Institutional pressures and mindful IT management: The case of a container terminal in China

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1. Introduction

The emergence of global supply chains and the trend towards global outsourcing have put pressures on the transportation industry, especially on container port operators and authorities, around the world. The vigorous growth in global trade has prompted port authorities to expand their container handling capacity and develop new ports. Due to rapid economic development in China since the 1980s, capacity expansion has been a major issue. The growing number of manufacturing plants in the Pearl River Delta (PRD) required an efficient transportation system to satisfy its increased needs.

Prior research on the use of IT for container terminal operations focused on IT development and the management practices that are critical to leveraging IT for operations [5]. Most of these studies focused on the adoption of IT and its contribution to port operations performance, but a few explored the institutional pressures that affected the organizational IT management (ITM) [7,9]. Fewer studies investigated how ITM can improve the development of IT in meeting the institutional pressures faced by container terminals. IT development is not only affected by the operational needs of container terminals but also by the operations of its external entities (customers, competitors, regulatory agencies, etc.) [12]. These exert pressures on operations as they compete or use the facilities and services of the port. There is a need for a theoretical assessment of how container port operators attend to the institutional pressures while satisfying operational needs. Specifically, we examined:

- what institutional forces exerted pressures on the operations of a container terminal;
- how these influenced the ITM development of the container terminal;
- how container port operators leveraged their IT resources to cope with the institutional pressures in a mindful manner, while reaping the benefits of ITM.

We conducted a case study of a prominent container terminal operated by the Yantian International Container Terminals Ltd. (YICT), for trade between China and other countries. The case study provided evidence of how a container port operated under a divergent set of institutional pressures; allowing us to determine how to deal with different pressures through ITM. In addition, YICT’s success in tackling its institutional pressures was obvious from its prior success. As a member of the world’s largest independently owned port investor, developer, and operator (Hutchison Port Holdings (HPH) Group), YICT showed how a group level ITM influenced the ITM development at a subsidiary level. We sought to determine the impact of institutional influences on the ITM and used the concept of organizational mindfulness to explain how YICT reduced its institutional pressures.
2. Theoretical background

2.1. Institutional Theory

An organization’s institutional environment plays a key role in shaping its legitimacy and performance. In addition to competing for resources and customers, organizations are competing for political power and institutional legitimacy in obtaining social and economic rewards. Institutional Theory posits that structural changes in organizations are driven by both the desire to reduce cost or improve efficiency with external entities and by organizational legitimacy. Such drivers foster institutionalization of IT development as the context of the organization shapes its activities [4,10]. For example, Lun et al. [8] observed that organizations are likely to adopt technology for container transportation security due to the pressures exerted by supply chain partners. The institutional pressures are exerted by organizations with which they are dependent or competing.

Institutional Theory provides a suitable foundation on which to investigate the influence of institutional pressures on the ITM. It helped us identify the organizations that exert institutional pressures requiring IT development efforts. However, IT development due to these pressures might not result in the desired outcome; it is inherently risky to develop and implement new IT; it might lead to inefficient operations, disruption of the supply chain, and delayed cargo inspection by customs. It was therefore crucial for YICT to make mindful decisions about its IT development to ensure its operational efficiency and to meet the needs of users.

2.2. Mindfulness and ITM

Mindfulness is a state of being alert and aware. In contrast to a Resource-based View of a firm, it considers not only how an organization creates value by integrating its competencies but also how it acts to attain business performance, i.e., monitors its internal and external needs [11]. Mindfulness involved three characteristics: ensuring continuous creation, being open to new information, and being aware of more than one perspective. Fiol and O’Connor [2] extended the concept of mindfulness to understanding the interactions between scanning and information processing mechanisms in decision making; they argued that a high degree of mindfulness was likely to expand scanning processes, providing more context-relevant interpretation of all conditions, helping make decisions when organizations adopt an idea, technique, technology, or product because of pressures from organizations that have already adopted it. In container terminal operations, the need to use IT to facilitate flows in transportation chains is required in order to comply with transportation policies and regulations and to enforce security [3]. In adopting new software, a mindful firm would take care that it is compatible with the existing software and hardware of the firm, that users could easily adapt to the new software, that it was compatible with the software used by its major suppliers and customers, etc.

