



Maritime Transport: A Theoretical Analysis Under a System's Approach

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ABSTRACT

Historically, maritime transportation has been the most common method to transport significant volumes of goods and creating commercial relationships between markets.

However, as a consequence of the evolution of the international commerce, other models have increased their relevance due to certain factors: specialization of the customer services (door to door), technological evolution, and geopolitical changes which extends the logistics chains beyond the port. Land transportation (by truck), the use of the rail transportation to move significant volumes of goods, air transportation for specialized cargo and shipping which require fast delivery, and the appearance of Intermodal transport, as the Motorways of the sea, in the case of Europe, show the need to analyzed and understand in details the current model on maritime transportation in order to identify and maximize their competitive advantages thru the identification of the value drivers.

In the value management, the most used and known methodology is the Porter Value Chain, for which all the system's approach methodologies are applicable. Using this scope, a theoretical analysis will be performed over the activities and maritime process, identifying stakeholders, value drivers and competitive strategies.

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1. Introduction

Historically, shipping has been the most common method used to move large volumes of merchandise and create business relationships between different markets, coming to carry more (under the WTO) over 90% of the goods moving worldwide.

However, due to the evolution of international commerce, have taken relevance other transport models due to the specialization of customer service (door to door), technological developments and geopolitical restructuring, extending the supply chain beyond the port. Ground transportation (Truck), the use of rail transport for significant volumes, air travel for specialized loads which require a limited time, and the emergence of mixed models (intermodality) such as motorways of the sea like the Mediterranean Corridor, makes it necessary to analyze and understand in detail the current shipping model to detect and enhance their competitive advantage through the identification of value drivers.

The study of the supply chain considering the context implies going beyond the operators who execute the process, as

a deeper analysis is required considering the relevance of the whole system from an economical perspective.

To make the overall system a good performance of each of the components that comprise it is required, this, in the logistics chain is applied to each of the nodes within it.

From the origin of the chain within the manufacturer until the final customer at the destination point, several processes are performed, each of them of vital importance without which it would be impossible to reach the objective. If we add to this the importance of cost reduction strategies, which in times of crisis (Martinez and Eguren, 2009) is one of the most important tasks of shipping companies, a great pressure is generated into the process to avoid unnecessary costs directly affecting all the components of the supply chain.

This situation generates value management requirements, which is the study of this investigation.

Within the value analysis, the most commonly used method is the Porter value chain, on which systems analysis methodologies (Eguren and Castán Farrero, 2011) are applicable. For this reason, the theoretical analysis presented in this research will consider both sides, one side chain model of the actual value and the other, the systemic approach.

Due to the nature of this article, no case studies or practical cases developed. However, it is a possible line of research for future collaborations.

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2. The value chain

According to Fernández et al. (2006) value chain is defined as the set of activities performed by the company in order to transform raw materials into finished products that are then distributed to final consumers.

In this sense, the value chain of a company includes a series of activities, processes, resources and objectives that relate to each other generate “value” for the company. According to Porter (1985) that value is the amount that buyers are willing to pay for what the company provides.

Considering all those processes and activities that somehow are involved in the process of transformation and value creation, it can be seen following the scheme of Porter (1985) that such activities can be classified into two groups:

2.1 Primary Activities

Those directly involved in the production process of the company, understood in this sense as Navas y Guerra (2007) those activities that are physically part of the process of production, transfer and post-sales service to the customer. The main areas that are included in this sector are:

- Inbound logistics or input factors: receipt, storage, inventory control and internal distribution of raw and auxiliary materials.
- Operations / Production: transformation of factors into products or services.
- Outbound logistics: warehousing and distribution of finished product to the customer.
- Marketing and Sales: activities aimed at selling the product.
- After-sales service: Customer-oriented to service and maintain their satisfaction once made the sale activities.

