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Innovation processes in the logistics chain of maritime transport in Colombia

Procesos de innovación en la cadena logística del transporte marítimo en Colombia

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ABSTRACT

This article analyzes the operational performance in the logistics chain of maritime transport in Colombia. The research in this article is based on the current situation, the different shortcomings it has and the approach of indicators that allow us to observe differences of interests that exist in decision-making between managers and shareholders of an organization which will help improve the innovation process and which in turn leads to the implementation of new programs. In the introduction to this article we talk about the history of Colombia in the logistics process and the economic impact on the country. Let us remember that the maritime fleet is used more than air transport because freight is cheaper, not to mention that the volumes that are handled are higher and the possibility of handling two modalities - consolidated cargo, which means a container with several types of merchandise and will only be charged per ton

per cubic meter or the handling of a complete container, which makes this more interesting transport.

Keywords: Logistics chain, maritime transport, innovation, ports and technology.

RESUMEN

Este artículo analiza el desempeño operativo en la cadena logística del transporte marítimo en Colombia. La investigación de este artículo se basa en la situación actual, en las diferentes deficiencias que tiene y en el planteamiento de indicadores que permitan observar las diferencias de intereses que existen en la toma de decisiones entre los directivos y los accionistas de una organización lo cual ayudará a mejorar el proceso de innovación y que a su vez conlleve a la implementación de nuevos programas. En la introducción de este artículo hablamos de la historia de Colombia en el proceso logístico y el impacto económico en el país. Recordemos que la flota marítima se utiliza más que el transporte aéreo porque el flete es más barato, sin contar que los volúmenes que se manejan son mayores y la posibilidad de manejar dos modalidades - carga consolidada, que significa un contenedor con varios tipos de mercancía y sólo se cobrará por tonelada por metro cúbico o el manejo de un contenedor completo, lo que hace que este transporte sea más interesante.

Palabras clave: Cadena logística, transporte marítimo, innovación, puertos y tecnología.

Introduction

Although Colombia does not possess the most advanced technological developments in terms of port infrastructure, it benefits from being one of the best connected countries in terms of South American maritime trade. According to the United Nations conference on trade and development (Unctad) report, the country has a rating in terms of its maritime connectivity of 50.1 points below the 56.6 that the isthmus presents (Portafolio, 2018). This indicator represents the number of ships, total cargo capacity and the companies that offer services inside and outside the country, that is, exports and imports, not counting the great news of the shipping companies that operate in the country today.

The maritime transport sector in Colombia has registered low growth and performance in terms of the logistics chain, which is worrying for trade since many ports make up the main chains of supply and distribution. Logistics must be a management model that guarantees security in the supply chain and achieve competitive performance in a global context, however, according to information registered in legiscomex, Colombia's freight tendencies are extremely irregular. Andrés Osorio, commercial manager of Maerks Line, says that "faced with this situation, shipping companies need freight to increase, mainly in the most important traffic area with Asia. However, when the level of utilization of the ships does not reach an optimal level of 95%, the freight war in the market is quite tough. What we have seen so far, in the first quarter of the year, is that the importation of products from this continent has not been activated or reactivated as such, so the use of ships ranges more or less between 80% and 85% % so far this year (Legiscomex).

Global shipping demand has improved in recent years and medium-term projections also point to expansion, with increasing opportunities in the area of maritime activities. The specialisms of different countries in maritime activities require policies that improve connectivity by reducing trade costs and opening up new possibilities in port investments (UNCTAD, 2017).

The decentralization of many logistics operators in terms of the different processes that are carried out puts maritime operations at risk. Competition is becoming a disadvantage for export and import operations, for example, some operators are implementing new tools and technologies that simplify their internal processes, which for some implies the speed of operational processes. What they do not take into account is that shipping companies handle stipulated departure times, a shipment that travels to a certain destination can do so weekly or biweekly. If the process is carried out quickly, they must also be subjected to the waiting times of the shipping companies and the arrival times of each of them.