3. Research procedures

We used a case study technique to investigate the relationship between institutional pressures and mindful ITM at YICT. First, before interviewing the relevant staff, we visited the port to understand its operations: managing the control tower, discharging and loading containers, planning stacking areas, etc. The visit provided us with practical knowledge of container terminal operations, which helped us understand their use of IT. Second, we developed an interview guide (see Appendix C) to use in our data collection; it included a description of the objectives of our study, the data collection procedures, and our research questions developed from a review of ITM and institutional forces in container terminal operations. Third, we collected interview data at YICT via in-depth interviews with managers and executives responsible for the three major functions: operations support, commercial services, and information services, where the interviewees provided answers about past and ongoing ITM development and its impact on YICT. The key informants had participated in planning and implementing strategic decisions related to the ITM. It was therefore reasonable to assume that they had adequate knowledge of YICT’s operations and ITM development. Fourth, we initiated meetings with groups of managers to seek information that might have been overlooked in the individual interviews. All site visits and interviews were attended by at least two interviewers. Interview notes were taken and retained by the interviewees and these notes were compared and checked after each visit for accuracy and completeness. Fifth, during our site visits to the YICT and HPH Group, we collected documents and publications relating to the port operations. These included vessel schedules, maps of YICT, the YICT log, YICT corporate brochures, details of customs clearance reform, multi-modal transportation development at YICT, practical inspection and quarantine initiatives, the YICT traffic plan, Hutchison Whampoa Limited annual reports, introduction booklets of YICT and HIT (the Hong Kong International Terminal, a wholly owned subsidiary of the HPH Group), newsletters, introduction booklets of the HPH Group, introduction booklets of HIT, etc. Sixth, follow-up emails were sent to interviewees when the information was insufficient or clarification needed. Seventh, for validation purposes, we accessed information from publicly available resources, such as the Internet, periodicals, and newspapers, to triangulate the findings from our interviews with the executives of YICT. Eighth, based on the interview notes and documents collected from the interviews and open resources, a case report was prepared by the first interviewer, then reviewed and verified by the second. Ninth, the case report was sent to the interviewees for verification. Minor revisions were then made, based on comments and further information provided by the interviewees. After revision, the report was resent to the interviewees for any further comment.

4. Case study of Yantian International Container Terminal (YICT)

The HPH Group is a wholly owned subsidiary of the multinational conglomerate Hutchison Whampoa Limited (HWL). It operates 300 berths in 49 ports in 25 countries throughout Asia, the Middle East, Africa, Europe, and the Americas. In 2008, the container terminals of the HPH Group handled a throughput of 67.6 million TEU (Twenty-foot equivalent container). This accounted for approximately 13% of the world’s container traffic. The HPH group is proactive in the development and application of IT to serve the shipping community and to support the administration, planning, and operations of container terminals. This is reflected in its continuous IT development with various achievements ranging from its award-winning IT solution Next Generation Terminal Management System (nGen) to its Information Security Management System certified as an international standard [ISO/IEC 27001:2005 in 2009]. The information infrastructure is provided in Appendix B.

To seize the opportunity due to growing container traffic in Southern China, in October 1993, HPH signed a joint venture contract with Shenzhen Yantian Port Group (YPG) to develop YICT on the eastern coast of Shenzhen, South China. In July 1994, the first container vessel called at YICT; this marked the start of the official operations of the Yantian Port. YICT commenced operations in mid-1994 and handled 13,000 TEU in that year. In ten years, YICT registered an annual throughput of 6.26 million TEU. In 2007, YICT recorded an annual throughput of over 10 million TEU, becoming the world’s largest in terms of annual container throughput by a single terminal. Today, Yantian Port has become the largest in
terms of throughput of Shenzhen’s three main container ports, accounting for nearly half the southern Chinese city’s cargo volume in 2008. Shenzhen is the world’s fourth-busiest port, while Shanghai, Hong Kong, and Singapore remain the world’s top three container ports in terms of throughput.

