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FACTORS LINKED TO COMPETITIVENESS OF THE TARO SUPPLY CHAIN IN VERACRUZ, MEXICO

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ABSTRACT

The competitiveness of any agricultural product depends on the efficiency of the supply chain. Until now, the competitiveness factors of the taro (*Colocasia esculenta* (L.) Schott) supply chain have remained undetermined. The issue in terms of research lies in the lack of studies concerning taro supply chain competitiveness and associated factors. The objective was to determine the factors associated with the competitiveness of the taro supply chain and define a competitiveness model. Competitiveness was assessed, based on three key factors: production management (PM), administrative management (AM) and business performance (BP). A questionnaire was applied to 47 people involved in the supply chain. We found a significant relationship between the discerned factors and variables. The variables related to competitiveness were: proximity to importing countries and ability to obtain high yields. PM (0.845**), AM (0.756**) and BP (0.717**) manifested highly significant correlation ($P < 0.05$, two-sided). The overall competitiveness value for the taro supply chain was 6.3. The factors that contribute most to competitiveness are non-economic, such as production capacity, demand estimate, flexibility and sales planning. Economic factors, totally beyond the control of chain agents include: production costs, distribution and international prices. We concluded that three factors involved in the taro supply chain accord it competitive advantage.

Keywords: agroecosystems, chain, commercialization, distribution, taro.

INTRODUCTION

Taro is a perennial crop that pertains to the Araceae family of edible corms that includes the genera: *Colocasia* and *Xanthosoma*. The first is native to the southeastern part of Indo-Malaysia and the second is from the northeastern Amazon region Bradshaw, 2010; Quero-García *et al*., 2010). Morphologically it consists of a succulent herb, whose leaves sprout directly from a primary underground corm, with secondary and smaller corms known as cormels (Montaldo, 1991). In recent years, the trade and consumption of taro has spread to many countries such as the United States of America and Canada. Taro corms are mainly eaten in countries that include Malaysia and other parts of Asia, the Netherlands, Belgium and the Caribbean (Lebot, 2019). It is estimated that around 4 million tons of taro were consumed in West African countries in 2010 (McGregor *et al*., 2011); likewise in Central Africa in countries like Chad and Cameron, its consumption is quite widespread (Aboubakar *et al*., 2009).

Taro production is destined for human and animal consumption and for the agro-industry. The corms are usually eaten cooked or fried, as the heat removes the calcium oxalate content that is present in the raw corms. Taro flour is an important food for children and the elderly due to its nutritional content (Savage and Vanhanen, 2019). No previous studies have addressed the competitiveness of the taro supply chain. In the state of Veracruz, the taro supply chain for this agro-industrial product is quite well-established, and includes production, transformation, and national and international marketing. Taro starch is used as a raw material in the agro-industry for the preparation of various food products (National Starch Food Innovation, 2008).

Worldwide production of taro has undergone a constant and notable increase in recent years. However, production, consumption and the world trade market vary considerably from year to year, in response to demand from the dominant international markets. In 2007, global taro production was around 12 million metric tons, of which 9.5 million tons were produced in Africa and 2 million in Asia. From 2001 to 2008 a maximum of 12.2 million tons was reached; in 2009, production dropped to 9.5 million tons and in 2010 production of 9.0 million tons was recorded. However, little production is destined for international trade, as more than 72% of production in these continents is destined for local consumption (Ubalua *et al*., 2016). In the case of Ecuador, taro generates less than 1% of foreign exchange income at the level of non-traditional products, as taro income is directly linked to the international price because more than 80% of production is exported (Savage and Vanhanen, 2019). World taro production in 2013 reached just over 10 million tons and was led by Nigeria, China, Ghana and Cameroon (FAOSTAT, 2015).

The main taro exporting countries in recent years have been: Ecuador in first place with an export of 10,788 million dollars in 2013, which represents 37% of the total. Costa Rica ranks second with 9,753 million dollars and Nicaragua third with 3,889 million dollars. These are followed by the Dominican Republic, Mexico and Honduras (SAGARPA-SIAP, 2016), Cuba, Venezuela, El Salvador and Peru (Otekunrin *et al*, 2021). Up until 2016, the main taro-producing states in Mexico have been: Oaxaca, Veracruz and Tabasco. In 2013, 475 hectares were registered for the state of Veracruz with a production of 13,690 tons and an average yield of 47 tons per hectare, with an average value per hectare of $5,500 (Nazario Lezama *et al*., 2020).

