

Business competitiveness model based on the value chain for the coking sector in Colombia

Modelo de competitividad empresarial basado en la cadena de valor para el sector coquizador en Colombia

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Abstract

The aim of this paper is to propose a model of business competitiveness based on the value chain for the coking sector in Colombia that allows its promotion and strengthening. A systematic review of the literature in the Web of Science and Scopus databases, in the period 2012-2022, was carried out to establish the documentary corpus. The categories of analysis identified converge in the competitiveness based on the value chain from which a model is proposed to integrate: the participation of social actors (government, community, academy, businessmen and unions), primary activities, support and articulate to maintain and improve competitiveness business with direct involvement in the coking sector. As a conclusion, this model contributes to the definition and direction of strategies in the transformation of coke, generating conditions of competitiveness based on customer satisfaction and the strengthening of the sector.

Keywords: value chain, business competitiveness, stakeholders, coke.

Resumen

Este artículo tiene como propósito plantear un modelo de competitividad empresarial basado en la cadena de valor para el sector coquizador en Colombia que le permita su fomento y fortalecimiento. Se efectuó una revisión sistemática de literatura en las bases de datos Web of Science y Scopus, en el periodo 2017-2022, para establecer el corpus documental. Las categorías de análisis identificadas convergen en la competitividad basada en la cadena de valor, a partir de la cual se plantea un modelo que integra: la participación de actores sociales (gobierno, comunidad, academia, empresarios y gremio), actividades primarias, de apoyo y articulación, para mantener y mejorar la competitividad empresarial con una implicación directa en el sector coquizador. Se concluye que este modelo contribuye a la definición y direccionamiento de estrategias en la transformación del coque, generando condiciones de competitividad a partir de la satisfacción del cliente y el fortalecimiento del sector.

Palabras clave: cadena de valor, competitividad empresarial, partes interesadas, coque.

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1. Introduction

This research arises from the need of the coke sector to meet the challenges and those challenges imposed by the global environment protection, which constitutes a force of great impact in the business environment, due to its dynamism and vitality. These aspects make it difficult to control and, of course, stay in the market that increasingly requires greater attention and care, besides demands being changeable. They are increasing due to the standards of the modern world (Boffa et al, 2021). The coke sector has been exposed to scenarios of adversity and ambiguity due to the dynamism of the environment, the need to endure and survive in the market, among other factors that have motivated the appearance of a culture of change, which seeks to respond to these transformations, using strategies for internal strengthening with impact on the external context (Khubana et al., 2022).

Business competitiveness is one of the most valued and desired capacities by organizations, as expressed by Diaz et al, (2021), considering that the demand and requirements of the market are changing and increasing with the privileged and differentiating position in the market, as well as ensuring its long-term permanence. In this sense, Chávez (2011), speaks of the linking of the different areas and with their articulation contribute to the company for decision-making and generation of strategies, with the aim of having stable, efficient and functional processes, which execute their work productivity.

This article is justified by the fact that it takes up the broad panorama of literature related to the subject of study and finds that there is no model that adjusts to the conditions of the coke sector in Colombia, that's why it proposes its own model. The proposed model is made up of a differentiating system, with unique competitive and comparative advantages for its promotion and strengthening, as well as for other economic sectors due to the benefits it offers. It refers to a fundamental tool to maintain and increase competitiveness from the value chain, since it is

a robust and comprehensive model, which offers reliability and validity. This model allows to take back, recognize and overcome the existing gaps in literature, integrate and respond to the particularities and specificities of the sector and facilitate the possibility of being applied to other regions and other sectors and contexts.

