

Seerat Fatima\*

Shahzad Khurram†

Anjeela Khurram‡

## Logistics Crunch: Analysis of Intermodal Containers Resource in Pre and Post China Pakistan Economic Corridor's Establishment



**Abstract** *China Pakistan Economic Corridor would link Gwadar (one of the deepest seaports on the southwestern coast of Pakistan) with China, Central Asian States, Russia, Turkey, and several other countries. Pakistan appears less prepared in so far as international logistics is concerned. Analysis of the focus group and archival records suggested that the quantity and quality of the intermodal containers are not sufficient to fulfill the exponentially rising trade needs. We found Pakistan does not produce intermodal containers locally. This area needs immediate attention from both public and private sectors, as a shortage of intermodal containers can potentially disrupt the regional trade.*

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## Introduction

A synchronized mechanism designed and implemented to regulate the movement of goods and products in the firm's supply chain across borders comes in the domain of international logistics. The strategic position of international logistics is indubitable since it can account for 10 percent of firms' total costs ([Rugman et al., 2006](#)). Moreover, the lack of reliability and trust caused by poor management of logistics can have adverse consequences for the salability of the product ([Mayinger, 2001](#)). One mentionable development that helped international businesses resolve the related issues is the introduction of intermodal containers ([Stern, 2010](#)). Inter-modality ensures the most cost- and time-effective, uninterrupted and smooth flow of goods and products throughout the supply chain, from firms to final customers' purchases (Hayuth, 1994). It has thus, changed the landscape of entire international logistics (Levinson, 2006).

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\*Assistant Professor, Institute of Management Sciences, Bahauddin Zakariya University Multan, Punjab, Pakistan.

†Assistant Professor, Department of Business Administration, Air University, Islamabad, Pakistan. Email: [khurramjah2002@yahoo.co.uk](mailto:khurramjah2002@yahoo.co.uk)

‡PhD Scholar, Department of Business Administration, RITM University of Paris Sud (Saclay) Paris, France.

Undoubtedly, in recent years Intermodal Containers sector witnessed a boom of research and development in terms of *new intermodal techniques* ([Rugman et al., 2006](#)). Notwithstanding, international logistics literature in this area is quite scarce. Intermodalism, in particular, has been rarely examined in emerging economies context. This article fills this gap by examining the situation of intermodal containers in the context of Pakistan. Such an examination is crucial for the field of international logistics when trade patterns between East and West are drastically changing and similar patterned change is taking place in terms of intermodal containers resource.

This study will, therefore, contribute to the extant literature on international logistics and particularly Intermodalism. We draw on previous research to establish the significance of intermodal containers for international businesses. Moreover, data gathered through Focus group and archival records help us analyze the intermodal container resource in pre and post China Pakistan Economic Corridor's establishment. Our study has important implications for Academia, the Government of Pakistan and China, MNEs and several other important stakeholders.

We have structured our study in the following format: In the section titled *Literature review*, we discuss the various types of transportation and issues therein. This helps us understand the significance of intermodal containers. In the second section on the *methodology*, we briefly describe the data collection and analysis through focus groups and archival records. In the section titled *Research site*, we try to map the important stakeholders in the intermodal sector of Pakistan and quantify the available intermodal resource. Then we discuss the changing pattern of international and domestic trade and its implications for the intermodal containers sector of Pakistan. We *conclude* with final remarks towards the end.

## Literature Review

While reviewing the literature we mainly focus on issues in traditional transport and the significance of intermodal containers. We will first present the literature that deals with logistics and types of transportation.

### Logistics

In recent years, management of distribution as a branch of business science emanated as logistics management ([Allen, 1997](#)). This field of study investigates the process of designing, executing, and monitoring the proficient and effective mechanism required for the supply and storage of goods, services, and allied information from firms to consumers. To meet the needs of the consumer market, a sound analysis to cater to various dimensions of demand and supply of products and services in the market is a pre-requisite ([Allen, 1997](#)). To benefit from logistics management, international firms have developed an international logistics system to deal strategically with cost management ([Rugman et al., 2006](#)).