Mexico has a competitive advantage, because it contrasts with other taro producing and exporting countries, ranking highest in yields per hectare. In 2012, the yield obtained was 46 ton/ha and in 2013 it was 49.3 ton/ha, followed by Cuba with 10.04 ton/ha in 2012 and 11.3 ton/ha in 2013 (Trade Map, 2018). The competitiveness of a product's supply chain depends on its comparative advantages, associated with various factors such as the relative costs of production, structure, transport and marketing. Porter (1980) points out that competitiveness is the capacity of a business to produce and market products at better price, quality and opportunity conditions than its rivals. Two world-renowned schools (Harvard Business School and the Institute of Management Development, IMD) have provided theoretical bases for comprehensive studies of competitiveness. However,

there is still no consensus regarding the concept of competitiveness in the business and international trade context.

At an international level, competitiveness is a concept that is debated in the academic, political and even business spheres. Considered from a variety of perspectives, it is assigned great importance with respect to the economic growth of countries, due to its impact on business or the capacity of countries to enter the international market (Buendia-Rice, 2013). This relates to several factors that combine to affect competitiveness. The Economic Commission for Latin America and the Caribbean points out that there is no exact definition for competitiveness, although it has become more global. Thus the indicators that assess competitiveness have not been fully defined (Bayoumi *et al*., 2018). Generally, research proposals and methodologies to measure competitiveness tend to include only economic factors, reflected in costs and prices. However, there are other non-economic factors that determine the competitiveness value of any supply chain (Rojas and Sepúlveda, 1999). These factors include land, agricultural capital goods, monetary capital, the technical and managerial skills of the unit head, access to labor and business contacts (Chavarría and Sepúlveda, 2001).

In the central region of the state of Veracruz, particularly in the municipality of Actopan, taro cultivation dates back more than 20 years. The cultivation of taro has become the main labor activity and source of income for the inhabitants, a factor which has reduced the number of workers migrating to the United States (Parra *et al*., 2017). The supply chain has recently been consolidated with the participation of taro processors, buyers, exporters and other associates. However, factors that intervene and make the taro supply chain in the Actopan region competitive, still need to be determined.

The importance of this study refers to the lack of research on the supply chains of agricultural products in relation to the factors associated with competitiveness. This means, there is no information defining which factors make the supply chain more competitive. In the international literature, there are no concepts or definitions related to the competitive supply chain; and only essential characteristics are mentioned. We have not found previous empirical studies that comprehensively analyze the 14 variables analyzed here. We have only detected some works that analyze two or exceptionally five variables and their relationship with the level of supply chain competitiveness.

The research query intended to find out which factors drive competitiveness related to the taro supply agro-industry in the municipality of Actopan, State of Veracruz. Therefore, the objective was to design a competitiveness model for the taro supply chain, based on a correlation study of competitiveness factors, proceeding from a hypothesis that the competitiveness of the taro supply chain in the municipality of Actopan, Veracruz is determined by both economic and non-economic factors.

MATERIALS AND METHODS

Research aimed to identify the factors that drive the competitiveness of the taro supply agro-industry in the municipality of Actopan, State of Veracruz. Therefore, the objective

was to design a competitiveness model for the taro supply chain, based on a correlation study of competitiveness factors. The hypothesis is that the competitiveness of the taro supply chain in municipality of Actopan, Veracruz is determined by economic and non-economic factors.

This research was developed using different methodologies and approaches and comprises two stages: the first exploratory and the second descriptive and comparative. During the exploratory stage, the variables related to the concept of competitiveness were identified by a bibliographic review. For this purpose, 20 articles closely related to the competitiveness factors of the supply chain were identified, obtaining 35 variables for further consideration. During the descriptive stage, we elaborated a conceptual model, comprising competitiveness factors and the operability variable (Figure 1). Subsequently, we designed the methodology (questionnaire). To assess the reliability of the methodology, a pilot test and a reliability analysis were carried out by calculating Cronbach's Alpha coefficient. We designed a questionnaire of 116 questions, all of which were closed questions to enable the evaluation of factors that influence competitiveness.

The information obtained from the questionnaires was analyzed using a descriptive statistical tool (Crobanch's Alpha, frequencies, percentages, averages, and correlations) together with the SPSS STATISTICS® package and Microsoft Excel 2016. A correlation analysis was performed and a model was developed, using the Structural Equation Modeling Software (EQS).

