LIFCO - A SAS® Application for Container Information in the Maritime Cargo Industry

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ABSTRACT

In the past twenty years freight transportation activities have undergone significant changes, in particular the growing utilization of containers. Using containers offers many advantages but it also introduces new planning and operating problems such as fleet management, empty container balancing, etc. The high cost of procurement, maintenance, handling and transportation of containers makes the adequate management of the container fleet a very relevant problem for maritime cargo firms.

This paper discusses the development of a container information system for Flota Mercante Grancolombiana, the biggest Colombian maritime cargo company. This system was completely developed using the SAS software for Windows, integrating several SAS products, SAS/AF®, SAS/SCL® and SAS/GRAPH®, and also Dynamic Data Exchange with Excel. The result was a user-friendly multi-user information system called LIFCO.

INTRODUCTION

In order to serve the different world ports, Flota Mercante Grancolombiana (FMG), the biggest Colombian maritime cargo company, is divided into traffics. A traffic is a group of ports that are served by the same ship in a round-trip. At each port FMG has an agent (it could be owned by the company or shared between different firms) who is in charge of dealing with the clients.

Each traffic manages a fleet of containers coordinated by the Container Department of FMG. When an agent needs containers, it reports that requirement to the traffic manager who supplies the containers with the help of the Container Department. In order to make good decisions such as the number of containers to be maintained at each port, the shipping of empty containers between ports, the acquisition of new containers at the ports and the devolution of surplus containers, the traffic manager and the Container Department need to know exactly how many containers they have on land and on sea every time. The problem for the decision maker is that several people around the world (agents, traffic managers, container department) hold this information that constantly changes over time. Figure 1 illustrates the relationships between the different parts of the "container system".

The Containers Logistics, Inventory and Flow information system, LIFCO 1, integrates the agents data into a central system in order to:
- Supply the information requirements of container inventory and flow of FMG.
- Summarize the information in reports that can be printed or viewed on the screen.
- Present the information graphically, facilitating the decision process.
- Allow that any interested person in FMG uses the information.
LIFCO is a multi-user application that receives information from different sources but allows sharing that information in a central manner (Figure 2).

Using LIFCO the different sources of information enter their data into the central system, allowing the other users of the system to access that information. In this way different parts of the system can obtain consolidated reports of the state of containers considering information from all the parts of the company.

![Figure 2: LIFCO Information Flow](image)

**SYSTEM OVERVIEW**

After extensive (and intensive) preliminary discussions with potential users of the information and the system, LIFCO was divided into three basic modules: Inventory, Flow and Configuration. Depending on the type of user (supervisor, traffic, generic), they would use the several options available on the system.

![Figure 3: User Validation Screen](image)

After a user validation screen (Figure 3) the main menu is displayed (Figure 4). The user can easily navigate through the application using the mouse or keyboard for selecting his preferences.

![Figure 4: Main Menu](image)

The **Inventory** module keeps track of the number of containers at each port of each traffic (Figure 5).

![Figure 5: Inventory Menu](image)

The **Flow** module keeps track of the movement of containers between ports (Figure 6).

![Figure 6: Flow Menu](image)
The Configuration module lets the users search and modify specific information of the container information system, such as authorized users and traffic-port relationships (Figure 7).

All the graphical user interface was created using the SAS/AF and SAS/SCL software.

At this time, the SAS/SHARE® for Windows was not available so we faced a very important problem: while someone was reading the central database, no one else could write anything into it. We solved this problem by using a "batch updating" process to the central database. When a user introduces some information to LIFCO, that information is stored in a temporary directory at the server. At specific hours during the day, LIFCO’s administrator executes a SAS program that transfers the data from the temporary directories to the central database. Although the central database is not updated "online", the users are satisfied with this procedure. As soon as the SAS/SHARE software for Windows is available, this limitation will be completely solved.

DATA ENTRY

Before LIFCO was developed, the agents sent the inventory and flow information on standard formats. Figure 9 illustrates the Weekly Containers Report used for inventory management.

For the Inventory module the process for the data entry is (Figure 10) as follows:

- The agents send via fax or e-mail an Excel 4.0 spreadsheet with the inventory information. This spreadsheet has the same structure of the traditional formats the agents were used to fill.
- The traffic receives the information in the headquarters at Bogotá.
- The different spreadsheets are copied to the traffic manager’s PC. Note: Even though all the source code is at the Novell server, each user has a special directory at his PC for managing the temporary files and other internal processes.
• The traffic runs LIFCO and executes the reading inventory data module.
• Using Dynamic Data Exchange, DDE, LIFCO transfers all the information from Excel to the SAS system. After a validation process with multiple data sets, the information of the spreadsheets is transferred to the Novell server, into a temporary directory.
• After the batch updating process, the central database is ready with the information.

![Image](image_url)

**Figure 10. Inventory Data Entry Process**

The process used in the Flow module is the same as in the Inventory module. The only difference between the modules is that instead of sending an Excel file the agents send an ASCII file with the information.

The use of familiar spreadsheets and ASCII files for entering the data, and the DDE facility of the SAS system for Windows, made the data feeding to LIFCO real easy!!

**REPORT GENERATION**

Once the data is in the system, report generation and screen display facilities were crucial to the users. All the reports were written using SAS/AF and SAS/SCL combined with the SAS system. We were able to create a lot of customized reports that merged many data sets into one user-friendly report. Figures 11 to 13 illustrate different examples of the report generation feature.

**GRAPHIC REPORTS**

Linking SAS/AF, SAS/SCL and SAS/GRAPH, we were able to create specialized graphs for summarizing the information. This graphs (bar charts and line graphs) are particularly useful for analyzing the container inventory development through time. This was a desired feature by FMG managers. Figures 14 to 16 illustrate different examples of the graphic feature.
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