

# A Comparative Analysis of Dry Port Operations in Coastal and Landlocked Countries

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Malaysia is a coastal country surrounded by sea, while Nepal is a landlocked country with no direct access to the ocean. This paper investigates the challenges faced by dry ports in Malaysia and Nepal and looks into issues concerning the connection of seaports and dry ports both intra-regionally, i.e. within Malaysia, and inter-regionally, i.e. outside of Nepal. The structure of dry port operating systems in these two areas is visibly different. Hence, the relationships between the major nodes in these different geographical regions need to be examined. Face-to-face and telephone interviews with dry port operators, legislative personnel, and public policy stakeholders from both countries were conducted to establish the impediments to dry port operations. Interview session transcripts have been analyzed using grounded theory. This tool is suitable for this paper due to its capacity to identify categories and concepts within the text linked together to form theoretical models. Secondary data have been used to support the primary data collected, to enhance the range and reliability of the findings. The findings indicate challenges such as inadequate connectivity capacity, inefficient border transactions, seaport-dry port integration issues, inefficient economic corridors, insufficient legislative framework for policy and regulation development, and environmental issues faced by the two countries. These challenges have a negative impact on the possibility of dry ports in Malaysia to take full advantage of their potential. Meanwhile, in Nepal, such challenges limit dry port operations since dry ports are the main gateway for the nation's international trade. This paper recommends strategies for overcoming these challenges and improving the quality of dry port operations, focusing on the provision of sophisticated and modern logistics services to stakeholders in the different geographic landscapes.

## KEY WORDS

- ~ Malaysia
- ~ Nepal
- ~ Dry ports
- ~ Seaports
- ~ Comparative study

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## 1. INTRODUCTION

In general, ports are located in the vicinity of a sea, ocean or river via a waterway connection and are regarded as entities that have at their disposal the infrastructure and technological equipment required to manipulate a specialized cargo type (Devendran et al., 2021). The inland component has become essential in shaping the competitive strategies of seaports. Containerization has become the main driving factor for technological improvement in the multimodal transport system (Rodrigue & Notteboom, 2011). Dry ports are now the primary medium for raising the competitiveness of a complex supply chain, that enables it to remain cost-efficient, contributes to environmental performances, and improves the quality of hinterland network connections. The definition of dry ports has evolved significantly due to the drastic changes in the global trade system, diverse demands from various stakeholders, and technological development in multimodal transport. A dry port can be defined as an inland intermodal terminal directly connected to the seaports, with high capacity means of transportation, where clients can leave and pick up their standardized units as if dealing directly with the seaport (Böse, 2011; Khaslavskaya & Roso, 2020). Rephrased, it is a logistics node that improves the cost-efficiency, environmental performance and the quality of hinterland network connections (Cullinane & Wilmsmeier, 2011). Based on these definitions, dry ports are also recognized as the extended gates of seaports (Bergqvist, 2016; Veenstra et al., 2012). The principal role of dry ports is to increase the effectiveness of inland freight transportation systems, such as a freight distribution centers, serve as an extended gateway for seaports, and hubs for intermodal transport (UNESCAP, 2017). Moreover, they encourage trade and contribute to regional and national economies (Munim & Schramm, 2018). There are various types of dry ports in terms of location, including seaport-based, city-based and border-based dry ports (FDT, 2007), distance such as close, mid-range and far dry ports (Abdoulkarim et al., 2019; Roso, 2008) and also connecting transport mode based dry ports.

A dry port is an essential node for coastal and landlocked countries that ensures the flawless transportation of cargoes along the supply chain, while safeguarding the integrity of the flow of goods (Notteboom, 2006). Dry ports are seen as the potential solution to strengthening intermodal transport as part of an integrated and more sustainable transport chain (Awad-Núñez et al., 2016). By replicating various functions of seaports at an inland location, dry ports have been providing stakeholders with cost and time benefits during the channeling of containers through an effective freight network from seaports to the end-user and vice versa (Roso & Lumsden, 2010). In general, dry ports are a part of a responsive intermodal transport system, freight platforms, coordinators of seaport systems and promoters of regional development (Frémont & Franc, 2010). In coastal countries, the dry port concept evolves mainly to assist seaports by providing additional capacity, serving as a buffering zone during congestions, increasing vessel turnaround time, and seaport productivity, resulting in increased competitive advantage (Roso & Lumsden, 2010). Meanwhile, in landlocked countries, the evolution of dry ports is starting to overcome their physical challenges such as isolation, supply chain-related barriers from the seaports and high costs of trading with other traders in other parts of the world (UNCRD, 2018).

Dry ports serve hinterlands, but challenges impede the utilization of dry port operations to the benefit of supply chain stakeholders. The inabilities of dry ports to demonstrate their actual capabilities in the supply chain due to limited modal shift, poor connectivity, and a narrow range of value-added services make dry ports ineffective in serving seaports or performing the role of seaports in some regions. Challenges such as limited connectivity capacity (Ng and Gujar, 2009), strict border transaction procedures (Kunaka et al., 2014), low seaport-dry port integration (Jeevan et al., 2020a), poor economic corridors (Black et al., 2013), environmental issues (Hanaoka and Regmi, 2011) and restricted capacity and productivity are generally faced by all dry ports, in coastal and landlocked regions alike. These challenges have a significant impact on dry port operations and their stakeholders since inefficient dry ports mean inefficient transport chains from seaports to their hinterlands and vice versa. This network is crucial as it connects various stakeholders who have different objectives in the supply chain.

Challenges faced by dry ports may result in increased total logistics cost in the supply chain, affecting the competitiveness of businesses (Myagmarsuren and Deng, 2015), particularly in landlocked countries. One of the most common impediments to dry port operations is the delay caused by border transactions in a landlocked country. Additionally, lengthy customs clearance with low technology container clearance, low frequency of rail freight services, severe congestions in seaports, and high dependence on a single mode of transport (either road or rail) prevent dry ports from realizing their full potential in the container transport chain (Khaslavskaya and Roso, 2019). This state of affairs offsets the benefits of dry ports to stakeholders. Moreover, any obstructions to dry port development in landlocked regions affect the economic development of nations within the regions, which profoundly rely on the existence, efficiency, and operational effectiveness of dry ports along the supply chain (Kurtulus and Cetin, 2019).

Dry port operations in a landlocked country depend on the operation of seaports located in other countries. For example, dry port operations in Mongolia are highly dependent on the unstable political situation in Russia (Myagmarsuren & Deng, 2015); Laos relies on the seaports in Thailand, Vietnam and China (Do et al., 2011); and in Africa, the inland economic development of Rwanda and Burundi heavily depends on Tanzania's Dar er Salaam seaport (Haralambides et al., 2011). Due to geographic constraints, landlocked countries have a limited selection of seaports and need to accept other nations' decisions on which seaports will be put at their disposal. Although dry ports in landlocked countries choose cost-effective seaports in the neighboring nations, the inbound/outbound destination of cargo depends on the instructions of the seaport's nation. Where seaport regions are unprofitable to dry ports, there is a substantial increase in transport and product prices at consumer destinations (Yang and Chang, 2019).

In contrast, dry ports in coastal regions have more options and can choose the most cost-effective seaports to cater to their respective stakeholders. However, in some coastal regions, issues such as congestion, limited infrastructural capacity, competition with other seaports, modal shift imbalance, inadequate railway transport capacity, and being situated in less strategic locations, affect the operational efficiency of dry ports (Jeevan et al., 2021a).

