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**WORLD MARITIME UNIVERSITY**

Malmö, Sweden

**DESIGN AND IMPLEMENTATION OF A COST  
CONTROL SYSTEM FOR CUBAN SHIPPING  
COMPANIES**

By

**SANTIAGO ALVAREZ RODRIGUEZ**

**Cuba**

A dissertation submitted to the World Maritime University in partial fulfilment of the  
requirements for the award of the degree of

**MASTER OF SCIENCE**

in

**SHIPPING MANAGEMENT**

**1999**

## DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the university.

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*" I know what I can measure"*

*Lord Kelvin*

*To my family*

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Also my thanks to all professors, lecturers and staff of the World Maritime University.

## **ABSTRACT**

Title of Dissertation: **Design and Implementation of a Cost Control System for Cuban Shipping Companies**

Degree: **MSc**

The dissertation is a proposal of a cost control system which has been designed taking into account the peculiarities of the Cuban maritime industry. National shipping companies will be able to survive and grow only if each unitary cost generated in operations is known, registered and controlled.

A brief look is taken at the unfavourable situation of the majority of developing countries within the maritime industry. In this sense, analysis is made on how the economic development and survival of these countries depend particularly on world shipping. The economical, financial and managerial problems faced by state-owned companies in general and the Cuban shipping sector in particular, are described as the main obstacles for the further development of the industry.

The volume of costs required for running a shipping company are evaluated under the influence of three factors: the ship performance, economic trends outside the company and management abilities. Various data and statistics are used for looking in great detail at the structure of costs related to the requirements of the international and national scenarios. The analysis is divided following a conventional classification of capital costs, operating costs and voyage costs with clear differentiation per cost element in each group.

The budgetary organisation of Cuban shipping companies is defined as the first step within the implementation of the cost control system. This organisation is based on the determination of five cost centres responsible for the elaboration of departmental budgets. The budgets are structured to indicate the area which will be covered in terms of unit or ship budgets, departmental budgets, divisional and corporate budgets.

The proposal of a cost control system comprises the description of its three main components: the establishment of standards, the measurement of performance against these standards using the budgeted unit contribution, and the correction of variances from standards and plans. Initial steps and considerations for the further automation of the system are also established.

The concluding chapter summarises the most important points and analysis carried out by the author and a number of recommendations are made taking into account the process of implementation of the cost control system within Cuban shipping companies.

**KEYWORDS:** Budget, Control, Cuba, Management, Shipping, Standards.

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## ***LIST OF ABBREVIATIONS***

BIMCO	Baltic and International Maritime Council
cbft	Cubic foot
dwt	Deadweight tonnage
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
H&M	Hull and Machinery Insurance
IMO	International Maritime Organisation
ISF	International Shipping Federation
ISL	Institute of Shipping Economics and Logistics
MARPOL	International Convention for the Prevention of Pollution from Ships
OECD	Organisation for Economic Co-operation and Development
P&I	Protection and Indemnity Insurance
STCW	International Convention on Standards of Training, Certificates and Watchkeeping for Seafarers
TEU	Twenty- foot equivalent unit
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
VLCC	Very large crude carrier

## **Chapter I. Introduction**

Most of the states who own shipping companies are developing countries, like Cuba. Therefore, state- owned shipping companies are facing all financial problems that states have. Practically all these states still face difficulties of poverty, inadequate growth of national income, lack of sufficient resources and balance of payment problems.

In addition, the controlling tasks in state- owned shipping companies are mostly focused on what would be called as the control of liquidity. Within this framework and with this vision of working, there is a permanent risk to take with less consideration of other requirements, which would have been quite relevant for an overall and effective management control towards a better profitability of an enterprise which is also market- oriented.

Many insufficiencies in the financial management in these enterprises are mainly characterized by a lack of relevant tools for effective control, such as the absence of an appropriate cost accounting system and the lack of strategic planning or good management information system.

The internal accounting system in Cuban shipping companies is based on a cutting out of the enterprise in responsibility centers and on a vertical analysis, either per nature/ origin or per program of actions. This system has been criticized for not being a fair management cost accounting system. Therefore, it cannot enable managers to fairly determine standard costs, cost prices and analytical results with accuracy or establish the financial profitability of investments.

At the present moment, the design and implementation of a cost control system is one of the most important requirements for the Cuban shipping industry to reach a competitive position within the industry. The system in that sense should be understood as an integrated part of the general control management.

In addition to particular economical, social and political factors, the lack of an efficient cost control system is also responsible for the poor financial performance of the Cuban shipping industry nowadays. These companies will be able to survive and grow in the middle of a fierce competition characterized by freight rates going down only if each unitary cost generated in operations is known, registered and controlled.

Furthermore, the analysis resulting from the cost control system allows the companies' core level to develop strategies based on cost leadership. All statistic information generated by the system is also a powerful tool for investment appraisals and forecasting plans looking for business consolidation and expansion.

There is no ship cost existing in isolation and the same concept applies to the relationship between the management of the ship and all supportive operations developed by the shipping company. In spite of the influence of external factors, there is a major influence lying on the management effectiveness at sea and inside the company. The main target of minimizing overall costs and multiplying earnings is only possible if each disbursement is opportunely registered and controlled.

The final goal of the present dissertation is to propose a cost control system for Cuban shipping companies and for that reason the following objectives will be covered:

1. Evaluation of the actual situation of the maritime industry in developing countries.
2. Analysis of the financial and economical problems faced by state- owned companies within the maritime industry.
3. General description of the Cuban Maritime Administration and national shipping operations in Cuba.
4. Analysis of the international and national scenarios which determine the volume of costs of shipping operations. The analysis will also comprise a differentiated evaluation per cost element in different kinds of shipping companies.
5. Proposal of the budget organization for Cuban shipping companies based on the concept of cost centers as basic elements of the process.

6. Definition of the cost control system and its three main components; the information recording system, the budgetary execution control and the analysis of variances and the budgeted unit contribution.

Chapter II analyses how the economic development and survival for developing countries depend particularly on world shipping. In that sense, various data and statistics illustrate the unfavorable situation of the majority of developing countries within the maritime industry. The chapter also comprises an analysis of the managerial and economical problems faced by state- owned companies within the shipping industry, not only due to financial issues but also taking into account the lack of relevant tools for effective control and management. In the case of the Cuban Maritime Administration it describes the organizational structure and the main obstacles faced by the national industry related to the high level of centralization, the economic recession affecting the country since 1989 and the poor financial performance of the Cuban shipping industry.

Chapter III examines the volume of costs required for running a shipping company under the influence of three factors: the ship performance, economic trends outside the company and management abilities. This part looks in great detail at the structure of costs using real examples from two different Cuban shipping companies and also information and statistics compiled from different sources. The analysis is divided among acquisition and capital costs, operating costs and voyage costs with clear differentiation per cost element in each group.

Chapter IV establishes the basis for the budgetary organization of Cuban shipping companies through the determination of five cost centres responsible for the elaboration of departmental budgets. This organization includes a clear definition of roles, division of elements, budget setting forms per departments and a numerical code per cost element. In that sense, the budgets are structured to indicate the area which will be covered in terms of unit or ship budgets, departmental budgets and divisional and corporate budgets. The proposal of a cost control system comprises the description of its three main components: the establishment of standards, the measurement of performance against these standards using the budgeted unit

contribution, and the correction of variances from standards and plans. At the end of the chapter the initial steps and considerations for the further automation of the cost control system are proposed.

Finally, chapter V summarizes the most important points and the analysis carried out by the author and brings recommendations which should be carefully taken into account during the process of implementation of the cost control system within Cuban shipping companies.

To approach the objectives stated before the author has used a considerable amount of updated information and statistics issued by prestigious annual publications and also in situ from the analysis of different Cuban shipping companies and the national maritime administration. Furthermore, data compiled during different field trips to successful companies operating within the industry, mainly in Europe, have been used.

However, the main obstacles faced in the elaboration of the present dissertation have been founded in the lack of literature directly related to the topic and the impossibility to obtain experiences and details from the majority of the most important companies worldwide as they consider their cost control systems as a strategic advantage over competitors.

In that sense, the present dissertation could be considered as a modest contribution to those shipping companies looking for the reorganization of the planning and control processes. Like other systems, the cost control system requires to be developed and practiced by involvement of managers and their staff and to be understood as the basis for decision making, planning, control and effectiveness.

## **Chapter II. The shipping industry in developing countries and Cuba**

### **II.1- The situation of the maritime industry in developing countries**

The economic development and daily survival for developing countries depend particularly on world shipping taking into account that they are primary exporters of raw material and importers of manufactured products.

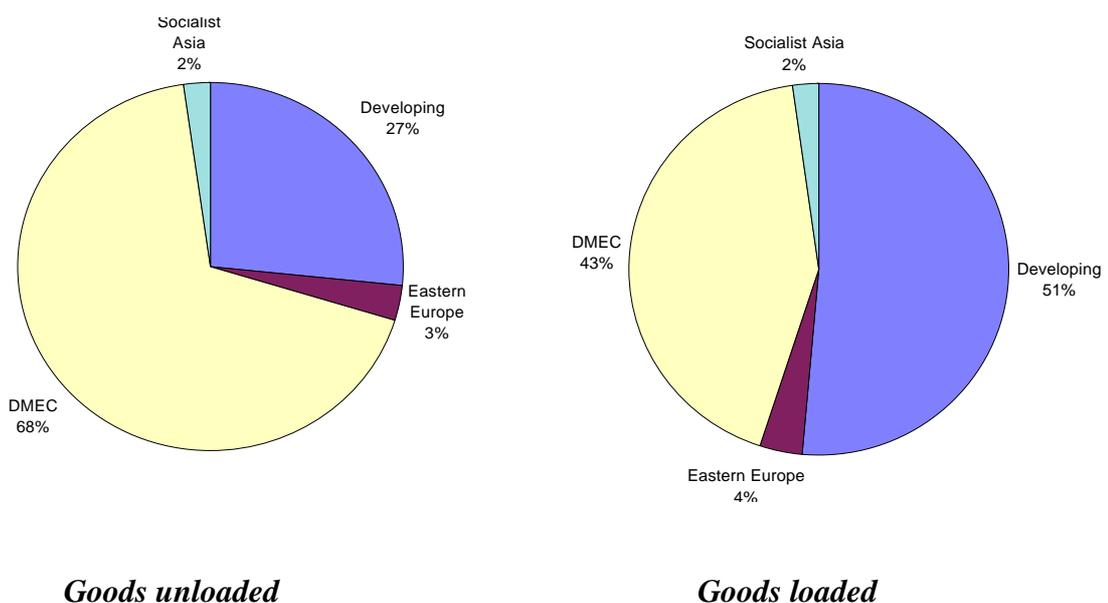
Shipping is an international industry and is particularly vulnerable to all sorts of pressures and unrest. An analysis of shipping matters and their conflicting spheres invariably leads to the question of a new international maritime order so strongly defended by developing nations. It is quite obvious that shipping activities are irregularly spread among nations. A brief look at shipping and trade statistics shows that the bulk of world tonnage remains under control of industrialised nations while developing maritime nations own just 19,5 percent of the world tonnage. In terms of world seaborne trade, the share of developing countries in world cargo turnover stood at 38,9 percent in 1996 (UNCTAD, 1997).

The policy of some developing countries is aimed at changing the present status quo in maritime transport, which have been defined by Iheduru (1996) and UNCTAD (1997) as:

- The majority of developing countries have to bear a heavy burden of freight costs associated with transport by sea of their foreign trade.
- World total freight payments as a proportion of total import value shows a comparative disadvantage between developed and developing countries. In 1995, this indicator for developing countries was determined at 8,30 percent whilst for developed countries was only 4,20.
- Import of shipping services represents a heavy burden for the developing countries' balances of payments.

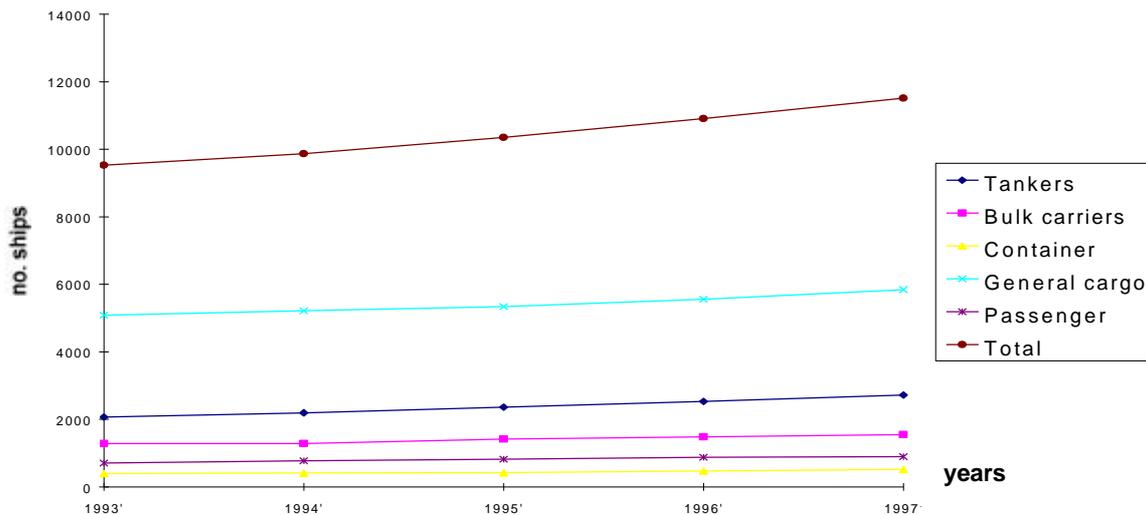
- Developing countries are facing obstacles relating to high distribution costs, lack of reliable shipping services, expensive transshipment charges, inadequate port facilities, limited maritime administration and diseconomies of scale which affect the process of negotiating freight rates with shipping companies.
- For island developing countries, like Cuba, the total freight costs are estimated at 10,9 percent of the total import value, which is considerable higher than for developed countries and the rest of developing states. This incidence is not only a reflection of low import unit values, but also as a result of long distances, low cargo volumes, transshipment and high feeding costs.
- The maritime industry in developing countries requires large investments involved in the development of infrastructures and acquisition of the means of maritime transport. To maintain or to improve maritime capabilities can not be reached without private sector investments, both local and foreign direct investments, which should be channelled by governments to the maritime sectors.

At the end of 1997, over 91 percent of developing countries' international trade, and about 80 percent of the international trade of industrialised countries were carried on by sea (Institute of Shipping Economics and Logistics, 1997). Figure 1 provides summarised data on world seaborne trade by major cargo segments and country groups in 1997.



