Model Automation for Managing Port Processes

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Abstract: This article aims to present a model based on information technology (IT), intending the automation of international trade processes, involving importers and exporters through the electronic exchange of data focusing the management of the supply chain. Initially, a literature review was performed on automation processes in the logistics trade. The research also pinpoints Brazil´s current situation in the face of the foreign trade worldwide, presenting the development of logistics processes with the use of IT in creating an integrated model which adheres to the business of companies for the increase in Brazilian exports compared to other ports.

Key-Words: International trade, Performance of Micro and Small Enterprises, Ports of Integration, platform of integration, Supervia Electronic Data-SED (electronic data highway – EDH).

1 Introduction

According to the Ministry of Development, Industry and Trade [1], in 2006 the Brazilian exports amounted to US $ 137.471 billion, representing an increase of 17.1% (based on the daily average) if compared with 2005. To maintain this rate of growth, investments are needed in the control and monitoring of activities aimed at the management of the supply chain. The model used in this article was the Electronic Data Highway (EDH) which, according to Torres (2007)[2] and Braga (2002)[3], was created as a technology tool that facilitates the entry of small and micro companies in this market through the automation of the processes of trade. Therefore, an effective environment of control and management of location and tracking of cargo during export and import is created, using Port Authority as a starting point.

			EXPORTING					
	P I B BRAZIL		WORLD (FOB)		BRAZIL (FOB)			
PERIOD	US$ bi (A)	Tx. real %	US$ bi (C)	Var. %	US$ bi (B)	Var. %	Part.% B/A	B/C
1950-1959	153,8	7,1	842,3	-	14,5	-	9,4	**1,72**
1960-1969	254,1	6,2	1677,8	99,2	15,9	9,7	6,3	**0,95**
1970-1979	1.230,7	8,8	8199	388,7	82,6	419,4	6,7	**1,01**
1980-1989	2.619,7	3,0	21248,6	159,2	254,9	208,6	9,7	**1,20**
1990-1999	6.082,8	1,7	45367,9	113,5	427,3	67,6	7,0	**0,94**
2000-2006	4.870,6	2,4	113384,9	149,9	1.125,5	163,4	23,1	**0,99**

Table 1: Evolution of Brazilian International Trade

2 Competitive Advantage

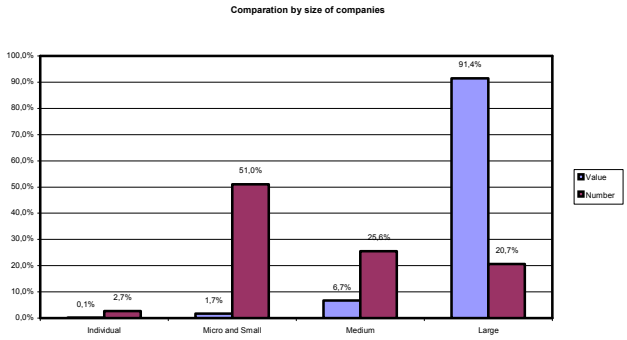
According to Porter (1989) [6], the search for competitive advantage as a source of strategic differentiation is the norm for modern companies, particularly in the export and import sectors in an increasingly competitive and globalized world economy. The frequent changes in the business environment require companies to have a high adaptive capability, leading them to adopt different positioning strategies, which can generally be classified as a competitive advantage through price or through differentiation.

As per Kauffman (2001) [7], in the business scenario, remarkable efforts in corporate strategy are made aspiring the creation of competitive differentiation. These distinctions tend to lead the companies to focus their resources towards activities necessary to the maintenance of their business, and, at the same time, trying to maximize their overall performance through the use of partners that possess the excellence necessary for their interaction with the currently globalized market.

3 Brazil in the Internacional Trade

According to Castelar (2002) [8], the development of international trade is moving towards the use of IT to speed up the communication between companies and to allow the reliable product control, even in small quantities.

The domestic entrepreneur, especially one whose main activities are transactions of purchase and sale in the domestic market, is situated within this context.
Our analysis found that, from 1950 to the present date, the participation of Brazilian exports in the international market has not presented significant changes in the global scenario of exports, as Brazilian exports consistently constitute around 1% of world exports.
According to the analysis conducted by the Ministry of Development, Industry and Trade[1], the Brazilian exports of 2006, according to company size, show that more than half (51%) are from micro and small enterprises; 25.6% are from medium businesses; 20.7% are from large business; followed by individuals, with 2.7%. The number of exporting companies decreased 2.6%, in absolute terms, if compared with the same analysis for 2005 (graphic 2).