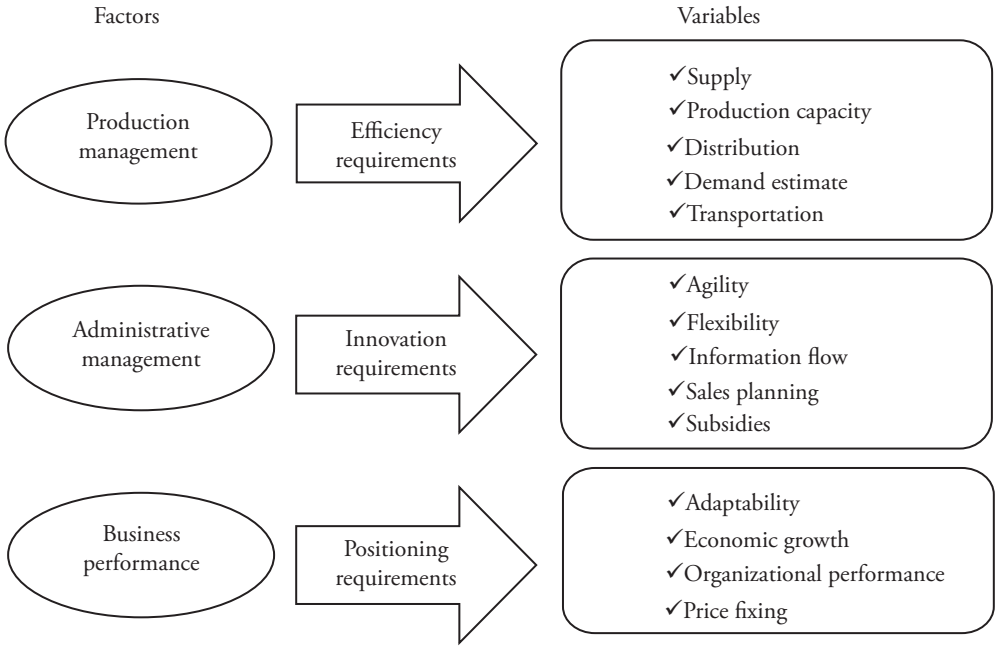


Figure 1. Factors for assessing the competitiveness of the taro supply chain.

Study area

The study was carried out in the principal taro-producing area in Mexico, which is the municipality of Actopan, in the state of Veracruz, Figure 2. This is located between 19° 23' and 19° 44 of NL and 96° 20 ' and 96° 48' WL, with an altitude between 1 and 1,000 masl. The climate is warm sub-humid with summer rains, average humidity (93%) and sub-humid with summer rains with less humidity (7%) ranging between 20-26 °C, and rainfall between 1100-1300 mm (SEFIPLAN, 2015). Figure 2 shows the localities studied: Santa Rosa, La Esperanza, La Bocanita, Buenos Aires 1, Paso de Vara, El Hule and Rancho Balderas.

Study subjects

Study subjects were selected from among factors that constitute the taro supply chain. The non-probabilistic sampling technique, known as causal or accidental, was used. A formal survey was carried out, interviewing the agents of the supply chain, including: 35 (56%) taro producers, 11 (17%) processors, 9 (14%) packers/exporters and 1 (2%) collection centers. The random sampling method was only used to select the taro producers. In total, 47 people were interviewed.

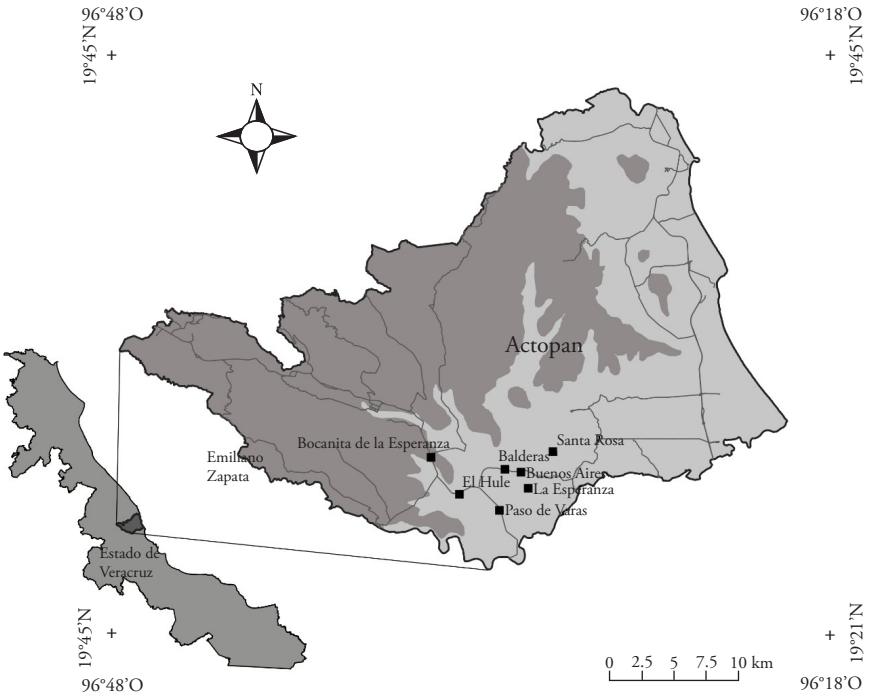


Figure 2. Geographical location of the municipality of Actopan, Veracruz.

