Import Clearance Digitalization and Socioeconomic Development: The Case of Ghana

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Abstract

The purpose of this study is to understand how import clearance digitalization can impact socioeconomic development in developing country context. Port digitalization has become important because it can be used by the governments in developing countries to support socioeconomic development. A growing body of research on port systems exists, however, this has focused more on implementation and use with less attention on socioeconomic impact. Given this gap, this paper employs qualitative interpretive case study as the methodology to investigate import clearance digitalization in Ghana. The findings show that import clearance digitalization can help improve efficiency in customs clearance, increase government revenue and reduce port-related corruption.

Keywords

Import clearance, digitalization, socioeconomic, boundary object theory, Ghana, developing country.

Introduction

The purpose of this study is to understand how import clearance digitalization can impact socioeconomic development in developing country context. Digitalization is a process of migrating physical activities and related documents from offline to online platforms (Fichman et al., 2014; Piccinini et al., 2015). For this study, digitalization means migration from paper-based activities to online activities on digital platforms. Import clearance digitalization has benefits and challenges. The benefits include online collaboration among actors (Carlan, Sys, & Vaneelslander, 2016). Commonly cited challenges in developing countries include high costs (Liu, 2012). Digitalization is a well-researched subject in Information Systems (Haraldson, 2015; Schmidt, Drews, & Schirmer, 2017). Information Systems (IS) research on port digitalization has focused more on implementation and use (Bergqvist & Egels-Zandén, 2012; Negi & Brohman, 2015) and less on socioeconomic impact. Therefore, to fill this gap, the research question that motivates this study is how does import clearance digitalization impact a seaport, actor groups and the economy in a developing country? To address this question, the study employs boundary object theory (Star & Griesemer, 1989) as the analytical lens and qualitative, interpretive case study as the methodology (Walsham, 1995, 2006) to gain rich insight into import clearance digitalization in Ghana.

The remaining part of the paper is structured as follows: The next section, reviews literature on digitalization and port systems. The subsequent two sections present the theoretical foundation and the research methodology. The case description follows. The section after present the case analysis. The discussions follow. The final section presents the conclusion.
Digitalization and Port Systems

Digitalization creates an opportunity to use digital technologies to increase efficiency and seamlessly connect activities of people, companies, public agencies and non-governmental organizations (Stephens, 2004). Although often used interchangeably with digitization (as well as with digital transformation), digitalization is distinguished from digitization, that is the technical process of converting paper documents into digital form. The term digitalization describes the various sociotechnical phenomena and processes of adopting and using these technologies in broader individual, organizational, and societal contexts (Legner et al., 2017). Digitalization involves the migration from physical to online platforms (Bharadwaj et al., 2013) and creates further opportunities to engage in research collaborations with industry (Legner et al., 2017). A number of organizational benefits of digitalization have been discussed in the IS literature (Beimborn, Miletzki, & Wenzel, 2011; Bharadwaj et al., 2013). These benefits include making processes more tailored, flexible and responsive (Fichman et al., 2014). In relation to documents, digitalization offers an opportunity for large storage, multiple copying and quick transmission of e-documents at lower cost and faster speed (Fichman et al., 2014) compared to physical documents. Moreover, digitalization promotes modernization and participation in online services (Schuppan, 2009). In addition, it enhances human capability to search, analyze and correct e-documents (Fichman et al., 2014). Other benefits include the opportunity for online information sharing and tracking (Fichman et al., 2014; Schuppan, 2009).

In relation to the seaports, digitalization involves the conversion of traditional, bureaucratic and paper-based processes onto digital platforms (Janssen & Estevez, 2013). The benefits brought by the digitalization of administrative procedures include minimizing document processing time, faster exchange of information, reduced number of errors due to single data entry, minimized the cost of documents transfer and increased information accuracy (Carlan et al., 2016). Port actors include terminal operators, freight forwarders, customs and port authorities (Srour et al., 2008). These actor groups actively coordinate (Heilig, Schwarze, and Voß, 2017) and comply with legal procedures and information flows (Carlan, Sys, & Vanelslander, 2015) for cargo clearance.