In 2006, of the total value of exports, 91.4% is represented by large companies; 6.7% by medium companies; and 1.7% by micro and small enterprises. In 2005, the same categories represented 91%, 6.9% and 2%, respectively.
By analyzing the values of exports and the number of exporting companies, and comparing data from the years 2006/2005, it is observed that the average exported amount increased in all categories; micro and small companies (+6.6% from $ 190 thousand to $ 202.5 mil); medium businesses (+15.4% from $ 1.357 million to $ 1.566 million); large companies (+16.2% to $ 22.670 million for US $ 26.352 million); and individuals (+ 12.2% to $ 285.2 thousand to $ 320 thousand).
According to SEBRAE (Brazilian Service of Support for Micro and Small Enterprises)[4], the foreign trade sector is a priority, especially with regard to small and medium business, which are responsible for two thirds of the country's jobs. Small and medium businesses tend to increase their number of employees and collaborators as sales improve. Conversely, large businesses generally base their undertakings upon technological solutions and, therefore, do not follow the same pattern.
One of the reasons for the low rate of export by micro and small enterprises, as released by the Ministry of Development, Industry and Trade, is the bureaucracy and the difficulties in the export procedure. According to the micro and small enterprises, this difficulty is due to the lack of information and specific expertise.

4 The Procedure Export in Brazil

To assess the current situation of Brazilian exports, based on industry, the model of the 5 Forces of Porter [9] will be used.
The Model of 5 Forces is based on the analysis of the influences of:
1. Customers
2. Suppliers
3. Substitutes to the product or service offered by the company
4. New entrants
5. Competitors

According to this analysis, the power of customers and the intensity of the rivalry between the competitors have caused a fall in the prices of major products. Another factor observed is the stagnation of the Brazilian industry which affects mainly companies with high indirect costs. A possible solution to overcome this situation would be to reduce the cost of products and/or seek new markets.
Within these scenarios, it is clearly noticeable that the international environment facilitates the export of Brazilian products. By analyzing the data of the port of Santos, the largest port in Latin America, we observed that the volume of cargo more than doubled in the past 5 years (CODESP, 2007)[5]. Thus, the automation of processes and methodologies becomes necessary, with the creation of a model of information technology (IT) to evaluate the actions and transactions between the actors involved (suppliers, buyers, public agencies, among others).

5 Bureaucracy as a Bottleneck in the Process of Export and Import and Deployment of Electronic Data Highway – EDH (Supervia Electronic Data-SED)

The companies that make up the port community submit the data to the authorities in the form of paper documents, which are collected and digitalized by their own staff in their IT systems. The authorities involved in port operations such as port authorities, customs, maritime, police, sanitary and phytosanitary, request similar information. This involves a multitude of data on paper, which is prepared and submitted in different formats, but with similar content. In addition, there is also the organizations that manage labor (OGMO's), responsible for the recruitment, selection and training of port workers (TPA). Using data on paper is a low-efficiency process, due to errors arising from multiple data entry and loss of documents. The end result is that the procedures are often slow, expensive and prone to errors.

The human interference in the system is quite significant, which compromises the quality of the information. For that reason, the EDH introduced the use of EDI (electronic data interchange) in the implementation of automated systems, which allows the exchange of data between the various actors and the organs of government involved.

The adoption of electronic data interchange systems, similar to those used in other ports in the world, was always a goal to be achieved in Brazilian ports. However, this solution had restrictions due to the high costs involved in its implementation, which can amount to tens of millions of dollars.

Taking into consideration the need for multiple submissions of the same information to the various port agencies, the use of the Internet was adopted, thus allowing the electronic exchange of data without the necessary adoption of specific communication infrastructure. Thus, the EDH allows a single submission of information that various organs require. This provides a direct and secure transfer of data between the systems of users of a port, including exporters and importers, authorities and other bodies involved in its operation.

The model implemented in ports introduced the electronic document management system known as Documentation Center-CDOC. This system is implemented in the Port Authority, in the ports of Santos, Rio de Janeiro and Sepetiba and the Customs at the port of Victoria, and aims to receive and distribute the information to other agencies involved. The CDOC has no data base, and its function is that of a "postman", which is simply to receive and deliver the documentation, validating its content, formatting and distributing to each organ the information that it requires. The use, storage and processing of data is the responsibility of each organ.

6 Description of the Eletronic Data Highway - EDH [Supervia Electronic Data (SED)]

6.1 Integration Model

Integration of Port authorities through administrative procedures.