Dry ports in coastal and landlocked regions may face similar or different operational challenges, depending on their geographic location, transport system and economic development (Varese et al. 2020). This paper compares the challenges of dry port operations in Malaysia and Nepal. Identification of challenges helps develop specific strategies, policies, and resource (e.g. finance) allocation systems addressing them. In this context, this paper also gives recommendations that would help both countries overcome the operational challenges of dry ports, which would contribute to regional development and lower supply chain costs. The outcomes of this study may serve as a reference for other coastal and landlocked regions highly dependent on dry ports, and aiming to spur their economic growth.

## **2. REQUIREMENTS FOR DRY PORT OPERATIONS**

This section offers an overview of literature on dry port research conducted in various coastal and landlocked regions, to gain an understanding of essential requirements for dry port operation. The overview shows that hinterland connectivity capacity, border transactions, seaport-dry port dyads integration, existence and integration with economic corridors, policies, and regulations are essential for efficient dry port operation. These requirements have served as the basis for interview questions and comparison of the two selected countries in this paper.

## 2.1. Capacity of hinterland connectivity

Basically, hinterland connectivity capacity can be measured using three main indicators, namely connection to seaports with inland freight facilities, the availability of multi-transport connections and their capacity (Chen et al., 2016), i.e. frequency and ability to load maximum number of containers (Kunaka and Carruthers, 2014). In general, the hinterland is referred to as the seaport backyard, i.e. a geographical region served by any type of terminals, especially seaports, inland waterways or road and rail terminals (Sorgenfrei, 2018). According to Merk and Notteboom (2015), from a seaport's point of view, this backyard is the main attraction for various business prospects and cannot be limited by time, distance, mode of transportation and commodity restrictions.

This means that connections between terminals, such as seaports and dry ports, allowing them to serve the region, are critical. Basically, connectivity can be defined as direct or indirect connection between two points in a network (Capineri and Rietveld, 2018). Moreover, connectivity includes land distance and efficient inland transportation networks, which are the main indicators of seaport competitiveness (Yeo et al., 2008). Market dynamics, supply chains and logistics systems are a risk to seaports wishing to maintain their hinterlands. Hence, an extensive inland transportation network facilitated by dry ports is required to assist seaports in their effort to adapt to changes and effectively serve their respective hinterland. The availability of dry ports in the seaport system improves the capacity of hinterland connectivity and contributes to the competitiveness of the price of cargo at the destination.

## 2.2. Cross-border transactions

One of the functionalities of border-based dry ports is to facilitate country's cross border transactions. In fact, dry ports are normally categorized based on the distance, location and transportation mode perspectives (Wei et al., 2018). Border-based dry ports are normally located in the border zone of a certain region to conduct inland transshipment activities with customs clearance services for stakeholders from other regions. Normally, these types of dry ports are located away from seaports, between two or more different hinterlands with different regulations. The main aim of border-based dry ports is to cater to the hinterlands of different regions and increase the fluidity of road and railway transportation to boost cross border trade development in coastal and landlocked regions (Beresford et al., 2012).

On the other hand, geographical, economic and political fragmentation has a negative effect on the achievement of both intermodal scale, and scope economies (Ambrosino et al., 2016). For example, effective bilateral agreements and mutually agreed land-bridge services facilitate healthy growth in the Canadian and Mexican cross-border trade and have subsequently become the main factors for successful freight transportation between these regions (Notteboom and Rodrigue, 2005). Due to the limited railway capacity between India and Pakistan, containers need to travel more than 3,000 kilometers via sea from Mumbai to Karachi rather than using the land route shorter than 300 kilometers (Rahmatullah, 2009).

## 2.3. Dyadic integrations between dry ports and seaports

Dyadic integrations are business interactions between two parties that enable them to achieve optimum quality of business by sharing knowledge and exchanging commitments (Liden et al., 2016). In the early 1980s, dry ports were defined as inland terminals to which shipping companies issue their importation bills of lading to import cargo, assuming full responsibility for the costs and conditions and from which shipping companies issue their own bills of lading to export cargo. This definition clearly describes an inland intermodal terminal directly connected to a seaport with high capacity means of transportation, where customers can leave and pick up standardized units as if directly from a seaport (Bask et al., 2014).

For example, dry ports in Brazil faced high competition from seaports because seaports have high interest in dominating the hinterland market (Cullinane et al., 2012). According to Flynn et al. (2010), integration basically refers to the extent to which separate parties work together in a cooperative manner to arrive at a mutually acceptable outcome. Moreover, dyadic interaction refers to quality business interactions between two business parties (Ashnai et al., 2019). It shows that seaports and dry ports need to collaborate to achieve effective outcome in the supply chain. Competing for the same hinterland market creates severe competition within the network, which affects integration between these nodes. The intense competition between seaports requires their integration with inland components such as dry ports to overcome the competitive environment (Monios and Wilmsmeier, 2013). Bask et al. (2014) argue that inclusion and expansion of different value-added services play an important role in the seaport-dry port dyadic development and in the integration of intermodal transport. Therefore, the dyadic relationship between seaports and dry ports needs to be developed to overcome the competition with neighboring seaports, as well as to realize niche objectives, which will reflect their performance in their respective line of business.

## **2.4. Integration of dry ports with economic corridors**

Economic corridors are essential to dry ports, as they ensure the continuity of containers to the inland terminal. Dry ports located adjacent to such corridors have an added advantage allowing them to reap substantial benefits from private sector investment in dry port operations. In general, efficient transportation connections to and from dry ports have the maximum potential to integrate major freight corridors between seaports and their hinterlands (UNESCAP, 2017). For example, Drenthe Dry Port in Netherlands, located far from economic corridors, faced severe issues, such as the underutilization of its existing facilities and, as a result, fell behind other dry ports from the same region (Visser et al., 2007). The development of economic corridors along with dry ports ensures the survival of inland terminals in the dynamic environment.

The expectations of seaport clients, especially with respect to the continuity of moving containers to and from dry ports, time and costs, are placing a massive pressure on dry ports. Hence, an economic corridor within the service range of a dry port reduces that pressure and improves seaport system functionality. The presence of economic corridors in parallel with dry ports will ensure that sufficient funds are allocated to the development of multimodal transport connections through the involvement of the private sector, to ensure the capability of dry ports to effectively cater to stakeholders, including seaports and inland clients (Jeevan et al., 2020b). Therefore, the availability of the economic corridor has been an important factor for determining the success of dry port operations in the seaport system.

## **2.5. Policies and regulations relevant for dry port development and operations**

Government policies regulating transport infrastructure development and management are relevant for dry port operations. These policies include infrastructural investment (Shirley and Winston, 2004), cabotage (Jeevan et al., 2018), multimodal transport (Othman et al., 2016), seaport and transport infrastructure (Mak and Tai, 2001). Investment model that allows an agglomeration between private and public partnerships (PPP) in dry port operations, where the private sector funds dry port development, while the public sector provides land for development and plays the regulatory role in the operations, has been widely adopted. Therefore, PPP is a combination of the two sectors which increases efficiency by providing legal, technical and financial competence between both parties, allowing them to manage and operate dry ports. This model increases transparency, information sharing, tightens the security in dry ports and expands experience and knowledge requisite for the smooth operation of dry ports.