YICT has exerted great efforts into its ITM, which has undergone significant improvement over the years. In 1994, the operations at YICT were supported by a legacy system. Today, YICT plays a leading role in the development of IT for the HPH Group. The effort has earned YICT more than 120 awards in the past years. The background on the ITM by HPH Group and YICT are summarized in Appendix A.

5. Institutional pressures and mindful IT applications

There are three groups of organizations that impose different influences on container terminal operations: (1) private organizations that use port facilities for business purposes; (2) public organizations that impose regulations on container terminal operations; and (3) rival organizations that compete for businesses.

5.1. Institutional pressures from customers

The customers include freight forwarders, shippers, logistics operators, trucking companies, etc. Trucking companies send trucks to a container terminal to pickup and/or deliver goods, while the shipping lines call at the terminal to ship containers from or to another container port. The operating cost of these container terminal customers is associated with the container turnover rate and coordination of port-related activities, such as organizing adjacent transportation, managing shipment for their customers, tracking and tracing shipments, and declaring customs. Customers therefore prefer container terminals that provide reliable and value-added services and infrastructure that can help lower their operating costs.

5.2. Mindful IT applications for customers

To improve operational efficiency, YICT relied on IT to manage and organize the movement of containers within and beyond its port facilities. Mr. HonWah Chan (Operations Support Manager) emphasized that one major mission of ISD was to help YICT achieve operational efficiency by reengineering business processes and developing IT innovation to provide fast and efficient services. YICT has reengineered container terminal processes to increase efficiency and developing IT to facilitate a central management of yard resources via information sharing amongst the various IS, enabling the allocation of resources at the right time and place. Specifically, it is used to manage (1) discharging and loading of containers; (2) yard resource allocation; (3) utilization of stacking areas; and (4) data sharing between port users. For example, recent deployment of the Tractor Mobile Terminal System (TMT) with a WiFi network for allocating a tractor in the container port to a grounding and pick-up location has significantly increased operational efficiency.

Moreover, YICT intends to develop IT that provides value-added services to its customers. This is evident from the following quote by the Information Services Manager of ISD at YICT:

“It is important to provide value-added services that help customers reduce their operating cost and increase revenue. YICT is therefore using IT to improve data sharing with trucking companies and the railway for coordinating chain of transportation; reengineering of customs declaration procedures to shorten time for customs declaration and clearance; and coordination of pickup/drop-off of containers to reduce vessel turnaround time.”

An example would be the development of the Port Community Card System (PCC) to manage entry and exit at the gatehouse by automatic acquisition of truck identification and transfer of service charges. This enhances terminal security, and helps truckers manage their finance and trucking operations. YICT made sure that the system interface was user-friendly and easily adopted by users i.e., similar to the previous gatehouse system, Vehicle Entry Pass. Moreover, the development of a communication platform, EasyPort, enhanced data visibility by allowing container terminal users to trace and monitor the status of their goods. EasyPort integrates many systems and involves many parties.

5.3. Institutional pressures from customs

Chinese Customs has recently reformed its regulations and reengineered the customs declaration procedures. Its purpose was to facilitate the flow of goods through a container terminal by developing a centralized inspection, risk management, and import and export declaration. This reform benefited all import and export companies, shippers, and shipping lines, by reducing the time and procedures needed for inspection, and cargos clearance at the container terminal.

Port operators and customs have recently been paying close attention to port security. Security concerns range from controlling theft to preventing terrorist acts. While these could enhance the security of supply chains, they add cost and cause delays. Being an important link in sea transportation and supply chains, it is necessary for YICT to improve the security with minimum disturbance to the efficiency of its container terminal operations, turnover rate of containers, and workload of customs.