In developing countries, import clearance digitalization is pursued to achieve socioeconomic development (Palvia, Baqir, & Nemati, 2015). Socioeconomic development can be defined as a process of change or improvements in social and economic conditions as they relate to an individual, an organization, or a whole country (Roztoccki & Weistroffer, 2016). Socioeconomic development in a developing nation involves a number of stakeholders. These stakeholders include the government and governmental agencies; private firms; investors; and, ultimately, the citizens of the country (Palvia et al., 2015). So far, studies on the digitalization have focused management level and users’ perspective revealing challenges needed for reorganization and improvement of processes, operations, structures and IT systems (Schmidt, Drews, & Schirmer, 2017; Henriette et al., 2016). IS also have an important impact transparency and responsiveness of governmental agencies and individuals (Palvia et al., 2015). Despite these insights from IS literature, there is still limited research on digitalization’s impact the port, actor groups and economy in developing countries. Therefore, there is a need for research on import clearance digitalization and socioeconomic development.

Theoretical Foundation: Boundary Object

The theoretical foundation for this study is boundary object (Star & Griesemer, 1989). The theory was originally developed to understand how heterogeneous actor groups with diverse interests collaborate and share different views (Star and Griesemer, 1989). The fundamental concepts of the theory are boundary object, actors, and their interactions. Boundary object (BO) refers to objects that can adapt to local needs and constraints of actor groups yet robust enough to maintain a common identity (Star & Griesemer, 1989). Actors are stakeholder groups who interact with a BO. Interaction refers to contacts or viewpoint of the BO. In this study, boundary object refers to the import clearance system, while actor groups are the different stakeholders who interact with the import clearance system.

Among the key principles of the theory are that: (1) boundary objects have common identities and local features; (2) different stakeholders have divergent viewpoints about boundary objects; (3) boundary objects are dynamic. The theory of boundary object has been applied in IS research to investigate varied phenomena (Rehm & Goel, 2013). Examples include: (i) an examination of the process of innovation and knowledge sharing (Kimble, Grenier, & Goglio, 2010), (ii) the role of objects in problem solving.
collaboration (Franco, 2013), (iii) an analysis of obstacles to knowledge sharing (Chouikha & Dakhli, 2015) and (iv) in investigating platform governance (Ghazawneh & Henfridsson, 2010). BO is a useful concept to understand the coordinative role of technology in practice. Import clearance systems involve multiple actor groups with different objectives. The theory is therefore considered appropriate for this research as it offers rich concepts and principles for understanding import clearance systems, as a boundary object.

Research Setting and Methodology

The study was conducted at the Tema Port in Ghana, a Sub-Saharan African country. This port was selected because it had recently gone through digitalization. The methodology of the study was based on an interpretive qualitative case study (Walsham, 1995; 2006). Interpretive studies seek to understand phenomena through the meanings that people assign to them (Myers, 1997). An interpretive method of research in IS aim at understanding the context of the information system, and the process by which the information system influences and is influenced by the context (Walsham, 1993). Data collection occurred over a period of four months, from September 2017 to January 2018. We collected data from multiple data sources including interviews, observations, field notes, and documentary materials (Myers, 1999).

The interview guide was semi-structured (Myers & Newman, 2007). The interview sessions lasted between 30 minutes and 1 hour. Ten participants were interviewed: chief revenue officers of customs (3); clearing agents (2); importers (2), port authorities (3). Some of the interview sessions were audio recorded, subject to the informed consent of the interviewee. Interviews were subsequently transcribed for more detailed analysis. Initial data analysis occurred alongside data collection (Walsham, 2006) and based on Hermeneutics cycle (Myers and Klein, 2011). In line with interpretive tradition, data analysis took place concurrently with the data collection (Walsham, 2006). The data analysis was aided by boundary object theory concepts of boundary objects, actors, and their interactions to analyze the case findings.

Case Description

Background

The case study concerns Tema port in Ghana. The Port of Tema is the bigger of the two seaports in Ghana. It spans a land area of 3.9 million square meters and is flanked by an industrial city. The port receives an average of over 1,650 vessels calls per year. Import clearance at the port involves interactions between port authorities, clearing agents (working on behalf of the importer) and customs. In the past, these processes were largely manual. The Ghana Community Network Services Limited (GCNet), is an e-Solutions provider to the Government, developed and deployed the Ghana Customs Management System (GCMS) for clearing of goods at ports. In collaboration with the Customs Division of the Ghana Revenue Authority (GRA), GCNet deployed the paperless clearing system at the Tema Port.

