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The Interrelationship of the Value Chain and Competitiveness of the Micro, Small, and Medium-sized Enterprises (MSMEs)

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Abstract

Since the 80s, the business dynamics were modified, establishing, in this case, in a developing region, essential companies in the automotive and clothing sector. As a result of the Value Chain fragmentation some companies settled, losing performance, and letting local and micro, small and medium enterprises (MSMEs) disappear. This research aims to analyze how the MSMEs Value Chain is managed. Also, to determine the impact of the Value Chain administration for the MSMEs Competitiveness in a developing country. To this end, a cross-sectional, and quantitative research was carried out, a survey (148 MSMEs) designed in such a way that it considers in the first place the Value Chain (CV) factor, which in turn is formed by the dimensions of Production Systems (SP), evaluated by eighteen questions aimed at analyzing the level of automation in these businesses. In addition, the Logistics of the Company (LE) factor was evaluated by thirty-eight questions that analyze the state of supply purchases, supply warehouse, disposition of materials to production and distribution to customers. Whereas the Competitiveness (CO) factor was measured by four questions with a 5 points Likert scale. As a result, a positive and significant correlation of the Value Chain on Competitiveness in MSMEs in the central region of Mexico, was obtained. First, however, it is discussed how the Value Chain in MSMEs is at a basic development of operation and with little application of technology and systems.

Keywords: *Value Chain, Production Systems, Logistics, Automation, Competitiveness.*

Introduction

Improving and making sustainable the Competitiveness of the Micro, Small and Medium Enterprises (MSMEs) of any country, that is to make them capable of being business units that generate profit for the owner, workers, and the society that surrounds them (Aziz, Mahmood, Tajudin and Abdullah, 2014), has become a purpose and a challenge for all those involved in the economic cycle and its ability to compete. This situation manifests itself by fighting to stay in the market despite competition and achieve higher-level development. For MSMEs, this challenge is even more significant. After all, they start operations without structure as many of them are born by the economic need of the owner, who thinks that with a good idea it is enough to establish a business unit that gives profits from the beginning (Navarro-Caballero, Hernández-Fernández, Navarro-Manotas, Hernández-Chacín, 2020). Naturally, then, the owner expects excellent

benefits from this idea. However, time shows that it is necessary to have such an administration, which allows the organization to develop and place itself above the competition. In addition, however, the Value Chain needs to be considered since the operations are global and not only local (Chistopherson, Martin, Sunley, and Tyler, 2014).

The importance of Value Chain in this process is of paramount importance since, globally, in the last two decades, in the industrial sector, operations have fragmented, and therefore, work has been divided. So, this is done throughout the globe (Milberg, 2004) so we see how world-renowned leading companies carry out operations in emerging countries like ours, in the search to solve their manufacturing needs and the application of modern ways of working to support the development of the economy (Berguer, 2005). Therefore, Value Chains at the global level must be updated and adapted at the global level (Gereffi, Humphrey, and Sturgeon, 2005). Now it is up to local companies to live up to what global companies require to prevent them from bringing feeder companies.

In current times, this changing way of manufacturing structurally affects the entire existing business environment. In the case of MSMEs, derived from globalized production as a strategy of global companies. Therefore, they must take advantage of this situation and work internally to strengthen their Value Chain by participating within the globalized production process and being available to be part of the intermediate goods system (Foerster, 1998). Likewise, to ensure that global companies consider them within their production schemes. So then, it is up to entrepreneurs to do what is conducive to being at the level required derived from global new working forms. The dimensions of the Value Chain, such as production systems and logistics in the company, must be optimized (Fairies, Stachowiak and Ciplik,2014). These are considered critical elements in business competitiveness (Machado, Casagrande, Roman, and Carvalho, 2018).

The Value Chain

The evolution in the way of production is in line with the company to improve operations and achieve maximum benefits for those who participate in the organization's operations. This evolution is manifested mainly in how the company carries out its production based on the demands of the market and technological advances, achieving competitive advantages over its competitors. The explanation about the steps in any production process, regardless of the degree of control systems and made by mentioning the three stages of this process: inputs, transformation, and outputs (Noori and Radford, 1997).

