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## EDITOR'S LETTER

As always, we present with pleasure the new issue of the Digital Magazine of the Universidad Autónoma de Chiapas, *Espacio I+D, Innovación más Desarrollo*. We also share that, as a result of new international publishing policies and editorial trends that contemplate greater openness to online publications, we have undertaken a series of changes in favor of the visibility of our authors' collaborations. This is the result of the revision and update of the Latindex-UNAM's evaluation criteria, which has arranged the integration of new features to belong to its Catalog. Academic editors, aware of the processes of scientific communication in current journals, have as their primary mission to be involved in the dissemination of science, so that now qualify under the same criteria journals with different objectives such as research, techniques and dissemination, as it is our case. In this way, we have initiated a review and restructuring of various areas, in order to obtain the approval of this entity once again and continue with its endorsement, to guarantee the academic quality of what is published in our magazine.

In the 17th issue we put at your disposal, dear reader, documents from various institutions. First of all, from the Universidad Católica de Ecuador, the article: Practices in the handling of wood and its incidence in the artisan sector of Ambato; from the Cinvestav- Universidad Justo Sierra the article The effect of consuming *Feijoa* reduces the glucose levels in blood; from the Instituto Tecnológico Superior de Cintalapa: Statistical methodology for the decrease of variability in the cheese sector, case study: cotija cheese production in Tonalá, Chiapas. From our institution, we present the articles: The presence of crossroads in Mexican art and History of the concept of sustainable development and its construction in the current population.

Likewise, the complementary articles from the International Congress on Poverty, Migration and Development, organized by CEDES, is presented; these collaborations include: Mexican immigrant entrepreneurship in Quebec: towards a grounded theory, from the Universidad Politécnica del Golfo de México; Historical construction of inequalities: Mexicans and Anglo-Americans in California (UNACH), Migration and population dispersion in Tecpatán, Chiapas (UNACH).

The title *Comparative case study of sustainable production of fine aroma cocoa in Mesoamerica* joins the collection of e-books "Letters without paper", and in the multimedia reports section we have the collaboration of the Faculty of Architecture with the National Laboratory of housing and sustainable communities of the Conacyt. Finally, we invite you to watch the report in

Cultural breviaries about the jazz musician Hilario Sánchez del Carpio, one of the most important figures of this genre in Mexico.

We hope that the materials presented here will be useful and contribute to the projection of the UNACH, through this means of dissemination of contemporary science, culture and art.

Enjoy your reading! 📖

*"Por la conciencia de la necesidad de servir"*  
Universidad Autónoma de Chiapas

The editors



V INTERNATIONAL CONGRESS  
ON POVERTY, MIGRATION AND  
DEVELOPMENT “IN TIMES OF WALLS”



The migration of people to other territories is due to various factors such as social and economic problems, mainly, without ruling out that it also occurs due to natural disasters and even public health problems. Many studies show that migrations have a negative impact on the place of origin's development, since people leave their families helpless in the hope that upon their return, they will have economic solvency to overcome the poverty to which they are condemned; however, people return searching for work opportunities and development possibilities..

In this context, the Center for the Study of Municipal Development and Public Policies (CEDES-UNACH), since 2009 has been organizing jointly with other governmental, non-governmental and civil associations; the International Congress on Poverty, Migration and Development, which aims to provide a space for academic debate and reflection as it is known in each call about these major thematic axes.

In addition to the publication of the reports of each one of the congresses, for its fifth program, the best works were submitted to peer evaluation to be published in the University's digital magazine Espacio I + D; of which four were published in the previous issue and three more in this one. The works address topics such as inequality, autonomy and empowerment of Mexican migrants.

With this second stage of the publications in the Magazine, 70% of the 10 best works that were selected are attended; the remaining 30% will be published in the next semester once the evaluation and editing process of the last articles is finished, they will be disclosed in the framework of the Congress.

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A R T I C L E S



# PRACTICES IN THE HANDLING OF WOOD AND ITS INCIDENCE IN THE ARTISAN SECTOR OF AMBATO

—

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To quote this article:

Alvarez, A., Andocilla, J., Medina, E. y Mendez, R. (2018) Prácticas en el manejo de madera y su incidencia en el sector artesanal de Ambato. *Espacio I+D Innovación más Desarrollo*, 7 (17) 9-21. Recuperado de: [http://www.espacioimasd.unach.mx/articulos/vol.7/num17/pdf/01\\_Madera.pdf](http://www.espacioimasd.unach.mx/articulos/vol.7/num17/pdf/01_Madera.pdf)

— Abstract —

This essay introduces an examination of the artisanal sector on the good and bad practices in the use of wood and its incidence in the productive and commercial sector in the city of Ambato, Tungurahua Province. It is proposed with the objective of determining the level of knowledge in the use of wood in artisan workshops and the repercussion at environmental and commercial level within the environments of production and commercialization of products of the sector. The methodology used was exploratory, based on field research carried out in ten carpentry workshops and ten craft sales centers (informal distribution points and popular fairs). It was identified that the informal sector that works with wood, wastes a considerable percentage of the material during the productive process. This has a number of origins such as: low knowledge in the manipulation of specialized tools, lack of exhibition strategies and sale of wooden objects in craft stalls and popular fairs, deterioration by the manipulation of buyers, among others. The above shows a significant reduction in the life cycle of wooden objects and directly affects the decrease in sales of products, which has led several artisan workshops to relegate their activities of craft work by a work of intermediaries in the provision of raw material to industrial producers. This document concludes that the responsible handling of wood (good practices) represents a determining factor to raise the sales rate and the appreciation of wood crafts in the sector, also creates a friendlier sense in the use of the material that discreetly affects the decrease of the environmental impact.

**Keywords**

*Wood treatment; artisan practices; artisan sector.*

**A**rtisanal wood production is established from the emblematic traits of the identity of the city of Ambato, Ecuador. This idea became the main objective of the essay to determine the level of knowledge in the use of wood in craft workshops of the city during the process of producing a craft. This facilitates the estimate of future actions to detect malpractices in wood use, and promote strategic activities for the the artisanal wood sector development in production techniques and value addition to the artisanal products available in the market (Linares, 2015, p.7).

What was previously mentioned has an impact in the construction elements, the manufacturing process, and the manipulation of wood and its derivatives, for the artisanal objects production of different commercial value (Calderón, 2013, p.10). Calderón explains that, in Ambato out of a total of 500 artisans only 27 export thanks to the quality achieved in the manufacturing process and in the finishes of their products, good practices in the manufacturing and packaging process. In addition, in some cases, there are external agents that cannot be controlled, such as the manipulation of customers in the exhibition process that directly affects the sale of the product.

The artisans of the city of Ambato produce objects with wood and other materials, conceived from transcendental craft processes and adapted to their economic, spatial and labor skills. In this sense, Bacheschi (1980) explains that, at a product level, the craftsman has established productive and aesthetic standards, over the years with the conservation of identity features of their environment; however, as a result, a lack of management is generated of innovation and design components in the exercise of new proposals.

The manufacturing processes of artisans have generated rudimentary wood treatment methods, which is called malpractices in the process and use of tools, material and waste management, finishing alternatives and exhibition of objects, which results in the economic loss of the artisan (Pesantes, 2008). In this sense, Calderón (2013, p.10), considers it fundamental to know the material in a profound way, and to achieve the maximization in the use of resources.

The idea of diminishing handicraft sales responds to Thompson (2005): "At present, achieving full customer satisfaction is an essential requirement to gain a place in the minds of customers and, therefore, in the target market." In this sense, if the artisan does not incorporate innovation processes and shows greater interest in the handling of wood, the initial intention of selling it is hindered. This generates lower profitability, loss of confidence, little relation with the product and therefore low perception of quality.

## METHODOLOGY

The document introduces field research based on observation of wood treatment processes, interviews with producers and sellers of the artisanal sector, among other techniques. This process was defined with the purpose of carrying out an analysis of good and bad practices in the handling of wood in craft workshops in the city of Ambato. For the sample, ten carpentry workshops and ten handicraft sales centers (informal distribution points and popular fairs) were chosen around the city.

During the research process, twenty artisans were gathered, each with a minimum of five years of experience in the wood craft sector. Each artisan manufactures objects and distributes them directly at popular festivals in the city of Ambato, of which fifteen of them are affiliated to the National Board of Artisans (JNDA). (MCP, EC, 2011).

The observation and the interview for the productive sector were oriented to seven processes of the manipulation of wood: 1) the choice of raw material, 2) line drawing; 3) cut; 4) sanding; 5) assembly; 6) wood finishing; and 7) waste. It is important to mention that the data was collected in order to understand the dynamics of the wood sector, concluding that, in the choice of wood, the lines, the finishing, and the generation of waste, are those that have a high percentage of the malpractice with the material (See Table 1).

**Table 1.** Malpractices in the use and treatment of wood

Wood malpractices		
	Workshops studied	Observations
Wood selection	16	In the type of material choice, there is no compatibility between the properties of the wood with the functional and structural scope of the object. Little knowledge about properties and characteristics of wood, prior to the choice of material.
Line drawing	13	The lines are drawn with rudimentary and inaccurate tools.
Wood cut	6	Inadequate machinery is used. The tools are in poor condition. Ex. Rust and wear.
Sanding	7	The sanding work is not very thorough and deep. Apprentices have low motivation at work.
Assembly	7	Little knowledge of types of assemblies. Low quality in the assembly process, poor measurement accuracy.
Finish	14	There is no previous wood cleaning. Mix enamel with water and lacquer at the same time.

Waste	15	Residue is thrown away as waste. Lack of knowledge about the possibilities of residue reuse. They do not present norms or regulations in the processes of waste management.
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Source: Authors' making

To contextualize the above information, an analysis of the physical conditions of handicrafts sale is shown in ten selling stands of popular festivals in the city of Ambato (See Table 2).

**Table 2.** Good practices in the production and treatment of wood

Good practices on wood		
	Workshops studied	Observations
Wood selection	4	Material selection is made in relation to the productive capacity of the workshops.
Line drawing	7	In the drawing of complex lines, squares, rules, meters and compass are used.
Wood cut	14	All necessary cutting tools are considered.
Sanding	13	The type of sandpaper is selected in relation to the type of wood and finish.
Assembly	13	Assembly construction is done respecting the necessary resistance level of the object.
Finish	6	The finish is adjusted to the limitations of resources.
Waste	5	Part of waste is used for partial activities such as filler putty, small objects, among others.

Source: Authors' making

In relation to the handicrafts sale, interviews were conducted with structured questions to the wood sector sellers, to measure the level of quality of wood products for sale, including: finished in wood, presentation, among others (Mier and Porto, 2009). In that sense in the last ten years entrepreneurship has been incorporated into Ecuadorian culture with concern about the level of presentation of products for sale. However, the economic progress of woodcrafts sales has diminished due to the lack of innovation and the physical conditions of the products; this projects a visible absence of creativity of the artisans perceived by the clients. The above described causes a low constantly desire to buy and consequently the decline of craft sales in the sector, perpetuating this phenomenon for the last ten years (Parish, 2010, p.9; Sales, 2013).

**Table 3.** Physical conditions of handicrafts sale

	Stalls	Observations
Chips	7	Chip residues in crafts with finishes.
Stains like: grease, paint	5	People manipulate objects and leave traces of grease and dirt.
Low finish	8	A single wood treatment.
Broken objects	3	Visible broken parts.
Used objects	4	Returns are generated after the acquisition. The craftsman places it again for sale
Environment	10	Exposed to all types of weather conditions, rain, sun, dust, among others.

Source: Authors' making

## PRACTICES DURING THE PRODUCTION AND SALE PROCESS

The wood in the productive field must be treated under special considerations from obtaining, choosing, storage, treatment to sale. The strictness in the production process allows to guarantee a quality product, however, the workshops of the lumber sector in Ambato, due to legal-labor considerations and reduction of fixed costs<sup>1</sup>, hire young and inexperienced personnel, to which we will call in the document as a young worker, lacks technical knowledge and experience. This dynamic is developed under contract conditions for men between 17 and 20 years old with low experience in woodworking. For the purposes of the study, it is considered important because it is the factor with the highest incidence in the reduction of quality in crafts, this is asserted because the time to exercise in the innovation of products is replaced by the time of training in the trade, in addition to have unstable staff at work for short periods of time. The described causes losses of resources, economic, material, temporary and human, resulting in the lack of efficiency in the generalized wood craft workshops in the sector (Galarza Ventura, 2015).

The effectiveness in processes lies in a good manufacture from the flexing of the material, brushing, sanding and assembly for Pascha (2013), and the production process should be the ideal start to regulate planning stages, standardization and responsibility in the handling of a material (Montero

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1 This situation is far from the traditional scenario where the young worker received the apprenticeship (an individual who assumed the commitment to serve a master craftsman during a certain period of time). In addition, an obligational relationship was established where the teacher assumed the commitment to train the apprentice in such a way that, over the years, he could become an officer (qualified worker without the title of master craftsman) or teacher.

and Muñoz, 2006). The correlation in process management transcends in the maximization of benefits and the efficient use of resources, by influencing the reduction of environmental impact.

In relation to the above and following these observations, implementing action measures in craft workshops is paramount, as follows:

- Do not accumulate large amounts of wood in outdoor repositories
- Inspect the wood prior to its treatment
- Normalization of processes and procedures for apprentices.
- Basic planning of resource utilization strategies

Problems at the production level transcend the commercial environment, due to its direct impact on the presentation of crafts easily discernible by customers in the exhibition. A good exposure of the product allows raising the attention rate of people and therefore facilitates the sales process (González, 1979, Murrilo, 2014). At present it is easier to promote the exhibition of products through online media and social networks, where artisanal stalls are replaced entirely on public roads, but it causes the client to lose interaction with the object. In this sense, to rescue the handicraft sale process, the following should be considered:

- Organization of products by color, size, gender, theme, use or target
- Propose creative ways of organizing products
- Encourage cordiality with the seller
- Make the identity of the city visible in the product

The success of a product is based on efficiency through low costs and high productivity, effectiveness through reliable and fast delivery, high and consistent quality, and flexibility through the rapid introduction of new products and a wide variety of services derived from the purchase. In this sense, productivity is the result of the interaction between the desired product (in quantity and quality) and the factors that affect it such as labor, capital, materials and energy, made visible in its purchase (Galarza, 2015).

## RESULTS

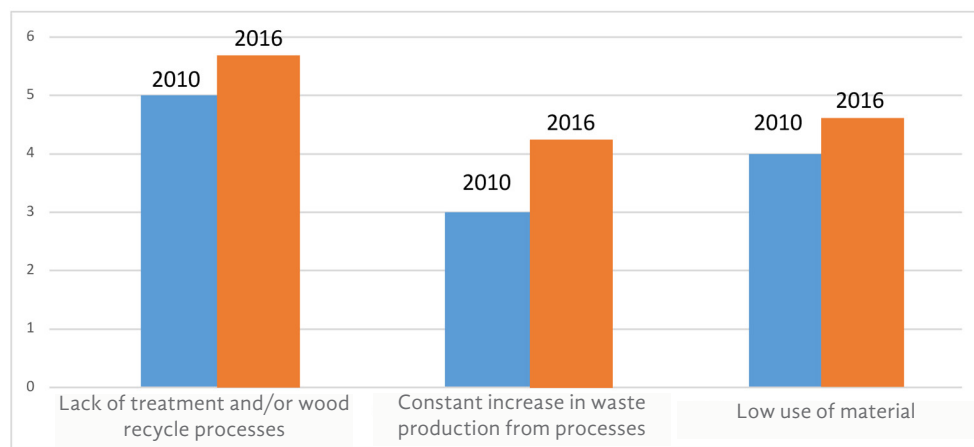
The bad practices regarding the handling of wood in craft processes originate from the lack of knowledge of technical parameters in the handling of the material during all the phases, a finding derived from the inexperience of the young workers described in the previous section. This phenomenon causes economic and environmental impacts, defined below:

Rating of importance:

- (1) Very slight
- (2) Not important
- (3) Moderately important
- (4) Important
- (5) Very important

In relation to production processes, it is estimated that the aforementioned problems (choice of wood, line layout, cutting, finishing and waste) affect the increase in production costs significantly. Furthermore, this situation has an impact on the amount of production, sales volume and size of the workshops and limits their capacity to face the market as visible signs of innovation and quality.

**Figure 1.** Environmental Impact



Source: Authors' making

On the other hand, the absence of wood treatment and/or recycling processes is considered to be the most important procedure, since artisan workshops lack wood treatment processes and other materials associated with their production processes. It also causes a gradual increase in waste, becoming in complex repositories hard to control. In this sense it is revealed that 50% of wood waste is permanently discarded and the other 50% becomes repositories of raw material exposed to the environment that, for an extended time, could cause economic and health damages in the workers of the craft workshops.



Regarding the know-how<sup>2</sup> treatment for waste optimization, it was found that young workers do not have the necessary knowledge to practice the profession; which generates damage to materials, loss of time, money and tools damages. In addition it was determined that younger craftsmen have little knowledge of methods and techniques for the production of objects, and their sale. This finding is considered important due to the high turnover of apprentices in the workshops. In 90% of the workshops studied, the new craftsmen are employed with a projection to one year of work, which is considered to be a very short time to learn and master wood treatment techniques in an effective way (France, Tapia and Yela, 2013). This assertion impacts on the productive process, use of resources, use of tools and machinery, among others, which means that the craftsman does not reach a considerable level of improvement of techniques for the use of wood, which results in the reduction of the quality and value of craftsmanship in the Ambato workshops.

This is relevant for the study and confirms the established by Valverde (2010, p.7), who states that, for the production process it is necessary to know how to use the wood according to its type and properties. Also know the needs and conditions of the object to be built, exposure to weather and sustainable treatment measures.

Thus, the most latent problems occur in the first place, 45% are largely unaware of the properties of the wood giving rise to poor quality products, easily breaking products, low aesthetic level, all this leading to the reduction of its sale price. Secondly, 32% of wood products produce chips and imperfections. In third place, 45% have stains from the use and manipulation of customers, 45% have bad finishes and presentation, which generates low attraction in the purchase process. On the other hand, in fourth place, during the process 50% does not use measurement tools to draw lines; this produces bad cuts and directly affects waste. Finally, having rotating young workers makes it difficult to teach wood handling and treatment techniques, distancing themselves from establishing regulations and work protocols that lead to efficient practices in the workshops.

In relation to the aforementioned, the income from the sale of wood crafts, has presented a decline in Ambato, extending the dynamics to consumption

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2 It refers to the way technology and knowledge transfer concerning the efficient treatment of waste.

throughout the country, which transcends even more important aspects such as: the sense of belonging and local identity of the city of Ambato.

In relation to crafts, 80% of craft stalls in fairs are outdoors, prone to noise, theft and severe climate changes, which directly affect the crafts' quality and physical presentation. Also, transport is a factor that directly affects the product, so, for the commercialization of the same, the artisans transport with little care and safety standards that guarantee the optimal conditions of the crafts.

Given the above, under these basic, environmental, economic and commercial indicators, addressed in the document, it is essential to place more emphasis on good and malpractices regarding handicrafts in the timber sector because of their projection at the local and national levels.

## CONCLUSION

A panoramic vision of the artisanal wood sector has been exposed, its current situation, causes of the decline in sales, the use of wood and commercialization, factors that cause an impact on the economy of wood crafts in the city of Ambato. Malpractices in the productive stage and the lack of knowledge are factors that determine the quality of the product, which causes an acceleration of its useful life.

In general, 56% of artisan workshops that use wood for the manufacture of their products create malpractices both in the production and sale of wood crafts. This, in a broader sense, describes the wood craft sector as a potential agent that generates environmental impact and does not promote the recovery of wood within the planning of productive processes. Consequently, the artisan workshops of the city of Ambato do not acquire responsibility of the wood's manipulation in any phase of its life cycle.

The findings of the study show that the production of wood objects deserves more attention and an impulse of innovation through the design and good management of the tools that allow the development of products with higher quality. Thus, the wood artisanal sector is not an example of good practices in wood handling, considering this sector as the one with the highest wood handling in the city of Ambato. Concluding that, the artisans still preserve rudimentary techniques that do not maximize the use of wood and this is reflected in the most latent problems described throughout the document, which highlights the productive and commercial reality of the artisanal sector, which needs a prompt intervention in the city.

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# THE EFFECT OF CONSUMING *FEIJOA* *REDUCES* THE GLUCOSE LEVELS IN BLOOD

—

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— Abstract —

In this work we show that the effect of consuming Feijoa reduces the glucose levels in blood on wistar rats. For the experimental part, we prepare these rats constrain them to consume sugar in liquid solution. Normally, the glucose level in blood for these rats is around  $85 \pm 5$  mg/dL. After consuming this liquid solution during three weeks their glucose level raised to 150 mg/dL. Later, for other three weeks they were constrained to consume feijoa juice. Every week of consuming this juice we controled the glucose levels in blood finding it was reduced to 80 mg/dL by the third week, and even less, to  $65 \pm 4$  mg/dL. These results show that drinking feijoa juice helps to reduce the glucose level in blood.

### Keywords

*Feijoa, glucose; wistar rats.*

The feijoa is scientifically known as *Acca sellowiana*, it is a fruit native from the tropical and subtropical zones of South America, particularly in some areas of Brazil. It is also commercially available in some European countries whose suppliers are New Zealand, Israel and France. On the other hand, in the American continent it is usually cultivated in Uruguay, Colombia, the United States, Argentina and Mexico, as well as Brazil. This fruit is similar to guava, it has a spherical shape with a length of 5 to 8 centimeters and an approximate weight of 30gr. This fruit is matured in autumn (see figure 1) (Giuseppe Y Corrado, 2004).

**Image 1.** Ripe Feijoa.



To date, not all the components of this fruit are known. However, Shaw and colleagues showed that in the peel of the feijoa, there is a substance called pectin, which, when consumed, helps control blood pressure; this brings benefits for those patients who suffer from hypertension (increase in blood pressure). It has also been reported that pectin helps lower blood cholesterol levels (Shaw, Allen and Yates, 1990).

The feijoa pulp has been used in rejuvenating creams helping to delay the appearance of wrinkles and, applied to the hair, helps to keep it hydrated. On the other hand, the feijoa contains high levels of chlorophyll in its shell which, together with the amino acid arginine present in the pulp, stimulates the growth of the children who consume it. It is also high in vitamin C, making it an excellent natural anti-flu (Motohashi, Kawase, Shirataki, 2000, Vuotto *et al.*, 2000, Bontempo *et al.*, 2007, Nakashima, 2001).

In those people who have trouble sleeping, the consumption of feijoa juice helps them to stabilize the normal sleep cycle. In addition, it helps to improve mood, reduce fatigue, reduce irritability and can help prevent depression (Motohashi, Kawase and Shirataki, 2000, Vuotto *et al.*, 2000, Bontempo *et al.*, 2007; Nakashima, 2001).

**Image 2.** Feijoa pulp with high nutritional benefits.



For all the reported benefits that the feijoa presents in the nutritional status of the human being along with the little information that is available about its effects on patients suffering from diabetes mellitus (high blood sugar levels) in our laboratory, we decided to investigate as a main target if the feijoa juice helps reduce blood glucose levels.

## METHODS

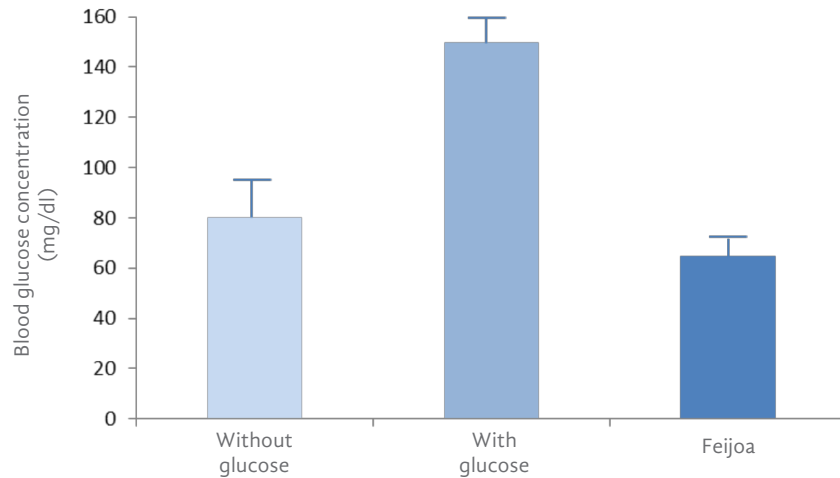
The present study is of experimental type with a longitudinal temporal frequency. Wistar rats were used, which were treated to raise their blood glucose levels by consuming a solution with high glucose content daily for three weeks. Under normal conditions, the rats had glucose levels between 80 to 90 mg/dL, this will serve as a control. In our experimental phase, we used four rats that raised their glucose level in the three weeks to 150 mg/dL. These rats, once removing the food to increase their blood glucose level, were subsequently given the feijoa juice for three weeks.