**Figure 1. World seaborne trade by country groups (percentage distribution of tonnage, 1997). Source: UNCTAD (1998)**

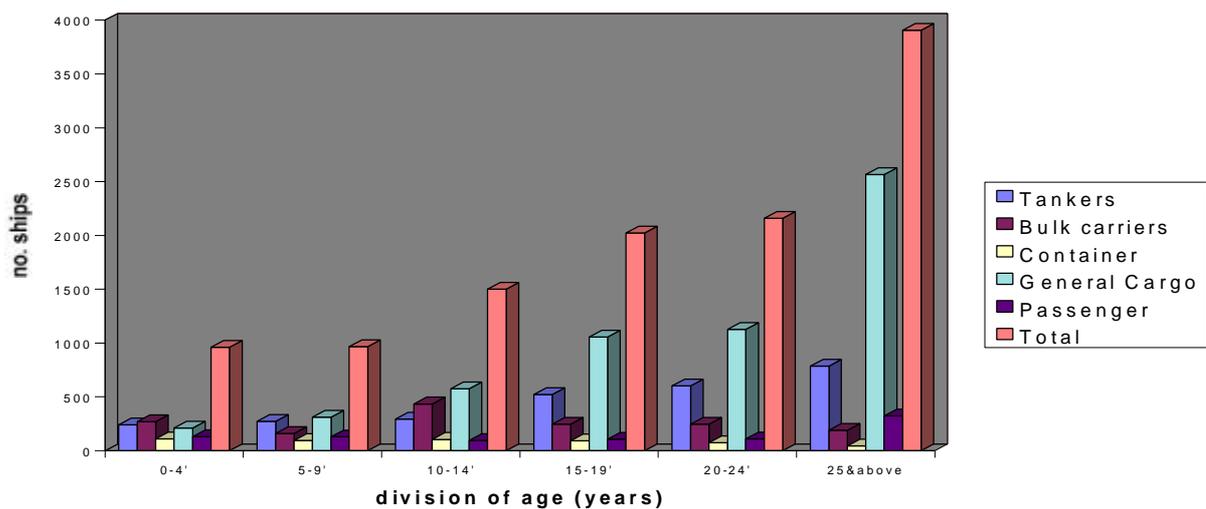
The evaluation of the actual situation of the maritime industry in developing countries related to the development and structure of the total fleet by major ship types from 1993 to 1997 is shown in Figure 2 and Figure 3. An analysis of the number of ships by



**Figure 2. Development of total fleet by major ship types (1993-1997)**

di

Source: Fairplay (1998)



**Figure 3. Number of ships by division of age and ship type, 1997**

Source: Fairplay (1998)

From the Figure 3, it is possible to analyse how nearly 50 percent of the developing states' fleet is 15 years old and over. This ageing fleet is facing higher operating costs, as a result of growing repair and maintenance requirements. This obsolescence also causes schedule delays and unreliability, as well as greater environmental risks associated with old vessels.

The aims of developing countries to establish and develop their own national shipping industry was encouraged in 1970 when UN adopted an international development strategy. The objective was 'to promote, by national and international action, the earnings of developing countries from invisible trade and to minimise the net outflow of foreign exchange from these countries arising from invisible transactions including shipping' (UN Publications, 1972).

However, this objective was followed with the implementation of legislation and a number of practices of flag discrimination and regional- integration arrangements aimed at the development of a national merchant fleet. This situation is setting these countries on a collision course with their major trading partners in Europe and North America who see such practices as protectionism and obstructing freedom to provide maritime services (UN Publications, 1996).

In addition, the shipping industry in developing countries has been extremely affected not only for internal factors such as the lack of economic resources, an insufficient growth of the national GDP and low levels of industrialisation, but also for market trends which are characterised by a dramatic decrease in freight rates, unbalances of trades and the cyclical nature of the maritime industry.

Despite the establishment and expansion of national fleets in the 70's, developing countries, like West African states, have not only failed to achieve the objectives of a new international maritime order, but, since the late 80's, they have also become more dependent on foreign shipping companies for their international trade (Idehuru, 1996).

The new international maritime order should help to change this state of affairs. As seen by UNCTAD (1996) the new order should include three major objectives:

- The guarantee in long term for each country, particularly for each developing country, of a significant and equitable participation in all shipping operations relating to the transport of cargo generated by its international trade.
- The guarantee in long term for each country, particularly for each developing country, of a significant and equitable participation in the effective determination of the transport costs of the cargo generated by its international trade.
- The guarantee in the long term for each country, particularly for each developing country of the freedom to carry out a significant rationalism of equitable principles of the shipping which serves its territory.

These objectives require an integrated action at all levels, comprising technical, economic, organisational and legal aspects of maritime transport.

## **II.2- Financial and economical problems of state- owned companies**

Public enterprises are established in order to intervene in the strategic sectors, thus enabling the state to master them. They are also set up in order to promote and to stimulate the economy. In that respect, the notions of profitability and productivity are as fundamental for these public enterprises as for the private ones. Therefore, good assessment of performances is essential to both types of enterprises.

State-owned companies within the shipping industry, as a rule in many developing countries, have this double obligation to satisfy the aims and the objectives of the government as regards its strategy in that sector as well as its social and economic policy. On the other hand, these companies should produce positive results for the purpose of fair profitability ensuring them a long-term growth and thus their long life. A presentation of the different mechanisms of economic control over these corporations indubitably leads to an analysis of some key issues related thereto, as far as their effectiveness and efficiency are concerned.

Most states, which own shipping companies, are developing countries. Therefore, state-owned shipping companies are facing all the financial problems that states have. Practically all these states still face difficulty of poverty, inadequate growth of

national income, lack of sufficient resources and balance of payment problems. As a consequence, the good work of state-owned shipping companies is affected because the authority of the state in these companies results frequently in a diversion of the profit (if any) to the general budget of the state, which generally is not used for developing the sector or improving the sector.

Another problem is that as these states are poor or do not have sufficient resources they have no guarantee of availability of the necessary amount of money to purchase or replace the vessels, to acquire adequate training facilities for people who work within the industry, or improve the development of the appropriate technical and commercial know-how, as well as inadequate repair and maintenance facilities.

The availability of financing schemes for the expansion of services is also an obstacle for state-owned shipping companies due to the fact that usually the local currency is not a hard currency, and the accessibility to foreign finance on favorable terms and conditions becomes difficult.

The controlling tasks in state-owned shipping companies are mostly focused on what could be called the control of liquidity. Within this framework and with this vision of working, there is a permanent risk to take with less consideration for other requirements, which would have been quite relevant for an overall and effective management control towards a better profitability of an enterprise which is also market- oriented.

Many insufficiencies in the financial management in these enterprises are mainly characterized by a lack of relevant tools for effective control, such as the absence of an appropriate cost accounting system and the lack of strategic planning or good management information system.

The internal accounting system is based on a cutting out of the enterprise in responsibility centers and on a vertical analysis, either per nature/ origin or per program of actions. This system has been criticized for not being a fair management cost accounting system. Therefore it cannot enable managers to fairly determine

standard costs, cost prices and analytical results with accuracy in different lines or to establish the financial profitability of investments.

Furthermore, although general accounting to support the budgetary control system does exist, the information tools for sustaining it, such as the forecast balance sheet, the accounts plans, the investment and financing tables are not regularly established for a fair monitoring of the financial performances.

The higher state control in these companies is only focused on the formulation of criticisms upon the financial irregularities detected in the organizations whilst less time is given to the appreciation of the quality management. This leads to a restrictive view of the objectives of a shipping company, which is first of all commercial and market oriented, dealing with a competitive environment requiring what is called as the control of effectiveness on the one hand and the control of efficiency on the other hand.

The disadvantaged geographical location of developing countries in respect to the main traffic for shipping companies is also a problem for these enterprises. They should respond to the interest of the state and they could be used in transporting goods which are produced in the country, or are needed for the country, but they are going to be in an unbalanced trade if they do so. Normally products of these countries are not exported to the place where they can find goods they need to import or vice versa.

To participate in and expand trade, efficient maritime transport and port infrastructure are essential. This is particularly important for liner companies in developing states that are geographically and economically at a disadvantage. These handicaps are manifested by high distribution costs, lack of reliable shipping services, expensive transshipment charges, inadequate port facilities, limited maritime administration and diseconomies of scale when negotiating freight rates with shipping conferences. For example, estimates of total freight costs for developing states are more than 45.5 per cent higher than for developed market-economy countries (UNCTAD, 1997).

The protectionism given by the state to the company, inflexibility, and bureaucracy are the factors that affect state-owned shipping companies. In addition, the state sets rigid rules to be followed by every company. This can diminish the capacity of the company

to react when there is a change in the outside market. Consequently, it will not be prepared for the rough international competition.

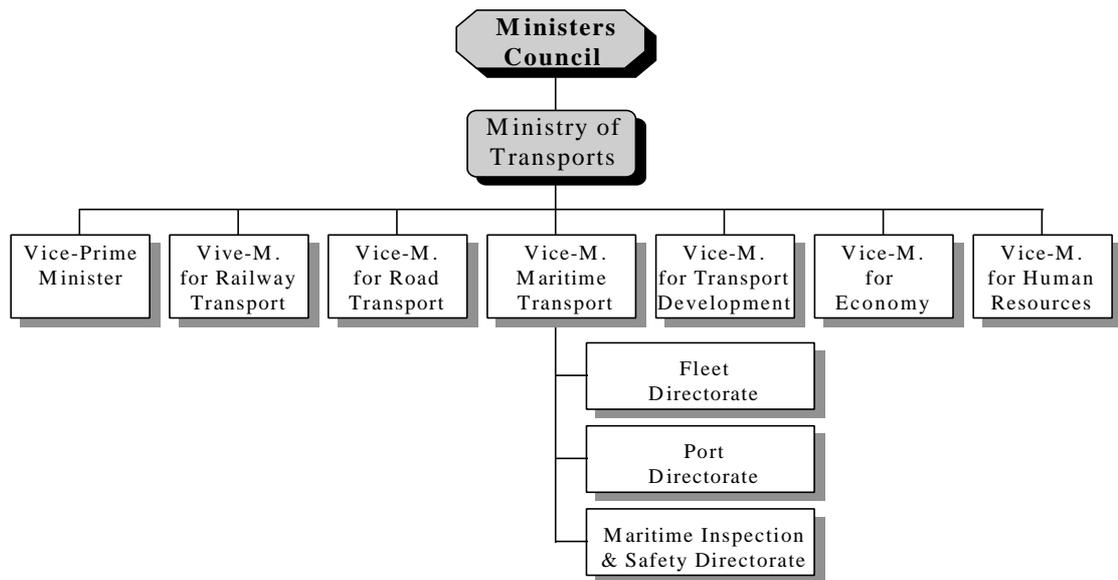
### **II.3- General description of the Cuban Maritime Administration**

The Ministry of Transport in Cuba is responsible for the organization of all kinds of transport: maritime, rail and road. The Law of the Organization of Cuba's Central Administration (1982) defined the Ministry of Transport as the authority in charge of maritime and inland water transport, auxiliary services and the civil maritime navigation. There are also other ministries with a close relationship to the Ministry of Transport and especially to maritime affairs taking into account their responsibility in matters such as lighthouses, fisheries, marine education, hydrographic studies and aids to navigation.

The structure of the Ministry of Transport (see Figure 4), directly subordinated to the Ministers Council, comprises three vice- ministries for the main areas concerned with safety, engineering, operation and organization of road, maritime and railway transport. Other vice-ministries have supportive functions like human resources, transport development, economy, legal matters and international affairs.

According to the structure, the Vice- Ministry for Maritime Transport includes three directorates with specific functions and coordinated matters in the maritime sector:

- The Fleet Directorate is responsible for the control of the maritime transportation of passengers and cargoes, merchant fleet operations and also technical matters.
- The Port Directorate attends the administration of ports under the jurisdiction of the Ministry of Transport, shipbuilding and ship-repairing activities in addition to technical operations of ports.
- The Maritime Inspection and Safety Directorate as representative of the Cuban Maritime Administration is responsible for the safety of ships, cargoes, passengers, crew and ports; the safety of maritime and inland water transport and marine pollution prevention in general terms.



**Figure 4. Organization of the maritime transport in Cuba**

One of the most important problems the Cuban Maritime Administration is facing is related to the structural design with a high level of centralization and a lack of flexibility in the process of decision making. Clear examples of that are the impossibility for the companies to decide about any kind of investments in assets or new technology, which are determined by the Fleet Directorate at the central level. In the same ground, annual plans of income and expenditure should be calculated by the companies following central indicators of growth and budgetary execution. Furthermore, there is no freedom for the companies to decide about marketing strategies based on freight rate competitiveness because the prices for Cuban shipping services have been rigidly stated by the Minister of Finance and Economics since 1981. Other problems are caused by intermediate and not functional middle management located in regional districts and a considerable amount of bureaucracy. This situation determines that the process of information and communication within the organization is deficient and delayed.

In relation to international conventions, Cuba, which is one of the earliest members of the International Maritime Organisation (1966), has signed and ratified the majority of the conventions adopted by IMO. However, the implementation process has been

unsuccessful, mainly due to two big obstacles. First, the economic crisis determines the impossibility to fulfil most of the requirements established by these conventions, such as the investments in port reception facilities (MARPOL 73/78) or the use of simulators in training courses and educational institutes (STCW 1978), taking only two examples. Second, there is a lack of subsidiary legislation which is necessary for the effective law enforcement. In addition, it is essential for the Cuban Maritime Administration to organize an efficient flow of information from IMO to the National Maritime Administration with corresponding feedback.

Finally, the Organization also requires investments in building new ships, port infrastructure, work conditions and other necessary material items with the aim to improve the maritime activity and particularly the development of the Maritime Safety Administration.

#### **II.4- Shipping operations in Cuba**

The economic recession faced by the Cuban economy as a result of the end of the socialist block in Eastern Europe has affected all industrial sectors in general and the shipping industry in particular. The first day of 1990, Cuba woke up without more than 80 percent of the external trade due to the disappearance of the eastern block markets, the main destination of Cuba's products between 1962 and 1989. At that time the 62 per cent of total external trade was transported by Cuban shipping companies. By 1993 the value of seaborne trade had plummeted to under US\$ 3 170 million from \$13 500 million in 1989 (World Bank, 1994).

Since 1989, the Cuban fleet has been facing a dramatic decrease regarding the number of ships available and the total carrying capacity. The following figures show a comparative analysis based on the evolution of those indicators from 1989 to 1997.

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**Figure 5. Evolution of the number of vessels owned by Cuban shipping companies from 1989 to 1997. Source: ISL (1998)**

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**Figure 6. Evolution of the dwt operated by Cuban shipping companies from 1989 to 1997. Source: ISL (1998)**

From the figures above it is possible to observe a steady improvement from 1993, a moment which is considered as the starting point of the recuperation process for the Cuban economy after the collapse originated in 1989. In spite of that, at the end of 1997, the Cuban fleet is only 84% of the total owned in 1989 and in terms of dwt, the value in 1997 is estimated to be 97 % operated at the beginning of the crisis.

The maritime industry in Cuba accounted for 8.6 percent of the national income in 1998 (World Bank, 1998). During the next ten years the government is going to invest quickly in this sector with the purpose of obtaining a diversified industrial base to break with the traditional support of sugar cane.

Table 1 includes detailed information about the number of ships controlled by the Cuban shipping industry in 1997.

**Table 1. Composition of the Cuban fleet in 1997. Source: ISL (1998)**

<b>Items</b>	<b>No</b>	<b>1000 dwt</b>	<b>1000 TEU</b>	<b>Av. age (years)</b>
<b>National flags</b>	22	137	1	21,0
<b>Foreign flags</b>	69	854	7	19,0
<b>Total fleet</b>	91	991	8	19,5

As it can be analysed from the table above, 72 percent of the Cuban fleet is flying a foreign flag due to the economic benefits offered by open registry countries, like Panama under whose legislation almost 60 percent of the total fleet is registered. The open registry countries also allow the Cuban fleet to avoid the trade restrictions dictated by the American Embargo Law against Cuba. On the other hand, the majority of ships are getting old taking into account the number of years in exploitation

(average of 19,5 years). From this group 80 percent of the total fleet was built in the former Soviet Union shipyards.

