

INTERCOMPRAS® CONTAINERS: AN INTEGRATIVE TOOL OF THE LOGISTIC INFRASTRUCTURE AND MANAGEMENT OF SUPPLY CHAINS.

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ABSTRACT

Freight transportation is, for any country's economy, the backbone of the production and service activity logistic organization. At present, the trend of the international cargo movement is characterized by the increasing use of containers in the commercial trade of goods. This process is accompanied by two facts: in one hand production of containers worldwide is insufficient to meet the demand, and on the other hand the increases of containers' customs duties concepts such as taxes, delayed return cycles, etc., all of which results in the need for speeding up the rotation cycle of all containers at present available in the international trade. The InterCompras® Containers System provides a new concept for the logistic chain of containers' movement, with the support of Internet/Intranet software, as the backbone of the supply chains within the country, as well as of the traceability of these freights unitizing means.

Keywords: traceability, containers, supplies chain management.

1. INTRODUCTION

Freight transportation represents, for any country's economy, the backbone of the production and service activity logistic organization. At present it is recognized that businesses do not compete as isolated enterprises but as Supply Chains, and at present their transformation into Security Networks is envisaged. Supply Chains working within the national economy framework share the country's general service infrastructure such as containerized cargo management, sea transportation means, harbor terminals, railroad & road transportations of goods, road transportation, the cabotage activity, containers storing at different warehouse lots (Load & Unload Centers, hired warehouses) while at the same time chains make use of their own infrastructures.

In Cuba, due to its insular condition, harbor facilities are the main connection points to perform the exchange of merchandises. Also, its open economy accounts for the fact that all the supply chains within the country start at harbors, being these the places where raw

materials, components and parts of every kind, equipments, as well as other commodities are received. The worldwide containerized freight movement increases every day, and Cuba is not an exception (Vila, 2009). It is known that more and more shipping companies concede shorter expiry dates for containers returns, and that, at the same time, tax rates imposed on unreturned or delayed containers continuously increase. If each member of the supply chain has only partial information about the containers' situation, this is a risky condition for the economy. Therefore, it is necessary to devise an integral container cycle management which allows keeping a record of it traceability from its arrival in any harbor to its final return through the application of a new systematic model which by integrating this concepts, provides for a system of analysis and control as an accurate tool to take timely, effective, and efficient actions, in order to guarantee a high level of services to clients. A solid integration of these concepts is only possible by using advanced informatics and communication technologies and through its consolidation in an informatics system.

2. INTERCOMPRAS® CONTAINERS: A MANAGEMENT AND TRACEABILITY SYSTEM.

The development of the InterCompras® Containers Informatics System has focused on both the design, and the application of an integral control of container's cycle, which includes the main actors of containerized cargo movement chain throughout the country (Fig 1).

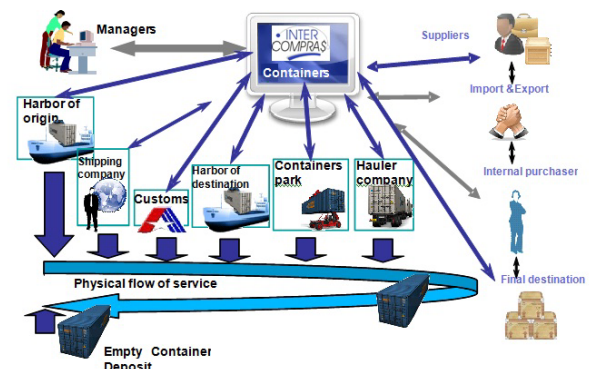


Fig 1. General design of the container management and traceability system.

The container management and traceability system is supported by the following 4 components:

1. The container cycle management model.
2. An informatics system to process information.
3. An infrastructure that guarantees connectivity among the framework links.
4. The education and training of the personnel in charge.

The basic principles on which the system should be based are meant for ensuring the following actions:

1. To trace out any container either at the export & import activities, or at the internal circulation of the national economy.
2. To keep up-to-date information record about each container registered into the system. Delays in gathering the necessary information should be kept at a minimum.
3. To trace out the whole container life cycle. For this, it is also necessary to keep focus on the global process.
4. To make an integral planning of the container's activities throughout its life cycle.
5. To keep control of the activities in which the container is involved.
6. To keep control of all the expenses resulting from each one of the container's activities.
7. To keep control on the accumulated expenses for each container.

