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EDITOR'S LETTER

Welcome to the XXI issue of the magazine Espacio I+D: Innovación más Desarrollo of the Universidad Autónoma de Chiapas. With this issue, we close volume VIII and congratulate ourselves on the advances that have been achieved in terms of good editorial practices, thanks to the innovations that the new indexes to which the magazine has been postulated oblige.

This number is made up of various publications from several national institutions such as UNAM, UNISON, UJAT and of course UNACH. The articles are: Geometric and mechanical properties of hollow concrete blocks manufactured in the area of Tuxtla Gutiérrez (Chiapas, Mexico), "Elite". Approaches to a concept, Gender and mediation: the male figure on television, Analysis of the effect of wetting on the stability of a side slope of the Grijalva river, in the state of Tabasco, Present bias, financial sources and productive variables: evidence of a group of milk producers in Hermosillo, Sonora, Axial stress-strain curves for two Bamboo species (*Guadua Angustifolia Kunth* and *Bambusa Oldhamii*), Radical images committed in the immediate situations of the production of the technical school council, Politics and literary creation in Chiapas' press (1910-1912). An academic document from the Universidad de Ciencias y Artes de Chiapas is also presented, titled Results on the walls of the dental service when recycling lead lamellae, from the X-ray cabinet, at the School of Dental Sciences and Public Health.

Two different stories can be found in the multimedia content: one academic dedicated to know the activities that are carried out within the framework of the Specialty in Family Farming and business, to disseminate the work that the university develops in the matter and improve its social reception, expanding its social impact. On the other hand, the cultural story is dedicated to the life and work of José Emilio Grajales, author of the Hymn to Chiapas.

In addition, in this new issue we have new functions for authors such as the possibility of downloading in PDF format data on the number of downloads in the various formats, visits and citations of all articles by magazine number or each article. It is worth mentioning that they are data collected and constantly updated by the magazine and stored in the database, available at all times.

We hope that you continue to collaborate with this institutional publication, which every day achieves greater visibility and a projection of knowledge and technological exchange of Chiapas researchers to the world.

Enjoy this Space of Innovation!

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

The editors

ARTICLES

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GEOMETRIC AND MECHANICAL PROPERTIES OF HOLLOW CONCRETE BLOCKS MANUFACTURED IN THE AREA OF TUXTLA GUTIÉRREZ (CHIAPAS, MEX)

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— Abstract—

This paper presents the results of a series of tests for geometric and mechanical characterization of concrete block (from 8 local factories) and cement mortar used in masonry in the region of Tuxtla Gutierrez. The laboratory tests were performed according to standards and protocols of Mexican organisms. The results of the analyzed samples show that the height of the blocks is very variable and differs from the standard values while the other dimensions and wall thicknesses comply with the regulations. The compressive strength of the mortar specimens is good (4 times higher than required). The total water absorption of the blocks is greater than the maximum allowed (12%) in half of cases tested, but the volumetric weight does not reach, in any case, the minimum one required (1700 kg/m^3). The compression strength of individual pieces and block piles (manmade with type I mortar) is much lower than that required in the regulations (60 kg/cm^2 and 50 kg/cm^2 respectively). The quality and poor strength shown by the tests carried out warn of the need for regulation and local control of the block manufacturing process.

Keywords

Concrete block, mechanical testing, compression resistance, masonry, regulation.

The concrete block (CB) is a basic housing construction material in Mexico, being the most used in the construction of masonry walls. In Tuxtla Gutierrez, as in many other regions of developing countries, geometric and mechanical characteristics are used without evaluating in the laboratory, the pieces of CB manufactured in their environment, which are mostly used. It is often forgotten that these real characteristics are those that must be taken into account, both in the project and in the execution phase to ensure a building with adequate structural response to different types of solicitations, including seismic in active regions.

A large part of social interest houses that are built in Mexico, are buildings of one and two levels, based on masonry and concrete walls, which must withstand vertical and horizontal loads. In large cities, such as Mexico City, the construction of apartment buildings of 4 or more levels is common, for this type of housing.

In Mexico, most homes are built based on masonry walls and reinforced concrete slabs. According to the National Institute of Statistics and Geography (INEGI), most of the houses are structures made of masonry brick, CB, brick thick partition, and stone, that in 1990 were 69.5%, increasing to 75.6, 78.9 and 79.5% in 1995, 2000 and 2004, respectively (Castro Hernández et al 2009), and in 2010 they represented 92.0% of urban housing and 65.4% of rural housing (DOF, 2014). In Tuxtla Gutierrez, 47% of social interest homes are built of masonry walls of CB (Argüello Méndez et al, 2012).

Concrete block is a modular element, manufactured by molding concrete, which is used in both structural and non-structural masonry. It is a compact, rectangular, three-dimensional, gray-natural and rough surface product that began to be used in Latin America in the first decade of the 20th century. Little by little it has been imposed in the construction industry, especially for the ease of its manufacture and the speed in the progress of work.

The use of concrete blocks implies certain advantages, compared to traditional materials such as brick or adobe. It is a versatile material and its uniformity allows the walls to be raised to be completely vertical. The vertical cells of the concrete blocks in the walls are very useful because inside them you can place the vertical reinforcing steel, electrical and hydro-sanitary installations, among others. This avoids perforations in the walls and accelerates the placement of the mentioned systems, which saves a lot of time and labor.

The virtues of this material do not end here, because if they are manufactured or cut in a “U” shape they can be used to build the upper reinforcements of door frames and window openings, also known as lintels. Using this procedure saves time, and a good amount of material. It should be noted that the concrete blocks have a great adhesion to the coatings due to their texture; they are of low absorption, which

avoids a bad adhesion by contraction, and have a high compatibility with cement-based elements. In addition, it is possible, for example, to increase its thermal and acoustic insulation capacity by filling the vertical perforations with specific materials for that purpose.

Due to the widespread use of concrete blocks in buildings, both in wall-based constructions and in other types of structures, the construction industry has to produce large quantities of this material to meet this high demand. It has been found that the compressive strength of the brick or block is one of the most important structural characteristics, in particular the strength of concrete parts depends mainly on the quality control of the manufacturing process and the level of industrialization of the plant (Alcocer, 1997). Therefore, these quality controls must be established to ensure the safety of end users of wall constructions with this material.

As an example we will cite some research carried out to identify the geometric and mechanical characteristics of CB's masonry. The vast majority of experimental studies developed in masonry in the world have been devoted to the study of the mechanical properties of materials. In Mexico, the research carried out in the 70's by Professor Meli (1975), which included the study of the variability of the component materials, the determination of basic properties of the masonry in trials of small specimens, the study of behavior before lateral loads in one direction and before alternating loads. This work allowed to improve the design recommendations for masonry structures in Mexico.

Tena et al (2007) researched the response to cyclic loading of mixed masonry walls (based on brick pieces and concrete blocks) and confined. They performed tests of the compressive strength of 12×18×38 cm^3 block pieces and of the adhesive mortar according to the protocol for the Technical Standards for Design and Construction of Masonry Structures (NTCM-17) and the standards of the National Standardization Body and Certification of Construction and Building (ONNCCE). Their results indicate that the properties of the blocks are bad (poor) in general, and do not meet the requirements of Mexican standards, except for the rupture module, which was relatively high (f_r = 8.14 kg/cm^2 ≅ 0.17 $\overline{f}_p$, were $\overline{f}_p$ is the average of the compressive strength of the pieces, referred to the gross area), greater than the minimum value of 5 kg/cm^2 required in NMX-C-404-2012-ONNCCE. The mortar compression test gave a design index strength f_j^* = 136.6 kg/cm^2, greater than the 125 kg/cm^2 established in the NTCM-17 for a type I mortar.

Morales Padilla (2008) worked on the compressive strength of concrete blocks in the Perote region, following the ONNCCE standards. Specimens of 12×20×40 cm^3 were evaluated from three suppliers in this region. The results indicated that none of the suppliers complies with the minimum

resistance of 60 kg/cm² required by the regulations, the maximum calculated being the average compressive strength of 36 kg/cm² -only 60% of what the regulations require-.

We will mention some of the work done in other Latin American countries, for example, in Peru Quiun et al (2007) tested 60 masonry piles with axial compression, built with brick and CB pieces, to experimentally determine the correction coefficients applicable to the characteristic resistance f_m' (f_m^* in Mexican regulations) in columns that have slenderness other than the nominal value indicated by Peruvian regulations -5 for the National Training Service for the Construction Industry (SENCICO, 2004) and 2 for the National Institute for the Defense of Competition and Intellectual Property (INDECOPI, 2003) -. The results indicated that the correction coefficients were slightly lower than the values of SENCICO, and lower than those of INDECOPI, 2003 - which are the same as those of the American Society for Testing and Materials (ASTM, 2003) -

Also in Peru, San Bartolomé et al (2007) researched how to improve block-mortar adhesion by using additives (in liquid and powder). Axial and diagonal compression tests were performed on masonry piles, and significant improvements in adhesion were achieved when powder additive was used in the mortar, without altering the compressive strength of the masonry.

In El Salvador, Arias Guevara et al (2013) conducted a comprehensive study on the quality of CB through volumetric weight, absorption and compression resistance tests using parts from six local suppliers. The tests were performed according to the ASTM C 90-99a protocol, which indicates the requirements on the physical properties that the concrete parts must meet. For the determination of the quality control of the blocks, samples were taken from several semi-industrialized factories, for the corresponding sampling. The results showed that the average compressive strength of individual pieces is between 77.93 and 56.74 kg/cm², none of the resistance obtained from the blocks made by the factories under study reached the minimum resistance required by the standard of 133 kg/cm². On the other hand, ASTM C-90 establishes a maximum absorption of 240 kg/m³, which met most of the parts tested, except for a supplier that presented an average absorption of 291.16 kg/m³. As regards density, ASTM C-90 indicates that parts with density between 1682 and 2000 kg/m³ are considered medium weight, thus, five of the lots presented medium weight parts (with densities between 1694.13 and 1948.00 kg/m³) and one of them was of normal weight (with a density of 2079.46 kg/m³).

Navas Carro and Fonseca Mojica (2016) analyzed the results obtained in previous studies on CB masonry in Costa Rica. For pieces of 12×20×40 cm, they found that the values of the individual density of the blocks tested are

2067 kg/m³ (dry condition) and 2243 kg/m³ (saturated condition), values considered as normal weight according to the ASTM C-90.

In Chiapas, despite the wide and attractive use of this material, there is a lack of sufficient studies on the geometric and mechanical characterization of the locally manufactured CB, which allow for a realistic calculation of this type of construction and thus achieve convenient levels of structural safety. On the other hand, there is also no regional construction regulation for the design of structures with this manufacture system. The current construction regulation for Tuxtla Gutierrez does not include a section that addresses the design of masonry buildings or recommends the quality of the masonry elements used.

The ignorance of the geometric characteristics and mechanical properties of this material can lead to hypotheses of incorrect calculation of wall buildings, which can lead, for example, to the presence of cracks in the face of extraordinary phenomena, and even jeopardize their structural functionality. The study of masonry pieces does not only include its compression capacity, other characteristics such as geometry, volumetric weight and moisture absorption must also be evaluated. In addition, the capacity of the mortar that is used to glue the concrete blocks must be known.

Due to the absence of specific regulations in Chiapas, in Tuxtla Gutierrez there is no regulation of the quality of the CB produced by the different manufacturers in the region. As a consequence, there is no uniformity in the manufacture of this material, and in general the blocks are of doubtful and deficient quality, which, in the case of an extraordinary seismic solicitation, can put the structures built with this system and its occupants at risk.

This paper presents the results of controlled tests in the laboratory in concrete blocks, from 8 different suppliers in Tuxtla Gutierrez, and of the adhesive mortar, to be able to estimate the behavior of wall structures. The tests were carried out, from September 2016 to May 2017, in the Laboratory of Soil Mechanics and Materials Resistance, of the Faculty of Engineering of the Universidad Autonoma de Chiapas, in accordance with the protocol indicated in the NTCM-17 standards and ONNCCE. The following tests were considered: geometry measurement, total water absorption, cement-sand adhesive mortar capacity, compressive strength in individual parts and block piles. This is a first approximation to the geometric characteristics and mechanical properties of this material, therefore, only simple compression tests were considered during the tests performed. At a later stage, shear or diagonal tension, adhesion and flexural tests will be carried out to achieve a better approximation to the physical reality of the hollow concrete block. The tests carried out are described below and their results are discussed.

PERFORMED TESTS

The necessary material was prepared in accordance with the recommendations of the aforementioned regulations (NTCM-04, ONNCCE). Thus, for each of the 8 lots tested (with BC from each of the suppliers) the following number of pieces were used for each test:

- Geometry characterization: 10 pieces
- Initial water absorption: 10 pieces
- Simple compressive strength: 10 pieces
- Compressive strength of piles: 3 pieces per battery (3 batteries tested).

Therefore a minimum of 29 pieces were needed for each supplier, but foreseeing some kind of alteration of the material by transport, handling or other unforeseen events, several more pieces were acquired for each lot.

Adhesive mortar

To perform the necessary tests of adhesive mortar, cement was used for masonry, with the characteristics recommended by NMX-C-021-ONNCCE-2015 and NMX-C-414-ONNCCE-2017. The tests with pieces of CB, mortar and batteries of CB were carried out in the Laboratory of Soil Mechanics and Resistance of Materials, of the Faculty of Engineering of the Universidad Autónoma de Chiapas.

Mortar tests were carried out in accordance with NMX-C-464-ONNCCE-2010. Steel molds with dimensions of 5×5×5 cm^3 were used to prepare the mortar specimens. In the tests carried out, the ratio most commonly used for adhesive mortar was used in local professional practice of 1:3 (sand-cement, mortar classified as type I according to NTCM-17).

Mortar paste was prepared considering NMX-C-021-ONNCCE-2015 and NMX-C-061-ONNCCE-2015. With this paste the molds were filled in half, the contents were flatten, they were filled again and each mold was flush. In total, 24 specimens were made, which were stored for 3, 7, 14 and 28 days, respectively. At the end of each period, 6 specimens **were tested under compression** (see Image 1), until the 24 prepared samples were definitively tested. The results for the 28-day specimens are shown in Table 1.

Image 1. Mortar cube test in universal press

Table 1
Compression test results of the 28-day mortar specimens

Test tube number	Final load (kg)	Compression strength (kg/cm²)
1	6321.00	245.43
2	6295.00	246.86
3	6348.00	253.92
4	6290.00	246.67
5	6268.00	250.72
6	6353.00	249.14

The average value of the final load applied (Table 1) was 6312.50 kg, with a standard deviation (σ) of 33.96 kg and that of the compressive strength was 248.79 kg/cm², with a σ of 3.12 kg/cm².