Shipping operations in Cuba are divided among different state owned companies controlled by the Ministry of Transport and its Fleet Directorate. Seventy-five percent of all commercial operations are accounted by the following three companies:

- Coral Container Line S.A.: This company was established in 1990 for the operation of liner services within the containers market. At the present time this shipping company is operating direct services to the Caribbean, Canada, Mexico and the Mediterranean and combined services with the rest of the world. The company's fleet comprises fourteen vessels from which eleven are multipurpose ships, one container ship and two bulk/ container ships. The fleet has a capacity range of between 8 350 and 17 821 dwt. All these characteristics confer to the company great flexibility, allowing it to fulfil a wide variety of customer requirements. This company generated almost 30 percent of the total income within the shipping industry in 1998. ( Cuban Vice- Ministry for Maritime Transport, 1998)
- Naviera Friomar: This company was established in 1987 and is dedicated to the administration of refrigerated ships and multipurpose ships with a refrigerated capacity. The company is specialised in the transportation of perishable products, which demand sophisticated temperature and environmental control. Principal cargoes are fresh fruit and vegetables, frozen meat, poultry and fish. The fleet numbers eight vessels with a capacity range of between 41 000 and 190 000 cbft. The company's main markets are located in South America, the Caribbean and Europe. These activities are marketed through a pool structure using three ships and the remaining 5 vessels are tramp operated. At the end of 1998, Naviera Friomar accounted for 35 percent of the total income within the national shipping industry. ( Cuban Vice- Ministry for Maritime Transport, 1998)
- Naviera Cubana- Caribeña: Was established in 1991 and whose main objective is the transportation of passengers and cargo between the southern part of the Cuban island and the second largest island in the country, Isla de la Juventud. Taking into account that Cuba is an archipelago, the transportation of passengers by sea has been one of the priorities for the national shipping industry. The company's fleet

accounts for seven ships, divided in two catamarans, one ferry and four high-speed hydrofoils. At the end of 1998, the company registered a transportation of 370 000 passengers which is considerably lower than the peak of almost 500 000 reached in 1995. In the same period, the national shipping industry earned 10 percent of all incomes from the passenger transportation generated by this company. ( Cuban Vice- Ministry for Maritime Transport, 1998)

## **II.5- The reasons for implementing a cost control system**

The subject of costs is a crucial element of the economic analysis. Generally speaking, costs are seen as expenditure by the producers to generate goods or services. Cost of shipping may be regarded from two different scopes; as cost generated by the ship operator to produce the service and as a cost borne by the user of shipping services. The present dissertation deals with the first type of costs, i.e. those which are borne by the shipowner to produce transport services.

'The existence of a control process enables management to know from time to time where the organisation stands in relation to a predetermined future position' (Wilson, 1991) and according to this postulate it requires that progress can be observed, measured and modified if there are deviations between the actual and the desired positions.

At the same time, costs within the shipping industry are one of the factors which determine the price for shipping services: tariffs in liner shipping and charter rates in tramping. It does not mean that pricing of shipping services is based only on costs, although, the level of costs has a definitive role in pricing.

It is impossible for any industry and even more for companies involved in shipping operations to reach a competitive position without the implementation of an effective cost control system. In that sense the cost control system should be understood as an integrated part of the general control management.

The lack of cost control is one of the most important deficits the majority of shipping companies from developing countries are facing at the present time. In the case of Cuban shipping companies, costs are only used for a rudimentary and general analysis of the budgetary execution at the end of each annual operation period.

It is not an easy task to measure how much the lack of an efficient cost control system is responsible for the poor financial performance of the Cuban shipping industry nowadays. Among the well known and common problems faced by state- owned companies worldwide, the Cuban maritime industry is affected by particular economical, social and political factors, like the American Law of Embargo against Cuba. These particularities diminish the accuracy of comparative analysis with other shipping companies.

However, there are some indicators, which could be used to demonstrate the relationship between the absence of a cost control system and the performance problems of national companies. Table 2 shows a comparison between a group of 114 medium shipping companies (6- 20 ships) all around the world and 5 equal-size Cuban shipping companies.

**Table 2. International medium shipping companies and equal- size Cuban shipping companies. Source: Massop Project and national statistics.**

Note	Items	Foreign shipping companies	Cuban shipping companies
1	Av. no of ships	11,25	10,7
2	Av. office staff: • Ops/ com	7,46	10,21

	<ul style="list-style-type: none"> <li>• Technical</li> <li>• Services</li> </ul>	6,33	11,30
	Total	<b>24,5</b>	<b>36,63</b>
3	Office staff/ship	2,18	3,42

The comparative results show how Cuban shipping companies are less efficient in the management of human resources in comparison with the average of foreign medium shipping companies. In general terms, national companies require an additional number of 12,3 employees doing office jobs for managing a fleet which is smaller than the average controlled by foreign companies. From the cost point of view, a major number of office staff means higher expenditures in salaries, social security funds and proportionally lower rates of unitary benefits per ship taking into account the incidence of the costs of shore- based management staff. An analysis like this can be carried out through the implementation of a cost control system as the only way to detect and to correct deviations which are affecting the financial performance and operational efficiency in terms of cost/ benefits rates of the Cuban shipping companies.

Cuban shipping companies operating within the shipping industry will be able to survive and grow in the middle of a fierce competition characterised by freight rates going down only if it is known, registered and controlled each unitary cost generated in operations.

In addition, this analysis permits the company's core level to develop strategies based on cost leadership. On the other hand, the statistic information generated from previous operations is a useful tool for investment appraisals and forecasting plans looking for business consolidation and expansion.

## **Chapter III. Shipping costs. Analysis of the international and national scenarios**

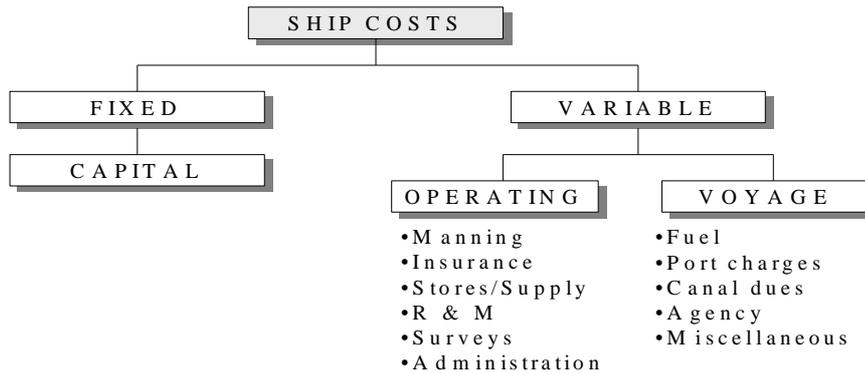
### **III.1- Costs of shipping operations**

'Cost management is related to the classification, recording, allocation and analysis of cost data to provide information for product costing, management control and decision making' (Armstrong, 1992).

Costs need to be classified according to the type of expense (direct or indirect) or behaviour (fixed or variable) and by reference to the product or service and the location of the activity when the expense is incurred. Costing determines the costs of products or services allocating direct costs and overheads to products or services and provides the basis for analysis, decision making and control.

The classification of costs as direct or indirect and fixed or variable, and their distribution to products or services and cost centres is essential to the process of cost-volume-profit analysis. The classification and analysis of costs are the basis for responsibility accounting, a process in which managers have a role in planning their budgets and determining responsibilities for any variances that occur under their control.

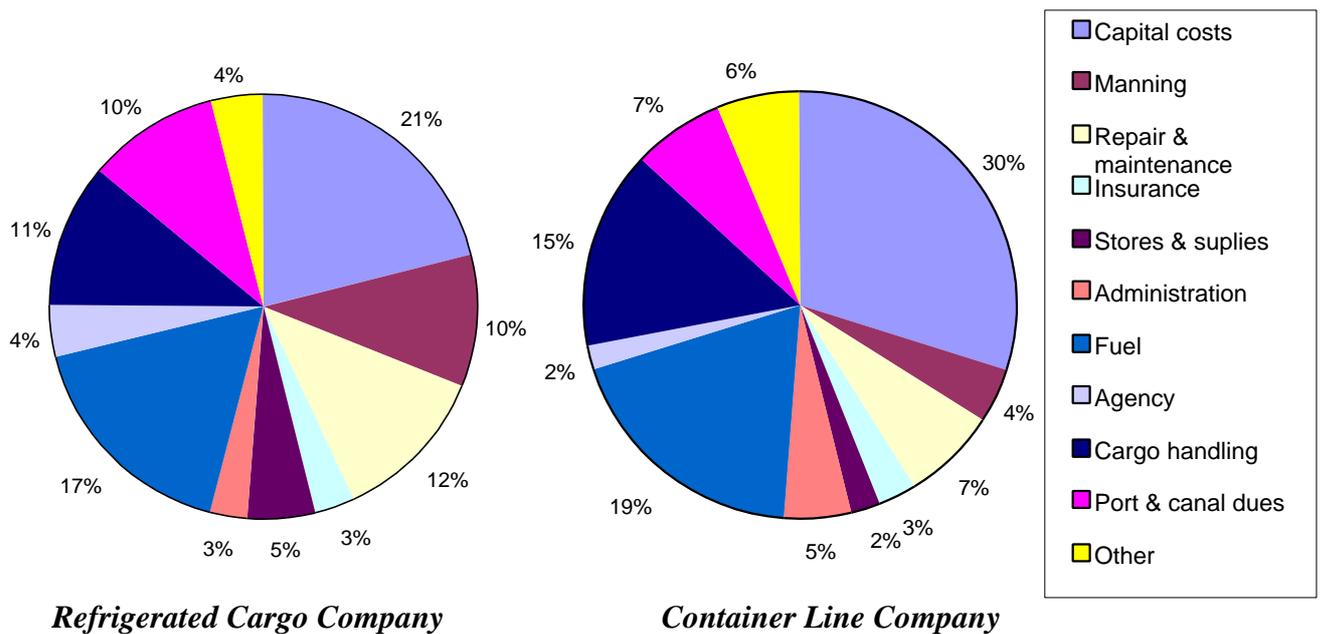
In contrast to other industries there is no internationally accepted standards for cost classification in the shipping industry (Stopford, 1997). Despite that, under the scope of this study, cost will be classified according to the divisions shown in Figure 7.



**Figure 7. Ship costs classification**

Stopford (1997) states that the volume of costs for running a shipping company depends on the combination of three factors. First, there are costs, which are determined by the ship itself in terms of fuel consumption, requirements for repairs and maintenance, the number of crew, among others. Second, economic trends outside the company, like inflation and fluctuations in prices for bunkers, interest rates, spares or stores and supplies have also a role in the total amount of costs incurred by the company. Finally, costs are heavily influenced by management abilities, overhead expenses and operational efficiency. According to this criteria managers can establish an effective control over the costs of running a shipping company, with the exception of the second case due to the influence of economic trends outside the shipowners' control.

To understand and to establish a cost control system it is necessary to look in much greater detail at the structure of costs. Figure 8 shows the break down of costs in the year 1998 for two different Cuban shipping companies based on the analysis of their balance sheet statements at the end of the year.

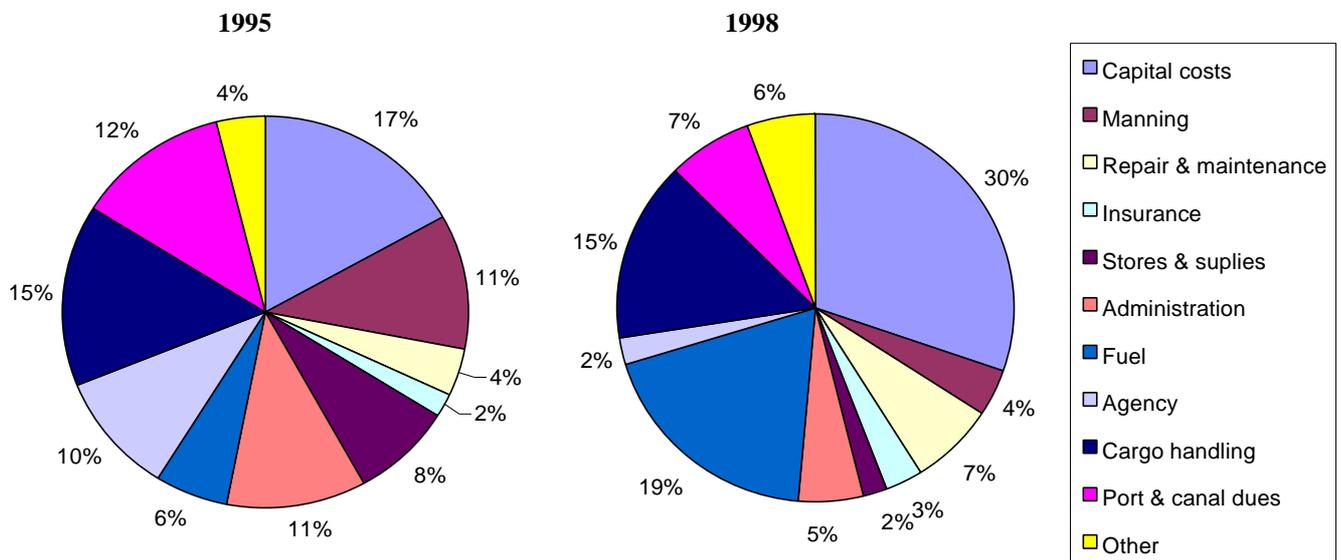


**Figure 8. Cost distribution for two Cuban shipping companies in 1998**

It can be observed from the figure above that there is no similar distribution in the percentage of each cost item in the total cost structure from shipping company to shipping company. The most important difference between these two companies is found in the percentage of capital cost within the total distribution. In the container line company, this is a result of the acquisition of two newbuilding container ships of 1 100 TEU between 1995 and 1996. In addition, the amount invested in the fleet by this company is bigger than in the case of the refrigerated cargo company, not only in terms of capital but also interest rates associated to the repayment of the different loans. In the case of manning costs, the refrigerated cargo company is paying higher rates of salaries per crew members and officers as a consequence of a new national salary policy, which at the present moment is experimented in some shipping companies. The repair and maintenance element is also higher for the refrigerated company due to the fact that in general terms, the fleet operated by this company is older ( 16,5 years) in comparison to the average of number of years in exploitation for vessels operated by the container line company ( 10,3 years). For that reason, the refrigerated cargo company's fleet requires more regular maintenance and more frequent renewal of parts. However, it is not an easy task to determine the reasons for the difference in cargo handling costs because both companies are operating on

different routes with different ports of call. This element is also linked to diverse distribution of responsibility between port authorities and stevedoring companies in different countries, competition between ports, the use of private companies and the allowance of volume/ throughput discounts to regular or high volume callers.

Furthermore, this distribution can change over time due to the influence of external factors such as prices, market fluctuations or inflation and also taking into account internal factors like management capabilities, strategies and policies. In the case of the container line company, the following figure shows a comparison between 1998 and 1995 in which structural changes in cost distribution over the time could be appreciated.