Data analysis

A reliability analysis was performed by calculating Cronbach's Alpha coefficient, using the data collected from the questionnaire. Cronbach's Alpha is an internal consistency method that makes it possible to estimate the reliability of a measurement method; through a set of items that are expected to measure the same construct or theoretical dimension. Reliability defined by Cronbach's alpha assumes that the items (measured on a Likert-type scale) measure the same construct, and use Likert scales to evaluate the internal consistency of the proposed group (concept to be measured), (Welch and Comer, 1988). Scale according to mean values between 0 and 1.

The values obtained in the reliability analysis (means, variances and covariances) indicated that the Alpha value for this concept is 0.857, which means that the questionnaire has very good consistency. In Table 1, we can see the modified value for Cronbach's Alpha, if one of the three factors being measured is eliminated. This does not present significant differences as it continues in the 0.80 and 0.90 range; meaning that consistency is good.

Correlations were calculated by applying the Pearson test. Pearson's test makes it possible to measure the strength and direction of the association of two random quantitative variables with a joint bivariate distribution. The values of the correlation coefficient range from -1 to 1. The sign of the coefficient indicates the direction of the relationship and its absolute value indicates the strength. Higher values indicate that the relationship is closer. Then, the correlations of pairs of variables are the Pearson correlation coefficient and the mean level of significance obtained, in addition to the number of cases (Table 2). Apparently, the three factors (PM, AM and AF) have a very positive relationship (this is in the positive range of ($p>0.05$) to 0.89) and has a significance below ($p>0.05$), meaning there is no linear relationship between PM, AM, AF and competitiveness.

Correlations for all variables were calculated in the same way. The results show a statistically significant, moderately positive linear association for most of the variables (they are in a range of 0.05 and .079); they have greater and lesser significance at 0.05, therefore, there is a linear association between the variables and competitiveness; with the exception of the transportation variable, which has a low relationship (-0.047) with a negative sign and a significance of 0.867 (Table 3).

Table 1. Cronbach's Alpha of the taro supply chain's concept of competitiveness.

	Average scale if the factor is deleted	Scale variance if the factor is deleted	Corrected total correlation of factors	Cronbach's alpha if the factor is deleted
Production management (PM)	20.5937	2.150	0.730	0.809
Administrative management (AM)	20.9138	2.447	0.564	0.881
Business performance (BF)	20.2431	2.646	0.600	0.857

Source: self elaborated.

Table 2. Correlations between general factors and competitiveness.

General concept		Production management	Administrative management	Business performance
Competitiveness	Pearson correlation	0.845**	0.756**	0.717**
	Sig. (bilateral)	0.000	0.000	0.000
	N	47	47	47

Design of indicators

Competitiveness indicators are tools that reveal how a country or a region is performing in areas such as education, health, institutions, care for the environment, market operation, infrastructure, etc. As mentioned previously, there are several indicators created by international and national organizations that measure these capacities based on the analysis of hard data (GDP level, inflation, investment, employment, etc.) or perception (security, transparency, corruption, etc.). In this research, competitiveness indicators for the taro supply chain were designed, with the purpose of determining the situational factors of the chain's competitiveness, as a valid, reliable and comparable benchmark.

Analysis and information concerning the level of competitiveness of the taro supply chain in the state of Veracruz was undertaken by calculating indicators that quantify all the information in this study, carried out in a segmented manner. This predicts which factor and agent will have greater or lesser effect on the global competitiveness indicator chain.

We used descriptive statistical techniques to build a system of indicators using the data obtained from the questionnaire, taking into account the minimum and maximum scores, and calculating the average value for each factor by type of agent, according to its particular characteristics, size of business and accuracy, among others. The points obtained from the factors considered are summarized to arrive at a value to indicate the competitiveness of the supply chain.

Table 3. Correlations for competitiveness factors and their variables.

Factors	Variables	Pearson correlation	Sig. (bilateral)	N
Production management	Supply	0.777**	0.000	17
	Production capacity	0.760**	0.000	47
	Distribution	0.480	0.051	17
	Demand estimate	0.478**	0.001	47
	Transport	-0.047	0.867	15
Administrative management	Agility	0.347*	0.017	47
	Flexibility	0.468**	0.001	47
	Information flow and sales planning	0.300	0.278	15
	Subsidies	0.446**	0.002	47
	Adaptability	0.534**	0.000	47
Business performance	Economic growth	0.670**	0.000	47
	Organizational performance	0.185	0.213	47
	Price fixing	0.607**	0.000	47

