

Article

Exploring the Challenges of Inland Container Depot (ICD) Development

Md Mostafa Aziz Shaheen and Humayun Rashid Askari *

Department of Port and Shipping Management, Bangladesh Maritime University, Dhaka 1216, Bangladesh

* Correspondence: humayunaskari@gmail.com

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Abstract: Inland container depots (ICDs) are vital components of the global trade and logistics system for processing a substantial number of import, export and empty containers in Bangladesh. Despite playing a crucial role in easing port congestion and facilitating cargo flow, ICDs face several challenges that compromise operational effectiveness and service quality. This study investigates ICD challenges in Bangladesh through semi-structured interviews with port officials, ICD operators, freight forwarders and academics. The study reveals that policy inconsistencies lead to legal and regulatory impediments, operational inefficiencies, poor infrastructure, safety and security concerns, and location-specific restrictions as the challenges exist. The results demonstrate the urgent need for consistent legislation, infrastructure, and automation investment; improving road and rail networks; and initiating capacity-building programs. Addressing these issues through strategic planning and public-private partnerships would improve ICD performance and enhance supply chain competitiveness in Bangladesh.

Keywords: inland container depot (ICD); dry port; Chittagong port; Bangladesh

1. Introduction

An inland container depot (ICD) is a type of common-user facility that processes arriving and outgoing containers using any applicable mode of transport under customs control through seaport or airport [1]. Following their connection to a seaport via road or rail, the ICDs become vital nodes in regional, national, and international transportation networks [2]. ICDs are described in literature as important transportation nodes named differently in each region as dry ports, inland terminals, inland logistics centers, inland hubs, and freight villages [3]. ICDs primarily provide services such as Cargo Freight Stations (CFS), customs clearance, warehouse space, container servicing and repair, as well as connecting various transport modes [2]. For different players along the transportation and logistics spectrum, dry ports provide several advantages. ICDs help seaports extend their hinterland connections, reduce congestion and improve cargo-handling capacity. They also help seaport cities reduce road traffic and make valuable urban land available for other uses. Rail operators can handle a larger share of freight and benefit from economies of scale. Road operators spend less time on congested roadways and terminal areas, therefore lowering delays. Through more environmentally friendly logistics, dry ports help shippers access seaports and assist green marketing projects. Finally, the reduction of environmental impact and the creation of employment possibilities connected to dry port activities help society [4]. Container traffic in seaport yards is increasing on a daily basis across the globe due to not having enough space at the current terminal to accommodate any further growth. This port capacity problem is only going to get worse in many of the seaports [5]. To keep pace with the increasing demand, ICDs are the most efficient and cost-effective choice instead of expanding ports [6].

When it comes to emptying import and filling export containers, as well as containers in transit, ICDs are indispensable in Bangladesh. The ICDs handle nearly all export containers; the rest go straight from the industry to the port yard in Bangladesh. ICDs are responsible for managing nearly 23% of all import container traffic,



although interviewee estimates of ‘nearly a quarter’ of total imports [7]. There are many challenges that the ICDs in Bangladesh must overcome, notwithstanding their importance. It takes a long time to get from the port to the ICDs. Passenger vehicles primarily use the roads, making trailers unsuitable for them. Traffic increases as passenger and freight vehicles share roads. In addition, ICDs often fail to follow the established fare policy. Transportation expenses might vary widely due to factors such as political unrest and weather conditions [8]. Traffic among ports, ICDs, and industry has grown throughout the years. Time and money spent on transportation have increased consequently. In the countryside, freight containers use the railway less frequently than the road. Rail transports only 10% of containers from the Chittagong port to the Kamalapur ICD. No other private ICDs offer train connectivity [9]. From Dhaka to Chattogram, the freight train journey takes around 9 to 18 h per day, and there are only two dedicated regular trips [9]. Another major problem is that there aren’t enough ICDs in Chittagong currently to alleviate port congestion. Further complicating matters is the fact that private ICDs lack the necessary vehicles and equipment to deal with the increasing volume of trade [7].

Despite their limitations, ICDs have a crucial role in alleviating port congestion, and promoting their use can enhance port handling capacity even more. Therefore, this study aims to examine the challenges that ICDs have faced so far and evaluate their role in Bangladesh. In addition, it aims to offer a comprehensive analysis of the present state and functioning of dry ports in Bangladesh. Interviewing key stakeholders and presenting industry insights for enhancing their performance will attempt to achieve these objectives. Port authorities in Bangladesh, as well as port users, stakeholders and policy makers may take these perspectives into account as a part of the future trade facilitation initiatives.

2. Background

The port of Chittagong, a prime seaport, is considered the center of the country’s export-import trade and continues to play a significant role in the national economy. Around 1981, Chittagong Port became familiar with containerization. At that time, the Chittagong Port Authority (CPA) realized the necessity of establishing an ICD. Seafarers Limited set up the nation’s first ICD in 1985. Up until 1998, the ICDs only dealt with empty containers. From 1999 on, as the number of ICDs increased, their roles and responsibilities began to expand [10]. The ICDs began to handle export goods by storing and stuffing them into containers and dispatching them to port for shipment. In 2006, the government granted permission to some ICDs to deliver nine bulk containerized cargo items, including rice, wheat, chickpeas, lentils, mustard, animal feed, raw cotton, waste paper, and scrap. In 2010, ICD authorized the handling of eight additional types of containerized cargo, including fertilizer, onion, garlic, ginger, hard coke, carbon black, marble chips and ball clay [9]. In April 2020, the National Board of Revenue (NBR) permitted dry ports to handle six more imported cargo goods: all types of seeds and fibers, drug administration-approved products for pharmaceutical companies, yarns, insecticides, fungicides, herbicides and tire cords. Of late, NBR has authorized private ICDs to handle and deliver 15 additional categories of imported goods through Chattogram port, increasing the total eligible product categories to 65 [11].

ICD Overview

A few decades ago, the establishment of the ICD aimed to reduce port congestion and encourage private investment. Currently, Bangladesh has a total of twenty-one (21) ICDs. Among them, twenty (20) are private ICDs situated within 29 km of Chittagong port, and the only public ICD is in Kamalapur, Dhaka [12]. These ICDs primarily serve the CPA. Private ICDs have three main functions: deconsolidate and store the import container cargo, store and consolidate the export container cargo, and store empty containers. Private ICDs currently handle 65 import items. ICDs receive import cargo shipments from either the vessel’s hook point or the port yard. After the importer receives the unstuffed cargo, the mainline operator transports the empty containers to designated depots or CFS for storage [13]. In addition, off-dock terminals handle most of the export cargo, which includes ready-made garments, jute and jute products, coils, steel, and other items. Shippers transport their export cargo to the CFS for unloading from the local covered van, consolidation and storage. The Main Line Operator sends the stuffed and sealed containers to CPA for shipment. In addition to transporting goods by rail or road to and from serving ports, ICDs also handle customs clearance, consolidate and separate cargo, weigh and certify the verified gross mass (VGM) of export containers, maintain and repair container units and perform other tasks [14].

