review-Hakam-Solvang/aaa09a2dcdf0ad30b23b1bc9ea0154545a19ad89>
- Tubielewicz, A. (2016). Financing of Ports' Investments. Retrieved 29 August 2019, from <https://bullmaritimeinstitute.com/api/files/view/57725.pdf>
- Merk, O., Busquest, B. and Aronietis, R. (2015). The Impact of Mega-Ships, A paper presented at the International Transport Forum at the OECD.
- Port Technology (2017). Worldwide Port Container Throughput Increases. Available on [https://www.porttechnology.org/news/worldwide\\_port\\_container\\_throughput\\_increases](https://www.porttechnology.org/news/worldwide_port_container_throughput_increases)
- Qianwen, L. (2010). Efficiency Analysis of Container Ports and Terminals; Centre for Transport Studies Department of Civil, Environmental and Geomatic engineering, University College London, Research Paper
- Yap, W. & Notteboom, T. (2011). Dynamics of liner shipping service scheduling and their impact on container port competition, research paper Available on [https://www.researchgate.net/publication/233254225\\_Dynamics\\_of\\_liner\\_shipping\\_service\\_scheduling\\_and\\_their\\_impact\\_on\\_container\\_port\\_competition](https://www.researchgate.net/publication/233254225_Dynamics_of_liner_shipping_service_scheduling_and_their_impact_on_container_port_competition)
- Weigmans, B & Dekker, S (2016). Benchmarking deep-sea port performance in the Hamburg-Le Havre range. Benchmarking: an international journal, 23(1), 96-112. <https://research.tudelft.nl/en/publications/benchmarking-deep-sea-port-performance-in-the-hamburg-le-havre-ra>
- Barros, C. & Athanassiou, M. (2004). Efficiency in European Seaports with DEA. <http://dx.doi.org/10.1057/palgrave.mel.9100099>
- Trujillo, L & Nombela, G. (1999). Privatization and Regulation of the Seaport Industry. Journal article [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=623975](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=623975)
- World Bank. (2019). Global Rankings 2018 | Logistics Performance Index. [online] [Lpi.worldbank.org](https://lpi.worldbank.org/international/global). Available at: <<https://lpi.worldbank.org/international/global>>.