Pre-Digitalization

1.Clearing Agent submit paper documents to port authorities & customs
2.Customs validate paper documents and manually calculate duties payable
3.Clearing agent goes to the bank with paper documents to pay duty and paper receipt issued
4.Clearing agent sends receipt to customs
5.Shipping line stamp on documents to release cargo to port authorities
6.Customs & Clearing agent physically examine cargo
7.Custon releases cargo to Clearing agent

Figure 1: Pre-digitalization Import Clearance Process

Figure 1 shows a diagrammatic representation of the pre-digitalization era, characterized by manual processes and paper records. This caused delays, inaccuracies, and high costs. An importer observed:
Customs control documents were paper-based resulting in slow data processing, corruption and error-prone.

As a result of the paper-based system, the Government of Ghana annually suffered huge revenue losses. This situation affects the nation’s ability to meet revenue generation targets for the socio-economic development of the nation. A senior government official stated that:

*The system’s inefficiencies enabled private profiteering. It created an informal, nontransparent facilitation economy by demand and supply for efficient service. Thus, customs, for several years, had been counted among the most corrupt bureaucracies in Ghana.*

Prior to digitalization, import clearance was cumbersome and involved many agencies and outdated custom examination procedures. An importer expressed his frustration about the clearing procedures at the port as:

*involvement of too many agencies leads to complexity and subsequently, an obstacle for a swift clearance of goods ..... requirement standard and regulations of different parties mean the administrative process becomes cumbersome, long as the clearing process relies on human interface who have varied interests.*

The processes were delayed mainly due to paper-based documents requirements. It was time-consuming, burdensome and prone to petty and arbitrary charges. Cargo clearance activities for a first-time importer was the obtainment of tax identification number (TIN) from Ghana Revenue Service. The importer appointed a licensed Customs House Agent (Clearing Agent) of credible reputation and hands over import documents to execute the clearing on their behalf. The main stages of the clearance process were: valuation of cargo, declaration, payments of duty and other relevant charges, verification, and release of cargo by shipping line. The commander of customs at Tema Port explained that:

*The clearance process starts with the valuation of cargo at the destination inspection company offices in Tema. Here, the Final Classification and Valuation Report (FCVR) was issued.*

The FCVR provide the importer with the assessed amount of duties and taxes to be paid. It also shows how fast clearance process moves. A green channel is a low risk, yellow identified as potentially high-risk and red as high-risk. Red is subjected to physical inspection on a random basis by customs. The declaration is validated and the entries of the declaration sent to the front end of the declarant. A validated customs declaration indicated taxes and tariffs payable and the name of the customs officer assigned for verification. Import clearance is complete after payments were made and goods released by customs.

**Digitalization**

The main objective of digitalization is bringing stakeholders at a virtual table for coordination and interactions. The GCNet provided a TradeNet and Ghana Customs Management System (GCMS) and operate the data centers for the systems. The company deployed the TradeNet system as the Single Window platform for all parties accessing the GCMS. The system ensures a secure and seamless electronic process of documents to promote paperless transaction to deepen the Single Window concept. The platform operates in accordance with international best practices and the World Customs Organization (WCO) standards.

*The platform includes electronic declarations, permits, licenses and exemptions and processing paperless customs operations, electronic payment of duties, taxes, and fees. The platform also houses an integrated shipping line, port operations, bookings and delivery orders as well as inspection booking systems and joint examination and scanning operations ....* (Director of Ports)

It establishes a neutral and open electronic platform with the intelligent and secure exchange of e-documents between public and private stakeholders. This improves efficiency and competitive position of port community members. The director of Tema Port explained that:
The looming challenges of the future make it vital for port administrations to consider intelligent handling methods. Manual and semi-manual methods of goods clearing are totally inadequate in dealing with the current challenges and would ultimately collapse.

In 2017, the new Government of Ghana decided to fully digitalize the Tema Port systems with the intention to make it paperless. A senior customs’ officer observed:

There was a desperate need for a paperless clearance system to streamline and eliminate unnecessary and bureaucratic processes to improve revenue generation.