Approximately 90% of export-laden (fully loaded with cargo) containers handled at Chittagong port pass through private ICDs [9,15]. ICDs handle roughly 23% of imports by NBR-permitted cargo categories [16]. Once unloaded at the port, the ICDs receive these items for delivery to consignees. Overall, private ICDs play an important role in handling export, import and empty containers in Bangladesh. Their operations help reduce pressure on Chattogram Port, although differences in capacity and service efficiency limit their ability to handle

additional cargo volumes [9]. Due to the substantial growth in import volume, CPA is planning to shift the total import operation to private ICDs. However, the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) is not interested in releasing imports from the private ICDs because of the higher charges and time-consuming process compared to the CPA [7]. The CPA also recommends doubling the number of private ICDs so that export-import activities can continue uninterrupted. However, the Bangladesh Inland Container Depot Association (BICDA), which represents ICDs in Bangladesh, disagrees. The BICDA President stated that ICDs cannot attract private investors due to their poor ROI in many cases [17].

Traditionally, the state-owned Kamalapur ICD has handled both inbound and outbound container shipments by Bangladesh Railway. However, Kamalapur ICD's capacity is inadequate to handle the increasing numbers of containers diverted to the Bangladesh Railway [18]. Therefore, a new ICD with constant access to container handling and transportation was required [19]. The Public-Private Partnership (PPP) modality is constructing a new ICD near the Dhirasram Railway Station, connecting it to the Dhaka Eastern By-Pass Road, to fulfill this purpose. The proposed ICD has a capacity of 354,000 TEUs with a railway spur of 6 km [9]. In addition, Bangladesh plans to establish a new rail-based Inland Container Depot (ICD) at Ghorashal in Narsingdi under a Public-Private Partnership (PPP) model. The 20,000 m² facility, to be developed on a Design-Build-Finance-Operate-Maintain-Transfer (DBFOMT) basis, with an annual handling capacity of 100,000 TEUs [7]. Table 1 shows an overview of the ICDs in Bangladesh.

Table 1. Inland Container Depots (ICDs) in Bangladesh.

SL	Name	Location	Year of Establishment	Distance from CPA	Distance from Dhaka
1	ESACK Brothers Container Terminal	Middle Halishahar, Bandar, Chittagong	2002	0.74 km	243 km
2	Chattogram Container Transportation Company Ltd. (CCTCL)	Middle Halishahar, Bandar (Near Port Stadium), Chittagong	2003	1.5 km	244 km
3	K&T Logistics Limited	CEPZ, Chittagong	2001	1.0 km	248 km
4	QNS Container Services Limited	Sector 6A, CEPZ, Chittagong	1999	1.5 km	248 km
5	Ocean Containers Ltd.	Kathgor, North Patenga, Chittagong	1988	7.5 km	251 km
6	Summit Alliance Port Limited (North)	Kathgor, North Patenga, Chittagong	1988	9.8 km	252 km
7	Vertex Off-Dock Logistic Services Ltd.	Kathgor, North Patenga, Chittagong	1999	6.0 km	250 km
8	Shafi Motors Limited	Faujdarhat, Sagorika Avenue, Chittagong	1996	7.0 km	239 km
9	Port link Logistics Centre Ltd. (Unit 2)	Bhatiary, Chittagong	2003	14 km	230 km
10	Summit Alliance Port Limited (SAPL EAST. M-G 1)	Kathgor, North Patenga, Chittagong	2007	9.2 km	251 km
11	Summit Alliance Port Limited (SAPL West)	Kathgor, North Patenga, Chittagong	2007	9.8 km	252 km
12	KDS Logistics Limited	Ghoramara, Sonaichari, Sitakunda, Chittagong	2008	19 km	221 km
13	Incontrade Limited	Laldiar Char, East Patenga, Chittagong	2008	8.0 km	254 km
14	Golden Containers Limited	North Kattali, Pahartali, City Gate, Chittagong	2008	7.5 km	235 km
15	BM Container Depot Ltd.	Keshalpur, Sitakunda, Chittagong	2011	16 km	247 km
16	Eastern Logistics Limited	Katgor, North Patenga, Chittagong	2009	6.0 km	252 km
17	Haji Saber Ahmed Timber Co, Ltd. (Container Yard)	Kalurghat Industrial Area Chittagong	2009	14 km	248 km
18	Nemsan Container Limited	Uttor Sonaichori, Kumira, Sitakunda, Chittagong	2011	28 km	217 km
19	Dhaka Inland Container Depot (ICD)	Kamalapur, Dhaka	1987	243 km	1.1 km
20	Bay Link Containers	Barabkunda area, Chittagong	2023	35 km	210 km
21	Anchorage Containers Depot	Port Link Rd, Chittagong	2022	10 km	235 km

Note: Standardized TEU capacity figures for individual ICDs are not consistently available in the public domain. Readers are directed to the Bangladesh Inland Container Depot Association (BICDA) for operational capacity data. Source: Bangladesh Inland Container Depot Association.

3. Literature Review

The inland facilities as strategically located logistics hubs connected to seaports through dedicated transport corridors, enabling the efficient movement of cargo between port terminals and inland intermodal terminals through road, rail and inland waterways [3]. These logistics activities are responsible for coordinating the transfer of cargo. There are many essential roles of an Intermodal Container Depot (ICD). ICDs offer various value-added services such as container handling and distribution, container storage and consolidation, container receipt and delivery, as well as customs clearance and container repair [20]. Adejumo [5] pointed out the infrastructure difficulties faced by dry ports in Nigeria in his study. The lack of an efficient transportation infrastructure, particularly a rail network, hinders the movement of large volumes of cargo from the port to the ICD sites. The ongoing discussions also address the difficulties pertaining to safety and security, with a focus on finding viable solutions. In addition, he outlined three primary characteristics of the inland infrastructure for the ports in Nigeria. The report lacks explicit guidance on overcoming the aforementioned issues. Moreover, the primary obstacles faced by Malaysian dry ports are specifically related to infrastructure, transportation, container handling, competition and legal difficulties [2]. The challenges include a lack of enough railway lines, disorganized container planning on the rail deck, overreliance on a single method of transportation, little acknowledgment from seaports about the reliability of dry ports, competition from seaports, and unfavorable location. An effective approach for enhancing Malaysian dry port operations involves implementing a dual-track railway system that combines land haulage and train transit. The data gathering for this article mostly relied on conducting in-person interviews. Jeevan et al. [2] proposed ways to address the current issues of connecting seaports to interior transportation systems. The proposals include the following objectives that include reducing road congestion, increasing rail capacity to encourage a shift in transportation modes, improving inland freight facilities, and advancing overall development. UNESCAP's study posed importance the quality of road and rail connections for the effectiveness and attractiveness of dry ports. This study specifically examined the geographical and logistical challenges that lead to the limited amount of container traffic. Customers choose road transport to transfer containers affected by severe traffic congestion caused by their location in a heavily populated area. Additionally, the restriction on truck access during daylight hours adds to the challenges faced by road transport [21]. Begum [22] examined the contribution of port traffic from Dhaka ICD to the economy of Bangladesh. The study also explored the effects of Chittagong port's efficiency and productivity on the country's economy. The Chittagong Port Authority manages the Dhaka ICD, located on the territory of Bangladesh Railway, with the agreement of the National Board of Revenue. The research focused solely on identifying the weaknesses and risks of Chittagong port, without delving into a detailed discussion of these issues or exploring the findings of ICDs. A study by Rahaman et al. [9] highlighted the limited development of ICD facilities beyond the Chattogram area and emphasized the need to establish more inland terminals near major industrial centers, particularly Dhaka. They demonstrated the geographical obstacles associated with the ICDs. Moreover, the study examined both the advantages and disadvantages while presenting their arguments. Without a doubt, ICD plays a crucial role in smoother port operations and seamless container transfer. There is a little literature focusing on ICD challenges in Bangladesh. The industry's perspective is still being documented. The study made efforts to bridge this gap. Table 2 synthesizes the challenges reported in previous ICD and dry-port studies.