**Figure 9. Comparison of cost distribution between 1995 and 1998 for a Cuban liner shipping company**

From 1995 to 1998 there were significant changes in cost distribution. First of all, the increase of capital cost is associated with investments in newbuilding ships as was explained in the comparison with the refrigerated cargo company. Secondly, the economic crisis faced by the industry determined a drastic reduction of employees on board and at shore, which is the main reason for the decrease observed in manning and administration costs. However, the number of employees doing office jobs is still inefficient in comparison to foreign companies of equal size, as was analysed in chapter II (see Table 2). Finally, the considerable increase in fuel cost percentage is

not only a result of a rise in bunker prices, all over the world during the period, but also a consequence of the fleet obsolescence.

### **III.2- Acquisition and capital costs**

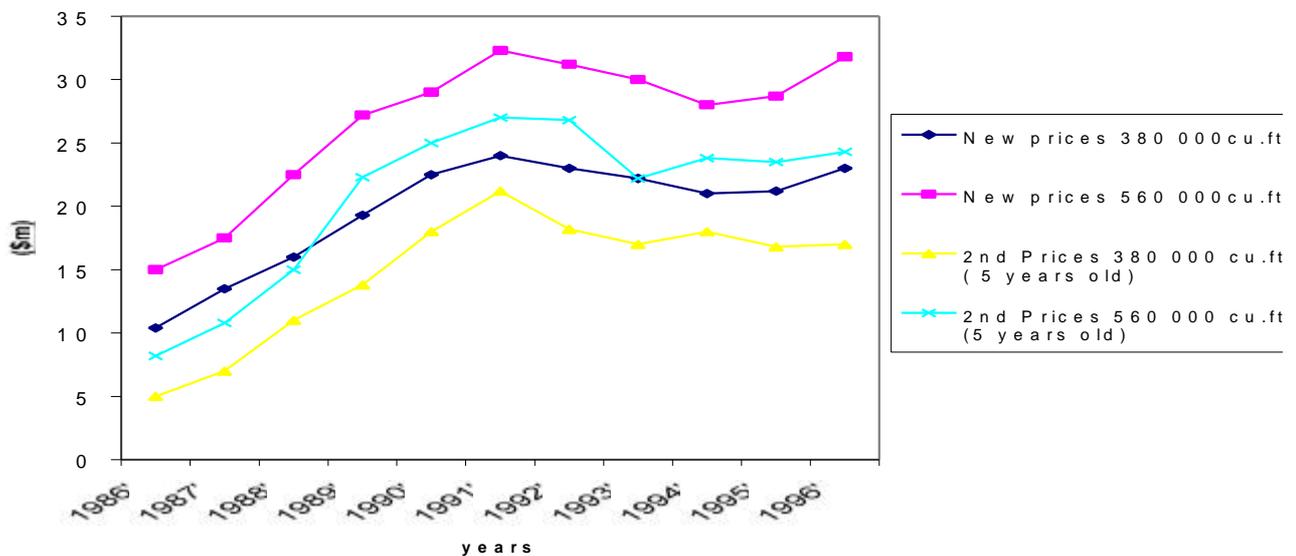
Capital costs, in an elemental definition, are all those costs related to the acquisition of a newbuilding or second hand ships. It also includes the cost of the loan capital in terms of interest rates. Dewry Shipping Consultants (1997) state that price trends in the newbuilding sector will be influenced by:

- Newbuilding demand.
- The impact of the elimination of shipping subsidies, if this, indeed, is ever fully achieved.
- Developments in shipbuilding capacity and utilisation rates.
- Shipbuilders' production costs.
- Additional costs imposed by safety and environmental legislation.
- Inflation and exchange rates.
- Freight market trends and shipowners' revenues.
- Availability of credit for investment in shipping.

In the case of second hand ships, their demand is dependent on the freight market for such a vessel, trading forecasting and buyers' and sellers' prices. In contrast to a newbuilding, the short acquisition lead-time for second hand ships permits shipowners respond quickly to any increase in the freight market movements. For that reason, the second hand market is very much linked to movements in the freight rate and as a consequence, volatile fluctuations can be expected ( Fairplay, 1998).

Figure 10 demonstrates a comparative and historical analysis between newbuilding and second hand prices for reefer ships from 1986 to 1996. In this analysis it could be noted how the specific characteristics of a vessel in terms of size, type and configuration have a direct influence on the price. Also, the differences in trends between newbuilding and second hand prices could be explained considering that

second hand market values should always reflect freight market earnings and anticipated market earnings at any one time.



**Figure 10. Newbuilding and second hand prices for reefer ships from 1986 to 1996** Source: different graphs from Dewry Shipping Consultants and Lloyd's Shipping Economist

From the perspective of any cost control system, the capital cost of the company also includes the opportunity costs and interest payments associated with the purchase. However, an effective control and analysis should be able to identify not only the total volume of capital costs per vessel, but also be able to break down this item into unitary costs.

These unitary costs could be measure as dollar per day calculation, per unit of carrying capacity, per slot or per cubic foot. This analysis of capital cost evaluated in terms of unitary cost is additionally useful in comparisons among capital, operating and voyage costs.

An estimation of annual capital charge evaluated in terms of dollars per day for different kind of vessels operated by various Cuban shipping companies could be found in the following table. For the calculation the average capital cost per ship has been estimated, taking into account the original price, the period of repayment and the interest rates associated with the principal loan.

**Table 3. Annual capital charge for vessels operated by Cuban companies**

Vessel Type	Price ( US \$ m)	Year	Annual Capital Charge (US\$perday)	Payback Period(years)	Interest Rate
Aframax Tanker	31,2**	1993	9,801	8	12%
Handysize Bulk Carrier	9,8*	1987	2,837	5	9%
Handymax Bulk Carrier	13,1*	1987	3,792	5	9%
Panamax Bulk Carrier	19,5**	1993	6,126	7	12%
General Cargo Ship (20 000 Dwt)	14,8**	1996	4,649	6	12%
Container Ship (1 100 TEU)	21,2*	1994	6,143	7	13%
Reefer Ship ( 200 000 cu. ft )	13,9*	1989	4,025	5	11%

\*newbuilding price      \*\* second hand price

companies a limited access to the full range of financial packages enjoyed by other shipping industries all around the world. The national maritime industry is considered very risky by international banks and for that reason the interest rates associated with loans are extraordinarily high. On those grounds the government provides almost all the monetary resources for financing new investments.

However, bank lending is not the only option for the maritime industry at the present time, and in that sense Cuban shipping companies could look for viable alternatives to fund the newbuilding projects. Among these different financial options, one of the most appropriated are leasing techniques which often offer a cost of funds significantly less expensive than traditional bank finance. This peculiarity is based on tax benefits for both, the lessor and the lessee. On the one hand, the lessor who keeps the ownership can obtain tax benefits by depreciating the ship against profits and without any involvement in the control and operation of the ship. On the other hand, the lessee can also obtain benefits from the tax regime through lower rent payments. Stopford (1997) says that this type of operation has several advantages. First of all, it provides access to long term finance from commercial banks. Secondly, there is a reduction of the capital cost, taking into account that the lessee company does not actually purchase the ship. Thirdly, the lessee has the freedom to operate the ship according to his interests, and he can even determine the design's requirements during

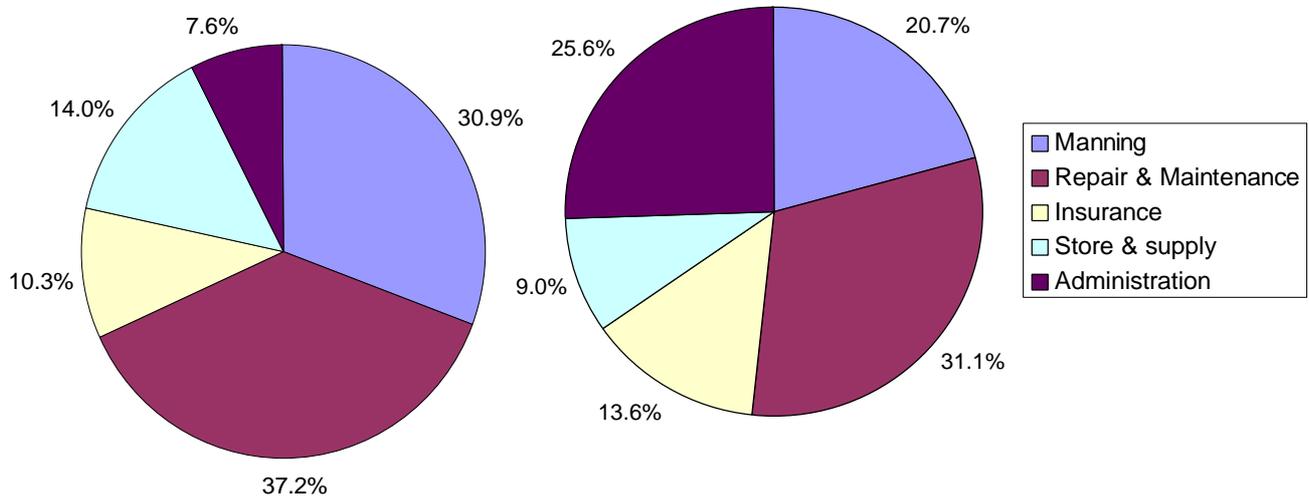
the process of building the vessel up. However, the handicaps of leasing operations are based on the financial strength of the lessee and his capability to fulfil his obligations to the lessor. In addition, the long term transaction limits the lessor's rights of unwinding the lease. Finally, the advantage of leasing operations can be diminished due to changes in tax regimes or government's policies. At the present moment there is no evidence that leasing finance is being used by any national company.

In spite of the fact that privatisation is against the core values of the social system, the joint ventures with international shipping companies and operators could be considered as one of the most important sources for newbuilding projects in the future.

### **III.3- Operating costs**

For a ship to be in an operational position requires the arrangement of a number of other activities. First of all, officers and crew should be employed to run the ship. The seaworthy condition of the ship is determined by maintenance and repair operations and an opportune supply of spare parts and other materials. Insurances also have an important function in the ship's operational position taking into account not only the huge amount of capital invested, but also the still high risk involved in the transport of cargo by sea ( Ma, 1998).

Figure 11 shows the break down of operating costs in the year 1998 for two different Cuban companies. The differences in the percentage distribution between these two companies were explained before in the analysis of Figure 8.



*Refrigerated cargo company*

*Container Line Company*

**Figure 11. Operating cost distribution for two Cuban shipping companies in 1998**

From the Figure 11 it can be noticed how repair and maintenance costs, in both cases, are the highest costs in terms of percentage distribution. The explanation for that should be found again in the high level of obsolescence faced by the whole Cuban fleet, which requires continuous repairs and maintenance for keeping the operational position. Secondly, the amount related to administrative expenses, mainly in the container line company is also considerable. This aspect was analysed in the chapter II (Table 2) as a result of the lower efficiency in the management of human resources in comparison with the average of similar size international companies. National companies are using an additional number of 12,3 employees doing office jobs over the average in foreign companies.

An analysis of the most important elements within the group of operating costs will be carried out in the following.

### **III.3.1- Manning costs**

The majority of operating costs and voyage costs could be broadly the same when comparing identical vessels, no matter the company or nationality. That is the case for insurance, bunkers, and port dues, which are determined by the same patterns. However, the manning costs have a particular difference from the rest based on the fact that they are extraordinarily linked to matters of nationality, wage costs, onboard numbers, conditions of service and state and government subsidies (Precious Associates Ltd, 1997).

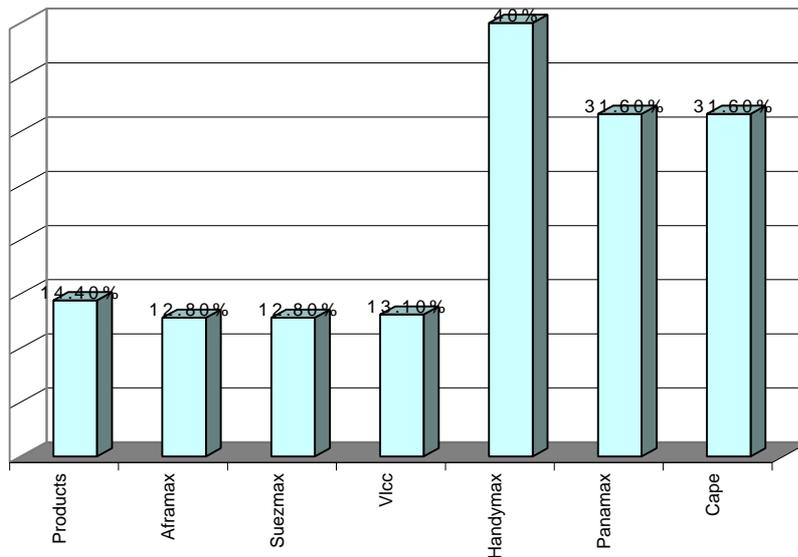
On the international scene it has been a shared interest for main shipping companies to look for the cheapest crew composition and to reduce these operating costs, which in many cases can be as much as 50 % of the total amount of vessel costs. The reduction in crew costs has also been one of the factors determining the flagging out operations since the early 80's.

At the end of 1995, the International Shipping Federation (ISF) and the Baltic and International Maritime Council (Bimco) issued a research project analysing the current and projected scenario for the world supply and demand for seafarers (Lloyd's Shipping Economist, 1996). The most important points of this research could be summarised as:

- The maritime industry at the end of 1995 was facing a 4% shortage of officers, a deficit which is expected to increase to a 10% by 2005.
- The OECD countries provide more than half of the senior officers for the industry. Taking into account that more than 35% of these officers are aged between 41-50, this supply will be inevitably reduced.
- Almost 20% of the world's seafarers are provided by the Philippines.
- Geographical changes in supply from OECD countries to the Far East have been observed since 1990.
- The needs of the marine shore- based community must be considered.

- The increase of standards in quality for crew and officers will suppose further shortages in supply.

According to recent statistics the manning costs in terms of US \$ per day have faced dramatic increases in only seven years (Precious Associates Ltd, 1997). These increase for the tankers and bulk carriers market is presented in Figure 12.



**Figure 12. Increases of manning costs in percentage from 1990 to 1997**

**Source: Precious Associates Ltd, 1997.**

In the particular case of the Cuban maritime industry the situation is different in comparison with international trends. All Cuban ships are using 100 percent national crews and officers even in the case of ships registered under foreign flags. On the other hand, Cuban seafarers and officers can not be employed easily onboard foreign companies' vessels because it is forbidden for them to enter into the United States territory, territorial waters or ports, according to the American Embargo Law against the country. For that reason, instead of shortage, the industry is facing an oversupply of officers and seafarers.

Table 4 gives a comparative analysis of international wage scales for a range of major supply countries and Cuba, using the benchmarks of Master, Second Officer and Crew Member.

**Table 4. Typical wage costs including basic wage, vacation and guaranteed/ fixed overtime (US\$ per month). Source: Precious Associates Ltd (1997) and national statistics**

Nationality	Master	2 <sup>nd</sup> Officer	Crew
Chinese	2,530	1,465	645
Croatian	6,000	2,300	1,100
Filipino	3,345	1,678	991
Indian	4,700	2,600	980
Polish	3,950	2,400	1,190
Portuguese	6,650	3,735	1,825
Russian	3,300	1,760	1,100
Spanish	6,700	2,800	1,630
Sri Lankan	4,400	2,600	500
Cuban	2,875	1,811	995

Nevertheless, the gradual recovery in the national maritime industry, and slow investments in newbuilding fleet reorganisation and new salary policies could be seen as clear indicators of growth in manning costs during the next ten years. For that reason, the cost control system should be able to determine with accuracy the volume of manning costs per type of vessel and fleet during the operational period. At the present moment it is not possible to precise by any shipping company how much manning cost is spent by a vessel operated by the company.

