Is outsourcing the Panacea? A discourse on the sustainability of Indian Ports A case of Jawaharlal Nehru Port Trust

Mr. Toorban Mitra[a] (Research Officer)
Dr. Krushna Mohan Pattanaik[b] (Assistant Professor)
[a]Indian Maritime University, Kolkata 700 088, INDIA
[b]Indian Maritime University, Kolkata 700 088, INDIA
email: tmitra@imu.ac.in

Abstract: The discourse on sustainable transportation illuminates the fact that port competitiveness and efficiency gains are two major pillars of blue economy in a world which is much integrated than in the past. However, most literature on port efficiency measurement undermine the very eco system of a port. Port eco system is complex interconnected web of network which requires collaborative involvement of spate of stakeholders such as CFS, Agents, ICDs, Transportation companies, to mention a few. Understanding such network and their holistic potential impact on the efficiency of port performance is scarcely addressed in the context of larger dialogue on port efficiency. Such an analysis is paramount when deeper levels of economic integration and spatially competitive ports are considered to be co joint twins. Further, efficiency gains of ports have received much academic attention in view of total quality management which focuses on customer delight and thus customer retention. It is this regard; the present paper tries to make an infant endeavour in terms of measuring terminal efficiency with respect to the turnaround time which would include export cycle time and import cycle time of CFS (a potential outsourcing activity of a port). Such a step in efficiency measurement of ports is scanty in Indian scenario. A case of Jawaharlal Nehru Port Trust is referred as a case in point.

Setting the Stage

With the dawn of globalisation, market around the world is getting integrated. Such integration results in global transaction, a development that demands operational efficiency in supply chain. In this regard, ports are key gateways in the global supply chain to the extent that efficiency of global supply chain depends to a significant degree on port efficiency (Kennedy *et al*, 2011; Sen *et al*, 2020) and thus affects international trade. This is because efficient ports can potentially reduce operational bottlenecks in the supply chain, thus reduce cost and time of maritime transportation (Clark *et al*, 2002; Lei and Bachmann, 2020) and thereby increase the strategic competitive advantage of a country in terms of international trade. In this context,

there exists an undisputed consensus in the larger discourse on the positive linkage between port performance and economic development due to multiplier effect (Dwarakish and Salim, 2015). Ports create employment, purchasing power, linking a country with other parts of the world, helps a country earn foreign exchange and thus significantly contribute to economic development of any country. Due to such importance, sustainable port efficiency is seen as a survival strategy for ports as it affects ports competitiveness, cost advantage and customer retention (Kim, 2012). In this context, Nyema (2014) and, Sinha and Bagodi (2019) illuminate that inefficiency in port operation may lead to longer stay of a ship in the port and in return escalate transport cost and cost of operation to shipping companies. Thus, lead to diversion of cargo from such port to other ports. Such linkage between operational efficiency and port performance stipulate for outsourcing as a source of efficiency gain. In port sector such outsourcing could be seen in the form of public private partnership model of ownership model (world Bank,2020).

The question of efficiency gains necessities focus of organisations mostly on their core competencies and thus improve competitive advantage, and outsource non-core activities to other firms which pursue such activities efficiently. In this regard, outsourcing could be defined in the words of Ishizaka *et al* (2019) as "*Outsourcing is a business agreement, either domestic and/or international (known as offshoring), and strategic management initiative for gaining a competitive advantage of a firm by contracting out their existing internal and/or external non-value added functions, and/or value-added functions, and/or core competencies to competent supplier(s) to produce products and/or services efficiently and effectively for the outsourcing firm*". Thus, semantically such intervention leads to value creation and improvement in the competitive stance of an organisation. At the same time, mixed views exist on the cost of outsourcing and the efficiency outcome of outsourcing as being unsynced. If outsourcing firms and activities are not selected in a proper way by an organisation, the results of outsourcing may prompt questions on optimality of such exercise (Kalinzi, 2016).
Transportation sector is no exception. However, as pointed out by Parola *et al* (2016) port competitiveness is affected by a complex web of activities by various stakeholders presented in the maritime ecosystem. Such elements in the maritime ecosystem affecting port efficiency would include Exporters, importers, Container Freight Station (CFS), Shipping companies, to mention a few. Such multidimensional interactions potentially affect efficiency of a port. Any inefficiency in the ecosystem would lead to leakages in efficiency gains. It is in this context that, outsourcing is rewriting traditional functions of a port wherein the public sector involves