### Transportation and its Types

As a part of logistics transportation has been explained as a process of conveying different types of goods from one point to another. Quantitatively, it constitutes the core function of logistic management, accounting for approximately 40 percent of the total distribution costs ([Allen, 1997](#)). Moreover, in terms of production and distribution activity, it accounts for large movements of freight in all economies ([Pisarski, 1981](#)).

The transportation network consists of links—roads, railways, waterways, and air mode—for the movement of vehicles. These links are interconnected at terminals and logistics platforms are commonly known as nodes (Marchis et al., 2011). Of these, road freight transport stands out as an imperative transportation mode for its great door-to-door service quality (Weigmans, 2015).

### **Issues in traditional transport**

Due to the modern technologies the traditional transportation—i.e., transportation before the Intermodalism—has failed to help firms meet their objectives. There are several reasons for traditional transportation to turn ineffective. For example, the delivery period between departure and arrival of a carrier fluctuates significantly, so one of the questions a firm must answer is: How quickly a delivery has to be made? Several factors have to be taken into consideration while answering this question. The perishability of the products like food items or exotic flowers, time to replenish the current stocks, for instance, in the case of the auto industry is some factors. Moreover, the political factor is worth considering factors while articulating the transportation strategy (Jackson et al., 2014).

Time factor directly determines the mode of shipments, notably if the delay of even one day could significantly affect the salability of the product (Rugman et al., 2006). Usually, an MNC opts for a mode of air shipments only, if time is critical and/or the product has high worth (Mavinger, 2001). Besides, the shipments cost also affects the selection of an international transportation mode. Similarly, the labor costs spent on loading and unloading ships at portside to avoid damage to the goods in breakbulk shipping should also be considered (Levinson, 2006).

### **Intermodalism**

To resolve the aforementioned issues innovation is needed. In international business, to get a competitive advantage, constant innovation is inevitable (Rugman et al., 2006). Elucidating the innovation in international logistics, Stern (2010) contends that the introduction of containers has changed the face of world trade. The containers are the best manifestation of innovation in international logistics and deserve due recognition (Stern, 2010).

Following the container development, innovation brought a more sophisticated form of containers—i.e., intermodal containers. The intermodal containers are large size steel/iron boxes built in different sizes and then joined together for goods transportation through numerous modes of transportation like shipping, trucking, train and rarely by airplane. The intermodal containers loaded on carriers are simply unloaded at their final terminal point, without any repackaging (Lewandowski, 2016). Though intermodal containers are a product of simple technology, their use, as well as their social and economic impact on the environment, have extremely increased (Levinson, 2006).

In terms of cost, the intermodal containers system provides shippers with the opportunities to cut costs or save their money from transportation and spend that cost on other functions—e.g., to improve their marketing and distribution (Mahoney, 1985; Rugman and Collinson, 2006). In addition to it, the intermodal containers freight is based on the principle of economies of scale that reduces the cost per transported unit. But it is also providing a solution to the freight of low density and high-quality goods when the quality requirements have to be met (Jackson et al., 2014).

Intermodal transport has captured major market share in international logistics for the transportation of commodities from production houses to depots, for distribution over long distances, for seaport hinterland flows and others through seaborne transport, road transport and railways (Jarzemskiene, 2007). For safe and no-damage shipments, the intermodal containers are also providing cost-effective service in terms of packaging with a purpose to transport the products over a long distance, avoiding the issues of spoilage or leakage. Packaging minimizes theft and pilferage and also reduces loading and unloading costs. In the international logistics perspective, packaging will hold on its focal position. Therefore, the MNEs should maximize their shipping space to reduce transportation costs ([Rugman et al., 2006](#)).

Although intermodal container carries substantial significance, we may not be able to precisely quantify their importance to the world economy in general, and the Pakistani economy, in particular. For instance, how have the transportation costs changed after containerization as compared to the costs incurred to export, say, 1,000 Tons of wool from Punjab (Pakistan) to Europe in 1955? The containerization has reduced the transportation cost of moving freight nationwide and internationally. For example, the transportation cost from Germany to China using hinterland transportation is \$8205, but it reduces to \$4620 using multimodal transportation. Similarly, before containerization, in 1961, the US sea-freight costs 12 percent and 10 percent of the value of U.S. exports and imports respectively. As per the report by the Joint Economic Committee of Congress, the role played by these costs is more decisive than much another trade barrier ([TR News, 2001](#); [Siddiqui, 2016](#)).