### **III.3.3- Insurance costs**

The group of insurance- related costs has its fundament in the high level of capital invested in the company and the need to protect the vessels against the risks involved in insurances (H& M) and protection and indemnity insurances (P&I). The role of H&M insurance is to cover all risks associated with tangible assets in terms of hull, equipment and machinery. On the other hand, P&I insurance covers risks to third parties such as loss of cargo, pollution, and personal injuries, among others. The

premium levels for H&M are determined mainly by two factors: the assessed hull value of the vessel and the owner's statistics of claims records. In the case of P&I, the premium level is established by around 20 P&I clubs all around the world based on the statistics of claims in past years and previsions for the forthcoming years.

Costs associated with H&M insurance have faced two different trends from 1990 to 1996. From 1990 to 1992 the main characteristic trend was a sharp increase due to rises of the world total losses. Since that moment the costs have dropped rapidly based on the improvements in the shipping loss position, a reduction in ship values and an increase in insurance market competition (Dewry Shipping Consultants, 1997).

Table 5 shows a comparison between H&M insurance costs and newbuilding prices for different types of vessels where the relationship between decreases in newbuilding prices and reductions in H&M insurance costs could be observed from 1990 to 1996.

**Table 5. Evolution of H&M insurance costs and newbuilding prices for different types of vessels from 1990 to 1996. Source: From various statistics issued by Dewry Shipping Consultants and Fairplay**

Year	Suez Max Tanker		Handimax		Container ( 3500TEU)	
	Prices (US\$m)	H&M (US\$ per day)	Prices (US\$m)	H&M (US\$ per day)	Prices (US\$m)	H&M (US\$ per day)
1991	70,0	1,040	26,0	575	72,5	1,981
1992	72,0	1,450	24,7	795	75,0	1,105
1993	56,0	1,235	25,1	660	70,0	1,012
1994	53,0	905	24,2	450	50,0	817
1995	54,3	725	24,9	355	55,0	628
1996	52,5	715	23,7	340	52,0	572

In contrast to H&M insurance costs, P&I premiums have been facing a permanent growth trend during the entire decade. The reasons for that could be explained by an increased level of litigation, environmental penalties and higher liabilities related to personal injuries. A report published by the United Kingdom's P&I Club in 1996 alerts about the relationship between the quality crew and the ship's overall performance (Lloyd's Shipping Economist, 1996). According to this criteria, the international strategies of saving manning costs through the cheapest crew has a direct

influence in the increase of human mistakes as main causes of P&I claims. In the case of Cuba, statistics compiled from 1995 to 1998 prove that human mistakes are the first cause of accidents to P&I claims (Table 6).

**Table 6. Main causes of accidents covered by P&I insurance in Cuban shipping companies from 1995 to 1998**

Causes of accidents	Percentage from the total
1- Deck office error	30 %
2- Crew error	21 %
3- Structural failure	15 %
4- Equipment failure	11 %
5- Shore error	9 %
6- Mechanical error	7 %
7- Pilot error	3 %
8- Engineering office error	2 %
9- Other causes	2 %

### **III.3.2- Repair and maintenance costs**

The operational position of any ship is highly linked to the volume of costs invested in repair and maintenance costs, which must conform classification standards and individual companies' policies.

As was demonstrated in Figure 11, repair and maintenance costs for different Cuban shipping companies are the most important disbursement in order of importance before manning costs. According to national regulations established by the Minister of Finance and Economy in 1976, shipping companies should make an annual provision

for dry- docking and other repair expenses, and for that reason expenditures are gradually assumed before their arise.

The major influences on repair and maintenance costs can be identified by six factors (Dewry Shipping Consultants, 1997):

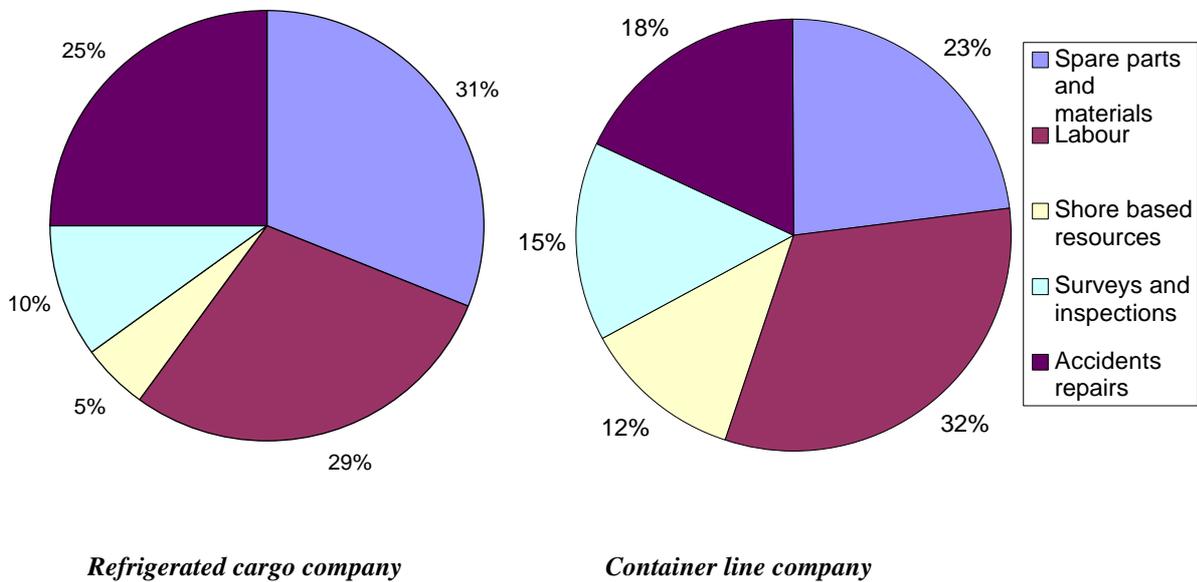
- Class requirements
- Freight market
- Vessel age
- Vessel type
- Vessel size
- Trading patterns
- Company strategy

According to different technical opinions consulted in Cuba ( Marquez and Hernández, 1999), the increase of repair and maintenance costs in the majority of Cuban shipping companies is in first instance due to the fleet age. The ageing Cuban fleet needs more regular maintenance and more frequent renewal of parts due to corrosion and damages after a long time in operational use. In addition, the fleet is also subject to an increased amount of surveys by port state control mainly to those vessels operating in Japanese and European markets. An international research into the ship-repair market suggests that vessels between 15 to 20 years old (the average for Cuban fleet is 19,5 years) require 1.60 scheduled repair and 2.0 unscheduled repair per one unit of the same operations on vessels between 5 to 9 years old ( Dewry Shipping Consultants, 1997).

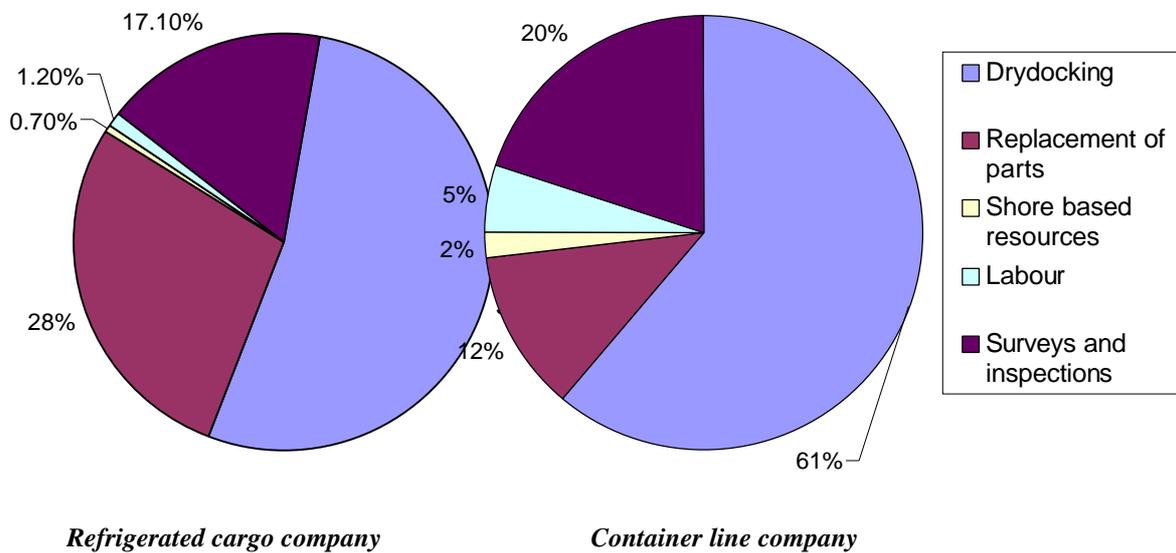
Secondly, after the age factor, the specialists allocated the economic depression at the beginning of the decade and companies' strategies as responsible for the increased levels of repairs and maintenance costs. At that time an incorrect policy based on deferring scheduled repairs classified as no essentials was adopted. This problem was conditioned by market losses and cash flow shortages. However, there has been a price for this caused by a raised level of unscheduled repairs and corrosion matters.

Problems like the ones explained above are also a result of deficiencies on cost control because it is not possible to determine any comparative analysis of repair and maintenance costs per ship. In the majority of the national shipping companies this amount is registered in global terms which leaves analysis blind to foresee issues and to compare preliminary savings with subsequent increases in collateral costs.

In the case of the container and reefer companies used in this charter, the break down of repairs and maintenance costs during 1998 (divided in running repairs and maintenance, and docking repairs and maintenance) are shown in Figures 13 and 14.



**Figure 13. Running repairs and maintenance costs in 1998**



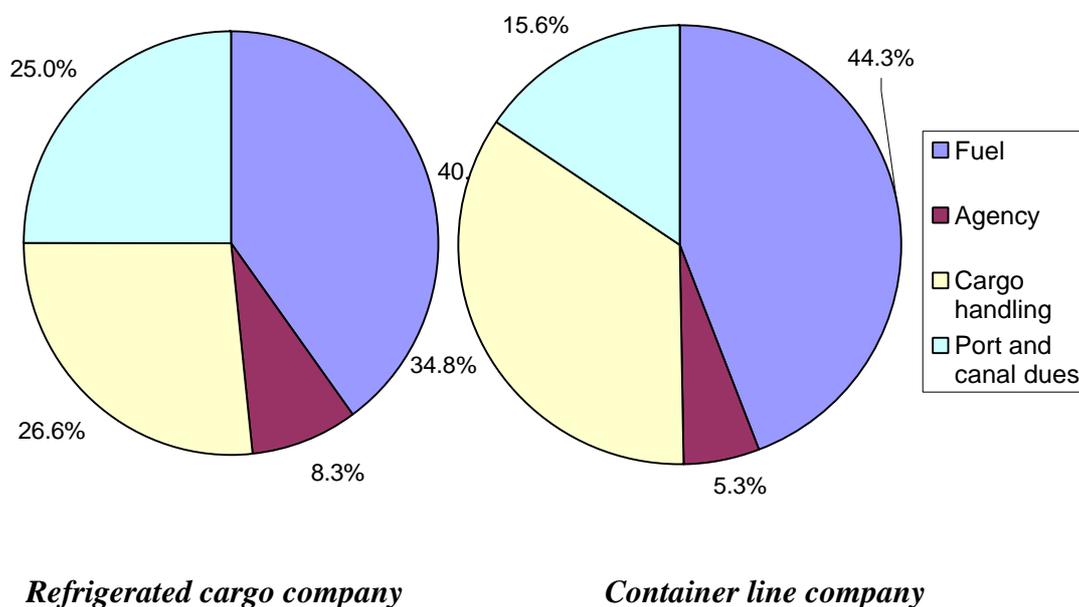
**Figure 14. Docking repairs and maintenance costs in 1998**

From the Figure 13 it can be observed how the age structure of the fleet affects the volume of running repairs and maintenance costs. Older units are more prone to the ravages of wear and tear, even in the case of high standards of ongoing maintenance. For that reason, the refrigerated cargo company which is operating the older fleet, in comparison to the container line company, has a major incidence in elements such as spare parts and materials and accidents repairs. The same reason is also valid for the analysis of Figure 14, where the percentage of the element associated to the replacement of parts is considerably higher for the refrigerated cargo company in relation to the container line company. It is well known that older machinery will need more regular maintenance and more frequent renewal of parts while corrosion and weathering of interior and exterior surfaces will increase in relation to the length of exposure and the time in operational use.

### III.4- Voyage costs

Voyage costs are also frequently classified as variable costs, taking into account they are determined by the characteristics of every sailing. Even a ship performing the same route will never account identical amounts of costs per voyage.

Following the analysis carried out through this chapter, the break down of voyage costs for two different Cuban companies is shown in Figure 15.



**Figure 15. Voyage costs for two Cuban companies in 1998**

It could be observed from the graph above how for both companies, bunkers are the most important voyage trading cost, a question which could also be considered as an international common factor for the majority of the shipping companies operating within the industry. It is considered that fuel costs account for a range between the 40 to 60 percent of all voyage costs (Dewry Shipping Consultants, 1997).

The costs associated with bunker consumption depend on a wide range of factors determined by engine efficiency, suppliers' location, vessel type, speed and the fluctuations of prices in the bunker market. Bunker costs are also influenced by

different operations performed by the ship at port such as the use of lifting equipment, generators, and cleaning, among others.

The table below comprises an analysis of bunker costs for different types of vessels operated by Cuban companies in 1998. From the table it can be observed how fuel consumption has a direct relationship with speed, vessel type and size.

**Table 7. Analysis of bunker costs for different types of vessels operated by Cuban companies in 1998**

<b>Vessel Type</b>	<b>Fuel Oil/Day (tonnes)</b>	<b>Service Speed</b>
Aframax tanker	57,2	15
Handysize bulk carrier	16,3	13
Handymax bulk carrier	17,8	13
Panamax bulk carrier	34,6	14
General cargo ship ( 20 000 Dwt)	15,2	13
Container ship (1 100 TEU)	32,4	17
Reefer ship (200 000 cu.ft)	19,5	15

The lack of monetary resources faced by Cuban companies limits the implementation of new technologies and innovations which could reduce considerably the volume of bunker consumption. That is the case of the use of waste heat from the engines for covering the seaborne electric power. However, further measures do not require investments. An example of that is the cooperation between different shipping companies which can centralise their purchasing needs and as a result obtain more competitive rates per volume purchasing and establish a good network of contacts within

the bunker market. This aim can not be reached at the present time because all companies are operating small fleets and the purchasing volume is very low.

Unfortunately, the information provided by national companies is not enough for a deep analysis of costs associated with agencies, cargo handling and canal and port dues due to the impossibility of breaking down the global numbers in different items. Furthermore, there is no differentiation in costs among different ports of call or per vessel.