Seaport policy which aims to utilize and improve land side transportation and establish inland networks has an effect on dry port operations. This model has been developed in parallel with the seaport industry, as manifested especially in the specialization of terminals and the demand for effective inland transportation

systems (Mak and Tai, 2001). The implementation of seaport policy in Thailand, Myanmar and Vietnam has generated additional investment into the development of transportation links connecting seaports, dry ports and their respective hinterlands. Therefore, connecting seaports with their hinterlands by means of infrastructure may become a noteworthy competitive advantage on the seaport services market, that fits perfectly into sustainable port strategy (Kotowska et al., 2018). Transport infrastructure policy ensures capacity and durability in the form of highways, railway gauges, traffic lanes and thick pavements suitable for heavy motor vehicles, that ensure the effectiveness of distribution processes (Shirley and Winston, 2004).

The development of transportation infrastructure attracts investments to a particular location. By attracting new manufacturers, dry ports secure freight to and from seaports. For example, the government has reduced land costs and tax rates to encourage the development of new industries in the vicinity of the Mandalay dry port in Myanmar. The support from the government has attracted new industries to the dry port, creating new jobs and boosting regional development in Myanmar (Varming, 2013). This shows that dry port performance and regional development (Ng and Gujar, 2009) depend on state decisions. Consequently, the implementation of centralized integrated planning, clarity in regulations encouraging infrastructural investment and new legislation aiming to encourage collaboration between seaports and dry ports can ensure the effective use of inland logistic infrastructure for economic and environmental benefits.

### **3. METHODOLOGICAL APPROACH**

This paper employed descriptive, case study, and cross-sectional research approaches. According to Tight et al. (2016) and Yin (2013), a deeper understanding of a subject can be obtained through cross-sectional research conducted in a particular time frame on a different population, whereas a case study approach enables researchers to have a microscopic view of particular objectives. Hence, the results for the Malaysian and Nepalese dry port operation system obtained through the qualitative approach are transferable to other regions.

In this paper, dry ports from both coastal and landlocked regions in Malaysia and Nepal have been selected to identify the challenges faced by dry port operations. These countries were selected to analyze the connection between intraregional seaports and dry ports (Malaysia) and interregional seaports and dry ports (Nepal). All dry ports in these countries have been used in the case study that served as the basis for this paper. The structure of the seaport-dry port integration in these two regions is different and worthwhile studying to examine the relationship of these major nodes in different geographical settings. This study compares dry ports in different regions, targeting landlocked and coastal countries based on current literature.

Furthermore, this paper makes a distinction between the preparation of dry ports for the dynamics of seaport operation in the coastal and landlocked regions. Dry port operations in both regions have been looked into, with emphasis on current impediments and strategies for reducing the negative impact on trade systems.

Face-to-face and telephone interviews, along with literature overview, have been carried out to gather the quantity of data required to address the objectives of this paper. Initially, twenty invitations were sent out to potential participants in both countries. In Malaysia, potential participants were dry port operators (five participants; two from the northern, two from the central and one from the southern region), container seaport operators (five participants; two from Penang Port, two from Port Klang and one from PTP), and seaport authorities from the federal regulatory regime (five participants; three from the Ministry of Transport and two from the Marine Department) who are directly involved in operating and developing Malaysian dry ports. In Nepal, the invited potential respondents were dry port operators. On the other hand, all five (5) Nepalese participants participated in the face-to-face interview session. The participants were from the Bhairahawa, Biratnagar, Birgunj, Kakarbhitta and Tatopani dry ports. Interview sessions in both countries were conducted from July 2018 to January 2019. During the interview session, the selected participants from each country gave their opinions based on their country of origin.

Twenty participants were selected for this study overall. All participants were chosen by convenience sampling, which allows the willing and available to be interviewed (Klassen et al. 2012). The response rate for the interview session for this paper was seventy-five per cent, and fifteen respondents successfully participated in interview sessions. Eight participants participated in interview sessions in Malaysia. They included dry port operators, container seaport operators and seaport authorities. These participants were interviewed by telephone. Owing to the limited number of key personnel in these unique entities, the number of survey participants was low. However, twenty participants can provide a number of substantial insights due to their significant involvement in dry port operations in both countries. The interview session ended when it was found that additional or fresh data would not lead to new insights or reveal new findings (Charmaz 2006). Malterud et al. (2015) introduced the concept of information power as a pragmatic guiding principle, suggesting that the more information power the sample provides, the smaller the sample size needs to be, and vice versa. In this paper, data saturation was achieved in the interview session with the last participant.

The recorded interviews were transcribed in a Word file, and the key points from each interview written down. Subsequently, the data were analyzed using grounded theory, a set of inductive and iterative techniques designed to identify categories and concepts within the text, linked into theoretical models (Corbin & Strauss, 2012). Hence, grounded theory is a suitable method for case study research (Glaser & Strauss, 2017). Grounded theory consists of systematic and flexible guidelines for collecting and analyzing qualitative data. This method sheds significant light on incomplete theories and is capable of representing all the complexity of the process. Furthermore, Charmaz (2006) justified the use of grounded theory for the development of theories that explain interactions in a substantive topic through the use of systematic qualitative procedure.

## **4. DRY PORT DEVELOPMENT IN MALAYSIA AND NEPAL**

In Malaysia, dry ports are recognized as a part of a container seaport system, with an ongoing network of stakeholders, within which containers are transported using inland transport infrastructure and existing resources to ensure supply chain efficiency, improve seaport competitiveness, and promote regional economic growth. Meanwhile, Nepal is a landlocked country that is largely dependent on the Kolkata, Haldiya and Visakhapatnam Ports in India for the exportation and importation of goods due to the non-availability of direct sea access.

### **4.1. Dry port development in Malaysia**

The maritime industry, notably ports and shipping activities, has grown steadily, establishing Malaysia as a leading maritime nation (Mohd Zaideen, 2019). There are four main dry ports that support container terminal operations by acting as interface nodes linking production zones with seaports, customs services, offering space for container storage, and customized services. Moreover, these dry ports also supply continuous container volume to seaports, provide additional capacity and act as connecting points to the multimodal transport system. All dry ports in Malaysia operate as vertical partnerships integrating the public and the private sector in the form of a public-private partnership (PPP).

The development of dry ports in Malaysia started in the mid-1980s, when the first dry port, the Padang Besar Cargo Terminal (PBCT), was built (Jeevan & Roso, 2019). This dry port is located at the northern tip of Peninsular Malaysia, near the Thailand border. This dry port caters for containers from the container catchment zone in southern Thailand and the Malaysian economic cluster in the northern region. It is connected with major container seaports, notably Penang Port and Port Klang, by road and railway. Due to its vicinity to Thailand, it is classified as a border-centric dry port. The second dry port built was the Ipoh Cargo Terminal (ICT), opened in 1989 and well connected by road and railway to all major seaports, including Penang Port, Port Klang, and Port of Tanjung Pelepas (PTP). This dry port is classified as a city-centric dry port (Jeevan et al., 2021b).

The third dry port is the Nilai Inland Port (NIP), which started its operation in 1995 and is located in the central region of Peninsular Malaysia. This dry port is connected to Port Klang and PTP by road. It is classified as a city-based dry port since it is close to Seremban, Malacca, south Selangor and northern Johor. The fourth dry port, the Segamat Inland Port (SIP), opened in 1998 and is connected to Port Klang and PTP by road and railway. This dry port is also a border-based dry port that caters to manufacturers from southern Malaysia and Singapore.