2.2 Support Activities

As indicates its name are the activities which collaborate and support the primary activities. Among them are:

- Procurement and Sourcing: procurement activities both productive and non-productive material (including services and advertising)

- Technological development (IT): activities involved in the development and improvement of new products and production processes and management.
- Human resource management: activities that include all the administration of the human resources of the company (recruitment, training, etc).
- Firm Infrastructure: company business activities oriented management, planning and control of all primary and support activities that sustain it.

From the above it can be seen that the value chain is a vision of the company according to the activities and processes that accompany it in its vital development from the acquisition of raw materials to the sale and service-after sales of the final product.

In this sense, the value chain of the company, is an analysis tool that allows you to view the same position within their environment and internally at all the processes that compose it, making way for a number of possibilities that we will see below, which relate to design, incorporating or not activities, their interrelationships and subcontracting among others.

If the company in its environment is analyzed, we could observe from a general approach that it consists of its own activities, relationships with suppliers and customers and relationships with external agents that somehow have an influence on the company.

In this regard, the activities of an enterprise “start” on a sequential basis at the time that the “raw material” is acquired and ends at the time that “sells” the product or part thereof which it is made . However, a company may not include the entire process from the exploitation of raw materials from nature to sell the product to the final consumer.

Because of this distinction must be made between two concepts: the value chain explained previously and that includes those activities of that company and the value system (Guerras and Navas, 2007) consists of all activities (and value chains of different companies) contained from the exploitation of the raw material in nature to final sale.

As a first consideration, the shipping process itself is part of the value system of the majority of companies that require transporting goods from one place to another. As can be seen, it is a rather broad definition and is involved in all economic sectors: primary (agriculture, livestock, mining, fisheries and forestry), secondary (manufacturing and processing of raw materials into finished products or semi-finished) and services as well as applied to different types of business (small and medium enterprises, multinationals...). This is one aspect to consider in the analysis and development of competitive strategies based on vertical integration.

Taking the above into consideration, the process of shipping (considering the activities included from the source provider and target client) can be described by the following scheme:

Which can be seen as a symmetrical process, initially considering the processes performed in the geographical area of origin and destination. Additionally, and as discussed below, these processes develop in defined areas and logistics with the help of actors and agents required to support each of the processes involved:

Figure 1. Porter Value Chain.

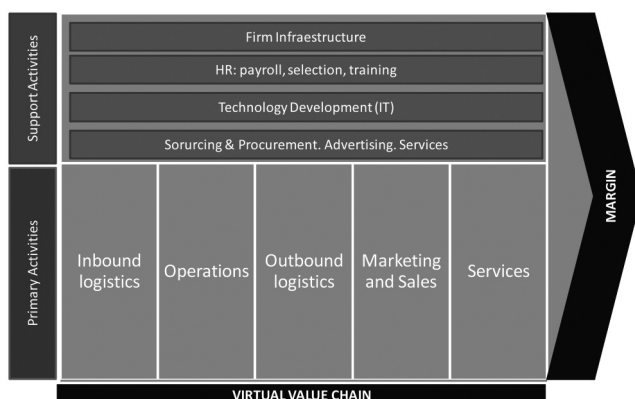
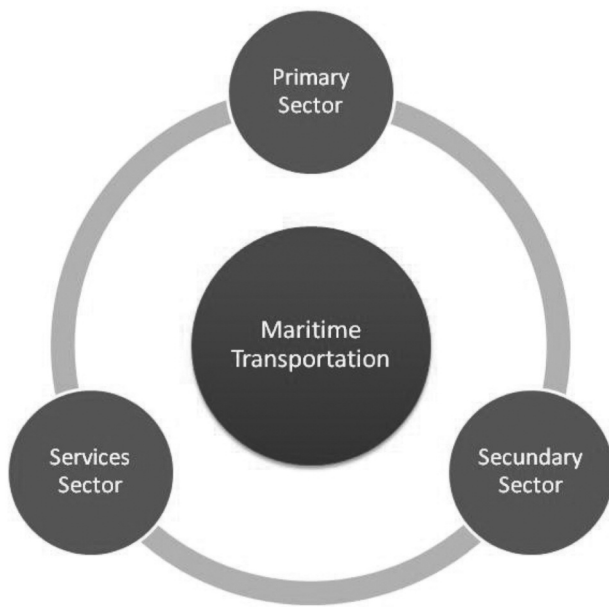