## RESULTS

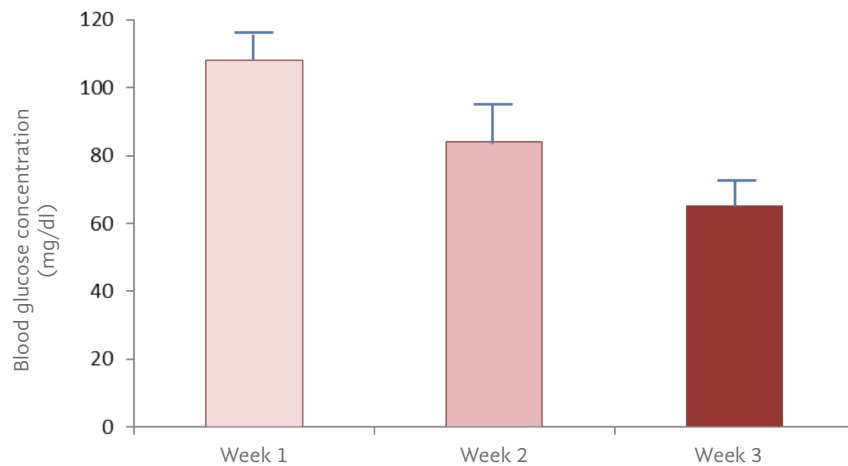
The blood glucose levels of the rats that consumed the solution with high glucose content were monitored week by week. Before starting the glucose solution they had blood glucose levels of  $85 \pm 5$  mg/dL and as the weeks progressed the blood glucose levels increased until reaching an average

concentration of 150mg/dL. Subsequently, by removing the solution with high glucose content, the rats were given feijoa juice for 3 weeks and their blood glucose levels were being evaluated. These results can be seen in image 3. It was observed how it was decreasing every week, until the last week where glucose levels were  $65 \pm 4$  mg/dL, that is, at normal levels (see Image 4).

**Image 3.** Feijoa reduces blood glucose levels in rats with high glucose levels.



**Image 4.** Temporary course of blood glucose reduction in Wistar rats with high glucose levels that consumed Feijoa for three weeks.





## DISCUSSION AND CONCLUSIONS

The feijoa is a fruit with many health benefits. The potent antimicrobial and antifungal activity has been reported, for example the Vuotto team and collaborators demonstrated that Feijoa has helped to reduce the *Helicobacter pylori* levels, bacteria responsible for gastrointestinal diseases (Vuotto *et al.*, 2000). The Bontempo team and collaborators in 2007 showed that Feijoa extract has anti-carcinogenic properties. More recent studies report the nephroprotective effect produced by the feijoa extract (Karami *et al.*, 2014). However, no information has been found on the effect of feijoa on blood glucose levels, which is why our team was interested in this topic. This work is the first to demonstrate that the daily consumption of feijoa juice helps reduce the blood glucose levels of Wistar rats. With these favorable results, our plan is, in the near future, to generate diabetic rats and see if the daily consumption of feijoa juice (during a month) helps to reduce blood glucose levels that are usually elevated. It is also desired to know which chemical component of the feijoa is responsible for the hypoglycaemic effect (decrease in blood glucose).

In our country we have a great variety of fruits and vegetables of which we do not know about their existence and we still do not know the great nutritional benefits they can provide us. We have heard many times in different media that *Diabetes Mellitus* is the main disease that affects the Mexican population and that some of the complications of this disease is kidney failure (decreased kidney function). In an investigation, the team Karami and collaborators showed the nephroprotective effect produced by the feijoa; therefore, the consumption of this fruit could help diabetic patients. The contribution that our team is making is to show data that prove the benefits that feijoa can have in reducing blood glucose levels in the Mexican diabetic population.

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# THE PRESENCE OF CROSSROADS IN MEXICAN ART

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— Abstract—

The idea of crossroads appears quite frequently in Mexican art, and, though a fairly universal symbol, within the context of the country's artistic expression it takes on its own particular features. The present work is part of a project concerning the presence of crossroads in Mexican art, and deals with a number of works of considerable artistic value, viz. the sculpture of Coatlicue, as interpreted by Justino Fernández; the Popol Vuh; the Memorial de Sololá; the novel *Pedro Páramo* by Juan Rulfo; various songs by José Alfredo Jiménez, among other works of Mexican artistic expression. Although the Popol Vuh and Memorial de Sololá were made in what is currently the country of Guatemala, they share the vision of the Mayan cultures of Mexico.

**Keywords**

*Crossroads; Mesoamérica; Mexican art; Coatlicue.*

**N***etzahualcoyotl* wrote, in the fifteenth century, that "from four to four we men, / we will all have to leave, [...]. / Like a painting / we will be erased (José Luis Martínez, 1984, p.203). The poet of Texcoco seems to indicate in these verses that the man is a continuous loss; however, like flowers, it is beautiful in its transience; life presents a hole where you walk towards your twin sister: death; the four indicates their confluence, the embrace of its borders.

At the crossroads the protagonists arrive at the threshold of disappearance; it is said that *La Llorona Mexicana* –whose legend takes root in the *Cihuacoatl*, the snake-woman– left her son *Mixcoatl* at a crossroads, to which she frequently returns to mourn for her offspring lost, "but in that place she only finds a sacrificial knife", says Yólotl González Torres (1995: 38-39). Fray Francisco Ximénez (1999, p.140) points out that one of the rites of the indigenous people of Guatemala took place at crossroads:

If the children were already big, they went together to the skirts of the mountains, and if there were none, at the crossroads (*at these crossroads they had and still have many superstitions, as it is said*)<sup>1</sup> and there the parents began to sacrifice themselves and draw blood from many parts of their body with stones and knives and taught the children to do the same.

Allen J. Christenson, in his commentary on the *Popol Vuh*, (2012, note 176) affirms that, among the Mayans, the crossroads were considered dangerous "because they are focal points of the hidden powers that can come from any direction". Christenson also says that Fray Francisco Ximénez "wrote that the ancient k'iche' ceremonially gathered the sins of the entire community and abandoned them at a crossroads".

*Tezcatlipoca*, one of the most enigmatic deities of the Nahuatl world, represented fate, walked in heaven, on earth and in hell; he materialized to men as a ghost, shapeless mass or gray shadow. Westheim (1985, p.14) notes that Mexicans erected stone seats "at the crossroads, the place of uncertainty, where the traveler doubts which road to take."

Justino Fernández (1959) showed that the sculpture of *Coatlícue*, the most important work of the Mesoamerican indigenous history, corresponds to a

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1 Italics are from the author.

fundamentally cruciform structure, if one looks at it from front to back; and pyramidal, if it is observed laterally. The configuration of this goddess figures the worldview of the Aztec society and of the other Mesoamerican groups.

Fernández observes that the fundamental components of this divinity refer to the symbolic and religious numbers of two and four; two basic structures, two claws, two feather hangings, two leather hangings, two snakes per belt, two skulls, two arms, two snakes per hands, two breasts, two snakes per head, and two faces. Its fundamental structures have four parts: the cross with its four directions, four parts make up the pyramidal structure, four the front claws, four eyes on top of the claws, four eagle or snake heads partially cover the arms, four bracelets, four parts form the front flaps of the bracelets, four hands on the collar in front and four hearts, four hands on the shoulders and back and two more hearts, four fangs on each side have the serpents of the big head, with four eyes on the two faces, and all the tongues of the serpents are bifid, so they become four in the heads of hanging snakes of the belt, four in the serpents that make of hands and four in which they act as heads; four are the large feathers on the leather hangings. The number five appears in the elements of the necklace, because at the center and in front the four hands and the four hearts finish in the hanging skull.

Justino Fernández says that *Coatlicue* objectifies a religious, cosmic, mythical, magical and poetic conception of the Aztec people as heir of old traditions of the indigenous cultures that preceded it, that absorbed and enriched with their own creations; its structure obeys a primordial, mythical order, by means of which men must have felt certain security before chaos. Four were the main gods, sons of the dual principle, male and female, who resided in *Omeyocan*, place 2, and who had by name *Ometecuhtli*, Two lord, and *Omecíhuatl*, Two lady. The four children of the divine and indivisible couple were: *Tezcatlipoca*, represented by the black color and corresponding to the North; *Huitzilopochtli* or *Tezcatlipoca* blue, which belonged to the South; *Tezcatlipoca* red, also *Xipe* or *Camaxtle*, of the East direction, and *Quetzalcóatl* or *Tezcatlipoca* white, of the West. On the other hand, the divine principle or couple represented the central direction, up and down, heaven and earth. Four times the world and man had been created, four suns too, and four cataclysms that had ended with everything; the fifth sun was being inhabited, the fifth world, destined to perish by tremor or earthquake. This dynamic conception of the world and of man, of creation and destruction, gave existence an inflexible sense of expiration, of death, but also of constant resurgence.

A central feature of the human skull that the *Coatlicue* carries lies, according to Justino Fernández, in which it is represented alive; its place in the navel of the goddess refers to the most central and deepest of the Earth.

The author of *Estética del arte mexicano* states that for Mesoamericans the world was built on a cross, on the crossroads that lead from East to West and from North to South. The cross was the symbol of the world as a whole. But these roads had a dynamic sense towards the unknown: the mystery, because the center also meant the crossing of the high and the low, which was the fifth direction, thus completing the dynamic conception of space: the pyramidal form of ascent and descent, which goes from the bottom of the earth, the world of the dead, to the highest site: *Omeyocan*.

Justino Fernández concludes by affirming that *Coatlicue* is alive because of its artistic expressiveness and tragic beauty; it is not a relic of our past, but its presence is a source of suggestions that moves our aesthetic, historical, vital and mortal interests.

Rubén Bonifaz Nuño (1995, pp. 19-31) finds in the Olmec culture the origin of the quincunx or cross of San Andrés, that abounds in the Mesoamerican plastic, which, under the different forms of its representation (points, crossed or linked bands, square with circle and interior quadrants, vanes with varied centers, and others) have received from the scholars different interpretations; however, there is, until today, no clear theoretical explanation for them. In search of such clarification, and based on an ancient text whose truth is proven by an abundance of images created in different times and places of pre-Hispanic culture, he presents a hypothesis: the five points of the quincunx symbolize the creative power applied to the matter of the creation, as well as its evolutionary development. The quincunx is a symbol of the precious, of heaven and earth: these are the immediate fruit of the supreme act of power; it is a symbol of the world's space, because space is the area that acquires its full meaning when it is populated with the created; it is its movement: creation is not a static fact, but a permanent process; it is a symbol of this same process: it represents, in its central point, the present time, and in the rest, the existence of the times that preceded it.

The quincunx thus understood, adds Bonifaz Nuño, acquires the fullness of its meaning in the images where it is related to the snakes and the human being; those represent the gods qualified for creation; the last one, the entity that gave them the impulse and provided them with the necessary material to carry it out. Man is a condition without which the universe would not exist; he is the irreplaceable mean of its preservation and its development.

The author of *El cercado cósmico* refers to a myth whose interpretation clarifies and establishes the meaning of the quincunx. "It is the text contained in the *Histoyre du Mechique*, irreplaceable as the key to understanding the original values of our ancient culture." Here's the story:

Some others say that the earth was created this way: two gods, Çalcoatl and Tezcatlipuca, brought the goddess of the earth Atlalteutli from the heavens below. Which was full in all the joints of eyes and mouths, with which she bit like a wild beast; and before they had lowered her, there was already water, which they do not know who created it, on which this goddess walked. When the gods saw this, they said: "There is a need to make the earth." And saying this, they exchanged the two in two great serpents, of which one grabbed the goddess from the right hand to the left foot, another from the left hand to the right foot, and oppressed her so much that they made her break by the half, and from one half to the shoulders they made the earth, and the other half they took it to heaven.

For Bonifaz Nuño, the text exposes the development of universal creation. Its elements are four: a previous meeting of waters without a known creator, two gods that change into snakes and a human form. "Changed in serpents, the gods-opposed divine principles of creation- come to this form, whose sight made them feel the need to create, and in that human form, of their own body, they make the earth and the sky." In the moment of the union of the divine serpents with the human form, the creative power of the versal sum is integrated. That moment is represented in the Mesoamerican culture by the image of the entity called *Tláloc* by the Nahuas, and whose representation has its origin in the Olmecs. But, after that moment, the creation took place.

Imagine says Bonifaz Nuño, now the moment where both gods, changed into big snakes, are put to the creative task: one of them grabs the human form of the right hand to the left foot; the other, in reverse, from the left hand to the right foot. In doing so, they necessarily mark five points: those corresponding to the limbs, hands and feet of the human form, and the central one, that which their ophidian bodies engender when they cross one over the other. A point in the center; another four indicating the angles of an ideal surface: there is the quincunx or also called cross of San Andrés. Those five points represent the power of the gods that, applied to the human form, will create the universe. They are, in this way, signs of the cosmogony action.

Bonifaz Nuño, based on the study of iconographic and textual relations, says the quincunx was invented by the Olmecs in order to express their fundamental



conceptions of man and the world, they were transmitted, keeping their original meanings, to the fields and centuries of multiple manifestations of Mesoamerican culture.

The meaning of these crosses was not completely buried in the past; it often appears in rituals masked with the symbol of the Christian cross. Currently, various rituals in Chiapas are about crossroads; in Tuxtla Gutiérrez there is still a dance whose steps trace crosses. The Dance Master of Zoque Stewardship, Víctor Manuel Velázquez López, tells the symbolism of two "carnival dances", which refer to certain Nahua myths about the creation of the sun and the moon and also to the *Popol Vuh*:

Not only the dance of San Roque carries crosses; for example the Carnival dance alludes to the four points; a standing cross is danced; that is the sky, the moon, the sun and below is the *Jocoshto* or the underworld. It is danced towards the sunrise and towards the sunset; the crest, or the character that wears it, should bow to the four points, not to the cardinals, but to the four sacred points; although we do the dance for the virgins, there are other points; they are the goddesses; then we have to bow before them, as a greeting; and it is how the *Yomo-Etzé* is formed to later perform the dance of *Napapok-Etzé* or Carnival; an allusion is made to the celestial bodies and the underworld, the *Jocoshto*, as old people used to say, that's what they called him, the bad lord and that he was down. The *Yomo-Etzé* is the fertility dance; previously all the dancers wore a hat on their heads; but due to the course of time, people stopped doing it, and it was lost until only the dance lady wears the hat; she is the one who also makes and carries the crest and marks those points: towards the front, towards the back and towards both sides, she together with the crest. As this festival is the largest in Tuxtla, the two dances are joined; first the dance of the women is given and later the dance of the Carnival. They dance from January 30th to February 2nd, and from there they dance again in union until October 14th and 23th. That of the *Yomo-Etzé* makes the turn in the opposite direction of the hands of the clock; in the middle there is a small house where irrigated land, corn, banana and other plants are planted; at the end of the twelfth, the old ladies of Carnival and the dancers of the *Yomo-Etzé* run and acquire one of these products; we call it "*La robadera*", it is sacred; when the virgins are already seated, we can plant them in the yards to have good harvests. It was named Dance of Carnival so that it could subsist to the European conquest, but this dance alludes to time, the sun and the moon. The girl, who is the moon, carries four mirrors which represent the four lunar phases, and the crest is the sun; they both play a fundamental role in dance, from its beginning to its end. The music starts early in the morning and ends in the afternoon, at sunset. They tell that these women, "the Old ones", are

the dead ones in childbirth that gave birth to a warrior son; and the squiggles are to defend the sun and the moon as they pass through the underworld. The world is here but they are transcending all the time; when they arrive at night, they help them to emerge so that they can subsist again during the day, the afternoon and again the sunset. Men dress as women because they refer to those women warriors.<sup>2</sup>

Jacques Soustelle (2012, pp. 164-166) says that the center is the contact point of the four spaces, of our world and of the afterlife, the crossroad par excellence; the *Cihuateteo* and *Tezcatlipoca* appear at night at the crossroads. Every crossroad is an ambiguous, dangerous and disturbing point, where diverse influences come to collide, where the conjunctures of appearances can relax for a moment to make room for the extraordinary and the horrible that lies hidden behind what we see. The world is constituted on a cross, on the crossing of the roads. Soustelle considers that the cross and the cruciform signs among the *Tarahumaras* refer to that past, also among the Indians who have become Christianized and in the non-Christians.

The rites conjured up the chaos of the world, allowed the communities to maintain their unity, to not disorient the path of their existence. Many Mexicans, who participated in armed movements, such as the Mexican Revolution or the Cristero movement, did so under the symbolism of the cross with their apparently Christian sense and left the mark of it in various songs such as "The stone bed":

The day where they kill me  
 let it be of five shots  
 and to be near you  
 so I can die in your arms.  
 Instead of a box I want a zarape;  
 instead of a cross, my double cartridge belt,  
 and let it be written on my grave  
 my last goodbye with a thousand bullets.

The lyrical subject of "The stone bed", longs to leave with "five bullets" and that his grave has "instead of a cross" his "double cartridge belt", with which he risked his life; that is to say, as in the poem of *Netzahualcóyotl*, it goes

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2 See Antonio Durán Ruiz (2017, pp.71-72)

with the four and the five, the magic numbers of the deep Mexico. In the mural "Dream of a Sunday Afternoon in Alameda Park" by Diego Rivera, the belt buckle of the Catrina sports the *Nahuiollin* sign, which represents the sun with the four cosmic directions and its center. This sign is, then, on the navel of the Catrina, in the place of being and non-being.

Juan Rulfo (1997, p.877) spoke about the deep thought, relative to the cross, among contemporary Tzeltal Mayans, during a talk, in March 1974, with students of the Central University of Venezuela:

In Tenexapa<sup>3</sup> they have, like all towns of that zone, many crosses. They have some in front of the church; they have others in all the roads that enter the town. And always, when leaving or entering, they kneel, they cross themselves and I do not know how many things they say to the cross. And one says: "Man, how religious are these people! Aren't they?" Then I knew, because I asked one of the principals, a butler who was bilingual: "Hey, why are the indigenous people so devoted here? I see that any crosses they find, they kneel before it and begin to pray." -" No- he says-, they do not pray. The crosses are the doors of the roads; they ask the cross to open to let them pass, because if they don't do it the cross does not let them in or leave the town. But they do not pray, they do not know how to pray."

The crosses are the doors of the roads, from there the paths of man start and there they converge. The butler offers flashing revelations because the words that the Tzeltals speak to the crosses, like the poetic substance of which José Gorostiza spoke, is magical and opens the interior roads.

Crossroads also play a central role in the songs of one of Mexico's most popular composers, José Alfredo Jiménez (2002, p.91); there they appear referred to with number four:

There are four roads in my life,  
which of the four will be the best?  
You who saw me cry of anguish,  
tell me, dove, which one should I go to.

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3 Rulfo talks about the *tzeltal* town of Tenejapa, Chiapas

The question posed in this verse by the lyrical subject is similar to the query that the protagonists of the *Popol Vuh* (p.54) make the four paths in their journey to the *Xibalba*, the world of the gods of death. In light of the travelers' question, the black road says: "I am the one you should take because I am the way of the Lord".

Another José Alfredo Jiménez' song (2000, p.92) says:

Buy me a drink or I shall buy you one,  
we need to talk about our matters.  
We won't get drunk,  
we'll just take four drinks

Four glasses suppose for the Mexican the trip towards a situation where reason or modesty do not act but, often, the suppressed yearnings; the lyrical subject formulates the invitation to leave the world of reasons and conventions to arrive at a place of loving freedom, beyond reason and the oppressive laws of this world.

In the *Popol Vuh*, the twin gods *Hun Hunhpú* and *Vucub Hunahpú* roam the places that lead to the realm of death: steep stairs, banks of a river that runs between the *Nuziván Cul* and *Cuziván* ravines, a river that advances between thorny *jícaros*, riverside of a river of blood, a river of water and a river of *podre*, the region inhabited by the *Molay* birds and, finally, the crossroads of four roads. The couples take, finally, the course of the black road.

A substrate of this is present in the novel *Pedro Páramo* by Juan Rulfo (2007); Juan Preciado's path to *Comala* is similar to that of the dead who go to *Mictlán* and the mythological heroes of the *Popol Vuh* towards *Xibalba*. Juan Preciado meets with the muleteer Abundio at a crossroads: "I had run into him at *Los Encuentros*, where several roads cross. I was there waiting, until at last this man appeared "(page 67).

In "*Los Encuentros*" the loss begins; the protagonist arrives at a labyrinthine time and space. *Comala* is at the same time the navel of the world, the place where the four roads come together, the cosmic crossroads and, at the same time, the deep human crossroads with its burdens of loneliness and anguish.

The crossroads of contemporary Mexican art, except in certain popular expressions, generally present the crossroads in the negative sense, as a rootlessness of life, as doors that open to throw them into wastelands.

In the pre-Hispanic world, it is observed that the march to the underworld is also towards the rebirth. In *Pedro Páramo*, however, death is sterile. Abundio is already dead when he meets Juan Preciado and heads to another crossroad: "I go further, where you see the work of the hills. There I have my house"<sup>4</sup> (p. 71). Abundio lives in the navel of loneliness, in the middle of nowhere, where it cannot be reached.

*Comala* refers to the mythical *Tulán*, from where the Nahuas and the *Cakchiquels* are said to proceed. In *Memorial de Sololá* (1980, page 48) it is said: "From four [places] the people came to *Tulán*. In the east there is a *Tulán*; another in *Xibalbay*; another in the west, from there we arrived, from the west; and another where is God. Therefore there were four *Tulans*, oh our children!"

The Tula "where is God" and the Tula of "*Xibalbay*" belong to the domains of heaven and the underworld. In *Pedro Páramo*, the following dialogue is given between Juan Preciado and Donis' sister:

-[...]. How does one leave here?

-Where to?

-Anywhere

-There are plenty of roads. There is one that goes to Contla; other one that comes from there; another one that goes straight to the mountain range. That one that can be seen from here, that I don't know where it leads to- and he pointed me with his fingers the hollow of the roof, where the roof has cracked-. (p.110)

Rulfo's characters wander, with their uninhabited faith, in search for redemption, but they are far from the world and from themselves. Juan Rulfo presents that Mexico that Octavio Paz (2008, p.423) observes so alive, deeply traditional, tied to its roots and rich in legendary antiquity.

I believe that the authentic history of a society has to do not only with explicit ideas but above all with implicit beliefs [...] Beliefs live in deeper layers of the soul and therefore change much less than ideas [...] What interested me in the case of Mexico was to trace certain buried beliefs.

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4 Gerald Martin, in his commentary on *Men of Maize*, by Miguel Ángel Asturias (1981, pp. 429-430, note 424), offers an explanation of the confluence of the hills: "The hills that come together [...]. Sahagun tells us that when a man or a woman died in ancient Mexico, they wrapped the deceased with blankets and papers and with some material goods, and told him the following: 'See here you must cross between two mountains ranges that are meeting each other' [...]. The same beliefs persist among the current chortís of Guatemala. "

Who seems to interpret pictorially the inner reality of the Rulfian characters, especially women, is the picture "Tata Jesus Christ" by Francisco Goitia; Why this title? What do these women look at? What makes them suffer? Paul Westheim (1985, p.12) gave the answer: "They are crying tears for our race, our sorrows and our tears, different from that of the others. All the anguish of Mexico is in them." These women seem to represent Christ at the moment of feeling abandoned by God.

The crossroads symbolize the man structured by a fundamental flaw; according to Lacan's theory, there is a trace, a mark of the lack where a subject is born. When the subject is born, something constitutive remains in the dark and will pulsate in the pain of existing. The constitutive lack of the subject opens a vacuum that is not filled; this opening constitutes the errata in the heart of the being that, as it is observed in several poems of Rosario Castellanos, marks the distance with the unit and, simultaneously, its longing.

Emptiness assumes, according to Jacques Lacan (2009, p.807), the existence of the lost object, and is the cause of nostalgia for death. Life crackles over death yearning for lost and remembered unity at the level of Platonic reminiscence. The subject, as the subject of the fault, is also the solitude: "This because the signifier as such, by crossing out the subject, of first intention, has brought into it the meaning of death. (The letter kills, but we learn this from the letter itself). This is why every drive is a virtual death drive."

In the Mexican literature field, the poetry of Rosario Castellanos (2004, p.19) expresses the sensation of that metaphysical abandonment: "Always abandoned. From what? From who? From where? / It does not matter. We are just abandoned." Fullness is impossible. The fundamental flaw is not filled, it turns the man into a clepsydra where the sand of death drips and causes the pain to exist. The lack is alive: "The death drive, says Jacques Lacan (2004, p.53), is but to realize that life is improbable and completely expired."