itself as planning, developing, and regulating activities whereas private sector involvement is seen as service provider and operator (World Bank, 2020). Outsourcing and its positive impact on port efficiency has been acknowledged (Nyathi, 2014) but scarely in the literature. Spate of the studies like Monteiro (2018), Merk & Dang (2012), Rajasekar *et al* (2014), Swaminathan (2019) focus on measurement of port efficiency using Data Envelopment Analysis (DEA) to establish efficiency scores. Such studies essentially focus on efficiency from the perspective of port operations. Also, there are attempts like Kennedy *et al* (2011) which use Stochastic Frontier Production Function to measure efficiency of ports. However, there have been scanty attempts made to study the impact of an element of maritime ecosystem on the efficiency of a port. For instance, in a partial equilibrium analysis, efficiency of a CFS reflected in terms of dwell time of handling a container could potentially affect efficiency of port. Such scenario exists as CFS facilitates decongesting ports (Klomperee, 2000). Since there are private players in CFS domain, their activities could be defined as outsourced activities for port which they serve in line with Ishizaka *et al* (2019). Further, studies focusing on the impact of agents of maritime ecosystem on port efficiency are sparse particularly in Indian context. From the above discussion, it is evident that in the literature on port efficiency measurement are mostly DEA focused, and is limited in Indian context. In this regard, the present study tries to fill this gap by taking an infant step in measuring the contribution of CFS to port efficiency. Knowledge of such linkage is important from managerial perspective because lower dwell time of handling containers leads to competitive advantage to ports through efficiency gains particularly in pandemic situation resulting in customer retention and customer delight.

Methodology

As is discussed above, the present study considers private CFS as a crude representation of outsourcing activity of a port and thus tries to estimate the linkage between the two in terms of efficiency of port being affected by efficiency of CFS attached to such port. To understand this linkage in Indian context, Jawaharlal Nehru Port Trust (JNPT) is considered as a case. JNPT is considered as it is considered as a top port in Asian continent (Swaminathan, 2019) and handles more than half of containers that are handled by all major ports of India (Rathi *et al*, 2020). It has five terminals and has both private and government CFSs. For the present study, only private CFSs are considered to represent outsourcing activity. To estimate the linkage between efficiency of CFS on efficiency of ports, variables like cargo handled at various terminals of JNPT **in tons**, import dwell time in hours, terminal wise import dwell time in hours, export dwell time in hours, terminal wise export dwell time in hours, and CFS dwell time in hours is

considered. The timeline for the data is financial year 2019-20 covering 12 months. A total of 13 CFSs are considered for the study. It is assumed that each of these 13 CFSs serve all the five terminals of JNPT. To establish understand the linkage between efficiency of CFS and efficiency of JNPT, Structural equation modelling (SEM) is used. The justification of using SEM is that it is a multivariate analysis which combines multiple regression and factor analysis to estimate structural relationship between variables. SEM is used in port related studies to estimate linkage between ports and economic development (Goncalves and Assumpção, 2016). Worth mentioning is that paucity of data on several other variables which could affect port efficiency is observed. The year taken for the study April 2019-March 2020 is considered to be a not normal year for international business in view of Covid 19 pandemic. These observations may lead to unrobust results.

