

LOGISTICS AND SHIPPING INFORMATION SYSTEMS IN TURKEY

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Abstract

Logistics is becoming a necessary factor to be competitive. In logistics systems; diversified products, short order cycle times, shipping in small quantities, high frequency and reliability of deliveries, customer service orientation, low stock level and rapid inventory turnover, timely and accurate information requirements are common features. Besides, higher customer's expectations of services and / or products, increased globalization of business are factors that will impact future logistics management, and increased global competition are factors that are important in future logistics management. As it is widely accepted, there are two common flows in logistics, namely: material and information. Logistics information systems are effective tools to establish efficient and effective information flow. The logistics information capability which facilitates efficient information flow is also a very important element in further improvement of the logistics systems by enhancing the productivity of the logistics system by enhancing the productivity of logistics activities. In this paper, an outline of the components of logistics and transport information systems are given. Second, the infrastructure for logistics information systems in Turkey is explained.

Keywords: Logistics information system, Document flow in trade and shipping, e-government, Turkey

INTRODUCTION

Logistics competitiveness is an important factor in determining the competitiveness of industries and the nation especially in the era of globalization. Although there has been many definitions of logistics, it has been defined as “the process of maintaining the flow of raw materials, parts, finished products and related information from the supply source to the point of consumption in order to satisfy end-

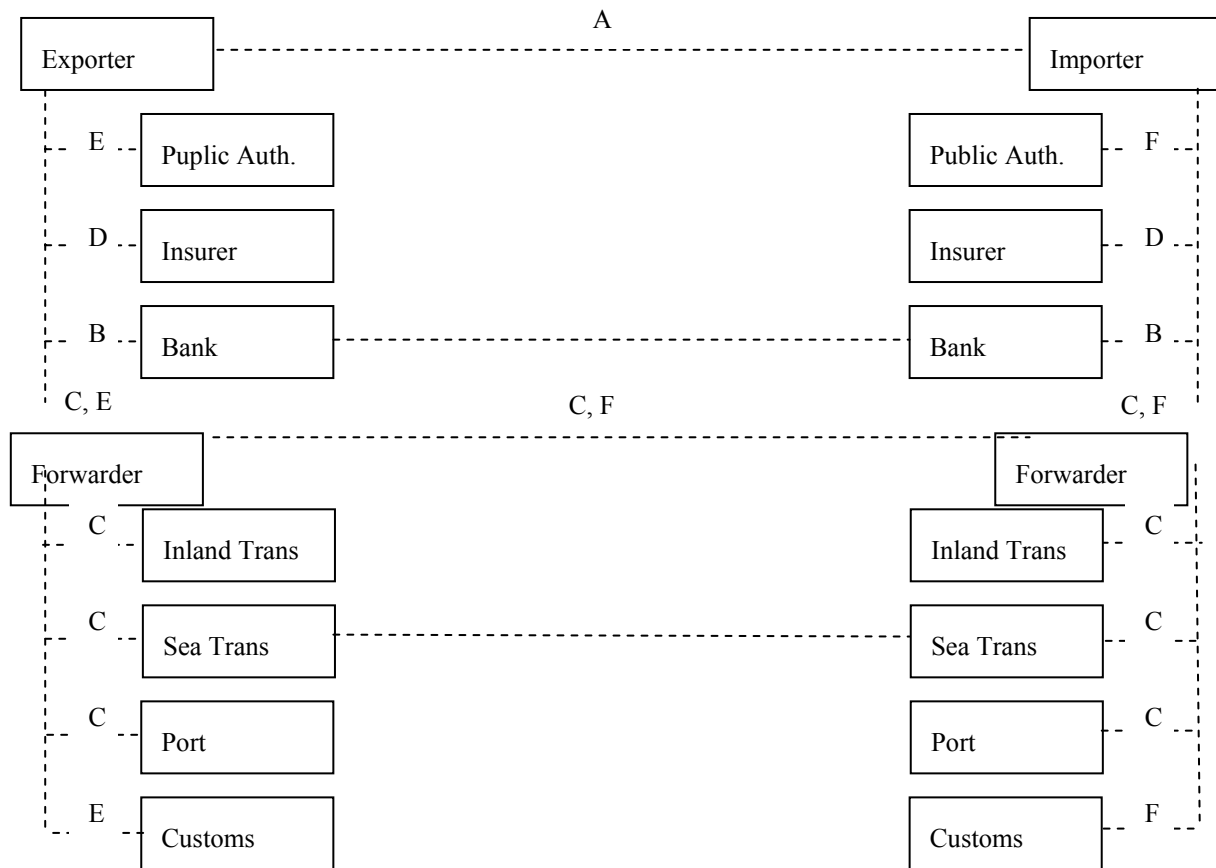
customers' needs and wants". This definition has emphasized the information flow and management compared to the former definitions of logistics. As Loebbecke and Powell(1998) emphasized efficiently managed data and information exchanges "information logistics" along the logistics chain are becoming crucial. Min and Eom (1994) stated that a substantial number of Franz Edelman Awards for Management Science Achievement, sponsored by the Institute of Management Science, go to logistics applications every year.