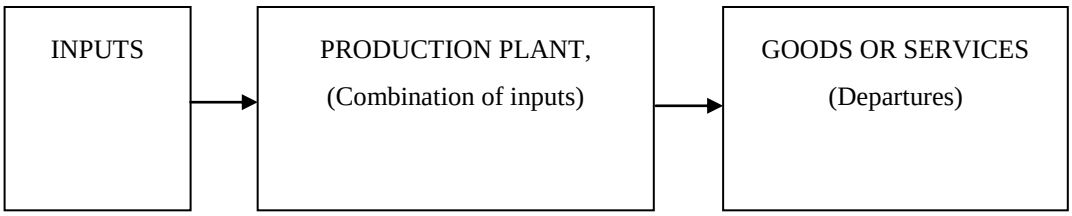


Figure 1 Description of a basic production process Source: Taken from (Noori and Radford, 1997).

When we talk about inputs, we mean anything required to produce the planned product. It can be raw material, machinery, money, knowledge, technology, facilities, among others, and as we can see, these are practically indefinite in terms of variety for each product type. All these inputs are combined in the production plant to be transformed until they become the customer's product. This process is recognized as a Value Chain, unique for each product. There may be similar Value Chains, but not the same for the two products. Porter (1989) defines the Value Chain as the group of organized activities executed to project, produce, market, deliver, and sustain a product designed to satisfy customers. Carvalho and Laurindo

(2003) define it as a set of different technological and economic activities which a company uses to conduct its business, according to the ability to add value and offer the basis for generating competitive advantages.

The Value Chain is understood as the internal structuring of the company, related to suppliers, attention during the manufacturing processes to realize an after-sales service that is satisfactory for the clients. Therefore, it is necessary to consider that the structure and implementation of this Value Chain constitute a competitive advantage over other companies considered competition (Silva, 2005). Likewise, the Value Chain can be visualized as a perfectly organized and controlled system, which is structured to increase the efficiency of processes and the competitive advantages of companies (Vasylyovych and Zophia, 2015).

The Value Chain evolved by incorporating modern manufacturing processes to support complex work and optimization of processes. For example, "the use of new and intelligent mechanisms, maintenance systems, hardware, and flexibility in operations" (Khan, Khan, Haq, and Shah, 2019). In the last three decades, Value Chains in organizations have fragmented due to the internationalization of markets, since mainly global companies now manufacture parts of a product in various parts of the globe to optimize their manufacturing capabilities and for the homogeneous development of the economy worldwide (Berguer, 2005).

This change shows the need to make profound arrangements in the administration of the Value Chain, both companies of origin, and selected countries to manufacture parts (Gereffi, Humphrey and Sturgeon, 2005). Furthermore, the globalization of production results in the growth of exports, even if it is subcontracting, and the updating of technology and control systems used in developing countries to produce goods and services (Milberg,2004).

It is significant to note that because of the fragmentation suffered by the Value Chain, by separating it into main and support activities, a new structure has been formed as a result; on the one hand, the activities considered as primary are integrated, since they add value to the product, and there is an area that is responsible for managing the processes related to the manufacture of the products. On the other hand, because they are considered to support functions, although no less important, the logistics tasks that are related through the Value Chain with manufacturing tasks (Mintzberg, 2006), however, must work in coordination to ensure that the organization obtains the maximum benefits, based on its Competitiveness.

Production Systems

Production systems have gone through different stages during their evolution, and we see the concern of entrepreneurs to continually improve their work systems, supported by the technological progress developed by people with the constant vision of optimizing the use of resources, all of them motivated by the main idea of giving economic superiority to their countries of origin (Cáceres, Martínez-Román and Romero, 2013). This evolution is presented as waves of ideas developed and then adopted by different organizations until a new series of ideas comes that benefit, in most cases, the companies that do it. The best way of working in production systems does not exist since a new idea that changes previous beliefs is always manifested.

The evolution in production systems dates 1776 with the invention of the boiler, designed by James Watt. With the application given to it in the ways of producing (Chiavenato, 1997), he began the replacement of labor by the application of machinery, although rudimentary, and the invention of tiny machines that supported the tasks mainly of the field. Later, the steam engine was used as a source of energy to move equipment such as the railway and ships and some machinery used industrially. Parallel to this invention, the discovery of electricity began, and its use as a source of power for machines began.