5.4. Mindful IT applications for customers

YICT has been working with the Chinese Customs to improve customs procedures. To assist in the reform of customs regulations, instead of adopting the IS developed by the HPH Group to support its customs operations, YICT has developed a customs system, the Customs Electronic Inspection System (CEIS), which supports information interchange amongst the Dapeng Customs, inspection area, and the YICT control tower. CEIS has enhanced the visibility of inspection information between customs and YICT and speeded up cargo clearance for container terminal users. This system shortens the container storage time and reduces storage charges for the container port users. Moreover, YICT has upgraded the system to replace manual documentation procedures for international trans-shipment, allowing shipping lines to make electronic pre-declaration for their import cargo before a vessel arrival. It allows customs to review the pre-declaration documents, and levy taxes and duties in advance, thereby enabling quick release of containers upon landing. For export cargo, pre-declaration can be performed before entering the gatehouse. Customs can inspect or release the cargo upon arrival, which improves the turnaround time of both trucks and containers. The development of CEIS was a challenge for the system security of the YICT as the information shared with the customs must be confidential; any potential information leakage can result in a serious lawsuit. In addition to developing IT solutions to improve customs-related procedures, YICT has been continuously developing IT solutions to minimize the adverse effect of heightening security by participating in the Smart and Secure Tradelines Program of the HPH Group by joining with three of the Group’s container ports: Europe Combined Terminals in Rotterdam, Hong Kong International Terminals, and Port of Felixstowe in the United Kingdom. YICT has installed RFID sensors to test the feasibility of using them to improve container port security. The sensors are inside the containers to monitor changes in light, humidity or pressure, which could indicate that someone had interfered with it. A nearby container YICT has...
Institutional pressures and mindful IT applications.

Table 1

<table>
<thead>
<tr>
<th>Institutional pressures on YICT</th>
<th>Mindful IT applications</th>
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<tr>
<td>Customers</td>
<td>Enhance container terminal operational efficiency.</td>
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<td></td>
<td>Develop chain of transportation.</td>
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<td></td>
<td>Reengineer customs procedures to shorten time for declaration and clearance.</td>
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<td></td>
<td>Ensure smooth flow of goods via the port.</td>
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<td></td>
<td>Computerize container terminal activities to enhance the container terminal operations.</td>
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<td></td>
<td>Data sharing to coordinate transportation.</td>
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<tr>
<td></td>
<td>Computerize customs operations to shorten time of customs declaration.</td>
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<td></td>
<td>Provide value-added services to help the customers lower operating cost and increase revenue.</td>
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<td></td>
<td>Allow customer access to information relevant to their operations.</td>
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<td></td>
<td>Heighten security with minimal disruption to the customer supply chain.</td>
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<tr>
<td>Customs</td>
<td>Heathten container terminal security.</td>
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<td></td>
<td>Provide channels for information sharing between the relevant organizations.</td>
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<td></td>
<td>Real-time and secure data transmission.</td>
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<td></td>
<td>Communication and data sharing between users.</td>
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<tr>
<td></td>
<td>Heighten container terminal security without incurring more work for customs.</td>
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<tr>
<td></td>
<td>Improve customs operations by using IT.</td>
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<tr>
<td>Competitors</td>
<td>Enhance container terminal operational efficiency to improve throughput capacity.</td>
</tr>
<tr>
<td></td>
<td>Computerize container terminal operations to lower operating costs.</td>
</tr>
<tr>
<td></td>
<td>Enhance service capabilities.</td>
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<td></td>
<td>Improve transportation infrastructure.</td>
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<tr>
<td></td>
<td>Provide efficient services.</td>
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<tr>
<td></td>
<td>Provide value-added services that enhance operational efficiency.</td>
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Competitors of YICT are neighboring ports that are competing for customers. Although there is a growing demand for cargo shipping, YICT is competing vigorously with its neighboring container ports such as HIT, Chiwan, and Shekou ports. This is evident in the quote by the Commercial Service Manager of the Commercial Department of YICT:

"In order to stay competitive it is necessary to increase our throughput capacity and continually improve services while other ports are seeking self-improvements."