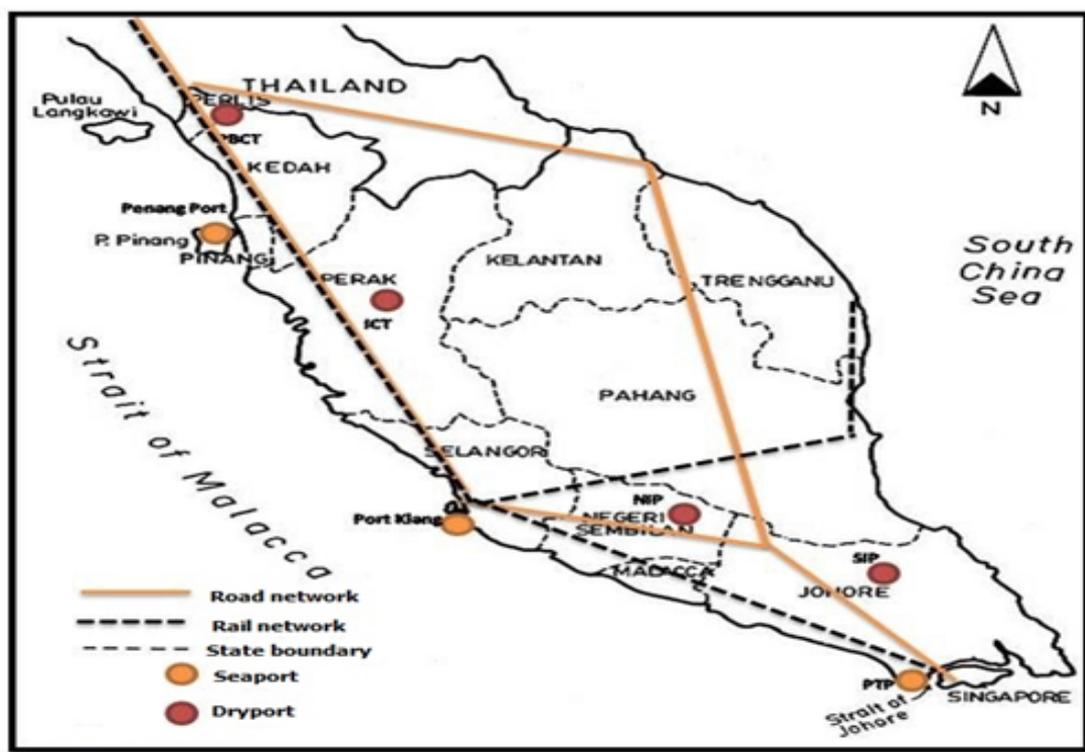


Figure 1. Malaysian dry ports in the seaport system (Source: Jeevan et al., 2017, pp 23)

## 4.2. Dry ports development in Nepal

Inland Clearance Depots (ICD) or dry ports have a prominent role in the promotion of intermodal transport in landlocked countries such as Nepal. The dry port concept was conceived in the early 1990s in the framework of the implementation of the five-year plan (1992-1997). The Nepal Multimodal formalized the concept with the establishment of the Nepal Multimodal Transit and Trade Facilitation Project (NMTTFP) in 1998 to construct rail-based ICD in Birgunj and road-based ICDs in Biratnagar and Bhairahawa to facilitate trade and transport, reform and introduce transport and multimodal legislation.

There are currently five dry ports in Nepal (Figure 2): Bhairahawa, Biratnagar, Birgunj, Kakarbhitta and Tatopani. Four are road-based, one (Birgunj) rail-based and all five border India. Kakarbhitta and Biratnagar dry ports, accounting for one per cent and eleven per cent of total trade, respectively, have been developed to cater for the industrial corridor of the eastern region. On the other hand, Birgunj and Bhairahawa dry ports have been developed for the trade of the western region, accounting for fifty-five per cent and thirteen per cent of the total trade, respectively. These dry ports serve as customs offices, security checkpoints, container stacking yards, parking areas and freight stations. While road-based ICDs are operated mainly as organized custom clearance points with proper warehousing facilities, the rail-based ICD has a more simplified procedure (Rajkarnikar, 2010). The rail-based ICD in Birgunj has a twelve-kilometer railway linking the Raxaul railhead near the Indian border to the Kolkata/Haldia ports in India (Hanaoka & Regmi, 2011). The railway agreement between India and Nepal was signed on 21 May 2004.

Further efforts are being made to improve the intermodal transport railway. Such efforts include a feasibility study of an east-west railway, a sixty kilometers long Kathmandu-Birgunj railway and connections to the four railheads in India. There are three proposed dry ports for Nepal's international trade. Recently, the construction of an international dry port has begun in Nepal's Kathmandu Valley with the loan assistance from the World Bank. The dry port is expected to become a business hub since it is connected to the Fast-Track Road Project, an expressway connecting Kathmandu with the Terai region, and the soon-to-be constructed outer Ring Road (ZD, 2019). Besides, four more ICDs are planned at Rasuwa, Kathmandu, Kakarbhitta and Dodhara Chandani (Ashcroft, 2019).

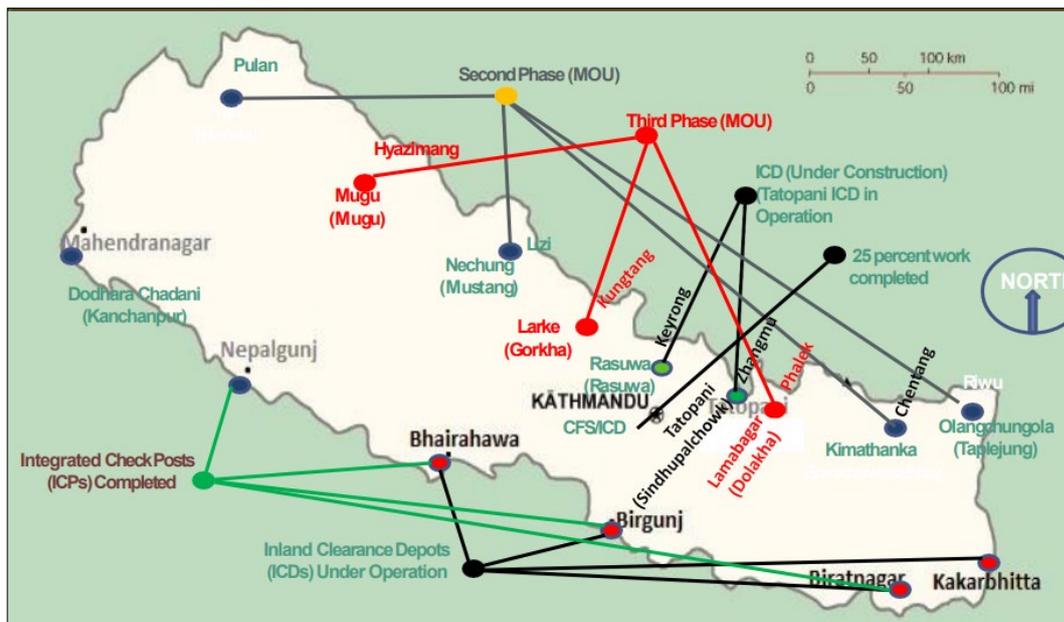


Figure 2. Major trade and transit points in Nepal (Source: NITDB, 2019, pp.6)