Figure 2. Maritime Transportation and their value systems.

that this function is performed by an agent with legal and professional capacity (Freight), which is acting on behalf of the shipper, deals with the necessary steps to make the goods available to the vessel contracted for transport.

2.2.3. Freight forwarder

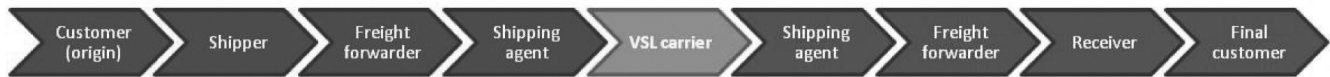
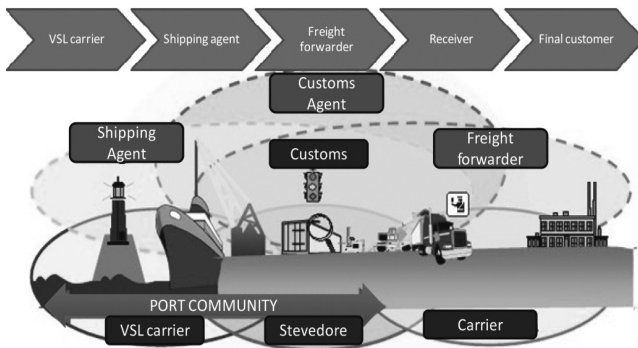
A professional who plans, coordinates controls and directs all actions necessary to perform the international freight operations, as well as complementary services, by any kind of transportation; is usually known as “The Architect transport “. Should be remarked that includes the ground transportation required in the process as well as the maritime transportation required. This stage of the process will be discussed later in developing competitive strategies associated.

2.2.4. Shipping Agent

It is the natural or legal person duly registered in the administrative agencies, serving the needs of ships while in port / s of the country inhabited by the consignee. Owner and represents their interests before the authorities of the country where the ship is. Responsible for provisioning the ship, and

Figure 3. Maritime transportation process.

Source: Own elaboration

**Figure 4.** Scopes of maritime transportation.

Source: Own elaboration adapted from several authors.

It is therefore necessary to define the main activities within the above process:

2.2.1. Client (origin)

Natural or legal person initially owns the goods to be transported to the final customer. Normally, this process will delegate transport actors below.

2.2.2. Shipper

According to the Spanish code of commerce, is the natural or legal person that delivers goods to the ship-owner, the master of the vessel or its agent at the port of loading to be transported by sea. In the bill of lading (English Bill of Lading or their initials BL), is defined as “Shipper”. However, in practice it can be said

for handling all matters of legal representation, and attention to the ship’s crew.

In the case of shipping containers, for example, are responsible to provide containers suitable for charging customers, if a shipping no containers can not meet the needs of the customer (Martínez and Eguren 2009), those needs are affected for various reasons, but the priority is that there is always equipment available in good condition to meet the demands of an export line.

2.2.5. Vsl carrier

In this case we refer to the vessel operator (which is not always the owner), which is responsible for transporting the goods from the source port to the destination port. In general, it is the natural or legal person who takes a commitment of transporting goods by sea from one place to another through a contract with the merchant that is embodied in the Bill of Lading.

2.2.6. Consignee -receiver

In this case we refer to the vessel operator (which is not always the owner), which is responsible for transporting the goods from the source port to the destination port. In general, it is the natural or legal person who takes a commitment of transporting goods by sea from one place to another through a contract with the merchant that is embodied in the Bill of Lading.