Shanghai Port has undertaken various projects to upgrade its IT infrastructure to enhance its operational efficiency and improve services, in order to increase its container handling capacity and attract customers. This move was due to the competition it has experienced from neighboring ports, such as Busan in South Korea, which, not only charges a lower container handling fee, but also possesses more reliable transportation and information infrastructure than that in the Shanghai Port.

5.6. Mindful IT applications for competitors

The competition between container terminals depends on their operational efficiency, terminal capacity, handling and terminal charges, custom clearance efficiency, and transportation infrastructure [1]. In order to stay competitive, container terminal operators must continually strive for improvements in these factors. As such, YICT has accelerated its Phase III development to cope with the growth of sea transportation. It has also developed IT that are both flexible, allowing easy modification of functionalities and easily extensible to accommodate new IT development.

YICT uses IT to communicate and share information with truck companies and the railway to facilitate transportation for its customers, thus improving its competitiveness against neighboring ports with a less developed transportation infrastructure. To ensure that users can fully utilize the system, YICT developed a user-friendly interface that requires no special training, but also set up a customer service center to answer user enquire. Table 1 summarizes the institutional pressures encountered by YICT and its mindful use of IT to handle these pressures.

6. Discussion and implications

Firms that possess mindfulness can accomplish a high level of differentiated reasoning in developing IT to meet organizational needs.

Preoccupation with failure and success—This is a characteristic of firms that are cautious in making decisions. Such firms tend to follow what others do. Unlike such firms, YICT scanned its internal operations and business environment to evaluate its IT development. YICT continuously looks for improvements in its operations through new IT development.

Reluctance to simplify interpretations—YICT takes a multiple perspective in its ITM development. This is a tendency to examine and understand the complex environment, instead of only looking for business improvement. YICT acknowledges the complexity of its internal and external operations, its interactions with customers, and competition with its neighboring ports. YICT actively assesses the different needs of its customers, customs,
the contribution of new IT development in sustaining the cost and service advantages of its container terminal operations.

Sensitivity to operations—A mindful organization attends to small and seemingly insignificant details in everyday operations. YICT installed IT to record and facilitate day-to-day processes and operations at the container terminal. This allows YICT to monitor its daily operations and to pinpoint problems, but also allows it to identify operations and services that can be improved. YICT possesses a high level of sensitivity to cues from its business environment and processes, enabling it to respond effectively to the changing needs of its container terminal operations [6].

Commitment to resilience—This is a characteristic of firms that are dedicated to opportunistic learning from mistakes. YICT engaged in experimental activities, such as participation in the Smart and Secure Tradelanes Programme to facilitate cargo flows and enhance port security, as well as the development of nGen to provide a flexible IT infrastructure for its future IT development. YICT learns from experimentation on its current operations, and gains insights into needed ITM development.

Reliance on expertise over formal authority—A firm must be willing to relax formal authority by ensuring that its IT development is based on its operational needs and characteristics, not solely on the authority of the CEO or CIO. Our research framework and case findings are summarized in Fig. 1.

YICT's ITM is frequently emulated by other container terminals, but its success does not come without difficulties.

6.1. Implications for research

Our study revealed the applications, infrastructure, and performance implications of IT in one of the busiest container ports in the world. It examined how the institutional pressures faced by YICT shaped its ITM, and also investigated how YICT reaped the benefits of tackling these institutional pressures.

Our study extended the Institutional Theory to examine ITM of firms in the transportation industry. It also extended the concept of individual mindfulness to organizational mindfulness by providing insights on how YICT tackled institutional pressures, while ensuring that its adopted IT were catering to its operational needs and business growth.