According to NTCM-17 the design resistance f_j^* of the mortar specimens is calculated with the following expression:

$$f_j^* = \frac{f_j}{1 + 2.5C_j} \quad (1)$$

Where f_j is the average compressive strength of mortar cubes and C_j is the coefficient of variation of the mortar's compressive strength, which in no case will be taken less than 0.20. Table 2 presents the results of f_j^* after applying in the expression (1) the values of the compressive strengths of Table 1.

Table 2
Compressive design strength of the 28-day mortar specimens

Test tube number	f_j^* (kg/cm²)
1	163.62
2	164.57
3	169.28
4	164.45
5	167.15
6	166.09

For the data in Table 2, the mean value of the compressive design resistance and its standard deviation are 165.86 kg/cm² and 2.10 kg/cm², respectively.

Geometric characterization of blocks

For the geometric characterization of the blocks, 10 blocks were chosen for each supplier, as indicated by NMX-C-038-ONNCCE-2013, and their geometric dimensions were measured with a "king's foot" gauge and a support ruler. They were registered: length, height, width, and thickness of walls and interior of holes. Neither the striatum nor the relief were measured, since the pieces did not have these characteristics. The average and standard deviation of the dimensions recorded for each lot were obtained, as well as for the whole set of pieces (see Table 3).

The wall thicknesses of the pieces of each batch were also measured, calling e1 to the thickness of the walls in the longitudinal direction, and e2 to the thickness of the walls in the transverse direction. The average values obtained from these thicknesses and their standard deviations are shown in Table 4.

Table 3
Average value and standard deviation of the CB's geometric dimensions

Supplier	Length (cm)	σ Length (cm)	Width (cm)	σ Width (cm)	High (cm)	σ High (cm)
1	39.98	0.10	11.98	0.03	19.21	0.44
2	39.90	0.15	11.93	0.08	19.90	0.13
3	39.86	0.11	11.91	0.07	18.76	0.26
4	39.91	0.08	11.95	0.10	19.84	0.16
5	39.82	0.16	12.02	0.08	20.09	0.35
6	40.14	0.07	12.07	0.11	19.35	0.17
7	39.97	0.04	11.99	0.04	19.83	0.13
8	39.97	0.06	12.00	0.04	19.89	0.15
All	39.94	0.14	12.00	0.04	19.61	0.49

Table 4
Average value and standard deviation of wall thicknesses

Supplier	e1 (mm)	σ e1 (mm)	e2 (mm)	σ e2 (mm)
1	26.83	0.60	25.80	0.64
2	26.67	0.52	24.80	0.58
3	26.91	0.52	25.00	0.52
4	27.59	1.12	25.38	0.68
5	31.96	0.83	29.26	0.68
6	41.25	1.88	28.98	0.78
7	27.02	0.34	27.60	0.28
8	30.28	1.20	31.17	0.44
All	29.81	4.81	27.25	2.30

Water absorption

The volumetric water absorption test (see Image 2) was carried out according to NMX-C-404-ONNCCE-2005. The samples, previously identified by their origin and piece number, were carefully dried and weighed. This weight is called *Ms* (dry mass of specimen). Subsequently the specimens were immersed in water at the temperature indicated by the standard, between 17° and 23°, for a period of 24 hours. After 24 hours they were removed from the container in which they were deposited, and water was removed on all surfaces of the block (faces, gaps and walls). They were then weighed again, and this weight is called *Msss* (saturated and superficially dry mass).

With the data obtained from *Ms* and *Msss*, the volumetric absorption (*A*) was calculated in percentage in 24 hours with the following expression:

$$A = \frac{Msss - Ms}{Ms} \times 100 \qquad (2)$$

Image 2. Photography showing different stages of the water absorption test

Table 5
Average value and standard deviation of water absorption

Supplier	Average dry weight (kg)	σ Dry (kg)	Average saturated weight (kg)	σ Saturated (kg)	Average % of humidity	σ Humidity (%)
1	11.90	0.21	12.94	0.19	8.81	2.31
2	11.97	0.20	12.84	0.28	7.27	1.15
3	12.34	0.32	13.53	0.38	9.61	1.69
4	11.68	0.32	12.67	0.23	8.55	1.64
5	12.28	0.23	14.39	0.28	17.15	1.10
6	11.96	0.17	13.49	0.38	12.74	2.27
7	11.71	0.21	12.84	0.24	9.65	3.29
8	12.82	0.13	14.04	0.12	9.56	2.76
All	12.08	0.42	13.34	0.65	10.42	3.29

Volumetric weight

The volumetric weight of each block was obtained by dividing its weight by the volume of the piece. The NTCM-17 indicates the minimum specific weights for each type of masonry piece, which in the case of the CB must be 1700 kg/m³. The average specific weights - and their typical deviations - of each lot and of the total population sampled, are indicated in Table 6.

Table 6
Average value and standard deviation of volumetric weight

Supplier	Volumetric weight (kg/m³)	σ Volumetric weight (kg/m³)
1	1239.06	22.16
2	1246.36	21.13
3	1285.42	33.20
4	1216.15	32.87
5	1279.17	24.21
6	1245.83	18.18
7	1219.79	21.80
8	1334.90	13.68
All	1258.33	43.86

Compression of individual parts

Compression tests of both individual parts and piles (NMX-C-404-ONNC-CE-2005, NMX-C-464-ONNCCE-2010, NMX-C-036-ONNCCE-2013), require the preparation of a pitching. This is a process of modification of the contact surface, which is necessary for the applied load to be distributed evenly throughout the contact area between the block and the press. The pitch must be done on both sides of the piece (see Image 3). Table 7 shows the average values of rupture load and compression stress along with their standard deviations of compression tests performed on individual parts.

Table 7
Average value and standard deviation of rupture load and compressive strength in individual parts

Supplier	Rupture load (kg)	σ Load (kg)	Compressive strength (kg/cm²)	σ Strength (kg/cm²)
1	6524.60	1738.38	13.62	3.61
2	14307.90	2839.70	30.06	5.98
3	8574.80	2013.00	18.06	4.20
4	9253.20	3016.09	19.39	6.27
5	6091.60	296.44	12.73	0.61
6	25089.70	413.06	51.80	1.08
7	31415.20	717.12	65.56	1.64
8	24896.30	530.66	51.91	1.19
All	15769.16	9501.53	32.89	19.73

Image 3. Individual pieces with sulfur pitch

The NTCM-04 indicates that the design resistance of individual parts should be calculated according to the expression:

$$f_p^* = \frac{f_p}{1 + 2.5C_p} \qquad (3)$$

Where f_p is the average of the compressive strength of the pieces, referred to the gross area and C_p is the coefficient of variation of the compressive strength of the pieces; the value of C_p will not be taken less than 0.35 for artisanal production pieces. Design resistances were calculated using expression 3. Table 8 shows the average values and their typical deviations.

Table 8
Average value and standard deviation of the compressive design resistance of individual parts

Supplier	f_p^* (kg/cm²)	σf_p^* (kg/cm²)
1	7.26	1.93
2	16.03	3.19
3	9.63	2.24
4	10.34	3.34
5	6.79	0.33
6	27.63	0.58
7	34.97	0.87
8	27.69	0.63
All	17.54	10.52

Pile compression

Three-piece piles were constructed as indicated by NMX-C-464-ONNCCE-2010. A nod was applied to the pieces of the ends, the blocks were bonded with mortar with a 1:0:3 ratio, common in local practice. Figure 4 shows as an example one of the compressed piles.

Image 4. Compression test in block piles

The specimens were subjected to **compression loading** until rupture and the corresponding effort was calculated for each pile. From this effort the corrected compressive strength of the pile f_m was obtained according to:

$$f_m = \frac{P}{t \times b} \times \text{slenderness corrective factor} \qquad (4)$$

In the previous expression f_m is the corrected compressive strength of the pile (in MPa or in kg/cm²), P is the maximum applied load (in N or in kg), t is the thickness of the pile (in mm or cm), b is the width of the pile (in mm or cm). The factor depends on the slenderness ratio of the pile, which is calculated as the ratio between its height and the smaller cross-sectional dimension, in this work a corrective factor of 1.05 was used, which corresponds to a slenderness ratio of 5- according to the NTCM-17.

The NTCM-17 also indicates that the value of the compressive design resistance is calculated from the following expression:

$$f_m^* = \frac{f_m}{1 + 2.5C_m} \quad (5)$$

In which f_m^* is the compressive design resistance and C_m is a coefficient of variation of the compressive strength of masonry piles, which in no case shall be taken below 0.15. Table 9 presents the average values and their typical deviations of breaking load, corrected resistance and compressive design resistance in piles.

Table 9
Average value and standard deviation of breaking load, corrected resistance and compressive design resistance in piles

Supplier	Breaking load (kg)	σ oad (kg)	f_m (kg/cm²)	σf_m (kg/cm²)	σf^*_m (kg/cm²)	σf^*_m (kg/cm²)
1	5043.67	488.46	11.08	1.06	8.06	0.77
2	3789.33	386.16	8.42	0.98	6.12	0.71
3	5176.67	412.92	11.35	0.77	8.25	0.56
4	4565.00	430.69	10.08	0.91	7.33	0.66
5	3583.00	32.19	7.79	0.05	5.67	0.04
6	11266.00	380.25	24.27	0.57	17.65	0.41
7	25975.67	567.18	56.23	0.59	40.89	0.43
8	16898.67	189.22	36.75	1.04	26.73	0.76
All	9537.25	7751.62	20.75	16.73	15.09	12.17

DISCUSSION OF RESULTS

Adhesive mortar quality

It should be remembered that the main function of the adhesive mortar is to provide a good adhesion of the masonry pieces, which is achieved with a good dosage, such that it provides adequate consistency, sufficient resistance (to compression and bending) and an appropriate capacity to retain water. In turn, the compressive strength of the mortar depends on the water-cement ratio and especially on the granulometry of the sand, which is established by the fineness modulus.

The tests performed show an acceptable behavior of the mortar tested. In the NTCM-17 and NMX-C-464-ONNCCE-2010, it is indicated that the minimum

compressive strength required of the adhesive mortar must be 40 kg/cm². The results found (see Table 2) show that the mortar considered complies satisfactorily with what is required by current regulations. It is noted that this material is of good quality (type I mortar according to NTCM-17), and that the 1:3 ratio that is used in local practice is adequate.

Geometric characteristics of the blocks

The regularity of the geometric dimensions of concrete blocks is a feature that depends largely on the manufacturing process. This uniformity facilitates the determination of representative properties such as: net area, density and moment of inertia; in addition to facilitating calculations of shear and flexural capacity, as well as the determination of stiffness. Therefore, these properties are indispensable for the design of masonry structures.

Lots

The average dimensions of the pieces tested for each of the lots did not show significant deviations in length and width (see Table 3) with respect to the manufacturing dimensions 12×19×40 cm³ considered by NMX-C-404-ONNCCE-2005. However, it should be noted that the height of the CBS had significant deviations, it is also different in each supplier (lack of regularity), and its value differs by more than 5 mm from the standard manufacturing height of said standard, its value closest to the one indicated for the modular dimensions of the blocks (12×20×40 cm3 which includes the 10 mm masonry joint).

This same rule indicates that for pieces with these dimensions the minimum thickness of the walls of the CB must be 20 mm, property that is met in all the pieces evaluated (all thicknesses exceed that minimum value) and also the dispersion with respect to the average is small in each lot (see Table 4). However, it should be remembered that NMX-C-038-ONNCCE-2013 indicates that in the case of block walls exposed to the weather without coating, the minimum thickness should be 30 mm in 90% of the area of said face, therefore, if the tested blocks were used to build walls without an exterior coat, this regulation would not be complied with.

It should be noted that the pieces tested have an average $A_{net} \geq 0.56\ A_{gross}$, which complies with what NMX-C-441-ONNCCE-2013 indicates for non-structural parts ($A_{net} \geq 0.4\ A_{gross}$), and strictly complies with the NMX -C-404-ONNCCE-2012 which, for structural use parts requires that $A_{net} \geq 0.50\ A_{gross}$.

These results indicate that the blocks tested show appreciable variations in height (before current regulations), and therefore in their geometry, and

have a lack of regularity between manufacturers since in the manufacturing process molds of non-standard dimensions are used.

Water absorption level

Water absorption from concrete blocks is an important property because it is related to shrinkage and, to some extent, to the durability of the piece. Its importance also lies in the fact that it directly influences the adhesion between block and mortar, since if it is high, the kneading water of the second disappears before sufficient cement hydration occurs, resulting in a partial or total loss of said adhesion and resistance of the mortar itself.

NMX-C-404-ONNCCE-2005 recommends that for concrete blocks, the maximum absorption should be 12%. This degree of permeability, depending on the manufacturing process of the pieces (vibrated, compacted, forced curing, controlled), benefits the durability of the piece and the adhesion between block and mortar.

The results of the tests (Table 5) indicate that the parts of only half of the suppliers comply with what the standard indicates. In the case of suppliers 5 and 6, the blocks absorb amounts of water that are well above what said standard states, 17.15% and 12.74%, with **σ humidity** of 1.10% and 2.27%, respectively, and in the case of Suppliers 7 and 8, although the average absorption value is somewhat less than 10%, its **σ humidity** of 3.29% and 2.76%, respectively, indicates that some of the pieces have a porosity slightly higher than recommended.

Volumetric weight

The volumetric weight is a quality index that indicates how much space the aggregate occupies in the concrete mix; and this feature can be used to separate good material from bad. A block of good quality is manufactured with an adequate proportion of cement and a sufficient time of vibration and compaction, which causes the level of structural resistance to be raised even more, giving it a higher density, lower moisture absorption and better superficial quality texture. It also influences the water-cement ratio of concrete, because the larger it is, the more porous the paste with which the block is manufactured will be.

The calculated average volumetric weights of concrete blocks are less than 1340 kg/m^3 in all lots (Table 6), which warns that none of the suppliers meets the minimum value of 1700 kg/m^3 required by NTCM-04. This deficit indicates that the pieces studied are too porous and that this deficiency in compactness influences the compressive strength of the material tested.

Compressive strength of individual parts

The compressive strength of concrete blocks is an important feature since the basic function of masonry is to withstand compression loads. This property depends mainly on the density and composition of the CB and its importance can be considered from two points of view: first, the greater the resistance, the greater the durability of the material under extreme weather conditions, and second, the resistance of the pieces affects that of the walls to a greater extent than that of the mortar.

The calculated values of compressive strength of design for individual parts are scarce (Table 8). These values reveal that none of the pieces tested reach the minimum resistance of 60 kg/cm² established by NMX-C-404-ONNCCE-2012. This poor compressive strength, which is only 11.32% (supplier 5) up to 58.28% (supplier 7) of the minimum required strength, implies that the parts tested do not guarantee in any case a good quality masonry, since the concrete blocks must have sufficient mechanical strength to ensure the correct transmission of loads, ensure their durability, and thereby ensure resistant walls.