Results and discussion

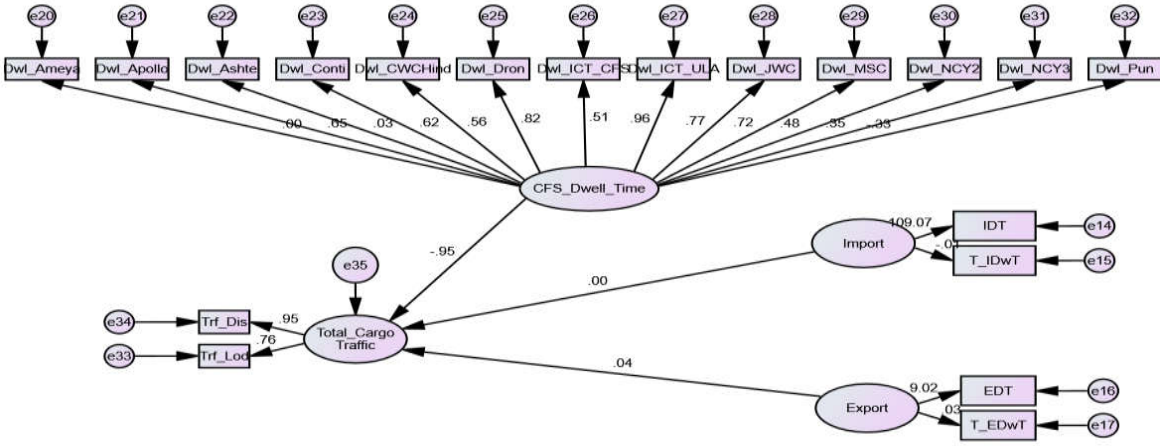
The first hypothesis presumed is that CFS dwell time (CFS_Dwell_Time is the total time (in hours) taken inside the CFS to clear a container after all prescribed formalities) has inverse effect on cargo handled at a port (Total_Cargo Traffic). This is presumed because the more time a container spends in CFS, it cannot be released to go to the port or cannot be released to the customer in the case of exports and imports respectively. The lesser the CFS dwell time the lesser is the time of container handling, thus in turn lead to efficiency gains.

The second hypothesis is that import dwell time (terminal dwell time (T_IDwT) as well as dwell taken from port out gate to CFS in gate (IDT)) has **an** effect on cargo traffic handling of JNPT.

The third hypothesis is that export dwell time (terminal dwell time (T_EDwT) as well as dwell taken from CFS out gate to Port in gate (EDT)) has **an** effect on cargo traffic handling of JNPT.

A terminal wise SEM is considered for all 13 CFSs. The above hypothesises were tested. In the case of BMTC terminal of JNPT, it is found that increase in CFS dwell time negatively impact total cargo traffic of JNPT. But, neither of import delivery time, export delivery time as well as dwell time at BMCT have an effect on total cargo traffic of JNPT (Fig.1.1.).

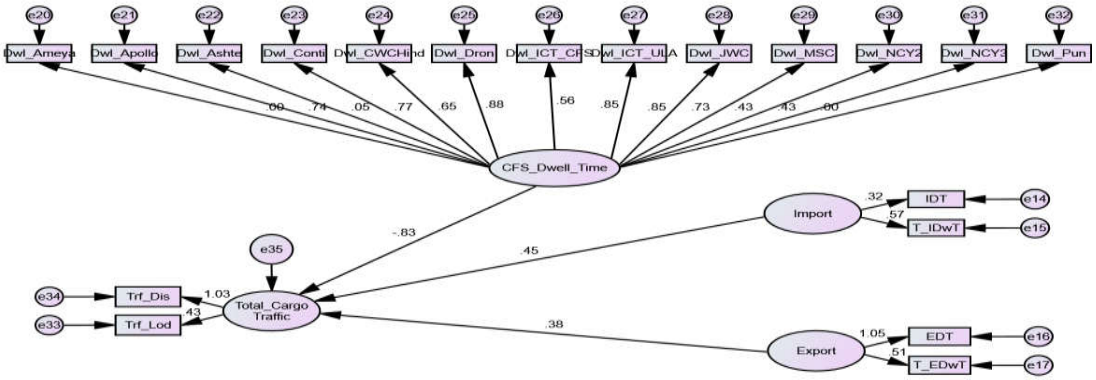
Figure 1.1: Results of SEM for BMTC terminal of JNPT