The Nepal Intermodal Transport Development Board (NITDB) is a model of PPP arrangement under the Chairmanship of the Secretary in the Ministry of Industry, Commerce, and Supplies, where members from the public and private entities are equally represented. The stakeholders involved with importation and exportation are engaged to the Board. The Federation of Nepalese Chamber of Commerce and Industries (FNCCI), the Chamber, and Freight Forwarders are the representatives of private entities, whereas the Deputy Governor of the Central Bank, Director General of the Customs Department, and the Joint Secretary of the Ministry of Physical Infrastructure and Transport represent the public sector. The NITDB, in keeping with the objectives stated in its statute, primarily oversees the cost-effective and efficient management of Inland Clearance Depots (ICDs) to facilitate Nepal's foreign trade. Its second objective is to develop, manage, and promote ICD terminals to facilitate Nepal's exports and imports. The third objective is to enter into agreements with private entities based on tendering procedures to lease out the management of ICD terminals. The final objective is to prescribe the criteria for determining terminal operation service charges and conclude a railway operation agreement with the Indian Railways for the railway movement of cargo to or from ICDs. The railway service agreement needs to be amended without delay as the current agreement does not permit the operation of private railway operators from India, with only the Indian national company, CONCOR, being allowed to operate. The Nepalese railway transport is managed by the state-run Nepal Railways Corporation Ltd. Nepal relies on the Indian Railways networks to transport a considerable amount of imported goods to either the Dry Port in Birgunj (Figure 3) or staging points for road transport into Nepal. The proposed Belt and Road Initiative (BRI) railway would link Kerung city in southern Tibet to Nepal's capital Kathmandu, entering the country in the Rasuwa district and eventually going on to India.

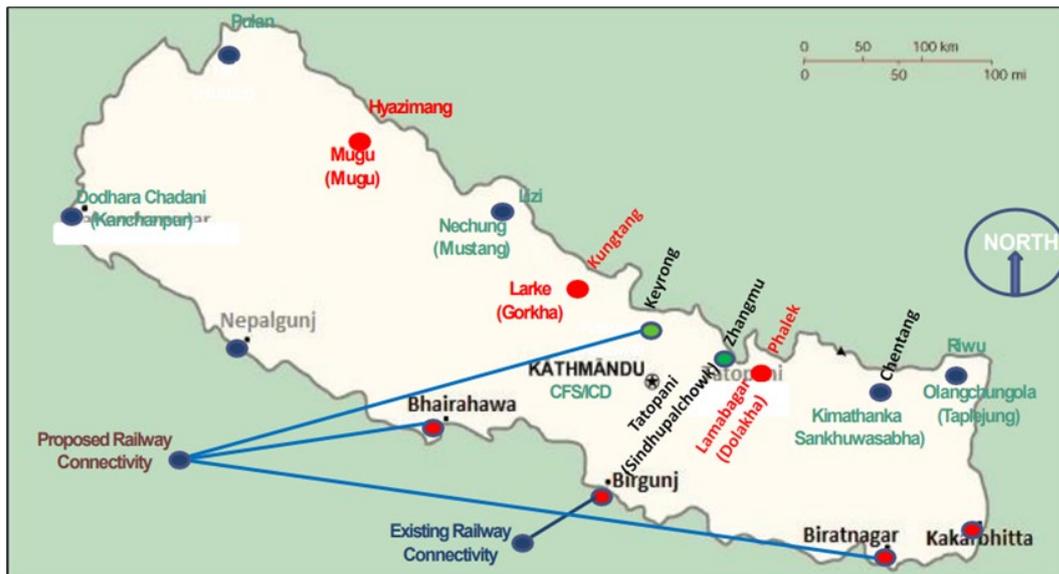


Figure 3. Status of railway connectivity in Nepal (Source: NITDB, 2019, pp. 7)

## 5. IMPEDIMENTS TO AND STRATEGIES FOR DRY PORT OPERATIONS

All impediments encountered by the dry ports of the two countries are discussed in this section based on an overview of literature and interview outcomes. Apart from pointing out the impediments to dry port operations, several strategies aimed at reducing the implications of these impediments are proposed. Identifying these impediments is essential to narrow down the practical strategies and optimize resources such as time and cost to overcome these impediments in both countries. The experience of Malaysian and Nepalese dry ports will serve as a guideline for the development of other regions with the same geographical setting.

### 5.1. Malaysian dry ports

The interviewees expressed concerns about the challenges faced by Malaysian dry ports serving the seaport system. The information obtained from respondents was analyzed, and five major challenges faced by Malaysian dry ports have been identified: transport system limitation, issues with the container planning, high competition with seaports, issues related to dry port location, and the community.

The results obtained using grounded theory indicate that all respondents agree that the transport issue is the main challenge faced by the existing dry ports in Malaysia. The transport issues are insufficient railway tracks, high dependence on single-mode transport, and no railway connectivity, especially in the case of the dry port at Nilai, located in the central part of peninsular Malaysia. Most of the issues pertain to the railway, not to the road transport system. All respondents agreed that railway track insufficiency is the main drawback of Malaysian freight transport. Malaysian dry port operators are not satisfied with single-track railway given its inability to keep up with dry port operations. The low train frequency is also one of the main challenges faced by Malaysian dry ports. The issues that arose from single-track railways and low train frequency are interconnected. For example, single-track railways and low train frequency are not cost-effective to the dry port of PBCT because it receives a high volume of containers from Thailand, and these impediments slow down the container transport to the Penang Port, causing space shortage and traffic congestion in PBCT. The inability of trains to carry a high volume of containers is another issue that needs to be addressed. Currently, the Malaysian railway system can carry sixty TEUs per trip and runs six trips a week. This capacity is insufficient to transport high volumes of inbound containers to customers. In Malaysia, the high volume of inbound cross-border containers being transported to dry ports is at odds with the outbound containers being transported from dry ports, especially ICT and PBCT.

Additionally, the lack of railway connections to dry ports, especially NIP, is another problem faced by local dry ports. Multi-modalism is one of the pre-requisites for dry port operation (Roso & Lumsden, 2010). The use of road haulage due to the lack of railway connections with NIP prevents this particular dry port from being established as one of the Malaysian dry ports in the seaport system. Besides, ICT faced challenges related to the haulage system due to railway system issues. Local dry port operators expect hauliers to execute short distance distribution. However, ICT has trouble directing containers to the short route because most hauliers prefer longer trips to shorter ones. Therefore, investing in dry port infrastructure and facilities, such as creating own haulier services, could contribute to the trust of seaport system stakeholders in dry ports operators.

Container planning system issues make dry port operations inefficient. One of the local dry ports, PBCT, faces the challenge of having insufficient facilities to store empty containers, as it does not have enough land to expand its business capacity. PBCT anticipates more clients from southern Thailand who benefit from PBCT, Penang Port and Port Klang regarding distance, price, and time. Apart from being unable to store empty containers, dry ports in Malaysia could not cope with the increased volume of laden containers. From the perspective of seaports, dry ports cause issues with container planning and management in seaports. Trains from dry ports filled with unorganized containers have to be relocated and replanned upon their arrival to seaport. Container relocation and replanning in the seaport are time-consuming, and more personnel is required for these unproductive activities. The disintegration of container planning in the rail deck has a negative impact on the integrity of vessel schedule at seaports, affecting the competitiveness of seaports. Frequent intermodal connection delays due to railway track limitations and low train frequency result in unused spaces in vessels in the seaports.

Dry ports faced significant challenges in competing with the dominant seaports located in their regions. Seaports and shipping lines question the ability of dry ports to function as a component of the seaport system. These doubts arose due to inadequate railway systems and the inability of dry ports to imitate the functions of seaports with high-tech facilities and infrastructure. In this way, they can increase the revenue from an operational perspective and simultaneously generate a significant effect from other points of view, particularly by providing modal shift, cost, and time benefits to customers.

