EFFECTIVE SYSTEMS OF DATA COMMUNICATION IN INTERNATIONAL TRADE

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Abstract

This paper aims to discuss the systems of data exchange and communication, already implemented as a standard, which lie behind the containerization concept, and to explore the possibility of improving its management by increasing its economic performance, by correlating new means available on the market with the existing legislation and standards for reducing operating costs. The innovating means of data exchange discussed in this paper are directly related to all actors involved in logistics. Being part in a research project, this paper will present how supply chain management can and will be improved. New logistic means, such as Electronic Data Interchange (EDI) and Radio Frequency Identification (RFID), will be presented, since these tracking systems were already implemented as ISO standards. Port Authorities are currently making efforts to increase efficiency through effective supply chain management, but also by keeping control over visibility and security.

Keywords: *communication, logistics, SCM, EDIFACT, RFID.*

1. GLOBALIZING BY CONTAINERIZATION

The first shipping container was invented and patented in 1956 by an American named Malcolm McLean [1]. From that moment on, the container shipping industry has improved its performance at an impressive pace, with containers production reaching high numbers, megacarrier container ships reaching 14000 TEU [2] (one freight container standard size = twenty equivalent units, TEU) and the seaports container terminals expanding capacity [3]. Moreover, it has become the backbone of global trade, estimated to account for 13% of seaborne trade in volume and 49% of its value [4].

Freight transport systems are characterized by sequential transfers of goods between points of origin and destination, generally defined as nodes. A node can be defined as a source, a sink or a transshipment node, depending on the transport assignment. Links represent transport and transfer activities connecting nodes which, together with the links, compose the transportation network. Links and nodes are abstract terms used for modeling. In the real system, vehicles and vessels using infrastructure serve the links. For the physical unit corresponding to transshipment nodes, the word terminal is used although the traffic mode specific terms airport, seaport and station are more common in colloquial speech. In the transport industry, transshipment nodes with a central role in a network are, varyingly and often inconsistently, called hub, dock, gateway and turntable [5].

Door-to-door services are provided mostly by freight forwarders through merchant haulage or by shipping lines through carrier haulage. Trucking companies, rail or barge operators could also theoretically develop door-to-door services even if, in fact, they are the most basic transport providers, being subcontractors of freight forwarders or shipping lines.

To ensure a successful freight operation, the management departments have to establish vital commercial links with international multimodal transport operators, shipping companies, local freight forwarders, the railways, the appropriate port authority, and local importers and exporters [6]. Experience with container and cargo handling is essential, together with the necessary personnel management skills for dealing with manual labor force. It is also necessary to establish a system of regular communication between interested parties regarding cargo status, container status (packed, unpacked, customs cleared etc.) and transportation information.

2. ELECTRONIC DATA INTERCHANGE – EDI

In a 1996 publication, the National Institute of Standards and Technology defines Electronic Data Interchange as "the computer-to-computer interchange of strictly formatted messages that represent documents other than monetary instruments. EDI implies a sequence of messages between two parties, either of whom may serve as originator or recipient. The formatted data representing the documents may be transmitted from originator to recipient via telecommunications or they may be physically transported on electronic storage media" [7]. It goes on further to say that "in EDI, the usual processing of received messages is by computer only. Human intervention in the processing of a received message is typically intended only for error conditions, for quality review and for special situations" [7]. United Nations/Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) is the international EDI standard developed under the United Nations. Since 1998, the work of maintenance and further development of this standard is done through the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) under the UN Economic Commission for Europe, in the Finance Domain working group UN CEFACT TBG5. EDIFACT has been adopted by the International Organization for Standardization as the ISO standard ISO 9735 [8].

Therefore, EDI standards are set for the purpose of better communication and time saving for all partners involved in freight container, as well as for all actors involved in international freight trade. The system can be recognized by different software programs used by port authorities, customs offices, shipping lines, owners and managers of ships, owners and leasers of containers, transport companies, importers and exporters, dry ports, and all others sharing the same information about the cargo and goods to be transported, EDI being a fine logistic instrument, partially replacing paper work and increasing the speed of information exchange, being also supported by the internet use. Due to the use of EDI standards, improved customs clearance and inspection procedures are generating faster, more certain and, ultimately, less costly trade transactions. The computerization of customs procedures has resulted in time and cost savings due to the reduced need to prepare, handle, store and deliver customs documentation.

Improvement in communication, access to information and the transparency of customs processes and appeals have increased the level of certainty and fairness. A good compliance track record has resulted in faster clearance and less intrusive verification techniques. Importers know the amount of duties and taxes owing as a result of clear and consistent rules. More efficient clearance will produce time and cost savings and provide the certainty required to exploit modern business practices such as "just-in-time" inventory [9].

One of the advantages of using EDI is cost reduction which, on its turn, triggers efficiency by rationalization and automation. Also, the usage of EDI/EDIFACT systems may lead to other strategic benefits, such as higher customer satisfaction through shorter order processing time or the optimization of value-added chain. Despite this potential improvement, a lot of companies do not use EDI for the transfer of business data yet, due to lack of knowledge.