From 1850, the evolution in the production processes arose, characterized by the replacement of iron by steel, improvement of the generation of electricity, and the improvement of the internal combustion engine,

which gave a very significant change to the transportation systems, since the automobile appeared. In addition, the need to optimize space in machines and facilities is detected. However, the worker continued to be exploited and little attended, demonstrating that the only thing that mattered was the amount of production generated. Derived from the sudden change observed, the owners of the empirically trained companies demonstrated their total lack of sense of resource management.

However, the vision derived from the mentality of industrialists achieves a change in working and management resources in organizations and generates methodologies that are applied to the development of productivity. Barba (2010) summarizes the evolution of the management of organizations and highlights the following: Charles Babbage, in 1823, initiated and developed the scientific approach to management, the study of repetitive operations and timing, and the division of labor. Henry L. Gantt, in 1901, designed and exhibited the Gantt chart, compensation plan, worker training, and industrial responsibility. Frank and Lilian Gilbreth, in 1904, began the analysis of movements, studies on the simplification of work, wage plans, and incentives, and invented the film graphic cycle to measure predetermined times of movements. However, the most significant contribution was made by Frederick W. Taylor, who managed to develop forms of control at work through observation and experimentation, which was the main problem in organizations at the end of the nineteenth century. In addition, it incorporates the stopwatch to the work analysis and suggests the incorporation of performance rewards in production tasks, and it can be analyzed how the productivity of the company is based on the worker's performance.

Later, in the mid-twentieth century, the concept changes and is responsible for productivity, to the control systems that are established, incorporate philosophies and methodologies of the location of the causes of problems, as well as techniques for problem-solving, again who applied these concepts was placed in the world industrial leadership. Specifically, Japan became the industrial leader of the moment by making quality one of the main competitive advantages of companies whose strategy is customer satisfaction. Again, Japan in the last quarter of the twentieth century, with its production systems and ability to produce small batches of production in a large number of models, according to customers' needs, gave rise to the flexibility of production. So that modern manufacturing processes become very refined and complex structures that require very well-structured maintenance, intelligent mechanisms, and control systems according to time (Khan, Khan, Haq, and Shah, 2019). At this time and from the end of the twentieth century, because of the internationalization of companies, they have chosen to dismember the Value Chain by separating the production process from the supply chain to achieve greater control of both parties (Milberg, 2004) phenomenon also known as fragmentation of the Value Chain (Arndt, Kierzkowaski, 2001).

Business Logistics

Mainly in the places of origin of transnational companies, the ways of managing the Value Chain have changed, caused by its disaggregation. Asa result, greater control of the internal and external logistics developed by the organization is required. Internally it must be controlled basically: reception, inventory control, movement of materials related to production. While externally controlling suppliers, subcontractors, and customers and distribution systems (Machado, Casagrande, Román, Carvalho, 2018), the logistics strategies used are based on techniques and philosophies that allow achieving the goals set by the company itself (Hadas, Stachowiak and Cyplik, 2014).

Business logistics have been defined as logistics management, business logistics, materials management channel, physical distribution, materials management channel, logistics management of the supply chain (Stock and Lambert, 2001), but the most used is logistics management (Pinheiro de Lima, Breval, Rodríguez and Follmann, 2017). The scope given to the logistics area varies according to the researcher's criteria, although there are many coincidences in this concept.

According to Pascual and Ribas (2015), logistics involves customer service, traffic, transport, storage, selection and distribution of the plant, inventory control, order processing, purchasing, transfer of materials, distribution, supply, packaging, and return of goods. Arbache (2015) relates logistics to marketing and concerns the tasks of moving and storing materials, the flow of information, and attention to orders. Finally, the coincidence between definitions is that logistics is responsible for the strategic management of the acquisition, transfer, and storage of materials, finished products, and the flow of information related to these tasks.