The insufficient recognition of dry ports by shipping lines reduces the investment potential of Malaysian dry ports. SIP is one of the dry ports that suffer from the lack of recognition from shipping lines, which has a negative effect on the volume of containers handled by that dry port. SIP also has to compete with private hauliers for freight distribution at short, midrange or long distances. The container volume handled by SIP failed to earn the trust of potential customers in using this terminal. Thus, SIP faces recognition issues from the shipping lines, while failing to meet seaports' expectations to be an all-rounder that provides maximum value-added services and sufficient facilities. ICT is another example that faces difficulties with short-distance container transportation as most hauliers prefer long trips to zone 2 or 3, i.e. 20-30 kilometers and above 30 kilometers from the dry port for high trip wages (Jeevan et al. 2021a).

The competition between seaports and dry ports in Malaysia exists because seaports want to maintain transshipment efficiency, tariffs, speed, and reliability. Likewise, the competition requires seaports to focus on transport connections and development of areas outside their immediate market (Woxenius et al., 2004). Cooperation between these two entities could increase turnover in a comparatively lucrative segment if dry ports were included in the container distribution flow.

Malaysian dry ports face some issues pertaining to their location, some of them being located too far away from manufacturing areas, resulting in the lengthy shipment process. Location is the decisive factor for a dry port's development and success within the seaport system. Criteria such as proximity to seaports, connectivity to other modes of transportation, and development cost, are considered in the selection of a dry port's location (Hanaoka & Regmi, 2011). The existing Malaysian dry ports face challenges resulting from their

operational location. For example, SIP in the southern region of Malaysia is classified as a border-based dry port located far away from manufacturing areas, causing difficulties to stakeholders. Interviewees stated that SIP's nonstrategic location makes shipments long, while single mode of transportation makes trips to and from SIP cost-ineffective due to low container volume. ICT is another dry port at a challenging location. It is located in a zone which is non-profitable for short-distance distribution and had difficulties in its operation. Even though ICT is a city-based dry port, its distribution services to short-distance customers are unsatisfactory. Notably, sufficient space is a strength of dry ports (Nguyen & Notteboom, 2016). However, dry port PBCT, as a northern region dry port, has little land for expansion, which poses a challenge to its operation.

Lastly, dry ports in Malaysia face several local community issues, especially pressure on their infrastructure and delays in the infrastructure upgrading process. The challenges are seen as stakeholders' issues, and they concern the local societies affected by dry port operations. The respondents were primarily concerned with the existence of Barter Trade Ports nearby seaports, which raised many logistic and legal issues due to their potential to increase the number of illegal immigrants and affect the reliability of safety and security during container transport. The addition of dry ports to the seaports system increases the pressure on roads, especially in the city areas. The predominance of road haulage in ICT and NIP increased the city's traffic flows and created a nuisance to communities due to increasing noise pollution. The noise and vibration generated by freight vehicles and equipment operations also contribute to the discomfort of the community. Simultaneously, the domination of road freight vehicles delays the infrastructure upgrading process for PBCT, NIP and ICT. Land infrastructure, especially roads, flyovers, road dividers, and traffic lights, is exhausted and damaged due to being overused by freight vehicles. The limited transportation options available in dry ports affect container distribution to and from the customers, causing traffic congestion in the regional area of seaports, especially Port Klang and Penang Port. Most of the manufacturers and some of the stakeholders question the credibility of dry ports in the seaport system. According to respondents, the community is not well informed about the exact functions of dry ports, causing their low utilization by stakeholders and manufacturers.

## **5.2. Nepalese dry ports**

Dry ports in Nepal are facing major challenges in terms of infrastructure, cost, and time. ICDs were initially developed to facilitate the movement of containers. However, the increase in bulk and break-bulk cargo requires better infrastructure. The high rates charged by private sector entities licensed to run the terminals contribute to the high cost ICDs. Also, due to the lack of proper equipment and technology, cargo clearing is time consuming. The Customs release time study shows a minimum of 3 days for customs clearance for importation and 5 to 7 days for exportation due to unavailability of trainload.

Nepalese dry ports need to attract more investment to upgrade their equipment, get additional space, and ensure safe storage to expedite early release. They also need to reduce delays by harmonizing document clearance between India and Nepal, negotiating time and procedure with their Indian counterpart under the Trade Facilitation Agreement, and implementing border coordination under World Trade Organisation (WTO) as indicated in the Revised Kyoto Convention. Dry ports in this landlocked region must modify the costs of handling procedures/operations. Initially, the government controlled dry ports in Nepal and leased these inland nodes to private sector companies owing to the lack of finances to improve dry port facilities. Being managed by the private sector, there is a tendency to increase operative costs (return on investment), resulting in higher cargo prices. In addition, Nepalese dry ports need to improve coordination by holding regular meetings at the border and addressing the problems as they emerge.

Challenges faced by Nepalese dry ports can be viewed separately at the regional, national and international levels. At the regional level, Nepalese dry ports lack harmonization in the clearance system. For example, there is no uniform customs procedure at border crossings, especially at the Indian border. West Bengal (Panitanki) and the Raxaul borders have different procedures. Another example is: a bank guarantee is

required for export at the Panitanki border but not at the Raxaul border. While Nepal has adopted the UNCTAD's Automated System for Customs Data (ASYCUDA), it is mainly used to process and record customs transactions rather than customs clearance, which is still done manually (Bandyopadhyay et al., 2017). Furthermore, it is only used in the Birgunj Port to calculate revenue and for other administrative purposes.

The second issue faced at the regional level are unrealistic treaty provisions, for example provide for the movement of goods via Kolkata but do not regulate the return of goods in case of cancellation or failure to meet the buyers' demand. Goods that are being exported are required to be exported by the last shipment date indicated in the letter of credit. Sometimes, the goods fail to meet that deadline due to transport delays, non-compliant documents, vessel or slot unavailability at that period. In this case, the buyer begins to bargain, and the letter of terms cannot be drawn up. The seller (exporter) is compelled to accept the buyer's demand to return the goods or sell them to another buyer from a transit port not indicated in the treaty. The non-tariff barrier is closely related to the treaty, which hinders the solution of challenges related to the border and beyond. Risk management services, regular inspections, and insurance provisions need to be in place to prevent pilferage. Exported cargo can be prioritized by fixing a schedule to export cargo once a week, enabling freight forwarders or exporters to prepare the loaded containers for export. These dry ports also need proper planning to coordinate the movement of loaded and empty containers by raising awareness of the advantages of dry ports.

Nepalese dry ports also face some issues at the national level. The performance of a dry port largely depends on its connectivity with a seaport, determined by a reliable and scheduled high capacity transport to and from the seaport. However, Nepal lacks appropriate road infrastructure and has limited access to railway transportation, increasing its dependence on trucks. Besides, Nepalese dry ports face challenges relating to cargo quarantine labs. Cargo quarantine labs are required because most exported goods are live animals, food items, and plant items, which need quality certification. Due to this constraint, the goods must wait for the certification from India. The transport union is yet another challenge faced by dry ports. It is a group of truck owners who do not permit other trucks to carry goods in a particular region. They fix rates and impose a load per trip system. High cost, low availability of appropriate type of vehicles, and involvement of this kind of a union significantly affect the performance of freight transportation in the region.

At the international level, inconsistent customs clearance procedures are the central issue faced by dry ports in Nepal. For example, goods transshipped from Singapore to the Kolkata port do not need to submit papers for customs clearance. However, goods in transit through Kolkata port need to go through customs at the port, which is inconsistent with international transshipment procedures.