6.2. Implications for practice

One limitation of our study was that data was collected for a single organization, although the objective of the study was to generalize from a single case to theory. By examining the ITM of YICT, our study suggested that firms maintaining divergent perspectives, paying attention to details of operations, committing to opportunistic learning, and preoccupying with both success and failure in ITM were likely to better handle the institutional pressures faced by the firms while reaping the benefits from their IT development.

Our study also revealed the benefit of maintaining group level ITM. As a member of the HPH Group, YICT gained from the diffusion of generic IT provided by the Group, which enabled YICT to allocate its ITM resources to customize and develop IT to meet its local needs. YICT has also illustrated the importance of developing its own ITM capabilities to share ITM's best practices across the Group members. Moreover, by using a generic set of IT, the HPH Group could improve communication, information sharing, coordination, and utilization of resources amongst its members at a group level. Managers can learn from the ITM of the HPH Group and YICT to achieve performance improvement through a group level ITM.

The IT infrastructure of YICT is depicted in Appendix B; it reveals a flexible IT infrastructure that allows effective communication and information sharing with customers and governmental bodies. The IT infrastructure also provides a compatible platform to integrate with new IT development to meet future needs.

The container terminal operators should regularly assess their business environment. Our study showed them how to determine the institutional pressures, and how they could proactively respond to them. Evaluating current operations in a continuous manner is highly desirable when attempting to reengineer business processes and improve performance.

Acknowledgements

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Appendix A. ITM by HPH Group and YICT

The HPH Group has implemented a centralized-localized IT development approach to provide generic IT for container terminal operations, in such areas as vessel planning and monitoring of yard and berths activities, while allowing some extent of IT customization to meet local operational needs. For example, in 1997, YICT deployed the Productivity Plus Programme (3P) system, which earned HIT the 1997 Computerworld Smithsonian Award, to support its operations with customization to meet its needs of handling mega vessels. The sharing of generic IT across the Group with flexibility to customize for local needs enables YICT to (1) exploit the Group's IT resources; (2) reduce the cost of developing and maintaining generic IT for container terminal operations; (3) maintain the flexibility of IT development to meet local operational needs through modifications to the generic IT; (4) share ITM best practices amongst HPH container terminals; (5) focus its IT resources to meet local operations requirements; (6) standardize IT infrastructure with other container terminals in the HPH Group; and (7) shorten lead time for new IT deployment.

To leverage IT-related intangible resources, such as ITM best practices and know-how, the HPH Group provides training for local staff and transfers best ITM practices to YICT. Such an approach enables YICT to develop its ITM capabilities by possessing skillful and knowledgeable human resources for ITM. To adopt best ITM practices, YICT works closely with the Information Services Department (ISD) of the HPH Group to develop IT to support its current and upcoming container terminal development, and to share best practices for IT development, with a view to benefit the container terminals operated by the Group. The importance of using IT in container terminal operations is evident from the following quote by the Operations Support Manager of the ISD of YICT:

"IT is a major resource to develop value-added services, thus strengthening our competitiveness. By saving our IT resources from development and maintenance of generic information systems, we can focus on developing IT innovations to enhance the customer service capabilities and competitiveness of our company."

YICT has upgraded and embraced IT innovation continuously to enhance its operational efficiency and create customer value.

Appendix B. Information infrastructure at YICT

The operations and services of YICT are complementary and inter-related in the sense that they can have impact on one another. For example, customs declaration, cargo loading/discharging, and ship and yard planning can affect the operational efficiency of one another, such that a delay in the customs declaration procedure can cause a holdup of cargo, subsequently bring disruption to shipping schedules. As such, the efficiency of container terminal operations is not guaranteed if the IT used at the terminal do not share information. The development of Next Generation Terminal Management System (nGen) provided information sharing possible. The information infrastructure of YICT is depicted in the figure.