Although it is true that Colombian Ports do not have adequate infrastructure, which generates setbacks and delays in the processes, compared to ports such as Shanghai, Miami and Hamburg, which have state-of-the-art infrastructure and a logistics chain that complements this. This allows them to improve their processes and generate greater facilities for trade operations.

As evidenced in table 1, the comparison of Colombian ports with Miami, where the capacity allows a better development of trade. Unlike Colombians who lack innovation

since the channels or access roads in areas of poor conditions and have deficient infrastructure. Additionally to this, there are the cumbersome processes that Colombia has in terms of documentation management which must be carried out for each operation.

Tabla 1. *Comparative analysis of technological development*

Service and or tools	Cartagena	Barranquilla	Buenaventura	Miami
Draft Handled	45 feet	36 feet	47 feet	50 feet
Length of port	1.698 mts	1,058 mts	9.581 m²	2.096.346 m²
Storage space	27.067 m²	24.151 m²	27.044 m²	238.281 m²
Access	Road and water (Levee canal)	Road and water (The Magdalena river).	Road and rail connections	Road and rail connections
Cranes	6	7	7	12

Fuente: Own elaboration based on Quimbay (2015).

According to Gutierrez (2018), the great pressure generated on the world's maritime terminals and ports, (in addition to their selection in terms of deep waters), is mainly focused on adapting their infrastructures, equipment, technology and workforce to become, either cargo transfer "nodes" that receive flows from feeder terminals under the Hub & Spokes system (a distribution model in which said nodes or hubs concentrate on the goods of origin or destination to or from areas of their influence, to feed giant ships with times and economies of scale), or they become maritime / land interface points where different rail, river and / or road corridors are integrated to connect internal terminals, intermodal logistics platforms and distribution centers, which contribute to the flow of large nodes (offshore hubs) located on major international trade routes.

Currently, new technologies offer opportunities to improve the efficiency operation of the logistics chain operation systems. In a highly competitive international environment it is necessary to meet the demands of external markets, which counteract the limitations of access in the ports of Colombia, expanding trade flows

and improving aspects such as quality, times, routes, allowing improvement in the aspect of generalized competition between countries. A mechanism that can be decisive, in this type of actions in the logistics chain in maritime ports in Colombia, is the implementation of innovation in advanced technologies that determine guidelines to develop competitive advantages, thus seeking to achieve higher levels of participation.

The strategic challenges for the Colombian port system focus on the handling of import and export cargoes in the country, as well as those transshipment traffics that can be captured, due to the geographical positions of the ports, in relation to international trade routes. Maritime transport will grow thanks, fundamentally, to the socio-economic development of the country and its opening up to other markets, taking advantage of free trade initiatives and the integration of regional economies. Another growing source of cargo, to be handled by national ports, will come from the transshipment of goods that will increase, as a consequence of the international maritime traffic that will occur, once the new system of locks in the Panama Canal comes into operation (Logistics Catalog , 2014).

Another challenge for Colombia according to Gutierrez (2018) is that, although the four main Colombian ports are making progress in investments, plans and adjustments for their competitive improvement, the country needs a comprehensive approach, away from regionalist interests and visions. This needs to consider its vocation and endowment , to enable the leading role granted by our geostrategic location and the potential for logistics development as a bi-oceanic country.

Taking into account what has been previously said, and in order to prepare this article, the following problem arises: how does innovation influence the performance of the maritime transport logistics chain in Colombia? Against this, it is intended to determine the influence and importance of the implementation of innovation in the country's logistics chain, for the fulfillment of this objective it is necessary to generate different types of analyze in relation to the information which helps to evaluate the innovation processes of maritime transport, to find the shortcomings that the country’s ports have. Comparing the country to others that implement processes that help improve the logistics chain with the use of new technologies and develop indicators that allow the proper use of innovation and propose improvements in logistics processes.

The theoretical references that support this article are presented below, where the research, comparison and development of problems in context are evidenced. Where, thanks to the results obtained, the strategy is proposed because the implementation of

innovation in the logistics chain is important , the article ends with the conclusions arrived at.