The mining sector is dedicated to the extraction, production and commercialization of different minerals such as thermal and metallurgical coal. The latter is commonly used in the steel industry and in Colombia, most of the metallurgical coal is transformed into coke for export. Coke is the fundamental fuel for the production of steel, as expressed by the Colombian Association of System Engineers, ACIS (2022), mentioning that it is a base product for the manufacture of iron, an aspect that makes the sector and object of study. To achieve market objectives and be competitive, companies must work on different aspects of strengthening the supply chain value, as a strategic tool that allows identifying the main activities and support them. The supply chain value, as a strategic tool that allows identifying the main activities and support them to carry out the management and articulation in favor of the coking sector. It is emphasized that competitiveness is the ability of a company to execute the strategies that allow it to increase and maintain the market share (Martínez-Arroyo et al., 2013).

This article begins with a literature review in an observation window between 2017 and 2022, which allowed a better understanding of the relationship between the value chain and the competitiveness; besides, it allows the analysis, the identification of trends and the determination of the main gaps. Based on the findings, the model that supports this research was proposed, integrating, in a way, harmonious value chain and its impact on competitiveness.

2. Methodology

A descriptive type of research was privileged, supported by a bibliographic review. According to Hart (2021), this type of research is defined as

the choice of different documents that deal with a specific topic, in which there is information, ideas, data and evidence where different opinions are enunciated about the development and the way in which it is investigated. The present article is based on the methodology proposed by Tranfield et al. (2003), which integrates three phases: planning, development phase and presentation of results.

In the planning phase, the objective is established, the sources of information are identified to determine investigative behavior, define and analyze studies associated with the concepts of business competitiveness and the value chain. Thus, the objective of the review of literature focuses on identifying and deepening about the object of study. In this sense, the search of information was carried out in indexed journals in the Web of Science and Scopus databases. To collect a set of metadata with authors, references, contributions and gaps. For de Vasconcelos et al. (2018), these data are of great relevance when carrying out a bibliometric analysis. Likewise, in this phase the parameters for filtering are established to offer a significant contribution to the topic of study.

The development phase is made up of four stages: The first one relates to the construction of the search equation, composed of keywords related to the object of the study, namely: ("model") AND ("value chain") AND ("competitiveness" OR "competitive edge"). The window of the observation for the consultation was from 2017 to 2022, which allowed obtaining a total of 327 articles, when the established selection and exclusion parameters were applied, based on the level of depth and centrality in the topic. Then, a debugging was carried out based on the title of each work, analyzing the affinity with the subject investigated, of which 142 articles were selected. The second debugging was done based on the keywords and summary of the documents. Finally, the complete content of the articles was studied and the articles from the most convenient documents (33 documents in this case) related to the research topic, were

selected. In the same way, 17 additional documents were considered, included as a snowball due to their content and relevant contribution to the research.

In the third phase of the reporting results, the systematic review process that facilitated the development of the descriptive analysis of the field of knowledge and the theoretical deepening of the concepts of value chain and competitiveness is shown. The documents were examined through the software of qualitative analysis of ATLAS.ti data, which allowed its coding and classification.

The study was carried out with three categories of analysis, namely: The first category is the value chain, finding a total of 18 documents in which the value chain is established as a set of processes intertwined working to meet customer needs. The second category is competitiveness, made up of 12 documents in which it was found that this is the capacity of the companies to establish and execute strategies in order to stand out and stay in the market. The third category is competitiveness based on the value chain, made up of 20 documents in which establishes that the value chain is a pillar for the generation of competitiveness, since its structure allows working from each of the areas and intertwining them in order to create value of companies.

3. Results and discussion

The review of the literature allowed us to establish that competitiveness based on the value chain is a key tool in the development of differential and added values. Diaz et al. (2021), express that, over time, competitiveness has been acquiring a high level of relevance among the companies because it is a strategic tool seen as a factor of growth, value and development of sustainability for organizations. For the generation of competitiveness there are different options and the value chain contributes to the generation of differential aspects. This due to the fact that through the disaggregation of different blocks composed of activities that identify the

generation of value perceived by the customer, companies can create a differentiation in the market with respect to its competitors, thus giving rise to a competitive advantage (Diaz et al., 2021). Below are shown the results organized from the three analysis categories.