In general terms, under the category of canal and port dues are accounted charges determined by the requirements of the port and the tonnage of the vessel. This is the case of pilotage, towage, line handling fees, customs and communications.

An increase concern about safety matters is analysed by Dewry Shipping Consultants (1997) as the main cause for raising port disbursements. Examples of that are pilotage and tug attendance charges and additional expenses associated with port state inspections.

In 1996, Inchcape Shipping Services issued an analysis of container port canal transit charges for vessels in different locations. A differentiation has been made for those ports usually called by Cuban ships.

**Table 8. Container port and canal transit charges for vessels at different locations Source. Inchcape Shipping Services 1996.**

<b>Port of call</b>	<b>Port charge (US \$)</b>
Osaka	37,000
Hong Kong*	17,957
Kaohsiung	19,764
Jebel Ali	5,062
Suez Canal*	197,000
Fos	36,961
Rotterdam*	34,361
Norfolk*	34,700
Panama Canal*	100,083
Los Angeles	22,612

\* Ports of call for Cuban ships.

As has already been demonstrated, no ship cost exists in isolation and the same concept could be applied to the link between the management of the ship and all supportive operations developed by the shipping company. Undoubtedly, shipping costs are determined at a certain level by external factors but there is a major influence lying on the management effectiveness at sea and within the company. The core objective of minimising overall costs and multiplying earnings could be achieved only if each disbursement is opportunely registered and controlled.

## **Chapter IV. The design of a cost control system for Cuban shipping companies**

### **IV.1- Budget organisation**

Planning and controlling are closely related. The basis for any cost control system is based on the process of planning (in the short and long term) of which the main aim is the determination of the company's objectives, strategies and policies. In that sense, the budget is a statement of these expected results expressed in numerical terms. The budget should be the fundamental planning instrument for any company as it is necessary for control, but it can not serve as a sensible standard of control unless it reflects plans.

The perception of the process of planning has been changing quickly in Cuban shipping companies. At the previous stages the budgets were seen as formal tools for fulfilling centralised requirements from ministers and the government. The organisation evolved opportunistically or as a result of tradition and past experience.

In spite of the bigger concern about the importance of elaborating accurate budgets, they are still designed by senior managers following national directives, which are based less on a rigorous evaluation of the business realities than on the best judgement of those involved at the time. In addition, budgets are communicated down through the organisation without serious evaluation of the level of commitment from middle managers and employees.

The present situation requires a radical change of the highly centralised budgeting process. In that sense, the pyramid should be inverted and the authority of making the budget should be delegated stating plans in terms of numbers and breaking them into different parts of the organisation. This process of decentralisation will let managers determine clearly what capital will be spent, by whom and where, and what expense, revenue, or units of inputs and outputs the budget will involve. After plans are

completed, coordinated and developed enough to be fitted into departmental operations, a useful departmental budget can be prepared as an instrument of control. The starting point for this budget reorganisation should be the determination of the cost centres.

#### **IV.1.1- Definition of the cost centres**

The budgets are structured to indicate the area which will be covered in terms of unit or ship budgets, departmental budgets, and divisional and corporate budgets.

Each one of these unit budgets are known as cost centres and the objectives of such division will be a more accurate determination of disbursements and costs directly related to the specific function of these cost centres. It also ensures the attainment of corporate strategic goals.

Downard (1992) analysed how the size of the cost centres for shipping companies can vary due to three factors:

- Convention: The traditional way of grouping certain items together.
- Convenience: Certain items fall naturally into groups.
- High cost items: Some items are of such high cost they can only be considered separately.

However, taking into account that the purpose of this proposal is to have a quick change in the budget organisation within shipping companies, the conventional manner should be proposed as the way to determine the cost centres. Furthermore, it does not mean any change in the structural organisation of the companies and for that reason the number of cost centres will be equal to the number of actual departments.

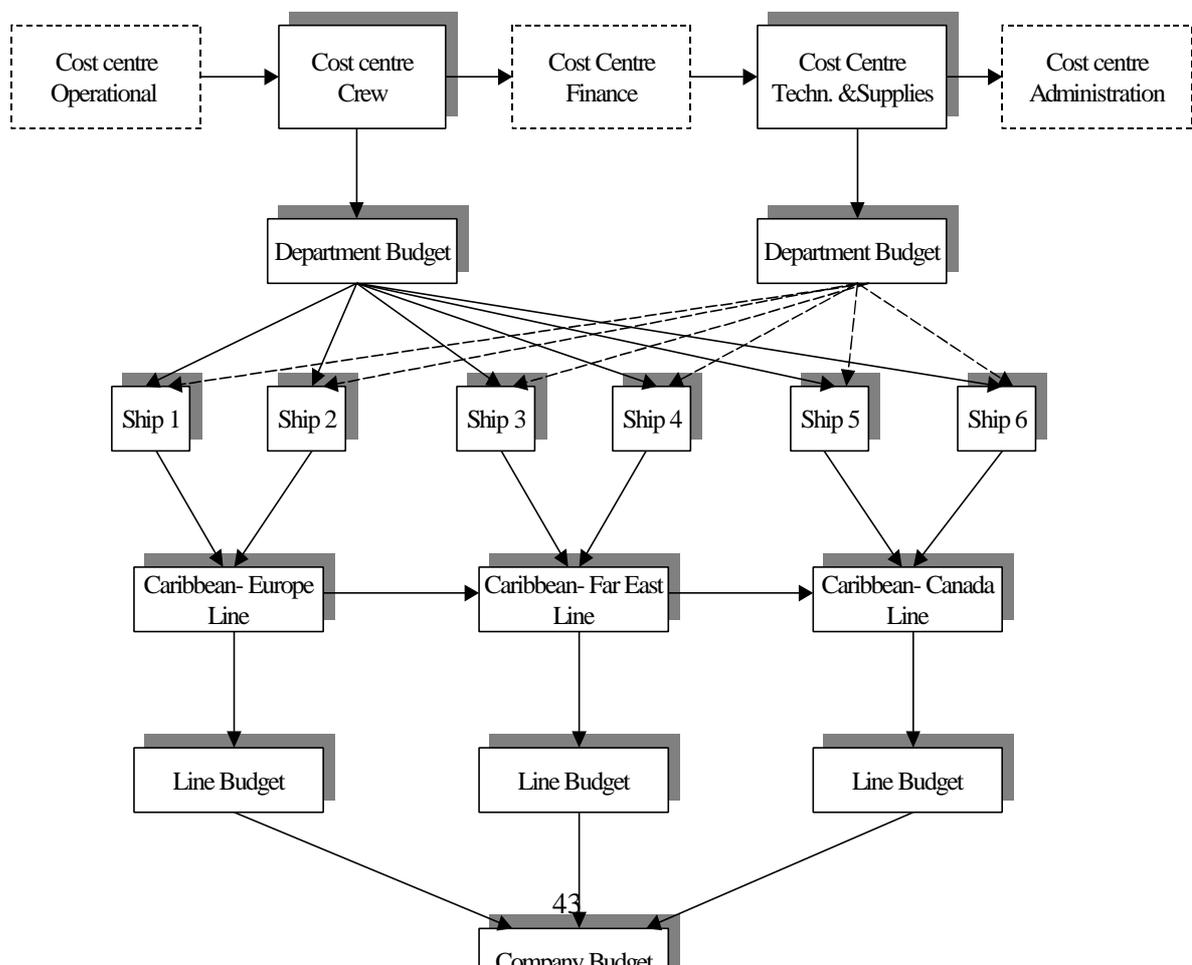
In that sense and due to the similar organisational structure for all Cuban companies, five cost centres will be defined as follows:

1. Crew department.
2. Operational department.
3. Technical and supplies department.
4. Finance and account department.

## 5. Administration department.

Figure 3 shows how each one of the cost centre budgets will be integrated to conform the unitary or per ship budget and the further steps for being joined as the corporate budget. The diagram is based on the classical structure of one of the Cuban shipping line companies operating in three markets: Caribbean- Europe, Caribbean- Far East Service and Caribbean-Canada. To simplify the diagram only two cost centres and a minimum number of ships per line are considered.

From Figure 3 it can be noted how the responsibility for elaborating the budgets are distributed through the entire company from the starting point of the departmental budgets as cost centres. In that way, managers who are directly linked with budgets are more likely to achieve their objectives because they produce the budgets themselves or are involved in its production, incorporating to them their feelings about the market, experience and know how. Despite the fact that the number of managers involved in this process will depend on the size of the company, the responsibility will lie in the person who produces the budget.



**Figure 16. Budget organisation of a Cuban shipping line company from cost centre budgets to company budgets**

The elaboration of budgets from the cost centres to the company budget does not exclude top managers from the process. First of all, because the top levels will determine the mission statement, strategies and overall objectives during the early stage before the process begins. During the whole process, top and medium managers should continuously supervise the budgetary elaboration, the way in those particular objectives per cost centres are congruent with the overall objectives to avoid any overestimated forecast, and finally they should provide the budget approval. The achievement of the objectives of divisions and departments will ensure the attainment of corporate goals.

Nevertheless, there are some dangers in budgeting which should be considered carefully. Weihrich and Koontz (1995) advised managers from budget programs becoming cumbersome, meaningless and unduly expensive. The following factors support these matters:

- **Overbudgeting:** There is a problem in overbudgeting through spelling out minor expenses in detail and depriving managers of the needed freedom in managing their departments. A clear example of that is when new ideas and projects are refused for the only reason they had not been considered since the beginning. Another case is the division of budgets in so many details that it is impossible to control them in a practical manner. As a result the budget loses its sense and it becomes useless.
- **Overriding enterprise goals:** Another danger lies in allowing budgetary goals to become more important than enterprise goals. This problem could be caused because cost centre budgets could be understood for the specialists involved in their elaboration as completely independent from other cost centres instead of a supporting and interlocking network among all departments. This lack of communication usually is the cause of many deficiencies during the planning process within Cuban shipping companies. A clear example of that is the insufficient provision of salaries realised by the crew department because it has

not included the cost of labour related to maintenance and repair operations, information which should be provided by the technical and supplies department.

- **Hiding inefficiencies:** It refers to the well established habit, easily observed in all Cuban shipping companies, of taking last year's budget and increasing everything by a given percentage. The danger involved in doing this lies in the fact that the percentage increased could be meaningful in tomorrow's fast moving maritime business environment. Wehrich and Koontz (1995) also support the idea that for budgets growing from precedent, certain expenditure made in the past can become evidence of its reasonableness in the present. The budget then can become a repetition of precedent inefficiencies. This problem is also analysed by Lambert (1993) who recommends the concept of zero budgeting which means "always starting from fresh to establish what must be spent in today's world to achieve goals".
- **Causing inflexibility:** Inflexibility is for Wehrich and Koontz (1995) perhaps the greatest danger in budgeting and for that reason it could not be used in any case for replacing management. In that sense the process of cost control should let managers know if the reality differs from which it was planned before. For that reason, budgets must comprise, in addition to the main budget, different alternatives able to cover any unforeseen change of scenario. On that ground it is more important for the elaboration of the budgets to analyse how each of the expense or individual costs should vary for different volumes of output, changes on prices, among other factors.

The present budget organisation proposal also requires a detailed definition of which cost items should be determined, analysed and controlled per each cost centre stated before.

#### **IV.1.1.1- Crew department**

This cost centre should be in charge of determining the salary expenses of officers and crew employed by the company whilst the cost associated to individual insurances and supplies will be under the scope of other cost centres. In spite of the fact that the composition of wages is generally complex, provided they are systematically

calculated, the estimates produced should be one of the most accurate of all the cost departments.

Conventionally the crew department budget comprises three main groups. First, the determination of wages and social security expenses such as the basic salary, overtime, holidays, leave subsistence, among others. Secondly, cost associated with travel expenses and accommodation of crew and officers before and after the voyage, and finally other costs, usually classified as indirect, which cover mainly medical examinations and treatments, payments to manning agents, recruitment and periods for training.

Taking into account that one of the main objectives of the present proposal is a clear definition of unitary budgets per ship, it is necessary to elaborate a typical budget setting form per department. In the design of this form, which is shown in Annex I, a numerical code per each one of the cost item it has been adopted and also for the specific ship and department. This numerical code is extremely important for the calculation because the same is used for controlling and accounting the actual expenses incurred for the company. In that sense, the numerical code keeps the uniformity in the classification between budgets and accounts registers, and it facilitates the further process of comparison, control and analysis at the end of each month, quarter or year.

#### **IV.1.1.2- Operational department**

The operational department costs will cover all variable costs associated with the ship's performance during the voyage or at different ports of call. An apparent contradiction could be founded between the name of the department and the group of costs under its control. But the name should be understood only as a conventional classification within Cuban shipping companies where these kinds of departments are always dealing with cost usually classified as voyage costs instead of operational costs.

For that reason, the cost centre will be responsible for determining the consumption of fuel and diesel oil, port costs and canal transit costs, agents, brokers and freight forwarder fees and commissions. In addition, in the case of line shipping companies or charter parties from which the company is responsible for the account of loading and discharging costs, they should be included in the budget as well. Finally, additional costs for miscellaneous disbursements, cleaning operations, purchase of dunnage and other materials, for example for lashing and securing purposes should also be considered.

The operational department as cost centre is facing perhaps the most difficult task in establishing the budget because it might be very complicated to determine in advance the amount of costs associated with the voyages that every ship will perform during the whole year. In that sense, information provided by agents and among all cost centres involved in the budgetary determination is essential.

Annex II shows a proposal for the budget setting form in which, the numerical code classification per each item of interest has been included, as well as in the previous cost centre.

#### **IV.1.1.3- Technical and supplies department**

The technical and supplies department has the main objective of keeping the fleet fully operational for the maximum period of time in the year. This cost centre is responsible for all costs associated with the maintenance and repair of every ship and also lay up, modifications and sale and purchase operations. The classification standards and company policies are decisive in determining the requirements of maintenance and repair levels. As was analysed in chapter III, to keep the operational position of a ship means to fulfil all regulations in terms of seaworthiness, safety and accident prevention, to avoid as much as possible breakdowns and to maintain its competitive appearance. For these reasons, the budget elaborated by this cost centre comprises costs in spare parts, materials, tools and equipment, radio and navigational aids, marine charts and other nautical publications, survey fees, items associated with

the registration of the ship and disbursements covering modifications in the structure and equipment of the ship.

From the supplies point of view the department is in addition responsible for forecasting all consumable stores carried onboard every ship. The amount of supplies is very wide and different ranging from marine stores such as lifeboat stores, life saving equipment, cargo equipment and fresh water to minimum details like cleaning materials and stationery costs. In the supplies budget are also included paints, chemicals and gases, lubricating oil, food, protective clothing and uniforms, among others.

The budget elaborated by this cost centre is a clear example of the advantage of the delegation of responsibilities in establishing the budgets. First of all, managers and specialists can incorporate their own know how and experience to the process, based on previous reports and inspections. There is also clear evidence of why budgets can not be determined as isolated plans. For example, the volume of dry-dockings and maintenance requires a close process of consultation between line managers and department specialists based on the determination of the employment regime per ship. In addition, a considerable percentage of supply items requires the direct collaboration of the master and officers onboard. Furthermore, the effect of technical and supplies costs on other cost centres evidences the inter-relationship in the process among all departments. On that ground, the costs of labour involved in maintenance and repairs have a direct influence in the volume of salary cost planned by the crew department.