Gonzalez (2016) mentions that the logistics chain is the planning of a transport activity where the possible routes, deadlines, times and a series of security components must be taken into account and the processes associated with transport must be determined. It is related to the management of supplies and materials, for their distribution in different countries (Mora, 2016). Logistics processes can be considered, not as an operational function, but as a planning mechanism (Castellanos, 2015).

According to Mora (2016), the distribution activities in a supply chain refer to the interval of time and space in the supply and distribution channels included in the processes of a business administration, generating benefits that are obtained through commercialization, thus increasing competitive advantages. The automation of loading and unloading procedures, allows greater sustainability in the transport of goods and in the maritime transport of containers (Gonzalez, 2016). Likewise, as Castellanos (2015) raises, when implementing logistics strategies, it is possible to maximize costs and effectiveness, thus allowing the carrying out of massive operations, using information systems that face the challenge of globalization.

Stephenson (2015) mentions how global chains have triggered an increase in commercial flow, altering the functioning of commercial models, linking logistics in a holistic way for the development of supply chain operations. There is clear regulation of logistical processes and activities, which makes it possible to guarantee high stability of processes that increase the capacity for innovation (Mora, 2016). However, Sanabria and Ospina (2017) discuss logistics, evaluating the levels of training in Colombia, which does not meet the necessary level to face national and international supply.

According to Parra (2017) companies must currently save on costs at all levels of supply, allowing a whole compendium of organizations to benefit each other, seeking the need to add value, from the beginning to the end of the logistics chain. Abad (2019) states that the implementation of management systems in transportation can optimize supply chain flows, complying with both the demands and speed that are required today to improve performance in trade operations. Good logistics management must take care of the forecast, organization and control of the flow of materials to obtain maximum efficiency at the lowest possible cost (Serrano, 2015).

Alarcon & Donado (2016) mention that the existence of logistics platforms supports the operation of infrastructural networks that condition the levels of efficiency and

quality of transport in the industry. Maritime transport constitutes 80% of world trade and is the that it can drive an expansion of developing economies. Logistics must be based on the needs of a company and must be in evolution in time to go to market. The 5 subsystems being unified (transport, storage, packaging, loading / unloading and distribution (Mora, 2016). It is mentioned by González (2016) that transport logistics is a very important part of the supply and distribution processes where its chains operate taking into account both physical geography and time, allowing them to meet the lowest possible cost both nationally and internationally.

Proper planning and management of the supply chain must be based on the needs of customers and designed according to the functional capabilities of a company (Díaz, 2017). González (2016) mentions that competitiveness in the transport and logistics industry has allowed the proliferation of new technologies, various mobile applications that allow access to information in real time, allowing improvements to the functionality of the supply chain, increasing efficiency and allowing the integration of economies. Mahecha (2016) states that the standardization and streamlining of processes must have a quality management approach to the administration of products and services that is based on continuous improvement, increasing security controls for the logistics chain.

Alarcon & Donado (2016) mention the deficient logistics infrastructure of Colombia in the maritime zone, where there are limitations to the entry of ships to ports, generating backlogs of cargo that do not contribute to the development and growth of the country. This raises the importance of expanding the productive structure in order to encourage competitiveness.To counteract these vulnerabilities in the logistics chain, private entities resort to the regulatory support provided through organization to control the step by step in the supply chain (Mahecha, 2016). Gonzalez (2016) Analyzes the changes in terms of mobility of goods and how a logistics model can favor a more efficient distribution of goods, giving added value with progressive specialisms, where all the processes that guarantee the delivery of products are managed in established times and agreed amounts.

Logistics chains generate supply networks, where demand planning must be synchronized by all the agents who interact in its supply chain (Díaz, 2017). Alarcon & Donado (2016) mention how in order to gain efficiency in the development of logistics infrastructures, public policy must provide economic benefits that guide private investment, to promote a better modal allocation of loads that contribute to the modernization of services. (Castellanos, 2015) Mentions that security in the mobility of goods must have DFI logistics management that includes all activities

corresponding to regional warehouses or terminals and indirect channels that guarantee the supply of goods.