Table 2. Challenges reported in prior ICD and dry-port literature, their impacts and potential responses.

Challenge	Description	Impact	Potential Solutions	References
Infrastructure Challenges	Inadequate or old handling and storage equipment at ICDs;	Inefficient and delayed cargo movement;	Modernizing the hinterland infrastructure;	[2,5]
	Inadequate power and utility infrastructure;	Heavy traffic and prolonged handling periods at ICDs;	Improving the handling and storage tool at ICDs;	
	Inadequate hinterland network (road and rail) linking among ICDs, ports and demand hubs.	Limited cargo handling capacity.	Building reliable utilities and power infrastructure;	
			Establish new ICDs to accommodate more containers.	

Table 2. Cont.

Challenge	Description	Impact	Potential Solutions	References
Operational Challenges	Weak yard management practices;	Increased operational costs;	Introducing best practices in yard management;	[2,5,23]
	Ineffective container stacking techniques;	Delays in cargo handling and processing;	Investment in automation technologies for stacking and handling;	
	Lack of skilled manpower;	Congestion within ICDs affects throughput.	Human resource training and development initiatives;	
	Limited technology and automation integration.		Integration of up-to-date information technology systems for optimizing operations.	
Legal Challenges	Complex, bureaucratic customs procedures;	Delays and higher company costs; Reduced efficiency in supply chain;	Reform customs processes;	[24]
	Lack harmonization in regional customs regulations;		Harmonizing regional regulations;	
	Time consuming documentation process;	Increased non-compliance risk.	Introduce EDI;	
	Uncertainty in ICD laws.		Promote clear and stable ICD laws;	
Safety and Security Challenges	Inadequate security measures;	Potential business losses; Reputation damage;	Introduce Security measures including CCTV, access control, and security personnel;	[5,25]
	Cargo theft, pilferage, and damage;		Strict fire safety compliance;	
	Lack of fire safety protocols and infrastructure.	Supply Chain Disruptions.	Cooperation with customs and law enforcing agency.	
Location Related Challenges	Environment issues related to noise and emission;	Higher transportation costs and delays;	Conducting complete location analysis considering connectivity, environmental impact, and future demands;	[2,5]
	Not strategically located near transportation networks or consumer hubs;	Environmental damage;	Adopt industry best practices to reduce environmental impact;	
	Land scarcity and high prices in preferred locations.	Space constraints make expansion difficult.	Introduce common infrastructure logistics facilities partnerships.	
External & Internal Challenges	Competition with other ICDs with superior services, lower pricing, or better locations;	Challenges in acquiring and retaining customers;	Specializing in cargo types or value-added services;	[2,25]
	Competition with seaports offering broader inland clearance;	Low profitability and market share;	Building excellent transportation and logistical partnerships;	
	Competition from trucking companies and logistics centers.	Pressure to improve efficiency and service.	Improving customer experience using technology.	

The literature synthesis in Table 2 was used to provide background context and to inform the broad areas explored in the semi-structured interview guide.

Although previous studies have addressed dry port and ICD related issues such as infrastructure constraints, transport connectivity, regulatory barriers and operational challenges, limited research has comprehensively investigated the challenges of ICD development in Bangladesh by integrating different stakeholder perspectives. This study aims to address this gap by examining these challenges comprehensively, integrating insights from port authorities, ICD operators, freight forwarders and academic experts to provide actionable recommendations for improving ICD efficiency and performance in Bangladesh.

4. Methodology

This study uses a qualitative research design to explore the challenges of ICDs in Bangladesh. Qualitative research is a kind of investigation that seeks to comprehend social phenomena in their natural setting in order to provide a thorough grasp of the underlying reasons, perspectives and motives [26]. This study employed purposive sampling to select participants with demonstrated professional expertise in ICD operations, port management, freight forwarding or academic research on Bangladesh's logistics sector. Data collection continued until thematic saturation was reached until the point at which no new themes or meaningful insights emerged from additional interviews [27]. After 11 in-depth semi structured interviews, recurring themes were consistently identified across all informant categories, confirming that the sample size was sufficient for the scope and purpose of this qualitative study.

The research drew on both primary and secondary data sources. Secondary data came from policy documents, peer-reviewed scientific journals, government publications, industry studies, and relevant circulars released by organizations like the National Board of Revenue (NBR), Chittagong Port Authority (CPA), and the Ministry of Shipping (Bangladesh).

Semi-structured interviews produced primary data. The study engaged four types of informants, resulting in eleven in-depth interviews (Table 3). The informants included port personnel, academics, ICD professionals and freight forwarders. Every participant had a minimum of five years of pertinent professional experience, guaranteeing educated and reliable viewpoints. Appendix A presents the details of the interview participants.

Table 3. Semi-structured interview participants.

Stakeholder Group	Number of Participants	Professional Experience
Academic experts	3	6–8 years
Freight forwarding professionals	2	8–10 years
Private ICD representatives	3	8–14 years
Port authority representatives	3	5–20 years
Total	11	

Prior to data collection, participants were informed about the purpose of the study, the voluntary nature of participation, their right to decline any question or withdraw before data analysis and the intended academic use of their responses. The consent process was included at the beginning of the interview schedule and informed consent was obtained before each interview. To protect confidentiality, no names, organizational identifiers or other direct personal identifiers were included in the analytical dataset. Participants were assigned anonymized codes and identifying details were removed from interview transcripts and reporting. The collected data were stored securely and accessed only by the research team for academic research purposes.

The semi-structured interview guide was developed to ensure consistency and allow for the exploration of emerging themes. The literature review informed of the broad areas explored in the interviews. However, it did not prescribe the six final themes or impose the categories presented in Table 2. This method let the researchers explore the unexpected but pertinent problems that came up during the interviews. It also gave the respondents the liberty to thoroughly explain their experiences and points of view.

Transcribed versions of the interviews were submitted to thematic analysis, a commonly used technique for spotting, evaluating and presenting trends (themes) in qualitative data [28]. Every interview was verbatim transcribed and then repeatedly checked for accuracy and familiarity. Coding is a method used to find intriguing and subtle elements of the text that are relevant to the study question or research objectives. One author conducted the initial coding by identifying meaningful text segments relevant to the research objectives and assigning preliminary codes. Then the codes were organized in a coding matrix and grouped into broader categories. A second author subsequently reviewed the transcripts, coded segments, code definitions and preliminary thematic categories. Differences in interpretation were discussed by the two authors and resolved through repeated comparison with the original transcripts. This process helped maintain coding consistency and refine the coding

framework. Related codes were then grouped into broader themes. The final analysis generated six key themes: Infrastructure Challenges, Operational Challenges, Legal Challenges, Safety and Security Challenges, Location-Related Challenges, and External & Internal Challenges. These themes guided the arrangement of the results, which also assisted in producing sound recommendations for stakeholders and lawmakers.