Annex III states the proposed budget setting form for the conformation of budgets elaborated by the technical and supplies department.

#### **IV.1.1.4- Finance and account department**

The role of this cost centre is the determination and planning of expenses which have been classified within the group of fixed costs at the beginning of chapter III (see Figure 7). The group comprises amortisation, insurance and financial costs.

In the case of depreciation, Cuban shipping companies are forced to follow the straight-line depreciation method according to central regulations for the industry determined by the Economy and Finance Minister. The process of establishing differentiated unitary budgets per ship is not complicated and requires only the allocation of annual fixed rates calculated on the basis of the purchasing price differed through all the estimated period of life for the ships.

On the contrary, the determination of the insurance costs is more complicated. First of all because the amounts are not negotiated directly by the manager or specialists of this department, who should request the information from line managers and brokers. Secondly, due to the fact that the amount of risks the company should take are usually made at the company level in view of the magnitude of the sums involved. For that reason, a close working relationship among all parties involved in the determination of insurance costs will be necessary. Another obstacle could be found in the non coincidence between the company's budget year and the renewal dates. Furthermore, the way in which premiums will be paid by the company is different. For example, in the case of H&M premiums if the amount is done as deferred payment on a quarterly basis, further discounts should be considered, which could be higher if payment is made in advance. For P&I premiums they are usually paid semi-annually without any kind of discounts. Taking into account all these factors the insurance cost budgets will include premiums for P&I, H&M, war risks, loss of earnings and other extra insurance items. In the case of deductible as a form of self-insurance, Downard (1992) argued that such deductible could not be considered as part of the budget taking into account the uncertainty of those expenses.

The finance and account cost centre should set up the volume of costs associated with bank commissions and other discounts for financial operations. In the case of Cuban shipping companies it is also usual to consider the interest rates from short-term liabilities as financial costs.

Annex IV describes the proposed budgets setting form per cost item for the finance and account cost centre.

#### **IV.1.1.5- Administration department**

The administration cost centre will deal with the determination of all overheads required by the company's shore staff in charge of the daily management of running a shipping company. As well as technical and supplies costs, administration costs comprise a wide range of expenses and disbursements conditioned by the size of the company, their location and the number of supportive staff. The volume of costs are determined according to the main functions of the ship management administration in terms of ship support, record keeping, accounting and communications. Taking into account those functions, the overheads will comprise expenses for staff salaries, disbursements in different kinds of communications (telephones, telex, fax, etc), training courses, the depreciation of buildings and equipment, printing and stationery, among others.

However, the most difficult task is not based on the determination of the group of costs classified as overheads. The problem is in the allocation of all indirect costs to conform the unitary budgets per ship due to the indirect nature of these expenses. For that reason, the best way should be found to apportion administrative costs, which can vary from company to company.

In spite of the fact that many companies prefer an equitable distribution per ship, this method is not completely fair taking into account that the volume of supportive work developed by shore staff is in a certain way different for different levels of vessel employment or size. For that reason, the present proposal suggests that overhead costs should be distributed according with the forecast level of incomes planned per ship. For example a ship which expected earnings are forecasted to be 25% of all earnings for the next year will be charged in its budget with the same proportional percentage of overall overhead costs.

As for previous cost centres, Annex V shows the proposed budget setting form with a clear distribution per cost and code number.

#### **IV.1.2- Line budgets and company budgets**

When budgets per ship and cost centres are determined for each one of the departments, to set up line budgets and company budgets, it is only a question of grouping each one of the items established previously, even per line or per company.

Annex VI gives an example of a budget setting form which allows managers at those levels to establish the line and company plans.

The operating expense budgets, which are the main aim of the present charter, should be completed with the determination of the sales budgets, as a formal and detailed expression of the sales forecast. These budgets should be prepared by line managers, taking into account they deal with the determination of different levels of ship's employment for the whole year according with the number of contracts already agreed or expected.

Expense budgets and sales budgets are the basis for cash budgets as the forecast of cash receipts and disbursements and one of the most important control tools in an enterprise. The availability of cash allows the company to meet obligations in the short and long term and to use the internal funds for investments in inventory, machinery or other assets.

As well as operating expense budgets, sales budgets and cash flow budgets should be determined for unitary purposes (per ship) and also for overall control even at the level of every line or company.

Nevertheless, in the preparation of cash budgets or cash flows within Cuban shipping companies basic mistakes are frequently found in mixing costs with disbursements and as a result wrong forecasts of net cash flows are obtained. A clear example of that is the depreciation costs considered a basic item for operating expense budgets but which are not outflows of money. Instead of depreciation, the cash budgets should include the repayments of loans and interest rates associated with the acquisition of new or second hand assets. Another example are the volume of taxes which should be considered for determining cash budgets as an effective disbursement, but they are not

included in any expense budget due to the fact they are not classified as costs. In addition, to forecast accurate cash flows one should know the volume of outstanding liabilities and receivables at the end of each period. For example, from the volume of sales expected for the period a certain amount should be deducted from client obligations, which usually remain in accountants' books until the next period. The same analysis also applies for the volume of expenses and liabilities to suppliers which have not been effected as disbursements at the end of the period.

Annex VII provides an example of a cash budget form able to be used as reference for avoiding these problems explained above.

#### **IV.2- The cost control system**

The basic control process, wherever it is found and whatever is being controlled, involves three steps (Weihrich and Koontz, 1995):

1. Establishing standards.
2. Measuring performance against these standards
3. Correcting variations from standards and plans.

The analysis of costs is based on the information system. The main source of that is all information is recorded by the Finance and Account department through invoices, bank operations and other documents. As well as for budgets, this information should be determined by the establishment of systems and procedures defining the methods of recording, transmitting, monitoring, storing and analysing the information.

##### **IV.2.1- Information recording**

The way that costs are accounted by Cuban shipping companies requires an immediate process of change. First of all, because the system of registration should establish a differentiated allocation of costs per ship, cost centre and using the same numerical code utilised for the determination of the different budgets. In spite of the fact that the kind and number of accounts used by Cuban shipping companies has been defined by the Economy and Finance Minister, companies have the freedom to determine as many levels and layers they consider necessary for the cost registration. Taking into

account that possibility the cost accounts could be operated at four different levels as follows:

		<b>Debit</b>
Code- <i>Account name</i>		<i>xx</i>
Code- <i>Name of the ship</i>	<i>xx</i>	
Code- <i>Cost element</i>	<i>xx</i>	
Code- <i>Cost subelement</i>	<i>xx</i>	

This system of registration not only allows managers to know with accuracy the exact volume of costs associated with a specific ship, or cost element, but also it facilitates the process of comparison and analysis of the current cost execution against what was planned before for the same element or ship within the budget. Furthermore, the system is also valid for obtaining different levels in the consolidated balance sheet, which is a useful piece of information about the volume of costs incurred in the employment of one specific ship, for a specific line or at the company level.

The following example shows a theoretical registration of crew salaries at the end of the period of operation using the registration method explained before.

- **Data:**

1. Name of the ship:	Caribbean Sea	Sea Star
2. Number of crew:	16	19
3. Volume of payment (US \$)	26 505,92	31 288,32
from which		
a) Basic pay *	19 846,00	22 831,00
b) Overtime	3 820,00	5 105,00
c) Social security	2 839,92	3 352,32

\* The reserved crew per ship is not considered in the calculation because these expenses are controlled by a central employment agency. Cuban shipping companies only register the amount of salaries of crew working onboard.

- **Registration:**

		<b>debit</b>
829- Operating costs		<b>57 794,24</b>
005- Caribbean Sea	<b>26 505,92</b>	
50 000- Wages	<i>23 666,00</i>	
50 100- Basic pay	19 846,00	
50 120- Overtime	3 820,00	
60 000- Social security	2 839,92	
006- Caribbean Sea	<b>31 288,32</b>	
50 000- Wages	<i>27 936,00</i>	
50 100- Basic pay	22 831,00	
50 120- Overtime	5 105,00	
60 000- Social security	3 352,32	

From the example above it can be observed how the use of four levels of analysis and the numerical code per ship and cost elements let the information be registered in a differentiated order. In that sense, it is easy to determine the volume of operating costs incurred by both vessels during their employment and to know the exact disbursement nature.

To achieve this method is not enough with its description. In addition, the managers' involvement is required in the account process as the only way to know what has been registered in accordance with their authority and responsibility for approving payments.

#### **IV.2.2- The budgetary execution control**

When information has already been collected and accounted it is time to make a comparative analysis between the current costs and the forecasts for the same expenses included in the budgets.

If budget preparation requires decentralisation and delegation of authority, the analysis of variances should also be made by the different company levels involved in the

process from the beginning. This means cost centre managers, line managers and top level managers.

The main aim of these comparative reports should be the systematic revision of variances between the actual amount of cost incurred at different levels and the budget for the period. In the determination of the variances carefully the percentage difference between items should be calculated and also the cumulative total costs for the period against the cumulative total budget. An example of how comparative reports should be prepared is shown in Annex VIII.

The report analysis is not only the calculation of variances but also the determination of reasons for such variances. In that sense is not enough with the revision of the general results because even for positive results, negative deviations could be founded in particular items. In general terms, reasons for variances are generally a consequence of the following items which have been combined with corrective actions.

1. The information used for forecasting the cost elements was insufficient and not accurate enough, and for that reason the planned items have lost their validity as a comparative pattern. In that case a corrective measure in the recalculation of the items should be realised as soon as possible. However, it is very dangerous to change the budget continuously and this measure should be taken only if the planned item is considerably different from the current execution either for unforeseen changes in the market prices or outdated information.
2. The actual costs have been incurred earlier than the planned within the budget year. This matter does not require any correction because in terms of annual execution the values remain valid for the comparison.
3. Mistakes in processing and accounting the information generated in the period. In that case the registration should be reverted immediately and variances should be recalculated.
4. Variances show negative deviation in overconsumption of cost elements. This analysis factor determines the validity of every cost control system because it allows managers to immediately evaluate the level of deviation, to find the causes and to take corrective measures.

The way in which the budgetary process and information recording and analysis have been proposed in this chapter permit managers to know opportunely under which cost centre, ship, line and cost element the deviation has occurred. However, finding the real causes of deviation requires discussions and analysis of all parties involved, from ship's senior officers to department specialists.

Furthermore, cost elements should not only be analysed separately because frequently the cause for a negative deviation could be a result of variances in other elements. For example, if periodic engine maintenance has not be done in the period, the comparison may show a positive result in the execution of the technical and supplies budget. However, as a result of this negligence the operational department will show a negative result in terms of fuel oil consumption. In relation to that, it should be underlined that managerial function of controlling is the measurement and correction of performance in order to ensure that enterprise objectives and the plans devised to obtain them are being accomplished. For that reason, the entire process of variance analysis is hierarchical. The greatest detail is at the lowest organisation level reported ( cost centre) and the variance analysis are increasingly condensed at each higher level in the organisation.

#### **IV.2.3- Analysis of the variance based on the budgeted unit contribution**

One of the problems in variance analysis is to decide when a variance is significant and when a variance requires managerial action. In addition, to determine variances only comparing the budget with the actual results could be misleading because in the case of variable costs they are influenced by the volume of production. This is not the case for fixed costs because whatever the volume of production, the fixed costs remain the same.

The problem then is to determine if the variable cost increases, as a result of an increase in production, has been a positive or negative effect on the company.

The analysis of variances based on the budgeted unitary contribution has been developed by the majority of industrial companies worldwide (Anthony 1990).

However, its application within the shipping industry is very limited, and the present research has not found any practical application in shipping companies around the world.

The budgeted unit contribution is to determine the percentage of each variable cost in the volume of production for each one of the budgets established during the planning stage. This volume of production could be measure in different ways, such as tonnes, tonnes- miles, voyage, and cubic feet, among others.

Taking an example of some cost elements in a theoretical variable cost budget, the calculation of the unitary contribution will be as shown in Table 9.

**Table 9. Calculation of the budgeted unit contribution for a feeder vessel of 1 000 TEU**

Name of the ship: Caribbean Sea ( feeder vessel, 1 000 TEU type)		
Volume of expected production for the period: 9 500 TEU (month)		
Cost element	Budget (US\$)	Unitary contribution (US\$/TEU)
• Fuel oil	180 000	18,9
• Spare parts	18 000	1,9
• Materials	12 000	1,3
• Lubricating oils	11 000	1,2
• Food	5 000	0,5
• Marine stores	2 520	0,3

When unitary contribution is determined and if the volume of production performed by the vessel is substantially different from the volume that was estimated, then the budgeted expenses are adjusted to the amount that should have been spent at the actual level of production.

The new value of adjusted elements is obtained multiplying the actual production per each one of the unitary contribution. In that case, the variances should be the difference between the actual expenses and the adjusted cost elements. In Table 10 an example of variances' calculation has been done using the information from Table 9.

As it can be observed from the table below, the budget for the period has been adjusted multiplying each one of the unitary contribution factors calculated in Table 9 per the volume of actual production. In that sense, the proportional budget to the actual level of production was determined, and the adjusted values have been used for the calculation of the variance. The variance between the unitary contribution and the actual cost per TEU has also been determined.

**Table 10. Calculation of variances using the budgeted unit contribution**

Name of the ship: Caribbean Sea ( feeder vessel, 1 000 TEU type)							
Volume of expected production for the period: 9 500 TEU (month)							
Volume of actual production for the period: 12 500 TEU (month)							
Cost element	Original Budget (US\$)	Unitary Contribution (US\$/TEU)	Adjusted Budget (US\$)	Actual Cost (US\$)	Unitary Cost (US\$/TEU)	Variances	
						Cost	Cost/TEU
• Fuel oil	180 000	18,9	236 250	237 810	19,02	<b>(1 560)</b>	<b>(0,12)</b>
• Spare parts	18 000	1,9	23 750	21 520	1,72	2 230	0,18
• Materials	12 000	1,3	16 250	15 810	1,26	440	0,04
• Lubricating oils	11 000	1,2	15 000	16 120	1,28	<b>(1 120)</b>	<b>(0,08)</b>
• Food	5 000	0,5	6 250	6 100	0,48	150	0,02
• Marine stores	2 520	0,3	3 750	3 250	0,26	500	0,04
<b>Total</b>	<b>228 520</b>	<b>24,1</b>	<b>301 250</b>	<b>300 610</b>	<b>24,02</b>	<b>640</b>	<b>0,08</b>

According to the results, the fuel oil consumption and lubricating oil costs show a negative behaviour against the plan, whose causes should be found and measures must be taken. Without the use of the unitary contribution method it had not been possible

to determine these deviations because all variances from the original plan could be understood as a result of logical increases in costs as a result of an increase in the production level.

#### **IV.3- Automation of the cost control system**

Computers can help managers in the execution of all budgeting and controlling functions by facilitating the various information systems that exist throughout their organisations. Because of the speed, storage and processing capabilities of computers, they can provide timely and accurate information to the users. The control reports that are being transmitted from various parts of the company, from cost centres to the company level, can easily be merged with one another, analysed for trends and summarised immediately to aid managerial decision making. Furthermore, computers provided management with the ability to receive information on which to take measurements and compare performance with standards.

Since the beginning, the present proposal of a cost control system for Cuban shipping companies has been designed taking into account the further automation of the whole system. The description of the system, its division in cost centres, the setting forms suggested, the calculation of the variances and the periodical reports are the basis to be included in the future software.