Díaz (2017) says that Logistics requires coordination of all the parties involved in controlling supply management. Distribution activities in transportation must be carried out in a comprehensive way, generating competitive advantages, locating and determining reliable sources that make it possible to optimize commercial relations. On the other hand, global trade promotes an expansion of integrated transportation systems, in Colombia the Caribbean region has a strategic location that can benefit from port infrastructure (Alarcon & Donado, 2016). Gonzalez (2016) addressed the idea that physical infrastructure can facilitate trade, where commercial and service requirements must be expanded, with the installation of new companies that promote maritime strategy and the modernization of ship safety legislation for the protection of ships.

Mora (2016) states that the automation of internal and external processes allows efficiencies of processes, which generates savings in time and money, impacting on profits in companies and in management indicator systems, which are important aspects of the logistics process integral. Campos (2015) thinks that there is a positive association in the different pillars that influence the logistics chain as a result of planning and control in the flow of processes that increase the efficiency of the services associated with logistics management. World maritime trade has not been immune to the economic growth of countries, or to the behavior of their trade balances. (Alarcon & Donado, 2016).

Throughout history, maritime transport has been a vehicle for the development of human activities (Montori, 2015). According to (Alvarez, 2016) transportation is one of the most important management areas in an organization where important aspects such as time, costs, physical protection and a series of factors that allow the exchange of merchandise trade and trade must be taken into account. Morelos (2012) allows that maritime transport has dominated the world, allowing, through ports, the enhancement of international trade where, thanks to shipping lines, operations that reduce transport costs can be carried out, achieving a benefit for exporters and importers.

(Alvarez, 2016) mentions that Latin America has improved its efficiency because of the modernization of port infrastructure. However, being that ports are an instrument of connectivity, it has many sectoral failures, which demonstrate a need for modernization in the area of reception of traffic from the transpacific lines that provide new economic opportunities. Montori (2015) addresses specializing of the of function

of the activity of ships, allowing an expansion of product distribution, which favors the development of countries, reducing the time of stay of ships in port, allowing the correct provision of transfer for a commodity. Maritime transport is an activity at the service of distribution logistics and as such is subject to a series of transport policy rules. (Anaya, 2015).

Lopez (2016) mentions that the world has changed with the use of electronic information and that maritime transport is not alien to these changes. Systems are increasingly demanding with relation to the information of ships in ports and the international community is constantly incorporating more tools to generate strategies for the control and monitoring of goods. Operations carried out between companies have ship berths without the intervention of other means of transport (Alvarez, 2016). A navigation channel encourages the construction of crossings that allow maritime routes for the internationalization of operations (Alvarez, 2016).

Larrucea (2015) Maritime safety from a holistic perspective, is where all the elements related to the regulatory aspects in the operational management of port facilities are considered, understanding these elements as a proactive management model of industrial activities. Thus pushing companies to practice a new trend of automation. Sanchez (2016) Port investments have been large, which has made it possible to improve the efficiency of public ports in 10 Latin American countries, promoting structural changes and reforms in management regimes, generating important effects such as increased competitiveness. Similarly, Valdes (2018) states that marine technology for allowing optimization of the efficiency of maritime transport by promoting development activities, which also contributes to the reduction of carbon emissions, thus supporting sustainable development in the region.

From the perspective of Alvarado (2017) The creation of logistics platforms in Colombia can improve the adequate transit, allowing an efficient flow of goods, which contributes to an evolution, taking advantage of things such as route options with the coasts in the Atlantic and Pacific oceans. Acevedo (2016) states that technology and innovation in a country allowing a greater accumulation of knowledge in an economy, opening new opportunities in developing countries, but that this is a constant challenge. Castellanos (2015) maritime transport is an important pillar of commerce, where you must be prepared to compete with more solid and experienced economies. Cargo handling is a process in which principles must be integrated, such as speed, consistency and control; this must comply with standards that meet the requirements of low-cost systems and high-volume travel.

Anaya (2015) suggests that the implementation of production systems such as "pull demand" where demand pulls production, generates effects like the use of computer servers and local information networks where higher levels of trust are guaranteed in terms of safety in loading and unloading, routes, distances, times and costs. González & Sánchez (2007) mention that market participation may increase due to competitiveness levels, where there is a high value in equidistribution. These are indicators oriented to distribution in the maritime sector. Larrucea (2015) says that for protection and security in ports, problems of infrastructure and port facilities for the fulfillment of obligations must be attended to. This is linked to transport.