Among the major objectives of the paperless port are increased turnover, efficiency, competitiveness, improved ranking on World Bank ease of doing business and in the World Economic Forum’s Global Competitive Report. Further objectives are and reduce clearance charges leading to savings to importers and operators. The customs management function constitutes the main components of the Ghana Single Window system. In terms of technology deployed, there is an Advanced Interactive Executive (AIX) operating system and an Oracle database used by customs to perform all necessary procedures.

The new system ensures import clearance without the need for distributing physical paper documents. The digitalization project was considered as part of measures to cut out human interference, inefficiencies, and malfeasance which was associated with the paper-based system. As part of the transition to web-based import clearing process, some selected clearing agents, customs and officials of the port authorities were trained to serve as trainers of trainers, advocates and change management champions. They were expected to transfer the acquired skills and knowledge to end-users in their respective local units. In addition, a team of advocates of the project was formed with members from the various participating units; their role was to promote the benefits of the new digital software and motivate its use throughout the clearing process.

The Ghana Integrated Cargo Clearance System (GICCS) platform, a single window portal houses the manifest, declaration and logistics modules. The main modules in GICCS include allowing the submission of cargo manifest for customs purposes and approval. Clearing agents use this module for the lodgment of consolidated cargo documents. The module also caters for the amendment of cargo manifest by parties and its approval by customs. The declaration module allows for online submission of customs declarations 24/7 by registered declarants to customs.

**Post Digitalization (Paperless port)**

| 1. Clearing Agent submits documents online | 2. Port Authorities, Customs and shipping lines access information on cargo | 3. Port system electronically generate and send duties payable to Clearing Agent | 4. Clearing Agent pays duty online and instantly receives cargo release notification |

Figure 2: Post digitalization Import Clearance Process

Figure 2 shows a diagrammatic representation of the post-digitalization era, characterized by electronic and online records. The full implementation of import clearance digitalization was the paperless port. The system was designed to enable electronic processing of customs clearance documents, calculation of duties and taxes payable and data collection on Ghana's imports and exports. In 2017, the paperless port clearing process was used for the first time.

> the paperless port allows centralization of steps in the clearance process and served a dual purpose of facilitating trade and supporting Government of Ghana’s revenue mobilization (a senior customs officer reflected).

Digitalization facilitates legitimate trade and clearance of goods in a secured manner and enhanced mobilization of trade-related revenue for socioeconomic development. Digitalization of import clearance has reduced malpractices associated with the old paper-based import clearance regime. In addition, transaction costs and delays were expected to significantly reduced.

While the paperless system is to eliminate fraud and facilitate speedy clearance of goods, the alleged submission of fake invoices is still delaying the process at the Tema Port,
leading to protracted agitations among agents since the system officially went live September 4, 2017 (a deputy Minister of Finance).

The new process begins when the importer obtains a complete IDF (import declaration form) by submitting the supplier’s invoice online through the GCNET system. The IDF form with the final documents is electronically transmitted to the customs’ Pre-Arrival Assessment Reporting (PAAR) system. The documents are reviewed, verified and validated for completeness and accuracy. If all documents are compliant and accepted, the transaction is moved to the next phase of valuation and classification. Otherwise, it is referred or rejected. Customs through PAAR submits a summary of documents online to the importer for “validation” or “declaration”, highlighting the data anomalies. The importer reviews documents and data elements and makes amendments before re-submitting reviewed document to Customs through PAAR.

Post digitalization benefits include a more accurate and increased collection of duty and taxes; improve efficiency, quality of service, transparency, and consistency. Digitalization has reduced incidents of corruption and the need for physical examination. Paperless has eliminated all the manual steps and gain better accuracy. (a senior custom’s officer)

Despite the above benefits brought by import clearance digitalization, challenges have been experienced. Some of these challenges include customs administrations need to maintain data integrity by working closely with the private sector and other government agencies. For instance, the documents sighted show some selected imports indicated three 20-footer containers of steel plates, used for manufacturing gas cylinders and one 40-footer container, all weighing 107.52 tons, were valued at $4,839.90 per container, but the system determined the actual value to be $66,662.40.

**Case Analysis**

From the case description, the paperless port system is a digital platform considered as a boundary object. The paperless system has common and local features viewed and used by the various actor groups. The actor groups are the customs, clearing agents/importers and port authorities. The expectations of customs were revenue mobilization using customs management systems, profile and classification and evaluation functions. Importers and agents in their quest to declare lower values for imports in order to beat down duties payable. They conceived their own means of generating their invoices locally. These invoices were often presented to replace the genuine documents. The clearing agent (importer) expect to obtain faster and cheaper process charges for the clearance of goods. The port authority’s expectations are for assessment and handling of imported goods.