To evaluate and determine level of competitiveness, indicators or indices with n numbers are used, enabling us to clarify the panorama with precision, and in turn to evaluate, estimate or demonstrate this phenomenon. Several of the indicators are composed of multiple variables. For example: to build the Supply sub-indicator, we applied the measurable variable for inventory management. This variable of interest is ordinal in nature, meaning that it consists of categories that must be assigned a value in order to be measured. In order to transfer the variable onto a scale of five to ten, it is necessary to establish the lower and upper limits of the existing values, so that the chain agent's responses are assigned parameters from 5 to 10 on a traffic light scale, where the color green represents acceptability, yellow risk and red critical or unacceptable (Table 4). The average value for the indicator, when assigned a rescaled score between 5.0-5.9, is classified as Very Unacceptable and is shown in red. Likewise, this is undertaken for all categories of variables, assigned to 5 categories. Therefore, if the chain agent has a Fair rating, it would be assigned a value of 7.0-7.9, and if it is rated Very Acceptable, the corresponding value would fall between 9.0 and 10.0. To rescale this value to scores from 5 to 10, we used the proportions obtained from Crombach's Alpha (González and Pazmiño, 2015).

To determine the indicator for each factor, a rescaling was undertaken, for which the arithmetic mean of the variables or subvariables of each factor was calculated to obtain a score. The same procedure was used to calculate the global competitiveness indicator (GCI) of the chain, but using all the variables and subvariables, thus obtaining a global score that represents the global competitiveness indicator for the taro supply chain.

RESULTS AND DISCUSSION

Interviewee profile

Producers: out of 35 producers interviewed in the municipality of Actopan, Ver., two types of producers were identified: quite commercial and very commercial. The average age of the median producer was 48 years old, with 3 years of schooling; 73% men and 27% women. For the large-scale producer, the average age was 44 years, with 7 years of schooling and 100% male; they are considered large-scale producers as they generate 190 jobs per hectare. The average yield is 71 tons and an income of $393,000 per hectare; income depends on the sale price at harvest time, as this varies throughout the year.

Table 4. Traffic light evaluation scale.

Lower limit	Upper limit	Traffic light for the variable
5.0	5.9	Very unacceptable
6.0	6.9	Unacceptable
7.0	7.9	Regular
8.0	8.9	Acceptable
9.0	10.0	Very acceptable

Source: self elaborated.

Distributors: distribution of taro is carried out by a group of workers, whose age ranges between 18 and 35 years, and who collaborate directly with the production plot. The product is distributed to different packers or collection centers. Transformers and marketers: 90% have a family structure, whereas 53% are small companies, 9% are medium-sized and 18% are micro-enterprises with less than 9 employees. 45% of the properties are rented, 28% are owned and 27% are a combination of these two. Transformers market their products regionally and nationally. Traders export 80% of their product to the United States and Canada.

Analysis of the taro supply chain

The taro production chain in Actopan, Ver., appears to consist of agents who manage economic activities of intervention in the production process; from the provision of raw materials and inputs, to the transformation or preparation of the product for consumption. This means that five main stages: supply, production, distribution, transformation and marketing, are managed by different economic agents: suppliers of agricultural inputs consist of agrochemical businesses which supply agricultural inputs to local producers and those in surrounding municipalities. Agents participate in more than two links in the production chain, in order to improve integration (Figure 1).

Lee and Whang (2000), mention that greater integration in the chain enables reducing uncertainty in supply and demand, while increasing efficiency. However, the supply chain is divided. 57% represents a traditional supply chain, where decisions are made independently by the people involved in the production process and 43% is a synchronized supply chain; a chain in which all manufacturing phases of the product are synchronized. This implies, that follow-up is implemented from the moment of entry of raw materials until the arrival of the product at the warehouse as a finished product; ready for shipment or sale.

Competitiveness indicators

Results show the construction of indicators in a chain of global competitiveness; below is the indicator for each factor, which is framed by a red line with a value of 6.3. The global competitiveness indicator is relatively low; this is due to the characteristics of the different agents in the chain. The competitiveness factor indicator was higher, reaching a value of 7.0. Evidently, the factor that is negatively affecting the GCI is PM. Therefore, if strategies are used to increase the competitiveness of the PM factor, the overall indicator can be improved (Figure 3).

Moreover, the indicators for the different variables are shown with respect to the global competitiveness indicator, where apparently, the variables: distribution, prices, organizational performance and demand estimation presented an indicator of high competitiveness. Contrarily, the variables: transport, economic growth and productive capacity manifested a low level of competitiveness. Generally speaking, it seems there are only four variables that require greater endeavor in order to gain competitive advantage throughout the supply chain (Figure 4).

Source: self elaborated.
Figure 3. Interaction between factors in the taro supply chain map.