## **Method**

As suggested above, most of the research in international logistics has mainly examined the benefits accrued to the national and global economy because of the use of Intermodal Containers. However, research that examines the changing patterns of global or regional trade vis-à-vis change in container resource has remained scarce. More importantly, this phenomenon has not been explored in the context of emerging economies particularly China and Pakistan. This study, therefore, fills this gap by reporting the key information of the sector and predicting the quantity and quality of intermodal containers in the Post-CPEC scenario, based on the recorded current situation of trade and intermodal containers resource in Pakistan.

This descriptive qualitative research mainly answers “What is going on in Intermodal Containers Sector of Pakistan?” We mainly relied on the Focus group and analysis of archival records to answer this question. The lead researcher had conducted a Focus group with key representatives of the All Pakistan Shipping Association (APSA) at their central office. Before the Focus group, a detailed review of archival records (including but not limited to) minutes of meetings, annual reports, articles, websites, news articles, press releases, etc. was conducted. This review helped us in identifying major stakeholders in Intermodal Containers sectors and in mapping their relationships.

A blend of archival record analysis and Focus group was chosen as it helped us a lot in understanding how major stakeholders think and provide a deeper understanding of this phenomenon. Several research strategies can be employed to answer a descriptive question like the one that we have. One such strategy is Survey that generally poses respondents to closed-ended questions. This well-known research strategy has one important drawback that it limits the detailed feedback that can be gained from

respondents. Another method that can potentially supplement archival record analysis and surveys is interviewed. But conducting interviews was found quite expensive proposition exceeding the available resources. Therefore, group interviews—i.e., Focus group (Krueger and Casey, 2009) allowed us to capture detailed information on the intermodal containers sector of Pakistan more economically than individual interviews. Apart from the economy, group interaction was another important benefit of a focus group. Secondary data on intermodal containers in Pakistan is virtually non-existent. Therefore, group interaction with representatives of APSA gave us the opportunity to several key statistics and information.

The Focus group was conducted for around two hours with the APSA managing committee that

consisted of members of the executive council and industry representatives. Total of five

person's focus group was held at the central office of APSA. Membership of APSA consists of shipping agents, consultants, chandlers, surveyors and consolidators among other entities. APSA has its representation on Pilotage Authority and also provides a commissioner for the Port Authority. Complying with the advice of Krueger and Casey (2009), every effort was made to avoid dichotomous—i.e., Yes/No and right/wrong questions. Moreover, open-ended and think back questions were more emphasized. Serendipitous questions were posed towards the end.

## Research Site

According to information retrieved from the focus group and archival material, the containers sector in *Pakistan* involves a variety of stakeholders. The key stakeholders to mention here include Port authorities, Container handling companies, Shipping services providers, Hinterland transporters, Freight forwarding agencies, and Inland Container depot service providers.

DP World Karachi (DP World), Karachi International Container Terminal (KICT), Pakistan International Container Terminal (PICT), South Asia Pakistan Terminal (SAPT) and Gawadar Internationals Limited (GIT), handle containers at Karachi port, Gawadar port and port Qasim in Karachi (Marine Group of Companies) (Please see *Table 1*). The four categories of the government bodies that involve intermodal transport network are (1) Sea- Karachi port trust, Gawadar Port Authority, Port Qasim Authority and, (2) Road- National Highway Authority, (3) Railway- Pakistan Railway and (4) Air- Civil Aviation Authority.

