

IMPROVING R.O.I. IN PORTS THROUGH DATA MANAGEMENT

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ABSTRACT:

Ports provide a critical link in the global supply chain by connecting sea transport, air transport and land transport. Ports provide facilities and services for the transfer, storage, inspection, and control of the goods moving both in and out of a country. The inefficient management of a port can considerably increase costs and hamper the timeliness of delivery. This paper looks at the potential impact of integrated data management on port operations.

Keywords: Port Management; Data Management; Transportation;

INTRODUCTION:

The ability to invest in infrastructure is key to modern port economics, and involves development planning, financing, and assessing the return on investment [3]. When economic development objectives and/or trade routes change, ports must re-evaluate their capacities with respect to expected future demands. One of the major problems facing port managers is that many of the major gateway and hub locations have reached a point where any on-site expansion of transport infrastructure will be very expensive and not necessarily lead to improvements in freight velocity due to urbanization and congestion [4]. Thus, the main objective of port investments is to facilitate the achieving of a desired level of throughput capacity; thus enabling the port facility to be competitive in its markets. Meeting this objective is hindered by the issue that ports traditional only generate between 2% and 5% net profits. Another complication is that the deregulation of transportation has forced Port Authorities to switch their focus to their financial bottom-lines as opposed to the satisfaction of government regulations. Deregulation has also contributed to increased competition. To meet the demands of increased completions, ports have to invest in their infrastructure so as to increase their efficiencies and productivity [2].

The key to success with the aforementioned goals and objectives is not how much money a port makes, but how much they get to keep. Meaning, there are common low-cost investments that can be made which produce high-yield profits and can increase efficiencies. Typically, ports on average operate at an estimated 15 – 20% deficiency, while ports in developing countries are estimated to operate with a deficiency as high as 30 – 50%.

Traditionally, the solution to efficiency problems, or capacity problems, has involved upgrades to infrastructure. This paper is focused on how ports can substantially improve their return on investment through better data management. There are two core elements that define this deficiency, (1) the collection of port data, and (2) use of that data.

PROPOSED METHODS FOR IMPROVING PORT ROI

There are numerous stakeholders involved in the management and operations of ports. These stakeholders include importers, exporters, the Port Authority, the terminal operators, customs, customs agents, transport companies, freight forwarders, and others. Each of these stakeholders control processes specific to their interests and each inducing variability into the port management process. These variances and the lack of visibility can significantly affect the

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effectiveness of the port to plan and execute freight and/or passenger flows through the port into the appropriate distribution networks.

In several studies conducted by I2A Philippines, assessing over 600 port infrastructures on four separate continents, commonalities were identified by port sector across technical, administrative and financial resources. A number of solutions were identified, developed and successfully applied, like addressing data management.

With the massive amounts of regulations worldwide, there is a need for innovative approaches that will simplify administrative procedures and operational practices. The numerous advances in information and communication technologies offer great potential for achieving this objective. Unfortunately, the current state of IT approaches remains piecemeal and singular in their approach, and often fails to deliver the efficiency and organizational effectiveness necessary for managing ports.

The ability to enhance business practices, revenue growth, etc., is often easier than most people believe. The lack of a set of rigorous data makes it difficult to perform reliable cost-benefit analysis, or to generate accurate forecasts, or to make effective operational decisions [5]. It only needs to be recognized that there are variables that are within the Port's control, if they are willing to take the time to identify them and take appropriate action.

As it relates to information systems within a port, stakeholders typically have mainstream thinking within a narrowly defined vertical. Meaning, stakeholders if asked to identify a port information system will generally speak to more common solutions like Terminal Operating Systems (TOS) and Vessel Traffic Management Systems (VTMS). The Committee on Maritime Advanced Information Systems (CMAIS) [1] published their final report identifying systems and infrastructure that could promote safe and effective vessel transits through U.S. ports. It was stated that the "recent advances in information technology could greatly improve the safety and efficiency of the U.S. maritime industry and the daily operations of ports and waterways" [1, p. v]. It was decided by the committee to focus only on information systems that promoted navigational safety and improved vessel traffic management. The committee did not investigate "the relationship between navigation safety and maritime transportation efficiency or evaluate information systems that promote efficiency" [1, p. 1]. Though safety is a top priority, ports also need to generate sufficient profits so as to stay in business and maintain as well as upgrade infrastructure, in order to remain competitive in the global economy and to operate safely.

When discussing information systems that affect operations, stakeholders also quickly limit any discussion to those solutions believed to manage activities within their own control, dismissing any consideration for enhancement by other solutions. Take for example Customs Management systems (CMS) that manage the cargo inspection process, stakeholders usually dismiss any discussion of such systems, as well as the organization itself, stating there is nothing they can do to influence a government agency or system. This directly relates to the human traits noted above, as it is easier for someone to suggest it is out of their control – when in reality it is well within their ability to influence an outside agency / system.

In discussing information systems, one must first recognize they are a combination of hardware, software, and communications for the expressed purpose of processing data. The significant factor is the origin of the data. The best way to accomplish this is to think of a port in the context of people, processes and infrastructures, where each asset has a number of associated data points. For example, every individual employed or even visiting the port has a name, DOB, SSN, and address. A vehicle entering the port has a make, model, color, and registration information. A rubber-tired gantry (RTG) has a make, model, size, and weight limit. A building

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like a terminal warehouse has a location, number of rooms, designated areas, and specific purpose. Even the process of transporting and inspecting cargo has various actions, locations and outcomes. These are all basic data points, each asset having additional data that may be further expounded upon.