3.1 Value chain

The value chain is given by a set of intertwined processes that work for the compliance with customer needs. They are divided into primary and support needs, each with a specific function. As a result of the above, the value chain is a tool that allows the organization to establish strategies based on the analysis of its own realities and consolidate an improvement plan to constitute a comparative and competitive advantage. Porter (1985), affirms that the value chain is an instrument for the analysis of competitive advantages, since that studies all the activities carried out by the company and its way of interacting. This allows dividing the company into activities in order to analyze the behavior of costs to better understand the competitiveness advantage, since as a whole it can be analyzed much easier and in this way, obtain the advantage of each of the company's activities.

Quintero and Sánchez-Carreño (2006), state that a way of articulating the activities is the value chain, since it determines the value for customers and the support of each one of them to reflect the evolution of the business, as well as internal operations. In like manner, Efiempresa (2018), establishes that the value chain proposes a sketch for the diagnosis of the position of the organization against its competition, being, in turn, an effective way to define the actions that must be developed to obtain a competitive advantage that is sustainable. Arnedo-Severichi (2012), mentions that the value chain is made up of different processes that represent the main costs of a business and that's why companies seek to generate competitiveness efficiently, optimizing resources and improving processes.

In the same way, Walters and Rainbird (2017), express that the value chain allows locating the sources of competitiveness, so it is important to consider the identification of the bases of the competitive advantages of the value chain. For this reason, it is essential that the entire chain system reach the level of competitiveness and not just one link, that is, the analysis of the value chain is fundamental to a value creation system. This instrument aids in the identification and evaluation of strategic options that provide competitiveness to organizations.

Walas-Trebacz (2015), states that the management of the value chain gives the opportunity to link the business strategy with the different processes of the company and thus cooperate in effective management, reducing costs and improving the efficiency of the components of the value chain. Also, Nagy et al. (2018), clarify that each company must couple and articulate its value chain to its reality and its environment, without forgetting that work must be done to develop new capabilities. Therefore, Wan and Wu (2016), establish that in order to obtain a place in the market, the processes must be managed internally, while Gopal et al. (2020), conclude that, to be successful in the implementation of the value chain, important changes must be carried out in the company's resources.

For Alvarez-Indacochea et al. (2019), the business strategy must be reflected in the chain of value, since it extends from the suppliers' suppliers to the clients' clients and each activity or link has specific tasks.

Additionally, Arce and Hernández (2008), state that these value-generating activities aimed at the same objective must be identified. Similarly, Vivar-Astudillo et al. (2020), explain that each of these activities must have clear and measurable goals to cooperate in the generation of value. Simatupang et al. (2017), indicate that the articulation of these activities allows to maintain and increase the value; while Mukhtar and Azhar (2020), affirm that there must be an integration between each of the links so that, in this way, there are high-value co-creation skills.

According to Moreno-Loera et al. (2022), each component of the value chain must know how it works and what its contributions are to run them correctly. Meanwhile, for Martínez-Arroyo et al. (2023), each of the activities must fulfill certain functions without being overloaded, but directed towards the target objective of the value chain. In this sense, Quintero and Sánchez-Carreño (2006), propose the value chain as a strategic tool that allows companies to manage those activities that contribute to giving value and pontetiate those that can be improved or eliminated. In view of the above, the analysis of the value chain leads to adapting the company's offer in order to meet the needs and expectations of the client, thus increasing the value for the final consumer. Along the same lines, the design of the value chain is relevant, since it gives a management contribution as a strategic tool (Borja, 2002). Simultaneously, Liu et al. (2018), stand out on the analysis of the chain, which must be relevant to analyze the strategy, structure and rivalry of the company, since these factors describe subjects of added value that contribute to the design or structuring of the value chain.