Source: Author's own estimation

In the similar line of BMTC terminal, GTI terminal results of SEM indicate that increase in CFS dwell time negatively impact total cargo traffic of JNPT. But, neither of import delivery time, export delivery time as well as dwell time at GTI have an effect on total cargo traffic of JNPT (Fig.1.2).

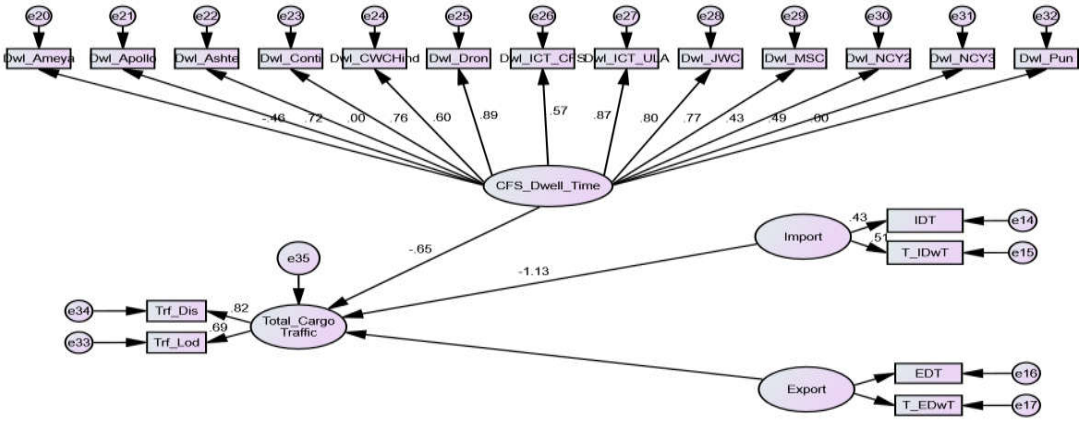
Figure 1.2: Results of SEM for GTI terminal of JNPT



Source: Author's own estimation

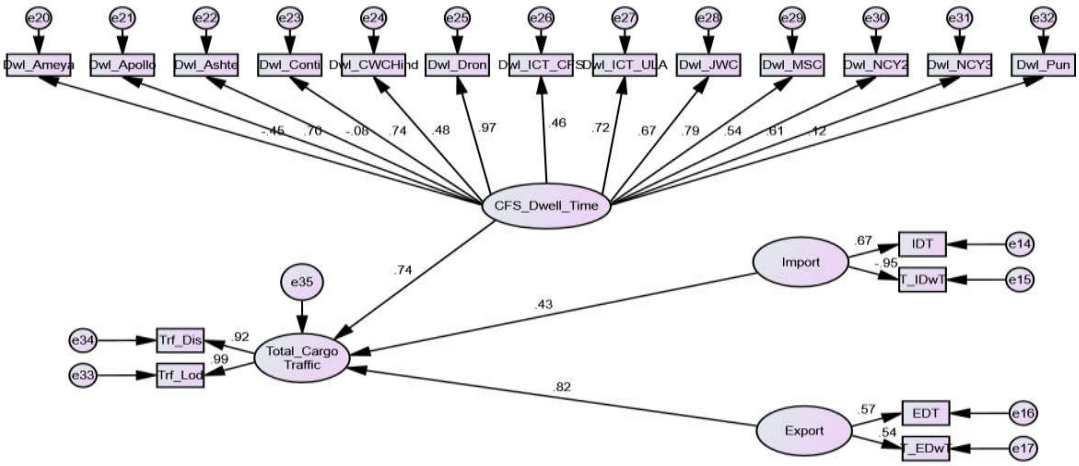
The above figure highlights that increase in CFS dwell time, import delivery time as well as import dwell time at JNCPT negatively impact total cargo traffic of JNPT. But, export delivery time as well as export dwell time at JNCPT don't have an effect on total cargo traffic of JNPT (Fig.1.3)