Radar charts were generated from the indicator results. Radar charts enable us to analyze the gaps between those agents that have factors with less developed capacities and those that are better positioned. The competitiveness indicators for each agent in the chain show that producers and collection centers have less developed capacities, that is, they have lower indicators than packers and processors. It was also found that in the four links of the chain, there are deficiencies in the variables: productive capacity, agility, economic growth, subsidies and flexibility (Figure 5).

This may imply a potential loss of projects for lower-level agents, as they would not have the possibility of absorbing and developing their internal capacities in the face of changes in competition and market demands. In this sense, the packers and processors are those who progress the most and who present fewer deficiencies.

As mentioned, these factors do not overall; greatly influence the competitiveness indicator of the chain, with the exception of production management, as this has greater impact on crop management methods. Young and Esqueda (2005) find that the most important or influential factors in the global supply chain, and therefore the most vulnerable, are those associated with the complexity of the distribution network, and the source or supplier of inputs.

Agility contributes to supply chain competitive advantage, and entails different aspects (market responsiveness, process integration, virtual supply chain, and network chain

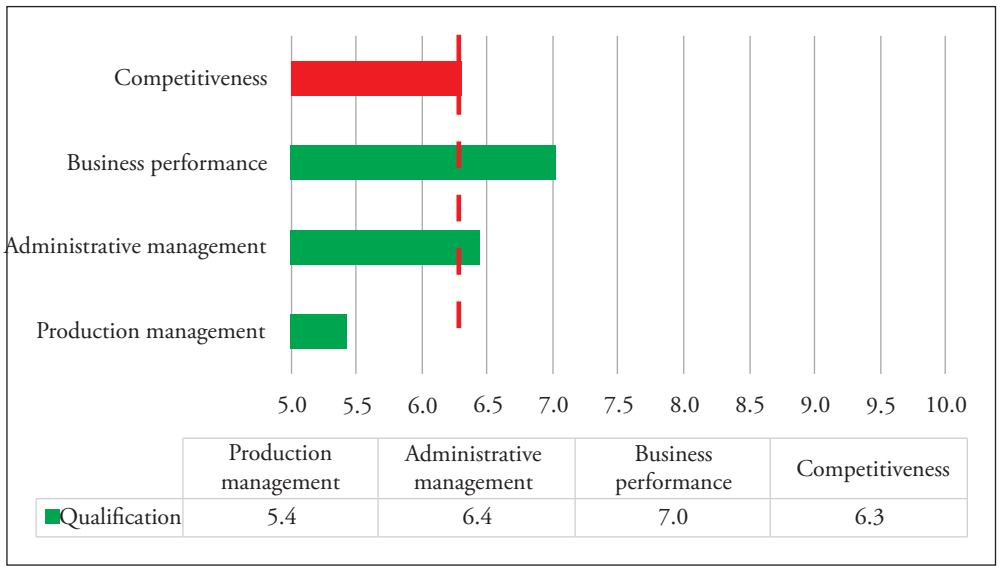


Figure 4. Global indicator of competitiveness and factors affecting the taro supply chain.

approach). Christopher (2016) points out that agility aspects in the supply chain (SC) consist of: market sensitivity, process integration and virtual CS. Agarwal *et al.*, (2006), consider flexibility as an aspect of agility, but Arana *et al.*, (2012) state that it is essential for agility.

The variables of transport, information flow and sales planning in the chain, show limited correlation with its competitiveness. However, other studies (Pacheco *et al.*, 2010) mention that the relative importance of competitiveness factors at 57.71% is customer

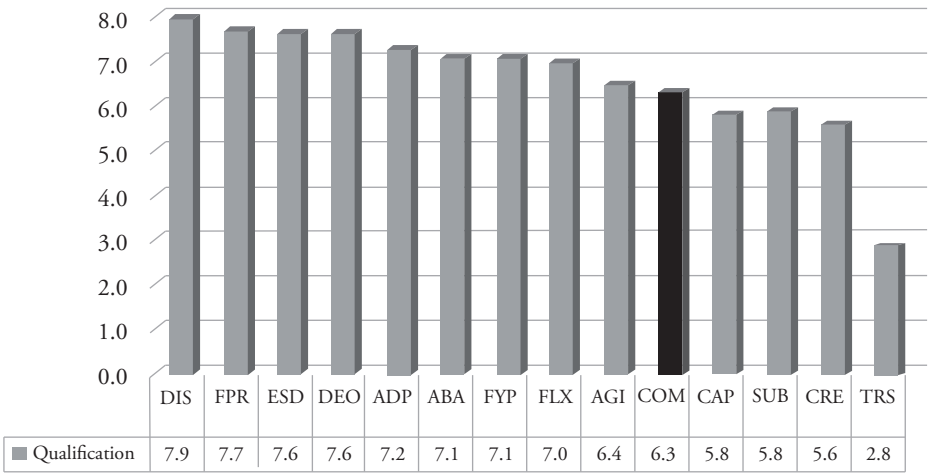


Figure 5. Global competitiveness indicators vs indicators for the variables of the taro supply chain.

relations. Salazar *et al*. (2012); Cano *et al*., (2015) and Robles-Obando, (2017) assert that transportation, information flow and sales planning, are key to gaining competitive advantage in the supply chain.