One of the strategies for Nepalese dry ports is to ensure sufficient railway connections, since Nepal does not have its own railway and India does not wish to connect them to, for example, Jogmani-Biratnagar or Nautanwa. Such connection would facilitate the supply of goods to eastern, western, and mid-western Nepal. Birgunj is too far for the western or eastern regions. Furthermore, more railway connections are also required to accelerate movement and improve coordination between terminal operators and stakeholders. Improving the information system by introducing EDI and automating information and document flow between the coastal and the landlocked country should improve the performance of the dry ports in Nepal.

Trade demands are additional motivation for both regions to engage in international cooperation. For example, the recent 2013 initiative by the Chinese Government, One Belt One Road (OBOR), is an opportunity for Malaysian and Nepalese dry ports. The OBOR initiative consists of the development of trade and infrastructure using land and maritime routes connecting East Asia with Europe (Aoyama, 2016; Grimmel & Li, 2019). The land route of this international transport network is a bright future for trade and contributes to the development and further improvement of the existing transport infrastructure in both regions. The OBOR railway line will begin at Xi An and lead towards Moscow and other parts of Europe.

The core agenda of OBOR is to further facilitate trade, exchange customs cooperation, integrate the application of e-commerce between nations, and develop modern services in cross border transactions. Using Malaysian dry ports for container transactions may help meet these objectives. Once the OBOR initiative is implemented, the containers from China, Europe, and South Asia will be transported to Malaysia by railway. The Malaysian dry ports will then be highly utilized to raise the quality of cross border transactions and increase the share of railway freight. The opening of trade connections with the OBOR network will emphasize and increase the already positive impact of dry ports on seaport trade volume and capacity which is currently insignificant. However, the interviewees pointed out that these nations' railway gauges are not standardized, ranging from 1000 mm to 1676 mm. This irregular gauge size limits the potential to expand the freight network between them. Improved policy coordination in the domain of infrastructural development, made possible by OBOR, is expected to increase Malaysian cross-border freight transactions, primarily via dry ports.

## **6. LESSON LEARNED FROM MALAYSIAN AND NEPALESE DRY PORT OPERATIONS**

Five (5) topics have been identified in interview sessions: transport infrastructure and operation, container planning, competition, location, and community. Table 1 summarizes the comparison between challenges faced by dry ports in coastal and landlocked countries and the strategies of overcoming them. Malaysia and Nepal suffer from uneven modal split of freight transport to and from dry ports. Therefore, the efficiency of freight transport to and from dry ports is not at a satisfactory level. Both nations should modify freight distribution in the transport network, aiming for equal modal splits to improve dry port operation efficiency and make cargo competitive at the destination. Malaysia is highly dependent on a single freight transportation connection, while Nepal, not having its own railway connections, is highly dependent on its neighboring regions. This situation shows that dry ports are unable to excel in a competitive environment. According to Roso et al. (2009), dry ports require a highly reliable railway service, i.e. a dedicated railway track, to avoid the risk of extended waiting times of container vessels. Since Malaysia is situated next to its trading partners Singapore and Thailand, and Nepal next to China and India, railway connections are the key requirement for the implementation of an effective inland transshipments procedure and direct transshipments between trains and ships (Salleh et al, 2019).

In spite of geographical factors, Malaysia and Nepal also face limitations with respect to the coordination between stakeholders and space for short-term and long-term container storage. Hence these dry ports need to increase their space capacity and improve the exchange of information between users and service providers. In that case, cooperation, instead of competition with domestic dry ports (in the Malaysian case) or international dry ports (in the Nepalese case), is required to ensure effective freight management within or across regional borders. Competition needs to be eliminated to encourage trust to exchange information between the stakeholders in the container/cargo chain. Moreover, the implementation of a location pooling plan between key players and dry ports or between dry ports could provide temporary relief from spatial constraints faced by dry ports in both nations. Apart from physical handling, the exchange of information between stakeholders is also required to minimize the risks, especially delays.

The attractiveness of dry ports in both regions to their clients is dependent on their location. The results of this study show that dry ports located away from an industrial zone were less sought by clients compared to dry ports located in or along economic corridors. Based on Woxenius and Bergqvist (2011), for dry ports that cannot overcome accessibility, connectivity, and physical infrastructure issues at their current location, location change is an immediate solution that will improve dry port performance in the seaport system.

<b>Challenges in dry port operations and proposed strategies</b>		<b>Similarities in challenges and proposed strategies in coastal and non-coastal regions</b>
<b>Coastal region (Malaysia)</b>	<b>Non-coastal region (Nepal)</b>	
<b><i>Transportation infrastructure and operation</i></b>		
<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Insufficient railway services</li> <li>• Imbalanced railway and road transport modal split</li> <li>• Limited road width</li> </ul>	<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Insufficient railway services</li> <li>• At Birgunj ICD, the railway line is congested, and the trains have to wait</li> <li>• Information system for arrival and departure is bad</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate railway services</li> <li>• Imbalanced proportion of modal split</li> </ul>
<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Introduce double-track railways</li> <li>• Provide options for transport</li> <li>• Encourage modal shift</li> <li>• Transport coordination</li> </ul>	<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Provide sufficient railway connections as Nepal does not have its own railway, and India does not wish to connect Nepal to, for example, Jogmani-Biratnagar or Nautanwa. The connection would facilitate the supply of goods to eastern, western and mid-western Nepal. Birgunj is too far for western or eastern Nepal.</li> <li>• Ensure more railway connections to accelerate movement and improve coordination between terminal operators and other stakeholders.</li> <li>• Improve the information system by introducing EDI and automating information flow and documents between transit and landlocked countries.</li> </ul>	<ul style="list-style-type: none"> <li>• Urgent need to develop an adequate railway network to balance the modal split in freight transportation</li> </ul>
<b><i>Container planning</i></b>		
<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Unorganised containers on rail decks transporting them to seaports</li> <li>• Limited empty container handling space</li> </ul>	<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Limited handling equipment</li> <li>• Limited and poorly managed storage of breakbulk, bulk and dirty</li> <li>• Border clearance procedure is lengthy on the Indian side</li> <li>• Very high delay fees on the Indian border</li> <li>• Very high handling costs</li> <li>• Insufficient coordination between stakeholders, governments and the private sector</li> <li>• Lack of coordination with Indian railway or infrastructural issues within India</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of coordination in container handling</li> <li>• Limited space capacity for managing full and empty containers</li> </ul>