Competitiveness

Companies are directly and strongly affected by changes arising in their environment, which can be done by changing the traditional administration forms to develop the ability to relate the company interior with the environment according to what is required by the market (Spendlove, 2007). Therefore, applying theoretical and empirical knowledge becomes indispensable in this process (Ramírez,2005). In the case of Mexican companies, it is pointed out that they have severe problems due to their management manners (Velázquez, Cerón, and Rodríguez, 2016) and the knowledge absorption through human talent exists, which is a worrying and challenging situation. Because Competitiveness development is based on the acquisition of skills that directly improve the organization's productivity, it is considered the sustenance of business Competitiveness (Álvarez,2008). These problems are not exclusive to Mexico but practically refer to Latin America, so there is a low degree of adoption and generation of technology, training, administration, and management and, therefore, low productivity levels (Zevallos, 2003).

A study of Competitiveness can be carried out from different points of view, and it can be associated with what happens outside the organization, such as government policies, the economic structure of the country, the market, and other regional variables (Mora-Riapira, Vera-Colina, and Melgarejo-Molina, 2015) but mainly to what happens inside. Competitiveness is defined as an organization's ability to maintain or increase its market participation, based on updating business strategies, with attention to results, enabling it to participate in different types of negotiation with different institutions and companies in an environment of competition; this is determined by the market and by government policies (Solleiro and Castañeda, 2005), considering that although the company is influenced by the field in which it is located, it is up to it to promote competition based on its performance. Therefore, leading companies to be competitive becomes an essential focus of attention (Machado, et al., 2018).

The Value Chain and Competitiveness

The Value Chain has been seen since 1980 in constant evolution, rapid and continuous growth, which begins with the disaggregation of production to different parts of the world, bringing therefore the change in the realization of the productive systems and logistics of the company (Khan et al., 2019) this caused the modernization of production systems and logistical control to make a difference in the results of different organizations. Therefore, a company's Competitiveness is manifested by the differences in the way it is managed and offers the product to the customer in better conditions than the others, a situation that supports it to obtain better results than its competitors (Porter, 1989).

The Value Chain must be managed internally by the organization's management, and for them, it must apply the knowledge that is at their disposal to achieve it efficiently and constantly to achieve total control over the general operation of the company; that give more significant chances of success and have a more excellent defense against the competitive advantages of companies considered competition. For local companies, this is highly important since while the transnational companies that have arrived in the region have their strategies to manage their Value Chain, this becomes a severe problem to stay in force for local companies. Figure 2vshows the interrelationship of the Value Chain concerning the Competitiveness of the company. Based on this model (Figure 2), the following hypothesis, H0, is that the Value Chain in Aguascalientes, Mexico, companies significantly impact their Competitiveness.

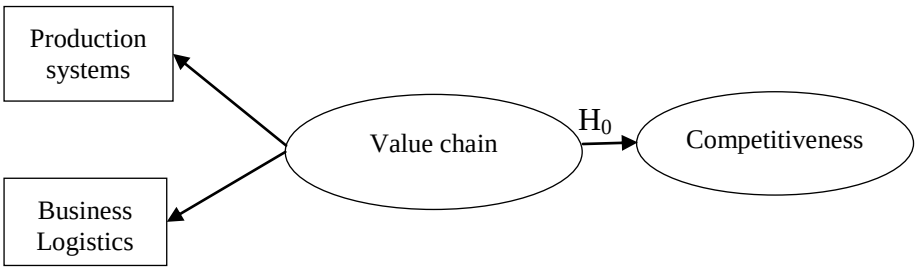


Figure 2: Theoretical model that relates the Value Chain with Competitiveness.

Despite the advances in production systems and business logistics that constitute the value chain, there seems to be a poor understanding of their current impact on the MSME's Competitiveness in developing countries. Moreover, most studies on value chains and Competitiveness have focused on big companies in developed countries. Therefore, this research objective is to measure the MSME's Value Chain's interrelationship with their Competitiveness.

Methodology

This research determines the degree of control in the Value Chain of MSMEs in Aguascalientes, Mexico, by analyzing their production systems and the company's logistics. Although subsequently, the impact of the Value Chain on Competitiveness is analyzed, the research is transversal, quantitative, not experimental. For this reason, a survey was designed to analyze the Value Chain construct, which is measured through two dimensions. The first analyzes the production systems with 18 questions, and the second analyzes the company's logistics with 38 questions. Finally, to analyze the company's Competitiveness, six questions were asked, of which after performing the reliability tests with the Cronbach Alpha index, only four were considered. Therefore, the five-point Likert scale was used, the meaning of which is described in table 1 below.