A chain must not only generate value, but it is important that it be sustainable over time. Accordingly, Bokolo (2019), expresses that it is relevant to establish friendly value chains with the environment. In this sense, Damite and Vallejo (2017), affirm that a sustainable value chain must be constantly innovating and have different actors to generate. Innovation will become a significant axis for the value chain, where investment in technology and innovation are options to maintain and improve it (Liang, 2021). Further, Rasanjani et al. (2019), referring to industry 4.0, they affirm that it plays an important role in the value chain, since it facilitates the generation of competitive advantages.

3.2 Competitiveness

Competitiveness is the ability of a company to execute strategies that are established to benefit, increase and maintain market share; besides

generating a differentiation with respect to the competition of the product or service they offer and working in favor of the customer's satisfaction and his needs much better than working in favor of the competitor. The word competitiveness has its origin in compete, as defined by Moya (2019), "to compete with two or more people, aspiring to each other and others committed to the same thing"; while competition is defined as a "dispute or contention between two or more subjects about something".

Similarly, Porter (1985) establishes that competitiveness is the ability of a company to manufacture and market products and services in the best conditions of quality, price and opportunity than its competition. Miranda (2012), states that there are two types of competitiveness, the external and internal. The first one is the gradual ability to take advantage of certain conditions of competitiveness of the environment and obtain achievements in the context of the market, in order to achieve an outstanding entrepreneurship performance to get a place and acceptance in the market. While the second one is the one that contributes to increasing and sustaining the degree of competitiveness and performance of the company's internal resources.

Porter (2015), affirms that the objective of the competitiveness model is to calculate the profitability of the sector, analyzing the competitiveness taking into account five forces: the existence or entry of substitute products, rivalry between competitors, the threat of new competitors, the bargaining power of suppliers, and the bargaining power of customers. Correspondingly, Jimenez (2006), states that a competitiveness model must be based on the manager's management in each of the areas and aspects of the organizations. This author states that between the value chain and competitiveness there is a connection, so the approach of a competitiveness model based on the value chain would provide organizations with a useful tool to obtain strategies for different links or activities. The activities, when articulated, generate a competitive advantage

over direct competitors, in addition to providing continuous improvements in different aspects, such as the acquisition of position, growth and performance in the market in the medium and long term.

Strakova et al. (2018), express that competitiveness depends directly on the environment where the company is found, since the level of competitiveness can vary depending on the constants changes in the economy. In the same way, the competitive advantage of companies diversifies and adapts to the current economy (Jun & Rowley, 2019), so that companies can generate value internally with trained and appropriate human capital (Wang & Thangavelu, 2021), that being the case, Bangun et al. (2017), recommend investing in human capital. Also, Cho and Jun (2021), affirm that value is also generated internally with the investment in technology and innovation which contribute to the generation of competitive advantages. On the other hand, Paiva et al. (2020), express that innovation and research contribute to the development of companies. In contrast, Jaroenwanit and Daowadueng (2021), state that other intrinsic variables such as knowledge management, operational efficiency and focus on the market, among others, contribute to competitiveness in a positive way.

Defining a company's competitive strategy is relevant in terms of its survival and the market share. In this sense, Arce and Hernández (2008) highlight the processes that generate value and costs must be identified, in order to advance the correct actions in the strengthening of the strategy and the organization. For Tanrattanaphong et al. (2020), the competitive strategy consists of adapting to the different requirements presented by different entities and thus seek to comply with what is required by the client. In addition, the company must interact with the environment for the constant search for strategic opportunities and allow it to be prepared for new challenges, becoming a competitive company in the market and in front of its competitors (Šnircová et al., 2016).

3.3 Value chain competitiveness

The value chain is a relevant pillar in the generation of competitiveness, its structure allows intertwine different activities that together and directed towards the same end contribute individually for the creation of company value. Additionally, it is a tool that cooperates for the analysis of competitiveness and the creation of a competitive strategic model, in addition to acquiring the ability to execute the appropriate strategies for each organization, which allows it to satisfy the needs of end users.