In the lyrics of Rosario Castellanos, the man appears faint and lost in his own labyrinth, essentially unknown and ghostlike by time, in permanent state of perishing: "[...] is animal of solitudes, / deer with an arrow in the flank / that flees and bleeds" (p 177). By the constitutive ripping, man is also a crossword puzzle with errors; he is at the crossroads of roads. Life is the error in the crossword because there is no unity, something has failed, and something does not fit, as expressed in the poem "Valium 10":

Sometimes (and don't try  
to diminish its importance

saying that it does not happen often)  
your measurement stick breaks,  
your compass goes missing  
and you do not understand anything.  
[...]

And you have the embarrassing feeling  
that in the crossword an error slipped  
that makes it unsolvable.

Death lives killing us as it appears in *Death without end* by José Gorostiza.  
At the center of the cross, the man walks between heaven and earth, existence  
is put into a trance of life and death.

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STATISTICAL METHODOLOGY FOR  
THE DECREASE OF VARIABILITY IN  
THE CHEESE SECTOR, CASE STUDY:  
COTIJA CHEESE PRODUCTION IN  
TONALÁ, CHIAPAS

—

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— Abstract—

A company from Chiapas focused on the production of Cotija cheese was monitored in its production process by analyzing the variability for 5 quality characteristics: grams of calcium, grams of antibac, grams of rennet, kilograms of salt, and milligrams of water. The basis of the study was the implementation of a methodology that includes basic statistical tools such as the Ishikawa diagram, the verification sheets, the control charts for individual measurements and mobile ranges, the histograms and capacity indexes for processes with double capacity specification (potential and real). No indicators were detected for the process control, work based on empirical knowledge and no standardization of the process. Indicators were generated and it was obtained that the productive process works with common causes of variation, although with levels of potential capacity below 0.11. With the implemented actions, it was possible to control the variability of the Cotija cheese process obtaining levels of potential capacity above 1.30.

**Keywords**

*ndividual control charts, capacity indexes, process control.*

Statistics are vital in the control and monitoring of processes, and in the improvement and innovation of quality, since it is made up of a set of techniques and concepts oriented to the collection and analysis of data, taking into account the variation in them. Statistical techniques are of great importance in all types of companies and in a great diversity of situations. For example, they are useful for: Identify where, how, when and how often problems occur (statistical regularity).

The data coming from the key business guides must be analyzed, in order to identify the sources of variability, in addition to analyzing their stability and forecasting their performance in order to quickly, promptly, and at a low cost detect abnormalities in the processes.

This is in the pursuit of objectivity in planning and decision making, avoiding phrases such as "I feel", "I believe", "my experience" and the abuse of power in decision making. For this reason, the facts should be expressed in the form of data and objectively evaluate the impact of improvement actions; in addition to focusing on the vital facts; that is, in the really important problems and causes. Analyze in a logical, systematic and tidy way the search for improvements.

The quality of a product depends a lot on the variability. Variability limits are established, this to avoid defects or differences between one product and another. So we could conclude that "the less variability we will have a better quality in the product or service offered". Quality is a predictable degree of uniformity and reliability at low cost and adequate to market needs, so improving quality is reducing variability (Deming, W. Edwards).

In large companies the use of statistical tools for the control of variability is common. However, for small and medium-sized companies in the cheese sector, the development of their productive activities is carried out empirically, without a systematic measurement or documentation of the processes. Therefore, the variation of its processes affects the quality of the final product and the competitiveness of the companies.

The case study presents a methodological proposal based on statistical tools applied in a cheese company located in the municipality of Tonalá, Chiapas. This methodology is intended to include statistical thinking to control the variability of the process in small and medium-sized companies in the Chiapas sector of the cheese industry.

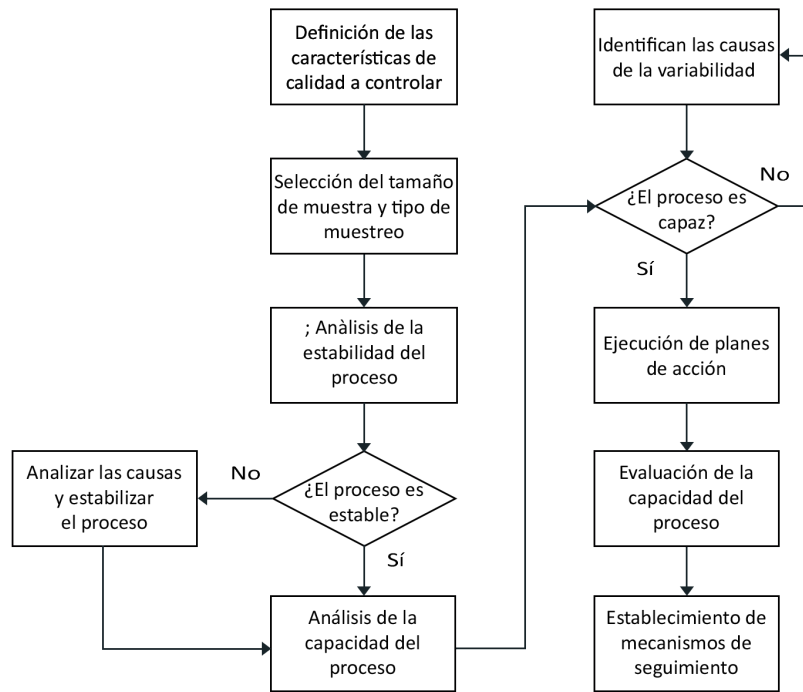
## WORK METHOD

The statistical methodology used is based on the following steps:

1. Definition of the quality characteristics to be controlled
2. Selection of sample size and type of sampling
3. Analysis of the process stability by means of an individual control chart
4. Analysis of the process capacity
5. Analysis of the variability causes
6. Execution of action plans
7. Evaluation of the process capacity
8. Monitoring mechanisms

The statistical methodology requires the definition of the quality characteristics to be controlled, which will be continuous (step 1). The sampling will be probabilistic with a finite population and randomly (step 2). The analysis of the process stability will be carried out by means of the control charts for individual measurements (step 3), if the process is not stable, the analysis of the special causes of variation will proceed, otherwise the analysis will continue. The capacity analysis of the process will be carried out by means of the potential process capacity index and graphically by histograms (step 4). If the process is not capable, the causes will be analyzed (step 5); otherwise the action plans will be implemented to reduce the variability of the process (step 6). The effectiveness of the action plans will be evaluated through a new analysis of the capacity of the process (step 7). Finally, the monitoring mechanisms will be established to ensure control of the process variability (step 8). See Figure 1.

**Image 1.** Statistical methodology for the project



### DEFINITION OF QUALITY CHARACTERISTICS TO CONTROL

Five continuous quality characteristics were defined for the control of the production process (table 1).

**Table 1.** Process indicators for Cotija Cheese

Number	Quality feature	Indicator (per tub)	Unit of measurement
1	Salt	Quantity of salt used in the Cotija Cheese process	Kilograms
2	Antibac	Quantity of granulated antibac used in the Cotija Cheese process	Grams
3	Granulated Calcium	Quantity of granulated calcium used in the Cotija Cheese process	Grams
4	Rennet	Rennet quantity needed to set the milk	Milliliters
5		Quantity of water used to blend the antibac	Milliliters
6	Water	Quantity of water used to blend the calcium	Milliliters
7		Quantity of water used to blend the rennet	Milliliters

## SELECTION OF SAMPLE SIZE AND TYPE OF SAMPLING

A confidence level of 85% was used, considering a finite population of 112 production tubs per week (formula 1).

Formula for finite sample:

$$n = \frac{N * Z_{\alpha}^2 * p * q}{i^2 * (N - 1) + Z_{\alpha}^2 * p * q} = 16$$

Formula 1

We used a systematic random probabilistic sampling considering a weekly production day. This selection procedure is very useful and involves choosing within a population N, for this case 112 tubs, a number n of elements, 16 samples, from a K interval (Sampieri, 2005) (formula 2).

$$K = \frac{N}{n} = 7$$

Formula 2

## ANALYSIS OF THE PROCESS STABILITY BY MEANS OF AN INDIVIDUAL CONTROL CHART

Sixteen vats were sampled per week, recording, for each 7 tubs produced, the data for the quality characteristics. The individual control charts were implemented for the process analysis of the average and the mobile range chart to study their variability. According to Montgomery (2009) the control letters specialize in studying the variability over time to improve processes through three basic activities: stabilizing processes, improving the process itself, reducing variation due to common causes and monitoring the process to ensure that improvements are maintained and to detect additional opportunities for improvement.

The limits of the individual chart (formula 3) and those of the chart of mobile ranges (formula 4) were built.

$$LCS = \bar{X} + 3 \frac{\overline{Rm}}{d_2} \quad LCI = \bar{X} - 3 \frac{\overline{Rm}}{d_2}$$

Formaula 3

$$LCS_{Rm} = D_4 \overline{Rm} \quad LCI_{Rm} = D_3 \overline{Rm}$$

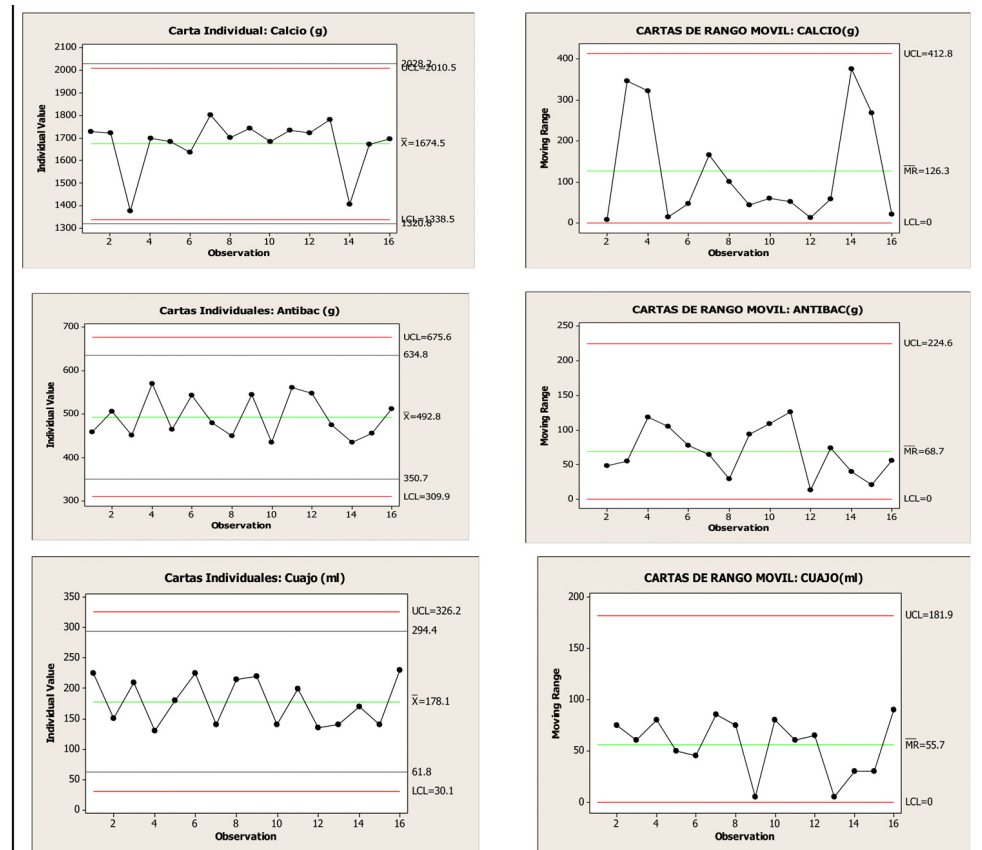
Formula 4

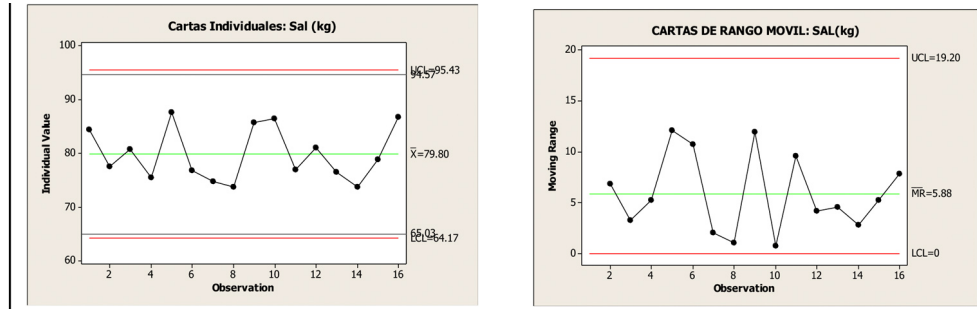
Figure 2 shows that, for the quality characteristic Calcium (gr), samples 3 and 14 tend toward the lower control limit without exceeding them and there is no apparent pattern in the behavior of the mean of the data which tends to 1674.5 grams. Regarding the letter R, no pattern is observed in the mobile ranges so it is concluded that the process is stable.

For the quality feature Antibac (gr), most of the means are detected in zone c of the individual card, with the exception of sample 4 that occupies zone B, with a tendency towards 492.8 grams. Regarding the mobile ranges, they do not show any special behavior, so it is concluded that the process is stable.

According to the individual's chart, the data for the quality characteristic of the rennet (ml) tends to an average of 178.1 milliliters and have very little variability. The process is stable.

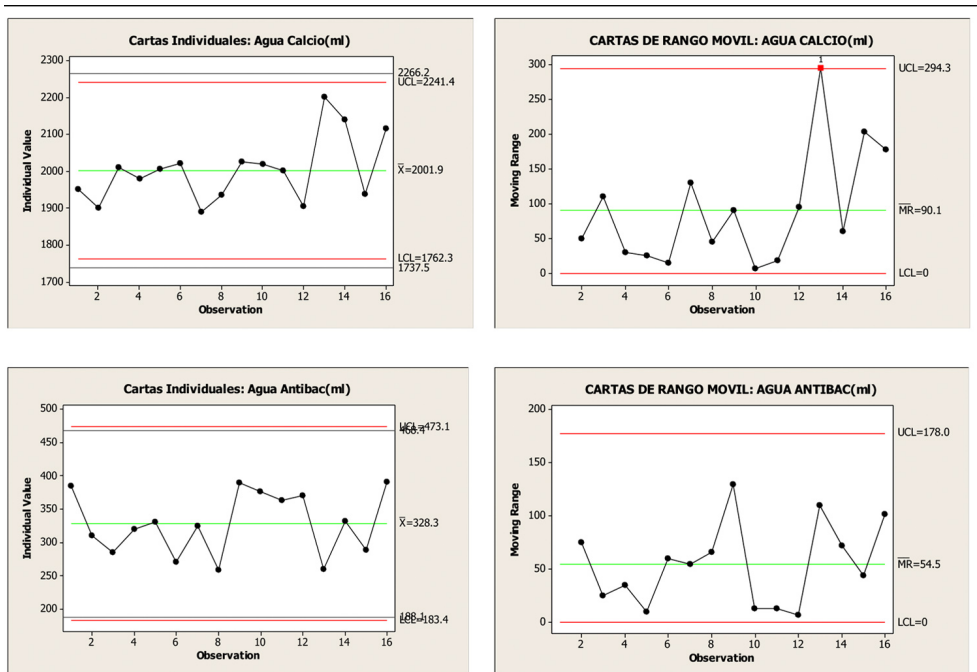
**Figure 2.** Control charts for individual and mobile ranges for the indicators: Calcium, Antibac, Rennet and Salt of the Cotija cheese process



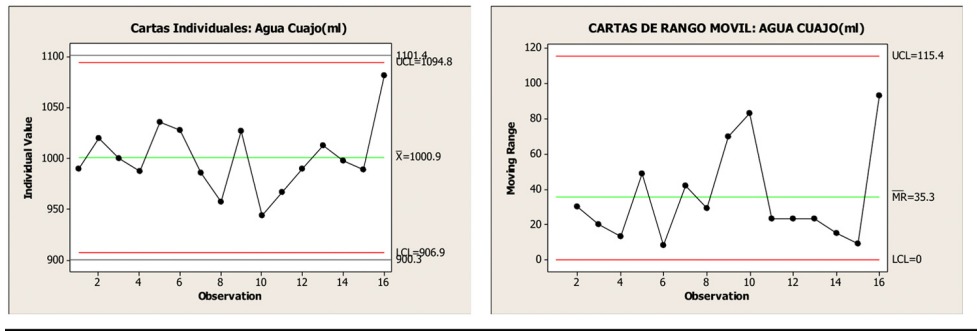


Finally, for the indicator Water for calcium, Water for Antibac and Water for rennet, a behavior without special standards for the average and a coincident point over the upper control limit is observed in the case of the range for the characteristic Water for Calcium. For this output variable, the process is considered stable (Figure 3).

**Figure 3.** Control charts for individual and mobile ranges for the Water indicator of the cotija cheese process







### ANALYSIS OF THE PROCESS CAPACITY THROUGH CAPACITY INDEXES

Analyzing the capacity or ability of a process consists of knowing the amplitude of the natural variation of the process for a given quality characteristic (Gutiérrez Pulido and Román de la Vara, 2009); the capacity indexes are analyzed, which, as the name implies, are specialized measurements in evaluating capacity.

The capacity analysis of the process has been implemented with the calculation of capacity indicators and with histograms.

Once the control charts have been implemented and the process stability analyzed, the values of the Cp, Cpi and Cps Indices of the Indicators to study the capacity of the process are presented in Table 2.

**Table 2.** Capacity indicators for the Cotija cheese process

Capacity of the process indicators	Calcium (g)	Antibac (g)	Rennet (ml)	Salt (kg)	Water (ml)		
					Antibac	Calcium	Rennet
Cp	0.056544	0.105583	0.085982	0.10157	0.03568	0.0189	0.09944
Cpi	0.040994	0.1601342	0.0698609	0.18980	0.03746	0.0260	0.10814
Cps	0.07209	0.051031	0.102104	0.0133	0.0339	0.011	0.09074

As for the indicators for calcium, rennet, water for antibac, water for calcium and water for rennet, we have:

**Cp ≤ 0.67**, means that it is not suitable for the job and requires very serious modifications.

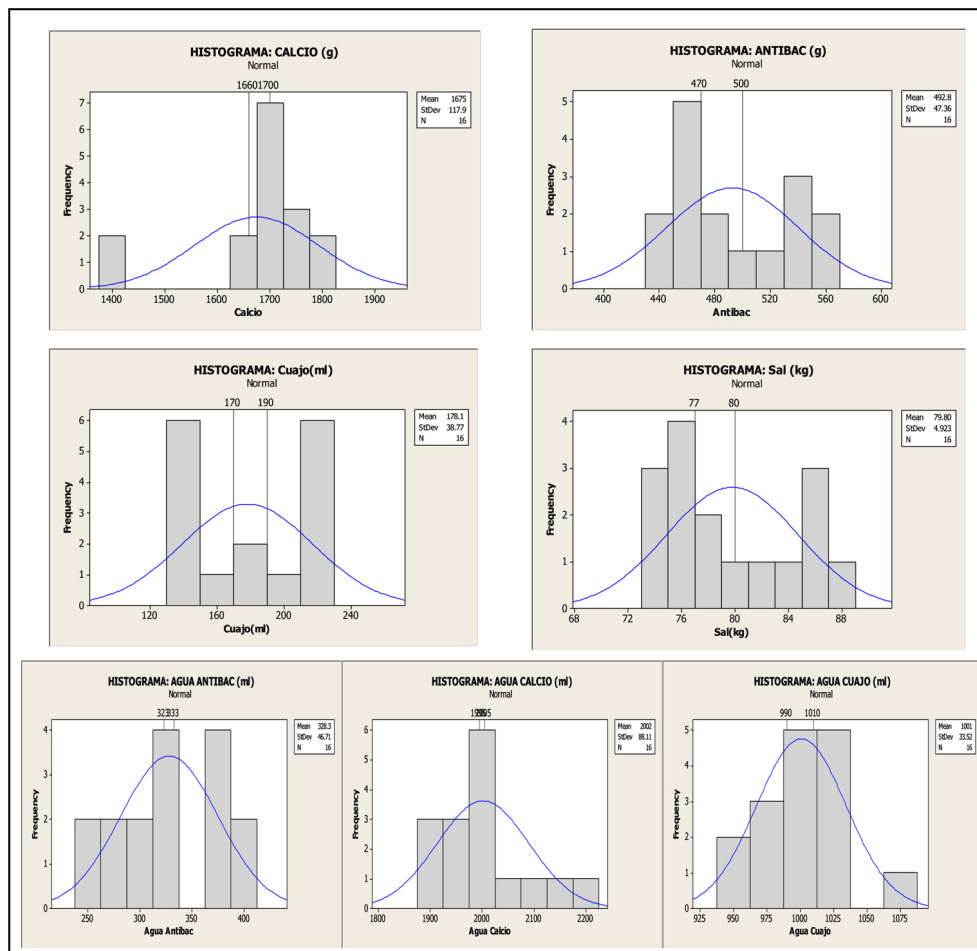
**Cpi**, and **Cps < 1.25**. It is suitable for the process

As for the indicators for the antibac and salt, we have:  $1 < Cp < 1.33$  It is partially adequate and requires strict control.  $Cpi$ , and  $Cps < 1.25$  is suitable for the process.

### ANALYSIS OF THE PROCESS CAPACITY THROUGH HISTOGRAMS

According to the histograms built for each of the indicators: Calcium, Antibac, Rennet, Salt, and Water do not meet specifications, so the process is stable but not capable (Figure 4). Regarding the behavior of the data, normal behaviors are not observed for any of the indicators.

**Figure 4.** Histograms for the indicators: Calcium, Antibac, Rennet, Salt and Water



For calcium, a behavior of rare or atypical data is observed because one class appears isolated from the rest and there is a standard deviation of 117.9, which indicates a lot of variation.

For the antibac two fashions are appraised that show two different central tendencies. Regarding the variation, there is a standard deviation of 47.36, indicating a wide variation in the data.

For the rennet it can be observed, in the same way, two peaks showing two realities for these data. The standard deviation is 38.77; the data exceeds the specification limits.

For salt, two central tendencies are identified, similar behavior for antibac and rennet. The standard deviation is 79.80, the limits of specification exceeding the data.

Finally, for the antibac and rennet water, histograms with atypical data are shown, because two and one bars appear away from the rest of the classes. The data, for both histograms, exceeds the specification limits. For the calcium water, a skewed behavior towards the left is observed, with a standard deviation of 88.11, which indicates a high variation in the data.

#### ANALYSIS OF THE VARIABILITY CAUSES

The causes associated with the behavior of the data are the following (Montgomery, 2009):

- Rare or atypical data:

The data is incorrect, either due to measurement, registration or "finger" error. The measurement was made on an article that is not part of the process. If the two previous situations are discarded, the measurement is due to a rare or special event.

- Bimodal distribution;

Significant differences from lot to lot in the raw material, due to different suppliers or excess variation of a supplier.

When in the process several operators intervene with different criteria or work methods.

The measurements of the output variable were made by different people or instruments, therefore, different criteria or poorly calibrated instruments were used.

- Skewed distribution:

In general terms, a bias in the output variable reflects the gradual displacement of a process due to wear or maladjustments, and it may indicate vitiated procedures in the way of obtaining the measurements.

For the analysis of the variability causes of the Cotija cheese flavor, a cause-effect analysis was used by means of the 6M method, involving a team of 6 people between the person in charge of the production area, operators, in charge of the reception of the raw material and store manager, the main causes being the following (figure 5):

- Associated with rare or atypical data:

Lack of responsibility of the workers (they carry out the activities quickly in order to leave before their workday, some workers work more than others).

- Associated with a bimodal distribution:

The salt used is not the same in all the tubs (they use cans of 20 liters, measurements are not done correctly, they have more filled tubs than others and in some occasions a greater amount of salt is added because the workers do not remove the serum entirely).

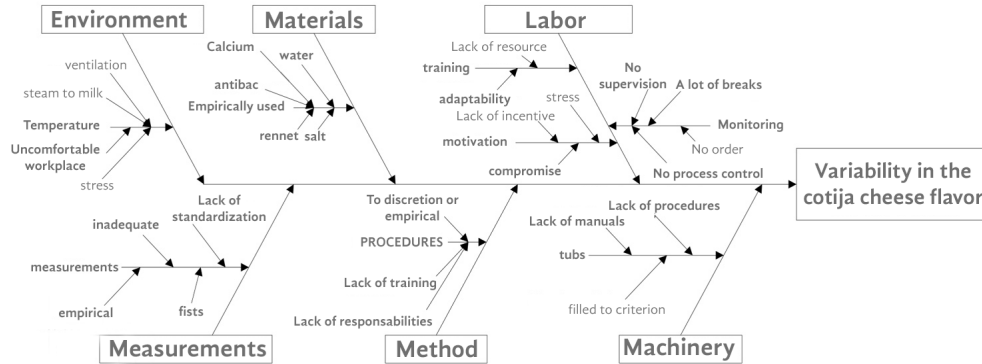
No standard measures are used in the preparation of the ingredients. They have been based solely on experience and using the method of scoring (fists to measure the antibac, a "cup" for calcium and the lid of a bottle to measure the amount of rennet needed).