The survey was applied to 154 entrepreneurs in Aguascalientes, Mexico, from which it was finally concluded that they agree that the use of techniques to control the Value Chain positively and significantly impact the Competitiveness of companies, likewise, it is concluded that at this time there is greater attention for the logistics of the company than for the production systems. To confirm the congruence in the respondents' answers, a reliability analysis was carried out utilizing Cronbach's Alpha. The results obtained are presented in Table 2, in which it can be observed that all the indices resulting from the test carried out have a value that exceeds 0.7. This value is the minimum recommended by Nunnally and Bernstein (1994). Consequently, it is considered that there is appropriate reliability of the survey response data.

Table 1: Operationalization of variables. Own source, based on the nature of the research.

Construct	Qualification of variables
Production systems	1= No formal production systems 2= They are used and controlled empirically, some production systems 3= Production systems are essential and general-purpose 4= Most production systems are current 5= All current production systems apply

Company Logistics	1= No control of the company's logistics 2= Occasionally, there is precise control of the logistics of the company. 3= Logistic control systems are essential and in general use. 4= Most current logistic control systems are used. 5= All current logistics control systems are applied.
Value Chain	1 = Constant problems due to the control of the Value Chain 2= Common problems due to the control of the Value Chain 3= Some problems of a complicated solution, by control the Value Chain 4= Sporadic problems, simple to solve by control of the Value Chain. 5= Full control of it
Competitiveness	1= Much lower than our competitors. 2=. Inferior to our competitors. 3= There is no noticeable change between us and our competition. 4= Superior to our competitors. 5= Far superior to our competitors.

Results and Discussion

Figure 3 presents the average response expressed by the directors of MSMEs surveyed, through which the state of the constructs (production systems, company logistics, Value Chain, Competitiveness) that were analyzed in this research can be defined.

Table 2: Cronbach's Alpha values and mean response for the analyzed constructs and their dimensions.

Factor dimension analyzed	Cronbach's Alpha	Average response
Production systems	0.887	2.3082
Company Logistics	0.909	2.9564
Value Chain	0.732	2.6323
Competitiveness	0.694	2.9307

Source: Own source, based on the result of the reliability analysis carried out.

Based on the average response, it is observed that the MSME entrepreneur in Aguascalientes recognizes that the production systems have a very high area of opportunity for improvement. They are rated with an average value of 2.30, which indicates that production systems are empirically controlled and that a large amount of old and manual machinery is available, which can complicate the rapid response when required.

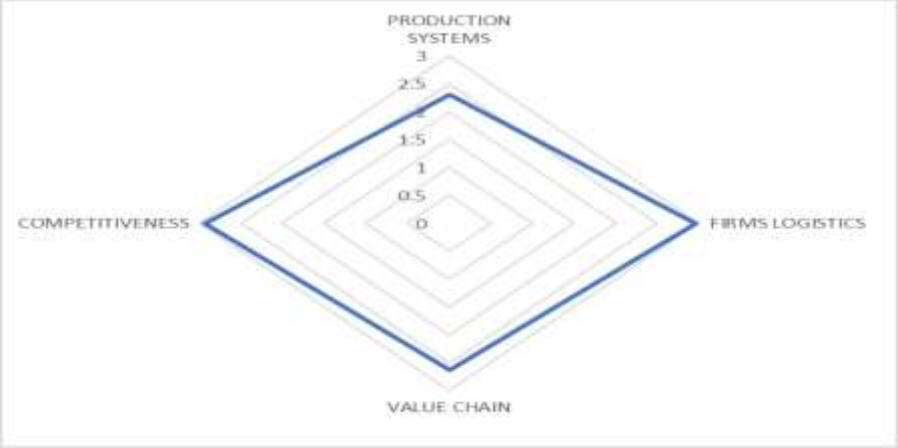


Figure 3: Asverage response from MSMEs in Aguascalientes, Mexico.