2.2.7. Final customer

Natural person or entity receiving or end buyer of the goods transported from the initial customer.

In order to proceed with its analysis under the value chain model, it is necessary following the systemic approach to first define the elements that compose it.

3. Value model application

As previously mentioned, as part of the systemic methodology, the first step is the identification and definition of the various components of the system, their common objective, scope and limitations:

3.1. Objective

Transporting a good from the place of origin to its final destination in this case assuming that no physical transformation along the process is performed.

3.2. Scope

The process starts from the initial customer and ends at the end customer

3.3. Limitations

Cases in which the good undergoes a physical transformation along transportation is not contemplate.

3.4. Raw material (system inputs)

Good to be transported.

3.5. Final product (System outputs)

Considering that the product undergoes no transformation throughout the process, physically it will be composed of the same physical good transported more value those elements incorporated throughout the process.

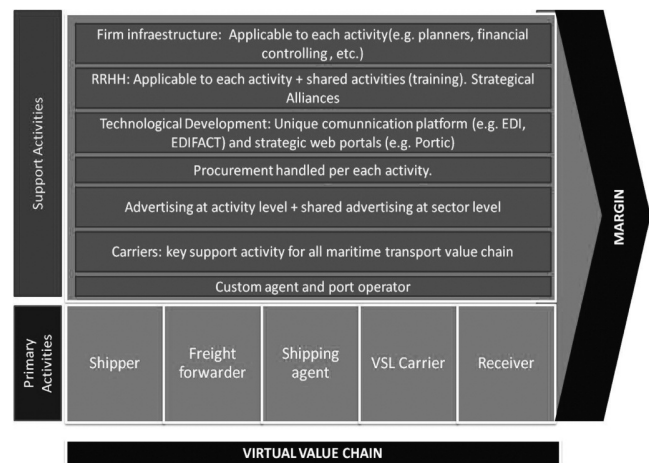
Additionally, different flows should be considered applicable to the system, from a logistical point of view and are defined as follows:

- *Flow of physical load:* Is that corresponds to the movement of the goods from the source of production to consumption.
- *Flow of transport:* The different modes of transport with their vehicles and routes between different nodes of the system.
- *Flow of information:* it must be parallel to the load current.
- *Financial flow:* to be established according to the contractual arrangements defined in each stage of the process and should be aligned with the flow of the physical load.

Once defined the parts that define the system, the specific processes that links it in order to identify the value drivers and therefore of possible competitive advantages. The result of this analysis is shown in the following figure is explained below:

As can be seen, we have proceeded to identify key processes and activities under the conceptual framework of

Figure 5. Maritime transportation modeled by Value Chain.



Source: Own elaboration.

the value chain under both types of activities covered by that methodology: primary activities and support activities.

4. Primary activities

As can be seen, the names of the activities defined match the different links above. However, it should not be confused with the concept of the concept of activity actor. In this case we refer to the functions performed by each of these figures within comprehensive process of shipping.

As discussed above, an object of study is the degree of integration between the different activities and their strategic management as regards the various support activities. This theme will be developed further in the next section.

5. Support activities

According to Porter's methodology, this section includes all those transversal activities that support the main process (primary activities). It's important to remark a key factor when modeling these activities and this is their scope of application: in many cases these activities are common but specific to the activity mentioned, but in other cases, and given the level of integration is related to strategic activities affecting several primary activities.

In this regard and as a first approximation defined the following activities:

5.1. Company infrastructure

By definition, consists of all activities of management, planning and control of primary and support activities. For each of these activities would be made by the specialized profiles however we would not be talking about an integrated but rather particular for each function. This group would be included profiles such as planners, financial controllers, auditors, inspectors and others.

5.2. HR

As in the previous case, both the management of payroll and personnel is specific to each of the activities, however for training and education deserves special attention. In this case we speak of training and strategic training commonly accepted and designed specifically for the sector. Additionally, and given its strategic and competitive importance, such programs are often provided with public uprisings and the European Community (in the case of Europe).