In addition, NMX-C-441-ONNCCE-2013 points out that for **non-structural** parts the average resistance must be 35 kg/cm², and its minimum resistance is 28 kg/cm², so these pieces are not admissible for non-structural use, except for pieces of supplier 7 that do meet this requirement, those of suppliers 6 and 8 being close to this resistance value.

Compressive strength of piles

The compression test of masonry piles is intended to reproduce in the best possible way the working conditions of the masonry; as a consequence, information is generated that can be used for an adequate structural design of the walls of a building, as well as for a good quality control of the masonry. The test specimens presented a fragile failure, with the development of a vertical crack that cuts the pieces and the mortar; this crack, which began in the pieces and extended to the mortar, is due to lateral expansion caused by the compression applied.

The results achieved show that the compressive design resistance of the piles (see Table 9) ranges from 5.67 kg/cm² (supplier 1) to 40.89 kg/cm² (supplier 7), values that are all below 50 kg/cm² recommended by the NTCM-17 for CB piles made with type I mortar. Despite the good quality of the mortar used for its manufacture, this behavior is dominated by the insufficient compressive strength shown by the individual parts tested.

CONCLUSIONS

In general, the results obtained in controlled tests of concrete blocks manufactured in Tuxtla Gutierrez during 2016 show a poor quality of the pieces tested. The tests reveal that the pieces do not comply with current regulations, with notable deficiencies in their volumetric weight and in their resistance to compression - both individual parts and piles. In addition, a great variability of the parameters measured between batches from different manufacturers has been observed. In other investigations (Tena *et al*, 2007; Morales Padilla, 2008; Arias Guevara et al 2013) it was also determined that the quality of the blocks and the masonry tested does not comply with the reference regulations.

It should be noted that the compressive strength of the adhesive mortar satisfactorily complied, in all cases, with what is required in the NTCM-17 and NMX-C-464-ONNCCE-2010, since the specimens presented capacities for above 40 kg/cm^2, which indicates that the mortar follows the usual local practice is of good quality.

The pieces tested did not show acceptable geometric uniformity in the block height, which exceeded the standard manufacturing height of the standard by more than 5 mm; each manufacturer supplied pieces of different height and in addition, the pieces of one of them showed a great variation in their height. However, it should be noted that the thickness of the block walls did exceed the minimum specified in the regulations in all lots.

The estimated value of volumetric water absorption is very variable among lots tested, and only in half of them is less than 12% required. In the other cases, the excessive permeability of the CB (greater than 17% in a manufacturer) indicates an appreciable loss in the block-mortar adhesion and a lower durability of those pieces.

The volumetric weight values are low and do not reach, in any case, 78% of the minimum required in the NTCM-17 (1700 kg/m^3). This together with the above, shows the convenience of improving the manufacturing process, especially the compaction and vibrating system, to reduce the current porosity. In addition, to reduce or eliminate these deficiencies, manufacturers should make a proper gradation to the sands they use in block manufacturing (in accordance with NMX-C-077-1997-ONNCCE), in order to meet the density that demands the regulation. Arias Guevara *et al* (2013) recommend using a 1:1.5:1 ratio of cement-sand-gravel to achieve parts with optimum absorption, convenient volumetric weight and adequate compressive strength.

The compression tests of the individual parts also showed a very poor and different resistance of the blocks between manufacturers. The compressive

design strength values are between 6.79 and 34.97 kg/cm², well below the minimum resistance of 60 kg/cm² required by NMX-C-404-ONNCCE-2012.

The compression test of piles also showed the poor quality of the blocks to build wall structures. The calculated values of compressive design strength of the batteries are clearly insufficient, between 5.67 kg/cm² and 40.89 kg/cm², and are well below the minimum value of 50 kg/cm² established in the NTCM-04. The good quality of the mortar used did not translate into a better compression performance of the tested batteries, so the compressive strength characteristics of the blocks must be improved.

The results obtained show the need for local regulation and control of the manufacturing process of the concrete block to improve its quality and ensure the resistance of the walls that are manufactured with this material, a necessary condition in the local construction sector in which many of the activities are still handmade.

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ELITE". APPROACHES TO A CONCEPT

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— Abstract—

The concept of "elite" frequently appears in public discussion and in specialized literature in social sciences. However, unlike what happens in this last field, in the media and through the daily informal exchanges, "elite" seems to have multiple meanings that distorts its original meaning. Therefore, it is precisely to step back in the timeline, to its origin. The concept means the way in which it has been problematized and what occurs with it in the contemporary debate.

Keywords

Elite; concept; language; social sciences.

The individual, to communicate, has developed a language composed of words and each one of them corresponds to a varied number of meanings (Sartori, 2015). This causes that, sometimes, those who participate in a conversation are not fully understood because what is said may not represent what is thought; therefore, it is essential to establish a convention on what words mean in certain contexts. Thus, natural sciences, humanities and social sciences –particular contexts where the phenomena that are observed, described, analyzed and explained are very specific– have their own, special language, as opposed to the mother tongue, standard or common use, which is the one that is available to everyone regardless of their training, age or social status (Sartori, 2015).

The individual requires concepts to understand reality and make possible the temporal continuity of their experience; the same goes for the sciences: they need a set of concepts to understand, differentiate, and compare phenomena (Ramírez Plascencia, 2018).

This paper offers an analysis of a concept used in political science, particularly when it comes to the structuring and social stratification, "elite", which is part of the specialized language; that is to say, that this concept has been adopted by the social sciences, and its scholars and practitioners have generated a convention around its meaning to avoid polysemy and reduce errors when identifying and explaining any phenomenon or social group that approaches it. These conventions on what the concepts mean are close to the paradigms: as long as their explanatory capacity is accepted, it won't be necessary to change it, but when they no longer have the capacity to provide analysis tools, it will be necessary to rethink it. The same goes for the concepts: as long as its content explains an object or phenomenon, there will be no need to review it, but when the phenomenon does not correspond to what the concept mentions, then it will be time to reinterpret or add a new one.

According to Kuhn (1986: 13), the paradigms are "scientific achievements universally recognized that, for a time, provide models of problems and solutions to a scientific community." This definition can be transferred to the formation and validity of the concepts. When these are constructed, an observable reality that is interpreted and expresses, of course, the moment in the development of that phenomenon is addressed; therefore, as long as it fits the concept, it will not lose its validity.

II. HISTORICAL NEWS OF THE CONCEPT

"Elite" comes from the French word *élite*, which means "set of the best in society." In turn, *élite* derives from *élire*, which means choosing or choice (Ferrando Badia, 1976). Towards the seventeenth century it acquired a

sense of commercial nature as it served to name the possessors of a special quality. In the eighteenth century, the word began to be used to designate small social groups. The concept "elite", as we now know it, emerged in the nineteenth century as an attempt, from the Social Sciences and language, to explain the new power relations that were appearing in societies.

It was in Italy where the conceptual development had its seat. Gaetano Mosca –first theoretician of the elite and founder of the elitist school– and Vilfredo Pareto –responsible for the worldwide dissemination of the concept and the theory of the "circulation of the elites"–, pioneers in the subject[1], stressed that in social groups, throughout history, a minority ruling class that monopolized, in all its forms, state power relations until such class was displaced by another:

> They decline inexorably when they can no longer exercise the qualities through which they came to power or when they can no longer provide the social service they provided, or when their qualities and the services they provided lose importance in the social environment where they live (Mosca, 2006: 123).

Mosca conceived the history of mankind as the "history of the ruling classes" (Meisel, 1975), his theory was called "the organized minority", whom integrate this minority are all the same: they practice the same trades, they have very similar social and economic origins, and share values and ways of life. These elements generate in the organized minority a sense of belonging, cohesion and solidarity that allows them to deploy strategies to obtain, maintain and increase their power (domination), over a disorganized majority. Consequently, there are, at all times and places, some, the few, who govern and, others, the many, who are governed (Aron, 1996). It was imperative that the ruling class would not be lagged behind. Mosca is the first author to propose a differentiation between elites and masses, holding "as a universal and necessary fact the existence of two 'political classes': a ruling class — always a minority — and a governed class that makes up the majority" (Dupont and Suárez-Íñiguez, 1988: 63).

> In all societies, starting with the moderately developed, which have barely reached the preamble of civilization, to the most educated and strong, there are two kinds of people: the rulers and the ruled. The first, which is always the least numerous, performs all political functions, monopolizes power and

1 Both authors were called "Machiavellian" by Burnham (1949).

> enjoys the advantages that are attached to it. Meanwhile, the second most numerous, is directed and regulated by the first in a more or less legal way, or in a more or less arbitrary and violent way, and it provides, at least apparently, the material and indispensable means of subsistence for the vitality of the political organism (Mosca, 2006: 106).

The same Italian author recognizes the works of Saint-Simon, Taine, Marx and Engels as background in the study of this subject, although there are considerable previous efforts in which some characteristics of the governing groups were mentioned: Plato, Aristotle and, of course, Machiavelli (Dahl, 2010), who in his *Speeches* expressed that the size or form of organization of the city did not matter, at the command levels there is always a small number of individuals; nevertheless, it was he who presented an argument with a scientific intent: based on the observation of the facts and raising it to the rank of constant law. Both authors, Mosca and Pareto, are influenced by positivism, which is no less because in the conceptual elaboration the positive inductive method is used with which they will highlight the unequal character of society, regardless of the historical moment of their constitution and the type of institutional organization they own (Cisneros, 1996).

In sum, the elite is composed of a small group of people, possessing influence, selected based on their capacity and training, who are located at the top of the power structure and access the positions, either through a single or collegiate designation or even through open commission exercises.

The central expression to understand the power that resides in this group is "political formula", composed of the education of the elite and its system of beliefs and values or, in Aaron's terms, the ideology of the political class. Such "political formula" amounts to legitimacy[2]: "The principles of this 'formula' must be rooted in mass consciousness and must not depart too far from these parameters to avoid conflicts, which can threaten the survival of society itself" (Blancha, 2005). Finally, the "political formula" also includes the administrative apparatus that defines the mode and scope of the power links (Blancha, 2015; Baras, 2001).

2 "By legitimacy I understand the fact that a political order is worthy of recognition. The claim of legitimacy refers to the guarantee at the level of social integration of a social identity determined by regulatory means. Legitimations serve to make this claim effective, that is: to show how and why existing institutions (or recommended ones) are adequate to use political power in such a way that the constituted values of social identity come to fruition." Habermas (1981: 266). Cfr. Bendix (2000).

III. CONCEPTUAL PROBLEM

Three approaches to elite formation can be recognized: merit-based theories; those that focus their attention on power, and elite approaches as a social class. The Italian school, represented by the aforementioned Mosca and Pareto, attended the merit of the elite. Pareto considered that its members were people with exceptional or eminent qualities: "The essence of the elite is superiority" (Alonso, 1997) and, for him, the circulation of individuals belonging to circles not influencing the position of the elites was imperative. In the elite there is a high degree of inexorable internal cohesion.

Charles Wright Mills (1987), on the other hand, analyzed the American structure of power and concluded that "although personal merit could contribute to a person becoming a member of the elite, the final element of this was his relationship with power" (Solimano, 2015: 43), invigorating the elitist theory of power against pluralist theory.

Mills, in his well-known book *The Power Elite* (1987), postulates that the population of the United States of America has been dominated by a small number of individuals that make up the "power elite": the owners and managers of large corporations, politicians and senior officials, and military commanders are the three sectors that have dominated the command structure in that country. However, there is homogeneity among the elite that is not only based on the structural coincidences of command and interests, but also on the action they take to coordinate their actions, as well as the network of social relations that they maintain with each other; in short, identical social origins, family and personal relationships and exchange of individuals from positions from one sector to another (Mills, 1987; Ruiz-Sánchez, 2009). Mills notes that there is an expansion and centralization of the means of power in the elite.

Finally, in the approaches of elites as a social class, it is necessary to refer to the contribution of Karl Marx and Max Weber. The first, through a comprehensive interpretation of society, defined the social classes in terms of ownership of the means of production, highlighting two large groups: the bourgeoisie, composed of the media, who controlled the wealth, shaped to the institutions and exercised political power; and the proletarians, owners only of their workforce (Solimano, 2015). It was, then, the notion of the ruling class, considering economic exchanges as the engine of history. However, it should be mentioned that social class and elite are different concepts: social class refers to structures integrated by economic processes, while elite is a minority with power and authority.

Max Weber highlights the concentration of the means of administration and violence available to the ruling minority to remain in power (Mejía Quintana and Castro, 2008). This author considers social stratification as a

selection product; that is, each individual is likely to have power based on their actions and the disposition of classes, classes and parties (Duek and Inda, 2006). Weber expresses in a letter to Robert Michels[3] dated 1908 that the elite is the most appropriate word "to speak on behalf of the entire nation" and not the "will of the people", which is a fiction (Zabludovsky, 1995: 28).

Representative democracy does not reject the presence of an organized minority vis-à-vis a passive majority, but in the type of existing elite. The fundamental point is found in "this relationship of inequality and hierarchical subordination [...] based on the contrast between the 'elites that are imposed' and the 'elites that are self-constituted and proposed' (Yturbe, 2007: 114). Let us insist: "The democratic ideology [...] does not suffer great damage, making itself seen in the arm of the theory of elites" (Yturbe, 2007: 115).

IV. CONTEMPORARY DEBATE AS A CONCLUSION

Globalization has led to a significant concentration of individuals with high levels of education and special talents, originating a new elite, the so-called "talent elite", in the 36 countries considered rich by the Organization for Economic Cooperation and Development (Mejía Quintana and Castro, 2008). Studies on inequality, such as those of Thomas Piketty (2015a, 2015b, 2015c) account for this type of elites.

The economic orientation of the "elite" concept allows us to notice the expressions of discontent in *Occupy Wall Street and We the 99 Percent* in the United States; the *Indignados*, in Spain, the student movement in Chile and the protest movements in Brazil against the celebration of the 2013 FIFA Confederations Cup, the 2014 Soccer World Cup and the 2016 Rio de Janeiro Olympic Games, and Turkey against the First Minister Recep Erdogan, among others. The participants in these mobilizations argued that the results of globalization have disproportionately benefited a small elite, while most see that their prospects for real economic progress decrease (Solimano, 2015).

3 Robert Michels is an author who also studied the forms of social organization, especially within political parties. From the observation made within these types of organizations, the well-known "Iron Law of oligarchy" is the result: "[...] most human beings are predestined, due to the tragic need to submit to the domain of a small minority, to a condition of permanent guardianship, and must agree to build the pedestal of an oligarchy. [...] Reduced to its most concise expression, the fundamental sociological law of political parties [...] can be formulated in the following terms: the organization is what gives rise to the dominion of the elect over the electors, of the presidents over the constituents, of the delegates over the subordinates. Who says organization says oligarchy." (Michels, 2008).