<p><b>Strategies:</b></p> <ul style="list-style-type: none"> <li>• Information sharing</li> <li>• Empty container management</li> <li>• Container distribution planning</li> </ul>	<p><b>Strategies:</b></p> <ul style="list-style-type: none"> <li>• Invest in equipment, allocate additional space, manage safe storage to expedite early release.</li> <li>• Reduce delays by coordinating document clearance between India and Nepal, time and procedure negotiations with the Indian counterpart under Trade Facilitation Agreement, and border coordination under WTO, as indicated in the Revised Kyoto Convention.</li> <li>• Reduce cost by fixing the suitable cost for each handling procedure/operation. Since it is leased to private companies, the companies raise prices to make a higher profit, increasing the cost of doing business. The procurement act only permits tendering to companies that offer the highest amount of money, so naturally, the private operators have no option other than price increase.</li> <li>• Improve the coordination by introducing regular meetings at the border, addressing the problems immediately, and defining clear responsibilities for each stakeholder at ICD.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage additional investment in spatial capacities</li> <li>• Improve interoperability between dry ports and users for effective coordination</li> </ul>
<b>Competition</b>		
<p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• Competition with seaports and other players in the container seaport system</li> </ul>	<p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• The monopoly of sole operator CONCOR is ruthless, with no responsibility for fixed movement or destination</li> </ul>	<ul style="list-style-type: none"> <li>• Competition issues between dry ports and seaports</li> <li>• Monopolistic issue in dry port operation</li> </ul>
<p><b>Strategies:</b></p> <ul style="list-style-type: none"> <li>• Use the ability of dry ports to function as inland extensions of seaports</li> <li>• Promote teamwork between seaports and dry ports</li> <li>• Provide value-added services with sophisticated facilities</li> <li>• Train more skilled labour who are well-versed in seaport and dry port operations</li> </ul>	<p><b>Strategies:</b></p> <ul style="list-style-type: none"> <li>• Permit other Indian private railway operators to keep CONCOR on their toes and incorporate the operator's responsibility and liability into the contract.</li> <li>• Extend empty container return deadlines for shipping companies operating between Kolkota and Nepal</li> </ul>	<ul style="list-style-type: none"> <li>• Increase collaboration between dry ports and key players in the system</li> </ul>

<b>Location</b>		
<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Location of dry ports away from manufacturing areas</li> <li>• Location of dry ports in less strategic zones</li> </ul>	<b>Challenges:</b> <ul style="list-style-type: none"> <li>• The pavement and platform area are damaged and waterlogged in all ICDs</li> <li>• The majority of ICDs are far from any industrial clusters</li> </ul>	<ul style="list-style-type: none"> <li>• The setting of dry ports is not strategic as it is far from an economically productive zone</li> </ul>
<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Use dry ports in the container transport chain</li> <li>• Establish network with other dry ports</li> <li>• Increase connectivity to reduce long shipment difficulties</li> <li>• Employ integrated transport planning in isolated regions</li> </ul>	<b>Strategies:</b> <ul style="list-style-type: none"> <li>• NITDB should improve road quality in ICDs to improve the freight transport procedure at the terminal</li> </ul>	<ul style="list-style-type: none"> <li>• Improve the inter-regional or intra-regional connectivity by integrated transport planning</li> </ul>
<b>Community</b>		
<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Noise and air pollution, congestion</li> <li>• Smuggling issues</li> <li>• Social concern from barter trade</li> <li>• Lack of awareness about dry ports</li> </ul>	<b>Challenges:</b> <ul style="list-style-type: none"> <li>• Pilferage issues at dry ports</li> <li>• Exported cargo at Birgunj ICD gets limited priority</li> </ul>	<ul style="list-style-type: none"> <li>• Exposure to cargo security issues</li> <li>• Limited awareness of dry port operations among the players</li> </ul>
<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Embed Barter Trade Port into the Malaysian dry ports</li> <li>• Balance the transport mode in container distribution</li> <li>• Use dry ports to reduce seaport reclamation</li> </ul>	<b>Strategies:</b> <ul style="list-style-type: none"> <li>• Prevent pilferage by providing risk management services, conducting regular inspections, and offering insurance</li> <li>• Improve the priority of export cargo by fixing a schedule for export cargo once a week to enable freight forwarders or exporters to prepare the loaded containers for export</li> <li>• Make proper plans to balance loaded and empty containers in their regular movement</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthen safety elements in dry ports operations</li> <li>• Improve awareness through rigorous dry port marketing approaches</li> </ul>

Table 1. Comparison between dry port challenges and strategies in coastal and landlocked regions (Source: Authors)

Safety and security aspects have been neglected in dry ports in both countries. Smuggling, pilfering, pollution, and congestion are common issues in these countries, and therefore, both aspects need to be enforced in all dry ports to ensure that their operational efficiency is made part of the seaport procedure. Safety and security aspects need to be imposed in daily dry port operations to improve customer services by improving cargo safety, ensuring rapid delivery, lowering transportation costs, and reducing congestion. Marketing is another component that needs to be emphasized in dry port operations in both countries. The awareness of dry ports is deficient in both societies (Jeevan et al. 2022). Hence, a marketing strategy that focuses on dry port services, functionality, and objectives is needed to expose dry ports and their functionalities to potential clients in their respective perimeters. This strategy will ensure that potential dry port clients in both nations are not limited only to domestic markets but can spread into international markets. Marketing strategy helps clients from both markets understand the important contribution of dry ports to seaports, especially in ensuring the continuity of cargo, reducing transportation costs, preventing delays at seaports, and emphasizing the importance of the hinterland market in the seaport system.

## **7. CONCLUSION AND IMPLICATION**

In conclusion, dry ports have become the primary nodes for domestic and international cargo transportation in both regions. Dry ports in Malaysia have primarily been developed to assist seaports and their clients to transport cargo between them effectively. However, in Nepal, dry ports, known as ICDs, mainly transport cargo across the border and carry out domestic distribution. In general, Malaysia and Nepal face similar challenges in transport infrastructure and operation, container planning, competition, location, and community. First, both regions have inadequate railway services and an imbalanced proportion of the modal split from the transport and infrastructure point of view. Therefore, dry ports in both regions must develop an adequate railway network to balance the modal split during freight transportation. Second, in terms of container planning in dry ports in coastal and landlocked regions, dry ports faced two main issues: the lack of coordination in container handling and limited spatial capacity for managing laden and empty containers. They should attract additional investment to increase their spatial capacities and improve interoperability between dry ports and users for effective coordination to overcome these issues.

Third, from the competition perspective, dry ports from both regions faced two different issues: severe competition from other players and terminal operator monopolies, causing delays and inefficiency. In order to overcome these issues, dry ports in Malaysia and Nepal are proposed to improve collaboration between dry ports and form dry port alliances in the system. Fourth, dry port locations in both regions have their inherent disadvantages, such as being in a nonstrategic location far from an economically productive zone. This situation can be remedied by improving the inter-regional or intra-regional connectivity through integrated transport planning. Finally, from the community standpoint, dry ports in Malaysia and Nepal face the crucial challenge of communicating cargo security issues and the benefits of using dry ports to the players. Dry ports need to strengthen the safety elements in their operation and raise awareness about dry ports through rigorous marketing approaches.

The outcome of the paper indicates that dry ports in both countries face some critical challenges, such as modal split imbalance, lack of coordination between dry ports and key players, competition between dry ports and seaports, dry port operator monopolies, nonstrategic location of dry ports, poor security procedures, and low awareness of the existence of dry ports in the seaport system. In Malaysia, dry port inefficiency affected the competitiveness of the nation's seaports. However, in Nepal, the dry port inefficiency might affect international seaport operations. Therefore, the fundamental requirements as indicated in this paper for dry port operations in both regions need to be updated to prepare these inland terminals and improve national and international seaport performance. Additionally, the One Belt One Road Strategy, the Asian Highway Plan, and the Trans-Asia Railway Network would be a great opportunity and an advantage for both nations to upgrade their

infrastructural capacities. Thus, policymakers in both regions should plan and implement effective strategies to make the best of this international plan to reap collective benefits.

In contrast, the authors faced several issues while drawing up this paper. For example, several interviews failed due to the time constraints and limited information certain interviewees were allowed to share. However, the information gained through interview sessions were sufficient due to non-ambitious research objectives. For future research, dry ports from coastal, landlocked, double-landlocked and Ocenia countries need to be compared to develop a comprehensive guideline for dry port management in these countries.

## **CONFLICT OF INTEREST**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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