5.3. Technical development (IT)

For this activity one can speak of a high degree of maturity in their horizontal integration. The existence of standardized communication protocols (such as EDI, EDIFACT) and strategic portals (eg Portic) allowing the use of a single system allow to increase process efficiency by reducing bureaucracy, paper use errors in data communication and thus by reducing the cost.

5.4. Procurement

Each of the activities is responsible for the process of indirect purchases. However, it seems to be a very relevant topic or endowment studied as it has been proven to perform this investigation. And precisely because of this, it can be one of the potential sources of competitive advantage to consider as will be discussed later.

5.5. Advertising

As in the case of infrastructure and human resources, should be considered the actions of individual advertising each of the specific activities and otherwise be considered strategic actions at the sector and various associations.

5.6. Carriers

The most relevant support activity for all primary activities. Inside it should be considered trucking companies and rail transport. Its strategic value should be considered in the development of intermodal mixed models as well as various strategic alliances under the win-win approach and quality service as a competitive strategy.

5.7. Customs

Activity performed by the customs agent that is defined as follows: Current legislation recognizes the "Representative Customs", whose definition is to be specified, however, functions can be defined as follows considering at all times the current legislation Local and implement "are natural or legal persons, depending on the specific laws of each country, which provide the necessary management before state agencies that collect taxes (Customs) on behalf of importers." Services activity affecting all primary activities mentioned above, plus according to its management can directly affect the costs associated with the goods transported and therefore its associated value. In this sense, the strategic actions on this activity should take

place in a legal and educational framework that allows proper management and cost estimation and risk.

5.8. Port operator

Formally on the "legal person who operates or manages, as applicable, the grant of the port terminal and operates its services in the port of origin / destination". Its functions are common to all the primary activities and their competitive advantage depends on their relative vs. local or other ports in direct competition due to the routes used. In this regard the development of their competitive strategies should be developed in all areas, reduced costs, increased quality of service and strategic alliances.

6. Competitive advantages and opportunities

According to Guerras and Navas (2007), the value generated by the company (also called margin or profit) is derived from the value generated by each of the activities on the final product minus the costs associated with each:

$$\text{Value Created by the company} = \sum (\text{Activity Value} - \text{Activity Cost})$$

In this sense, when analyzing how value is being generated the following items should be considered:

- The interrelationships between the activities of the company
- The interrelationships within the system value.
- The interrelationships between business activities in diversified firm

According to Porter (1985) relationships within the company, is a factor in achieving competitive advantage in two main ways (Guerras and Navas, 2007):

- Optimization: Doing an activity differently, can enable cost reduction in its activity and other activities.
- Coordination: A high degree of coordination allows the activities involved behave more efficiently.

The degree of interaction between the different activities and their alignment with a common goal, is fundamental to the operation of the company (Gimbert, 1998) factor. A company whose communication and activities are aligned with the objective understanding of each resolves itself will be able to create more efficient processes and therefore strong and competitive strategies; this is the basis of the horizontal relationship.

Moreover, the vertical interplay is based on the fact that the company's relationship with its customers and suppliers can be a source of competitive advantage to the extent that benefits both parties equally.

The alignment of the activities of the company as well as creating synergies and strategies may allow the company to increase its efficiency and market position. Additionally (Guerras and Navas, 2007) its use as a tool of analysis allows the company to identify strengths and weaknesses according to which an appropriate strategy can be designed and thus creating more value.