According to García (2017) in Colombia, 61% of the companies that provide logistics services have a long history in the maritime transport market. Market. However the country faces major problems in infrastructure deficiencies and cargo inspections, generating problems for exporters and importers because loading and unloading times are increased. Gonzalez (2016) raises that over the years the maritime industry has undergone important changes which have led to greater regularity in journeys, in that sense implementing new technology should provide answers and solutions to the problems that arise in infrastructure and costs. The implementation of continuous improvement processes in administrative environments is a widely extended practice in industrial sectors (Tolosa, 2017).

Alvarez (2016) allows us to address how international transport acquires greater strength and more competitive demands, where many companies have permanent mobility of their goods, which must adapt to current production systems in the industry, the internationalization of These operations become competitive advantages for a nation and for the companies that intervene in these processes, Gonzalez (2016) states that the current bet in the world is the improvement in logistics platforms, where maritime transport becomes a transport more regular, flexible and safe, by automating procedures for loading and unloading goods on ships.

In a world that is constantly developing, and with marked globalization, and bearing in mind that the sea covers almost three quarters of the planet, world trade is highly dependent on the maritime transport industry (Rodriguez & Gil, 2016) . Alvarado (2017) suggests that Colombia can evaluate the efficiency of port terminals,looking for a possible expansion, by calculating the cross-border trade indicator, looking for reductions in costs and in times used for cargo mobilization. When the importance of platform integration is understood, logistics can contribute to the economic development of technologies and innovation. For Gonzalez (2016) improving the yields in the links of the transport chain is an advance for its sustainability, where its

development should be increased according to the needs of an economic or territorial system. Understanding the importance of the integration of transport modes and logistics platforms, it can be concluded that these contribute to the competitive development of a region or a country. (Alvarado, 2017).

According to Anaya (2015), adaptation to new distribution systems must permanently evaluate and identify the transport management indicators, where greater efficiency is achieved in commercial distribution and distribution route planning. Alvarado (2017) mentions how an analysis of the logistics performance in the country, allows it to make important decisions, on issues of geographic availability and development of transport infrastructure and to improve the flow of goods. Organizations that focus on the development of an optimal transport strategy, are likely to perceive, as benefits, market penetration and the development of economies (Gonzalez, 2016).

According to Schumpeter (2014) innovation is defined as the introduction of a new good (product) for consumers or of higher quality than the previous ones, the introduction of new production methods for a sector of the industry, the opening of new markets, the use of new sources of supply, or the introduction of new ways of competing that lead to a redefinition of the industry On the other hand for Ponti (2010) says it is a philosophy of change and must be planted intelligently and for Arellano (2017) says it is an action of change that is a novelty.

There are different types of innovation, according to Restrepo (2017) product or service innovation includes the significant improvement of technical characteristics, components and materials that are part of a product, as well as its ease of use and other functional characteristics. For Arellano (2017) there is business innovation that is based on various processes within the company. On the other hand Ponti (2010) says that there is only one type of innovation and that the main mistake is wanting to innovate for a matter of fashion, or even worse as a desperate way out of a crisis.

Materials and methods

The methodological proposal of this research, with which the problem was answered, is descriptive and of a qualitative nature. Sabino (1992) said that descriptive research uses systematic criteria that allow it to reveal the structure or behavior of the phenomena under study, with emphasis on the analysis of documentary information, which for Castillo (2005) is an intellectual operation that gives rise to a by-product or secondary document that acts as an intermediary or mandatory search tool between the original document and the user requesting information. The qualifier of

intellectual is due to the fact that the documentalist must carry out a process of interpretation and analysis of the information in the documents and then synthesize it.