Lack of units of measurements to make the most accurate measurements.  
Lack of production indicators. Lack of a process standardization.

- Associated with a skewed distribution

Lack of a procedure manual

**Figure 5.** Analysis of the variability in cheeses through the 6 M's



### MEASURES TO REDUCE AND CONTROL THE VARIABILITY OF THE COTIJA CHEESE PROCESS THROUGH THE INDICATORS USED

The measures implemented to improve the capacity of the process are linked to the materials, methods and labor of the Cotija cheese process. The use of the following materials has been implemented:

- Scale from 1 to 5000 grams. It will serve to weigh the Calcium and the granulated Antibac.
- 500 ml test tube. It will be used to measure the amount of liquid rennet to be used.
- A 3000 ml beaker. It will be used to measure the quantity of water used to prepare the mixture of Calcium, Antibac and Rennet.
- Stainless steel table. It will be used to place the materials.
- 500 and 2000 gram containers. It will be used to deposit antibac and calcium to be weighed.

A new work method was implemented with the participation of the labor that interferes in the process, the new method was tested, the method was standardized and the implemented was followed up.

Once the new materials were defined, ranges were implemented for the 5 indicators of the process, which are in table 3.

**Table 3.** Ranges for each of the 5 indicators of the Cotija cheese process

N°	Indicator	Unit of measurement	Quantity in ranges
1	Quantity of salt used in the Cotija Cheese process	Kilograms	2000 liters= [80- 77] 1600 liters= [64- 62]
2	Quantity of granulated antibac used in the Cotija Cheese process	Grams	2000 liters= [470 – 500] 1600 liters= [376-400]

3	Quantity of granulated calcium used in the Cotija Cheese process	Grams	2000 liters= [1660-1700] 1600 liters= [1328-1360]
4	Rennet quantity needed to set the milk	Milliliters	2000 liters= [170 – 190] 1600 liters= [136-152]
5	Quantity of water used to blend the antibac	Milliliters	2000 liters= [323-333] 1600 liters= [259-266]
6	Quantity of water used to blend the calcium	Milliliters	2000 liters= [1995-2005] 1600 liters= [1596-1604]
7	Quantity of water used to blend the rennet	Milliliters	2000 liters= [990-1010] 1600 liters= [792-808]

After the implementation of the new materials and the application of the ranges, each one of the 5 indicators has been sampled again (Table 4) with the purpose of carrying out the new analysis of the capacity of the process.

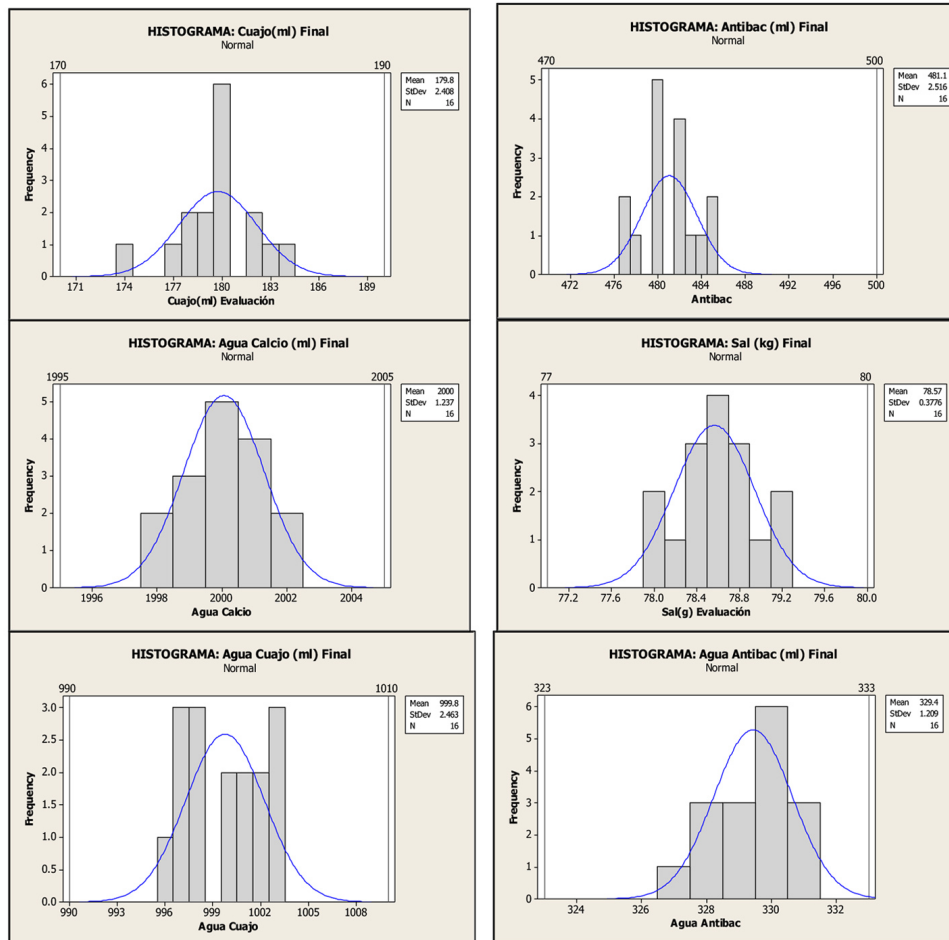
**Table 4.** Results of the 5 indicators of the process after the implementation of improvements

N°	Calcium (g)	Antibac (g)	Rennet (ml)	Salt (kg)	Water (ml)		
					Antibac	Calcium	Rennet
DESVEST. M	4.94637 915	2.51578 351	2.40831 892	0.37761 974	1.20933866	1.23659479	2.46306043
MEDIA	1682.75	481.062	179.75	78.568	329.437	2000.06	999.75
LES	1700	500	190	80	333	2005	1010
LEI	1660	470	170	77	323	1995	990
Cp	1.34778	1.98745	1.38409	1.32408	1.37816	1.34778	1.35332
Cpi	1.53310	1.46574	1.34948	1.38410	1.77438	1.36463	1.31949
Cps	1.16246	2.50915	1.41869	1.26405	0.98194	1.33093	0.33629

## IMPLEMENTATION OF IMPROVEMENTS

According to the histograms applied after the implementation of the new measures, a capable process is observed for each of the indicators studied. The standard deviation for the rennet is 2.4, for the Antibac it is 2.516, for the salt it is 0.377, which shows a decrease in the process' variability and, for the case of the indicators Calcium and Salt, a normal behavior is observed (Figure 6).

**Figure 6.** Analysis of the process capacity by histograms, after the implementation of improvements



Once the improvements have been implemented and their results measured, it is important to standardize the process, which was carried out through the implementation of a procedures manual. Tables 5 and 6 show the results of the follow-up to the actions carried out, which evaluate:

- A. Existence of indicators in the process.
- B. Existence of personnel responsible for each area of the process.
- C. Existence of control mechanisms for the variability of the process.
- D. Statistical control of the process, without variability to special causes.
- E. Standardized and documented process.
- F. Compliance with the manual for the elaboration of Cotija Cheese.

**Table 5.** Monitoring: reception of raw material, quality of milk and elaboration of Cotija cheese

Criteria	PRODUCTION AREA																				
	Reception of Raw Material							Milk quality analysis							Cotija cheese production						
	No			Yes				No			Yes				No			Yes			
	Scale																				
	Unfulfilled	Fulfilled with deficiency	Fulfilled with dissatisfaction	Not completely fulfilled	Acceptably fulfilled	Fulfilled to a high degree	Completely fulfilled	Unfulfilled	Fulfilled with deficiency	Fulfilled with dissatisfaction	Not completely fulfilled	Acceptably fulfilled	Fulfilled to a high degree	Completely fulfilled	Unfulfilled	Fulfilled with deficiency	Fulfilled with dissatisfaction	Not completely fulfilled	Acceptably fulfilled	Fulfilled to a high degree	Completely fulfilled
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
A						x							x								x
B							x							x							x
C								x						x							x
D								x						x							x
E								x						x							x
F								x						x							x

**Table 6.** Monitoring: Molded and pressed, unpressed and unmolded and stored

Criteria	PRODUCTION AREA																				
	Molded and pressed							Unpressed and unmolded							Stored						
	No			Yes				No			Yes				No			Yes			
	Scale																				
	Unfulfilled	Fulfilled with deficiency	Fulfilled with dissatisfaction	Not completely fulfilled	Acceptably fulfilled	Fulfilled to a high degree	Completely fulfilled	Unfulfilled	Fulfilled with deficiency	Fulfilled with dissatisfaction	Not completely fulfilled	Acceptably fulfilled	Fulfilled to a high degree	Completely fulfilled	Unfulfilled	Fulfilled with deficiency	Fulfilled with dissatisfaction	Not completely fulfilled	Acceptably fulfilled	Fulfilled to a high degree	Completely fulfilled
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
A						x							x								x
B							x							x						x	
C								x						x							x
D								x						x							x
E								x						x							x
F							x							x							x



## FINAL COMMENTS

In the case of the study, the activities carried out in the transformation of the product were analyzed in detail through observation, measurement, monitoring and documentation, defining production indicators and variables to be controlled.

The proposed methodology is focused on small and medium-sized companies in the cheese sector with the purpose of incorporating statistical tools to control the variability of their processes. Statistical thinking, although widely used in large companies mainly in the manufacturing sector, is used very little in the cheese industry and almost unknown by MSMES. It is sought with the proposed methodology that control and decision making is done with less uncertainty to ensure the quality of the final product and thus improve the competitiveness of companies in this sector.

The active participation of the staff and the commitment of the management are vital for the achievement of favorable results during the application of the methodology.

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# HISTORY OF THE CONCEPT OF SUSTAINABLE DEVELOPMENT AND ITS CONSTRUCTION IN THE CURRENT POPULATION

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— *Abstract* —

Speaking of development, we necessarily refer to the analysis of the impact of human activities on natural resources, which from its concept involves the use of natural elements for the development of the populations in a capitalist system. In the present study, it is aimed at analyzing the concept of sustainable development, since perceptions of the current population, a population of high biological diversity and low human development index. First of all, a historical transit of the origin and evolution of the sustainable development concept and further way will develop the perceptions of the current population, specifically the case of San Cristóbal de las Casas, Chiapas. We will look back into the 18th and 19th centuries with pronouncements in favor of environmental stewardship for the assurance of the food and the development of the populations. An analysis of the essence of the concept and the current construction of this by the population of a city later addressed media, multicultural, with low index of human development and wide biological diversity. Within the results, shows that the construction of the sustainable development concept by the population studied, regardless of gender, age, and level of schooling, is related to the care for the environment and the majority fails to articulate a definition. While it is true that conceptual constructions have to do with the socioeconomic context, political, ideological, and environmental, true that in the case of Chiapas is also, and for the period in which it has conducted this study, the position is paradoxical. Chiapas has an important environmental richness and total risk of extermination.

### Keywords

*Sustainable development, construction of the concept in current population.*

The impact of human activities on natural resources, which from its concept implies the use of natural elements for the development of populations in a capitalist system, led us to search for concepts that involve a series of factors of interest in the conservation and optimal use of them.

From this moment it is necessary to state that the concepts sustainable development and sustained development, have the same origin and the same meaning within the economy, ecology and development, can and are used interchangeably to refer to the maintenance of development by itself, due to that social, economic and environmental conditions allow it.

To speak of the interest for environmental care is to refer to the eighteenth and nineteenth century, with pronouncements in favor of environmental care for the assurance of food and the development of populations. The origins of the Sustainable Development concept can be found in the analyzes expressed by Malthus in 1798, which was restricted to the ability of the land to produce food to meet the needs of the growing population (Cavalcanti, 2000; Díaz, 2004); despite these projective analyzes, they did not avoid the chaotic environmental consequences of the Industrial Revolution (second half of the eighteenth century and part of the nineteenth century) and that are becoming more acute today.

It was not until the twentieth century that the interest and scientific discussion of the environmental impact of human activities was again rescued, as well as the planning of a new development mechanism that would ensure the environmental well-being of current and future populations. Despite these initiatives, it was not possible to have a foresight and measure the problems of development that would be considered chaotic for the next century.

Rachel Carson, biologist and writer of the twentieth century, started a movement in the United States of North America based on her studies on damages caused by pesticide and herbicide uses. Her writings, for example *Silent Spring*, demonstrated the serious damage caused by this activity and were the focus of attention and criticism generating waves of opposition, mainly from the industrialists and the government for obvious reasons (Carson, 1962). Because of this position, Carson was accused of being a communist; but her book generated an impressive environmental movement giving unity and coherence to the birth of a popular conscience.

Characters like Carson made history thanks to the publication of their studies and reasoning; such is the case of the British researcher James Lovelock, who presented the Gaia hypothesis, "The earth is a living being capable

of generating its own habitat"; "Gaia is a complex entity that includes the entire biosphere, atmosphere, oceans and Earth. It constitutes in its entirety a system that feeds itself and seeks an optimal physical and chemical environment for life "(Lovelock, 2008).

For 1968, the discussion was resumed by the Roma Club, made up of politicians, intellectuals and scientists concerned with solving world problems, who discussed and analyzed problems related to the limits of economic growth and the extensive use of natural resources. From these discussions was written the book entitled *The limits to growth*, Meadows and Meadows, which exposed both the limits of growth and the depletion of natural resources (Naredo, 2000).

Now it was between the 1970s and the 1980s that the concept of sustainable development began to be outlined, as a result of regulations, reports, events and international pronouncements, and a global opening to the exposition of reasons as to why the search for models of development that will take care of the environment, resources and services.

1. Earth Day, April 22, 1970, as an initiative of Senator Gaylord Nelson; whose objective was to raise awareness in the United States of North America about the need to care for the planet.
2. The United States Environmental Protection Agency is initiated by the signing of the NEPA, National Environmental Policy Act in the administration of President Richard Nixon (1969-1974). Puerto Rico, at the same time, establishes the Law on Environmental Public Policy for that country, and establishes the Environmental Quality Board of Puerto Rico (Naredo, 2000).
3. In 1972, the Stockholm Conference of the UN on the human environment was held, expressing its concern about the global environmental problem with the report of the Roma Club called "The limits to growth". The Stockholm Declaration reflects the introduction of the environmental dimension into the international political agenda, with a limiting image of the traditional model of economic growth (Baylis and Smith, 2005).
4. In 1976 the report of the National Academy of Sciences of the United States provided scientific evidence on the reduction of the ozone layer by chlorofluorocarbons (Naredo, 2000).
5. In 1977, the intergovernmental conference of Tbilisi defines at an international level the pedagogical principles of environmental education, as well as the main guidelines that should govern its development. Later on, the World Conservation Strategies by the

International Union for the Conservation of Nature, UNEP and the World Wildlife Fund, promoted the idea that the conservation of the environment was important for the survival of the human species (UNESCO / UNEP, 1977).

6. For 1987, the Final Report of the World Commission on Environment and Development drew attention to the urgent need for economic development that would bring together elements of environmental and social equity. This is where the concept of Sustainable or Sustained Development (UN, 1987) becomes official.
7. In the same year, the Montreal Protocol analyzed the problems related to the deterioration of the ozone layer and considered the reduction of the manufacture of halogens and chlorofluorocarbons (CFCs) to reduce the hole in the ozone layer in the Antarctic. It was not until 1994 that the halogens were no longer produced in the developed countries and the CFCs in 1996 (UNEP, 2006).
8. In 1992 during the United Nations Conference on Environment and Development, Agenda 21 was presented in Rio de Janeiro, Brazil. It was approved and promoted as a program of action by nations for its implementation (UN, 1992).
9. At the same time, there was an interest in creating strategies for the Americas and in 1994 the First Summit of the Americas was held in the United States. In the same year, but in France, the United Nations Convention to Combat Desertification was celebrated in countries affected by severe droughts or desertification, mainly in Africa.
10. The Summit of the Americas on Sustainable Development was held in 1996, in Santa Cruz de la Sierra, in Bolivia. Subsequently, a series of meetings, agreements, creation of Biosphere Reserves continued to take place in various parts of the world.
11. It was in 2002 that the Johannesburg World Summit on Sustainable Development was held, known as Rio +10 and in 2004 the Special Summit of the Americas in Mexico. Up to this moment, all countries continued to commit themselves to legislate, develop action plans, cooperation agreements, and everything related to the search for environmental protection and sustainable development.
12. The foregoing allowed the Kyoto Protocol to be carried out in Kyoto, Japan, in 2005, entering into force the greatest ecological pact in human history. This protocol was signed by more than 140 countries. Its main objective is to limit the emission of gases causing the greenhouse effect by the most polluting countries.

All these antecedents have formed a history of events between countries and marked differences in the ways of interacting with each other and with the environment. However, the road ahead is still long to identify the appropriate ways to achieve true Sustainable Development.

The United Nations has a Division of Sustainable Development that is part of the Department of Economic and Social Affairs in New York. This division promotes sustainable development by providing substantive secretariat services to the United Nations Commission on Sustainable Development (CSD); it also carries out technical cooperation and creation actions with international, regional and national capacity (UN, 2015).

In this way, the CSD can be understood as a forum on sustainable development that examines and monitors the progress made at the national, regional or international level on the implementation of Agenda 21, the Barbados Program of Action and the Plan for the Implementation of Decisions of Johannesburg and reports on this.

Part of the conclusions of Agenda 21 is on the importance of the participation of public opinion in decision-making as one of the fundamental requirements for achieving sustainable development. The specific functions and responsibilities of nine main groups of civil society are also mentioned, being these women, children, youth, indigenous peoples, non-governmental organizations, local authorities, workers, trade unions, commerce, industry, farmers, scientific and technological community.

Regarding the emergence of the concept of Sustained Development, it arose during the Brundtland report (UN, 1987), when the idea that the environment and development could not be separated was exposed. This idea was analyzed and approved by the General Assembly of the UN, during its XLII Session (1987).

Faced with this reality environment-development conjugate a binomial that cannot be separated and in the same way the execution of processes, challenges, planning of strategies must be constructed from that reality and it is under this criterion that the essence of the concept Sustainable Development can be understood as the capacity of humanity to make development sustainable without compromising future generations (CMMAD, 1987). This vision therefore promotes not only economic growth in quantitative terms but a qualitative development to consider among other elements, the social equity that leads to a better distribution of human,



symbolic, material and natural capital, a rationalization in the use and exploitation of natural resources, and national and international public policies that develop strategies to minimize environmental impacts.

However, even when the origin of the concept is genuine, the uses that have been given to it, mainly in less developed countries, are irrationally discursive in political forums, rather than academic ones.

Likewise, the approach of environmental training in the field of formal education is limited, with theoretical-methodological shortcomings that do not allow permeating correctly in the population and ensuring the educational goal, the change of behaviors. In this case, a change in the behavior of current generations in relation to their environment is sought, ensuring the quality of life of the populations at low environmental cost.

**Sustainable Development:** complex reality. The concept of economic development has evolved rapidly, from being considered as real *per capita* income to be constructed containing social, political and ecological elements. Within the latter, the central axes are the natural environment and society coercing into a sustainable process.

Unfortunately, the indiscriminate use of the concepts of sustainable development, and sustainability has led to a conceptual weakness. That is to say, the clarity of the term and the adequate use for it is not counted, becoming an epistemological complexity urgent to be attended to.

The importance of the above is that the current development processes in discourse are directed towards sustainable development, however, are we clear about what it means? Is it clear in the different social and production spheres?

Quoting Gutiérrez (1996), sustainable development represents an opportunity, a challenge to reconcile production methods with society and ensure a balanced distribution of wealth. But this reality is complemented by considering that currently the world is dominated by individualism, overproduction and consumerism (Martínez, 2003).

Tetreault (2004) discloses a set of models for sustainable development and presents a taxonomy of them to generate a comparison, some models that are normative and others are based on the experience of different projects, these models are: dominant, of political ecology, community model of sustainable development, fair trade, community industrial forest production, environmental activism and community-based conservation.

The above, offers the possibility that the regional development and its policies have had mainly two actors, the government in its three levels and the private initiative. Along with these actors there is also the voice of the population, previously non-participatory, from being only a passive element of development, to active participants of their own interests (Rappo and Vázquez, 2007).

In Mexico, awareness of environmental deterioration or what should be done is very low. The percentage of the population that ignores the environmental concerns is high (Urquidi, 2000, Galván et al 2012). This reality is opposed to what can be considered sustainable development, there is a disjunctive of growth and conservation, which focuses on increasing wealth to improve the quality of life of society without destroying the natural base on which the human activity, for the case of Mexico the costs of sustained growth are enormous as in other countries; but each country has different conditions, so the problem and alternative solutions differ (Castro, 2008).

#### OBJECTIVE

Analyze the conception of sustainable development in an area with high biological diversity and low human development index.

#### METHODS

The main objective of the study was to analyze the conception of sustainable development in an area with high biological diversity and low human development index. It was carried out during the period of June 2015 to February 2016. As a methodological basis, the study is qualitative, based on the biopsychosocial approach and with three phases of development: Phase 1) analysis of perceptions on sustainable development; in this phase, a sample of n=215 people were interviewed, from which the elements related to their perception of sustainable development were obtained. Phase 2) the identification and construction of the concept of sustainable development; and Phase 3) Viability for sustainable development in this region of Chiapas.

#### RESULTS

The average age of the interviewees was 25 years, in equal proportions to the male and female population. 100% have been living in San Cristóbal de las Casas for at least 10 years. However, 19% have their place of origin outside of Zona Altos.

Regarding schooling, 40% of the interviewees have a bachelor's degree; 11% high school; 35% secondary and only 14% have only primary level.

The Tseltal-tsotsil Zona Altos of Chiapas is characterized for being an area of high cultural diversity, and specifically the city of San Cristobal de las Casas, is cosmopolitan, a center of commercial exchange and great tourist activity. In the case of the interviewees, the mother tongue corresponds to Chol 10.81; Tojolabal 2.7; Tseltal 21.62; and Tsotsil 16.21; the remaining percentage corresponds to Spanish.

**Perception of sustainable development;** 35% of the interviewees said they did not know its meaning. On the other hand, although a high 65% claimed to know the concept, at the time of asking to be defined, 11% did not give any definition; 32% did not do more than refer to the care of the environment. The greater proportion (38%) defined it as being able to count on a job for the development of their family, making a daily salary; and the remaining percentage (19%) makes reference to the fact that sustainable development is a government program but they do not know it.

It should be clarified that they were asked if sustainable development is the same as sustained development. For 68% the concept means the same, protection of nature; and for the remaining percentage (32%) the concepts are different; but they could not express why.

Almost 50% of the interviewees consider that the development of Chiapas is not based on sustainability, because nature has been considerably destroyed and natural resources have been abused, poverty is increasing and there are not enough jobs. On the other hand, those who think that it is based on sustainability, say it because of the existence of protected natural areas, tourism and indigenous groups that represent the state.

Regarding the actions related to sustainability, 95% refers only to waste sorting, made at the state level as well as personal; paradoxically in Chiapas we do not have this type of waste management, and although personal or family, citizens separate their garbage, it is not processed, only raised by collection trucks that leave any type of garbage collected in the same space.

The identification of environmental changes in Chiapas is marked by the elimination of vegetation cover, air, land and water pollution, the decrease in rainfall and the increase in ambient temperature (98%). When asked if sustainable development would favor the environment and avoid current changes, the majority response was no, because there has been no way for

the government to actually lead sustainable development projects for the entire state; nor the population has been aware and educated for that. Those who do consider that sustainability in development is favorable are aware that these strategies would be beneficial for the care of nature and little by little the green areas would recover.

When requesting that they list the actions that they would do to favor sustainable development, they again considered waste sorting as the main action, followed by the reduction of vehicular use.

Finally, it was asked if they consider that Chiapas has a low human development index. The answer in 100% of the cases was yes and when asking the reasons why this was so, the main response was the mismanagement of resources in government; followed by the lack of jobs and useful projects, as well as the lack of a good functioning of the educational system in the state.

Some authors consider that the concept is shown as a development proposal, which expects a peaceful and gradual social change, organized and planned, based on the improvement of our relationship with nature (Meza, 1993, Riechman, 1995, Bifani, 1997). The question is how slow and gradual this change is expected, considering that the environmental impact of human activities in the last three decades has been, in many cases irreversible and in others, of high impact for the welfare of human populations.