Due to the importance of information in logistics and transport, an area of "logistics information systems" has developed. As it's easily compiled from the definition of logistics, transport is an important process in logistics. Relation between logistics and transport resulted in the definition of transport also. In relation to this, definition of transport has changed from a traditional role to a redefined role (Crowley, 1998). It is said today every business competes in two markets: the marketplace, in which resources and products exist physically and require traditional freight transport services and the marketpace, which is a virtual world of electronic commerce in which the main object of transaction is information.

Because of competition in the logistics supply, shippers can now expect high standards when they outsource their logistics activities. The quality of information support as shippers need to exert tight control over their logistical operations. Shippers want also detailed operational information to acquaint themselves with the physical operations and maintain expertise in this area (Cooper, 1996).

1. INFORMATION SYSTEMS IN TRANSPORT AND SHIPPING

Strategic use of IS, cooperation and back to the core business as reactions to the business trends such as changes in technology, commercial relations and market developments have resulted in increase in use of IS and business networking. Both strategic and tactical use of information system is having a profound impact on business so that in some circumstances the flow of information, rather than goods, is the key asset. As explained by Debicka (2007), price was the main market demand for business in 1960s. From 1980s, delivery time was the new market demand for business. Besides, Sum and Teo (1999) stated that, there is consensus that information technology is a crucial component in logistics service providers' strategic and operational makeup and technology will be a key impact agent in the future logistics industry. The demand for delivery time caused the birth of new information system applications in transport, shipping and logistics. The potential applications of information system in transport and shipping are almost limitless ranging from automatic vehicle information, barcoding, in-vehicle navigation systems, two-way communication systems, warehouse information systems, port information systems, tracking and tracing systems. Besides, Sum and Teo (1999) stated that, there is consensus that information technology is a crucial component in logistics service providers' strategic and operational makeup and technology will be a key impact agent in the future logistics industry. It has been suggested that logistics service providers should offer the services of a "flow management mega sector" rather than just transport or other more traditional elements of logistics. In order to realize IS applications, it's necessary to figure out the document flows in international trade and shipping.



Main Functions

- A Establishment of commercial flows.....Commercial
- B Arrangement of payment.....Financial
- C Arrangement of transport.....Transport intermediary
- D Arrangement of insurance.....Insurance
- E Clearence of export.....Official
- F Clearence of import.....Official

Data Flows

Figure 1. Data flows in international trade and shipping

1.1. Benefits and Applications of Information Systems in Trade and Shipping

Modern IS advances have changed the nature of international business and shipping. With widespread international sourcing of goods, manufacturers need to know the status, location and delivery dates for their shipments. International trade has always been characterised by the substantial paperwork that accompanies it, with documents showing the ownership and nature of the goods carried. Such a system lend itself to electronic transmission. Intermediaries such as freight forwarders have always processed the complex documents of international trade and transport, and one study has argued that the very survival of freight forwarders might depend on their information management capabilities (Ozsomer et al., 1993).