**Table 1.** Container Handling Firms at Gawadar, Karachi and Qasim Ports in Pakistan

Type of Company	Container Handling Capacity (TEUs)
KICT	1,000,000
PICT	750,000
DP World	850,000
SAPT	1,000,000
Total	3,600,000

*Note: Gawadar International Limited is not yet fully operational and carries a handling capacity of 500,000 TEUs.*

This is in addition to the variety of firms involved in intermodal service infrastructure. The following constitutes the detail of these firms under various functional headings:

1. **Port services:** Premier Mercantile Services (Pvt.) Ltd (PMS), Pakistan International Container Terminal (PICT), and Pakistan International Bulk Terminal (Pvt.) Ltd (PIBT).
2. **Shipping services:** Port link International Services (Pvt.) Ltd (PIS).
3. **Hinterland Transport:** Pakistan Intermodal Limited (PIL) handle freight train and Marine Logistics (Private) Limited (MLPL) handle road transport.
4. **Freight forwarding:** AMI Pakistan (Pvt.) Ltd (AMI).
5. **Inland container depot services:** Marine International Container Terminal (Pvt.) Limited (MICT)

Pakistan has three main ports– Karachi, Gawadar and Port Qasim. However, the Gawadar is under construction but it is operational to some extent. The total handling capacity of these Ports is estimated at 133 million tons, but investment in expansion is already underway.

		
<p><b>Karachi Port</b> Handling Capacity 70 Million Tons</p>	<p><b>Port Qasim</b> Handling Capacity 58 Million Tons</p>	<p><b>Gawadar Port</b> Handling Capacity 4.8 Million Tons</p>

There is a variety of containers as per the classification of ISO 6346 with a variety of specifications and attributes. Presently, the container type being used in Pakistan is the twenty-foot equivalent Units chamber. A twenty-foot equivalent unit is a measure of containerized cargo capacity equal to one standard 20 foot (length) × 8 foot (width) × 8 foot in (height) container.

Information obtained through focus group and archival records show that in Pakistan different types of containers are used such as General-purpose dry vans, for cartons, cases, boxes, bales, sacks, drums, etc. So, the containers in use in Pakistan are also classified in terms of their special interior layouts such as:

- Tank containers are used for liquid or gases which are potentially dangerous goods.
- Rolling-floor containers are used for difficult to manage goods.
- Ventilated containers are used for ventilating organic goods such as dry vans.
- Garmentainers, for shipping garments on hangers (GOH)
- Temperature controlled containers are used for insulation, refrigeration or heat which is required for the storage of perishable goods.
- Bulk containers are used for bulk minerals.
- Few Containers have different features such as pad eyes and they are used for offshoring.
- Flat-rack containers are used for barrels, crates, or any heavy machinery, processed timber, etc.

### **The Rising Importance of Intermodal Containers in Pakistan**

In recent years, economic corridors have emerged as an important tool of regional cooperation and development in a globalized world. Following the experience of regional economic integration through a network of transnational economic corridors in the Greater Mekong Sub-region (GMS), similar initiatives are now being promoted in different parts of Asia to accelerate economic growth by linking backward regions with more developed industrial centers and to improve access to markets through the integration of trans-border production networks (Ranjan, 2015). By 1979, the power center had shifted in China and the Chinese economy was opening up under the new leadership of Deng Xiaoping. Deng's main plank—i.e., the economic relation precedes all other forms of relationship—changed the dynamics of Chinese foreign policy, which shifted closer to Pakistan. By the 1980s, China had become the most trusted ally of Pakistan (Kayani et al., 2013). The relationships between the two countries became stronger and stronger which resulted in the enhanced trade which was \$1 billion in 1998, and after FTA in the year 2006, the trade eventually reached \$15.5 billion. So, this enhanced cooperation laid the foundation of a China-Pakistan economic corridor (VANDEWALLE, 2015).

To understand the significance of the CPEC and Intermodalism, the trade volume before the CPEC and when the CPEC is operationalized will have to be considered. Not only the total trade of Pakistan is continuously growing but a little fluctuation in the trend is also being observed. Moreover, it is forecasted that the exports of Pakistan will rise to \$76 Billion by 2025 from the current level of approximately \$25 Billion (Pakistan vision 2025).

A careful review of archival material shows the solid economic relationships between Pakistan and China evident from multiple free trade agreements and \$ 48 Billion projects relating to CPEC. The total trade volume between the two reached \$15.15 billion marking an annual growth of 12.57% in 2015 from \$1 billion in 1998. Further, both governments have plans to increase the trade up to \$18 billion by 2018. The trade will grow by 24% with china after the CPEC is being functional (Salman, 2015).