At the present moment the majority of the Cuban shipping companies are using their computers for the narrow function of transaction processing, rather than in the context of an overall computer concept for the business. Automation of the cost control systems, which measure the performance of the business in its cost centres and provide the tool of control should underlie the determination of system strategies.

The principal benefits resulting from the automation of the cost control system include:

- Accuracy
- Speed of delivery
- Comprehensiveness

- Multi- analysis (e.g., analysis of variances among the budget and the actual cost per elements, analysis of variances of unitary contribution, etc)
- Real time
- Rapid evaluation of deviations
- Opportune corrective actions

However, the automation requires a previous process of change and adequacy of functions regarding the budget elaboration process. In general terms, it should comprise the following elements:

1. Decentralisation of responsibility for the planning process to the different cost centres.
2. Training of all managers and employees involved in the operation of the system, not only in terms of the software requirements but also in the conformation and analysis of the cost control system.
3. Clear definition of the information flows and documents among the different cost centres and organisational levels. This element also includes the schedule for the elaboration of the annual budget and the periodical analysis of results.
4. Determination of the security requirements for the equipment itself, for authority to enter into the system, for the risk of fraud, for the consequences of computer failure, among others.

Nowadays, there is a general system for accounting established in all Cuban shipping companies called Condor. The system covers all functions of recording, processing and elaborating the financial information in terms of balance sheets and profit and loss analysis. In that sense, the control system should be incorporated into the software as an additional module, keeping the principle of decentralised computer operations per cost centre. The fact that the author of the present dissertation is a member of the teamwork in charge of developing the automated systems within the Transport Ministry, it will be a decisive factor in the future design and implementation of the system in all Cuban shipping companies.

Furthermore, the implementation of the software for the cost control system does not require additional investments in technology because all companies have enough support in equipment and internal information networks.

## **Chapter V. Conclusion and recommendations.**

Cuban shipping companies need to change quickly the process of planning and control, which are closely related. In that sense the implementation of a cost control system is an effective way to solve inadequacies in the registration and analysis of disbursements and costs. As it has been demonstrated during the investigation carried out by the author, there are clear indicators about the relationship between the absence of a cost control system and the performance problems of national companies.

National companies are facing all the financial problems that the state has. This determines the lack of resources for new investments or the development of appropriate technology and commercial know how. In addition, the high level of state control and centralisation could lead to the failure of the shipping companies to achieve their objectives.

The analysis of shipping operations in Cuba shows a dramatic decrease regarding the number of ships available and a considerable obsolescence of the fleet operated by national companies, which among other problems, is one of the main causes for the increased level of maintenance and repair costs. In that sense, it is necessary to start a process of investment and renovation during the next ten years, which will allow the industry to recover at least to the level reached in 1989.

The lack of financial resources for the fleet renovation should be analysed taking into account the advantages that non traditional financial options can bring to the process. For that reason, it is necessary, in addition to bank loans, to evaluate viable alternatives such as leasing techniques and joint ventures with international shipping companies and operators.

The evaluation of the costs of shipping operations, under the scope of the international and national scenarios, showed how, in spite of the influence of external factors such

as market conditions and prices, there is a major influence lying on the management effectiveness at sea and within the company. Problems related to overspending on spare parts, fuel, materials, repair and maintenance costs, among others, are not possible to detect and to correct opportunely due to the non existence of a differentiated control of expenses per ship and unitary costs.

The implementation of the cost control system requires as a basic premise the delegation of authority of making the budget to different parts of the organisation defined as five cost centres: Crew Department, Operational Department, Technical and Supplies Department, Finance and Account Department and Administration Department. Those cost centres will be responsible for the accurate determination of disbursements and costs per each one of the ship operated by the company. Top level managers and line managers should remain responsible for defining the starting objectives, continuous supervision and budget approval. They also are in charge of the budget consolidation at the levels of line and company budgets.

In the elaboration of the cost centres budgets the uniformity should be maintained in the use of the numerical code per items and the budget setting forms proposed by the present dissertation. It facilitates the further process of registration, comparison, control and periodical analysis. Also, and in spite of the clear definition of tasks per cost centres, it is necessary to keep a network of continuous information among all departments involved within the process.

The differentiated budgets per ship elaborated by the cost centres should be consolidated at different levels according to the interest of the company. At those levels, expense budgets should be integrated into sales and cash budgets. Basic mistakes in the elaboration of cash budgets can be avoided with the use of the budget setting form proposed in Chapter IV.

However, managers should take care of some dangers that budgeting can produce in terms of overbudgeting, overriding enterprise goals, hiding inefficiencies and causing inflexibility.

During the process of cost control the following considerations should be carefully taken into account:

- The process of information recording should be based on a system of registration able to establish a differentiated allocation of costs per ship, cost centre and using the same numerical code utilised for the determination of the different budgets. The present dissertation proposed a system of four levels of analysis.
- The budgetary execution control requires the determination and analysis of variances between the current costs and the budgets.
- The revision of variances should be a systematic process which concerns all involved parties, from ship's senior officers to department's specialists.
- The introduction of the budgeted unit contribution should be a powerful tool in the analysis of deviations and a valid method for determining opportunely the causes of such deviations.
- The results from the analysis of the cost control system imply the preparation of periodical report analysis, which should include not only the calculation of variances, but also the determination of reasons for such variances.

The proposal of a cost control system for Cuban shipping companies comprises the basic elements for the further automation of the whole system. In that sense, the software should be elaborated over the stated principles of cost centres, the use of the setting forms suggested and the calculation of variances and periodical reports.

The automation of the cost control system does not require investment in technology or equipment but a more efficient use of the installed capacity. However, measures should be taken in terms of decentralisation of functions, training of all employees involved in the operation of the system, clear definition of the flows of information and security requirements.

Finally, it should be pointed out that there is no cost control system able to be effective if it is imposed instead of developed and practised by involvement of managers and their staff. No system can ever be perfect and improvement is constantly needed. Nevertheless, if efficiency is to be reached, then there have to be systems which are workable and easily understood by all parties concerned.

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**Annex I. Proposal of the budget setting form for the Crew Department**

Company: \_\_\_\_\_

Budget year: \_\_\_\_\_

Ship: \_\_\_\_\_

Department: \_\_\_\_\_

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
<b>50 000</b>	<b><i>Crew wages</i></b>					
50 100	Basic wages					
50 200	Overtime					
50 300	Special payments					
50 400	Bonuses					
50 500	Holidays					
	<b>Total</b>					
<b>60 000</b>	<b><i>Crew social security</i></b>					
60 100	From basic wages					
60 200	From overtime					
60 300	Personal illness					
60 400	Social retribution fund					
	<b>Total</b>					
<b>90 000</b>	<b><i>Direct monetary costs</i></b>					
90 010	Travel tickets					
90 020	Visas and documentation					
90 030	Manning agents					
90 040	Training					
90 050	Recruitment of new crew					
90 060	Reserved crew					
90 070	Other items					
	<b>Total</b>					
	<b>Total Crew Costs</b>					

**Annex II. Proposal of the budget setting form for the Operational Department**

Company: \_\_\_\_\_  
 Ship: \_\_\_\_\_

Budget year: \_\_\_\_\_  
 Department: \_\_\_\_\_

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
<b>40 000</b>	<b><i>Bunkers</i></b>					
40 010	Fuel oil					
40 020	Diesel oil					
40 030	Gasoline					
40 040	Other					
	<b>Total</b>					
<b>80 000</b>	<b><i>Voyage Costs</i></b>					
80 010	Port services					
80 020	Loading and discharging					
80 030	Storage of goods					
80 040	Demurrage and fines					
80 050	Agency payments					
80 060	Brokers and freight forwarders					
80 070	Canal transit tolls					
80 080	Vessel certificates					
80 090	Cleaning operations					
80 100	Dunnage and lashing materials					
80 110	Miscellaneous					
80 120	Chartering					
	<b>Total</b>					
	<b>Total Operational Costs</b>					

**Annex III. Proposal of the budget setting form for the Technical Department**

Company \_\_\_\_\_

Budget year: \_\_\_\_\_

Ship: \_\_\_\_\_

Department: \_\_\_\_\_

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
<b>10 000</b>	<b><i>Hull and engines</i></b>					
10 100	Hull, decks, fittings					
10 200	Heating coils					
10 300	Anodes					
10 400	Drydock costs					
10 500	Main engines					
10 600	Auxiliaries					
10 700	Refrigeration					
10 800	Others					
	<b>Total</b>					
<b>11 000</b>	<b><i>Equipment and auxiliary materials</i></b>					
11 100	Radio and navigational aids					
11 200	Spare gear					
11 300	Charts					
11 400	Safety equipment					
11 500	Life rafts					
11 600	Others					
	<b>Total</b>					
<b>12 000</b>	<b><i>Surveys and registry</i></b>					
12 100	Classification					
12 200	Surveys					
12 300	Fees					
12 400	Others					
	<b>Total</b>					
<b>13 000</b>	<b><i>Modifications</i></b>					
13 100	Safety requirements					
13 200	Operational					
13 300	Classification					
13 400	Others					
	<b>Total</b>					

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
<b>20 000</b>	<b><i>Marine supplies</i></b>					
20 010	Safety					
20 020	Paints					
20 030	Cargo equipment					
20 040	Wires					
20 050	Deck stores					
20 060	Fresh water					
20 070	Chemicals					
20 080	Gases					
20 090	Electrical					
20 100	Lubricating oils					
20 110	Stewards stores					
20 120	Work tools					
20 130	Medicaments					
20 140	Food and provisions					
20 150	Recreational					
20 160	Clothing					
20 170	Others					
	<b>Total</b>					
<b>30 000</b>	<b><i>Vessel repairs and maintenance</i></b>					
30 100	Maintenance					
30 200	Repairs					
	<b>Total</b>					
<b>31 000</b>	<b><i>Lay up and sale expenses</i></b>					
31 100	Lay up					
31 200	Losses in sale operations					
	<b>Total</b>					
	<b>Total Technical Costs</b>					

**Annex IV. Proposal of the budget setting form for the Finance Department**

Company: \_\_\_\_\_  
 Ship: \_\_\_\_\_

Budget year: \_\_\_\_\_  
 Department: \_\_\_\_\_

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
<b>70 000</b>	<b><i>Depreciation of productive assets</i></b>					
70 100	Vessel					
70 200	Equipment					
70 300	Other assets					
	<b>Total</b>					
<b>90 000</b>	<b><i>Other direct monetary costs</i></b>					
90 070	H & M insurance					
90 080	P & I insurance					
90 090	Personal insurance					
90 100	War risks					
90 110	Loss of earnings					
90 120	Extrainsurances items					
90 130	Bank commissions					
90 140	Discounts for financial operations					
	<b>Total</b>					
	<b>Total Finance Costs</b>					

**Annex V. Proposal of the budget setting form for the Administration Department**

Company: \_\_\_\_\_  
 Ship: \_\_\_\_\_

Budget year: \_\_\_\_\_  
 Department: \_\_\_\_\_

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
<b>51 000</b>	<b><i>Administration wages</i></b>					
51 100	Salaries					
51 200	Overtime					
51 300	Special payments					
51 400	Bonuses					
51 500	Holidays					
	<b>Total</b>					
<b>61 000</b>	<b><i>Admin. Social security</i></b>					
61 100	From salaries					
61 200	From overtime					
61 300	Personal illness					
61 400	Social fund					
	<b>Total</b>					
<b>71 000</b>	<b><i>Depreciation of non productive assets</i></b>					
71 100	Buildings and other properties					
71 200	Vehicles					
71 300	Equipment					
71 400	Others					
	<b>Total</b>					
<b>91 000</b>	<b><i>Other indirect monetary costs</i></b>					
91 010	Travel expenses					
91 020	Postage					
91 030	Communication					
91 040	Training					
91 050	Recruitment					
91 060	Maintenance and repairs of transport equipment					
91 070	Other maintenance and repairs					
91 080	Subscriptions and publications					
91 090	Energy and rent					
91 100	Personal insurance					
91 110	Professional charges					
91 120	Consultants					
91 130	Entertaining					
91 140	Printing and stationery					
91 150	Recruitment					
91 160	Other items					
	<b>Total</b>					
	<b>Total Administration Costs</b>					

**Annex VI. Proposal of the consolidated budget setting form for line and company levels**

Company: \_\_\_\_\_  
 Ship: \_\_\_\_\_

Budget year: \_\_\_\_\_  
 Line: \_\_\_\_\_

Code	Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
10 000	Hull and engines					
11 000	Equipment and auxiliary materials					
12 000	Surveys and registry					
13 000	Modifications					
20 000	Marine supplies					
30 000	Vessel repairs and maintenance					
31 000	Lay up and sale expenses					
40 000	Bunkers					
50 000	Crew wages					
51 000	Administration wages					
60 000	Crew social security					
61 000	Administ. social security					
70 000	Depreciation of productive assets					
71 000	Depreciation of non productive assets					
80 000	Voyage costs					
90 000	Direct monetary costs					
91 000	Other indirect monetary costs					
	<b>Total</b>					

**Annex VII. Proposal of the cash budget setting form**

Company: \_\_\_\_\_  
 Ship: \_\_\_\_\_

Budget year: \_\_\_\_\_  
 Line: \_\_\_\_\_

Element	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
Cash in bank at the at the beginning of the period					
Net income					
Profit in sales of assets					
Issue of shares					
Bonuses					
New loans					
Financial incomes					
Receivables at the beginning of the period (+)*					
Receivables at the end of the period (-)**					
<b>Total inflow of cash (I)</b>					
Hull and engines expenses					
Equipment and auxiliary materials					
Surveys and registry					
Modifications					
Marine supplies					
Vessel repairs and maintenance					
Lay up and sale expenses					
Bunkers					
Wages					
Social security					
Voyage cost					
Other monetary costs					
Repayment of loans and interests					
Losses in sales of assets					
Financial losses					
Taxes					
Dividends paid					
Investment in fixed assets					
Liabilities at the beginning of the period (-)**					
Liabilities at the end of the period (+)*					
<b>Total outflow of cash (II)</b>					
<b>Net cash flow for the period (I-II)</b>					

\* The element should be added to the group

\*\* The element should be diminished from the group

### Annex VIII. Comparative report of budget execution

Company: **Coral Container**  
Ship: **Sea Star**

Date: **31th March**  
Period: **Month**

Code	Element	Budget	Actual	Variance	Cumulative Budget	Cumulative Total	Cumulative Variance
11 000	Equipment	7 642	4 256	3 386	19 105	11 917	7 188
20 000	Marine supplies	22 235	23 257	<b>(1 022)</b>	55 587	59 125	<b>(3 538)</b>
30 000	Vessel repair and maintenance	37 295	21 494	15 801	93 238	91 154	2 084
40 000	Bunkers	180 000	197 526	<b>(17 526)</b>	450 000	483 105	<b>(33 105)</b>
50 000	Crew wages	28 500	29 523	<b>(1 023)</b>	71 250	68 256	2 994
80 000	Voyage costs	11 620	9 623	1 997	29 050	31 259	<b>(2 209)</b>
90 000	Monetary costs	1 250	925	325	3 125	2 120	1 005
	<b>Total</b>	<b>288 542</b>	<b>286 604</b>	<b>1 938</b>	<b>721 355</b>	<b>746 936</b>	<b>(25 581)</b>