The benefits of the use of information systems in logistics and shipping can be summarized as: better supply chain management, inventory efficiencies, shorter lead times, better customer services, better use of resources, logistics cost savings and improved internal process. Different logistics and transport business areas have tended to become computerized at different times. A survey in the UK in 1991 found that inventory control was over 70 % computerized, where as it was less than 20 % for warehouse automation (KPMG, 1991). A survey covering seven West European countries found that there was still significantly more attention given to computer applications in commercial applications, such as order processing, purchasing and inventory control than to more transport-related areas such as vehicle routing and scheduling (Touche Ross,1995). A survey published in 1998 found that 55 % of organisations throughout Europe had implemented an integrated software system, and 40 % of respondents were using EDI, mainly for placing orders and receiving delivery notification. 35 % were using Internet, but mainly for publicity through web pages. In a era of rapid technological advance, any such survey will become outdated very quickly. Indeed, since 2000 there has been an expansion of interest in so called dot.com businesses including internet-based freight auctions intended to bring together shippers and carriers.

1.2 Document Flow in International Shipping

Figure 1 explains the data flows in international trade and shipping. Hence, it is necessary to examine the document flow in detail. Figure 2 tries to show detailed document flow

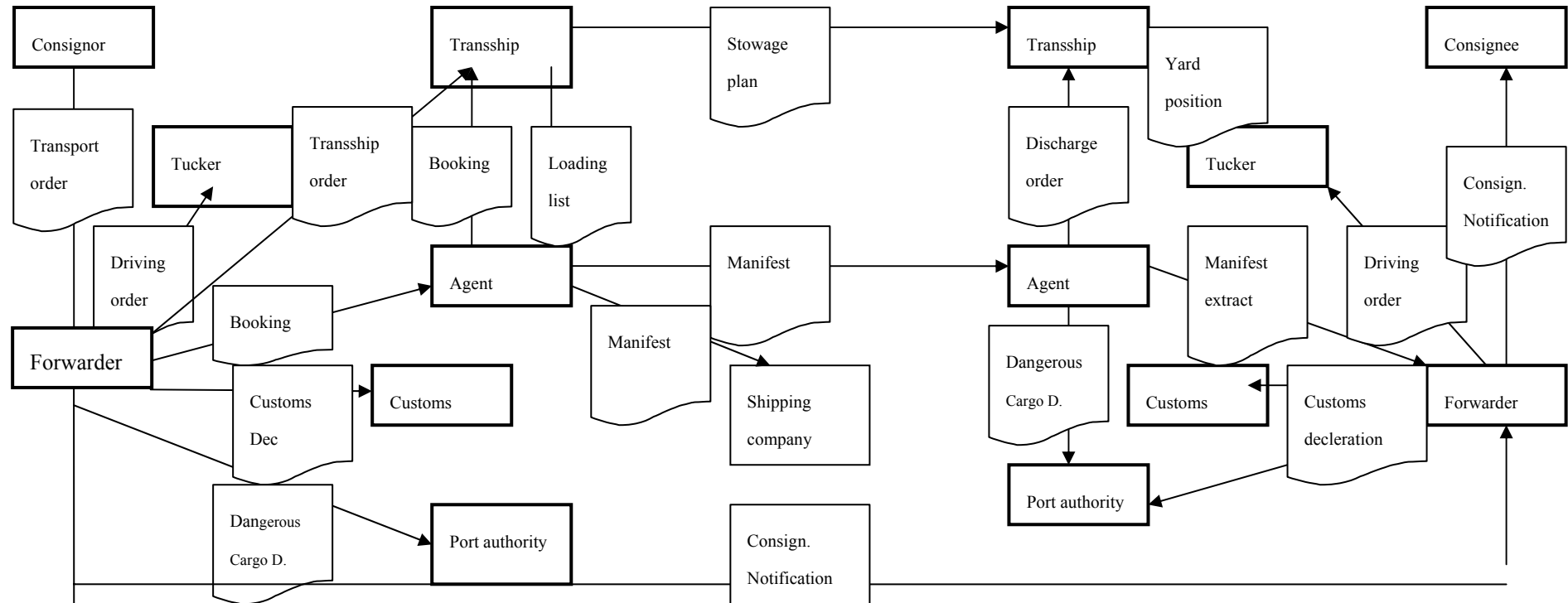


Figure 2. Flow of documents in international shipping

1.3. Difficulties in Traditional Information System in Seaborne Trade

However, classical (or traditional) information system in seaborne trade based on exchanging of paper documents has many faults:

- There are delays in delivering documents to different partners;
- Costly and time consuming, manual or partly automated processing, editing and transmitting paper documents
- Too many unformalized contacts between different partners; lack of precision
- Flow of information and cargoes is not synchronised: cargoes arrive before relevant information, or documents are not available with sufficient time advance
- Same information are inserted many times and multiplication of errors occurs
- Critical situations arise because of improper handling of dangerous goods
- Management decisions are delayed: current operating situation precedes decisions which relate to already past situation
- Resources are not utilized efficiently (e.g. containers)
- There are legal conflicts and complications connected with demurrage, charters, conditions of transport and storage, bills of lading and so on, mainly because of errors in documents.
