

A NEW MODEL FOR EVALUATION OF RFID UTILIZATION IN VARIOUS PORTS OF THE WORLD

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Abstract

Port's container transportation is facing an increasing number of problems. In order to deal with these problems, innovative technological solution are becoming one of the most important steps to control quality of services and manage port's processes that aim at customer satisfaction. RFID technology is a flexible solution which triumphs over current limits of other technologies in ports. Using this technology will cause improvement in control, management and operational procedures and will help port's customers to access more relevant services. In this viewpoint paper a roadmap for adopting the innovation technology in ports is presented, based on the roadmap to assess RFID usage in different world ports, this paper identifies the influencing factor and proposes a model for evaluating and comparing them.

Keywords: RFID, Port, Transportation, Container, Evaluation

1 Introduction

As one of the most fundamental parts of the global trade, ports are the issues which at the same time that they grow in terms of size, they are facing with some challenges, therefore they considered as one of the most important parts of extensive supply chain. Boosting changes in world trade especially marine transportation cause for increasing competitive creation among different world ports. Following intensive state investment and port development strategy through large-scale project, important world ports now threaten to oust others from competitive circle [1].

In recent decades, as a competitive factor, the utilization of modern techniques and technologies in world commercial ports award them great advantages. The main aspects of developed world ports are speed increasing and time reduction in

doing operation [2]. Nowadays ports aimed at to raise customer satisfaction [3]. Dramatically, growth in port's logistics, modern production and implementing identified framework, reveal that traditional and old method can't fulfill the seaborne process and implementing modern techniques to control process is inevitable [4]. Incorrect locating, possibility of abuse, error-prone process and etc are the problems that originate in manual control [2] and port authorities should implement a system to resolve them that can tracking and monitoring the process without need to human being control [5,6]. According to importance of logistic processes in ports, this paper, illustrates which technology is suitable for container transportation and reveals the needfulness of technological support for container supply chain. Next, it proposes a roadmap for adopting and utilizing the innovation technology in ports. The aim of this study is to compare analytical factors which have direct effects on RFID utilization in ports container transportation supply chain and to achieve this goal a new model has been proposed.

2 Technological support for the Container Supply Chain, an obligation or a choice?

Due to the increasingly competitive nature of global markets, particular emphasis has been placed on meeting the needs of one's end customers [7], and this has forced supply chain organizations to become flexible in their business processes [8,9]. It is only through improved collaboration between parties of a supply chain that obtaining efficient information, complete and exact process and eliminating of unnecessary process, can be achieved. However, the extended integration of a large number of parties along the supply chain means that a number of inefficiencies can be incurred at many points [8]. Such inefficiencies can often be attributed to a number of problems, such as inefficient data capture, lack of collaboration

between supply chain entities, and manual, error-prone processes [9]. Presented as a representation of major supply chain problems, Figure1 demonstrates supply chain management problems and the results.

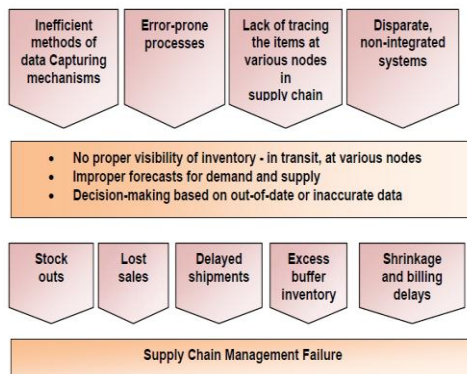


Figure1. Reasons for supply chain management failure [9]

A number of innovations in information technology (IT) can assist organizations with tracking [10]. Using wireless technologies in conjunction with handheld devices has allowed for real-time, accurate data to be transferred from one object to another. One of the newest technologies expected to improve the supply chain significantly is RFID [11].