Time and financial restrictions made it impossible for this study to acquire access to a broad spectrum of stakeholders, which limited the study's scope. Still, triangulation across several informant categories improved the results and helped minimize this problem.

Figure 1 indicates the research process flow diagram.

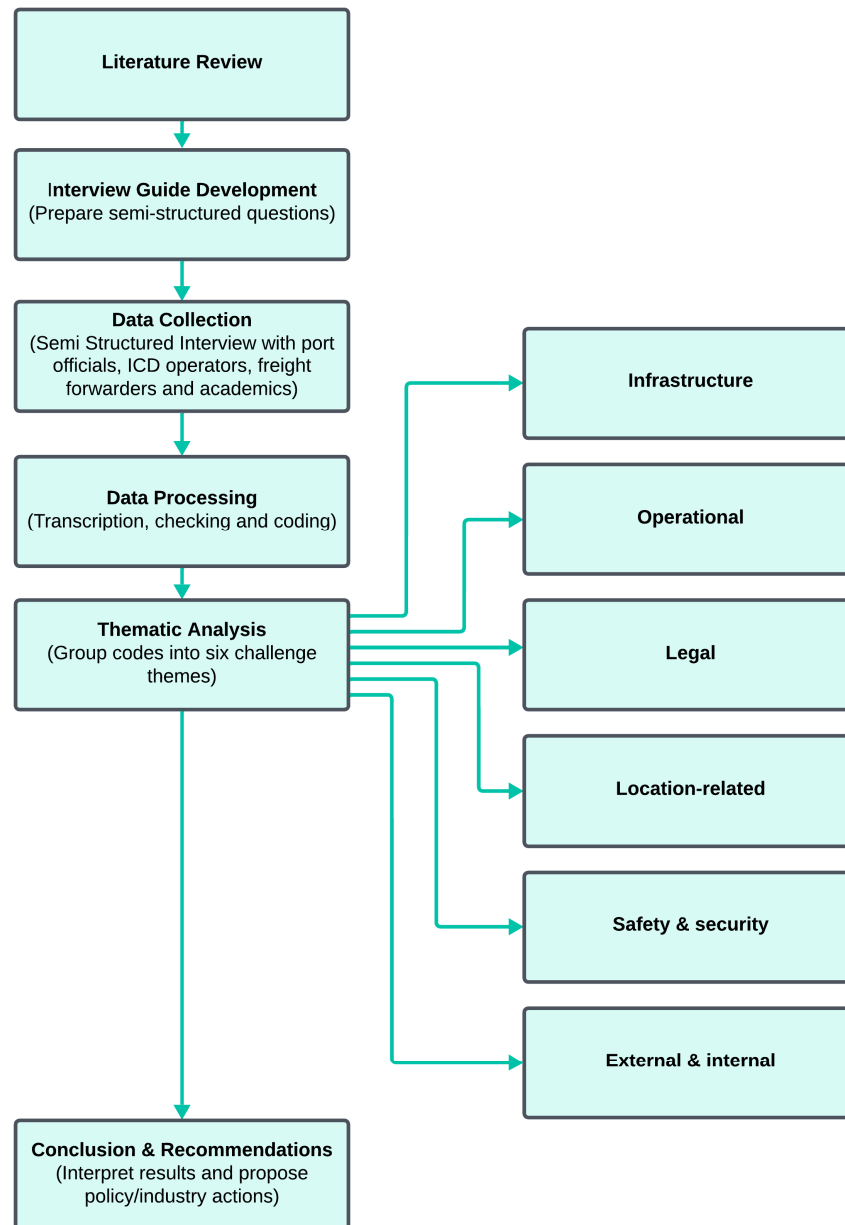


Figure 1. Research Design.

5. Interview Analysis

Interviewees, when questioned about the challenges Bangladesh faces in ICDs, expressed various opinions. Unlike other private ICDs, Kamalapur ICD is the only public one, and it has some unique as well as critical challenges. However, all of the interviewees agreed on the following aspects: lack of government policies and incentives; shortage of skilled manpower; poor transportation facilities; unsatisfactory return on investment; and ignorance among stakeholders and government agencies about the contribution of ICDs.

During the interview at Kamalapur ICD, the study identified two primary issues. Firstly, it is located in the center of the capital, Dhaka. Secondly, the capacity of the serving trains is very limited. The number of passenger

trains from Kamalapur to Tongi has also been increased compared to previous times, and for obvious reasons, passenger trains get a higher priority than container trains. The railway authority plans to have more lanes, but they also added a question about how the train's inability to carry the containers would contribute to the growth of shipping cargo.

The freight forwarding respondent also commented that the Kamalapur Rail ICD is not attractive to shippers due to the higher cost of transportation as well as the delayed delivery of containers from CPA (Chittagong Port Authority) to Dhaka. Furthermore, the existing ICD facilities are inadequate. He classified the main challenges as the smaller number of ICDs, a weaker superstructure, and a shortage of trained manpower. He suggests two solutions: automation of existing facilities and establishment of new ICDs.

Another interviewee, the CEO of a private ICD, identified capacity and infrastructure facilities as the primary challenges currently facing the organization. The current ICD capacity handles all of Bangladesh's exports and nearly a quarter of the imports. They store a total of 65 commodities, which constitutes insignificant portion of the total volume. The capacity of ICDs is insufficient to handle all the imports, and the primary issue lies in the infrastructure. The same issue was brought up by a higher official from CPA and another private ICD respondent, specifically highlighting the significant concern of relying heavily on a single road for both public and port transportation. The road in question extends beyond the jurisdiction of the CPA. Every year, during the Eid holidays, this problem worsens.

A senior representative from another private ICD cited the lack of government incentives and policies as the main challenges for the consistent growth of the ICD sector. Surprisingly, all 21 ICDs have handled 92% of the country's total exports without receiving any incentives from the government. The NBR issued ICD policies in 1998, followed by the Ministry of Shipping in 2016. However, a significant issue is that multiple sections of these two policies conflict with each other. He proposed the establishment of a tariff committee to set the tariff for the ICD.

However, the proposal was unprecedented, as the ICD is a private sector entity and cannot set its tariff. The second challenge is a shortage of trained manpower. Particularly, some ICDs have employed foreign nationals to support their operations, having no other alternatives as high management skills are crucial in some aspects. However, relying on foreign nationals highlights a gap in local expertise, which is concerning given that the ICD sector has been operational for over two decades. The third challenge lies in the lack of understanding among stakeholders, policymakers, and the government agencies concerned regarding the role of ICDs. Although the export and import sectors of this country heavily rely on these ICDs, there is a lack of clear understanding about the role and purpose of ICDs.

Another major issue is the low return on investment (ROI). Though the investment in ICDs is huge almost 500 crore Bangladeshi taka, the return is inadequate. As the returns are neither attractive nor appealing, investors are reluctant to invest in expanding or setting up new facilities, posing a significant obstacle. However, the CPA respondent disagreed, stating that they had managed over 3 million TEUs in FY21. This level of performance is truly promising. In comparison, the combined simultaneous yard storage capacity of all ICDs is approximately 10,000 TEUs, representing the maximum number of containers that can be stored at any one time, as opposed to the annual throughput, which exceeded one million TEUs in 2024.