Chavarria and Sepulveda (2001) state that competitiveness must be understood from an economic point of view, while incorporating social, environmental and political elements, which are determined by the environment or by the industry as a whole, remaining beyond the company's control. Correspondingly, this disadvantage can be seen as an area of opportunity to expand commerce into new markets.

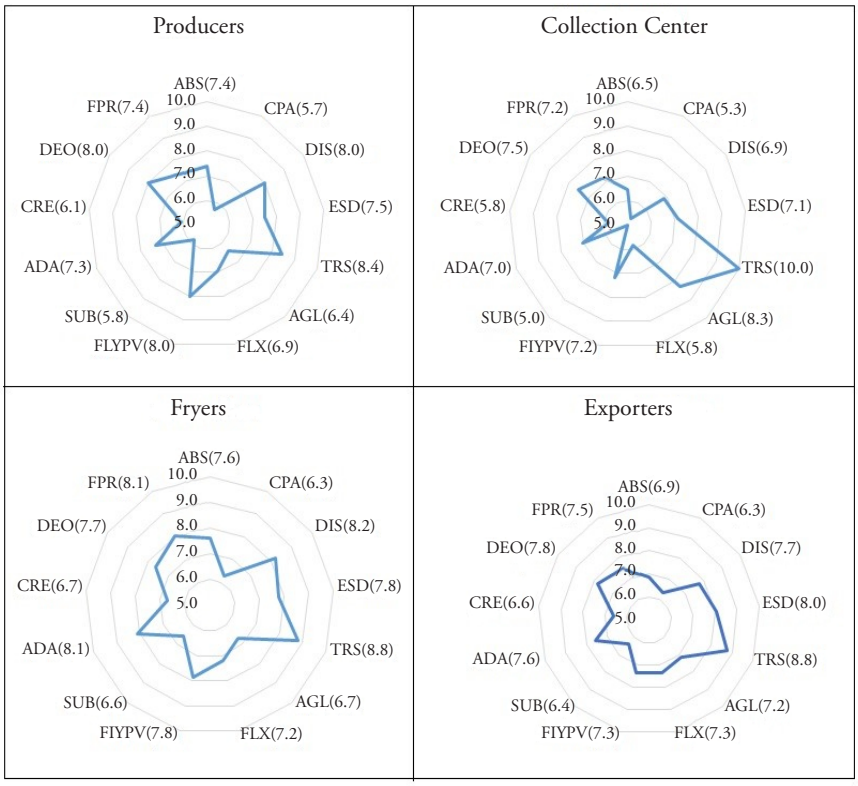
This research ascertained that the factors most affecting competitiveness are non-economic, such as production capacity, demand estimation, flexibility and sales planning. However, factors exist that cannot be controlled by the agents in the chain, such as subsidies. The main advantage of the taro supply chain lies in production capacity and disadvantage refers to dependence on a single sales market.

Factors considered competitive in the taro supply chain

Of the 47 interviewees, 68% consider that price and quality have greatest impact on the chain's competitiveness; productivity influences by 15%, order delivery time by 6% and 11% refers to technology applied, and design and variety of the product, in terms of the chain links. 50% consider that they are competitive. Concerning the first production factor of Management that of the inventory management variable contributes minimally (40%). Gutiérrez and Vidal (2008) say that for companies to maintain their competitiveness, it is necessary to control the raw materials through to the finished products, meaning the entire chain. And to be 100% aware of competitors (producers, fryers, local packers); Mexico has the conditions and competitive advantages to be the main producer and exporter of taro worldwide; however, agents in the chain have limited outlook; 67% are unaware of market changes, meaning that they do not identify customer habits and market needs. This conclusion is similar to that arrived at by Regino and Barbosa in 2016 in their study "Factors that influence competitiveness: an empirical analysis for micro and small businesses in the municipality of Guaduas". Their results indicated that 53.7% were unaware of the market or of how to implement market strategies aimed at improving the supply of products and services.

For the second Administrative Management factor, the variables that contribute positively are: firstly, a sufficient labor force of 96%; however, only half of that percentage represents trained staff and only 10% had been evaluated; secondly, the flow of information refers to the relationship between the agents involved in the chain (suppliers, producers, collectors, packers, fryers, customers). 57% of agents and partners agree on tasks and responsibilities for each area, shared risks and benefits, and also promote product information, such as variables that present risk (Figure 6).