## DISCUSSION

The results of this study show that the construction of the Sustainable Development concept, regardless of gender, age and level of schooling, relates it to the care of the environment; the majority of the population fails to articulate a definition. Another important percentage of the population considers that it can be defined as "Having a job for the development of your family, making a daily livelihood". Emphasis is placed on the use of the term "livelihood", since in Spanish the word "sustento" is a factor that the interviewees relate to the "sustainable" concept.

It should be remembered that this study is temporarily located three decades after the appearance of the concept. Then we can infer that there has been no advance in the knowledge of the concept, as the first phase of the appropriation of the same for its execution.

It is clear that the concept is accepted as a social proposal, since the population does distinguish changes and environmental problems as a result of human

action and considers it necessary to implement strategies for environmental improvement. However, from that point, it is also limited to avoiding pollution and immoderate logging.

On the other hand, it is worrisome to know that the population has adopted the discourses related to the management of garbage, paradoxically for the case of Chiapas, Mexico; there are no programs for the proper management of solid waste. The exercise is truncated from the moment in which the garbage collection mechanisms do not stick to the waste sorting system that the families *could* have made at home.

Although it is true that the conceptual constructions have to do with the socioeconomic, political, ideological and environmental context, it is also true that in the case of Chiapas, and for the period in which the study was carried out, the position is paradoxical. Politically speaking, a party governs in the state in which the concept of the environment adheres to its name and discourse; likewise, Chiapas has an important environmental wealth and in total risk of extermination. Hence, the possible implementation of a sustainable development, in the case at hand, is not perceived as a central axis nor articulator of the political exercise, even less as a real possibility in the short and medium term.

In this regard, it is important to mention that according to the *2013-2018 Development Plan*, it states a development plan related to the environment, which promotes, among other actions, "An environmental culture for sustainability", under this heading The Education Environmental Plan for Sustainability becomes one of the axes with greater weight and seeks to articulate the perspective of gender and multiculturalism. Regarding this action, we still have to wait for the results that are generated, because three years after its implementation, it is not yet possible to measure its impact.

The complex reality of the insertion of the concept, in addition to the previously discussed, can be understood among other aspects, because the population is culturally diverse, in conditions of low human development index with poverty or extreme poverty, which makes it clear that basic demands are prevailing and that environmental policies should be based on these characteristics rather than take them homogeneously and import them from other areas of the country, or worse, from other countries, even if they have been successful in those places.

The concept of sustainable development will continue to be modified, both in its discursive part, and in the construction made by the population itself; so far in paradoxical positions.

The population is aware of a threatened environment and the consequences that the human population suffers from environmental deterioration. The unfortunate thing is that, despite the passage of time, national and international movements and commitments, it has not been possible to put into practice a concept that improves the harmonious link between human populations and the environment.

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# HISTORICAL CONSTRUCTION OF INEQUALITIES: MEXICANS AND ANGLO-AMERICANS IN CALIFORNIA

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— *Abstract* —

This paper explores economic and social inequalities between Mexicans and Anglo-Americans in the state of California during the second half of the 19th century and early 20th century. Our results suggest that discrimination against Mexican immigrants and Mexican-American population has ancient precedents, and is rooted in racialized social relations as well as in the structure of labor relations –at least since the territory of California was annexed to the United States in 1848.

The complexity and depth of the problem of economic and social inequality of the Mexican population in the United States is discussed, taking as a starting point the border delimitation between both countries after de Mexico- United States war (1846-1848)<sup>7</sup>. As a consequence of this event, power relations, and, therefore, institutions, laws, and social practices were reconfigured in such a way that Mexican population previously inhabiting that territory ended up at a disadvantage vis-a-vis Anglo-American population.

The arrival of Mexican immigrants at the beginning of the 20th century intensified the hostility against Mexican-Americans and Mexican immigrants, and at the same time produced a further segmentation of the labor market. Thus, the low-skilled and low-paid occupations in California --already performed by so called “non-white workers” (Mexican Americans, African-Americans, and Asian immigrants) evolved into a niche for Mexican immigrant labor.

### Keywords

*History; Mexican immigrants; Mexican-Americans; Anglo-Americans; social and labor inequalities; California.*

Although the public speeches and attitudes against Mexicans living and working in the United States have recently become the object of public interest, the relationship between Mexicans and Americans has historically been characterized by inequality and conflict. In California, the relationship between these social groups was structured on the settlement patterns of the Mexican and American populations, as well as on the conflict over the distribution of the territory and its resources.

The conflicting relationship between these groups, which in a few years saw their social, political and economic position changed, was ultimately resolved in favor of Anglo-Americans –once they had a national reference that allowed them to appeal to rights as us citizens. Moreover, the social relations and unequal material conditions shaped the class structure of nineteenth-century California agricultural capitalism, where Mexicans became the working population; employed in the less qualified activities and paid lower salaries, while Anglo-Americans gradually appropriated the land and became the owners of the agricultural plantations.

The conditions of economic and social inequality between the us and the Mexican population (immigrants and Mexican descent)<sup>1</sup> continue, but this inequality is the result of a historical process that, for the case in question, arose in the configuration of agricultural capitalism. This article aims to show the tense relationship that has historically been established between Mexicans and Anglo-Americans. This, we argue, will help us understand that the current conditions of the Mexican population in California are the product of structural and historical disadvantages found in the state and federal laws, a mechanism to justify the occupational and social segregation of "non-white" populations, among them the Mexicans who lived in California before the annexation by the United States.

#### METHOD

Our research is based on documentary review and historical studies on California in its Mexican period, during its annexation to the United States and in the period after that: from the 19th century to the beginning of the

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1 According to the Pew Hispanic Center, in 2009, the national percentage of the population living in poverty in the United States was 14.0, considering only the population of Latino origin amounted to 25.3 percent and in the population of Mexican origin it was 27.7 percent; highest percentage between Latinos or Hispanics groups (Pew Hispanic Ceter, 2009, 2011).

20th century. Our approach is inserted in the Historical Sociology studies (Skocpol, 1984), which relies on historical sources and documents to analyze the configuration of social and labor inequalities. This is not properly a historiographic study, but a sociological study that is based on documents on the state of California and some of its counties. The review of the literature and the consultation of documents were carried out in different libraries of the metropolitan area of Los Angeles, California, during 2012, as part of a larger research that was developed as a PhD dissertation.

### CALIFORNIA: A TERRITORY IN CONFLICT

The North of Mexico, as it is well known, was a region of late colonization by Spain, given the lack of interest that the Spanish kingdom had in this territory. It was only until the discovery of important mines that settling advanced towards the North. The population that settled in these territories was much smaller compared to the population established in Central Mexico. For example, in the first population census, conducted in 1781, the Pueblo de Nuestra Señora la Reina de Los Ángeles, Alta California, reported 46 inhabitants among men, women and children. This was the population that founded the place, today known as Los Angeles, California (Weber, 1973).

The growth rates of the population remained low, so by 1821, with the Independence of Mexico, the territory did not have enough population or resources to shape the new independent government, not to mention the administrative staff required to delimit the border. The distance from the North to the Center of Mexico, combined with the problems related with the building of a national government, left the economic and political processes of the Mexican North adrift. Such processes were strongly influenced by the commercial opening (of 1821) with the United States and by American expansionist policies initiated in 1845 by President James K. Polk.

The commercial opening began with the Independence of Mexico. During the colonial period, the Spanish authorities banned trade with the English colonies. After Independence, California, Arizona, New Mexico and Texas intensified their commercial exchange with the American population. This led to the establishment of small border businesses whose owners were Anglo-Americans; to the increase of the expeditions in search of valuable natural resources, and to the settlement of American colonies in Mexican territory (Weber, 1988).

Gradually, Americans established settlements that, in some places, surpassed Mexican population. As early as 1828, Manuel Mier y Terán warned of the

danger of a secession from Texas, not only because of the numbers reached by the American population, but also because of the independence displayed by the settlements in matters related to legislation, economy and security. The measures proposed by the Mexican government to control the immigration of Anglo-Americans included, paradoxically, assimilation policies for Anglo-Americans settlers, the closing of borders to us immigration, the promotion of European immigration, and repopulation with Mexicans. However, none of these measures were implemented, and in 1836 Texas became independent. Latter, in 1848, after the Mexico- U.S. war, the remaining territories of the Mexican North were lost<sup>2</sup>.

In California, the share of the population represented by Americans before the annexation to the United States was smaller. The loocal elites, mainly formed by Mexicans and Spaniards, had qualms regarding being part of the United States. Thus, the definitive separation of California, unlike that of Texas, was more the result of the war than a political decision of the elites (Weber, 1976, 1988).

#### CITIZENS OF NOWHERE: MEXICANS IN CALIFORNIA

By the Guadalupe Hidalgo Treaty (signed on February 2, 1848), the us government committed itself to respect the rights of Mexicans in the United States and to grant American citizenship to those that requested it. Nevertheless, when the Treaty was ratified on May 30, 1848, articles IX and X, corresponding to citizenship and land ownership, were modified.

Implementation of Article IX, regarding US citizenship for Mexicans, was conditioned on the "judgment of the United States Congress." Article X was completely deleted. The article dealt with the prttection of the private and collective property of Mexicans. The reason given to eliminate article X was that the recognition of land grants made by the Mexican government did not need a special reference in the law, since American courts would uphold them, according to the law of the United States, *as long as* people had the "legitimate titles" granted "under Mexican law until May 13, 1846, in California and New Mexico, and until March 2, 1836 in Texas" (Treaty of Guadalupe Hidalgo, 1848).

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2 The definitive separation was made through the Treaty of Peace, Friendship, Limits and Definitive Arrangement between the United Mexican States and the United States of America (or Guadalupe Hidalgo Treaty).

These modifications to the Guadalupe Hidalgo Treaty, plus the laws stipulated in the Constitution of the State of California and the Constitution of the United States, became the legal sustenance to deny Mexican citizenship to the Mexicans and to take away their lands, as will be shown in the following sections.

### NEW DISTRIBUTION OF RESOURCES

During the period of the Spanish colony, resources in California were not evenly distributed. This asymmetry in the possession of resources and goods was reconfigured with the annexation of California to the United States. Although the Guadalupe Hidalgo Treaty stipulated some rights for Mexicans, after 1848 the dynamics of re-appropriation of resources such as land, affected indigenous Mexicans, and Mexicans of indigenous and of Spanish descent, because the majority of them did not have the written property titles endorsed by Mexican law, so it was impossible to prove ownership in US courts. While citizenship rights were claimed by and for "American citizens"; anyone who wanted to obtain this citizenship had to meet the federal yardstick: to be a "free" and "white" person<sup>3</sup>. In this way, "race" was a criterion to exclude all people considered "non-white".

The White/Black dichotomous relationship that prevails in the discussions on racism in the United States, in California took another content and it was transformed into a white/non-white dichotomy. The "non-white" category included Mexicans, Asians, African-Americans, and Indians.

Between the population that inhabited California before its annexation, there was a group who were granted US citizenship, and it was formed by people of Spanish descent and Spaniards that settled in the region, and whose "whiteness" came from their European origin. They had accumulated large tracts of land during the Spanish rule and in the brief period since the Independence, and they quickly joined the new California elite through marriage alliances, especially of women (daughters of Spaniards) with American men (Almaguer, 1994). But most of the population was made up of Indians, mestizos and mixed race, their "non-whiteness" derived from their indigenous and/or African heritage. This population did not possess

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3 Criteria stipulated in the first Naturalization Act of 1790 and in force until 1952, when they were abolished with the Walter-McCarran Act.

large tracts of land since the Spanish colonial period, and occupied the lower strata in the new agricultural capitalist order of California (Menchaca, 1995).

The argument for denying us citizenship to "non-white" Mexicans was based on their being descendants of indigenous people. Like Native Americans, it was claimed, they already had a set of rights. In this sense, only "White Mexicans" could be considered as candidates to obtain us citizenship. This interpretation of the laws left a large part of the Mexican population without protection, because Native American Indians were not considered American citizens and lacked political rights (Menchaca, 1995, p.19).

The economic decline of the Mexican population was not a homogenous process. In some towns and counties the resistance of Mexicans delayed the loss of economic and political power until the end of the 19th century. But at the beginning of the 20th century, precarious conditions for Mexicans were widespread. In Santa Bárbara, for example, between 1848 and 1873 the economic and political power remained in the hands of a group of Mexicans because this population was greater than American population. The change occurred when the demographic composition was reversed, the economy based on the ranch was dismantled, and reforms were implemented in the electoral districts that undermined the electoral representation of Mexicans. Thus, the election of 1873 was the watershed of the loss of political power of the Mexican population, because all public offices were occupied by Anglo-Americans (Camarillo, 1979, p.46).

#### THE LOSS OF ECONOMIC POWER AND THE CONTROL OF RESOURCES

Since the times when California was part of Mexico, after Independence, economic asymmetries began to take shape between Americans and Mexicans, because in the years that followed the disappearance of the Spanish mercantile system, many of the economic activities of the border like hunting with traps, producing cotton, cutting and selling wood and selling manufactured products were in the hands of Anglo-Americans. They had more capital, means of transport and access to markets, but the natural resources extracted in this period were still from Mexico. However, the lack of a legal system that regulated the use of natural resources made California a paradise of excessive extraction (Weber, 1988).

Later, once the territory of California was annexed to the United States, the rights over the resources changed. Disputes over land were the most

important, since Mexicans were left without legal protection to guarantee their ownership of the land.

The California Land Commission (CLC) and the courts requested both the indigenous population and private owners (descendants of Spaniards) to show legal property title and register them under US law. In Santa Paula, the land of the indigenous population whose property could not be endorsed with documents of ownership and registered by California Land Commission were considered as public domain (available to the United States government) and became eligible for redistribution. Mexican owners of ranches shared the same fate as the indigenous groups. By 1869, the CLC certified only one property in Santa Paula and invalidated all other property rights of the Mexican people (Menchaca, 1995).

The Mexican-Californian elite also saw their properties drastically reduced between 1848 and 1880. These lands were transferred, on a massive scale, from Mexicans' hands to the hands of Americans, specially since the Federal Land Law of 1851, which provided the California Land Commission with legal powers to verify the property titles of Spaniards and Mexicans (Almaguer, 1994, p. 66).

In this way, Mexicans –including the California owners who made up the elite in the Mexican period, saw their properties shrink due to the high costs involved in defending ownership in the US courts, the duration of the process (up to 10 years until the ruling was issued), the fees of the lawyers, and the changes in economic production. Thus, at the end of the 19th century, Mexicans became landless farmers and Americans became the owners of land and capital. By the early twentieth century, most Mexicans were incorporated into low-wage jobs in Californian agriculture (Menchaca, 1995).

#### ECONOMIC STRUCTURE AND LABOR SEGREGATION

In the new class structure of California, Americans occupied the highest positions and the Mexican population experienced a sudden decline, because the forms of production changed from a pastoral agricultural system to an agricultural capitalist system. The loss of land accelerated the dismantling of Mexican and Spanish institutions, and Americans gained full control of the new social, political and economic institutions (Menchaca, 1995).

By 1880 the economy was already capitalist and the agro-pastoral activities that Mexicans carried out began to be insufficient for the survival of the families, so men migrated to places where the ovine cattle was concentrated,

especially in the shearing season, while women joined the labor market as domestic workers in American households (Camarillo, 1979).

Thus, the pastoral agricultural production system was replaced by a capitalist agricultural system, where the lowest labor positions were for Mexicans and the other minorities considered as non-White. Without ranches as a unit of economic and social production, Mexicans were unable to subsist on their own and came to depend on the salaried work (Menchaca, 1995).

The jobs were also assigned with "racial" criteria, and thus the lowest positions within the new socioeconomic structure were assigned to Mexicans, Indians and Asians. For example, in Ventura County, by 1870 the majority of Mexican, Indian, and Chinese men were employed in low-skilled activities. The percentage of "White" workers in this type of economic activity was 17.6, for Mexicans it was 60.2 percent, for Indians 90.5 percent, and for Chinese workers 100 percent. In contrast, in the 1900 census, in the same county it was recorded that 95.0 percent of agricultural entrepreneurs were "White" people (Almaguer, 1994, p. 189).

The new structure of the Californian society was conformed with a high economic and social inequality that was justified by the prevailing racist prejudices at the time, resulting in an acute social segregation for all "non-White" minorities, so that housing, schools and services were of lower quality in Mexican neighborhoods and these were separated from the settlements of Americans (Bogardus, 1930).

These were the conditions in which the Mexican immigrants who arrived at the beginning of the 20th century as demanded by the development of infrastructure in the southwest (Loyo, 1969) were inserted. The immigrant population, on the one hand, restructured the labor market by joining the low-skilled and low-wage occupations that, as we have shown, were already assigned to the population of Mexican origin (non-immigrant). And, on the other, the social relations between groups (Mexican immigrants, Mexican-Americans and Anglo-Americans) became even tenser: exacerbation of hostility against Mexicans (immigrants and Mexican-Americans) and competition for low-skilled jobs among Mexican immigrants and Mexican-Americans (Gutiérrez, 1995).

## CONCLUSIONS

In summary, this article shows how the historical processes of California are characterized by a tense and unequal relationship between the two groups that



have been in continuous contact in the same territory: Mexicans (of indigenous, African and/or Spanish descent) and the Anglo-American. This last group increased its presence in Mexican territory since the Mexican Independence, because the abolition of the Spanish restrictions on trade increased commercial exchange at the border. Anglo-Americans set up businesses in this territory and, gradually, established permanent familiar settlements in the north of Mexico. Later, with the annexation of California to the United States, these inequalities became greater because Mexicans inhabitants lost a set of rights; including the right to property and us citizenship rights.

The change of production system, from an agro-pastoral system to an agricultural capitalist system, completely transformed the relationship between Americans and Mexicans, the former occupying the highest social positions and the latter the lowest. So, by the beginning of the 20th century, Mexicans' conditions of poverty were widespread, although, as has been pointed out, for the descendants of Spaniards this situation was completely different.

This allows to problematize the analysis of the criteria that explain the economic and social inequality, since, as has been documented in this paper, inequalities have different configurations. In this case, they are rooted in the racist prejudices of the time and in the structure of classes of agricultural capitalism. The "race", as a criterion of inequality, preceded the class criterion in California. Many of the jobs were assigned according to physical traits rather than people's skills and knowledge. However, both criteria are strongly imbricated and it is not possible to understand the current conditions of the Mexican immigrant population if it is not understood how the population of Mexican origin was stigmatized and segregated since the 19th century, due to their physical appearance and their different cultural practices.

In these precarious conditions, and in an environment of racial discrimination against the Mexican population, the first Mexican immigrants were inserted at the beginning of the 20th century, entering in a previously segmented labor market and taking even lower employment positions. The Mexican immigrant population expanded the sectors of the lower working class (segregated and stigmatized) and competed with the other (non-white) minorities for low-skilled jobs.

The atmosphere of hostility that prevailed in the second half of the nineteenth century against the non-migrant Mexican population, was exacerbated by the arrival of Mexican immigrants in the 20th century. On the one hand, strained social relations between groups and, on the other, reproduced a set of prejudices that operate as social constraints for immigrants today. Therefore, the current problems of the population

of Mexican and immigrant origin in the United States, which include low levels of schooling, low wages, uninsured population, housing in separate neighborhoods<sup>4</sup> and discrimination, are not only explained by the structure of the international labor market, nor by the unskilled labor force of immigrants, but by the unequal historical relations of California society that have been reproduced in different ways.

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4 See Current Population Survey, 2010, United States Census.

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# MIGRATION AND POPULATION DISPERSION IN TECPATÁN, CHIAPAS

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— Abstract—

The analysis of data provided by the censuses and population counts from 1960 until the year 2010 allows us to confirm that the municipality of Tecpatán has experienced immigration and emigration events. The first of these processes occurred during the second half of the last century which coincided with historical events such as the construction of the Netzahualcóyotl Dam, better known as Malpaso Dam, as well as the eruption of the Chichonal volcano, which provoked the settlement of new rural communities. The following population changes happened during this century, probably as part of a late adjustment due to poverty generated by weak economic conditions. This paper is about the municipality of Tecpatán before its political cleavage in 2011, which led to the settlement of Mezcalapa Municipality, and addresses the migratory processes and events associated to those, as well as the population dispersion that occurred along its territory.

**Keywords**

*Migration; population dispersion.*

The municipality of Tecpatán is located in the northwest of the Mezcalapa region, in Chiapas. It is a mountainous area, with a humid warm climate and a wide variety of flora and fauna; it has abundant streams and rivers, since a good part of its territory originally included jungle and forest areas. Until 2011, it included what is now the municipality of Mezcalapa and was adjacent to the states of Veracruz de Ignacio de la Llave, Tabasco and Oaxaca and the municipalities of Ostuacán, Francisco León, Copainalá, Berriozábal, Ocozocoautla de Espinosa and Cintalapa.

During the first half of the last century the Zoque language and the traditions and customs of this group were common, however during the following decades there were changes in the cultural and religious patterns, as well as in the forms of subsistence and in the visions of progress of the inhabitants. New locations also emerged, such as Raudales Malpaso, a town that over the years had more inhabitants than the municipal seat and whose residents managed to be recognized as a new municipality in 2011, thus emerging Mezcalapa.

These changes propitiated the questioning of population movements in the territory, finding that from the last half of the past century to the present, Tecpatán experienced migratory processes that included both the arrival and departure of inhabitants, which paid to the rural community and dispersion of its population. Taking into account what was written by Massey (1991: 15) who reports that: "(...) migration originates historically in the changes of the socioeconomic structure of the societies of origin and destination; that once implemented, the networks of social relations serve to support and increase the migratory flow". It is considered that in Tecpatán the immigrations and experienced migrations are the result of socioeconomic and natural events, such as the construction of the Nezhualcáyotl dam, the eruption of the Chichonal volcano and the transition towards economic practices oriented to livestock, events that have changed, in each historical moment, the socio-economic structure in the territory, this way in the present work it is tried to explain from these events the migratory processes that the municipality has experienced and how they have paid to a dispersion of its population.

## METHODOLOGY

This work is part of a larger research project titled *Financial Cultures in the Northwest of the Mezcalapa Region, Chiapas: Regional Economic Dynamics of Livestock*. The information presented was generated essentially under a quantitative approach, with the objective of identifying the migratory processes experienced in the municipality of Tecpatán, from the second half of the 20th century until before its separation in 2011, which required

consultation of statistical data from the 1960 to the 2010 census, which were used to calculate population growth rates. The calculations showed pronounced ups and downs in population numbers, so we sought to deepen the search to find events that account for population movements, for this were interviewed 25 heads of family with an average age of 52 years, of which 32% were women and the other men, as a requirement for the selection of the interviewees, they had to be from the municipality of Tecpatán. The interviews were conducted during the second half of 2016.

## RESULTS

The data analysis of the National Institute of Statistics and Geography (INEGI) (2017), allows knowing the behavior of population levels that have occurred in Tecpatán, Chiapas from 1960 to 2010. Table 1 shows the municipality's total population levels and its composition by gender. It shows that from 1960 to 2000 the population remained in growth, but in 2005 the level of population was reduced, for the year 2010 the population records a new growth but at a lower rate than the past decades, that is, the rate of population growth has decreased in recent years. This phenomenon is more evident when comparing the population growth rates of the municipality with the regional, state and national scales, which can be seen in table 2.

**Table 1.** Total population, male population and female population of the municipality of Tecpatán

Year	Total Population	Male Population	Female Population
1960	7,648	3,984	3,664
1970	16,983	8,769	8,214
1980	21,451	11,025	10,426
1990	34,465	17,429	17,036
1995	34,988	17,846	17,142
2000	38,383	19,166	19,217
2005	37,543	18,558	18,985
2010	41,045	20,420	20,625

Source: Own composition based on data from the VIII Population Census 1960, IX Population Census 1970. X General population and housing census 1980, XI General Population and Housing Census 1990, Population and Housing Count 1995, XII General Population and Housing Census 2000. II Population and Housing Count 2005. INEGI, Census of Population and Housing 2010.

**Table 2.** Ten-year growth rates, at municipal, regional, state and national levels

Year	Tecpatán	Mezcalapa Area	State	National
1970	122.1%	39.2%	29.6%	38.1%
1980	26.3%	31.8%	32.9%	38.6%
1990	60.7%	32.0%	54.0%	21.5%
2000	11.4%	18.8%	22.1%	20.0%
2010	6.9%	15.9%	22.3%	15.2%

Source: Own composition based on data from the VIII Population Census 1960, IX Population Census 1970, X General population and housing census 1980, XI General Population and Housing Census 1990, XII General Population and Housing Census 2000. INEGI, Census of Population and Housing 2010.