3. RFID – RADIO FREQUENCY IDENTIFICATION

An article [10] shows that although millions of containers circle the globe and 250 million container movements are performed around the globe yearly through 220 ports, only approximately 2% of in-transit containers are physically inspected, while empty containers are rarely inspected. A serious container event could trigger a worldwide massive port shutdown. Government security officials recognize container shipments as one of world's greatest security threats, and consequently press for dramatic improvements in air and maritime security. Port Authorities are striving to increase efficiency through effective supply chain management, while focus is being placed on control, visibility and security [10]. The idea is based mostly on the

possible implementation of an RFID (Radio Frequency Identification) based container tracking system for dry port or sea container terminal. RFID will enable the identification of containers over long distances and in demanding environments such as the port area. This will help real-time identification and tracking of containers, thus reaching new levels of traceability and control. Companies will know, at any point in time, where their assets are, and all movements at key locations will be recorded for eventual streamlining and optimization. These will lead to a reduction in capital costs and significant overall savings in the long run for container terminals.

A new ISO (International Organization for Standardization) technical specification will help a proper implementation on the market for Radio Frequency Identification tags for freight containers, despite the difficult conditions which are encountered in maritime, rail or road transportation of goods by containers. The above specification has been named by ISO standards, ISO/TS 10891:2009. This specification provides a set of rules and methods, which are to be applied to RFID tags, which serve the chain supply linked by freight containers. The RFID tag has a unique reading of information and it contains identification and physical description data of the container, being applied on a permanent basis; it must also permit the same identification rules until the container is out of use.

The major functional advantages of RFID tags are (but not limited to): performance criteria necessary to ensure consistent and reliable operation of container tags within the international transportation community; physical location of container tags on containers; features to inhibit malicious or unintentional alteration and/or deletion of the information content of container tags when installed on a freight container.

It is intended to be applicable to freight containers as defined in ISO 668 as well as to other containers not defined in ISO 668 as well as to container ancillary equipment such as road and terminal chassis, generator sets and power packs (ISO 2006) [11].

The use of container tags and the equipment of containers for automatic identification are optional. The purpose of ISO/TS 10891:2009 is to optimize the efficiency of equipment control systems and to assist in container security initiatives and programs, including the optional usage of electronic seals in accordance with ISO 18185, and any subsequent International Standards. For this reason, any container tag system used for identifying containers shall be non-proprietary, in accordance and compatible with ISO/TS 10891:2009 [11]. Recent developments in the sphere of international trade have increased the need for tightened security, for increased efficiency, as well as visibility. The dual missions of protecting a country and collecting duties and taxes drive governments' interest in maintaining the integrity of the supply chain. The interest of private companies in just-in-time, reliable delivery, cost effective logistics, and maintaining the integrity of goods leads to the development of many tracking systems. The main reasons for the implementation of an RFID container tracking system arise from the concern that a lot of containers are misplaced, tampered with at other ports, lost in transit.

Linking all the port stakeholders in the supply chain and using a proper information system can further enhance the RFID container tracking solution. This will undoubtedly facilitate the easy delivery of cargo with an accurate and timely flow of information.

The private sector will be responsible for triggering the development and enhancement of technologies, which further expand current container tracking capabilities. The governments can provide incentives to companies developing tracking alternatives or mandate the use of certain technologies on all cargo/container shipments. As they progress, more quantifiable information will be available, allowing for countries and companies to make more informed decisions regarding cargo, vehicle tracking and associated technologies. While there is currently no mandate for RFID in any of the current regulations, there is every indication that it will be recognized within a few years as a means of compliance [10].

CONCLUSIONS

Using EDI standards brings major benefits to managing a logistic supply chain. Exporters have benefited from having similar customs rules and procedures applied across the international market, thus increasing market access opportunities while reducing costs and complexity. Customs Brokers have the opportunity to refocus their services from dealing with forms to using their expertise and knowledge to bring a new range of professional services to clients operating in a continuously expanding and evolving trade market. Carriers benefit from faster service, lower costs and the ability to use their equipment to its utmost capacity rather than having it delayed at Customs.

Efforts to improve the security of the container shipping system continue to be focused on ports and facilities. Unfortunately, the route over which cargo travels is vast and difficult to secure. Security efforts should address vulnerabilities along the supply-chain network edges so as to keep the cargo secure while it is en route, hence moving along for a comprehensive strategy to secure the global container supply chain. The RFID technology can be further enhanced to detect weapons or illegal shipments by offering remote scanning of explosives and radiation detection to improve the security of the container shipping system in dry ports.

Tracking offers benefits to both private and public sector individuals, allowing for real-time visibility of goods and the ability to receive advanced information regarding cargo and security status. The primary means of tracking cargo through RFID and GPS technologies are quite common; yet they still require further development to truly provide accurate and secure information with regard to the location and status of containers.

This paper has shown that different existing technological means and standardized instruments can be applied with major benefits in implementing and operating supply chains, working with containerized goods for reducing costs, for time-saving advantages, improved communication and security information, as well as for better environmental protection.

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