For the development of the documentary analysis, those documents and articles that are the result of similar investigations and whose approach serve as a basis for reflecting and constructing the results related to the problem were taken into account. The information analysis was developed in three stages, the first was the consultation and compilation of sources that covered the current situation of maritime transport in Colombia and worldwide, the concept of innovation and various comparative port analyzes were also taken as a reference. In the second stage, the most relevant information, that which generates a greater impact and theoretically contributes to the development of the article, is classified to reach the third stage where the result of the investigation is generated and the same is concluded.

The documentary information analyzed for this article was obtained from different bibliographic sources such as open databases (academic google), the virtual library of the ECCIuniversity (https://www.ecci.edu.co/es/Bogota/biblioteca-131 ? language_content_entity = es),in electronic books and by a subscription Alfaomega CLOUD (https://www.alfaomegacloud.com/library), articles, institutional reports, degree thesis were also reviewed.

Results and Discussion

Currently Colombia is a country that moves most of the trade through maritime transport, however it is important to identify that a lack of innovation processes puts the country at a disadvantage. Colombia must work quickly on the growth of ports so that it becomes a more attractive proposition for shipping companies and other countries that intend to make additional investments. With relation to the shortcomings that are reflected today in seaports, it should be noted that in this investigation the ports of Cartagena and Buenaventura were taken as a basis because they are the most important in the country in terms of volumes received and ports passed.

It is important to mention that innovation plays an important role in this process. According to the digital public innovation center, in 2013 a platform was launched that manages functionalities such as maritime regulations, sales of nautical charts, events, weather forecasts and navigational notices (Centro de innovacion publica digital, 2013). The above generated confidence in users and operators, since they reduced the processes by email, long waits, reprocesses and others things that affected not only the

main client but also the final client, achieving an improvement in costs in terms of paperwork and procedures.

The innovation processes in the ports exist thanks to the different investments, in Colombia the idea of privatizing them was implemented and this is something that worked very well during the early years. Several of the Latin American countries followed this example with the difference being that today they find themselves with better infrastructures unlike Colombia thanks to taking full advantage of this privatization. Emerging technologies such as the internet also promise to develop this sector by improving workflows and saving costs according to Pablo Marrone, architect of Cisco Digital Solutions, they can provide a notion of the revolution that is coming to free zones, ports and maritime and river trade, with the digital transformation applied to this sector (Dinero, 2018).

Today there is a challenge for the largest ports in the world, among them the port of Shanghai stands out, its new technology will allow China to become the Country that moves the most cargo in the world. Currently the SMART PORT model must be, in addition to being smart and connected, ports that are more sustainable, efficient and socially responsible. It is a long-term transformation strategy that will affect all areas of maritime transport and that will introduce technologies such as automation, autonomous vehicles, blockchain or the internet of things into port operations. The progressive adoption of these innovations would allow ports "to offer a continuous service, 24 hours a day, 7 days a week, more efficient and faster" (PierNext, 2019). For articles like these that speak of the reality in Colombia, it must develop an immediate innovation process that allows the development of new projects and generates economic movement.

Now if we talk about current innovation processes, the port of Cartagena puts forward several improvements, one of which is digitization, according to the Contecar group, who speak of iintegration with the multiple actors in trade chains. Customers, ports, land logistics service providers, customs agencies and the government this in order to generate growth and added value to customers (Contecar, 2019).

As for the port of Buenaventura, the access channels are increasingly complex for shipping companies due to their depth and that for large ships it is difficult to enter since they can be anchored for this reason according to the latest news. of the Gobernación del Valle, Corpes de Occidente and Super Puertos signed an inter-institutional agreement that will allow the start of pre-feasibility studies for the deepening of 15 meters of the access channel to the maritime terminal (EL TIEMPO, 2019).

The aforementioned is completed with the following indicators mentioned by the port society:

• The access channel of the Buenaventura Maritime Terminal has a Length of 31.5 Kilometers equivalent to 17 Nautical miles. The depth is 13.5 meters at low tide (Equal Zero) in the outer part (From sea buoy to welded tip) and in the interior bay (Buoys 23 -24 to buoy 40 diagonal corner of pier No.2) the depth is 12.5 meters at low tide = 0 ”(Buenaventura Port Society, 2019).