Currently, ports make two critical mistakes in data collection. One, they only collect information for a specific purpose; because they think in terms of information (end product), rather than data (raw product). Two, stakeholders only collect information within their own vertical functions. This produces stove-piped information cells, duplicated data collection efforts, and many times, conflicting information (data analysis). Part of the problem is that any large-scale collection of data must be coordinated at the port management level, as opposed to the individual stakeholder level. Another area of concern is that any such collection effort is typically abandoned the moment the issue of proprietary information and business competitiveness are broached. The realities being both of these issues are easily addressed if the human factors noted previously can be overcome.

Improvements in data collection and management offer the broadest, easiest and most cost-effective method for advancing port management. Data collection, processing and management require minimal capital expenditure (CAPEX), but offer a significant ROI to all parties – resident and non-resident alike. Key data collection areas include asset movement (ships, trucks, cargo), asset environment (cargo content, cargo processing, customs clearance), and end user management (global supply chain).

The key reason to effect data is that it allows for activity management outside the port boundary, without a physical presence; providing port operators the ability to address the entire supply chain. The most impact to a port actually comes from managing activities outside the port, not inside. Think of it this way, a port facility is the tool(s) used to manage cargo movement, but it's the actors outside the port that actually control the content. For example, a grocery store is the one who directs what food is procured and ultimately shipped through the port. A commercial freight company is responsible for transporting the product to and from the port. The port operator just facilitates its movement, within the physical port boundary, so focusing solely on the port operator actually only addresses one component of the supply chain. The key here is to understand the need to look beyond the port's physical boundary, as the remaining portions of the supply chain directly affect a port's productivity.

IMPLICATIONS

There is often a significant difference between reality and perception. Understanding how these principles apply to the PCS and the impact of each is crucial to improving ROI. This brings us back to the original discussion of human factors. The ability to recognize how complacency and deflection affect the true understanding of port operations is critical. As simplistic as it may seem, increasing a port's ROI is directly linked to the removal of pride of ownership. Individuals must prepare themselves mentally and emotionally to view the port in a critical manner, with significant detail and absence of blame. Accepting this concept is imperative to achieving maximum ROI.

Performing a comprehensive port assessment is the first step. Assessments are an iterative process. Even a port that has completed an assessment will still require an update. When conducted properly, port assessments can be performed biennial, although table-top reviews should occur annually. In many cases such assessments are conducted poorly or avoided altogether due to cost. To resolve the financial concern assessments may be performed internally with the assistance of an experienced 3rd party consultant to lead the assessment process. There

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are a number of advantages to this approach beyond the cost savings. Any properly conducted assessment requires participation from port stakeholders regardless, as no consultant knows the port better than its stakeholders. Under effective tutelage and guidance by a 3rd party consultant, port stakeholders will learn to better understand the broad activities and effects of operations across the port community and its global supply chain, thereby starting to recognize and comprehend the significance of effective integration beyond the port boundary.

The major importance of performing an assessment is it identifies and prioritizes improvements. When properly performed, cost-benefit analysis identifies corrective action with the highest ROI. This ensures that port operators quickly address issues that affect higher profitability easing typical management concerns, whether internal, from outside review committees or even public scrutiny. In assessing multiple ports in Africa, the total assessment cost was approximately US\$ 500,000. A subsequent proof of concept cost an additional US\$ 1.1 million. The result was an astounding 34% increase in annual revenue generation. Any hesitation in performing the assessment and proof of concept was quickly diminished after reaping a US\$ 340 million benefit, an improvement to annual revenue that is repetitive in nature. The same model has since been applied using a public private partnership approach, eliminating the initial assessment and proof of concept costs altogether.

While an assessment is the primary tool for identifying a framework for improvement, it's the collection of data and integration of data management systems that offers one of the most significant avenues for improving ROI. Using system integration techniques a port master plan is developed to ensure maximum data capture across the entire global supply chain, not simply the port. There are a number of elements that must be addressed. The most significant of which is determine the lead program entity. Maximizing data collection requires the integration of the various stakeholders regardless of whether they are resident, non-resident, public or private. To achieve synchronization of a multi-layered organizational structure, a host organization will need to be identified to lead the overall process. As government is at the top of the hierarchy the typical host organization is the port authority.

The port authority leads participating stakeholders in crafting policies and procedures for the capture, use and confidentiality of port data. There are a number of unique considerations that must be addressed like ensuring competitiveness. When conducted properly a port information sharing process is implemented fostering higher profitability across the entire PCS.

Beyond processes, technology and equipment is required to capture data not currently being monitored. New infrastructure will also be needed, the most common being a centralized information management facility.

The most critical element to achieving success in the most cost-efficient manner is the procurement method. Public private partnerships may be established to incorporate the entire process from concept to commissioning, eliminating any cost to the government, port authority or terminal operator. However, to execute a zero-cost program emphasis must be placed on the financial model used to implement the public private partnership.

CONCLUSIONS

Big data is a term for data sets that are so large or complex that traditional data processing applications are inadequate. It is a term that is quickly catching the attention of mathematicians and scientists around the world, addressing technical challenges like analysis, capture, data curation, search, sharing, storage, transfer, visualization, querying, updating and information privacy. In essence, it describes the core principle of increasing ROI in port

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management when considering the global supply chain and the amount of relevant data that can be captured and used to maximize port productivity.

Over the past decade the author has applied big data theory to improve ROI over dozens of ports across five continents. Enhancement to existing annual ROI has exceeded on average 30%. Evidence of such improvements exists, removing any doubt that substantial increases to port ROI can still be made. This once again brings us back to the original issue. The ability to create an organizational culture that does not except damaging human behaviors, such as complacency and deflection, is the first step in achieving success. It's a mental game that only the smartest of port stakeholders will apply.

The second issue in enhancing ROI is the financial element. As touched on earlier this may also easily be overcome by applying the public private partnership model. With the elimination of upfront OPEX and CAPEX the only remaining excuse is procrastination.

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