Straková et al. (2018), establish that the value chain plays an important role in the generation of competitiveness, profitability and sustainability of companies, besides being an excellent analysis tool that guarantees a high level of competitiveness and cooperation in the creation of corporate strategy. In like manner, Lombanma (2011) proposes the value chain as a comprehensive and flexible alternative for the analysis of business competitiveness. What's more, Straková et al. (2021a), found that companies must evaluate the effectiveness of their strategies and coupled them, for which, the value chain is a tool that allows the design of a model of competitive business. To fit into the environment, Cheng (2021), affirms that it is by restructuring the processes of the value chain according to their environment, how competitiveness is improved in the organizations.

The value chain is a pillar of relevance for the generation of competitive advantages, as establishes Arnedo-Severichi (2012), who affirms that it must be known and analyzed in depth so that there is competition in the organization. For this reason, Straková et al. (2021b), consider that it is necessary to have an original value chain, since this is in charge of generation added value, maximize potential and minimize costs; in addition, this approach provides companies with a high competitiveness in the long term, that is, it is sustainable. Likewise, for Bokolo (2019), a chain of sustainable value depends on internal operating performance

and also goes hand in hand with the environmental theme. Considering how competitiveness is integrated so that organizations find in it differential aspects, Simatupang et al. (2017), propose the value chain as a set of activities interlaced with each other with the function of maintaining value. Along, Lie et al. (2018), raise the relevance of analyzing the relationships between these activities in the supply chain value with which we cooperate to generate and improve competitiveness. Likewise, McColl and Moore (2013), consider that the connection and interactivity among the activities contributes to the implementation of the value chain and it is an important factor.

Abid et al. (2020), highlight the importance of the existence of relationships of trust between the participants in the value chain for maximum use and, in this way, develop improvements and innovation, which influence competitiveness. Meanwhile, for Mukhtar and Azhan (2020), coordination between the functions of the value chain is a source of competitiveness and co-creation, what's more, generating more solid and robust networks, which gives the advantage of creating very particular singularities and difficulties to imitate. For Kueo-Ling et al. (2001), through the value chain it is possible to acquire a utility from each supplier and each competitive unit, up to the target market. Antonio and Griffith (2017), affirm that it is pertinent that there is a coordination along the value chain from market research to balancing requirements of the client, which helps to improve and maintain competitiveness, as well as the efficiency of the chain of value. This is true for the sale of products and also for services. As mentioned by Gopal et al. (2020), services must move along the chain accompanied by an absorptive learning capacity. It is important to emphasize that each unit or activity in the chain has its role and its function within the process, for this reason Samamé-Castillo (2019), considers that there must be a relationship among the activities for the chain with structural, administrative and financing assistance to strengthen competitiveness.

As stated by Khubana et al. (2022), the productivity of the value chain contributes to shared value, to competitive advantage and sustainability performance, which generates value to the organization. Boffa et al. (2021), take into consideration that the integration of the value chain cooperates for an increased competitiveness, which is useful for small companies that want to acquire and maintain their competitive advantage. Nzivo (2011), came to the conclusion that the value chain is an important basis for the generation of competitiveness, which also guides compliance with the requirements and needs of the client, accompanied by a reduction in the cost of operation. In the same way, Gao and Zhang (2018), clarify that the value chain has the capacity to increase management and strengthen links by actively promoting competitiveness.

3.4 Proposed model

The review of the literature allowed us to establish that, although there is a wide panorama of research on related topics, there is no model of competitiveness based on the chain of value that meets the characteristics and specificities of the sector and in particular on coke as an object of study. This section proposes its own competitiveness model that recognizes the gaps of literature and the particularities of the sector, considering that coke mining industry is fluctuating (see figure 1). This implies the need to generate long-term competitiveness and maintaining the sector in the market under the articulation of different tools and skills, both internal or external.