The above is verified with the report *An Economy for the 1%*, prepared by Oxfam, which indicates that in 2015, 62 subjects accumulated the same wealth as 3,600 million people, and that since the beginning of the 19th century, the world's half poorest population has only received one percent of the total increase in world wealth, while half of that "new wealth" has been received by the richest one percent (Oxfam, 2017, 2016, 2014).

The presence of the five monopolies that characterize the "polarizing globalization of contemporary imperialism," according to Samir Amin (2004) can be noted: the monopoly of new technologies; control of financial flows worldwide; control of access to the planet's natural resources; media control, and the monopoly of weapons of mass destruction. Beyond that, and countries are immersed in the globalization process, characterized among other things, by the high level of interconnection and intercommunication through the use of Information and Communication Technologies, these are presented as an alternative to raise the readers indexes. However, Castells asserts that:

This new elite has generated a new debate around democracy. While it is true that democracy, as mentioned earlier, does not face, in principle, the theory of elites, we must bear in mind Joseph Schumpeter's reflection on the democratic elitism he performs in his work *Capitalism, Socialism and Democracy* (2015), which consists in the designation of a minority of individuals by citizens who must take political decisions on their behalf (Fernández Santillán, 2007). Those who embrace elitist theory express that by examining the history of societies it is possible to find a constant: a minority has the ability to dominate the rest of the subjects. However, the influence of the super-rich in the designation process alters the essence of democracy: they, the few, can incur expenses for advertising, research and advice, mobilization; in short, campaign financing, to favor their relatives to the detriment of the original decision of the people.

Individuals, to use the concept to which Schumpeter (2015) resorts, vote for a representative; however, the guarantee that this actually represents the general interests is void (Manin, 1997). Bottomore points out that the existence of elites is incompatible with the postulates of an egalitarian and plebiscitary democracy (Bottomore, 1965; Laurin-Frenette, 1989).[4] The possibility, often materialized, appears that democracy is filtered by money (Jiménez and Solimano, 2012).

4 According to Bottomore, "the political elite can be considered as a leading class in the Marxist sense, in cases where their power is based on economic bases, and in which, therefore, it belongs to a larger group, defined by private ownership of the means of production to whose protection and perpetuation power serves." Laurin-Frenette (1989: 11).

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GENDER AND MEDIATION: THE MALE FIGURE ON TELEVISION

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— Abstract—

Mass media are cultural industries of high consumption amongst Mexican population, becoming a reference to explain the popular culture and the social behavior. From them, television keeps going a high popular influence mass, from messages that seek to respond to the information and entertainment needs of all sectors. In matter of gender and cultural representation, the TV messages associate the masculine figure with the stereotype of the strong, successful and productive man, which ignores a reality of the masculinities in Mexico, transgress the human development and reinforces the inequity between man and women. This situation implies in a silent conflict that violence the Human Rights and the legal environment of the television as a media. That is why is necessary to rule the media and the message in order to transform the traditional structures of power in the democratic systems, taking the cognitive mediation as an alternative method of solution of controversies.

Keywords

Conflict; masculinity; television; cognitive mediation.

Masculinity and femininity are concepts that acquire meaning from the connections between each other, such as social delimitation and cultural opposition. In the case of masculinity, its traditional conceptualization is linked to power, so being a man means having and exercising power, with characteristics such as winning, ordering, achieving goals and being tough, even dominating women and other men.

The masculine demonstration of power means controlling feelings, emotions and emotional needs, to avoid the loss of control and control over others, and the fear of being attributed with feminine characteristics, which are absolutely rejected (Hardy and Jiménez, 2001).

Connell (2003) defines masculinity as a social and historical construction, changing from one culture to another, at different historical moments, throughout the course of each individual's life and between different groups of men according to their social class, race or ethnicity; it is based on physical values that are subsequently transformed into moral values, and that the family, school, media and society in general explicitly and implicitly teach the way in which the subject must think, feel and act as a man (Hardy and Jiménez, 2001).

The construction that Seidler (2000), Cruz (2006) and Montesinos (2005) make of masculinity, is associated with bodily and affective restriction; Corneau (1991) states that these prohibitions are demonstrative forms of masculinity among men. The media spreads this social construction from messages where the male is linked to power and alienated from affectivity, promoting the reproduction of behaviors that are framed in social gender prescriptions, in this regard, Metz notes “Mass communication, especially television, play a transcendental role in the construction of social identity; and their extraordinary diffusion, make them agents par excellence to institute and reaffirm imaginary that perpetuate the gender gaps” (2016: 2).

In that context, men constitute what Orozco (1997) defines as audience: cultural subjects capable of meaning their material and symbolic production, but also of reproducing without questioning the meanings offered in the media; this enables the influence between the receivers of the hegemonic models with which the male figures transmitted by the media are constructed.

This article presents a reflection on the representation of the male figure projected on Mexican open television, based on the exploration of the gender perspective, Human Rights and the Federal Radio and Television Law, to suggest the application of mediation cognitive that promotes more democratic television content on masculinities.

II. MASCULINITY AS A CONFLICT

Human beings form groups when interacting with others, and together they integrate society. Each group represents a culture that reflects and guarantees the permanence of their beliefs, values and actions, so that the multiplicity of conceptions of life makes possible the existence of conflicts.

Regarding gender, it is interesting to explore how each culture determines the recognition of human beings. On the one hand there is the essentialist approach that governs the vision of life based on differential characteristics delimited by biology, inheritance and evolution (such a system recognizes the existence of men and women), and on the other, the perspective of polarization that establishes two different but complementary sides: the masculine and the feminine (Rocha and Díaz, 2011). In Western contemporary society, the sociocultural representation of people is established from birth, considering the genitals of men or women to assign them the male or female gender.

Gender, as conceptualized by Lamas (2002, 2013), attributes feminine and masculine characteristics to each sex, based on the ideas that each culture establishes about sexual differentiation; this symbolic construction determines activities and behaviors for each individual. In turn, Connell (1997) states that gender configures social practice over time.

The concept of gender is used as a reference to determine identity, that is, what individuals decide for themselves when they are aware of their existence, even if it is socially imposed from birth. In the gender identity is the gender role, which are the tasks that each subject performs from their social construction. All these relationships about masculine and feminine are called gender culture.

> Gender culture refers to the set of norms, rules, expectations and myths that are transmitted in multiple ways and through different agents with the purpose of incorporating new individuals into society, ensuring their "optimal" functioning (Rocha and Díaz, 2011: 19).

The starting point of studies with a gender perspective is the recognition of the social and political subordination of women in a social system dominated by men. For Lagarde (1996), the gender perspective has as one of its aims to contribute to the subjective and social construction of a new configuration based on the re-signification of history, society, culture and politics from and with women and men.

> This approach seeks to provide the elements to analyze what happens to women and men of defined historical moments, in their precise generic relationships,

> and also forms the conceptual frameworks in which societies and cultures are interpreted in a complex way: their organization and its imagery, its ritualization, its worldviews, its ideological forms and its forms of dominance, of meekness, of reproduction of the generic political order, of distancing from the canons, of rebellion and of construction of alternatives. And this ranges from personal and intimate relationships, to those that occur customarily and explicitly in the structures of civil society and the State (Caséz, 1998: 108).

The academic production on gender is based on the debate about the power, identity and structuring of social life (Tena, 2014; Castañeda, 2008; Olavarría, 2008); these studies favor interdisciplinary approaches that articulate contributions from large areas of knowledge of human and social sciences, such as sociology, historical analysis, political theory, anthropology, psychology and psychoanalysis (Bonan and Guzmán, 2007).

In the case of masculinity, conceptualizing it implies the risk of limiting it to a stereotype linked to social norms to be a man, excluding men who by decision or obligation do not agree with the traditional meaning of masculinity; including the recognition of multiple masculinities, such as transsexual, transgender, intersex, intergender identities, as well as those who make up vulnerable groups such as indigenous people, senior citizens and adolescents.

The social configuration of masculinity sets expectations of behavior among men, since it demands a constant demonstration of power; failure to do so would cause them a situation of vulnerability in the face of criticism from those who respond to social gender prescriptions.

There are men who even complying with the corresponding code of behavior, do not agree to be considered as the dominant gender because they affirm that there are actions that should not be exclusive to masculinity, but should be shared by the other gender[1], or they have the desire to get involved with tasks considered feminine[2].

Permanence and reproduction of this duality among the most recent generations, has caused what Bell (1987) calls "paradox of masculinity", which is that as men they are educated to maintain the social privileges

1 Men of more recent generations are educated with a greater gender perspective, which makes them sensitive to the search for equity. They are individuals who observe that women around them have ventured into the work field, and that they carry out activities that were previously exclusive to men, such as engineering careers or trades related to construction and transportation.

2 The clearest example is paternity, a right that they have strengthened from the involvement of the male during pregnancy, childbirth and postpartum. More and more men are observed in the care of their children, they even carry out domestic activities such as cooperation for family education.

attributed to the masculine gender, but they are brought up with the idea of gender parity, provoking intrapersonal conflict to decide what is most appropriate for them in relation to women.

The dissident culture, made up of those who criticize polarization and who fight for gender diversity, communes with the idea that masculinity is not exclusive to men, as well as femininity towards women. There are masculine women and feminine men based on their personality characteristics and roles they play in the scenarios where they grow. This perception causes the existence of another conflict that is more of social construction: blindness regarding the construction of being masculine and being feminine.

Family and school, to mention two institutions, are socialization cores where the characteristics assigned to men and women are transmitted, a role that is reinforced, even distorted with mass media content.

In a semantic analysis of the male figure presented in print media, specifically in magazine advertising, the male is visualized as a superior subject, with symbols of power that support the social status acquired by the fact of being a man (Olarte and others, 2015). For Connell (1997) they are dominant men, *alpha males* who excel in a masculine world, where those who do not comply with the stereotype of the physically attractive, strong and successful man, alienate themselves from the privileged sphere to become subordinate and marginalized men, linked in many cases with expressions of femininity

It is appreciated that as men they have a stage in the public space to show themselves as such: they are on the lookout for women to conquer them, thereby fulfilling the requirement of being those who must court in an interpersonal love relationship (Olarte *et al*., 2015).

Although they comply with stereotypes of western men, where thinness, white skin, height and physicality are privileged, it is broken by the belief of man who, being a man, strays from aesthetics and health. Men are shown as subjects who care about their body and physical appearance, their health and well-being; which is why the projected models are young adults, in good shape, which implies health care.

However worrying about health, and sometimes showing certain emotions, does not mean that they show emerging models of masculinity, because the sole care of the appearance, rather than imply wellness, connotes power, and with it, the reproduction of hegemony (Olarte *et al*., 2015).

Another conflict is the ridicule media to which men who do not meet established expectations are subjected, since in many cases they are shown as effeminate subjects, degrading the female gender. In this configuration, very feminine, or transvestite men are perceived, linked to orientation and/or preference other than heterosexuality[3], which give guidance to think that a man with such an identity will always be like a woman.

Those figures of men with masculine characteristics that fulfill roles established since their birth by social gender prescriptions are set aside, and that partly respect the social norms of behavior, but have decided for themselves an orientation, preference and/or sexual identity other than heteronormativity, and therefore do not detract from their existence as a human being, as a person and as a male; however, when others know of such an identity, they are mostly targets of mockery that reflect an exacerbated machismo.

III. ESTERIOTYPES ON TELEVISION

Of the traditional mass media, television is the channel with the greatest social impact, despite the radio domain in semi-urban and rural areas, because its scope is recorded in urban areas[4].

According to the *National Time Use Survey (ENUT)* 2014, the inhabitants in Mexico of 12 years and more use some mass media, for an average of 13 hours per week (INEGI, 2015).

The *Media Performance Yearbook 2011* mentions that the degree of television penetration in homes is very high, since 98.8% have access to this media, in addition to 32.2% having Pay-Tv; there is also at least one television on for more than eight hours per day, and from Monday to Friday 78.5% of consumers tune in to open television channels, which drops to 72.9% on weekends. It is significant that 44% of people with local television spend more time watching open channels (IBOPE AGM Mexico, 2011).

Mexican television has two national channels that dominate the programming through their various channels, while in the closed system the number of television stations increases, they share the quadrant with foreign production. *Las Estrellas* is the channel that concentrates more than one fifth of the national audience, 15% is monopolized by Channel 5, 13% Channel 13, followed by Channel 7 with 9.3% and Channel 9 with 7.3%. The rest is distributed, in tiny fractions, on the other open television channels and between pay channels (IBOPE AGM Mexico, 2011).

Although there is a diversity of programs for all types of audiences, Mexican soap operas and series predominate in Mexican open television as forms of population entertainment.

3 Heterosexuality is the orientation and/or preference that characterizes heteronormative society, as a must for men and women; for that reason it does not know the divergent identities.

4 Population in Mexico during 2010 was 112 million 336 thousand 530 inhabitants, of which 77.8% were located in urban areas, and 22.2% in rural areas (INEGI, 2011).

The *Media Performance Yearbook 2011* indicated that among the top fifteen places of preference in programming, ten were occupied by soap operas; in second order of preferences are sport events and news.

The most successful soap operas reach between 15 and 20% of the total rating, that is, the proportion of the audience that is watching a certain program, compared to the total of the potential audience, which in turn refers to the total number of households with television, whether or not they are on. These programs reach up to 40% rating when the population makes use of television at the time of counting (IBOPE AGM Mexico, 2011).

Such statistics show that television in Mexico does not respond to an educational interest but to lucrative purposes, whose consuming population has a preference for productions that make up or act on reality, with little importance for the facts that truly make sense of reality; that is, soap operas and talk shows have a higher rating than opinion programs.

Television could help work for education in the country, based on programs and messages that build knowledge for life. However, being part of a capitalist system, the television industry responds to interests of the high spheres that dominate programming, making this medium a tool of manipulation and social blindness.

> The educational potential of open television is broad, as demonstrated by the most developed countries in this area. The example of Europe is outstanding but the cases of Latin America (Chile, Brazil, Colombia, Argentina, Uruguay) in which alternatives have been sought and achieved are no exception. Cable television also gives evidence that important market shares can be achieved with programs with a cultural and educational focus. It is above all a matter of defining priorities and substantive work in this area. But it can be done (Rodríguez, 2014).

As a means of socialization, television contributes to form identity, to establish culture, "to build its history from cultural processes as articulators of communication practices with social movements" (Martín-Barbero, 1991: 178).

Practices of men and women who seek gender equality constitute a social movement that has triggered facts to transform the reality of human relationships. It forces to review the history of how men imposed their presence in a patriarchal system and how women should be subordinate in quiet spaces; it boosts to travel the path of feminism to know the achievements of women and claim their role in society; invites us to reflect on the need to investigate men from perspectives that move away the stigma of being the victimizing figure.