A senior academician expressed a different view regarding the location of ICD, namely that it should be near the growth center or EPZ (Dhaka, Gazipur, Narayanganj) instead of near Chittagong port, so shippers don't have to go to CTG. Those who establish an ICD near the growth center or within the EPZ will be able to capture the market. The largest challenge is policy-related. Previously, the policy was that the ICD should be within a 20 km radius of the port. However, the current policy mandates that the ICD must be farther than 20 km from the port, although it currently appears to be within this range. He highlighted the capacity issue as a challenge for private ICDs, as capacity is lower than the demand. The cargo volume at Chittagong port is greater than the ICD capacity. As a result, the ICD is also facing congestion. Furthermore, the markets are not free. The market must be given freedom. Within the ICD, customs checked only 65 commodities. At the traders' request, customs were asked by Chittagong port to inspect 100% of the goods in the ICD during the COVID-19 pandemic, which helped to decongest the port.

5.1. Infrastructural Challenges

When interviewees were asked about the impact of ICD's infrastructure issue, most talked about the challenges regarding space, equipment, and roads. While addressing the challenges, a high official from Kamalapur ICD attributed the lack of planning during its establishment. In the beginning, the ICD functioned as a warehouse, and a new ICD was constructed later. A private representative of the ICD stated that the poor quality of the narrow roads hinders transporting large trailers and prime movers, while the new off-dock policy restricting

100% foreign investment adds to the challenges. Another key infrastructural challenge is the lack of designated communication between ICDs and the port. Additionally, the high initial capital cost poses both a challenge and a risk. According to the 2016 policy, a minimum of 10 acres of land is required to establish an ICD, while a sustainable one needs 25 acres of land, making land acquisition extremely costly. This necessitates bank loans. But bank interest rate of Bangladesh is a burden, as a lower interest rate would benefit this sector. Both ICD representatives and CPA officials addressed that high land costs and complex purchasing processes make setting up ICD facilities difficult. According to a CPA representative, though the majority of ICDs provide ample space for container stacking and storage, there are a few ICDs with limited space and no scope for extension, which hampers Chittagong port operation and causes container congestion problems. As Chittagong Port experiences a certain amount of annual growth, which increases the necessity for the port authority to expand its storage capacity through various projects, such as the Bay Terminal and the Potenga Terminal Project. Additionally, they have initiated yard extension activities to support Chittagong Port's growth rate. Private ICDs have fixed yard capacities, which limit container and empty vessel access. Each section of an ICD operation, such as the FCL, CFS and empty container operations, requires designated space to distribute equal proportions to those sections of different containers. More empty containers should be stored to meet operational needs, as current allocations are insufficient. During peak season, the Chittagong port experiences an overflow of both import containers and empty containers. To alleviate container congestion, the Chittagong port must rely on private ICDs, as the port heavily relies on private ICDs to manage the overflow during Eid's peak season. At that time, Chittagong Port suffered a little bit of a container congestion problem because of the lack of sufficient support. The ICDs must take action and transfer the containers from Chittagong port to the relevant ICD when vessels discharge containers into the port yard, which is hampered due to a lack of sufficient tractor trailers to transfer all the containers from port to port. The most critical issue facing private ICDs is the lack of adequate equipment. Therefore, equipment is a crucial component of the private ICD sector as vessels discharge numerous containers daily, requiring adequate trailers and machinery. Leading private ICDs like Isack Brothers, KDS Logistics, Incontrade and BM Container handle a significant number of containers from Chittagong Port. A senior academician also highlighted the existing equipment shortage, suggesting that raising competition among ICDs could initiate investment and modernization. However, upgrading faces multiple challenges. Another private ICD representative also explained the lack of proper equipment. The high tax on imported cargo handling equipment is another challenge as importing equipment from foreign countries like the USA, Italy, and Japan is needed due to its unavailability in Bangladesh.

An interview with a freight forwarder highlighted the absence of automation. The ICD's designated space for loading, unloading, cargo storage and container movement trailers is unavailable. The lack of automation in the infrastructure and transport systems is preventing us from reaping the full benefits of the system.

5.2. Operational Challenges

When interviewees were asked about operational challenges, a public ICD respondent mentioned that the lack of parking and truck space creates difficulties when trucks enter. Another respondent, a freight forwarder, echoed this concern. Without proper parking facilities, factories face demurrage charges, leading to financial burdens for customers.

According to a high official from the private ICD, Bangladesh is among the few countries globally where a substantial share of stuffing and unstuffing still takes place within the port premises, although ICDs also handle stuffing and unstuffing for permitted cargo categories. The port area handles approximately 70 to 80% of the import volume. The ICDs dispatch more export containers from Bangladesh monthly to the Chittagong port for shipment to different destinations around the world, while the ICDs are bringing in (monthly) fewer imported containers to Bangladesh, which creates a serious imbalance between the imported and exported containers, keeping ICDs an extra 30% or 40% more empty. Most import containers are 20-foot containers (TEUs), necessitating their empty evacuation. Another private ICD respondent confirmed the imbalance between imports and exports. Ideally, their volumes should be equal or nearly so, but this is not the case. After delivering imported goods, containers often remain empty, necessitating ICDs to transport them back from Chittagong Port for export stuffing. Utilizing 60,000 empty containers for exports would establish balanced operations. Currently, handling fewer import items causes a significant operational challenge.

The second challenge includes congestion in the container yard due to the process of unloading containers and delaying the transfer of containers to offshore docks. The offshore docks must have empty containers for operations. Synchronization is crucial in this regard. Additionally, poor road quality limits container movement, as some off-dock facilities can't operate in the morning. Roads connected to public transportation were available only in the

evening, which reduced daily operational hours to 10–12. A major concern is the disruption of 70,000–80,000 TEUs of imports within the port, intensified by bulk cargoes like wheat and rice occupying significant space.

An interviewee from the private ICD highlighted additional operational challenges from a unique perspective. The first operational challenge is the absence of full automation due to the full automation feature. While every ICD has operational software, it often fails to show container locations, reducing operational speed and necessitating the need for upgraded software to display each container's position accurately. The ICD stores and manages the containers, and it can overcome internal challenges by upgrading its software. The second operational challenge also relates to software, specifically the interface between the ICD's operational software and the Chittagong Port Authority's system. The Chittagong Port Authority uses an operational software known as CTMS (Container Terminal Management System), while ICDs utilize their own proprietary software. Currently, the interface only allows ICDs to input data into CTMS, not data extraction, limiting operational efficiency. Additionally, the Customs Authority employs ASYCUDA software for automating custom data assignments. A similar issue arises with the interface between ICD software and Customs' ASYCUDA software, where data flow is not fully functional. To improve operations, expanding interlinking between these systems to facilitate faster data exchange is needed, with a focus on "software automation" at both the ICD and Chittagong Port Authority.