For the company logistics, an average value of 2.95 indicates that this part of the Value Chain is given greater attention than production systems, possibly due to the market's current need when companies become service providers to international companies working in the state. As well as the tremendous available export possibility, however, the company's logistics are still in the making, and for the moment, there are basic control systems, but with excellent growth potential.

The condition of these two parts that are formed motivates the Value Chain to have an average result of 2.6323, and this indicates that it presents in its control some complicated problems that require a lot of time and attention for its solution, and it is recognized that specific techniques and tools are required to support so that the Value Chain is controlled expeditiously and simple. Competitiveness has an average response of 2.9307, in which it is expressed that MSMEs in Aguascalientes do not see notable differences between them and their competition.

Table 3 shows responses frequency that indicates the state of attention given to each element analyzed in this research. Initially, 93. 9% of business owners or directors mention that they have frequent problems in the management and control systems used in their respective organizations since the production systems used are essential. On the other hand, only 6.1% of entrepreneurs recognize that they use most of the control and management techniques of production systems in their respective organizations, so the problems that arise are sporadic and that they are also solved in a fast and straightforward way. Likewise, within the 93.9% who affirm that their management and control systems of production systems are essential, there is a 20.9% that recognizes that there is no degree of management and control over the production system.

Table 3: Percentages of the frequency of response for the proposed research model

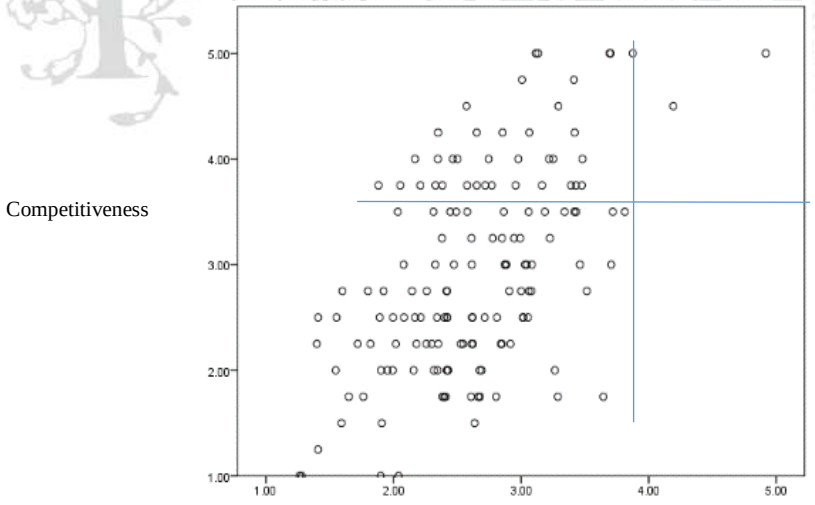
Dimensions to qualify the constructs Value Chain and Competitiveness.	You do not have clear control, continuous problems with customers, far inferior to the competition	Empirical control, frequent problems, inferior to competition	Basic control systems, some serious problems, no difference with the competition	Sporadic problems, use of control techniques and tools, superior to the competition	Total control and far superior to the competition
Production systems	20.9	43.3	29.7	4,7	1.4
	20.9	64.2	93.9	98.6	100
Company Logistics	3.4	22.3	52.7	18.9	2.7
	3.4	25.7	78.4	97.3	100
Value Chain	8.8	39.2	39.8	11.5	0.7
	8.8	48.0	87.8	99.3	100
Competitiveness	12.8	31.1	21	24.3	10.8
	12.8	43.9	64.9	89.2	100

Source: Own source, based on the results obtained.

As for the company's logistics, 78.4% of entrepreneurs recognize problems and that it is difficult for them to solve them since their logistics control systems, in many cases, are empirical. On the contrary, 21.6% say that their respective organizations use current logistics control techniques and that their problems are few and simple and quick solutions. Although the results are not encouraging, there is a clear difference between the attention to production systems and the company's logistics, derived from the currently existing market, which mostly requires attention to customers outside the area in which the companies are located and therefore requires special attention.