- Double cargo bookings occur
- Sequence of cargo handling operations is not optimal, both in discharging and loading
- It is difficult to indicate critical points in the transport chain infrastructure
- Requirement for cargo-handling equipment is too often neither excessive or unsatisfactory
- Cost of storing cargoes are higher

1.4. Information System Applications in Maritime Transport

Maritime transport is not isolated but embedded in intermodal transport chain. Intermodal transport chains are inherently complex. As noted by Dürr and Giannopoulos(2003), even the simplest chain which consists of two modes of transport, requires the interaction and exchange of information between 8 different “agents” or “parties” which are by definition “sources of information” – receipt or transmittal. Considering the nature of transportation, information in the transport chain can be typified by the following attributes:

- Many sources of information
- Great diversity of form and contents of information
- Many receivers of information
- Changing intensity of information stream over time,
- High quality and reliability requirements
- Necessity of high speed of data transfer
- Confidentiality of data

Users of information system in transport and shipping industry are: port operators, shipping lines, ship agents, forwarders, port authorities, customs authorities, truck/railway operators, local/regional authorities, stevedores, logistics companies, manufacturers, exporters and importers. As explained by Dullaert and Landeghem (2007), tendency to increase collaboration in the transport chain induces a large demand for increased information system integration of the cooperating parties to obtain real-time exchange of information.

The shipping industry with its global operations is ideal for information system. Through IS, a shipping company can transmit a high volume of ship manifest or stowage plans to partners around the world. But shipping is one segment of international supply chain. Goods cannot flow if information does not flow in modern global business environment. That's why latest definition and concepts of logistics emphasizes the importance of information and documentation flows and management. Because the information flow is so intrinsic to the physical movement of goods, information processing is as important as the physical movement itself. For a shipping line, the information flow at the point of sale confirms the cargo booking for a particular vessel. The booking information goes through internal electronic data processing systems, to print the bill of lading automatically after loading. Besides, order registration and tracking is defined as the primary real-time process that provides value of time to the customer (Dullaert and Landeghem, 2007).