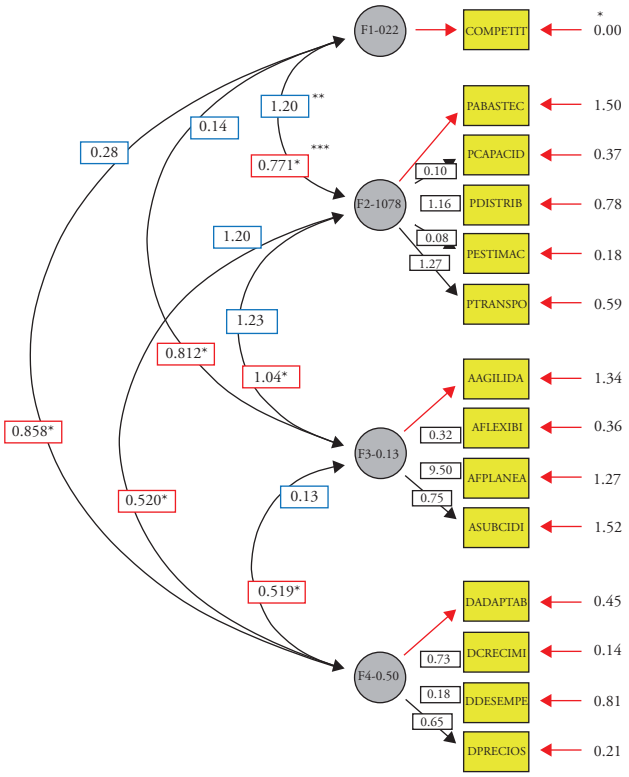
The competitiveness model for the taro supply chain in the municipality of Actopan Veracruz, examines different factors that contribute to achieving the chain's effective competitiveness. Empirical evidence concerning validity of information and the model



Abbreviations for variables in the graphs SUP: Supply; PCA: Production capacity; DIS: Distribution; DES: Demand Estimate; TRS: Transport; AGL: Agility; FLX: Flexibility; FIYPV: Flow of information and sales planning; SUB: Subsidies; ADA: Adaptability; EGR: Economic growth; OPE: Organizational Performance PRF: Price fixing.
Figure 6. Model for competitiveness factors in the taro supply chain. Self elaborated.

constitutes basic information for future research. Efficient operation of the supply chain can reduce losses (decomposition or spoilage) of fresh corms due to storage problems. Similarly, the transformation of the corms into flour might represent a more stable form of conservation (Pérez *et al*., 2000) allowing greater added value and facilitating its use in the food industry for human and animal nutrition. Relevant indications were obtained in terms of strengthening the business fabric and for competitiveness factors related to success links in the chain (Figure 7).

Identifying the key factors of competitiveness are undoubtedly important for any business in the market and trade sector. This is made up of five organizational capacities that allow the agents of the chain to supply themselves with quality inputs, production facilities and suitable measurement systems, which have effective control on the processes, maintain continuous improvement processes, ensure the shipment of products to meet customer expectations, handle non-conforming material properly and safely and, finally, carry out an internal communication process that allows the implementation of customer demands



Nomenclature of the initials of the F1 model: Competitiveness; F2: Production management; F3: Administrative management; F4: Business performance.
*Variance of independent variables; **Covariance between independent variables; ***Correlations of the independent variables.
Figure 7. Competitiveness model of the malanga supply chain.

in a timely and efficient manner. All these capacities contribute to maintaining a reliable and agile productive apparatus to respond to the demands and adaptations required by the clients' companies. Undoubtedly, the strong competition in the global market will continue and companies will have to consolidate, reorganize, restructure and reassess their capabilities and operations as a supply chain (Sánchez *et al.*, 2002; Lassar *et al.*, 2010).

CONCLUSION

It is concluded that the malanga supply chain is described by three factors and 14 variables associated with the competitiveness of each link in the chain. The agents in the chain (producers, packers, exporters and processors) have great strength to obtain high yields; a great advantage is the geographical location to distribute the product to the main importing country. However, the Agents in the chain (producers, packers, exporters and processors) are qell positioned to obtain high yields; a great advantage is the geographical location to distribute the product to importing countries. However, lack of knowledge about the

market niches to which the product is directed limits possibilities for the chain's growth and expansion. Also, the biggest weaknesses are market positioning, strategies to attract new customers, and growth by giving the product status and keeping it in the consumer's mind. Difficulty is encountered concerning access to the resources of the financial system because of their level of income. Although the global level of competitiveness enjoyed by the taro supply chain is good, it requires significant changes in various contexts, bearing in mind the different factors required to generate competitive advantage for the entire chain.

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