3 RFID in the Container Supply Chain

Emerging as one of the most pervasive technologies ever developed, RFID is gaining popularity as a technology of automatic identification [12]. By allowing organizations to track their physical assets and maintain information about items at all times, RFID allows for complete information integration within the supply chain. In this sense RFID meets the competitive organization's need to 'sense and respond' through integration of IT infrastructure [9]. RFID works by allowing a reader to read and write to a remote transponder (also called a tag) through electromagnetic waves [10]. What makes RFID suitable for supply chain applications is its ability to track an item along its journey through the supply chain [9].

4 Proposing a model for evaluating RFID implementation in ports

Bypassing traditional method and implementing new technologies in industrial and economical situation are the main reasons of productivity in ports [13].

Therefore, updating and utilizing new technologies in industrial sector and considering new economic strategy always require exact and expertism consideration. There were several studies to assess port's competitiveness [1], but there isn't deep and

exact study about port e-readiness to adopt innovation technology. To assist understanding and evaluating of improvement on innovation adoption by ports especially RFID technology an analytical structure is required. Lack of information for port management, difficulty in prompt response in term of marketing, delay in obtaining real-time terminal operation status, unnecessary transaction in logistics process, and inefficiency and extra cost in logistics process persuade ports to adopt innovation technology and put it on their port development strategy [9]. According to proposed roadmap (figure2) port authorities in first step consider ports transportation infrastructures and then review port IT substructures. In next step they determine port's bottlenecks and if there is any, they analyze it and then examine different innovation technology there. If port authorities and customers are satisfied, the best innovation technology will be selected and then will be confirmed in port. It is noteworthy that without any port bottlenecks this examination will be tested for all parts of port and the chain will be continued.

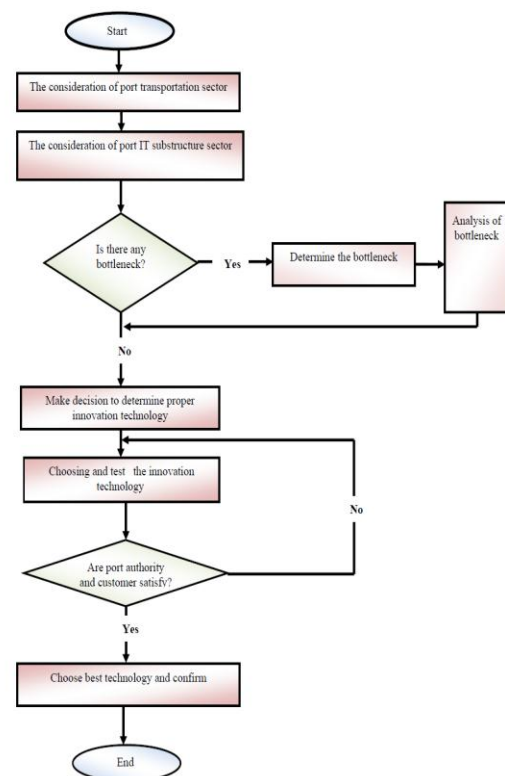


Figure2. Proposed roadmap for port innovation technology adoption

Figure 3 proposes a new model to compare ports RFID technology utilization in container transportation supply chain. Up to now there isn't any expressive framework to analyze ports e-readiness, therefore proposing this structure and the roadmap (figure2) are the main contributions of this paper.