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<tr>
<th>Common features</th>
<th>Local features</th>
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<tr>
<td><strong>Customs</strong></td>
<td><strong>Clearing Agents (importers)</strong></td>
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<tr>
<td>Web-based Secure channeled access Support electronic data interchange (EDI)</td>
<td>Customs Management function Profile Management function Customs classification and valuation function</td>
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Table 1. Common and local features of the paperless port system

Table 1 is a summary of the common and the local features of the paperless port system. The next sections detail how import clearance digitalization impacts the customs, clearing agents and importers and the port authorities.

The key principles of boundary object used in this analysis are (1) boundary objects have common and local features to meet divergent view; (2) different stakeholders have divergent viewpoints about boundary objects; (3) boundary objects are dynamic. The concepts of boundary object, actors, and their interactions...
Import Clearance Digitalization and Socioeconomic Development

were used to analyze the case findings. The paperless port is identified as the boundary object, the actors are customs, clearing agents (importers) and the GHPA (the port authority).

**Common features and use**

The common features of the paperless port are that: (1) it is a web-based platform (2) it has secured access and (3) it supports electronic data interchange. As a web-based platform, the paperless port simplifies and optimizes import clearance procedures. Declarant prepares and submits pre-arrival entries through a secured access channel. The shipping submits manifest used by the importer to prepare final declaration submission. Compliance officer vets the document and sends for examination through the electronic data interchange, EDI. Shipping line then releases the consignment after receiving payment of charges. An examination officer schedules date and time for examination. Joint examinations are done before the terminal operator releases consignment to the importer.

The system is interactive and tailored to meet needs of actors while delivering fast, efficient and accessible services to the importers, clearing agents, customs, and port authorities online. The new system has eliminated bureaucratic and corrupt practices hitherto associated with clearance. This has help plug revenue leakage resulting from connivance of some customs officers and clearing agents. the paperless port support (EDI). EDI aims to reduce cycle time and replace physical documents with e-documents to increased productivity. The paperless system is a more expedient way to communicate and process important data for goods clearance. In terms of interactions, customs, clearing agents and port authorities exchange information towards successful import clearance procedures and increase revenue generation.

**Local features and use**

The customs management, profile management and customs classification and valuation functions are local features of the paperless system. The customs management functionality is used by customs to check the submission of electronic manifests, entries, payment of duties confirmed electronically by banks and sharing of files by customs officials. It also allows the transferring of electronic messages between Customs and Importers, thus, enhancing and facilitating import clearance procedures. The out of these interactions result in a reduction of clearance time from three weeks to at most three days.

The profile management function classifies risk levels of imported goods. The outcome is the consistency and predictability in the application of rules and procedures for classifying goods into green, yellow or red for physical examinations before clearance. Green profile indicate that goods can be cleared without physical examination, yellow may be inspected per the discretion of the custom and red is given random physical inspections. The classification and valuation functions are used by customs to generate classifications and valuation reports (CCVR) issued electronically and transmitted seamlessly to all relevant agencies /systems. Clearing agents, acting on behalf of importers interact with the paperless system using the online submission and payment functions. Importer/agent submits a request electronically to the shipping lines for delivery of the consignment with the original electronic bill of lading. Importer presents the bill of lading to the shipping line to confirm title to goods (legally required to be paper). The Ghana Harbors and Ports Authority (GHPA) use the paperless system through the cargo clearance functionality. The port authority also uses pre-arrival assessment reporting and the pre-arrival assessment functionalities. These functions are used by customs to calculate import duties and other taxes and levies. The online payments and documents submission functions used by clearing agents (importers) to pay and submit import clearance e-documents. Port authorities use the cargo clearance and pre-arrival assessment reporting functionalities to ensure proper handling of import clearance processes.