In 1970, the population growth of Tecpatán was totally atypical and does not correspond to any of the other scales (regional, state and national). This growth coincides with the emergence of the Raudales Malpaso town, following the construction works of the Nezahualcóyotl dam in the years from 1958 to 1966, which caused the arrival of migrants to be employed in the area and who later settled there. Information obtained in interviews reported that they came from many parts of the country, but that people were identified mainly from Puebla and Tabasco. They also report that many workers arrived with their families, some left Raudales Malpaso when their contract ended, but others decided to stay and establish their residence in the place, which caused other people to come to trade attracted by the consumption of these families. Those who decided to stay acquired land and built their houses there and also used them to work the land, mainly through livestock activity.

In 1980, the population growth rate was slightly lower than the other three scales, which is associated with the adjustments of the floating population in the Malpaso area, since the population movements included people who left, people who stayed and people who arrived attracted by the available national lands.

These lands attracted the area near Raudales Malpaso, both people from the interior of the municipality and other municipalities, this was the case of "Doña Manuela" and her children, a woman dedicated to livestock and who for these years was established in a ranch near the municipal head, on the route that leads to the town of Luis Espinosa, owned approximately 100 hectares and had

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1 Regarding the customs of those to whom they inherited to, field data obtained in interviews and mainly that made to Juárez (2016), who has been dedicated to advising and managing paperwork in the town of Tecpatán, reveals that there was a tendency to inherit goods mainly to the sons and the youngest son of the family.



9 children; several of them were looking for a way to dedicate themselves to livestock on their own, with the limitation that the generational succession would leave the property divided into very small units<sup>1</sup>, conveniently they found the opportunity to acquire cheap land in the Malpaso area and found there its livestock units<sup>2</sup>.

The interviewees also report that some people came to Malpaso to work at the Federal Electricity Commission and that they settled there, these people were characterized by having greater purchasing power derived from their periodic and constant income they received from the parastatal as salaries, the interviewees assure that this was a factor that affected a greater economic dynamism in Malpaso, which attracted merchants.

In 1990 the growth rate exceeds again the other scales, keeping correspondence only with the state, this situation agrees with what happened in 1982 when the Chichonal volcano erupted, located between the municipalities of Chapultenango and Francisco León, the latter adjacent to Tecpatán. In the area of the eruption, in addition to losing their homes and relatives, the Zoques had to face the loss of fertility of their lands. The diaspora caused by this event had Tecpatán as one of the many points of arrival, as explained by people from the area of the volcano and now living in Tecpatán.

At some point, migrants from the upper region also arrived in the territory of Tecpatán, as data from the INEGI (2016) reveal that there are currently 48 localities in the municipality where Tzotzil is spoken, 6 where Tzeltal is spoken and 2 where Chol is spoken. In total there are 56 localities which main languages are not native to the territory and exceed in quantity the 52 localities speaking Zoque. It was found that these migrants did not join the already existing localities but founded new localities.

In recent years, the population growth rates of Tecpatán have fallen to the point of being below the other scales, not even reaching half of the regional and national growth rate and being even greater the difference with the state rate. A historical event to which to attribute the pronounced decrease in the growth rate and the incursions made in the study area, as part of the field investigation, is not accurately identified. The research did not show

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2 The data on the life of "Doña Manuela" were collected in interviews with her children and grandchildren; she had seven sons and two women.

that a high and unusual mortality was aroused, as well no statistical data were found about this; however the interviews carried out show changes in economic activities, since the interviewees report that since before 1980, the inhabitants began a slow change, abandoning the cultivation of coffee to gradually adopt livestock. Nonetheless, this transition was accelerated at the end of the 1980's when the price of coffee was seriously diminished, which is related to the opinion of Solís and Aguilar (2006) who say that migration in Chiapas has been due to, among other factors, the decline in international coffee prices, a situation that was more accentuated as of 1989. For Tecpatán, migrations to other territories grew in the nineties, registering the low population growth in 2000 and this situation was accentuated in the new century.

The interviewees mention that many migrate, some leave alone (no children, no sentimental partners), others leave with their families (couples and children), but they assure that both men and women leave in the same proportion. Marina (2016) narrated that he has a son living in Tuxtla Gutiérrez and two in the United States, and that they send resources with which he has bought land and cattle that he manages. He assures that the salaries in Tecpatán are low, reason for which his children migrated, and for which he also worked in the United States for some time.

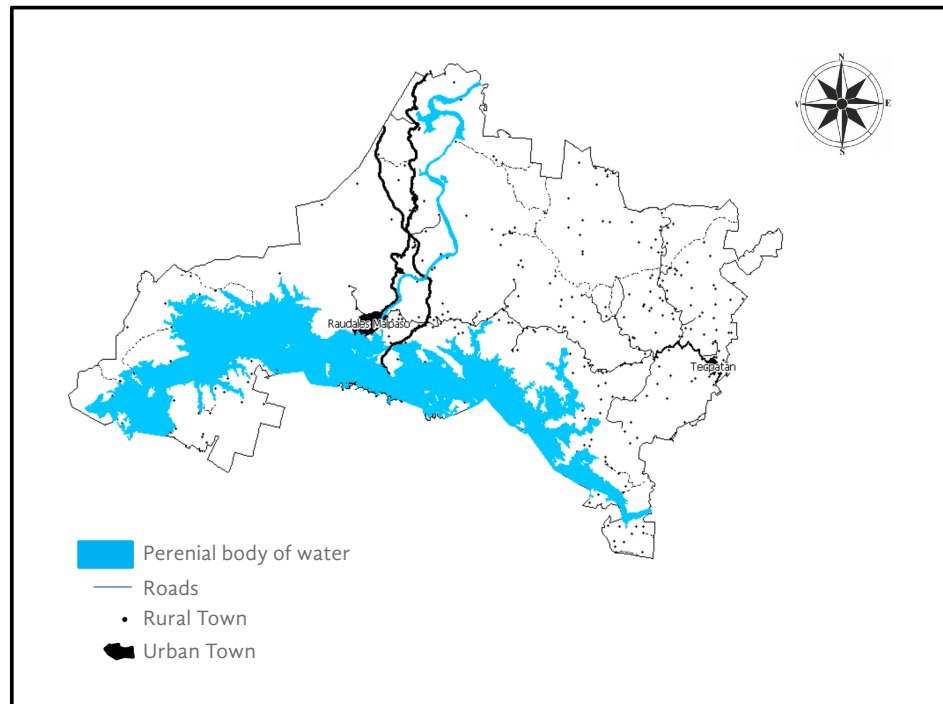
Other people who also gave an account of these migrations, assure that many people from Tecpatán have gone to other municipalities in Chiapas, to other states and abroad, at different historical moments. They say that 4, 5 or 6 decades ago they migrated in lesser proportion and to national destinations, some in search of better jobs and others for reasons of academic preparation, but in the last decades migration has increased and has been added as a destination the territory of the United States.

In Table 1 we can also see the proportion between genders, until 1995 the number of men was greater and as of the year 2000 women outnumber them in quantity. However, this disparity is reduced, showing a parallelism, which implies that the atypical rates of population growth have been proportionally in both men and women, this confirms the data obtained in the field, in the sense that both immigrations and emigrations have been made as a family or, in the case of single people, both men and women have done it.

The immigration processes that have arisen in Tecpatán have configured a distribution of the population in such a way that it is reflected in the high dispersion of localities; what can be seen in figure 1, it highlights two urban locations, Tecpatán and Raudales Malpaso as well as a large number of rural

locations. You can also see the roads and bodies of water that connect these locations; the lines that represent the roads differ in their thickness, in such a way that the thickest ones correspond to toll roads and the thinnest ones correspond to dirt roads. Note that the roads are not sufficient to communicate all the localities of the municipality.

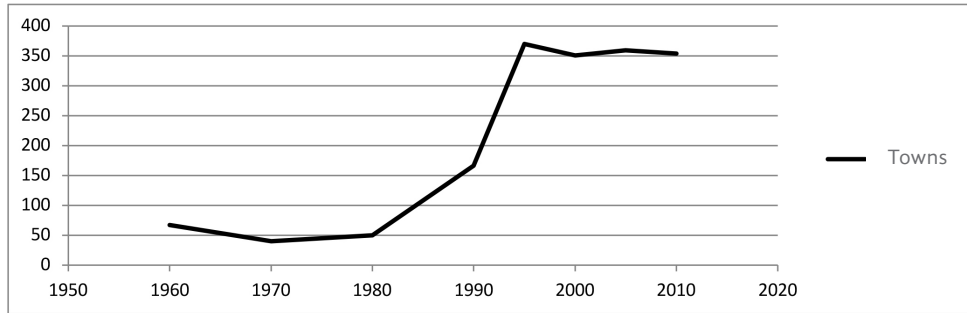
**Figure 1.** The map shows urban and rural towns; roads and perennial bodies of Tecpatán. Year 2010



Source: Own elaboration based on the ENJ2010.

As explained above, the highest population increase was recorded in 1970, but observing Figure 2, it can be seen that the number of localities decreased in relation to 1960, and that Malpasado dam, although it acted as a magnet for migrants, it also generated the flood and disappearance of many localities. When construction work on the dam finished, employment levels dropped and part of the population migrated from Raudales Malpasado to the interior of the municipality looking for land to work, which justifies the increase in localities registered from 1970 to 1980.

**Figure 2.** Number of locations in Tecpatán from 1960 to 2010



Source: VIII Population Census 1960, IX Population Census 1970. X General population and housing census 1980, XI General Population and Housing Census 1990, Population and Housing Count 1995, XII General Population and Housing Census 2000. II Population and Housing Count 2005. INEGI, Census of Population and Housing 2010.

From 1980 to 1990 and then from 1990 to 1995 the growth of the number of localities is high since in 15 years the municipality went from 50 to 370. According to the population and housing census of 1980, in that year the Municipality of Tecpatán counted with two localities that concentrated the largest population, one had 2,353 inhabitants and the other 5,526, it is presumed that the first corresponds to the municipal seat (Tecpatán) and the second to Raudales Malpaso, therefore this data reveals that all new localities that were registered in the censuses between 1980 and 1995 had less than 2,500 inhabitants, that is, they had the category of rural, which implies a high dispersed population.

Although during the construction of the Malpaso dam there were not many who migrated to the area from the same municipality, after filling the glass of water and over the years, the inhabitants of the new generations sought other lands to exploit, the dam facilitated the communication by water arising several wharves and new roads were opened by dirt roads to communicate the new localities. The national lands attracted people from the same municipality and from other places that looked for spaces to live and work the land, thus, these lands were managed to acquire them legally. In this way, the population movements that started in other parts of the state and that chose Tecpatán as a point of arrival, the incursion of new spaces to exploit the land and the geographical points that began to act as jetties on the margins of the dam, were the main reasons for the emergence of a large number of localities that currently give the population of Tecpatán the characteristic of dispersed.

## CONCLUSIONS

As has been seen, the municipality of Tecpatán has experienced population movements in the forms of immigration and emigration. These processes match, in the case of immigration, with two specific events: the construction of the Malpaso dam and the eruption of the Chichonal volcano. On the other hand, the emigrations coincide with changes in the economic conditions derived from the abandonment of the practices of the cultivation of coffee for livestock.

In this way it is observed how the migratory processes have been linked to the intentionality of those involved in seeking subsistence and improving the living conditions for their families, this is a characteristic that prevails in most migrations. However, the case of Tecpatán acquires particularity due to the high population growth registered in the last mid-century, which implied modifications, emergence and disappearance of cultural patterns that are reflected in the reconfiguration of socioeconomic interactions in the territory, something that raises the need to deepen through specific studies oriented to the municipality. On the other hand, the emigrations point out that the economic conditions that attracted people during the last century have disappeared, so now there are many who seek opportunities for progress in other territories.

The processes of immigration and emigration addressed, acquire special relevance to understand the reality that now experiences the territory, characterized by the high rurality and dispersion of its population, which presents challenges for political actors and public policies to be able to equip conditions that pay to the improvement of the living conditions of the inhabitants.

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# MEXICAN IMMIGRANT ENTREPRENEURSHIP IN QUEBEC: TOWARDS A GROUNDED THEORY

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— *Abstract* —

This research presents an exploratory case study of Mexican entrepreneurs in the province of Quebec, Canada. Through a qualitative analysis using a methodology inspired by the Grounded Theory. Focusing on actors, a theoretical sampling was carried on taking data from different sources. Twenty-three interviews were conducted with Mexican residents of the cities of Montreal, Quebec and Gatineau. The main objective was to initiate a theorization about the immigrant entrepreneurship phenomenon in a poorly documented group and context. Some conceptual categories were built from the perspective of the migrants themselves. The importance of previous experiences, family support and the reading of the territory to detect business opportunities were relevant. Routes of business entry profiles were detected. In addition, it is proposed the ethnic positioning category (the social construction that is made in the host society according to the ethnic group to which immigrant entrepreneurs belong). This category was a key to shape the structure of opportunity that allows the creation of businesses in the host cities. The whole immigrant entrepreneurship process was synthesized with the metaphor "opening doors" which was an InVivo code that emerged from the words of the interviewees themselves and that allows us to understand the venture as part of a wider process of territorialisation by immigrants. The results outlined in theoretical models in order to better understand the phenomenon of immigrant entrepreneurship.

**Keywords**

*Migration; Canada; Qualitative research.*



Unlike the current anti-immigrant discourse sustained by emotions rather than by facts, in recent years a field of migration research has been built that has allowed us to better understand the causes and consequences of the media-related phenomenon of migration (Castles & Miller, 1993). Ideally, society should have reliable information, beyond perceptions and fears, about the role played by mobility for the development of peoples (Sutherland, 2013). Likewise, decision-makers can build public policies that guarantee the human rights of migrant subjects (and of non-migrants) by maximizing benefits and managing the risks of migration for both reception societies and countries of origin (Delgado-Wise *et al.*, 2013). One of the recognized effects of international migration is the creation of companies and the creation of jobs by migrants in host societies (OECD, 2010).

Different hypotheses have been proposed to explain why immigrants are overrepresented in the statistics of entrepreneurship and self-employment (Cai *et al.*, 2012). It has been suggested that immigrants are self-employed because the host societies do not give them better alternatives (handicap or blockade hypothesis) (Teixeira, 2007). It has also been said that immigrants have distinctive cultural elements that lead them to have a greater entrepreneurial spirit than locals (specificity hypothesis) (Ensign & Robinson, 2011). Another idea is that immigrants take advantage of the opportunity presented to them to operate in ethnic and non-ethnic environments (opportunity hypothesis) (Kloosterman, 2010). Finally, there are those who do not find too much difference between immigrants and entrepreneurs in the mainstream market (convergence hypothesis) (Curci & Mackoy, 2010).

It is obvious to think that the analysis of the actions of immigrant entrepreneurs could help design public policies that have a positive impact on the daily life of many people in the world. However, the majority of international migration studies have focused on the most representative migratory cases and corridors, neglecting other contexts and groups that would allow a more complete picture of this important phenomenon. According to Wang (2012), entrepreneurship studies have privileged an elite approach that emphasizes the cases of high tech and high-growth companies oriented towards international markets, created by immigrants in regions such as the Silicon Valley in San Mateo, California. This leads to an underestimation of the impact that the ethnic economies and small and medium-sized companies created by immigrants can have. On the side of migration studies, more efforts have been devoted to the analysis of cases of migrant's groups commonly associated with entrepreneurship such as Chinese, Jews or Koreans (Zhou & Cho, 2010).

This research pretends to study the exceptions little explored by scholars of immigrants' entrepreneurship field (Fairlie & Woodruff, 2010). This applies not only to the type of business but to the selected group, that is, Mexicans. While it is true that, given the global importance of the Mexico-United States migratory corridor, Mexicans as a group are very well represented in the literature of migration studies (Massey *et al.*, 2003), however it is very rare to find papers that give an account of their facet as entrepreneurs. Mexicans are often categorized as "labor", so the idea of them to integrate into the host society through the creation of their own businesses is often disdained. Adopting a qualitative approach, this study reports the case of Mexican immigrant entrepreneurs in a little known context, the province of Quebec, but that already has a stable migratory flow (Massey & Brown, 2011). The objective was to explore the factors that influence the creation of companies by Mexican immigrants in the province of Quebec.

## METHODOLOGY

This work is the result of a qualitative analysis that explores the process of business creation by Mexicans in three cities of the province of Quebec. Information was collected in the cities of Montreal, Quebec and the Ottawa-Gatineau metropolitan region during the summers of 2012 and 2013.

Given the lack of work on the phenomenon of immigrant entrepreneurship among Mexicans in Canada (Mueller, 2005), an inductive approach was adopted to initiate an informed theorization (Glaser & Strauss, 2010) using as analytical tool: the conceptualizing categories (Paillé & Mucchielli, 2010). This methodological approach involves collecting data immediately after the research problem arises, alternating the analysis of the same with the elaboration of a theoretical framework. It is a continuous process that concludes by constructing categories of solid and linked analysis, but putting the empirical evidence before the previous theory (Charmaz, 2006).

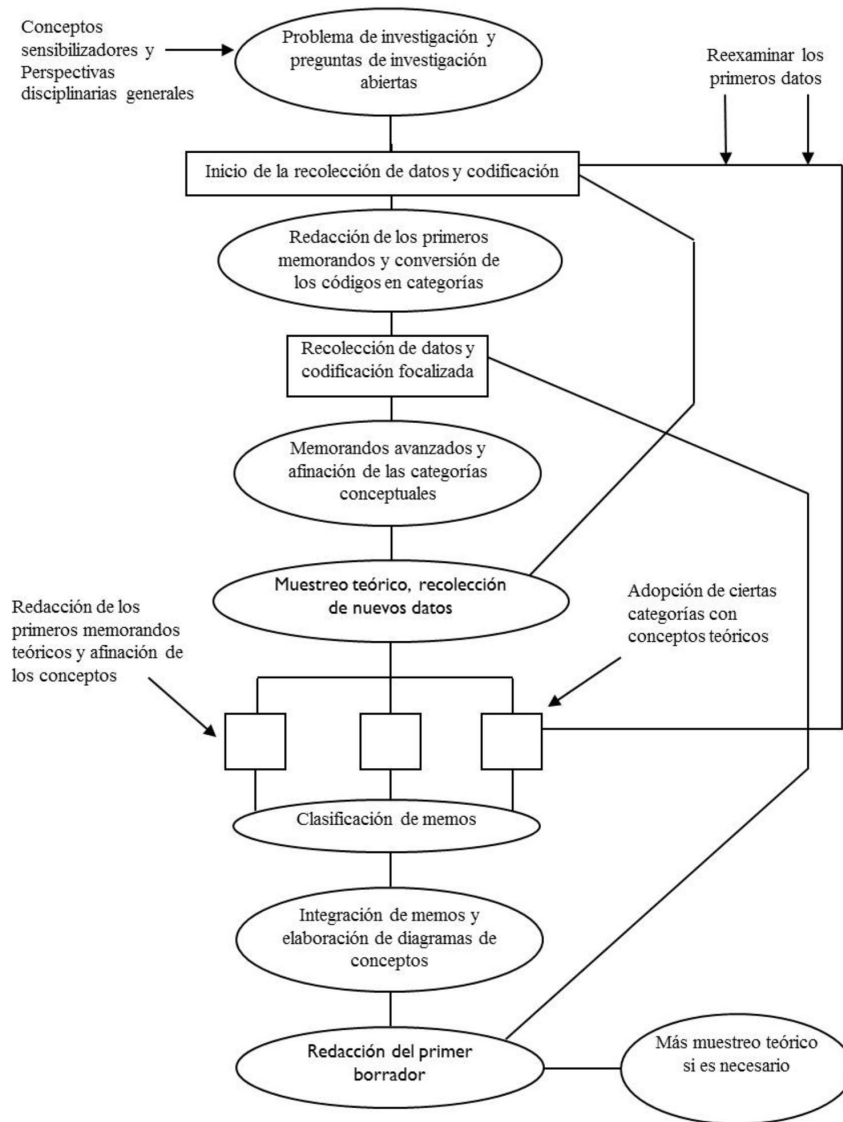
Following the Grounded theory, after having encountered the research problem, the field work began with obtaining the first data of the interviews, from those the first memos, which were notes on the first codes and identified categories, were integrated. These notes or memos also served to raise more questions looking for more cases and sources. This process was not presented continuously, but rather in the form of a spiral, alternating the analysis and data collection while advancing the construction of conceptualizing categories. Subsequently, literature review began with the first codes and categories identified. To refine the categories, we returned with some of the first respondents looking for other cases and sources. Finally,

the information was gathered into diagrams and memos. When the categories became saturated, that is to say that no more properties and dimensions arose because the cases and experiences began to be repetitive, the data collection was suspended and the research report was finalized (Image 1).

Interviews were conducted with 23 entrepreneurs of Mexican origin with businesses in the province of Quebec (Table 1). It should be mentioned that this is not a conventional statistical sampling but rather a theoretical sampling, that is, the number of cases that allowed the construction of the conceptualizing categories. The sampling was complemented with unstructured interviews with key informants such as officials, academics, entrepreneurs of other origins and family members of the entrepreneurs.

Techniques such as direct observation, participant observation, and the application of semi-structured and unstructured interviews with key informants complemented the methodological tools. These participants were located thanks to the "snowball sampling" technique. Interviews were conducted directly, although the follow-up of some was done by telephone.

**Image 1.** Process of grounded theory according to Charmaz (2006)



**Table 1.** Characteristics of the interviewees

Age	City	Profile	Field	Product	Market
45	Gatineau-Ottawa	Entrepreneur	Restaurant	Ethnic	Mixt
21	Gatineau-Ottawa	Entrepreneur	Construction	Non ethnic	Non ethnic
29	Gatineau-Ottawa	Entrepreneur	Childcare	Non ethnic	Non ethnic
56	Gatineau-Ottawa	Entrepreneur	Childcare	Non ethnic	Non ethnic
36	Gatineau-Ottawa	Entrepreneur	Food	Non ethnic	Non ethnic
52	Gatineau-Ottawa	Entrepreneur	Groceries	Ethnic	Mixt
42	Gatineau-Ottawa	Entrepreneur	Biotechnology	Non ethnic	Non ethnic

63	Gatineau-Ottawa	Entrepreneur	Food	Ethnic	Ethnic
58	Gatineau-Ottawa	Entrepreneur	Chemical industry	Non ethnic	Non ethnic
55	Montreal	Entrepreneur	Crafts	Ethnic	Mixt
43	Montreal	Entrepreneur	Imports	Ethnic	Non ethnic
38	Montreal	Self-employed	Professional services	Non ethnic	Mixt
36	Montreal	Entrepreneur	Restaurant	Non ethnic	Non ethnic
48	Montreal	Self-employed	Telecommunications	Non ethnic	Non ethnic
59	Quebec	Entrepreneur	Music	Ethnic	Non ethnic
57	Quebec	Entrepreneur	Groceries/food	Ethnic	Ethnic
38	Ottawa	Entrepreneur	Restaurant	Ethnic	Non ethnic
37	Quebec	Self-employed	Beauty	Non ethnic	Non ethnic
39	Ottawa	Entrepreneur	Food industry	Ethnic	Non ethnic
43	Quebec	Entrepreneur	Cleaning	Non ethnic	Non ethnic
37	Quebec	Self-employed	Health	Non ethnic	Mixt
47	Montreal	Entrepreneur	Cleaning	Non ethnic	Non ethnic
42	Montreal	Entrepreneur	Consultancy	Non ethnic	Non ethnic

Source: Own elaboration

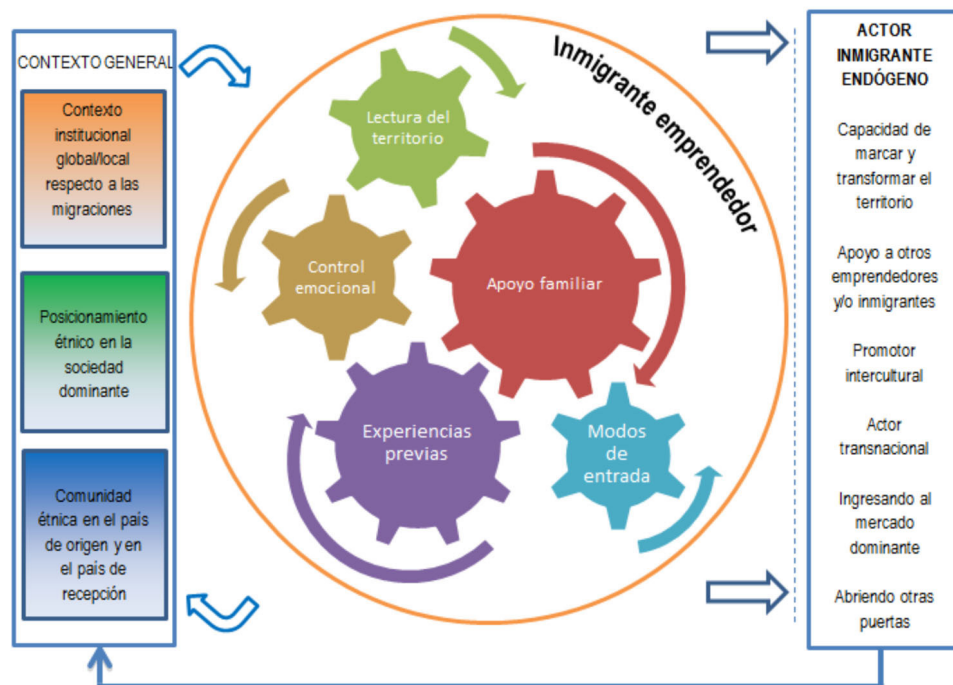
The informants were Mexican immigrants older than 18 years old; permanent residents of the province of Quebec or Canadian citizens of Mexican origin living in any of the three cities considered in this study; with experience in business for at least one year, whether for profit, social or cultural purposes. They were asked a central question: how did they become entrepreneurs in Quebec? Subsequently, the information was complemented with questions that had to do with their migratory experience, their business and transnational activities.