2.1. Container Cycle Management Model.

The Container Cycle Management Model has been developed from the definition of the following elements:

- The container's cycle and its requirement.
- The container identification parameters.
- The container management parameters.

2.1.1. Container's Cycle.

The container's cycle definition has been conceived in a general way, from the primary actions to establish a contract and other details in coordination with the merchandise supplier, down to the final container returning operation to its owner (Fig 2.), so as to ensure an integral picture of the container's cycle. It also allows an accurate identification of the institutions responsible for each steep of the container's cycle, as well as the duration of each cycle's steep.

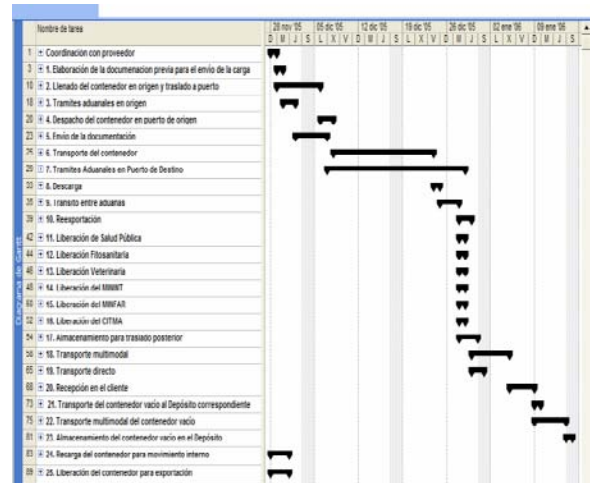


Fig 2. Imported container cycle.

The main requirements of the Imported Container Cycle are associated to the duration of some processes which are subjected to time regulations that should be met. If any importation container exceeds the fixed time duration values for a given process, it generally should pay a penalty in cash for that reason.

2.1.2. Definition of the container identification parameters.

In order to perform correct traceability actions of any resource, one of the essential requirements is to relay on an accurate definition of its identification parameters, since these allow resource localization at any moment of its life cycle. It has been already established 30 identification parameters for cargo containers, which are described in the InterCompras® Containers System Organization Manual. Among the main parameters are the followings: Identification Code; Type; and Length. Besides, the system allows users to add new parameters according to their needs. Fig 3. shows the Informatics System Interface which picks up the identification parameters of containers.

Fig 3. Identification Parameters of Containers.

2.1.3. Definition of the management parameters of containers.

The management parameters of containers should enable the planning and control of the container cycle, thus ensuring a reliable traceability of resources. The main management parameters of containers are the followings: process duration; process costs; container's state; and state of the activities. Gomez (2009) in his paper defined activities as "the total amount of tasks performed by one doer in a time period equal or longer than 1 day, within a process framework".

3. CONTAINER MANAGEMENT MODEL AUTOMATION.

The automation of the container management model has been made through the InterCompras® Containers System based on the concept of using informatics as a key factor to modify the general notions about management that should be introduced into the movement chain of the containers. Besides, the automation of the container management model should be evaluated from both the organization, and the informatics points of view.

From the organization point of view the InterCompras® Containers System has been conceived on the grounds of 2 basic functions:

1. To exert control:

- a) On container behavior throughout its life cycle
- b) On the behavior of all participants at the container movement chain within the country

2. To conduct the planning of:

- a) The container movement throughout its life cycle performing a service.
- b) The activity level that each participant of the container movement chain should be performing in a given moment.

From the informatics point of view the InterCompras® Containers is an automated system which is structured to respond for the 5 basic processes of the organizational concept showed in Fig 4.

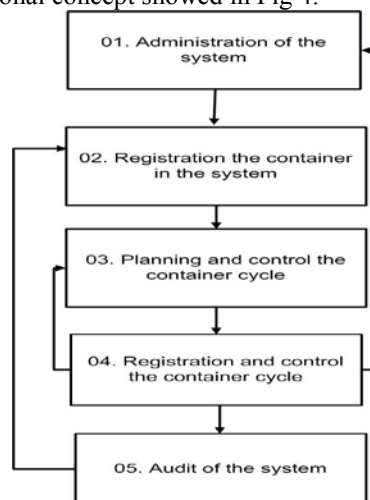


Fig 4. Container Management and Traceability System Processes.

The container management and traceability activity as supported by the InterCompras® Containers System, which in turn is backed up by either Internet or Intranet, maintains a constant communication among all the container movement chain participants 24 hours a day, 7 days a week. The status of each container is actualized at each defined control point at the chain. Also, it is possible to use different alternatives such as manual work, filing, web service, etc. to recover as well as to transfer data into the System.