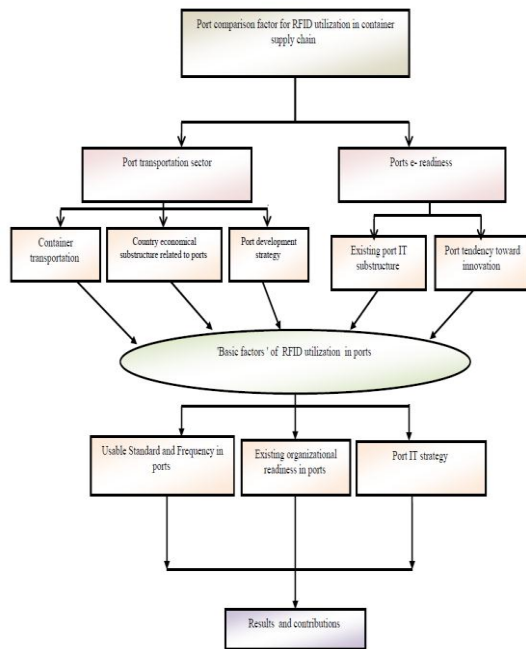


Figure3. Proposed model for evaluating and comparing RFID utilization in ports

5 Final analysis

The final analysis will illustrate the entire framework in term of its interrelated component as shown in figure3. Determination of analytical factors is a proper methodology for evaluating ports container transportation.

5.1 Ports transportation sector

Ports are as an important part of good supply chain in International trade [7]. Ocean shipping consultant have estimated that world trade cargo volume will be 620 million twenty- foot equivalent unit (TEUs) in 2015 [14]. In Analytical proposed model of this paper, ports are compared in three aspects including, port development strategy, country economical substructures related to ports and container transportation sector. Port development strategy especially is based on container transportation improvement environment, number of container, availability of vessel berth on arrival in port and etc [1]. Another aspect is substructure factor. Therefore, acceptance of changes in ports area is focused on substructure status as a critical factor [3]. Container transportation, according to it's specific features, such as the possibility of movement in international seas, availability of high volume cargo transportation in long distance route are various dimension of port competitiveness[2,3].

5.2 Ports e-readiness

Ports e-readiness assessment if is done properly, in more comprehensive evaluation process, could be as a first step in conversion of EC and ICT goals into the practical program and that is caused to alter lead-time process fundamentally [15]. Nowadays, rapid growth in information technology application is caused to impressive evaluation and fast port development [3]. In this paper two scope including existing ports IT substructure and ports tendency toward innovation are proposed to compare. IT substructure is pointed out as an important and basic factor for measuring e-readiness [15]. Nowadays one of the most important evaluation source in ports environment are great advancement in ports IT sector and ports readiness for utilizing new technologies. While the benefits of innovation technology in ports in particular have been made clear, the relative lack of research and investment into the adoption of innovation technology has left some ports with a feeling of uncertainty about the challenges to be faced [16]. Therefore the consideration of tendency toward innovation is particularly important for ports.

5.3 Basic factors of RFID utilization in ports

RFID is an emerging technology which result in gathering real-time information with decision support in supply chain management [12]. Real-time information used for designing and operating systems that based on updated data [9]. By availability of telecommunication substructure, high-level port e-readiness, and high volume container throughputs, RFID technology utilization could be as a part of ports development strategy. To assess Basic factors of RFID utilization in various ports this paper suggests 3 scopes including: ports IT strategy, existing port organizational readiness, and usable standards and frequencies in ports.

6 Conclusion

In today's growing RFID markets, as an efficient and flexible technology, port authorities might be willing to accept new solution in near future. Subject to feasibility study, RFID-based solution for container tracking will prove to be a viable alternative as compared to other tracking methods and it has a lot of advantages such as programming possibility, reducing labor cost, increasing efficiency and reducing human errors and etc.

In this paper, in order to compare and assess RFID usage in various ports, an evaluation model has been proposed. This proposed model that based on innovational technology adoption roadmap, aim at providing analytical factors which have direct effects on RFID utilization in ports container

transportation supply chain. The consideration of port transportation sector, the consideration of port's e-readiness and basic element of RFID utilization in port are the proposed factors for evaluating and comparing the ports RFID usage in container transportation supply chain. As basic factors of RFID utilization in ports, port IT strategy, existing port organizational readiness and usable standards and frequencies in ports are the main factors for ports evaluation. In this proposed model, there is special emphasis on substructure in both transportation and IT sectors. Determination of analytical factors is a proper methodology for evaluating ports container transportation and This proposed framework can be the basis for more completed models in future studies.

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