A key challenge is the lack of export slots and designated storage space for export containers at the Chittagong Container Terminal (CCT) and New Mooring Terminal (NCT). The Chittagong port yard should ideally store containers before loading them onto vessels, but this process is not happening. The Chittagong Port Authority instructs ICDs to transport containers directly to the vessel hook, but other operational tasks cause delays. Additionally, when trucks return after unloading export containers to the depot or ICD, they must prepare for imported or empty containers. Importing or using empty containers for packing further prolongs the operational cycle, creating a significant challenge for ICDs in handling container operations. Respondents from CPA mentioned that despite the daily increase in operational costs and the rising freight rate, ICD charges remain constant which perhaps demotivates ICD's stakeholders, resulting in impacts on their operational activities.

A representative from the academic sector asserted that if the gate operation at Chittagong Port had been automated instead of manual handling of paper, the task could have been completed in 1 min instead of 5 min. Approximately 5000 trucks or covered vans arrive at Chittagong port where automation could boost efficiency by achieving paperless operations. As Bangladesh has only conducted infrastructure-related studies, a lot of in-depth study is required for operational ones. An example of operational inefficiency is the prolonged turnaround time for container ships at Chittagong port. A container ship's turnaround time is about three days, with an additional three days of waiting and 14 days of dwell time, plus 20 days before the container leaves the port's gate from the outer anchorage. The ship stays in the outer anchorage for two to three days. After berthing, unloading a 2000 TEU ship takes over three days. Furthermore, containers must wait 2–3 days at the CFS to receive a serial number after being moved from the berthing yard, and after arriving at the CFS, customs work begins. Automation could ease these processes, reduce delays and improve overall efficiency.

5.3. Legal Challenges

When interviewees were asked about the causes and consequences of the legal dispute over the ICDs. Some interviewees accused the presence of non-transparency, while others discussed the challenges associated with the lack of automation in customs work and the delays in paperwork. A representative of the only public ICD mentioned that they don't face any legal challenges.

A private ICD representative highlighted the lack of coordination between the port, customs and ICDs and stated the legal issues. Standard Operating Procedures (SOPs) can be resolved by improved coordination. If customs set a policy, the port should be involved. While customs provide shipping licenses to facilitate export and import operations, ICDs still need port authority approval to operate.

A freight forwarding agent considered the lack of professionalism in ICDs a legal challenge. Improved transparency and management would help suppliers to avoid penalties and additional costs. One of the senior interviewees, an academician, highlighted the lack of transparency among some businessmen, who have tendencies to over- and under-impose duties, misdeclare goods and manipulate weights, which disrupts customs' legal and operational procedures. As a result, Bangladesh's customs inspectors inspect more containers. As an example, the respondent stated that Gothenburg Port inspects approximately 1% of containers, Chittagong Port around 10–15% and Pangaon ICT nearly 100%. The centralized inspection method presents a significant legal challenge. A private ICD representative blamed exporters for legal issues, mainly for importing goods. When importers misdeclare goods and are caught red-handed, authorities should take the necessary legal action instead of delaying, which causes products to remain in warehouses for extended periods. This mismanagement reduces ICD productivity,

occupies space, damages products, contributes to pollution, and ultimately leads to the destruction of goods. Another legal challenge lies in the efficiency of customs procedures. Despite using software for a decade, ICD paperwork has not decreased. It was thought that software implementation by the Chittagong Port Authority would smooth the processes, but when an import container arrives at the gate, they are required to complete both the receipt paperwork and additional paperwork related to the operational software. Now, the port authority plans to change its software from CTMS to TOS (Terminal operating system). However, the ICDs recommend upgrading the operational software to reduce their paperwork.

A senior official from CPA stated that during the establishment of Chittagong Port, legal issues such as the ISPS code, MARPOL, and IMO guidelines were minimal to follow for individual matters, which no one can ignore. However, in the absence of clear guidelines, the competent authority occasionally imposes legal issues based on current circumstances. Private ICDs must consider external factors, including regulatory costs, which are unavoidable. When engaging with a port, ICDs must comply with both port and external authority regulations, such as customs laws. While legal issues are inevitable, they can sometimes be negotiated for flexibility to ensure compliance.

5.4. Location-Related Challenges

When asked about the challenges associated with private ICD locations, the interviewees highlighted the state of the roads. When the question was asked about the necessity of relocating, the majority of the interviewees concurred that the distance between the ICDs doesn't pose a problem, provided the road infrastructure is in excellent condition. By maintaining and managing in a planned way, the interviewees believe that location-related challenges would not be an issue, nor would there be a need for relocation.

The CEO of a private ICD highlighted hinterland connectivity as a key challenge. In other countries, ICDs are located 100–200 km from the port, yet efficient roads allow cargo trailers to cover that distance in just two hours. On the other hand, Bangladesh's ICDs, 3 or 5 km away from the port, take around 3 to 4 h due to poor road infrastructure. Thus, 100-km-away ICDs from the port are fine. The authority, or government, asserts that the 20 km within or outside the city are due to traffic congestion. Additionally, traffic jams occur due to both passenger and port vehicles using the same road, which worsens the issue. From Dhaka and other locations, thousands of trucks and covered vans arrive offshore. A freight forwarder also highlighted related challenges, pointing out that ICDs are often located far away from ports in neighboring countries. Moreover, the interviewee stated, "We cannot reduce the number of ICDs. However, we can reduce this problem by improving road conditions. During the rainy season and peak season, truck movement becomes even more difficult, which causes traffic congestion".

A private ICD representative identified that a cluster of ICDs in the Patenga area utilize Chittagong Airport Road, the city's busiest road, which prohibits heavy vehicles. As a result, the airport road experiences congestion almost all day and night, which reduces ICD productivity. A heavily trafficked port-connecting road serves only a few ICDs, while most lack dedicated routes to Chittagong Port. Despite rising trade, their area cannot be expanded due to location constraints. Investors hesitate to participate due to location issues, and new ICDs remain unestablished. Kamalapur ICD is in the middle of the capital Dhaka, so it has some unique challenges in moving containers. The Dhaka Metropolitan Police has banned trucks from 8 a.m. to 10 p.m. The restriction of only 10 h for entering or exiting trucks significantly hinders people's ability to work. Therefore, it is necessary to relocate the location to an area where trucks can operate continuously.

5.5. Safety and Security Issues

When interviewees were asked about the safety and security conditions at Kamalapur ICD. According to a senior representative of the freight forwarding industry, the conditions are not satisfactory. This area is a crime zone. Given the abundance of slums in this area, security is a constant concern. Crimes, including snatching, extortion, and the free movement of drug users, are the most common. This ICD's boundary wall does not even rise to a height of 18 feet. Rebuilding it to a higher height is necessary. Since there is a possibility of moving the Kamalapur ICD, the authorities have paused any actions related to this matter. We hope that the new location will eliminate the need for a complex wall or gate for security.

A private ICD CEO stated that they always face safety and security issues because there is some type of agreement with the USA about child labor. The overseas offices have consistently hindered their progress. However, the situation has been improving recently. The inability to determine the age of child laborers based on their appearance creates confusion. This scenario is changing because of challenges from the buyers, the shipping companies and the freight forwarders. In 2020, a team from USA TiPa (Trans-Pacific Safety) came to visit and

conducted a brief check. Most of the off-docks have security gadgets. Off-docks follow the regulations strictly, as it is a priority for the customers and the shipping lines, and as a result, very few accidents took place in that area.