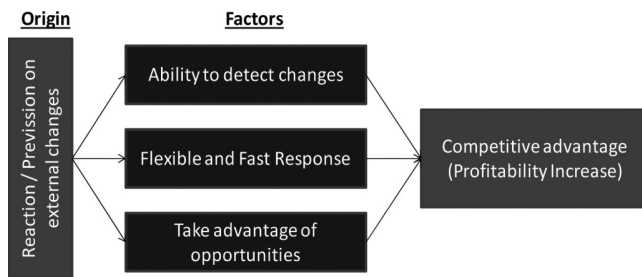
The definition of “competitive advantage” is a relative concept which sets the position of the company in relation to competition. According to Guerras and Navas (2006), a competitive advantage can be defined as “any property of the company apart from other placing it in a relatively superior position to compete.”

In this sense, it delves into the concept of relative position a company has a competitive advantage over another “when you get (or have the potential to get), persistently higher profits” (Grant, 2006). It turns out that unlike profitability this benefit can translate to factors such as market share, technology, brand image, etc..

According to Porter (1985) the basic competitive advantages are obtained through cost leadership and product differentiation. In both cases the application of these strategies should consider external factors and internal factors (Grant, 2006)

A company cannot generate competitive advantages in efficient markets (Grant, 2006), since by definition does not allow for rents to average and above the industry average (Guerras and Navas, 2007) long term. Therefore, the competitive advantages to be imperfect market can be developed. These factors and strategies are summarized in the following illustration:

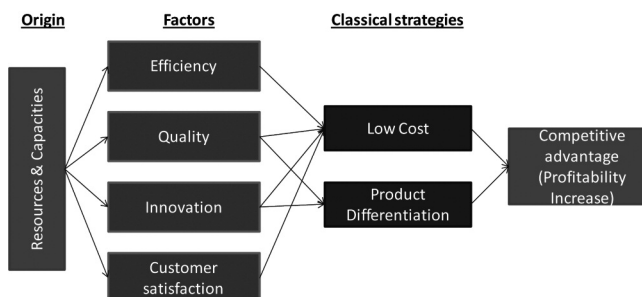
Figure 6. External Factors for creating a competitive advantage



Source: Guerras and Navas (2007, p.271)

As most part of the competitive advantages are not in this level (Guerras and Navas, 2007), the internal factor which generates competitive advantages should be considered as defined in this figure:

Figure 7. Internal Factors for creating a competitive advantage



Source: Guerras and Navas (2007, p.273)

Additionally, there are strategies based on the degree of integration of activities such as outsourcing and vertical integration strategies.

Outsourcing consists in transferring to a third party the performance of a specific activity originally done by the company. Such strategies (Gimbert, 1998) can be implemented, if the company after analyzing the value chain shows that such activity will not generate a competitive advantage, that is, that neither their costs are competitive enough nor their ability to make such activity differentiates sufficiently competitive.

To implement this type of strategy, several aspects should be considered: the feasibility of strategic alliances with the company that will handle the outsourced processes (reliability, exclusivity contracts, etc.), the strategic convenience to take the process out from the company chain (in some cases it could mean falling into the hands of competitors, for example), the flexibility of the company to adapt its structure and processes, among others.

By contrast, the integration strategy consists in incorporating business activities that previously were not performed. If the chain value is observed as the sequence of a series of activities, vertical integration is to incorporate activities that are in the limits / ends of the value chain. If done “backwards” related to the activities performed by its suppliers are incorporated, and whether activities of its customers is “forward”.

To consider a strategy of this type, it should be analyzed at medium and long term the potential impact of this within the activity of the company and the sector. Overall integration provides guaranteed availability, elimination of duplication in controls, greater coordination between areas, generation of barriers to entry and reduced transaction costs. By contrast, the integration involves loss of creativity and adaptation of the company, implementation and maintenance investments, loss of bargaining power with former suppliers, loss of visibility in certain costs and increased fixed costs, loss of competitive advantage related to experience to be incorporated as new knowledge and this has a ripple effect, loss of external synergies (Fernández et al., 2006).