4. SUPPLY CHAINS AND CONTAINER MANAGEMENT AND TRACEABILITY.

Nowadays the enterprise management in Cuba should be adjusted in accordance to new paradigms such as the followings:

1. To accomplish the integration of the whole chain (or network) from suppliers to final customers.
2. To perform a temporary synchronization of the results of all chain processes.
3. To produce and to supply at any moment according to the demand.
4. The final costumer keeps pulling the movement of the entire chain.
5. Enterprises become competitive as a participant in a chain, not individually.

In order to fulfill these paradigms it is necessary the use of sound logistics concepts, and an integral management of the supply chain. (GICS) (Acevedo, 2008).

The InterCompras® Containers System provides a modern concept as to the logistic chain management of containers movement as the backbone of supply chains within the country.

The application of this System in any company has a significant impact since it allows identifying and to conduct the planning concerning the localization and activities of each container moving through the logistic chain, supported by software based on the Internet/Intranet service, with a more proactive planning and control of container's cycle. At the same time, the system allows the planning and control of the activities level of each participant within the supply chain, as it is showed in Fig 5.

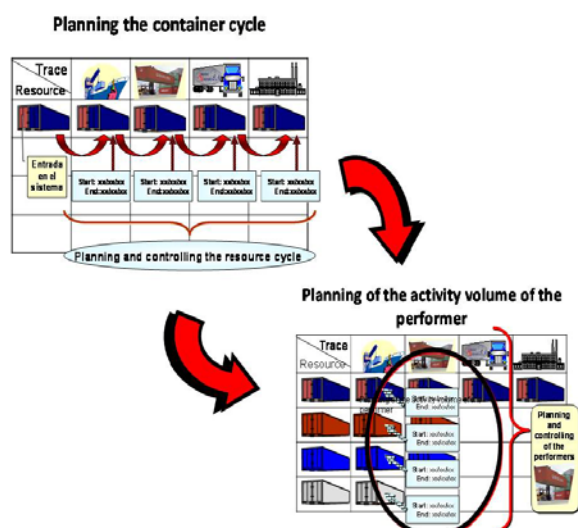


Fig 5. InterCompras® Containers System control and planning functions.

In this sense the informatics system becomes an essential tool for the logistical management of container movement within the supply chain, since it guarantees the planning and control activities of containers from the original supplier to the owner of this unitizing resource. That is why it can be said that, more than merely create an informatics system, a whole management model of containerized freights has been conceived.

At present there are systems that perform traceability of containers at only parts of its life cycle, basically in the case of traceability systems at shipping companies. However, this only allows a partial visibility of containers' life cycle.

The application of the InterCompras® Containers System in any entity is performed in a personalized way which implies a careful process of adjustment and design according to the peculiarities of each enterprise. The application project embraces the following elements:

- An organization project for container management and traceability.
- Software installing and personalization.
- Training of the personnel in charge.

The application of the InterCompras® Containers System has the following significant effects on container management and traceability within the supply chains:

- To improve clients' satisfaction.
- To increase responsive ability in the presence of unexpected troubles during the process.
- To decrease chain cycle.
- To reduce stocks.
- To reduce costs within the supply chain.
- To reduce the obsolescence of both resources: the merchandises, and the containers.

5. CONTAINER TRACEABILITY IN DRUG SUPPLY CHAINS.

Supply chains for the production and commercialization activities of medical drugs in Cuba are performed by the Drug Distributing & Commercializing Enterprise (EMCOMED) belonging to the Chemical & Pharmaceutical Enterprising Group (QUIMEFA) of the Ministry of Basic Industries. EMCOMED is a logistic operator that provides different services linked with the storing, distribution, transportation, and commercialization of raw materials and medical drugs for QUIMEFA entities as well as for health institutions throughout the country. As a logistic operator EMCOMED is responsible for the movement of containerized cargos which arrive in the country.

The EMCOMED logistic chain of imported containers extends from the international suppliers to the final customers in Cuba. It also takes care of the returning cycle of containers which ends up in the empty container deposit, as previously agreed.

Before the application of the InterCompras® Containers System, containers traceability at EMCOMED was made based upon a reactive way of gathering information, which prevented taking timely decisions in response to troubles, due to the slowness of the information processing and transmission to each one of the chain participants.