## RESULTS

The process of creating a company by Mexicans in Quebec is outlined through the Actors-based Immigrant Entrepreneurship Model described below. First, it highlights the general context in which immigrants carry out their businesses with three dimensions: the institutional context regarding migrations and entrepreneurship (orange box); ethnic positioning in the receiving society (green box) and the ethnic community (blue box). The colors of the tables are presented in gradients of different shades to represent the level of minor to greater consolidation or strengthening of each dimension (Image 2).

To illustrate what was previously explained, let's take the case of an entrepreneur immigrant who tries to establish a business in a receiving country with an institutional framework that promotes the creation of companies, but belongs to an ethnic group that is not well-known in the receiving society and that it also has strong internal conflicts, surely its possibilities will be more in the economy of the mainstream market. While another entrepreneur would have a different opportunity structure if located in a host society that does not boost entrepreneurship but does demand products of their ethnic origin since they are very well positioned and also their community has managed to establish a genuine ethnic economy.

**Image 2.** Actors-based Immigrant entrepreneurship Model



Source: Own elaboration

Regarding the institutional context shared by entrepreneurial immigrants with the mainstream market entrepreneurs, this may have a local, national or global character. Restructuring in economic sectors, global trends, public policies and even the mainstream discourse may favor, or not, entrepreneurship and self-employment. That is, entrepreneurs can become part of it, because they find a favorable environment that promotes and facilitates the creation of business.

Exclusive of immigrant entrepreneurs, the second dimension has to do with the ethnic positioning of entrepreneurs in the host society. It is about the social construction that natives make about immigration in general and about a particular ethnic group or immigrant group. The quantity and quality of information available in the host society will favor the flourishing of a certain type of business among immigrants, creating a structure of opportunity that can be exploited by entrepreneurs. Likewise, ethnic positioning will help or prevent immigrants from establishing relationships of trust, partnerships and other types of collaborations with the actors of the host society. Information can be positive, negative, ambiguous, scarce or null, having a spatiotemporal delimitation and a dynamic character.

Finally, the third element of the immigrants' context is their own ethnic community, and in their case, the transnational community to which they belong (blue box). This sub context can provide the immigrant with a type of resources and opportunities to form an ethnic economy, serving as a natural market in which he has a competitive advantage over the mainstream market companies, since they know and share the tastes, preferences, trends and consumption expectations. But it can also mean an environment of high self-destructive competition (Andersson & Hammarstedt, 2012) that prevents the emergence and consolidation of companies that generate added value capable of transforming territories through welfare. Table 2 presents excerpts from the interviews that exemplify the dimensions of the general context of Mexican immigrants' ventures.

**Table 2.** Dimensions of the "general context" category

Global/local institutional context	Ethnic positioning	Ethnic community
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I did not come here with the “if I don’t make it here, I go back home” mentality, because there is a huge Latino community. I came here with the mindset to adapt and incorporate myself. And not to go back, since my husband is Canadian and he gave me the option “if you’re not comfortable we go back to live in Texas”. But I love the Canadian community, I love my Mexican roots as well, my whole family lives in Mexico, I visit them very often.

We went to an accountant to trademark the business. We did it at noon. We were surprised by how quickly it all was, unlike our countries where the paperwork takes so long and they always say something is missing. In Mexico, everything is so complicated that it’s better if someone with in the field of knowledge does all the paperwork. Here, if you have the documents, you go and it’s all done quickly.

It’s been two years since I started the business, but the encouragement here is better, you have to work and everything, but the bank at least discloses percentages and every detail, if you have everything, they give you a loan, the government gives you incentives. Hopefully that would happen as well in Mexico.

Mexicans that sometimes come because of longing. The Canadian or tourist that comes here wants to go on holiday and have a good time. Yesterday a few clients who are remodeling their kitchen came to buy these tiles because they saw them when they were in Mexico.

The store is actually a Mexican craft promoter, but only of quality craft. Because we also want to change that wrong mentality that sometimes people have of Mexico. That objects are poorly constructed, that are cheap. We wanted to change that concept of Mexico.

So when I became more easy-going and everyone knew I was Mexican. People started knowing the Mexicans who work at the island (île d’Orléans) and that is a good reputation in Quebec. So they told me “oh, Mexican”. And they start telling me how much they love my country.

It has been ten years in the Mexican community. To me, being immerse in the Mexican community of Ottawa-Gatineau, speaking Spanish, hanging out with Mexican people, has been as if I were living in one of Mexico’s cities. When I was a child, I lived in Tehuacan, Puebla, and that’s how I feel.

I’ve been living here for ten years but I haven’t been surrounded by the Mexican community, because I’m always working and sometimes they fight against each other. Mexicans are also a bit ugly. If there’s someone I don’t really like I don’t talk to them, but overall I try to be nice with everyone.

At first, when I got here, there were a few Mexicans; then meetings started taking place. What I didn’t like of these meetings was that everyone went only to gossip. There wasn’t anything positive. That’s why I told myself that it made no sense wasting my time there. There was nothing that broadened my knowledge, just partying and that’s it.

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Source: Own elaboration from interviews with the 23 entrepreneurs of Mexican origin

The negative aspects of the environment in which the immigrant entrepreneurship takes place invite us to pay attention to the call of Edna Bonacich (1993) regarding the excessive optimism that certain researchers have shown about the entrepreneurship of immigrants. It was not the intention of this research to join the institutional discourse on self-employment and the creation of companies that justifies that capitalism works even for those who are clearly displaced or oppressed by the system. It is not a matter of idealizing the Mexican immigrant entrepreneur in Quebec nor of thinking that all immigrant people have all the conditions to create their own company and make his way in the receiving society.

Although the saying “start from scratch” was frequent in the stories of the participants, the immigrants interviewed counted to a greater or lesser extent



with a series of capitals (savings, university studies, assets in Mexico, previous experiences in their business sector, business experience, family support, etc.) that they knew how to deploy strategically to overcome the difficulties and take advantage of the opportunities that the context puts in their path at the time of founding their companies. The three dimensions of the context of the immigrants condition but do not determine the actions of the entrepreneurs. On the contrary, under certain circumstances, they can become actors that modify, transform or strengthen their environment.

However, immigrant entrepreneurs rarely face the power of strategists and their apparatuses that lead them to affirm their freedom as subjects. Rather, they usually accept the rules of the game of the receiving society to try to achieve upward mobility. A Mexican entrepreneur will hardly have as goal to modify the institutions and structures of the Quebec society. In any case, their project lies in adapting and integrating in the best possible way without erasing their identity of origin. Entrepreneurs are able to mobilize a series of resources that are within their reach; resources not in the economic sense of the term; not as something that can be exploited, but rather as a means to which one can resort in case of needing to reach an objective (in our graphic model they appear as gears). Entrepreneurs likewise resort to their families, friends and acquaintances to obtain what is necessary (financing, support, labor, infrastructure, specialized consulting, etc.) to take advantage of and even generate business opportunities. This means that entrepreneurship, like migration itself, can be seen as a family strategy or a collective phenomenon.

Immigrant entrepreneurs take advantage of the experiences prior to the creation of their company, that is to say, the accumulation of competences that they have been acquiring both in their migratory trajectory and in their incorporation into the host society. Whether within the industry in which they ultimately found their business, or by creating businesses both in the territory of origin and in the host, previous experiences seem to be key for certain Mexicans to decide to start their own businesses in Quebec, since they provide the entrepreneur with a series of important contacts to carry out business. Perhaps it is these experiences, including migration itself that allows them to better control their emotions, overcoming fears inherent in the risk involved in venturing into something unknown. Immigrant entrepreneurs have opened so many doors that they have become tolerant of uncertainty. The context has filled them with obstacles they have managed to overcome. Crises, tensions and clashes that, by resisting them, make them become actors capable of understanding their territory better.

Previous knowledge matters since entrepreneurs can succeed as they experiment, even failing; either as employees or as owners, in a business of the same industry or in other sectors. Unlike entrepreneurs in the mainstream market, immigrants have the advantage of having previous experiences in the society of origin, which allows them to detect other types of opportunities in the host territory. Although the transfer of competencies is not evident, it is possible that the resources accumulated during these experiences can be mobilized when the appropriate opportunity appears. Once entrepreneurs establish their businesses, they can have diverse impacts on the community. From giving greater visibility to their ethnic group by consolidating business networks; serving as a model for recently arrived migrants, to introduce them to other ways of living migration; to become a kind of cultural promoters that strengthen in the mainstream market the ethnic positioning of Mexicans.

When entrepreneurs stabilize their businesses and survive the unstable phase of creation and launch, they have the opportunity to become endogenous actors. Now they have more reasons to take root in the receiving society and try to transform and mark the territory in which they are recognized. They have detected and "opened doors" and will continue to open others even for their recently arrived co-nationals. It is not ruled out that some may return to Mexico to reestablish transnational ties. Such was the case of an interviewed entrepreneur who, after achieving economic success in the mainstream market in Canada, decided to found a company in the ethnic economy since this "allowed her to travel through Mexico to look for supplies as well as promote quality items of Mexican origin" contributing to improve the ethnic positioning of the Mexican in the receiving society. With a social vocation, this entrepreneur participates in the 3x1 program for migrants.<sup>4</sup> However, at least with respect to the entrepreneurs studied, it is not a tendency but rather an exception. Some of the extracts from the interviews that served to build the category by mobilizing resources are presented in Table 3.

**Table 3.** Dimensions of the "mobilizing resources" category

Territorial reading	Emotional control	Previous experiences	Family support	Means to begin
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1 Ministry of Social Development (Sedesol)'s program in which for each Mexican peso donated by a group of migrants, the three levels of government contribute with a weight of their coffers to perform basic infrastructure works and/or to sustain productive projects in the localities of origin of the migrants (3x1 Program for migrants, 2011).

<p>Like any other immigrant when you arrive to another country, you get there with another vision. You can see the good, the bad, the easy. You can see everything from another perspective. Canadians maybe won't see the same opportunities because for them is all the same, they can't differentiate them. You, as an immigrant, get here and see all these opportunities.</p> <p>Since Gatineau is small. With just one or two workdays everything gets done.</p> <p>I work in Mexican restaurants in Montreal and some small stores here in Gatineau. But now more organized, I had a full idea of what I had to do. You have to experience to see the opportunities. Some are very obvious and some not so much. But throughout three or five years, if you have an entrepreneur mentality, you can take advantage of the opportunities.</p>	<p>Not everyone does it because of their fear of the unknown. To me that's the difference between being an entrepreneur and not, regardless of the idea someone has, if you have the capital or not, if you have a project, at the end of the day developing it or not depends on how willing you are to cope the risks. You may have everything planned, have a market study, but the risk still exists, if you're not willing to confront it, you'll never do it. So, fear of risks.</p> <p>At the beginning, you always start with fear; you may have a year, or maybe less, because of the instability. It can lessen if you have a good plan, if you have a partner, but still you can't lessen it a lot, you cannot expect that in a year the business is working fully.</p>	<p>I worked at Ford for many years in, many in Xerox, as well as in Nortel Networks. And the Nortel company is from Canada, that's why I chose this country.</p> <p>My dad started his company from scratch as well. It's something that is in my family and my wife's too. My father in law has restaurants. In both families there's that kind of experience.</p> <p>I had the experience of working for a company, and left it. It's basically the same, all companies work more or less the same.</p> <p>The experience I got from my previous company was useful. I learned how to negotiate. Especially the counting training because I didn't know much of it.</p>	<p>I brought my siblings. One is a turner, driver. I needed someone who could work the machines. Make the tortillas is easy but the machines need maintenance and that's expensive.</p> <p>We had a small savings and we also have support from my family in Mexico.</p> <p>The machine costs ten thousand dollars. I needed it and also to install it. So my wife and four of my friends helped with money, two or three thousand each.</p> <p>My dad has been an entrepreneur all his life. And he told me he wanted to open a tortilleria in England because there are some huge restaurants that don't have a proper assortment. I told him alright, but why England if I'm here in Canada with nothing to do?</p>	<p>After five years, we thought we could've waited a bit longer to open the business, because you don't always think about everything, but at the end of the day I think it wouldn't have made a big difference.</p> <p>We waited a year to open, the thing was doing it. A lot of people I know here and also in Mexico, always have the same plan, the idea of being their own bosses, to have their own business. But they never start.</p> <p>Sometimes is risky. You can have a big plan, a procedure but there's always a critical point where you have to say "now!"</p> <p>You have to do a market research. I'd say that well thought, maybe a year or two of onboarding.</p>
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Source: Own elaboration based on the interviews with the 23 entrepreneurs of Mexican origin.

The period following the creation of immigrant businesses includes a lot of work within the organization to structure and consolidate it. Subsequently, entrepreneurs will expand their ties and social networks by making themselves known, receiving recognition from both their ethnic group and the host society. In this exchange of experiences, they will meet other entrepreneurs, they will be associated and they will even be advised to. These associations can be made with actors from the same ethnic group, the host society or

another group. Such is the case of a few Mexicans who entered Canada seeking refuge and who have been building a niche in the cleaning industry, establishing ties of collaboration with the Italians in the construction sector in Montreal.

Acquiring personal visibility due to their business success, entrepreneurs become a kind of cultural promoters, contributing to reinforce ethnic positioning in a positive way in the host society. The social construction of the Mexican will depend in part on what these entrepreneurs can do, if associates work, collaborating with other ethnic communities and with governmental institutions, they can achieve changes in the general context of the future entrepreneurs.

It is time to look for other possibilities beyond their business activity; new projects that lead the entrepreneur to fulfill a goal, helping other individuals of their ethnic group or of the host society, to acquire awareness that they can also be constituted as actors. Touraine (2005, p.203) pointed out that the individual is constituted as such when he acquires self-esteem receiving favorable images of himself, coming from the members of the community to which he belongs. Thus, the immigrant entrepreneur who has managed to become an endogenous actor in the host society becomes an issuer of those favorable images for the newly arrived entrepreneur immigrant.

Finally, the learning process does not stop. In this stage they will learn about the mistakes made during the previous stages and at the start of the business. If this is the case, the entrepreneur will seek to get out of the dynamics of self-exploitation and of the markets that oppress the growth of his company. The search for access to the mainstream market will be a real alternative. Making their company more structured and institutional will take up a lot of their time. Likewise, it is the moment in which one begins to reflect on performance. In addition to assessing performance through economic or financial indicators, it will evaluate it subjectively with indicators such as the feeling of pride or satisfaction of having achieved the goals set.

## CONCLUSIONS

The purpose of this research was to explore the phenomenon of entrepreneurship among immigrants of Mexican origin in the province of Quebec. The initial intention was to answer the question of what is the foundation of companies process like by that group of immigrants in the aforementioned Canadian territory.

Using a methodology of qualitative type, inspired by the Grounded theory method, a theoretical model was constructed from the data collected in the fieldwork interviewing 23 entrepreneurs of Mexican origin with businesses in Quebec and other key informants. This conceptual model explains some success factors of immigrant entrepreneurship identified by the actors themselves.

Unlike more deterministic approaches in studies of migration, the creation of companies by Mexican immigrants in Quebec goes beyond a mere act of economic rationality, of using resources to risk capital and adds value. It is also a search for access to spaces that are normally denied to them. Entrepreneurship as a territorialisation process allows immigrants to move from being exogenous actors to endogenous actors in the receiving society.

The spatial framework in which entrepreneurs operate matters, although the structure does not condition its capacity for action, it conditions the type of action that can be carried out. Contrary to the mainstream market entrepreneurs (convergence hypothesis), immigrants develop in three contexts. The general context, shared with the other entrepreneurs; the context of their ethnic community, being able to be the most natural market to start their businesses and even constituting themselves as an ethnic economy; and finally, the ethnic positioning, that is, the social construction that makes the host society of its ethnic group. This will depend on the quantity and quality of information available in the host territory and has a relatively dynamic spatiotemporal character.

Entrepreneurs can have a more advantageous opportunity structure to the extent that their ethnic group is well positioned in the host society. The analytical category of ethnic positioning constitutes a contribution to the hypothesis of the disadvantage or blockage to explain the entrepreneurship of the immigrants, since it goes beyond the negative aspects of the environment in which the businesses of the immigrants are created, contributing the positive side that can boost the flowering of businesses inside and outside of ethnic economies. It is important that the Mexican institutions with a presence in Quebec, do not let the positioning be fixed only in a natural way with the daily actions of migrants or by the messages that may come from the media, but continue to design instruments to influence strategically and positively in the perception about the Mexican in Quebec.

The Actors-based immigrant entrepreneurship Model starts from a first approach, so it should be validated and perfected in future research with both Mexican immigrants and with groups of other ethnic origins either in Quebec or in other territories.

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A C A D E M I C  
P A P E R



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STAKEHOLDERS AND THE  
CONSTRUCTION OF A  
MANAGEMENT MODEL FOR THE  
VIRTUAL UNIVERSITY OF THE 21ST  
CENTURY THAT INCORPORATES  
THE SUSTAINABLE DEVELOPMENT  
GOALS.

—

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CENTRO DE ESTUDIOS PARA EL DESARROLLO MUNICIPAL Y  
LAS POLÍTICAS PÚBLICAS (CEDES)-UNACH



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## I. VIRTUAL UNIVERSITY OF THE 21ST CENTURY: MANAGEMENT MODEL

**E**ducation and, alongside it, Higher Education, does not respond to formulas or production functions. This is the great thing about the educational process, which is generated and reconstructed automatically without the possibility of being repeated in space and time; it is a human process, not a mechanical one.

Therefore, if the educational process is unique in space and time, it should be noted that universities are not knowledge or employees factories for a market that demands new "products" and workforce. Universities are unique and atypical organizations, there are no formulas to impose "such and such" management model. As Duque (2009) has said, returning to Mintzberg (1991).

There are no management models designed *a priori* that fully satisfy the vision of Higher Education institutions. Each educational organization is different, either because of its context, because of the mission and vision that have been drawn, because of its lucrative or non-profit purposes, because of its philosophical or religious foundations, among others. There are no "equal" universities and, therefore, each educational institution should be encouraged and inspired to build its own management model.

If for a traditional university the construction of a management model is a challenge, in the case of non-on-site universities is greater. Given the growth that virtual education has had, along with the innumerable programs and institutions that have emerged in this modality, the design of management models has been neglected. As Antúnez points out in his work *Management Model for Distance University Education Centers*,

... due to the rapid growth of the sector, it has been difficult to reflect on the creation and implementation of management models according to the needs and expectations of the virtual modality, and in many cases it has been necessary to "adapt" models brought from the face-to-face system.

This situation forces us to think and question about the extent to which the ways of managing or administering in virtual education institutions are really relevant and appropriate for the processes that are carried out within them (2012: 2).

Although the topic studied here is strategic for the functioning of Higher Education Institutions, it was found that the studies and designs of management models carried out so far are not abundant.

We therefore consider that contributing to the topic will stimulate debate and generate new ideas. After all, daring to propose, based on what others have spent a lot of time researching and writing, which is a risk since it can lead to other errors, will open opportunities for university leaders, both students and administrative, companies and all stakeholders<sup>1</sup> or involved, promote a constructive dialogue in our own house of studies, the Universidad Autónoma de Chiapas.

This article seeks to interweave researchers and specialists' thinking, considering that it is time to not only work in a management model for the UNACH's Virtual University, but to also recover topics that the debate on the publication of the General Law of Education of 2012 opened between academics, such as the learning environments, and go from a vision centered on "schools that teach" to "schools that learn" (Andere, 2011).

As previously noted, university is an organization with objectives and goals, so it requires the construction of a management model designed *exprefeso* for its specific characteristics and context.

The production of theories and studies related to the management model based on stakeholders is not new; however, it is not abundant either. The need to promote a management model design is feasible and becomes relevant when the university is part of the global reality of knowledge, given that it is an organization in which different actors interact to efficiently produce knowledge and with a social responsibility. Such design acquires greater importance when little has been written on the subject, as it is the case of the UNACH.

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1 The term stakeholder refers to an individual or group that is part of an organization or has a stake or interest in it, in our case study the organization that interests us is the university. A detailed study of this concept will be presented later, which is one of the pillars of this article.

## II. MANAGEMENT MODEL FOR THE UNIVERSITY

The university is a center of production and exchange of knowledge linked to an environment that, in the knowledge society, seems to have no beginning or end. It is an organization with objectives and goals, apart from a series of strategies and academic procedures, as well as management that make it complex and, in Duque's words, said "complexity of the universities in terms of their processes and their diverse work make university organization an atypical organization "(2009: 39).

The university dynamic is linked to society, the entrepreneurial, economic and political dynamics, among other institutions. It is a network of exchange and generation of knowledge, a medium that students seek to obtain a better quality of life, meaning we are facing an extremely complex type of organization. It is, in this context, that we must reflect on a management that "implies mentioning the way to create, direct, develop and control a series of activities, resources and processes in order to fulfill the desired objectives of these centers, consolidating their educational mission"(Antúnez, 2012: 1).

It should be noted that the concept of "management model" has been gaining strength as a fundamental part in the performance of business, social and educational organizations. It is considered a strategic aspect to generate paths of growth and development in organizations, as Duque confirms:

Universities, like any organization, paraphrasing Porter, are constantly faced with changes, derived fundamentally from the evolution of their clients' needs, in the technology to satisfy those needs and in the form of management in organizations through the development of new competitive advantages, and it is precisely this that makes the development of management models increasingly important (2009: 26).

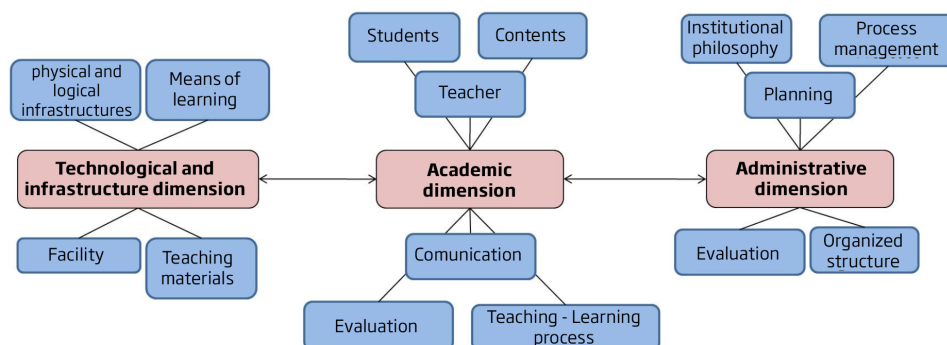
For Institutions of Higher Education and virtual education systems, as organizations with specific goals and objectives, the concept of "management model" has become a subject of study and controversy, given that at the theoretical level different types of management models have been defined arguing, for each of them, their strengths and areas of opportunity.

One of the characteristics of virtual university systems is that, generally, they were born after face-to-face systems, even on occasion, in response to the need to expand the educational offer of an institution to optimize resources. Many of these universities or virtual systems arise or are conceived as an "addendum" of the on-site university.

### III. ANTÚNEZ MODEL

Antúnez (2012) proposes three dimensions for the construction of a management model, specifically of distance universities: Academic, Technological and Administrative. Derived from the above, it presents the following model:

**Image 1.** Management model for distance universities (Antúnez, 2012)



The Antúnez model gives the academic dimension the central axis role. The administrative and technological dimension, including infrastructure, must rotate and operate according to the first, and not vice versa. From the academic axis, Antúnez writes that:

it is important, since it is the educational process itself, it is comprised primarily of the actors involved in it, especially the students and teachers, the contents that will be addressed during the learning, the forms, tools and strategies used in this process, the media used and evaluation to corroborate the achievement of the objectives (2012: 12).