From the academic field, the use of television is committed to educational purposes that promote human and community development. From a gender

perspective, the television message should reflect the parity between men and women, so that as a means of communication it disseminates democratic ideas in the generic relationship.

Unfortunately, the reality in media indicates the predominance of sexist language and traditional behavioral patterns for men and women. It is appreciated how the subjects are transformed into objects of power and pleasure, awakening the hedonistic thinking of consumers. In this context, the social construction of masculinity for television is associated with protection, bravery, intelligence, leadership, distinctive and rich, which have codes of behavior and ways of being that maintain the most classical masculinity (Metz, 2009).

In Mexican television, especially in soap operas, series and talk shows, the male figure responds to specific stereotypes: the good and successful are generally subjects with attractive personality, often physically handsome, strong voice, tall, usually white or light brown complexion, in good shape, with aesthetically developed muscles, which represent the traditional ideal of *the* western contemporary man. While men who represent problems or occupy less privileged spaces, are projected as less attractive subjects, with not so graceful bodies, and a series of difficulties for human relationships.

It also reflects the traditional figure of the strong man, macho, heterosexual, homophobic, conqueror and foul; as well as the effeminate man, ridiculed with actions that suggest that every male with female characteristics is homosexual, and in turn, that every homosexual male behaves like a woman.

It is clear that television reproduces stereotypes, assessments that are permeated by the population due to their passivity of reception; this means that rural masculinities, those of the elderly, indigenous people, dissidents, to name a few, have little or no place in the television industry, and if there are any, they are undervalued.

Such an assertion represents one more conflict in gender issues, because this medium reinforces the inequality between men and women, linking the male being with expressions of physical strength, when in reality, it is a social construct that allows a range of forms for the behavior and experience of being masculine.

When projecting figures that do not correspond to the reality of the majority of the men who inhabit this country, there is the possibility that television messages cause cognitive conflict, that is, of thought content, between those who make and consume such messages.

In addition, it is identified that when the male figure is limited to abuse of power, articles 5 and 63 of the Federal Radio and Television Law[5] are

5 The Federal Radio and Television Law was enacted in 1960 during the six-year term of Adolfo López Mateos; its most recent reform was in 2012.

violated. The 5th refers to the social function of television to improve the forms of human coexistence, among others, through respect for morals, human dignity and family ties; in addition to the avoidance of harmful or disruptive influences to the harmonious development of children and youth. The 63rd prohibits all transmissions that cause the corruption of language and contrary to good customs, whether through malicious expressions, words or sassy images, phrases and scenes of double meaning, apology of violence or crime.

When analyzing the behavior of the male figure projected by television, the moral transgression is appreciated (when the married male character is emotionally and sexually linked with more than two women outside the family institution) and human dignity (when presented to a man who is subjected to complicated tests to prove his manhood); In addition, obscene language and violence against others alter the use of language and break with what is considered good manners.

The misrepresentation that television makes of the male figure contributes to establishing a conflict scenario. Perhaps studying men from a historical, biological and cultural perspective has had greater retribution and support than studying women, but it is a reality that in studies about them they are presented as victimizers.

Without debating that role that by tradition and imposition[6] the male has, it is necessary to clarify that the configuration of the male as a male subject should not be limited, let alone affirm that there is only one masculinity. The human being has the right to openly enjoy his existence as he likes, as long as it does not cause discomfort to those around him; women have the same right to openly enjoy their existence as such.

The decisions of being imply the existence of masculinities and feminities, which should be openly reflected by the media, and avoid those limitations of social construction with respect to men and women with stereotypes that only transgress plurality and freedom.

The one that projects a masculinity and not the masculinities, and the one that distorts the experience of the men who identify themselves as masculine and/or as feminine, violates Human Rights because finally man and woman, masculine and feminine, are human beings with decision capacity

The right to equality is also added because television language symbolizes the inequality and discrimination that exists, not only between men and

6 By tradition because since ancient times men have been considered synonym of power, and by imposition because society assigns them the power to command; this is like expressing that men are violently destined to be violent.

women, but between men and between women; among teenagers, adults and older adults; between individuals from rural and urban areas, between professions, between trades, between diverse activities.

The right to freedom, both personal and sexual, is limited because the existence of prejudice causes social criticism towards the particular decision to be a person; and collective rights are violated by violating peace and freedom to be different. The single projection of the male figure that reproduces patterns of behavior associated with machismo contributes to these violations.

IV. MEDIATION OF THE MEDIA AND THE MESSAGE

The media responds to minority interests because it is the order of the spheres of power. Consumers are seen as passive entities that are easy to manipulate, which will not put any obstacles in absorbing intentionally selected messages as merchandise.

In this context, the transmission of the conceptualized male figure in a patriarchal society will boost the reproduction of hegemony among the subjects, which for the gender perspective represents a conflict. If such a situation is not recognized as such, the social practices of intolerance and discrimination will be maintained.

To avoid the above, it is required that the conflict be recognized by the parties involved, which would represent a first step towards the search for agreements that reduce and/or eliminate the negative effects of the dispute.

This possibility of change requires the responsible participation of those who elaborate and consume the message, and seek the most appropriate means to join efforts aimed at improving gender relations.

If such an approach is appreciated from alternative justice, social justice would be equivalent to the television message that responds to the daily life of men and women in the country, and the most feasible channels to reach an agreement, the alternative methods of conflict resolution.

Cornelio (2014) defines alternative means as various procedures by which people can resolve their disputes, without the need for jurisdictional intervention; such methods are: mediation, negotiation, conciliation and arbitration. The people who participate in these systems can be physical or moral, who voluntarily seek the agreement without attending the courts, which allows faster solution.

In the case of the male figure as a conflict, originated by the television industry, the participation of the medium and the receiver is required to seek the balance of the message (the male figure that responds to all the possibilities of being male). The application of alternative methods of conflict resolution, specifically of mediation, represents an alternative for intervention.

For González (2010) mediation is defined as the structured procedure in which two or more parties in conflict voluntarily attempt to reach an agreement on the resolution of their differences with the support and/or help of a mediator. Aladro (2004) considers that mediation by itself is communication, and when communication occurs, two positions that were disconnected are linked, through a symbiosis between a message and a way of transmitting it, which has created the right channel to do so.

> Mediations are places from which the constraints that delimit and configure the social materiality and expressive culture of television come from (...) Loaded both by the transnationalization processes and by the emergence of new social subjects and cultural identities, communication is becoming a strategic space from which to think about the blockages and contradictions that energize these crossroads societies, halfway between accelerated underdevelopment and compulsive modernization (Martín-Barbero, 1991: 203).

This means that the different spaces where men and women develop give meaning to communication, which, as an exchange process that involves the social context, constructs codes of behavior.

> The same means and their intrinsic characteristics, political and economic determinations, their logics of production and transmission, their loyalties and styles, are a mediation. As are the same audiences, always located, both as members of a culture and several interpretation communities, as well as individuals with specific development, repertoires, mental schemes and scripts for their social performance (Orozco, 1997).

Mediation requires the participation of those involved in the conflict and the figure of a mediator, who is an impartial subject that functions as a channel for the message that the parties issue regarding the dispute, in order to voluntarily reach a total solution or partial to it.

Of the types of mediation, cognitive mediation is resumed because it is the one that seeks to transform the cognitive structures of the subjects. Martín (1985) considers that cognitive mediation provides members of society with stories in which an interpretation of the environment (material, social, ideal) and what happens in it is proposed. Such narratives relate the events that occur with the ends and beliefs in whose preservation certain social groups are interested.

In this article, the social construction of masculinity that is broadcast on television is considered a conflict, so cognitive mediation of the media is necessary in order to transform the means and the message. The suggestion is that television reconstructs the background of the male figure to enable

the cognitive change of the receivers with respect to what is transmitted, especially since television is a channel of impact among the population.

> It seeks to generate new meanings. In this sense, it ceases to be a passive link in the transmission of some constant information between input (sender) and output (receiver). Such is essentially the function of a dialogue as a thinking device. The dialogic function tends to dynamism, heterogeneity and conflict between voices. Instead of trying to receive meanings that reside in the statements of the speakers as something provided by the conduit metaphor, the focus is on how an interlocutor can use texts as if they were thinking devices and respond to them in a way that generates new meanings (Cesca, 2014: 3).

These new meanings in the television message will depend to a large extent on the disposition of those who make the medium, to stick to reality without altering it.

Mediation of the media is proposed as a theory that involves the study of the production, transmission and use of culture, from the analysis of cultural models and their functions; and of the use of this mediation as a procedure of domination or social control influencing people's conscience (Cuchillo, 2009).

It is perhaps utopian that the communicative medium in a capitalist economic system such as that prevailing in western culture, transform its content to respond more to social interests than individuals, but if awareness of the impact that gender-related messages have on the society, surely there will be greater awareness of the need for joint participation of various actors to have a more democratic society.

DISCUSION

Mediation of the media and the message regarding the televised male figure represents an opportunity to transform the conception of masculinity in Mexico. This requires the voluntary participation of social actors who are willing to build a plural society, not only in name but also in action that responds to the demands for recognition of differences.

The reflection from the gender perspective that has been made about the male figure, allows us to identify the need for a cultural industry more committed to the population, which contributes to gender equality and the promotion of healthy human relations.

It also requires the thorough reflection of the masculinity construct which leads to its reconstruction, in order to understand that this social category is not exclusive to men, in addition to the fact that the human being has the right to live his nature as a man to his free decision even when

such experience is contrary to what is socially established for men, without implying his own devaluation.

Change of thought regarding the experience of masculinity is a possible but long and complex process; it depends on everyone, not just men because men and women shape social reality. In this dynamic the participation of the media is necessary; as stated by Cuchillo (2009), the task of the media is to establish the appropriate frameworks for social agents to place themselves in change.

Making television as a means of communication as a social service, not as a way of manipulating the elites, but as channels of rapprochement between the differences, will allow a path to mediate the media and the message.

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ANALYSIS OF THE EFFECT OF WETTING ON THE STABILITY OF A SIDE SLOPE OF THE GRIJALVA RIVER, IN THE STATE OF TABASCO

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— Abstract—

During the rainy season in the Mexican state of Tabasco there are landslides over the rivers that flow through the state, being one of the most affected area *La Manga*. This paper presents the stability analysis evolution of the side slope due to changes over the soils saturation that forms it, going from safety condition to failure condition. In order to achieve this goal, a campaign of field exploration and laboratory tests was first carried out, which allowed obtaining the geometric characteristics of the river bank, as well as the soil properties that constitutes it. From the undisturbed samples obtained in the exploration field, triaxial compression tests were carried out, varying only the degree of saturation of the soil. With the information obtained and through the GeoSlope 2012 software, stability analyses were performed varying only the degree of saturation. The results show that as the degree of saturation increases, the stability of the bank decrease. It was found that exceeding 70% degree of saturation implies a slip hazard condition. Therefore, the monitoring of the soil degree of saturation that constitutes river banks allows to anticipate its failure and, consequently, makes it possible to establish prevention actions.

Keywords

River bank; cohesion; stability; safety factor.

Slopes, or hillsides, are inclined surfaces regarding the horizontal surfaces that the soil structures must adopt, either of natural origin or product of man activity during the execution of civil works (Juárez and Rico, 2005). Slopes are present in civil works such as dams, excavations, tunnels, river banks, sanitary landfills, etc. Historically, in Mexico there have been landslides of natural and artificial slopes more frequently during the rainy seasons and during seismic events. Geology, relief, the weathering, erosion and tectonic history are factors that condition the slippage of the slopes throughout the world. However, the wetting of the slope constituent material is perhaps one of the most important catalysts for the structural failures of the slopes. During rainfall events, the slopes are exposed to water advance inside their body due to excessive prolonged infiltration. As a consequence of this, the shear strength is rapidly reduced and the volumetric weight of the soil increases (Cho and Lee, 2001; 2002; Ching-Chuan *et al*., 2008; Akay, 2016; Sun *et al*., 2016). The structural slope failures that occur during rainy season do so regardless of the type of soil that composes them and their geometry. This is evidence that the wetting of the building material of the slope is one of the main factors that generate instability. Normally the landslides are shallow (Xie *et al*., 2004). These types of failures are linked to regular rainfall but prolonged periods and can produce positive pore pressures in the body of the slope (Flores-Berrones *et al*., 2003). The deepest failures are linked to decreased suction (Collins and Znidarcic, 2004) and are due to very heavy and prolonged rains (Casagli *et al*., 2005). Much of the landslides occur in areas whose climate implies frequent rains during the year (Tohari *et al*., 2007; Mora-Ortiz and Rojas-González, 2012; Sun *et al*., 2017). Therefore, several researchers (Conte and Troncone, 2017; Wang *et al*., 2018) have worked on methods that attempt to predict slope failures.

The state of Tabasco is located within the rainy tropical zone of the country, with the influence of tropical and northern cyclones. It has a warm humid climate with rains throughout the year being more abundant in the months of June to October (INEGI, s.f .; García Payró, 2015). Tabasco is a flood plain where different rivers converge, among which Tonalá, Grijalva and Usumacinta stand out. The entity is located in the lower part of the Grijalva-Usumacinta basin, a basin that concentrates almost a third of the country's surface water. In the capital of Tabasco, Villahermosa, there are different areas that traditionally have instability of river banks during the rainy seasons. One of these areas is known as *Acachapan* and *Colmena*. This research intends to determine the effect of soil moistening on the instability of one of the river banks that passes through said area, specifically a board located in the *La Manga* 2nd section. It is desired to identify the degree of saturation for which the stability of this bank is at risk. The objective of this

article is to establish the first step to create an alert system of bank sliding on the rivers of Tabasco.

METHODOLOGY

The bank under study is located in Colonia *La Manga* 2nd section, municipality of Centro, Tabasco (Image 1). This area was chosen because it is in one of the sectors most affected by the instability of the banks, the so-called *La Manga* sector. Once the study area was chosen, it was necessary to have the bank's geometric characteristics and the properties of the soil that composes it. To achieve the above, a field recognition campaign was carried out where, using topographic equipment, the geometric profile of the bank was determined. To obtain the characteristics of the bank's constituent soil, three unaltered samples (20 cm cubes per side) were extracted by the Open Pit Mining (PCA) at a depth of 1.5 m following the procedure marked by the NMX-C- 416-ONNCCE-2003 standard.

Image 1. Bank under study location

Table 1 shows the basic soil properties determined in the Soil Mechanics Laboratory of the Universidad Juárez Autónoma de Tabasco (UJAT). The liquid limit (LL) was determined with the Casagrande Method; the plastic limit (PL) with the Atterberg Method, the plasticity index (PI) with the arithmetic difference between the LL and the PL. The specific weights of

soil mass and relative solids were terminated with the laboratory tests that bear its name. All tests were performed following the procedure described in standard NMX-C-416-ONNCCE-2003.