One of the great projects in Colombia is the fluvial fleet on the Magdalena River, one of the innovations to which the government wants to contribute to improve competitiveness and new business opportunities and with the addition that it would have lower costs and less environmental impact " We have to invest and bet on the Magdalena River as the fundamental axis of connectivity. To the extent that we have an active and dynamic river, this will translate into development and competitiveness for the entire nation, hence the river navigability recovery project must be understood as a countrywide project ”, said Lucas Ariza Buitrago Executive Director (e) of Cormagdalena ”(Dinero, 2018).

This would be a new strategy in the Colombian market, a work that reduces some risks, such as merchant fleets (Shipping Companies) eliminating the country as a market route because they do not have enough links for the arrival and departure of trade, currently it is being worked on and tests are being done to be able to receive approval. This access would help the ships to a safe entry and exit without the risk of being anchored. Additionally it would connect direct routes to Europe and Asia which would achieve an impact on the logistics chain and different actors involved in this system.

One of the biggest shortcomings that Colombian ports face, especially the port of Buenaventura, is insecurity, and looting due to the poverty that exists in the immediate area. Being one of the largest ports in Colombia, it is through here that the economy is managed. Unfortunately it has seen losses of complete containers. According to the publishing house another problem that is experienced day by day is the representation of customs agencies since they do not operate 24 hours and ideally they should have the same rhythm as the port (El tiempo, 2019).

We must mention a further shortcoming because the objective of this work is to find the majority of shortcomings in the process of the maritime transport logistics chain in Colombia, for this reason, the infrastructure of the port of Buenaventura cannot be omitted. and not precisely the machinery of the port, but the entrances and exits of the same, nowadays a truck takes more than 20 hours to arrive at the port of Buenaventura from the city of Bogotá because of the terrible conditions of the roads triples the journey.

The result of the aforementioned is the high costs of freight, but if we talk about the increase in freight, it is also worth mentioning the high cost in fuel, which brings one more problem, the national truck stoppages which complicate everything. This is a country that generates reprocessing in the logistics chain, for example loads that already had a reservation with a shipping company (x). Surely the ship will leave without that load and the new reservation must be rescheduled and wait for the next departure, and so on with several processes that are generated directly by the port.
Next, a presentation of the indicators that allow the adequate use of innovation in the logistics process.

• Specific performance attributes of the new services (for example, size, accuracy, power consumption, heat generation, speed, brightness, storage capacity, durability, ease of use, response time).
• Waiting time in relation to the competition.
• Number of new first-to-market services.
• Percentage of service launches on time.
• Number of new platform service applications.
• Income from new markets and segments
• Coverage of strategic skills in key R&D positions.
• Percentage of R&D employees who work effectively in interdisciplinary and multifunctional service development teams.
• Percentage of R&D employees capable of effectively leading project management
• Percentage of R&D employees with access to and knowledge of advanced modeling tools
• Expert review of current scientific and technological capabilities.

Lo anteriormente mencionado hace parte de la investigación que se realizó en este trabajo para entender cómo manejar la innovación como proceso de implementación en esta problemática y respaldar los objetivos propuestos en el artículo, este ejercicio se basa en la actualidad con investigaciones precisas y fuera de lo común que logra captar la importancia que tiene el proceso de la cadena logística en Colombia y que se debe estar preparado para un posible golpe aún más fuerte como el que hoy 2019 ronda en muchos de los medios pero que aún no ha sido público y no ha sido confirmado, la salida de Colombia como ruta comercial para algunas navieras por la apertura de un nuevo puerto en Ecuador, por ello es importante la atención en el tema.

The aforementioned is part of the research that was carried out in this work to understand how to handle innovation as an implementation process related to this problem and additionally support the objectives proposed in the article. This exercise is currently based on precise and groundbreaking research manages to grasp the importance of the process of the logistics chain in Colombia. It is necessary to be prepared for a possible stronger blow such as the one that (in 2019) iis said by many in the media, but not yet been made public, and has not yet been confirmed, the departure of Colombia as a commercial route for some shipping companies due to the opening of a new port in Ecuador.