**Discussion of findings**

The purpose of this study was to understand the socio-economic impact of import clearance digitalization on a seaport, actor groups and the economy in a developing country. This study has sought to achieve this purpose by explaining socio-economic impact as an outcome which emerges from the interaction between a paperless port information system and its related actors. It is worth noting that a paperless port system is a technology-based artifact which can generate organizational-level benefits (and undesirable consequences) such as access to information resources (Matook & Brown, 2017). From the case study, there is an increase in revenues which the state can use to fund its development agenda and budget. Despite this
potential and in light of this study’s purpose, the various observed outcomes emerging from the interactions between actors and the boundary object identified in the case study raise interesting issues for discussion.

It was noted that the different actors may have different assumptions, motivations, and goals for interacting with the paperless port system. These goals may be incongruent with each other. For instance, whilst importers may seek to clear their goods at minimal cost, customs officials may also be working to achieve set revenue targets, albeit using permissible means. Before the paperless regime, such means were somewhat obscure, leading to the perception that some port officials were corrupt. The advent of the paperless port system is a good attempt to harmonize and organize all these disparate interests so that various actors could achieve their goals within acceptable limits. Nevertheless, system owners, especially the government, should be mindful of port officials who may have selfish ambitions. Some may consistently probe the new system to identify loopholes to exploit in their personal interests. Socioeconomic impact of import clearance digitalization on port authority, clearing agents and importers and customs raise interesting findings for discussion.

**Impact of digitalization on the Port Authority**

From the analysis, import clearance digitalization enabled the port authority to weed out unauthorized persons, operating as clearing agents at the port. Transparency, consistency, and non-discrimination are features of the system. This has brought the port to international best practices. Automation and use of internationally accepted procedures at the port link the port to others in terms of standard and universality. Digitalization help improved collaboration and efficiency of port activities. This has attracted neighboring landlocked counties who use the port as transit. The impact on port authority is the increase volume of trade leading to higher revenue generation.

**Impact of digitalization on Clearing Agents and Importers**

The clearing agents, acting on behalf of importers have benefits and challenges. The agents who are subordinate to the port authorities and state regulators comply with a specific sequence of procedures for import clearance (Carlan et al., 2015). Challenges include technological deficiencies and cost of training and retooling. The study shows that efficiency and effectiveness in the clearing of goods have significantly improved. Customs processes for the import and export of goods are performed electronically (Schuppan, 2009) through the Ghana Single Window platform that facilitates the exchange of information between the stakeholders. The platform reduces the need for data to be entered multiple times – instead, it can be exchanged and re-used electronically, achieving faster, more accurate results and improving the ease of compliance with Government of Ghana requirements.

The swiftness and reduced congestion translate into savings for clearing agents. The challenges associated with the clearing of imported goods have been overcome by a fully integrated port management system. The paper-based system contributed to the cumbersome clearing procedures affirmed by respondents during the study. For instance, clearing procedures could extend to many days while they spent high amounts of money trying to circumvent the complex procedures.

**Impact of digitalization on customs**

In Ghana, the primary tasks of customs are to the facilitation of legitimate clearance of goods at the port, implementation of government policies, revenue collection from import tariffs and taxes, protection against terrorist activities and, enforcement of restrictions on imports of particular commodities (Widdowson, 2007). Import clearance digitalization requires a strong relationship between the port, actor groups (public and private) and customs. In fact, it fast-tracks the information flows from these different stakeholders through all the phases, starting from the steps preceding the arrival of goods to the final processes of transporting them out of the port. The paperless port has enabled customs to change from what has been historically the most rigid, bureaucratic institutions using archaic systems and technology-averse, to those employing and embracing cutting-edge technologies. Customs’ commitment to service quality to embrace the paperless concept and destination inspection services have contributed greatly to improving cargo clearance times.
Conclusion

The purpose of this study was to understand how import clearance digitalization can impact socioeconomic development in developing country context. The originality of the paper lies in its focus on the impact of import clearance digitalization on socioeconomic development. The findings show that import clearance digitalization can improve efficiency in customs clearance, increase government revenue and reduce port-related corruption. The findings have implications for research, practice, and policy. For research, boundary object theory is considered useful for studying digitalization phenomena involving heterogeneous actor groups. For practice, digitalization can significantly help streamline import clearing processes. For policy, port digitalization can help reduce corruption and increase revenue. The study is limited as a single case study in one developing country. However, from an interpretive perspective, the findings are applicable to other developing countries with similar settings. Future research can focus on export digitalization.

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import clearance digitalization and socioeconomic development