For container terminal users

For yard operations

<table>
<thead>
<tr>
<th>EDI</th>
<th>TMT</th>
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<tr>
<td>EasyPort</td>
<td>RDS</td>
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<td>CEIS</td>
<td>GUIDER</td>
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<td>nGen</td>
<td>OMS</td>
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<td>TPOS</td>
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nGen – Next Generation Terminal Management System
EDI – Electronic Data Interchange
EasyPort – Commercial Electronic Platform on the Internet
CEIS – Customs Electronic Inspection System
TMT – Tractor Mobile Terminal System
RDS – Radio Data System
GUIDER – Ship and Yard Planning System
OMS – Operations Monitoring System
TPOS – Tall Pier-side Operations System

Working jointly with HIT, YICT developed nGen which is a terminal operations control system and is the first container terminal in the HPH Group to launch it. nGen is a modular system that offers an architecture that is flexible for plug-and-play options to support future IT development. The system serves as a central...
processing unit to coordinate container terminal operations and facilitate information interchange between port users (e.g., shipping lines, shippers, customs, and freight forwarders) and YICT. Major IT applications for container terminal operations are integrated with nGen. These IT applications serve three key functions: (1) container terminal operations support; (2) information interchange for customs declaration; and (3) communications and information interchange amongst port users.

Tractor Mobile Terminal System (TMT), Tally Pier-side Operations System (TPOS), Radio Data System (RDS), ship and yard planning system (GUIDER), and Operations Monitoring System (OMS) were developed to support container terminal operations. TMT is a wireless system that gives pick-up instructions to a tractor at the terminal. It was developed by YICT’s local IT development team and was put into use in 2005, replacing the old pager system. TPOS manages and coordinates tally in the terminal. It enables tally agents to give information to the tally via wireless portable computers and direct the tally to the site of berthing container vessels. Moreover, YICT is the first container port in China that has installed vehicle-mounted computer terminals, offering broadband radio links (2.4 GHz) between yard equipments and the control tower of YICT. RDS provides the latest cargo-movement plans to yard operators, enabling effective resources re-allocation in the container terminal. OMS monitors yard and berthing activities and is operated from YICT’s control tower. It works closely with the operational and planning functions to give a quick response to changes by allocating manpower and equipment resources in the terminal. The planning of loading and discharging sequences is scheduled by the ship and yard planning system, i.e., GUIDER, to ensure vessel stability and reduce quayside waiting time. It displays real-time ship and yard information to allow system operators to arrange cargo movement sequences responsive to create a seamless flow of containers. GUIDER also allows planning information to be sent to the customers electronically.

Another major IT application at the container terminal is to facilitate customs declaration. The Customs Electronic Inspection System (CEIS) is designed to transmit real-time data on customs inspection requirements, processes, and results to the Dapeng Customs office, inspection area, and YICT’s control tower. It replaced the previous manual document interchange system amongst these three sites, thereby improving the effectiveness of cargo inspection and the turnover of containers at the container port.

Lastly, the EDI system and EasyPort are IS that support information interchange between YICT and its port users. The EDI system offers visual displays of cargo arrangement onboard and the location of containers. It also allows shipping lines to make electronic slot booking and to transmit electronic documents to YICT. On the other hand, EasyPort is an Internet-based port community system comprising functions assisting container terminal users to organize their internal operations by obtaining the information they need via the EasyPort website. Specifically, the container terminal users can track their containers by entering their booking or container numbers into the EasyPort website and pre-declare empty container customs by submitting the necessary information via the website.

Appendix C. Interview guide

C.1. Objective

This interview seeks understanding on (i) what are the institutional forces that influence the operations of YICT, (ii) how do the institutional forces influence the ITM development at YICT, and (iii) how does YICT leverage its IT resources in a mindful manner to cope with these institutional forces.

C.2. Data collection procedures

Target interviewees are the managers of YICT that have implemented IT for the terminal operations at YICT.

Before the interview, the interviewer should do the following:

1. contact the managers of the container terminal to seek their commitment to conduct an interview;
2. collect background information of the container terminal from secondary sources, such as press, company’s website, and public reports;
3. send a copy of the interview questions to the interviewees one week before the interview.