Additionally, due to the fact that companies are open systems, subject to environmental turbulence (Febles et al, 2008) and increasing complexity in societies that interact (De Quevedo et al, 2005); and by other side directly affected by the degree of interaction and communication generated by globalization; makes that mixed strategies based on negotiation and strategic factors achieve more importance and strength.

Whereas the level of cost reduction strategies implemented in shipping are mature and do not have great opportunities in establishing competitive advantage, therefore should pursue strategies to generate more value with innovative models and strategic nature.

7. Competitive advantages in primary activities

As already mentioned there is a strong relationship between the various activities that make up the primary activities of the value chain shipping. Therefore the development of their competitive strategies should be right in this line.

The integration of various functions (such as charger and freight) or service establishment owned or leased by the con-

signee as far as legally possible transport make their activities more competitive and efficient.

In addition, vertical integration regarding the various economic sectors in which it operates shipping opens the door to multiple strategic alliances that can make the differentiating factor in the marketplace.

8. Competitive advantages in support activities

8.1. Infrastructure of the company

Whereas the current business structure is based on an infrastructure of personnel management for each of the functions could be considered the creation of a business unit of Joint-Venture type specializing in financial management and planning. This unit could use existing IT infrastructure platform and create competitive advantages between the port area and another.

8.2. HR

Considering the integral training programs already implemented in various professional associations (Freight forwarders, shippers, etc.) and the growing need for specialized profiles in the area, the strategies should continue to strengthen initiatives that style as a tool for differentiation and increased service quality.

8.3. Technological development (IT)

Considering the high degree of maturity and integration in this area, the development of competitive advantages should go on line to increase the perceived quality of service and operational excellence.

8.4. Procurement

Not commonly considered, perhaps for not being initially considered too relevant. However, the great potential to develop competitive advantages lie in the fact that focus aspects have not been identified before, allowing competing on several fronts at once. In this sense his depth analysis is recommended in order to assess future possibilities.

8.5. Advertising

Similarly as discussed in relation to competitive opportunities in training, development and strengthening of joint strategic advertising campaigns that allow positioning at the regional level is recommended.

8.6. Carriers

Using the resources and experience of carriers, analysis should be increased in the development of intermodal mixed models to implement cost reduction strategies and value creation. Additionally, with a high strategic value to regional level and with a direct impact on auxiliary sectors not discussed in this research.

In addition to these activities usually work on models of price competition these complementary strategies based on creating value should be strengthened.

8.7. Customs

As specific activity and highly regulated by the applicable laws, strategic actions should be developed promoting training multi disciplinary actions and strategic initiatives of the hand with the competent authorities.

8.8. Port operator

As discussed above, given the nature of its operations and its impact on all the activities of the shipping process, strategies should be continued and clear in all possible areas. On the one hand maintain a competitive cost structure, with a steady increase in the perceived quality of service and the development of strategic partnerships with various actors around him.

9. Conclusions

The main findings presented throughout this research are the following:

- The shipping process is a system, and therefore the analysis methodologies existing systems are applicable for study. Also for this reason, it can be modeled using the Porter value chain. You can tell which part of the value system of the majority of companies that require transporting goods from one place to another, taking part in every economic sector (primary, secondary and services) being also independent of the size and type of company. This is one aspect to consider in the analysis and development of competitive strategies based on vertical integration.
- Possible lines for the development of competitive strategies have been observed, , both at primary and secondary activities. At the level of primary activities the main competitive opportunities are observed at the strategic level, vertical integration and economic sectors horizontally or strategic agreements between primary integration activities.
- As for support activities have been observed multiple options in developing competitive advantages, since the development of intermodal mixed models to existing blanketing such as communication platforms (IT) strategies. It is important to note at this point that progress in this area, are taken in consensus with the entire port community, that is, with all the actors who perform international trade, for maximum adaptation of the entire system, new technologies, on the other hand, considering the current situation of uncertainty and globalization, flexibility and adaptability of the marine transportation system is essential to maintain its leadership and efficiency in the market.

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