As can be seen, Antúnez proposes a management model as if the university were an organization isolated from its environment. One of the limitations lies precisely in that it leaves aside the influence of other actors in the 3 dimensions mentioned, likewise it exempts the role that the leaders or university directors, as well as the unions themselves, have in the management processes of the university.

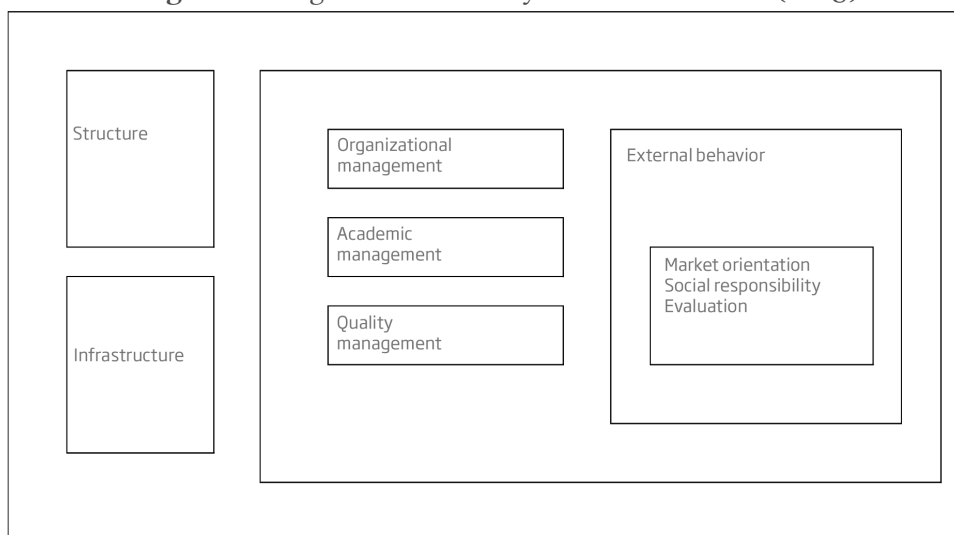
Another perspective of a management model that seeks to incorporate new spheres and actors has been proposed by Duque (2009) in his article "University management as a basic element of the university system: reflection from the stakeholders' point of view", where he points out that:

The management model is the way to organize and combine resources in order to meet the objectives; that is, the set of principles, policies, systems, processes, procedures and behavior guidelines to achieve the expected results and improve the performance of the organization. These elements are framed by regulations, missionary objectives, basic operating processes, structure and organization, organizational culture, human talent policies and competencies, and formal strategic planning of the organization (39).

#### IV. MORANTES & ACUÑA MODEL

On the other hand, in the model proposed by Morantes and Acuña (2013), the representative management factors are integrated for a Higher Education Institution that offers the distance methodology (IESA), in its three main axes: Organizational Management, Academic Management and Quality management, as can be seen in the following image:

**Image 2.** Management model by Morantes-Acuña (2013)



#### Distance education institucional system

This model recommends an establishment with adequate structure and infrastructure conditions, in terms of distance education, for maximum use, includes two management components:

- Internal, whose guidelines and course of action are defined, if not entirely, within the educational institution (in accordance with Higher Education Institutions' principle of autonomy) and, within which, factors like Organizational management, academic management and quality management are analyzed.

- External, also known as institutional projection; is made up of factors that, although oriented from the internal component factors, have a context and scope that transcend the physical and governance borders of the institution that directly affect its management. Topics such as market orientation, social university responsibility and evaluation, acquire a singular connotation with higher education institutions, which offer distance education (Morantes and Acuña, 2013: 86).

Morantes and Acuña make new contributions compared to other traditional management models that conceive management as a "closed" model, for example, that of Antúnez. They incorporate a slope that is related to the external context of the university "that transcends the physical and governance borders".

Specifically, in this section the authors link the virtual university with other universities. Later, they pick up variables proposed by Cabero (2010) which, practically, make up each of the 3 management channels.

## V. IMPORTANCE OF VIRTUAL LEARNING ENVIRONMENTS

We consider it of utmost importance, for the development of pedagogy focused on virtual learning and for the reflection and construction of management models in organizations such as universities, to define distance education from the concept of "virtual learning environment", so we propose the following: Distance education, which in the knowledge society has practically become virtual education, is that system of generation of some type of knowledge (including culture and the arts) that manifests itself in all educational levels, capable of producing a virtual learning environment, that is, an environment where learning takes place mediated by technology and where, derived from the global nature of information and knowledge, other actors participate beyond the traditional ones (teacher and student). Virtual education constructs virtual learning environments with which the "seeker" (student) is able to appropriate new knowledge and experiences regardless of their geospatial limitations.

This definition is of great interest because, recognizing that virtual environments involve not only the teacher-tutor and the student, it also opens study possibilities that incorporate the concept of stakeholders. When talking about virtual learning environments, in the paper "Virtual learning environments: a new experience", Avila and Bosco (2002) make the following statement:

UNESCO (1998), in its global education report, points out that virtual learning environments constitute a totally new form of Educational Technology and offers a complex set of opportunities and tasks to educational institutions around the world, the environment of virtual learning defines it as an interactive computer program of a pedagogical nature that has an integrated communication capacity, which means, that is associated with New Technologies (P. 2).

In this way, it is necessary to rethink management models when seeking to build organized virtual systems for learning, especially systems centered on the student. A management model that recognizes that it is the product of the interaction of different actors with profiles, stories, visions, contexts and interests, often different, that is, a model that explains the role of stakeholders.

#### VI. MANAGEMENT MODEL FOCUSED ON THE STAKEHOLDERS, IN THE VIRTUAL LEARNING ENVIRONMENTS.

The presented expositions were made taking into account a market perspective. Stated in other words, stakeholders are those actors that can influence the university or be influenced by it, since the term "stakeholder" refers to an individual or group that is part of an organization or has an "investment" or interest in her.

According to Kaler (2002), stakeholders can be defined from two points of view: those who have acquired rights in the university or the agents that have a defining influence in the educational institution; "A stakeholder is any group or individual that can affect or be affected by the achievement of the organization" (93).

The vision of Kaler, although very general, has the virtue of transmitting the importance of the stakeholders in the policies and processes of management both in the academic as in the educational organizational quality. When the author talks about a group or individual that can affect or be affected by the objectives, in our case, the university opens the perspective to incorporate actors such as unions, social or political groups, among others.

Academic decisions such as the incorporation of a new process of quality control or the modification of a regulation, are examples that are part of the management system of a university that will not only be subject to the decisions of teachers and students, but to a complete universe of stakeholders who see their interests affected and who can influence them.



There are different positions with respect to this universe that should be studied to build a management model. For example, Reavill reviews and justifies the inclusion of some stakeholders for the case of the university: students, employers, the family and dependents of the student, universities and their employees, assets and services suppliers, the secondary education sector, other universities, commerce and industry, the State, among others (53).

We think that building a management model from the perspective of stakeholders offers the possibility of expanding the universe of people or organizations that influence the policies, objectives and strategies of the university. A management model for the university is a strategic and vital instrument for the performance and evaluation of this type of organization. Identifying the universe of stakeholders and the way they affect the management of the university is not an easy challenge, but one that must be addressed.

The great economist Keynes affirmed in his *General Theory* that "it is the ideas and not the men that matter, whether for good or for bad". This statement is crucial when it comes to build a management model for a complex and atypical organization such as the university, because in addition to all the complexity that stakeholders represent, a management model for a university always has a theoretical foundation behind it regarding learning, which further expands the debate.

## VII. SUSTAINABLE DEVELOPMENT GOALS (SDG), THE UNIVERSITY AND SOCIETY

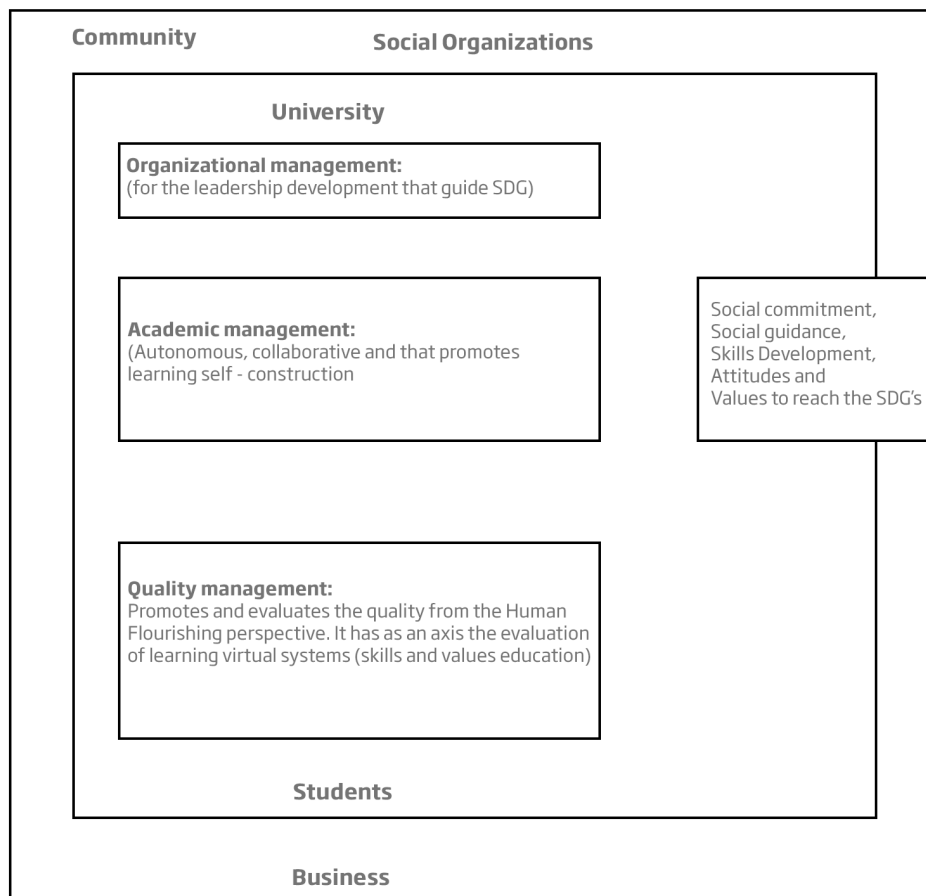
Mexico has adhered to the UN initiative to reach the 17 SDGs, both public and private universities play a strategic role to reach the goal in 2030. That is why a space for scientific and constructive dialogue should be opened to link bridges that allow the universities to participate in the construction of efficient public policies and that they lead to the great goal of reaching the 17 SDGs.

The University must play a fundamental role in the formation of socially responsible citizens, who know and commit themselves to the challenges and problems of a global world. The University must incorporate into university teaching, in addition to technical knowledge, the generic skills linked to the transmission of values that contribute to the formation of responsible citizens committed to Sustainable Development (Solana and Llanos, no date, P.2).

### VIII. LEARNING FROM THE STAKEHOLDER PERSPECTIVE, INCORPORATING THE SDGS.

Next, we present our model and its characteristics, starting from the following figure:

**Image 3.** A proposal for a management model incorporating the SDGs



1. This model complements the one proposed by Morantes and Acuña, in the sense that it recovers the figure of the stakeholders, and makes the interrelation of a finite universe explicit.
2. Retakes the idea of Morantes and Acuña to recognize the existence of an external factor that affects and interrelates with the work of the university. However, it "amplifies the photo" by identifying a set of external stakeholders involved, to a lesser or greater extent,

with academic, administrative, and quality management policies, among others.

From the definitions in the previous section, how to identify a stakeholder? As some specialists affirm, identifying them in a university system, and understanding how they are related, is not an easy task considering the complexity of an organization such as the university, which is especially sensitive to its immediate social, economic, political and business environment, but also those environments that are not "so immediate" that *are generated around it*; for example, the results of a chemical investigation, in the health department that has been carried out at the university, is not only the result of the academic level of its teachers and students. To reach this result, the university needed the talent of its professors, researchers and students, but it also had to be related to the state of the art of a scientific event, the state of innovation and technology, or the contributions that the Private companies have done to the health department.

In relation to the previous example, the effects of scientific advance not only impact on the areas of science and health, but also on the social areas for human development of the region and, perhaps, of the world. As has been repeated over and over again, the university is a complex and atypical organization, especially sensitive to the social, political and economic environment.

Defining and describing the interrelation of stakeholders in a management model also has to do with the limits of the private and the public, with greater importance in public universities. For example, should a scientific discovery financed entirely by public resources be shared with for-profit companies? Or, from another point of view, someone could say: "after all, who finances the university are the taxes of individuals, among them, for-profit companies".

Resuming the above, describing the interrelations between stakeholders is not an easy task, because it is a complex and dynamic power structure that does not follow a certain pattern. Due to this, a set of stakeholders is proposed that directly affect the management of the university, whose contribution is immediate and evident, with the fundamental purpose of opening a discussion that is not new, but is updated in very short terms by the dynamics of the knowledge society.

3. The model proposes academic and quality management systems that not only seek the optimization of resources, but, beyond that, place at their center virtual learning environments and academic leadership as axes to improve the quality of academic processes, promoting the

vision of involving the student in the construction of their knowledge in a framework of collaborative work and socio-affectivity.

As you can see, it is necessary that the quality management and academic management system go hand in hand understanding the meaning of the construction of virtual learning environments, as Andión points out in his paper "On quality in higher education: a qualitative view":

In the context of economic and cultural globalization, higher education systems have diversified, becoming complex systems energized by market forces and digital technology. The evaluation of the quality of educational services in the Mexican field of higher education is almost always linked to accreditation. Although this process has consolidated the hierarchical structure of the system, it has not helped much to measure the quality of education nor to evaluate the quality of the educational programs offered by the various institutions of the system. To achieve this, first of all, we need to really know the state in which the programs operate and what their impact is based on their actual results, regardless of accreditation. However, in order to effectively evaluate the quality of educational programs, it is necessary to adopt a qualitative vision of the problem of quality, and to look at quality in education and not the quality of education. That is, "knowing the qualities of the learning environment that promotes the operation of educational programs and not only identify certain attributes of educational programs as determinants of quality. From this qualitative point of view research is focused on the strictly educational, deepening in the pedagogical dimension of the processes to know their actors and the various resources that mediate the relationship between them "(2007: 91).

Teaching in a virtual environment is not just about changing the technological conditions and schedules of the students. Marianela Delgado summarizes the importance of generating a management model whose system is focused on the virtual learning environment:

being a mediator in virtual environments, does not mean changing the space of a traditional classroom to a virtual classroom, changing books by electronic documents, class discussions in virtual forums or hours of attention to students by chat meetings or conversation forums . It means finding new strategies that allow us to keep our students active even when they are in different parts of the world, promoting the construction of knowledge and collaboration (Delgado and Solano, 2009: 2).

4. The model proposes to build a proper concept of academic and administrative quality, in addition to promoting academic leadership.

Currently there is a series of quantitative measurements for the quality evaluation and certification of higher education programs. To access the financing of programs, universities must comply with a series of quantitative processes.

The systems of management of the quality effective in universities, generally, look for the assurance and improvement of the quality education. Some universities are immersed in processes of auditing and certification in university quality standards. This is the reality; the quality management of the model must be adapted in such a way as to encourage compliance.

In addition to the above, the management model of the virtual university should aim to develop a "proper" system of administrative and academic quality. It is necessary to build a vision of what is understood as "Quality Virtual University ". Without a doubt, this will lead us to an immense and endless debate about what we should understand by quality education. In fact, there is abundant literature on this in higher education institutions and also for virtual university systems.

Our management model seeks to define "quality university" by understanding it as a "learning university", a university focused not on teaching but on the learning of teachers and students, but also on integrating the 17 SDGs into their educational programs. In this sense, the quality model must be such that it enables adaptation and innovation. The virtual university community is able to establish its own quality parameters focused on learning. In such a way that, independently of the quality systems that are currently being evaluated, it is possible for the university to develop its own system, which would imply revising the concept of quality to which the virtual university aspires.

In the case of virtual education, quality acquires new nuances. It is not the same for a student who arrives early to the classroom and has 8 hours to devote in his learning environment to a virtual university student who, in general, "turns on" his computer after his workday and to face his daily life.

To evaluate the quality of virtual education, Andere's words acquire greater importance, by mentioning that:

The education or learning quality is a function of a complex and mysterious network of factors so mixed and interconnected that it is impossible to

separate, to specify a causal and unequivocal relationship. What is known is that what happens outside of school, home and society is as important or more than what happens inside the school to improve learning (2011: 132).

In the process of quality improvement, the role of a leader is fundamental. In addition it requires a very different function than the one usually developed by the director in the schools of our countries. Quality requires a new type of leadership based on personal experience and conviction, and not necessarily on schooling, age or rank. He achieves more with a coherent example to his life, with the values he proclaims and with his consistency, than with the authority that comes from his position.

#### IX. VIRTUAL LEARNING ENVIRONMENTS AND THE IMPORTANCE OF SOCIO-AFFECTIVITY

The proposed management model should see other areas that, as noted, have a great importance in the explanation of poor academic performance and, even more, in the university dropout. It is not just about establishing processes to optimize the always scarce resources in a public university. The management model should not be embedded in an economic vision of education. However, incorporating the socio-affectivity theme and virtual learning environments will be a "good investment" in the medium and long term because it will obtain better academic results and optimize resources.

The processes of organizational quality and academic development should be focused on the virtual learning environments and on the student, as well as encouraging the latter to become involved in the self-construction of their knowledge. In any case, socio-affectivity should be a fundamental condition of virtual programs, an idea also expressed by the Northern Catholic University Foundation:

Thus, as virtual educational environments are spaces for communication between human beings, socio-affectivity does not lose its essence there, and is, as in the face-to-face modality, in turn the input and result of educational actions typical of curricular formalization or implications of the context. In these environments, learning about values and attitudes are not absent, but they are different. That is, they reach the student through the same commitment that determines the virtual educational environment and the communication needs that are established among the participants (2005: 179).

## X. MANAGEMENT MODEL: STUDENTS' INVOLVEMENT IN THE LEARNING PROCESS

So far we have reflected on the virtues that constructivism has especially in virtual learning environments. Managers, academics and administrators must be very clear about the needs of involving students in their knowledge, which, in addition to improving academic performance, helps facilitate quality management processes.

As established in the definition of virtual education within our proposal, the virtual student must be a "seeker" capable of appropriating new knowledge and experiences regardless of their geospatial limitations, an idea confirmed by Schmelkes in the text "The formation of values in education", when we read the following:

The student learns more, better and more durably, when he makes discoveries and solves problems. A team of teachers interested in improving processes can assume the diversification, expansion and improvement of the quality of the processes that take place inside the classroom to make this possible. The process will begin by knowing how students participate in their school. The team will discover and share the strategies used by the various teachers of the school to encourage the participation of their students. They will document about different practices, used by others, to achieve this purpose. They will investigate the causes why the participation of students in this school is difficult or does not reach the levels that could be expected. There, for example, the team can discover strategies that include changing the disposition of students in the classroom. The results of the work can be analyzed collectively among teams of students. They will discover, perhaps, innovative experiences in which students of various degrees work together on a project, in which the older ones help the younger ones. They will propose solutions to the problems detected. They will be attentive to the process. They will evaluate its effectiveness and will monitor that the problems that previously hindered greater opportunities for participation do not recur (1995: 97).

## XI. AN EXERCISE TO QUANTIFY THE POWER RELATIONS BETWEEN STAKEHOLDERS

The following is an exercise that shows the interrelation between the stakeholders. This activity was created from the game theory and, rather than offering irrefutable quantitative measurements, it is intended to show how the proposed model can be evaluated.

The weight given to each "power relationship pair" is arbitrary and totally dependent on a subjective view of those who elaborate this material. A more objective weighting could be obtained from the debate among a multidisciplinary group of university students.

For analysis purposes, a limited set of stakeholders has been selected and a model based on a double entry matrix has been designed.

Two areas of the management model were studied:

1st area: Establishment of policies to improve administrative and organizational quality.

2nd area: Establishment of policies for the development of virtual learning environments.

Three types of qualification were fixed:

3 = Strong influence in the area at issue

2 = Intermediate influence in the area at issue

1 = Little influence in the area at issue

0 = No influence in the area at issue

The assumptions of the model were:

1. There are a limited number of stakeholders.
2. Single relationships between stakeholders are qualified, that is, only relations between couples are being evaluated.
3. It is assumed that relations between pairs of stakeholders have the same force, independent of meaning. For example, when rating the influence of an area of the relationship between union and directors, it is assumed that the union to directors' relationship is the same as that of directors to unions.
4. It is assumed that, in the case of administrative and organizational policies, the participation of teachers is less important than that of the union.
5. It is assumed that, in the case of academic policies, the participation of teachers is more important than that of the union.

Each matrix shows a maximum score that shows the stakeholder of greater importance due to its influence in the area evaluated. As already noted, the qualification is quite subjective, part of the researcher's perspective,



however, this qualification could also be assigned by developing a workshop between a representative of the selected stakeholders, or a group of multi-disciplinary specialists.

Regarding the area: Establishment of policies to improve administrative and organizational quality, the results were the following:

**Picture 1**

Stakeholder's influence in the creation of Policies to improve administrative and organizational quality												
Stakeholder	Students	Teachers	University managers	Administrative staff	Government	COMMUNITY	Social organizations	Private educational evaluation agencies	Union	Other universities	Private companies	Score
Students	1	1	1	1	0	0	0	0	0	0	0	4
Teachers	1	2	3	1	0	0	0	0	0	0	0	6
University managers	1	3	3	3	0	0	0	2	3	1	1	17
Administrative staff	1	1	3	3	0	0	0	0	3	1	0	12
Government	0	0	0	0	2	0	0	2	1	1	0	6
Community	0	0	0	0	0	0	0	0	0	0	0	0
Social organizations	0	0	0	0	0	0	0	0	0	0	0	0
Private educational evaluation agencies	0	0	2	0	2	0	0	1	0	1	1	7
Union	0	0	3	3	1	0	0	0	3	2	0	12
Other universities	0	0	1	1	1	0	0	1	2	1	1	8
Private companies	0	0	1	0	0	0	0	1	0	1	0	3
Score	4	7	17	12	6	0	0	7	12	8	3	76

The three stakeholders with the greatest power to influence the definition of policies to improve administrative and organizational quality were: University managers, administrative staff and the union.

In the case of the area: Stakeholders' influences in the construction of the Virtual Learning Environment, the results were the following:

**Picture 2**

Stakeholder's influence in the construction of the Virtual Learning Environment												
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Stakeholder	Students	Teachers	University managers	Administrative staff	Government	Community	Social organizations	Private educational evaluation agencies	Union	Other universities	Private companies	Score
Students	3	3	3	1	1	2	0	1	1	1	0	16
Teachers	3	2	3	1	1	2	0	1	1	1	0	15
University managers	3	3	2	1	1	2	0	1	1	1	0	15
Administrative staff	1	1	1	1	1	0	0	0	1	1	0	7
Government	1	1	1	1	1	0	0	1	1	1	0	8
Community	2	2	2	0	0	1	0	0	0	0	0	7
Social organizations	0	0	0	0	0	0	0	0	0	0	0	0
Private educational evaluation agencies	1	1	1	0	1	0	0	1	0	1	1	7
Union	1	1	1	1	1	0	0	0	1	1	0	7
Other universities	1	1	1	1	1	0	0	1	1	1	0	8
Private companies	0	0	0	0	0	0	0	1	0	0	0	1
Score	16	15	15	7	8	7	0	7	7	8	1	91

The three stakeholders with the greatest power of influence in the construction of the Virtual Learning Environments were: the students, the teachers and the university directors, the administrative staff and the union.

## XII. CONCLUSIONS

The construction of a management model will systematize a global vision of the virtual university and will lay the foundations to design management and quality policies in the search to reach the SDGs. The student, the virtual environments and the strategic stakeholders must be cornerstones to consolidate it, framed by the 17 SDGs.

With all this, a series of ideas has been generated to contribute and promote the debate for the construction of a management model for the virtual university of the 21st century. Our contribution has come from models made by scholars and specialists.

The universities, as it is seen, are atypical organizations and with particularities that make them different from the others, however, like any organization with a vision, objectives and strategies, it must have a relevant management model.

As has been pointed out, based on management models already developed, a management model has been proposed that is characterized by incorporating the vision of the stakeholders and putting the student at the center of the model, as well as the virtual learning systems and self-construction of knowledge.

A quantitative model was developed that shows an alternative to study the relationships between the various stakeholders. This exercise, as far as it was investigated, had not been carried out, reason why it is expected that it will stimulate the restlessness of the students and academics.

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