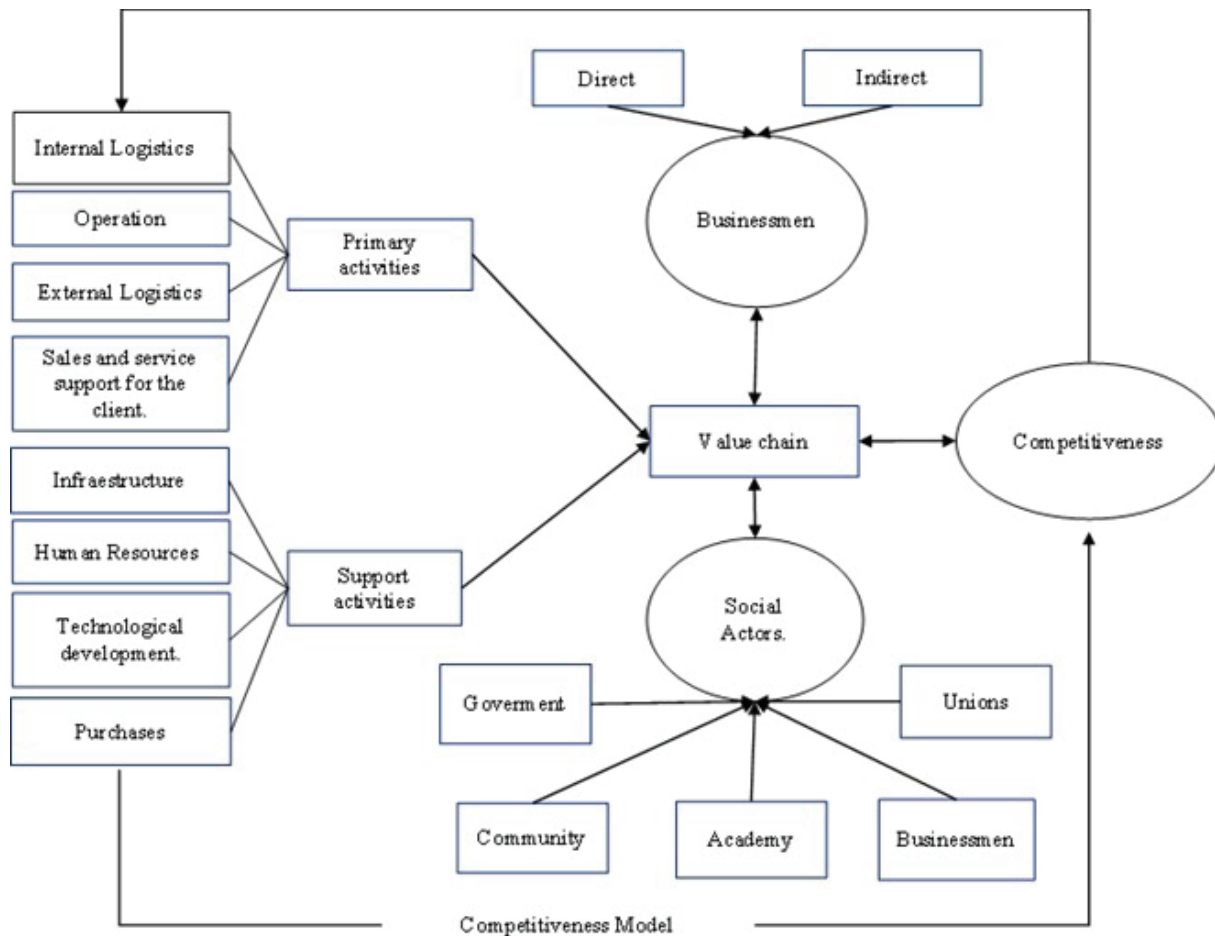


Figure 1. Proposal for a competitiveness model based on the value chain for the coker sector.