Table 1
Basic characteristics and material classification

Liquid limit (LL)	76 %	**Relative specific weight of solids**	2.64
Plastic limit (PL)	41 %	**USCS* Classification**	MH (High plasticity slime with sand)
Plasticity Index (PI) = LL - LP	35 %	**Degree of saturation (Sr)**	42.20 %
Specific weight of soil mass (γm)	16.83 kN/m^3		0.77

* Unified Soil Classification System

As observed in Table 1, the soil has a high value of the plasticity index (PI≥ 18), which means in engineering terms that it is a material susceptible to decreases in resistance when wet.

The main parameters of the ground that govern the stability of a slope or bank are two: the angle of friction (φ) and cohesion (c). The magnitude of the latter is closely linked to the water content of the soil, so that at large water contents the cohesion values are minimal. That is, the more water the soil has, the lower the cohesion value and, consequently, the lower the stability of the edge. For all the above, monitoring the cohesion values and their respective impact on the stability of the slope allows identifying the critical value of this parameter for which the edge passes from a structural safety state to a fault condition. The best way to determine the values of cohesion (c) and friction angle (φ) is by the laboratory Consolidated-Drained Triaxial test following the classic procedure described by Juárez and Rico (2005).

Since it is desired to know the evolution of the stability of the riverside as the soil that constitutes it is moistened, it is necessary to know the changes in the magnitude of cohesion as the amount of water increases in the soil. For this, triaxial compression tests were performed on different samples of this soil, varying only its water content. Cylindrical specimens 38 mm in diameter and 76 mm high were carved from the unchanged samples that were extracted during the recognition campaign (Image 2). Sample processing is the process through which, using a minor tool such as knives and cutters, unaltered soil samples (20 cm cubes per side) are obtained from cylinder specimens, in order to perform a laboratory test.

Image 2. Processing of specimens for the triaxial test

To obtain the cohesion value corresponding to the driest state of the soil, three specimens were subjected to a progressive drying in the open air avoiding direct contact of the sun's rays to prevent cracking. Subsequently, a triaxial test was performed on the specimens. In this way the cohesion value for the dry state was obtained, which is reached during the dry season.

In order to know the variation in soil cohesion due to different water contents, specimens were carved and, starting from the dry condition (described above), they were moistened three by three by a slight spray of water with the help of an atomizer. To ensure the homogeneity of the moisture in the samples after wetting them, they were placed in sealed containers for 24 hours. At the end of this procedure, seven groups of three specimens were obtained, each group with a different degree of saturation (Table 2). From the driest to the wettest state, various triaxial tests were carried out, which allowed us to know the evolution of cohesion in the soil under study.

Table 2
Cohesion for different degrees of saturation

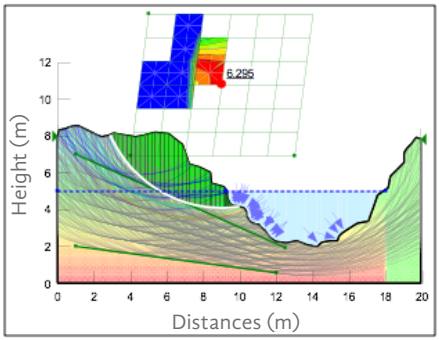
Groups of 3 Specimens	Degree of saturation (Sr)	Cohesion (kN/m²)
1	8 %	57.45
2	14 %	48.77
3	22 %	33.41
4	41 %	25.68
5	67 %	9.27
6	83 %	3.98
7	95 %	0.48

To evaluate the stability of the edge, the Geo-Slope software (2016) was used. This is an international computer program used to assess the stability of

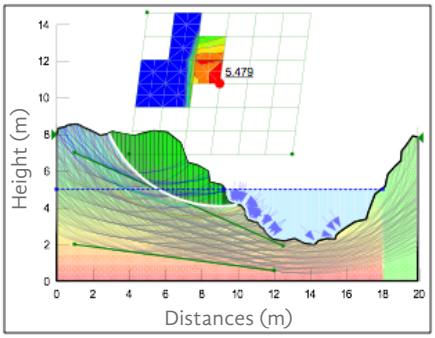
rock and soil slopes in different conditions of load and water table (Gofar *et al*., 2009; Leung *et al*., 2017; Munro and Mohajerani, 2018). The program requires as input data the geometry of the slope, conditions of the water table in the area, cohesion, the specific weight of the material constituting the slope (16.83 kN/m^3) and the angle of friction of the ground (24°). All this information was collected during the field exploration and through laboratory tests.

RESULTS

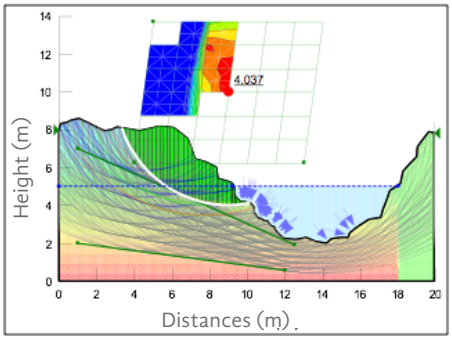
Once the edge's geometric information and the soil characteristics were collected, its stability was analyzed. This analysis consists in quantifying the forces that produce instability, as well as those that oppose the failure. The ratio between the forces that oppose the failure and those that cause it, is known as a safety factor (SF) (Juárez y Rico, 2005; Xiao, 2018). If the numerical value of this factor is less than one (SF ≤ 1), the board is considered to be in fault condition. On the other hand, if it is SF ≥ 1.5, it is estimated that the bank is safe. If the SF is between the two limits mentioned above (1 < SF < 1.5) the edge is considered to be at risk. The method used in this investigation to calculate the SF was the Fellenius method (Juárez and Rico, 2005). This method has been extensively studied, and implemented in analysis of soil slopes, and has shown excellent performance. Image 3 shows the stability analysis of the edge for different cohesion values shown in Table 2. In each analysis a mesh is observed in which the minimum value of the SF is shown. According to Image 3, the highest safety factor corresponds to the highest cohesion condition, that is, to the driest bank. It can be seen that as the degree of saturation increases in the constituent floor of the bank, the safety factor decreases (Image.4). It can be seen, in the results obtained, that the stability of the bank is guaranteed (SF ≥ 1.5) as long as the degree of saturation of the soil that composes it is less than 70% (Image 4).



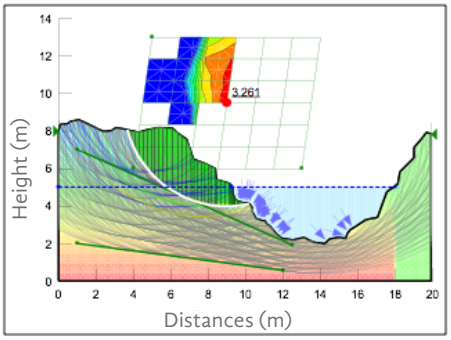
Degree of saturation = 8 %
Cohesion = 57.45 kN/m^2
SF = 6.295



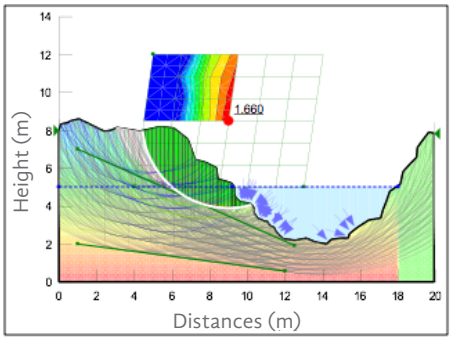
Degree of saturation = 14%
Cohesion = 48.77 kN/m^2
SF = 5.479



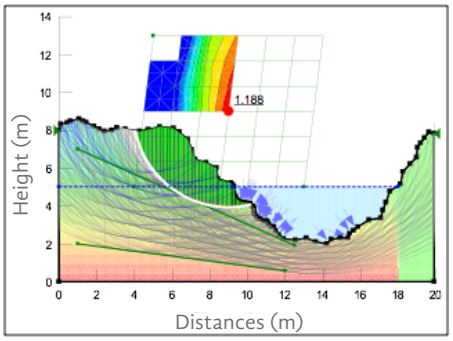
Degree of saturation = 22%
Cohesion = 33.42 kN/m^2
SF = 4.037



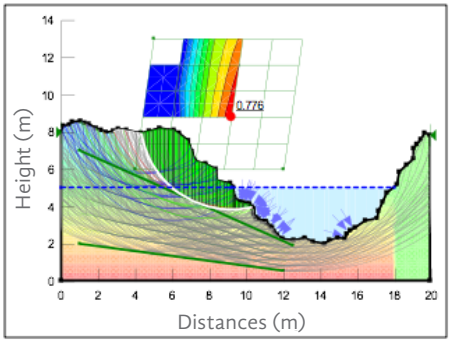
Degree of saturation = 41%
Cohesion = 25.68 kN/m^2
SF = 3.261



Degree of saturation = 67%
Cohesion = 9.27 kN/m^2
SF = 1.660



Degree of saturation = 83%
Cohesion = 3.98 kN/m^2
SF = 1.188



Degree of saturation = 95%
Cohesion = 0.48 kN/m^2
SF = 0.776

Image 3. Analysis of the bank's stability at different degrees of saturation

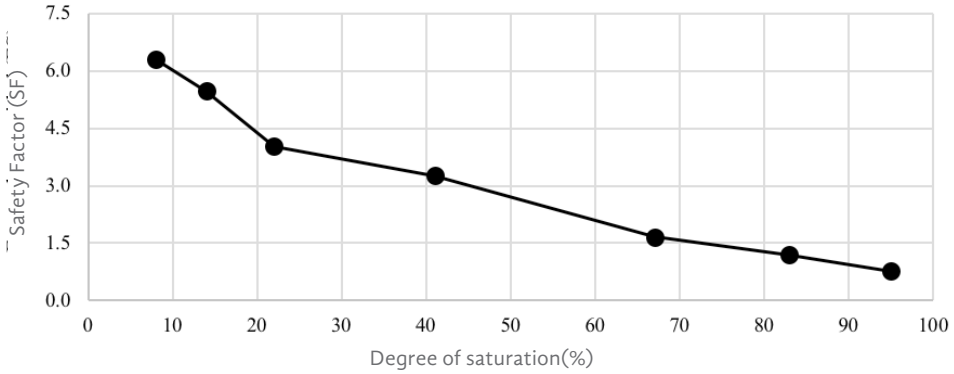


Image 4. Evolution of the safety factor with changes in the degree of soil saturation

From all of the above two conclusions are drawn:

- If rainfall is sufficient to place the soil's degree of saturation between 70% and 85%, the bank is in a situation of risk of failure ($1 < SF < 1.5$);
- If the dampening of the edge places the saturation level above 85%, the bank failure will occur ($SF \leq 1$).

DISCUSSION

Different factors influence banks' stability such as the type of constituent material, geology, weathering, erosion (by water or air), etc. However, in this study we have focused only on the dampening of the material that composes the bank. The above because the experimental evidence published by researchers such as Mora-Ortiz and Rojas-Gonzalez, 2012; Conte *et al*., 2017; Sun *et al*., 2017, to name a few, points to soil wetting as one of the main factors that cause instability in slopes located near or far from rivers. This work does not rule out the destabilizing effect of other agents, it simply aims to show that the saturation of the soil that makes up the bank under study alone is capable of causing the failure. A line of future research consists in incorporating into this analysis all the possible agents that contribute to river bank instability.

The results found in this investigation have shown that the progressive moistening of the constituent soil of the bank studied causes a decrease in the safety factor. After the flood in the state of Tabasco that occurred in 2007, it was necessary to repair 43 edges located only in the capital of Tabasco. The above represented an investment of 152.4 million pesos. The following year, after an intense period of rains (October-November), 53 edges were repaired, this time at a cost of 200 million pesos (Marí, 2009). The results obtained in this investigation show (at least for the bank under study) that when the soil reaches a degree of saturation greater than 85%, its stability is at risk. Achieving this degree of saturation in the state of

Tabasco is not difficult, since the entity is in the lower part of the Grijalva-Usumacinta basin (which, as already said, concentrates almost a third of the surface water of Mexico). Tabasco is also located in the rainy tropical zone of the country, with the influence of tropical and northern cyclones; there are rains throughout the year, the average annual rainfall being 2250 mm, although the most abundant rains occur during the months of June to October (INEGI, s.f.).

It is noteworthy that despite the data on banks' failures in the state of Tabasco there is no study today that allows to define the most prone to failure areas during the rainy season. That is to say, there is no danger map of bank sliding. Mexico City has maps of geological danger and hillside instability, and there are maps of geotechnical zoning and seismic zoning (Civil Protection, s.f.).

CONCLUSIONS

Due to its climatic situation in the state of Tabasco there are rains throughout the year, being more abundant during the months of June to November. During these rainy periods there have been consistently failures in the river banks that reach the capital of the state of Tabasco. The present investigation focused on analyzing the effect of soil moistening only on bank stability. It was found that for a bank located in the area known as *La Manga*, the wetting of the soil that makes up the bank is one of the main factors that cause instability. It was found that as the degree of saturation increases the safety factor (SF) decreases from a safe state (SF ≥ 1.5) to a fault state (SF ≤ 1). It was found that for the bank under study exceeding a saturation degree (Sr) of 70% represents a danger of failure condition. That is, by monitoring the rains and the degree of saturation of the soil that forms the slopes, it is possible to anticipate their failure. The present study shows a simple methodology that can be the basis for developing a map of danger of bank failure. Because all the bank change in their geometric characteristics and properties of the soils that compose them, it is necessary to repeat the process indicated here to all the banks that are to be monitored. The foregoing will allow the relevant authorities to take actions to ensure the integrity of people and structures close to the banks.

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PRESENT BIAS, FINANCIAL SOURCES AND PRODUCTIVE VARIABLES: EVIDENCE OF A GROUP OF MILK PRODUCERS IN HERMOSILLO, SONORA

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— Abstract—

The aim of this work is to relate the present bias (PB) with financial sources choice and productive variables of a group of milk producers in Hermosillo, Sonora. A sample of 53 milk producers (8 women and 45 men) with an age range of 29 to 73 years was intentionally selected. Through a socio-economic, productive and financial questionnaire and a choice test, it was found that: (a) the 51% of the producers choose informal sources, of which 72% presented PB; (b) a total milk production of 7,128 liters per day was registered, where 59% of the volume produced corresponded to PB producers; and (c) statistically significant differences were found between the PB and the type of financial source, but not between PB and production. The results in the present investigation not only reflect the high prevalence of PB in the producers, but also have inconsistency in their preferences, which may affect the development of the production unit.