Figure 1.3: Results of SEM for JNPCT terminal of JNPT



Source: Author's own estimation

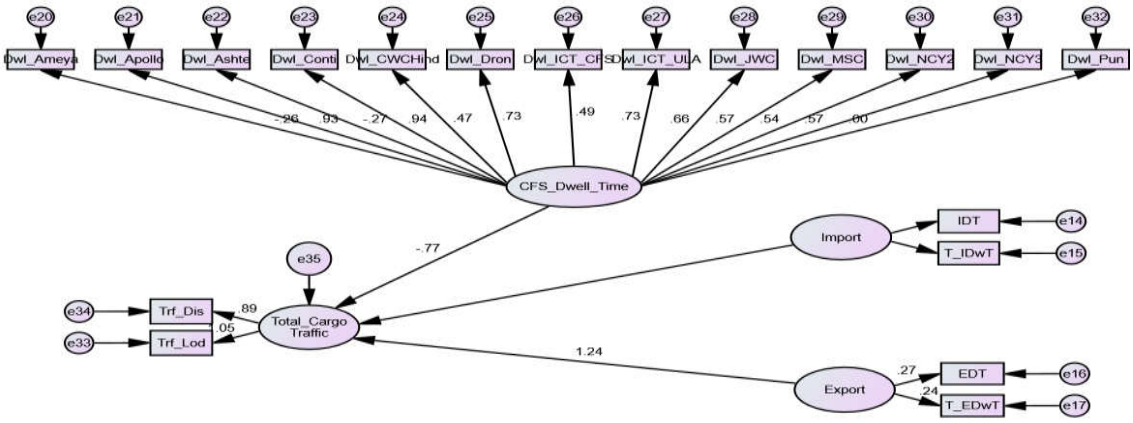
Figure 1.4: Results of SEM for NSICT terminal of JNPT



Source: Author's own estimation

It is evident from Fig.1.4 that CFS dwell time, import delivery time, export delivery time as well as dwell time at NSICT have positive effect on total cargo traffic of JNPT.

Figure 1.5: Results of SEM for NSIGT terminal of JNPT



Source: Author's own estimation

Fig.1.5 depicts that that CFS dwell time has a negative association with total cargo handled at NSIGT, and further export dwell time has a positive association with total cargo traffic.

From the above analysis, it can be concluded that except one terminal (NSICT), in all four terminals of JNPT, CFS dwell time is inversely associated with total cargo traffic handled. This is semantically possible as lower the time it takes for a CFS to clear a container, higher is the number of containers that reaches to the port in the case of export container and to the customers in the case of import containers. Such a tendency definitely improves efficiency in terms of cargo though put and customer satisfaction and delight.

Concluding remarks

Efficiency of port is affected by many factors and is important for sustainability of maritime transportation as higher port charges may lead to diversion of cargo to other ports or exploration of other modes of transportation. However, research in this regard has been focused on using DEA technique and not much research work exists to establish linkage of port efficiency with efficiency of stakeholders in maritime ecosystem. In this regard, the current study makes an endeavour to establish such linkage by take into account efficiency of CFS. JNPT is taken as a

case. The results of the SEM shows that there is an inverse association between the dwell time of CFS and total cargo handled at JNPT. Such results reveal that lower dwell time of CFS or higher efficiency of CFS leads to more cargo handled at a port terminal or efficiency gains for a port. Since private CFSs were considered as a representation of outsourcing activity of JNPT, it is found in the study that efficiency gains through CFS activity or outsourcing does have an impact on efficiency of JNPT.

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