Figure 1 shows that the value chain is made up of businessmen and social actors, moreover, some primary and support activities; with the articulation of these elements result in competitiveness. In this model, the value chain creates a process of inputs, processes and outputs, which in turn generates feedback from the businessmen and social actors, where each of them fulfill important functions. As Pirez (1995) says, the social actors are units of real action in society, which operate as executors and decision makers that affect the reality of the community. They are within the social base that act as individuals or collectives, In the model, social actors are those who interfere in the process and are represented by the community, the academy, the government, the unions and the businessmen. Each actor

contributes from their perspective and position to the development of a value chain supply in the coking sector and contributes significantly to the generation of competitiveness. Businessmen are represented by those who, directly or indirectly, are associated with coke. The direct ones are the customers or buyers of the final product and the supplies' suppliers. The indirect ones, are those that although aren't directly associated with the final product, they are part of the production process, such as: transportation, insurance companies and public services, among others.

In the value chain of the coking sector, primary and support activities are found. The primary ones are those that provide the greatest value to customers, among which we have the inter-

nal logistics, which is where the process begins with purchase, reception and management of the inventories of the raw material; the operation, which is the transformation of coal to coke passing through solera ovens type at more than 900°C (ACIS, 2022); external logistics is responsible for transporting and delivering the raw coke to customer. As well, sales and customer service are the areas in charge of marketing and sale of coke, as well as customer loyalty and search for more customers.

Support activities are those that reinforce the primary activities and add value to the product indirectly. These activities are made up of the infrastructure, at which it has administrative control such as the accounting, financial area and quality control of the raw material acquired, since the quality of the final product directly depends on it. The management area is another support activity, since it is responsible for hiring and maintaining the right personnel for the execution of each task of the process. The technological development area is also integrated here. It provides to the information systems, a track of the process and allows updating technology for continuous improvement. The last support activity is the purchasing area, which supplies from the raw material with quality standards to everything necessary for an optimal coke production. The competitiveness model based on the value chain of Figure 1, also proposes in a clearly way a dependent variable that is competitiveness and an independent variable that is the chain of value. Moreover, facilitator and support variables are integrated by the businessmen and social actors. Therefore, businessmen significantly influence the value chain, generating information that allows us to constantly assume the improvement of both the process as well as the final product. Social actors also become a fundamental part within the proposed model, since they provide very useful information for decision-making based on expectations, trends and perspectives.

The proposed model is a predictive bet on the cause-effect relationship between the value

chain and its incidence of the competitiveness of the coking sector. In this sense, a reaction of the independent variable gives rise to an effect on the dependent variable, like the primary and support activities that have an incidence on the dependent variable or competitiveness. The behavior of the businessmen and social actors in line with the performance of the primary and support activities are decisive in producing competitiveness for the coke sector. As a consequence, these activities constitute a robust model with internal validity (validity and reliability of the instruments) and external validity (possibility of being used in other sectors or spaces), which provide the studied sector with a tool for the strengthening and competitiveness.

The literature review allowed setting up that all the activities or links of the value chain must be directed towards a common objective and be articulated to achieve compliance which, generally speaking, is customer satisfaction. Also, to satisfy customer is an important variable in the development of competitiveness for any organization, since it offers aspects that allow us to work for his satisfaction.

4. Conclusions

Companies are constantly interested in generating competitiveness against themselves and their competitors, so it has become a continuous need that must be worked from different areas. It is highlighted that competitiveness is deeply rooted in the value chain, since this is a bridge for organizations to find and execute strategies. With the proposed model of competitiveness based on the value chain for the coking sector, different strategies for each of the activities and areas of the coke transformation process are suggested that allow to acquire levels of competitiveness based on the satisfaction of the end users.

The value chain is a strategic tool that significantly contributes to the growth and the acquisition of sustainable value over time. In this sense, it is relevant to carry out the analysis

and review in a constant of the value chain, in order to identify the effectiveness of strategies, activities, processes and procedures that allow its strengthening. In other words, the value chain is a pillar for business competitiveness, but it is important that it must be known and analyzed in depth to get the best possible benefit.

As future work, it is proposed to analyze in detail the contribution and individual role of each of the components of the model variables, to direct and articulate them towards a common objective. This will make it possible to generate strong connections between them, this being one of the main premises for the generation of competitiveness, thus improving the proposed model.

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