Concerning the Value Chain, it can be observed that 87.8% of entrepreneurs mention that, in their respective organizations, there are many problems related to the Value Chain, which are difficult to solve with the means they have, since they work empirically and sporadically with control techniques that support the proper functioning of it. Also, only 12.2% mention that in their companies, the problems derived from the control of the Value Chain are minimal and quick solutions since control techniques applicable to the Value Chain are frequently used.

Finally, the results in the degree of Competitiveness that is had concerning their peers, 64.9% mention that they are at similar or lower levels to their competition. Of which, 12.8% recognize that their level of competition is much lower than their peers. On the other hand, it must be that 35.1% mention that they are above their competition, which places them in the preference of their customers and copes with their development. The relationship between the variables Value Chain and Competitiveness is manifested by analyzing the correlation between these variables. Table 4 shows the result of the correlation analysis between the variables involved. With an index of 0.56, it is expressed that there is a high degree of correlation between the Value Chain and te Competitiveness of Aguascalientes companies. In addition, R^2 equals 0.3136, so 31.36% of the results in Competitiveness are due to what happens in the Value Chain. In this sense, graph 1, in its quadrants, shows that 2.82% (upper right quadrant) of entrepreneurs express that there is a high competitiveness and Value Chain in their organization.



Graph 1: Correlation of the value chain with competitiveness, in companies in Aguascalientes
Source: Own source, based on the result of the correlation analysis carried out.

On the other hand, 69.5% of these (lower left quadrant) express that their organization has low Competitiveness, and the degree of control of the Value Chain is also low. On the other hand, 24% of entrepreneurs (upper left quadrant) mention that, in their organization, Competitiveness is low, even though the control of the Value Chain is high. Likewise, 3.72% of entrepreneurs (lower right quadrant) express that, in their organizations, the degree of Competitiveness is high, although the degree of control of the Value Chain is low.

Table 4: Correlation of the Value Chain with Competitiveness in companies in Aguascalientes. Own source, based on the result of the correlation analysis carried out.

Pearson correlation	.560**
Sig. (bilateral)	.000

Table 5: Lineal Regression of the Chain of Valor and the Competitiveness in Aguascalientes, Mexico. Own source, based on the result of the linear regression analysis performed.

	Non-standardized coefficients		Standardized coefficients	t	Gis.
	B	Standard error	Beta		
(Constant)	.658	.286		2.305	.023
Value Chain	.863	.106	.560	8.176	.000

Next, a linear regression analysis was performed, where the Value Chain was considered as an independent variable and Competitiveness as a dependent, the result is shown in Table 5, which indicates that the equation that governs this relationship is:

$CO = 0.863\ hp + 0.658.$

Conclusions

Like those carried out in different parts of the globe, the present study confirms that managing the Value Chain in the MSMEs of Aguascalientes, Mexico, has a positive and significant influence on their Competitiveness. Therefore, if you want to be competitive to ensure the company's development, it is necessary to deploy the elements that are part of the Value Chain by applying different methodologies that relate to it. For example, approaches and techniques such as just-in-time, lean manufacturing and six sigma, and continuous improvement. For this, it is necessary to have the willingness to work and the knowledge of the different techniques that are part of the methodologies above.

If you make an analysis of your company regarding its Value Chain and qualify it as an organization with many problems in this regard and difficulty in solving them, you would be at a level according to the scale that was used for the study, possibly in 2, the result in Competitiveness indicates that your organization is slightly below the competition; therefore, you must work on improving the production systems and logistics in your company until you make the problems sporadic and easy to solve, that is, level 4. Thus, Competitiveness would rise to place it at level 4.11, slightly higher than its competition.

However, the owners and managers in MSMEs are accustomed to working empirically, possibly because there are sufficient utilities not to close the company despite everything. Although development is not glimpsed, changing its traditional family way of managing it is necessary. On the other hand, worry about applying techniques that support the development of organizations resulting from knowledge-based work. Also, in higher education institutions, it is necessary to include this type of topic in their teaching programs to train entrepreneurs or administrators of this type of company. This need is evident when observing the degree of application so small that it has in the production systems and logistics of the company. Future

research topics include determining the process of improvement required in MSMEs to exploit the potential that exists in them and thus achieve the development of these and the country that contains them.

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