The development of information system in maritime industry has led to wider use of Internet with more sophisticated web sites, although some are still merely extensions of the company brochure, offering only advertising info. Nevertheless, on-line schedule information and container tracking and tracing facilities are becoming more widespread. The electronic printing of bill of lading for shipper has increased with the investments in information systems in liner shipping industry. Most modern ports have implemented information systems and EDI. EDI system allows forwarders and ship agents to submit cargo advice and customs declarations prior to arrival of a vehicle, to the advantage of the traffic flow through the port. EDI installed in a port can reduce congestion and container residency time, which in turn should reduce demurrage costs to shippers. Use of EDI in ports enables the terminal management to plan the yard layout, equipment and personnel requirements in advance. Hence, operational advantages of information system usage in transport and shipping can be summarized as: shortened logistics turnaround time, increased quality service, improved quality internal process, cost saving, electronic partnership and more added value and information services.

Maritime transport is not isolated but embedded in intermodal transport chain. Intermodal transport chains are inherently complex. As noted by Dürr and Giannopoulos(2003), even the simplest chain which consists of two modes of transport, requires the interaction and exchange of information between 8 different "agents" or "parties" which are by definition "sources of information" – receipt or transmittal. The possibility to plan and control by integrating relevant and reliable information from different transport and traffic systems even become more important. Transport chains need information chains. Small medium sized transport companies and forwarders have to cope with this requirement to stay competitive. Conventional ports have transformed into IS based logistics platforms considering the requirements of port users. EDI is used mostly by the largest port communities. Small and medium sized ports are less equipped with telematics. Internet is developing very fast and there is a full benefit with web-EDI. Main reasons for using web-EDI are: SME can be forced to report electronically by the market, companies can be forced to report electronically by regulations e.g. for dangerous goods declarations in sea ports and status monitoring. Flexible and low-cost tools are required for communication in transport and shipping.

2. INFORMATION SYSTEM APPLICATIONS IN TRANSPORT IN TURKEY

In Turkey, information system usage in logistics industry is increasing rapidly. To take a note, the most important reason is the integration of global commerce and Turkey, and the speed in freight distribution. Diversity of products and increasing trade volume caused difficulties to identify the location of cargo. There are three levels of road freight operations where information technology is used: i) Management and logistics functions where IT is used mainly for communication and long-term planning, ii) fleet management functions such as route planning and scheduling, iii) vehicle management including trip planning and cargo identification.

As in other countries, it is better to explain the information technology applications in Turkey in two related dimensions:

1 – Information System in Logistics Companies: The modules used can be described as: Transport Organization; Route Planning; Vehicle, Cargo, Driver Monitoring Systems; Warehouse Information Systems, Customer Relationship Management, etc.

2 – Applications in Public Organizations: Should have data about operations in modes: highway, airway, seaway, railway, pipeline, customs.

Applications in public organizations can be defined in e-government applications in Turkey. Wu (2007) defined e-government transformation is one of the biggest challenges within the IT-related sector from the perspective of scale and complexity. E-government movement is being driven by reforms in public administration. Public sector reform can be grounded to New Public Management concept which represents administrative reform movements originating in several Anglo-Saxon countries such as the United Kingdom, Australia, and New Zealand since the late 1970s (Kettl, 1997, 446). In general, e-government activities can be organized into three main groups or sectors which analyze the relationships between government and citizens (G2C), business (G2B) and other sectors of government (G2G). Transport related applications related with e-government in Turkey are explained in Table 1:

Table 1: Transport Related E-Government Applications in Turkey

Project Owner	Project Name	Objective
	GIMOP (Customs Office Modernization Project)	Aims at solving problems,(facilitating e-Trade and preventing illegal trade), encountered in customs processes, by means of automating all of the customs procedures, and modernizing the customs offices through this project.