Conclusions

It can be concluded that the country still does not have enough tools to compete with the large markets. In the research carried out, the lack of innovation is noticeable since many of the processes that move in the ports are lacking in technology and implementations of new programs that facilitate maritime operation processes. It is important to mention that Colombia is one of the countries with the greatest commercial movement in Latin America, for this reason it is important to be able to review the shortcomings of the logistics chain. Through this writing perhaps steps can be taken for continuous improvement.

Within the points treated and in the results of the investigation, shortcomings can be evidenced. One of them is the insecurity, which currently is without promise of improvement. The port of Buenaventura was investigated directly in relation to this. It is not credible that Buenaventura is one of the largest ports in Colombia and that despite it being essential to the economy of the country, it is the location of a vulnerable population. There are still places without access to education, there is still poverty and crime is uncontrollable. The security regulations of the port are violated - even theft of complete containers. They are not revolutionary groups, as was thought at one time, they are groups that have been struck down by poverty and crime is the only way to get ahead. It should be noted that this has been going on for a long time and it has not yet been possible to control it.(The rich will continue to be rich and the poor will get poorer every day). That is why it is important to implement technological processes in the port that allow cargo to be kept safer, not only to share solutions to the port but also to be able to precisely involve the people in education processes to generate an impact on future generations.

To conclude, the infrastructure in Colombia is not adequate to reach these ports, the roads are not the best. While other countries such as Ecuador have 4G roads, which

makes them more enticing places land freight. This allows trade to move even more, for these reasons it is important to look at these shortcomings and involve innovation as reflected in this text and implement technological programs to expand this field and thus avoid problems such as national stoppages that involve losses for the country's entrepreneurs .

It is important to recognize what the continuous improvement processes will be in the country. To be able to enter the competition of the world of commerce, we must bear in mind that we are a good commercial route for shipping companies, that is, when they need to go to other countries Colombia is a country of passage. There are even land routes from Buenaventura that go directly to Peru and Ecuador, which means that we still have some advantages but we cannot neglect making infrastructure improvements because with the new opening of the port of Ecuador, Colombia can lose its place as a commercial route for this reason it is important that the government generate emergency plans.

Innovation supposes the creation of new strategies and processes that seek to improve what already exists and is a fundamental part of the development of the transport logistics chain since its implementation allows improvements and helps to enhance international trade operations, which would mean a competitive advantage for our country, since we could generate strategic alliances with nearby ports such as Panama, improving logistics operations, making goods trade more efficient.

Governments must invest in innovation and technology since these are fundamental for the economic development of a nation because they strengthen its economic structure, giving the country the possibility of growing and positioning themselves against other countries whose logistics facilities are not the best. The introduction of new changes allows the creation of new products and services.

Colombia, by not having a large investment in maritime infrastructure, is losing opportunities for new business and commercialization schemes since we are not taking advantage of the potential that we have as a strategically located country that has good trade agreements. In this order of ideas it is recommended that gradual investments are made in innovation in the logistics chain, which little by little will begin to generate small but significant changes in transportation processes, which will help the development of the nation's economy.

Although not everything should be a government investment, small changes could be initiated by each of those who are participants in the logistics chain, that is, innovation programs could be generated within transport companies where each one contributes their ideas. This would have a positive impact on the development of operations. For

the country's logistics chain to be recognized worldwide and contribute to the development of trade, it must carry out feasibility studies in current ports where they seek rapid adaptation of the changes that the operation brings daily. This can be achieved by generating statistical studies of the new ships, the capacities of the ports, the goods that require this service, and the implementation of new technologiesThis would make a big difference since we would be prepared for the changes that arise without generating a great impact on the current operation. We would be at the forefront of innovation which, with the help of technology, would facilitate the development of operations and meet the objective of being one of the countries recognized for its processes in the logistics chains, emphasizing maritime transport.

Finally, it is important to clarify that it is important for a nation to invest its resources in innovation and technology in terms of its transport logistics chain since this is the backbone of its economy and if it does not have the minimum facilities, optimal development will not occur. Commercial activities affect the entire structure of the nation because they could enter into a crisis which would generate bankruptcy of some companies and unemployment.

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