6.2 Integration of Port Authorities

- Organs of government
- Logistics Operators
- Importers and Exporters
- Integration of port processes through EDI protocol

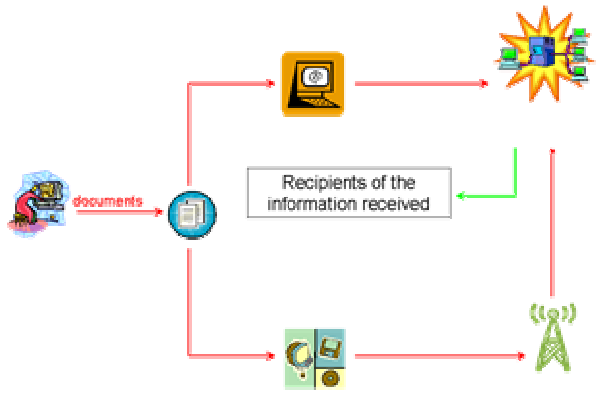
6.3 Processes Raised

- Docking
- Bill of Landing
- Loading and Discharge Report

6.4 Connectivity the Internet

An important feature of EDH is the connectivity through the Internet, enabling the integration of Exporter Users and Importer Users, though geographically distributed, to the processes of the EDH.

6.5 Operating Model



The statistical management system receives data, stores it in its own database which incorporates information, allowing development / integration of intelligent system to aid scheduling the docking of vessels, to review operational and tabulation of quantitative load, the billing charge of port and the management of lease contracts. The main hypothesis of this management system is the complete knowledge of the transported cargo.

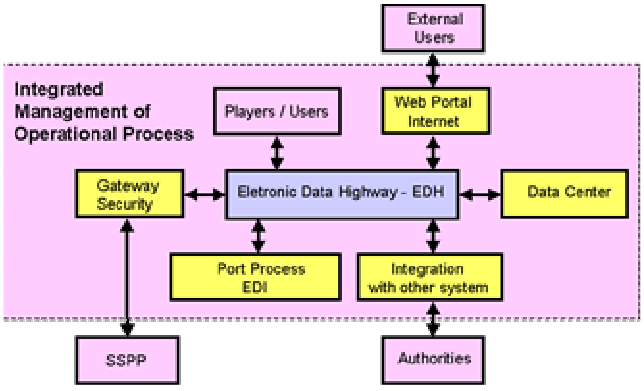
The information exchanged is:

- Request for docking;

- Cargo Manifest to load and unload;
- Loading and Discharge Report;
- Request for internal transfer;
- Gate in;
- Gate out;

6.6 Interface with the Port Authorities

This system facilitates treating the exchanged data, generating information that can be used in statistical reports, as well as enabling integration with legacy systems.



The purpose of Electronic Data Highway (EDH) is to facilitate the establishment of mechanisms that allow the verification and monitoring of the flow of boats and goods in the two paths - importing and exporting, loading and unloading - of responsibility of agents, port operators, and tenants.

7 Operational Strategy

In this model of Electronic Data Highway (EDH), the term Anchor Company refers to the company that sends and receives information concerning the process by which it is responsible. This company may be the provider, who will present information on the shipment of products, the type of transport, the amount transported, etc. The carrier, in turn, is responsible for sending information on the collection of products, estimates of delivery, routes taken, and so on. Therefore, the exchange and cooperation in a systematic way between the companies involved in the process of Supply Chain Management (SCM) benefit everyone involved. Due to the knowledge referring to the load, faster and cheaper solutions can be achieved. This is a great advantage of this system, because, without visibility in the transportation process, "prophetic" decisions are often made instead of the rational decisions allowed by the IT system.

According to Hayes et al. (1984), the cooperative relationships between all participants in the logistical process are developed through logistic partnerships, which result in benefits associated with the integration, such as greater control and predictability of physical distribution, avoiding the loss of strategic flexibility. In this sense, authors such as Devlin et al. (1988) show the relationships of partnership as an alternative. This is because logistic partnerships have been shown to be more efficient and flexible in several specific situations - particularly when the costs relative to the fulfillment of a certain level of service delivery are factored in – thus, showing that the use of IT and the automation of these processes are becoming increasingly necessary to ensure the exchange of information between anchor enterprises (buyers, sellers, transporters, exporters, importers, logistics operators, among others) and the organs of government.

8 Conclusion

As has been discussed in this article, it is necessary to emphasize that the government has a mission to further stimulate the economic growth and the strengthening of the country within the international market. International trade is a main concern, especially with regard to small and medium companies. To accomplish this commitment to development, it is necessary to change the focus of the action of the domestic entrepreneur to the new scenario, as well as to provide tools for integration that allow them to quickly position themselves strategically on the international market. This allows the target audience to identify opportunities for growth and clearly master the operational information, in order to successfully implement its international operations, and, most importantly, expand the base of support and economic expansion, specifically within the range that small and medium business entrepreneurs know: their own business.

The optimization of the information exchanges with the use of the Electronic Data Highway(EDH) will facilitate the integration of micro and small enterprises in Brazilian foreign trade, decreasing the existing bureaucracy. This would increase the efficiency and effectiveness of importers and exporters, bringing competitive advantages for the whole industry.

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