During the interview, the interviewer should do the followings:

1. ask for permission to record the interview;
2. allow interviewee to finish answering questions and ask the questions that come out in the middle of their answers later;
3. ensure the interviewee is clear about the questions being asked and avoid interviewee to interpret the questions;
4. ask for a copy of all the relevant documents, e.g., annual report, IT documentation, etc.

After the interview, the interviewer should do the followings:

1. based on the data collected and following the structure of the case study write-up guide, write-up for the case study should be performed within 24 h of the interview when the interviewer still has fresh memory of the conversation in the interview;
2. send the write-up of case study to interviewees for their factual validation.

C.3. Interview procedures and questions

<Thank the interviewee for his/her commitment and time>  
<Explain the objectives of this study>  
<Ask for permission to record the interview>  
<Put down the answers on the interview questionnaires if recording of the interview is not permitted>  
<Write down the questions that come out in the middle of their answers, and ask them later>  
<Start asking questions>

1. Describe the operations of YICT:
   a. How are the business functions structured?  <Ask for a graphical illustration by providing an organization chart>
   b. Describe how a container is being handled before and after it arrives at the container terminal? What parties are involved in the processes?

2. Describe the institutional forces that affect the operations of YICT:
   a. Who are the major customers?
   b. What are the port facilities and services that the customers use?
   c. What is the uniqueness of the services and facilities that attract the customers? Why do the customers use the port services and facilities? Give examples.
   d. Is IT used to serve the customers’ needs? What kind of IT? How does it help in serving the customers’ needs? Give details.
   e. Which neighboring ports are the major competitors?
   f. What are the competitive advantages of these major competitors relative to YICT? How does YICT manage the competitions? How does IT play a role in this? Give details.
   g. What are the regulatory authorities that have influence on the operations of YICT?
h. How does YICT comply with these regulatory authorities and how does that affect its operations? How does IT play a role in this? Give details.

<Ask for annual report and other organizational reports>

3. Describe the information technology management (ITM) at YICT:
   a. Describe the role of ITM (e.g., supporting, leading reengineering of business processes, and strategic purpose).
   b. Describe the IT infrastructure. <Ask for a graphical illustration>
   c. Which departments are responsible to decide on new IT development?
   d. How do these departments decide on new IT development? What are the criteria?
   e. How do these departments deal with the complexity of container terminal operations when they decide on new IT development?
   f. Are there systems to monitor the day-to-day container terminal operations and to look for opportunities for processes reengineering? If yes, what are the systems? In what ways is the information collected by these systems analyzed for deciding new IT development?
   g. Is the HPH Group involved in new IT development of YICT? If yes, how do the HPH Group and YICT work together for new IT development?
   h. Which department at YICT is responsible for IT development?
   i. <Ask if the interviewee does not work in the department for IT development> How does your department work with this department for new IT development? Give details. <Ask if the interviewee work in the department for IT development> How do other departments work with your department for new IT development? Give details.
   j. What are the IT development projects that have been completed in the past years? How do they affect the port operations?
   k. What are the ongoing IT development projects? How are they progressing? How would they affect port operations upon their implementation?
   l. Do the existing software applications and hardware infrastructure facilitate business expansion and enhance operational efficiency? If yes, how? If no, why?
   m. How would you describe the use of the IT resources (e.g., existing IT infrastructure and systems) for future operational needs?
   n. Describe the strengths and weaknesses of ITM at YICT relative to the major neighboring ports. How do these strengths and weaknesses affect the differences in performance of YICT and these neighboring ports?

<Ask for ITM manual and documents for systems development, support, and plan>

<Ask if a visit to the container terminal is permitted>

<Ask if a visit to their IT applications and its related operations is permitted>

<Thank the interviewee for his/her participation>

<Ensure documents are collected:
  • Annual report
  • ITM manual
  • ITM documents
  • Organizational chart>

References


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