Another interviewee from the freight forwarding profession raised concerns about accidents. Occasionally, equipment handling can sustain damage due to malfunctions or errors made by technicians or operators, which include theft from the ICD, malfunctioning of CCTV cameras, a lack of professionalism in management, poor equipment maintenance, and inadequate training for crane and forklift operators. This approach eliminates any potential safety or security-related issues. According to a private ICD CEO, the ICDs adhere to the CTPAT (Customs-Trade Partnership Against Terrorism). Additionally, to pass global security verification, the individual must take a test and achieve a minimum score of 85 in social complaints. Ports must manage security-related complaints. The Chittagong Port Authority manages a complaint issue known as the "ISPS code" (International Ship and Port Facility Security Code). According to this code, it must meet certain criteria. For example, the port's wall must be at least 12 feet tall and 3 feet wide with CCTV cameras, and there must be sufficient security personnel and regulatory compliance.

A CPA representative said that if the ICDs comply with IMO rules and regulations, such as the ISPS code and MARPOL convention, then they must follow the SOP (Standard Operating Procedure) to ensure the safety and security of private ICDs. Though ICD can avoid the industry's best practices, it cannot stop accidents fully, as equipment can malfunction or break at any time, and they need more safety gear. However, adhering to the appropriate rules and regulations can partially prevent incidents. During COVID-19, the port operated nonstop. He put the fire-related topic aside. Preventing fire hazards requires CO₂, extinguishers, and skilled personnel, but private ICDs lack these. Ignoring safety rules can lead to fatal accidents. Failure to follow safety and security rules can result in a fatal accident at any time.

5.6. External & Internal Competition of ICDs in Port Operations

Almost all respondents acknowledged that there is no conflict or competition between Chittagong Port and the private ICDs. CPA wants the ICDs to flourish or run smoothly. CPAs can extend their support to the level that the ICDs want from them. However, their readiness to fully utilize this support remains uncertain. Ports expect them to handle more containers, which requires an assessment of their capability. In this context, the CPA expects affirmative responses from the ICDs. During license applications, the CPA consistently recommends the need for additional private ICDs to alleviate and reduce congestion at Chittagong Port. Chittagong Ports always tries to fulfill the KPIs, like turnaround time (within 2 days), dwell time (within 7 days), and berth occupancy (within 65%). UNCTAD rules deem Chittagong Port to be in excellent standing. To enhance Chittagong Port's competitiveness with other subcontinent ports, it must adhere to the KPI within the specified limits.

An interviewee expressed that the Kamalapur ICD, which is located in Dhaka and rail-based, faces competition with road transport. He stated that road transportation is a key competitive advantage for Kamalapur ICD. The user decides how to transport the product from Chittagong port to Kamalapur ICD. Though multimodal transport includes sea, rail, and road, the majority of the goods come by rail, so even after that, road transport remains. In truck rental, distance is not a factor, though closeness to the bypass road around Dhaka would be advantageous. Importers primarily transport commercial and diplomatic goods to Kamalapur, while many take products directly from Chittagong port via road transport. This results in a competitive market where both road and rail connectivity enhance Kamalapur ICD's competitiveness.

Respondents from a private ICD also gave the same statement. The sole government ICD, Kamalapur ICD in Dhaka, manages a relatively small volume of goods without any competition between the government and the private ICD sector, including the Chittagong port and the ICDs. The market lacks sufficient product volume to match the capacity of the ICDs, increasing the operational expenses as all ICDs desire to compete for it among themselves whenever a product enters the market. This forces the ICD authority to lower the price, which decreases their profit margin and maintains the anticipated standard.

Another private ICD representative said that the real competition hasn't started yet. The government doesn't have an offshore dock, but it has Pangaon ICT (Inland Container Terminal), which is an unpopular choice due to its high cost. Additionally, fewer vessel port calls and safety concerns exist in Pangaon. Though private off-docks and port yards exist in Chittagong, a direct comparison is not possible. Stuffing/unstuffing is not standard practice within the port in modern terminal mechanism. But still the customer's preference for ports over offshore docks stems from the cost factor, which presents another challenge, as offshore prices are typically higher than port charges. Most customers mention that they expect 65 allowable import commodities to leave the off-docks. In practice, importers take delivery from ports because it's cheaper. Allowing foreign companies to invest is crucial for real competition. The quality of the offshore docks will naturally improve as a result of the technological transfer.

6. Discussion

From the institutional perspective, the problems of ICDs in Bangladesh are not only operational or technical issues; rather they are indicative of an institutional environment which is underdeveloped and fragmented. DiMaggio & Powell [29] contended that pressures are more onerous for organizations in weak or conflicting institutional contexts, which make it more difficult for them to function efficiently and to solicit investment. This proposition is strongly supported by the findings of this study.

Each of the three pillars of institutional theory (regulatory, normative and cognitive) is clearly involved in the ICD challenges that have been identified. Regulatory fragmentation, most obviously through the policy clash between the NBR in 1998 and the Ministry of Shipping in 2016, represents institutional uncertainty which reduces investment and adds to operational uncertainty. There are compliance costs associated with private ICDs under the international standards (ISPS, MARPOL, CTPAT) that are not matched by government counterparts. Cognitively, for national export containers, where 92% are handled by ICDs, the recognition of the contribution of ICDs is still very limited. And this is a persistent institutional blind spot among policymakers, which has led to no government incentives for the sector. Bridging these gaps with infrastructure investment and operational reforms are not sufficient; institutional change is needed, such as regulatory harmonization, development of incentive policies, and the definition of ICDs as strategic national assets, as opposed to peripheral logistics facilities.

The insights gained from the interviews are broadly consistent with the problems highlighted in the international books and papers on ICD and dry port development and reveal some new aspects of the problems in Bangladesh which had not been fully documented in previous studies.

Infrastructure issues were the most common problem identified and in line with Adejumo [2] and Jeevan et al. [5] who reported inadequate road networks, equipment shortages and limited hinterland connectivity as being the main infrastructure problems in Nigeria and Malaysia respectively. Similar empirical evidence in Bangladesh has been documented by Chowdhury et al. [30], who showed that equipment capacity, manpower, yard space and proximity to seaports significantly affect operational efficiency at dry ports. However, the Bangladesh context, has a unique factor to encourage neither new investment nor capacity expansion in the form of an affordability barrier due to the country's 9% bank loan interest rate and the minimum land requirement of 10–25 acres under the policy of 2016. This financial constraint is not well highlighted in the literature of existing ICDs and is a context-specific finding which could be a policy consideration.

In terms of operation, poor yard management and inadequate automation are cited as key weaknesses [23]. Bangladesh case presents a distinct structural challenge. Unlike many countries where a substantial share of container stuffing and unstuffing is performed at ICDs, a substantial portion of stuffing and unstuffing still occurs within port premises rather than being fully shifted to ICDs. It results in a persistent empty container imbalance of 30–40% at the ICDs and affects the efficiency of their operation. Further, the fact that there remains a one-way interface between ICD software and CPA's CTMS system and between Customs' ASYCUDA system, is also a Bangladesh-specific operational constraint that hampers the overall efficiency of the system.