	Computerized Customs Activities (BILGE)	A software enabling the customs activities to get actual timed computerized. Putting this software into effect has made it possible for 69 customs office to realize through on-line basis 99.5 of the foreign trade transactions in addition to the documents required by various other institutions. Besides, through the software, all the processes – from the point of arrival of the goods at the customs to the point where the import or export transactions are completed – are online and real-time basis.
	BILGE-EDI	Through this facility, (Internet and/or Electronic Data Interchange), the related parties/companies are able to issue customs declarations in their own offices.
	Project for the Security Systems at Customs Gates (GÜMSİS)	Aims at investigating the illegal flow of goods, vehicles and people. This system has been put into practice, having provided all the required equipment and software. (e.g. Control center, Vehicle routing system, GPS). The project also aims at exchanging data through domestic and international intelligence associations; establishing strong intelligence and audit fleet well-equipped with ethical values so as to fight against smuggling and corruptions; putting into practice advanced technology (GPS,etc) value input data so as to prevent low or high value good releases; proacting in providing data for goods and passengers by means of electronic data exchanging with the seaports and airports through which goods and passengers enter Turkey
	Customs Data Warehouse System (GÜVAS)	Decision makers are provided with rapid and reliable information by means of accumulating / collecting all the information related with the imports, exports, transits and smuggles operated and recorded by all the customs offices throughout Turkey at a central data base established at the Undersecreteriat for foreign trade.
Undersecreteriat for Maritime Affairs	Vessel Traffic Management and Information System for Turkish Straits:	The project aims at providing navigation safety through entries and exists through the Straits. This project makes it possible for all shipments / traffic through the Straits to be monitored by the traffic control stations. Those who will make use of the data / information to be produced by this system are the ships passing through the Straits with or without transits, the shore-based pilotage units, the units providing towage and tugging and escort services, harbour masters.

Ministry of Transport Land Transport Office	ULAŞNET	The project will provide online record the information about all the entering or existing vehicles and navigators and thus to easily provide the relevant statistics
	Land Transport Automation Office	With this system, all transactions will be carried out rapidly due to computer support; as it will be possible for individuals (citizens) to apply through Internet, visits to Regional Authorities (offices) will be minimized; rapid and healthy audits will be possible; and through integrations with the other related state offices, the processes will be effective.
General Management of Turkish Railways	Computerized Ticket Sales and Reservation	This system has made it possible for the citizens / individuals to make use of the Internet and Intranet facilities in getting tolls/tickets, returning or changing tickets, reserving seats, access to the information desk, etc.
	TCDD Enterprise Resource Management	This is a project aiming to manage all the activities carried out in all the TCDD units, starting with the operational activities through an integrated information system.

Source: Compiled from <http://bilgitoplumu.gov.tr/yayin/eDevletProjeveUygulamalari.pdf>

As it can be seen in Table 1, owners in e-government applications in Turkey are: customs, Undersecretariat for Maritime Affairs, Ministry of Transport Land and Transport Office and General Management of Turkish Railways. Customs was the first point for transport related e-government applications. However, an integrated system has not been realized yet.

CONCLUSION

State-of-the-art communications are fast becoming a necessity in today's international transport and logistics industries such as: electronic data interchange, freight consolidation, warehouse management systems, bar coding, vehicle routing / scheduling, RFID, automated storage / retrieval systems, satellite communications technology, voice input interfaces. Complex logistics and supply chains offering a fast, quick and flexible responses to customer demands, require an accurate flow of information for tracking, planning and control. Logistics companies are rapidly developing information system applications for their operations. However, effective and efficient logistics operations also require country-wide applications since there are lots of partners in logistics operations. Countrywide information systems, namely related with e-government, should integrate transport modes and partners. However, it is to be accepted that Turkey is just in the beginning stage of mentioned integrated applications for transport modes and partners in transport. In Turkey, it can be said that ports are the weakest point for an integrated information system. Therefore, it can be suggested that the most immediate action for integrated transport systems is developing port information systems. Going through the European Union projects, it can be easily discovered that projects aiming integrated modes are going back to the beginning of 90's. In Turkey, there should

be more projects which are aimed to integrate transport modes and freight distributions. The other suggestion for future studies is to develop how users of logistics information systems perceive the benefits and barriers while using these systems.

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