Keywords

Present bias; financial sources; milk production; intertemporal choice.

In Mexico, the livestock sector represents an important activity, since it contributes to the production and supply of meat and dairy products, these are considered as basic and strategic products for the population (Sustainable Rural Development Law, 2001). In addition, it has a significant economic contribution to the gross domestic product (GDP) of 3.5% (INEGI, 2018).

Despite the relevance of this activity, there are problems that hinder the development of the productive branch. Among the characteristic problems of agricultural producers at the national level and which is of interest for the present study, there is a shortage of economic resources. To cope with this, producers look for sources of credit that allow them to finance the acquisition of inputs and have a growth in production (Escalante *et al*., 2013). Therefore, the choice of financing sources becomes important for producers, mainly for small and medium-sized ones.

However, in recent years, financial choice studies such as Brown and Previtero (2014) have proliferated; Carvalho *et al.* (2016); Delaney and Lades (2017); Kuchler and Pagel (2017) and Gill *et al*. (2018); which have evidenced preferences in receiving immediate rewards from people. This is known as present bias (PB). This behavior has been manifested, mainly, at the time of making financial choices such as savings, investment and the use of credit cards (indebtedness).

For this reason, it is of interest to relate the PB with the financial choices and the production variables and establish an overview of the behavior of the producers. To understand the financial-productive environment and the notion of the PB, it is necessary to begin with a recount of the problem in the regional livestock sector and the theoretical support of the PB, divided into: (a) productive context of the livestock sector, (b) distribution and choice of financing in the agricultural sector and (c) intertemporal choice: a perspective from behavioral economics. Once the development section is established, the methodology, the analysis of results and the conclusions are presented.

PRODUCTIVE CONTEXT OF THE LIVESTOCK SECTOR

The Mexican livestock sector has registered certain changes, among them is the growing export of pork to Japan, characterized by highly technical agribusiness processes. However, cattle have remained in a traditional dynamic, linked to the export of meat to the United States (Salazar *et al*., 2011). Regarding the participation of the States in agricultural GDP, the ones that contribute the highest proportion are Jalisco (11.3%), Michoacán (9.4%), Sinaloa (7.7%), Veracruz (7.2%), Chihuahua (6.4%) and Sonora 5.9% (SAGARHPA, 2016).

On the other hand, the production of bovine milk in Mexico in 2017 registered volumes of 11, 807,556 liters (SIAP, 2018). This activity is carried out in heterogeneous conditions from the economic, technical, social and environmental perspectives and they are mainly constituted as family businesses (Espinoza *et al*., 2011).

While in Sonora milk production is divided into two forms: with specialized and dual purpose cattle, where the first produces 32% and the second 67%; and of the total milk production, 58% goes to cheese making and the remaining 42% as fresh milk (Salazar *et al*., 2011). This activity generates 18 million pesos annually, benefiting more than 33 thousand families in Sonora (SAGARHPA, 2017).

However, there are problems that affect productive activity such as: insufficient and poorly distributed support from government entities, a lack of milk price regulation, increased importation of powdered milk, as well as high poverty rates in rural areas (Borbón *et al*., 2011; Huesca *et al*., 2011). Therefore, accessing and choosing a source of financing is significant, since credit is one of the main components that drives the growth of these organizations, since it improves productivity, risk management and productive inclusion (Fletschner and Kenney, 2011; Olluqui and Fernández, 2017).

DISTRIBUTION AND CHOICE OF FINANCING IN THE AGRICULTURAL SECTOR

The allocation of agricultural loans in Mexico is related to the entities that have a greater contribution to agricultural GDP, and has a significant concentration in Sinaloa, Jalisco and Sonora. Table 1 shows the proportion of financing in these three States, from 2013 to 2016. In general terms, financing has been characterized by a stagnant trend, since there has been little increase in the proportion of credit that has been detected. These states are mainly characterized by the production of vegetables, corn, wheat and livestock activity.

Table 1
Proportion of agricultural financing by States

States	**2013 (%)**	**2014 (%)**	2015 (%)	2016 (%)
Sinaloa	13.9	13.2	13	13.1
Jalisco	9.1	9.4	8.6	9.8
Sonora	7.4	6.5	6.7	6.6

Source: Own elaboration based on FIRA 2013-2016

Table 2 shows the proportion of livestock financing granted by development banks in Mexico, from 2013 to 2016. It is observed that the Trust Funds for Rural Development (FIRA) allocate a greater proportion of financing to the sector; however, despite the fact that the National Development Finance Agency (FND) is below FIRA, its participation in the sector is significant.

Table 2
Proportion of financing to the livestock sector

Source of Funding	2013 (%)	2014 (%)	2015 (%)	2016 (%)
FIRA	20.3	19.1	21.1	22.6
FND	9.4	9.9	14.4	15.1

Source: Own elaboration based on FIRA 2013-2016

However, despite the increasing allocation of funding to the livestock sector, 64% of producers resort to informal sources of financing, while the remaining percentage chooses formal sources: 17% to development banks, 9% go to commercial banking, 9% to credit unions and 1% to Limited Object Financial (SOFOL) (Escalante *et al*., 2013). This demonstrates the growing existence of an informal credit market, as well as the financing of providers of supplies or services (Moreno, 2002).

According to Puyana and Romero (2010), this behavior of producers when choosing funding is largely due to the transaction costs of banks and financial institutions. These costs involve: (a) the provision of financing branches, (b) the times that the producer uses for credit procedures, and (c) identification and disposal of assets (collateral) (Puyana and Romero, 2007). Based on the above, an important aspect that characterizes informal sources of funding is the absence of transaction costs. This is translated for the producer in obtaining financing immediately, however the interest rates offered are higher than those of the formal market (Olivares, 2004).

The intertemporal choice: a perspective from behavioral economics

This behavior of the producers in the financial context has been the object of study of the economy through intertemporal choice and assumptions and models have been identified through which it is possible to understand this behavior. These choices involve decisions in which the distribution of costs and benefits extend over time (Loewenstein and Thaler, 1989). In economics, the model used to study intertemporal elections is that of discounted utility (DU), which has its origins in the authors' works: John Rae, N.W. Senior, William Jevons, Böhm-Bawerk, Irving Fisher and Paul Samuelson (Loewenstein, 1992). However, Samuelson (1937) introduced the

DU as such, whose objective was to model people's intertemporal choices; and supposes that individuals discount future events at a constant speed.

However, in works such as Strotz's (1956) and Phelps and Pollak (1968), it was observed that people change the preference of their choices in different periods of time. According to this, Strotz (1956) proposed that preferences change with temporal distance, and present an inconsistency. This indicates that the assumption of temporary consistency of the DU does not fit all the contexts of choice.

Following these works, experimental design studies associated with intertemporal choice such as Thaler (1981, 1988) and Loewenstein and Thaler (1989) emerged, where not only was it found that the behavior is guided by temporal preferences, but that there are also certain anomalies in the intertemporal elections that are opposed to the DU. Thaler (1988) mentions that an anomaly is an empirical result, specifically an election made, that is difficult to explain through rationality or that unlikely assumptions are necessary for its understanding. These anomalies are attributable to a limitation in the processing of information, which people commit at the time of making elections. The efforts made by Thaler (1981), as well as those of Tversky and Kahneman (1974) and Kahneman and Tversky (1979), gave rise to behavioral economics, through evidence of anomalies in the choices of individuals.

Among the anomalies that correspond to the intertemporal elections, the present bias (PB) is the one that concerns this study, since in the financing terms are established (present vs. future), and the PB is a tendency on the part of individuals to give greater weight to the rewards that are closer to the current time, when considering exchanges in two moments in time (present and future) (O'Donoghue and Rabin, 1999). In addition, the PB is relevant because it acts as an indicator of intertemporal elections (Meier and Sprenger, 2010).

The PB, also called quasi-hyperbolic discount, is represented by a model where it is observed that individuals have a bias due to immediacy. This has been based on the contributions made by Strotz (1956); Phelps and Pollak (1968) and Laibson (1997), where an additional factor was introduced to ¬the function that represents the PB (Patiño and Gómez, 2015), and is given by:

$$U^t(u_t, u_{t+1}, \dots, u_T) = \delta^t u_t + \beta \sum_{T=t+1}^{T} \delta^T u_T$$

Where $0 < \beta, \delta \leq 1$: In this model U represents profits, δ the consisting discount of the long term. While β represents the PB, if it is close to one it

means that the bias is minimal, on the other hand, if β <1 there is a greater weight for receiving immediate gratifications from individuals; therefore, they are more biased towards the present (O'Donoghue and Rabin, 1999). But if β > 1 is given less weight to the immediate rewards, therefore people are future biased. However, if β = 1 then the model would return to the exponential discount of the DU model, this means that individuals are consistent in their choices.

In studies like those of Laibson (1997); Fehr (2002); Heidhues and Koszegi (2010) and Meier and Sprenger (2010); A relationship of the PB with high financial indebtedness is observed. In Can and Erdem (2013) and Carvalho *et al.* (2016), relate the PB with financial resources, arguing that individuals behave with PB when their financial resources are limited. While in Mani *et al.* (2013), who carried out a study with cane producers, found that the participants focus more attention on immediate situations, this leads to more frequent funding. Despite the existence of various studies linking the PB with the financial environment, no empirical evidence has been found that relates the PB to the sources of funding.

On the other hand, in relation to PB and production, in the study by Liebenehm and Waibel (2014), conducted with livestock producers in West Africa, they found that the participants presented high levels of patience (under PB); in addition, they identified that factors such as the size of the herd (number of head of cattle) and the income from sales of products derived from livestock, influence temporary preferences. While Pushkarskaya and Marshall (2009), conducted a study with tobacco producers in Kentucky, and found a relationship between choice options and the decision to quit the tobacco market.

Based on the above, the objective of this study is to relate the PB with the choice of financing sources and the productive variables of a group of small and medium milk producers in Hermosillo, Sonora, Mexico.

METHODOLOGY

Design and sample

A quasi-experimental design was used, because we worked with an intact group of producers, which implies a lack of randomization of the participants and a partial control of external variables (Campbell and Stanley, 1995); in addition, the independent variable is modified (monetary rewards and the time to receive them), to know its effect on the participants' choices. A sample of 53 milk producers from Hermosillo, Sonora, Mexico (8 women and 45 men) in an age range between 29 and 73 years was intentionally

selected. The level of study that predominates in the participants is primary and secondary, both with 26%.

Instrument and measures

The instrument is divided into four sections: (a) socio-demographic variables: Age, Sex and Level of Studies; (b) productive variables: Hectares, Heads of cattle in production, Milk production and Revenue from milk sales; (c) variables of choice of financing sources: type of financing source and last amount financed granted; and (d) experimental treatment: an intertemporal choice test. The choice test was chosen as an instrument as it provides the types of bias that may occur at the time of choosing. In addition, this test is the most used by the authors working on this topic (Can and Erdem, 2013; Carvalho *et al*., 2016; Meier and Sprenger, 2010; Nguyen, 2016).

Once the participants responded to the socioeconomic, productive and financing sections, they took the election test using a hypothetical monetary incentive. The test consists of 19 elections divided into three blocks: (a) to = present vs t1 = 1 month, (b) to = present vs t6 = 6 months, and (c) t6 = 6 months vs t7 = 7 months; in each one a smaller reward is presented in the closest times to the present, ranging from $1,000 MXN to $1,550 MXN. While in the periods furthest from the present, a higher fixed reward with a value of $1,600 MXN is established. Using the information produced by the different points in time (present and future), an Individual Discount Factor (IDF) measure is obtained, which not only allows the identification of the type of discount (exponential or quasi-hyperbolic), but also the identification of the existence of PB, future bias or consistency (Meier & Sprenger, 2010).

The IDF is obtained when in the test a switching point is observed in the election; that is, change from choosing the small reward to choosing the large reward. For example, if an individual prefers $1,550 MXN today over $1,600 MXN in a month, but prefers $1,600 MXN in a month over $1,400 today MXN, then $1,550 MXN is taken as the exchange point and the discount factor is calculated (1,550/1,600) = 0.968.

The PB is calculated based on the IDF; that is, if a person is more patient (has a low IDF) when choosing a small and close reward in time (t = 0); then the individual is considered to be biased towards the present if $IDF_{0,1}<IDF_{6,7}$,, and is future bias if $IDF_{0,1}>IDF_{6,7}$. When a person is present bias he is considered as dynamically inconsistent (inconsistent in his choices). While to obtain the parameters β and δ, the following IDF measurements were used according to Meier and Sprenger (2010): $\delta=IDF_{6,7}$; $\beta=IDF_{0,1}/IDF_{6,7}$. To perform the non-linear regression, the quasi-hyperbolic discount model $\{1,\beta\delta,\beta\delta^2,\beta\delta^3,...\}$ was used (Laibson, 1997; O`Donoghue and Rabin, 1999).

An important result related to bias is *radius*. Which indicates the intensity of the bias: in the case of PB the radius will be greater than 1 (eg 1.01, 1.06, 1.10), the further the radius is from 1, the intensity of the PB is greater. On the other hand, when there is future bias it will be less than 1 (eg 0.986, 0.902, 0.877), the farther away from 1 the greater the future bias. While, when the radius is equal to 1 there will be consistency, this indicates that the person behaves as mentioned by the exponential discount of the discounted utility (Meier and Sprenger, 2010).

Data analysis

In this study a basic descriptive analysis of the variables was carried out, to subsequently perform relationship tests. Student's t-test was used to establish the existence of statistical differences between the type of funding source and the PB. The Chi-square test was used to establish the relationship between the type of bias and the source of funding. In addition, the ANOVA test of a factor for the variables of type of bias, number of head of cattle and milk production was applied. The tests were performed in the SPSS v20 software. Likewise, the quasi-hyperbolic curve for producers present biased was adjusted, in relation to the type of fundinh source they chose. The GraphPad Prism 6 software was used to graph the curve.

RESULTS

Descriptive statistics

The results analysis section is divided into five segments: (a) frequencies obtained from socio-economic variables, (b) frequencies obtained from productive variables, (c) frequencies and percentages of financing variables, (d) frequencies and percentages of intertemporal choice, and (e) comparative analysis of the variables.

The average age of the producers is 57 ± 11.8, with 85% (45) being male and 15% female (8). Regarding the level of education, 58% of the producers have only basic education, 27% have a high school and 15% have higher education. 46% have only one dependent.

Regarding the section related to production, the average number of hectares that the participants' production units have was 213 ± 172. The total number of head of cattle registered was 2,407, with an average per producer of 45 ± 25. While in milk production it was observed that on average a producer obtains 134.5 ± 79.5 liters per day. As for the sale price per liter of milk, the average is $6.30 MXN, which means that producers receive on average $852 MXN ± 526 per day.