Bureaucracy in customs procedures and regulatory inconsistency are common ICD challenges in Tanzania, according to Eliakunda et al. [24] on legal and regulatory issues. This is echoed in the Bangladesh results but also adds a second twist: the NBR policy of 1998 and the Ministry of Shipping policy of 2016 have conflicting elements, with no single body in Bangladesh having taken responsibility to bring the two frameworks together. This inter-agency policy conflict is a special case of Bangladeshi governance problem which has not been covered in the literature. In addition, the very high container inspection rate at Pangaon ICT (almost 100%) compared to other international port statistics like Gothenburg port (1%) and Chittagong port (10–15%) is indicative of a systemic transparency problem, which has its heavy operational cost.

The findings of this study are broadly consistent with the existing literature while also extending it through context-specific evidence from Bangladesh. Poor hinterland connectivity and close proximity to congested urban areas have been recognized as a major challenge in the development of an ICD by Jeevan et al. [2]. An important finding from the Bangladesh case is that the interviewees repeatedly stated that physical separation from the port is not a concern; it is instead the condition of the roads. The ICDs situated 3–5 km from Chittagong port have to take 3–4 h as the roads are not well developed, while those situated 100–200 km in other countries take 2 h as the roads are well developed. This insight is a paradigm shift from the conventional notion that being near ports is a positive attribute to the location of ICDs and holds important implications for future ICD location policy in Bangladesh.

The interviews validated safety and security issues revealed by literature search such as poor perimeter security, cargo theft and fire safety issues [5,25]. The Bangladesh situation also brings up child labor issues at private ICDs, due to the challenges involved in age verification, and has been subject to investigation by

international buyers and shipping companies. This is an important risk to reputation, especially for a country like Bangladesh, which is highly dependent on export-oriented industries, and is not mentioned in the ICD literature.

Last but not least, the CPA vs BICDA controversy over ROI is important because it represents a core structural conflict in the ICD industry in Bangladesh. As the Bangladesh ICDs account for almost 92% of the country's total export volume and have invested almost 500 crore Bangladeshi taka, they argued that their returns are still poor and they are not attractive to investors. The CPA, on the other hand, emphasized the handling of more than 3 million TEUs in FY21, as a sign of good performance. This split indicates two different measures of success which is volume throughput versus profitability and indicates that the sector's investment sustainability will be threatened in the long term, regardless of their size, if they do not implement pricing reforms and receive government incentives. This tension is lacking in the current literature, and one of the most policy-relevant results of this research.

7. Conclusions and Recommendations

The findings of this study have included the difficulties encountered by Inland Container Depots (ICDs) in Bangladesh based on the semi-structured interviews with eleven industry professionals of four informant groups. Based on thematic analysis, the data were organized into six challenge categories: infrastructure, operations, legal, location, safety and security and external and internal competition. The results confirmed and brought to light several Bangladesh specific issues not documented in the literature. In addition to the prohibitively high land acquisition cost and the requirement of minimum land, the bank loan interest rate in Bangladesh is not highlighted in the literature as an entry barrier for infrastructure development. Moreover, the continued practice of stuffing and unstuffing within port premises, although ICDs handle these activities for selected cargo flows, creates a significant imbalance in empty container availability. It also limits interoperability among ICD, Customs and port information systems, resulting in inefficiencies in cargo processing and information exchange. The conflicting provisions between the NBR policy 1998 and the policy of the Ministry of Shipping, 2016, along with a nearly 100% container inspection at Pangaon ICT, create significant inefficiencies which are not seen in the comparative literature. The most surprising result of the study is that the road quality is more important than the distance to the port, which contradicts the common assumption about the location of ports. Child labour risks also add to the safety and security risks, providing reputational risk to export companies. Lastly, the CPA-BICDA debate on ROI (volumetric throughput vs profitability) shows that there is a basic structure imbalance that could compromise the sector's long-term investment viability.

Policy recommendations. Based on these findings, this study offers the following concrete recommendations for policymakers and industry stakeholders:

- (1) Establish a unified ICD regulatory framework by harmonizing existing policies, improving coordination among relevant authorities, and implementing standardized operating procedures to ensure efficient and consistent ICD operations.
- (2) Introduce government incentives (tax benefits, subsidies, low-interest loans, and import duty reductions on cargo handling equipment) to promote ICD development and attract private investment.
- (3) Strengthen road and rail connectivity by developing dedicated freight corridors linking Chattogram Port with ICDs, including rail-based ICD integration to reduce congestion and delays.
- (4) Expand ICD capacity by setting up new depots near the industry center like Dhaka, Gazipur, and Narayanganj, while upgrading existing ICDs through land expansion and vertical storage.
- (5) Implement paperless gate operations and EDI, integrate ICD systems with CPA and customs ASYCUDA, and enable real-time tracking with automated yard management for seamless cargo flow and visibility.
- (6) Permit a wider range of import commodities for unstuffing at ICDs and shift operations from ports to enhance ICD utilization.
- (7) Strengthen Human Resource Development by introducing specialized training programs for ICD managers, operators, and customs personnel, focusing on automation, logistics management, safety, and regulatory compliance to build local capacity and reduce reliance on foreign experts.
- (8) Implement automated, risk-based customs clearance and strengthen real-time coordination among Customs, CPA, NBR, and ICD operators through integrated digital systems to ensure faster, transparent, and compliant cargo processing.
- (9) Strengthen ICD safety and security through modern surveillance, fire safety systems, and strict enforcement of international standards (ISPS, MARPOL, CTPAT), while ensuring occupational safety and eliminating non-compliance such as child labor.

Limitations and Future Research

This study has some limitations. The 11 interviews were adequate for thematic saturation but were limited due to time and resources and do not represent all stakeholder voices in each of the 21 ICDs. The study also focuses on the geographical aspect, including ICDs based in Chittagong, and the only exception is Kamalapur ICD which is based in Dhaka. Future research on the economic impact of ICD capacity enhancement on trade performance in Bangladesh, comparative study among dry port system in other developing countries like Vietnam, Nigeria and Sri Lanka and feasibility and cost-benefit of shifting the site of Kamalapur ICD from the Dhaka city center to a more strategically suitable location outside the city center should be explored.

Author Contributions

M.M.A.S.: Conceptualization, methodology, investigation, data collection, data curation, formal analysis, visualization, supervision and writing—original draft preparation. H.R.A.: Conceptualization, methodology, formal analysis, validation and writing—review and editing. Both authors interpreted the findings, revised the manuscript, approved the final version and accept responsibility for the work. Both authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.

Appendix A

Table A1. Interview participants.

Respondent	Role/Designation	Field of Expertise/Organization	Years of Experience
R-1	Professor/Researcher	Academia	8
R-2	Professor/Researcher	Academia	6
R-3	Professor/Researcher	Academia	7
R-4	Senior Freight Forwarder	Freight Forwarder	10
R-5	Freight Forwarding Agent	Freight Forwarder	8
R-6	CEO/Senior Official	ICD official	14
R-7	ICD Operations Manager	ICD official	8
R-8	ICD Representative	ICD official	9
R-9	Senior Official	Port Official	20
R-10	Port Representative	Port Official	5
R-11	Port Official	Port Official	9

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