At present the Cuban enterprise EMCOMED has already established the InterCompras® Containers System according to the method shown in Fig 6. (Rodriguez, 2010).

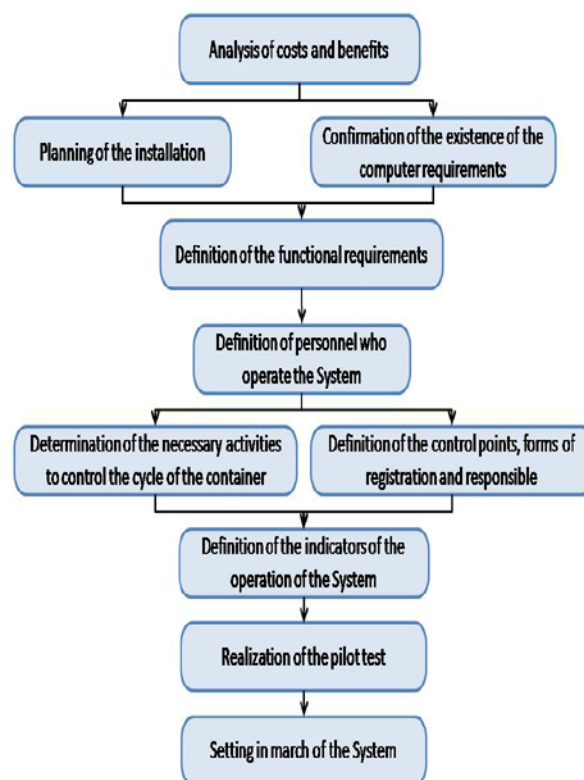


Fig 6. Application Method of the InterCompras® Containers System at EMCOMED.

InterCompras® Containers works as a connective tool among the supply chain participants, since each one of them should be keeping a record of every action they perform upon the container at any moment, whether it deals with a physical or mechanical operation or an informatics operation as well. Container's importer is the responsible agent for checking in each container into the System's registry. Also, the importer is responsible for keeping track of the first traces of each container until it is extracted out of the harbor facility limits. The transportation of containers from the country's harbors to their different destinations is performed either by automotive means, or by multimodal means of transportation. The use of different transportation means is showed in Fig 7.

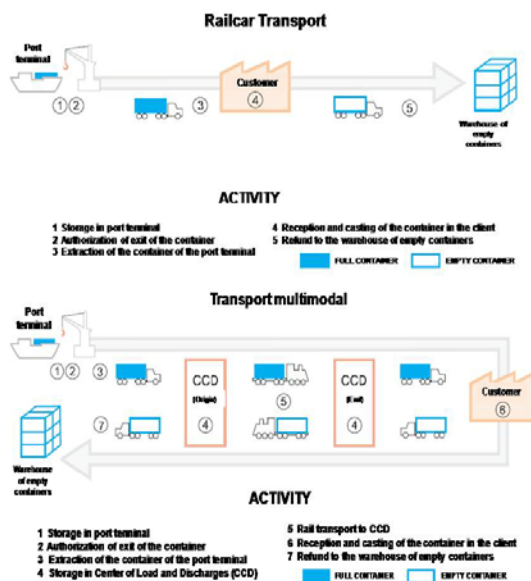


Fig 7. Transportation means of containers within the country.

EMCOMED holds responsible for containers' traceability in either way of transportation as reflected in Fig 7. However, it should be pointed out that the final customer or receptor is responsible for confirming the proper moment of container's reception in his own facilities. At present, the application of InterCompras® Containers System at EMCOMED has made possible to perform a better management of containers based on the followings advantages:

- There is a more accurate and on real time control about container's situation.
- There is a better definition of the responsibility of each participant in container's life cycle.
- Penalty payments due to delays in container's return have been reduced.

6. CONCLUSIONS.

- The InterCompras® Containers System is a tool that guarantees the management of container's movements within the supply chain frame work, through its permanent traceability 24 hours daily, every day of the year.
- The InterCompras® Containers System can be applied in either a specific supply chain, or in a

group of supply chains or organizations, as to ensure planning and control activities of containers' movement throughout its life cycle.

- The InterCompras® Containers System application at EMCOMED allows the following advantages: there is a better definition of the responsibility of each participant in container's life cycle; it is possible to keep an "on line" control of each container in progress within the supply chain framework; it reduces penalty payments due to delays in container's return to the shipping company owner of this resource.

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