Most important here is transit trade (the trade which arises from the passage of goods through one country or region to another). As suggested by one member of the focus group “although the exact monetary forecasts are not yet available a good guesstimate suggests an exponential rise in transit trade via Pakistan once the CPEC gets functional. For several economic and political reasons, Pakistan is going to replace Hong Kong as an entrepôt to China.” Declining trends are already there, in the past few decades the china's physical goods export was high through Hong Kong but it is gradually declining with time. In 2012, for instance, while the Mainland's exports expanded by 28% year-on-year, Hong Kong's re-export growth was only 12%. At Hong Kong's container ports, there has also been a sharp slowdown of throughput growth - from 8% in 2002 to only 2% in 2012. According to the HKSAR government statistics, in 2015, 61% of re-exports were of China origin” (Hong Kong Trade Development Council, 2016).

Our focus group participants suggested that another factor that will contribute to the rise in transit trade through Pakistan is China's oil needs being fulfilled through CPEC. Over 40% of the world's oil is extracted from the Gulf region and the Persian Gulf is used for its transportation. By linking the Kashghar region in Western China with

Gawadar in Southwest of Pakistan, China will reap several economic and political benefits in terms of oil trade.

Our focus group discussion also revealed that of the two major transit trade categories of Pakistan—i.e., CIS (Commonwealth of Independent States) and ECO (Economic Cooperation Organization)—where CIS transit can transport 24.19 million tons while ECO transit can handle and transport 74.09 million tons, will be routed through Pakistan. All these factors combined will lead to an exponential rise in transit trade and more use and handling capacity of intermodal containers.

As discussed above, the trade of Pakistan in the pre-CPEC era was less and it will remarkably grow once CPEC is fully functional. Our focus group discussion is in line with the forecasts that exports will exponentially grow in the post-CPEC era to reach \$76 Billion implying that they will be three times the exports today. Similarly, the imports will increase in some proportion but the guestimates are not yet available ([Pakistan vision, 2025](#)). The trade with China alone, excluding transit trade, is expected to increase by 24%. Therefore, imports, exports and transit trade will exponentially grow and Pakistan would need approximately three times more intermodal containers of what it possesses today.

Our focus group also revealed that “Total national container capacity of Pakistan is currently about 3.6 million Twenty-foot-equivalent units (TEUs), but this is likely to grow to about 10 million TEUs in the next five to ten years”. Moreover, the focus group elaborated that although the capacity of the intermodal container is increased yearly to meet the need, with the construction of Gawadar, Pakistan’s overall total national container handling capacity will grow sharply.

Presently, Pakistan offers twenty-foot equivalent units’ capacity for intermodal containers. One of the focus group participants suggested that “there are several high-quality intermodal containers available with different sizes—e.g., 40, 45, 48 and 53 feet high cube containers with added features—e.g., temperature control mechanism, ventilation, shock absorption, waterproofing, etc. that are being used in developed countries.” These containers are also useful in multimodality and their demand is expected to rise in the post-CPEC era.

Summing it up, Pakistan will be playing the role of bridge in South Asia for the transit trade. Also, Pakistan is a signatory to several regional, free and preferential trade agreements. Resultantly, the country’s trade will grow sizably creating logistics crunch as available quantity and quantity of intermodal containers is sufficient to meet the future trade volumes. It is, therefore, recommended, that the government should immediately involve major stakeholders and prevent any crises to emerge. We also recommend that a detailed feasibility study should be conducted to analyze the prospects of domestic production of intermodal containers. As informed by our focus group there is no intermodal production facility currently existing in Pakistan. High in unemployment and short in foreign direct investment, this country can benefit from the installation of such a facility.

## **Conclusion**

Intermodal containers are the largely neglected areas in the extant literature on logistics. This study contributes to the literature by highlighting the significance of intermodal containers particularly in the context of Pakistan. This sixth most populous country that is seen as one of the world’s biggest consumer market is replacing Hong Kong as an entrepôt to China. In post China Pakistan Economic Corridor era, transit

trade is expected to exponentially grow to put immense pressure on the already weak intermodal sector of the country. To understand the state of the intermodal containers sector, we collected and analyzed data that is collected from a focus group and a variety of archival records. Our analysis suggests that the quantity and quality of the intermodal containers are not sufficient to fulfill the exponentially rising trade needs.

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