In the financial section, regarding the type of intermediary that the producers chose, there was a slightly greater preference for informal sources of funding, with 51%, while the remaining 49% opted for formal sources. With respect to this result, of the percentage of producers that chose formal sources, 30% corresponded to the Private Bank and 19% to the Development Bank; on the side of the producers who preferred informal sources, 43% chose lenders (individuals) and the remaining 8% was pigeonholed into another, encompassing input suppliers.

Another important fact is the last amount granted to producers, where the average financing was $68,396 MXN. This figure is high because fundinh from formal sources (Private Bank and National Development Finance) resulted in high amounts, as shown in table 3.

Table 3
Amounts funded in relation to the type of financial intermediary

Last Amount Funded (MXN)	Privet Bank	National Development Finance	Informal Source
3,000 a 16,900	13% (7)	-	51% (27)
17,000 a 50,000	17% (9)	-	-
51,000 a 100,000	-	6% (3)	-
101,000 a 1,000,000	-	13% (7)	-

Source: Own elaboration with field data. Note: The number of observations is in parentheses

As shown in table 3, 16% of the producers who chose the National Development Finance, were granted funding amounting to $51,000 MXN and $100,000 MXN mainly. This means that the average amount financed is high. However, when applying the median to this variable, an amount of $12,000 MXN was obtained.

On the other hand, in relation to the variables obtained in the election test, it is important to start with the identification of the IDF, in which an average of .865 ± .09 was obtained. From this value, it is possible to make a classification of the temporary preferences of the producers, where the percentage proportion of the preference over time of the producers is presented.

60% of the producers presented a temporary preference with PB, this means that they are eager to receive economic rewards as close to the present time, regardless of whether there is a greater reward in the future. 15% were biased towards the future, which indicates that these producers are more concerned with receiving economic rewards in the future. Both types of bias are considered as dynamically inconsistent, since they do not maintain a consistency between their present and future preferences. On the other hand, 25% were dynamically consistent, which means that their preferences are consistent between two points in time.

As for the radius, the mean was 1.07 ± .17, this means that the intensity of the bias is slightly inclined towards the present. If the Radius> 1 the intensity is inclined towards the present bias. On the other hand, if the Radius <1 the intensity will be prone to future bias. The further the radius is from 1, whether in favor of present or future bias, the greater the intensity will exist.

Comparison of the variables

Once the descriptive results of the variables have been presented, table 4 is shown. It establishes the relationship of producers who are present biased, future biased and consistent; in relation to the productive, financing and intertemporal choice variables.

Table 4

Descriptive measures for productive, funding and intertemporal choice variables in relation to producer groups (present biased, future biased and consistent)

	Present biased producers	Future biased producers	Consistent Producers
A. Socio-demographic Data			
Age	56.3 (11.7) [32]	57.4 (15.1) [8]	58.9 (10.9) [13]
Gender (1=Masc.)	0.78 (0.42)	1	0.92 (0.27)
Education (Basic=0 Secondary y Higher=1)	0.40 (0.49)	0.5 (0.53)	0.38 (0.50)
B. Productive Variables			
Hectares	228 (203)	152 (139)	215 (90)
Livestock Heads in Production	47 (28)	49 (27)	38 (17)
Daily Milk Production (ltr)	130 (79)	170 (87)	122.5 (76)
Milk Sales Revenue (MXN)	854 (528)	1,231 (764)	837 (612)
B. Funding Variables			
Funding Source (Informal=0 Formal=1)	0.28 (0.45)	0.87 (0.35)	0.77 (0.43)
Last Amount Funded (MXN)	77,328 (243,256)	51,375 (43,506)	56,884 (79,563)
C. Intertemporal Choice Variables			
IDF	0.875 (0.07)	0.850 (0.14)	0.849 (0.10)
Radio	1.15 (0.13)	0.85 (0.13)	1

Source: Own elaboration based on the data collected in the research.
Note: The table shows means and frequencies, standard deviation in parentheses and the number of observations in square brackets

With regard to producers with PB, 60% were in this group, which was characterized by being 56 years old, male sex prevailed and the level of education was basic. In the productive section, they have an average of 228 hectares, 47 heads of cattle in production, produce 130 liters of milk a day and receive on average $854 MXN for the sale of milk. Regarding the financing variables of producers with PB, the average chose informal sources and the last amount funded was $77,328 MXN. It is important to mention that the figure of the amount financed is not exclusive to informal sources, rather it is for producers who are biased towards the present. Since there are present biased producers who chose formal sources of funding and therefore the amount financed amounts to higher figures. On the other hand, in the intertemporal choice variables, the average of the IDF of the group with PB was 0.876 ± 0.07 and the radius of 1.15 ± 0.13, both higher than the total average of producers. Regarding the average of the discount factor of producers with PB, the parameter was $\delta = 0.876$ and $\beta = 0.870$.

In the future biased producers, the average age was 57 years, the male sex prevailed, the level of education was 50% basic education and the remaining 50% middle and higher education. On average they have 152 hectares, well below the total average; they have 49 head of cattle, produce 170 liters of milk daily and receive $1,231 MXN on average. Regarding their financing condition, they chose formal sources on average and the last amount funded was $51,375 MXN. Regarding the intertemporal choice, future biased producers showed an average IDF of 0.850 ± 0.14 and a radius of 0.850 ± 0.13.

With consistent producers the average age was 59 years of age, the male sex continued to prevail, the level of education was basic. In the productive field they have an average of 215 hectares, 38 head of cattle, produce 122.5 liters of milk daily and receive $837 MXN per day. In its financial statement, formal sources of funding predominated and the last amount funded was $56,884 MXN. Regarding the intertemporal choice, the mean IDF was 0.849 ± 0.10 and the radius was 1.

An important result observed in table 4 is in relation to the groups of present, future and consistent biased producers with milk production. Since the future biased produce more milk (170 liters), then there are the PBS (130 liters) and the consistent ones (122.5 liters). Similarly, future biased producers received higher revenues from the sale of their production ($1,231 MXN). However, no significant differences were found between the type of bias and the last amount financed $F(2) = 0.985$, $p = 0.38$; nor between the type of bias and income from milk sales $F(2) = 0.911$, $p = 0.40$

Regarding the relationship between the variables type of bias (present, future and consistent) and source of funding, which can be seen in table 4, producers with PB showed a greater inclination towards the choice of

informal sources of funding. On the other hand, those who are future biased and the consistent preferred formal sources. It was found that there are statistically significant differences between the type of bias and source of funding χ ^ 2 (2, N = 53) = 14.3, p = 0.001.

While in image 1 the averages of change of the PB producers' discount factor are shown, related to the type of source of funding. Where $\beta = 0.82$ and $\delta = 0.80$ for those who chose informal sources, while for those who chose formal sources it was $\beta = 0.88$ and $\delta = 0.90$.

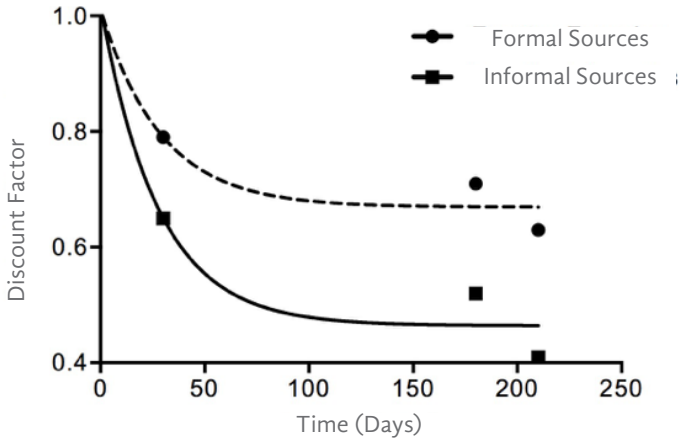

Image 1. Comparison of the type of source of funding in relation to the SHP
Source: Own elaboration

Image 1 shows that the producers discounted the value of the reward as the delivery delay in the election test increased. However, in the case of producers who chose informal sources (tables), they discounted the value more quickly, from 1 to 0.65 in a month; while the producers who chose formal sources of funding (circles), went from 1 to 0.80 in the same month. On the other hand, the discount rate for producers who chose informal sources was similar (k = 0.036, R ^ 2 = 0.96) to the discount rate of those who chose formal sources (k = 0.034, R ^ 2 = 0. 95). Statistically significant differences were found between the PB and the producers who chose informal sources of funding t (51) = -1.99, p = 0.05.

DISCUSSION AND CONCLUSIONS

The results in this research provide evidence to the field of behavioral economics; since there are several studies that deal with PB or inconsistencies in intertemporal choice and credit card indebtedness; however, no studies have been found that address the PB regarding the sources of funding types. On the other hand, in relation to the agricultural context, there is

little empirical evidence that relates elements of temporal preferences, such as PB and productive variables.

According to the intertemporal elections, the producers exhibited a higher PB (60%), in relation to the future bias and consistency. These results are consistent with the studies by Kahneman and Frederick (2001); Tanaka *et al.* (2010); Can and Erdem (2013) and Carvalho *et al.* (2016), where participants presented intuitive preferences and PB at the time of making their choices. In addition, of the participants with PB, 72% chose informal sources of financing over formal sources. However, there is no similar study that can contribute to the sustenance of what was obtained, however, in the work of Meier and Sprenger (2010), it was found that individuals with PB behavior have significantly high probabilities of borrowing with financial credits. While Mani *et al.* (2013) observed that cane producers in India focused on immediate financial situations, especially when economic resources were scarce. Although it is true, these studies are not similar to the present investigation, they allow to establish an important empirical support to base the obtained results.

Regarding the IDF, we found that the average discount factor was 0.86 for the total of the producers. This result is consistent with those obtained by Meier and Sprenger (2010), where an IDF of 0.83 was observed. The discount factor in our study is low, however, it is slightly higher than the authors cited. While the average radius found was 1.07, this result is lower compared to Meier and Sprenger (2010) (1.26), which indicates that the intensity of PB in producers is minimal compared to the study of these authors. As for the quasi-hyperbolic function, it was discounted more rapidly over time in relation to the exponential function. This indicates that there is a higher level of impatience in the producers who chose informal sources of financing β=0.82) to receive immediate rewards, than those who chose formal sources (β=0.88). The results obtained are consistent with those established in Laibson (1997); Berns, Laibson and Loewenstein (2007); Can and Erdem (2013) and Vanderveldt, Oliveira and Green (2016); However, in these studies the values of β are slightly lower than those presented in this work, except in Can and Erdem (2013), they registered an average of β=.955. While Liebenehm and Waibel (2014) presented lower values (β = .788) in producers with PB.

Regarding the results of type of bias and production, these match with what was established with Pushkarskaya and Marshall (2009) and Liebenehm and Waibel (2014), since they found a PB behavior in agricultural producers. However, they identified that the subjects that had a large number of head of cattle and higher income, resulted in higher PB. While in our study, the producers that registered the highest number of head of cattle and income were future biased. This allows us to understand the consistent existence of biased behaviors.

The results presented in this work allow financial institutions, private or government, to know the behavior of agents in the face of economic elections and the influence that said elections have on production. In the particular case of small and medium-sized dairy producers, where financing is an essential factor for their productive activity, choosing appropriately a loan is vital for the maintenance of the productive chain.

Within the study there are certain methodological limitations, which are set out below: (a) Due to the sample size in the present study, only the relationship between the PB, the producers that choose informal sources of fundin and the production of milk, therefore, is not allowed to make a causal inference of bias on sources and production. (b) A quasi-experimental design is established because the study involves a test of choice and is performed in a field environment. This means that it is not done in a laboratory where all the variables are in control. However, despite the limitation of not having total control of variables, this type of field experiments help explain the real behavior of people when they are in their natural environment (Cárdenas, 2004). (c) In the test of choice of the present study, hypothetical monetary rewards were used. While it is true, the limitation of not using real rewards may affect the choice of participants. Still, Locey *et al*. (2011) in their study mention that the same results can be obtained for both real and hypothetical rewards, therefore experiments with hypothetical rewards can be applied to the behavior of everyday life.

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AXIAL STRESS-STRAIN CURVES FOR TWO BAMBOO SPECIES (*GUADUA ANGUSTIFOLIA KUNTH* AND *BAMBUSA OLDHAMII*)

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— Abstract—

In this paper, experimental stress-strain curves of tensional and compressional tests carried out in Mexico for two bamboo species (*Guadua Angustifolia Kunth* and *Bambusa Oldhamii*) as wells as a comparison with those obtained in Ecuador and Colombia, are evaluated. For the *Guadua Angustifolia Kunth*, similar curve shapes for Mexican, Colombian and Ecuadorean bamboos were observed, despite variations in the test conditions, physic and geometric specimen properties, and original specimen position in the bamboo culm. Next, through a least square analysis, characteristic equations for these stress-strain curves were obtained. *Bambusa Oldhamii* species always showed higher tensile and compressive strengths (273.3 MPa and 56.1 MPa). Stress-strain curves for these bamboo species were favorable compared with that of unreinforced concrete. Then, for the building construction is adequate material.

Keywords

Bamboo, Angustifolia, Oldhamii, Relationship, tension, compression.

Guerrero, Oaxaca, and Chiapas have a high seismic hazard. Coincidentally it is also the area of least social-economic development in the country. This situation is reflected in the poor quality of materials and inadequate construction processes. The combination generates a high seismic risk for society. For this reason, it is necessary to propose lightweight, low cost, and resistant construction materials that can replace traditional materials (masonry and reinforced concrete). By considering the weather characteristics, bamboo is a biomaterial that could be used. It has shown adequate behavior under seismic forces (Camacho & Páez, 2002; González, 2006).

A parameter that defines an adequate seismic behavior is the ratio of compressive strength to unit weight of the material. The ratio are: a) 1042 m for compressive strength concrete, f'_c = 25 MPa (CDMX Government, 2017); b) 3373 m in A-36 steel with yield stress f_y = 248.2 MPa (Mexican Institute of Steel Construction, 2014); c) 8664 m for the *Bambusa Oldhami* species. Additionally, the ratio of the tensile to the compressive strength of bamboo is from 2.8 to 4.9 (Álvarez, 2012). For unreinforced simple concrete, it does not exceed 0.10 (Gonzales and Robles, 2005). The low unit weight of bamboo reduces the seismic design forces to values of 13% compared to those obtained in traditional masonry systems (Kakkad & Sanghvi, 2011). Regarding the mechanical properties, the tensile stress and elastic modulus are in the ranges 193 MPa - 340 MPa and 18 GPa - 25.6 GPa, respectively (Dixon & Gibson 2014). In compression, stress ranges from 25.9 MPa to 33.5 MPa (Sánchez *et al*., 2016).

After the Bhuj earthquake (India, 1999), constructions with double masonry walls and vertical bamboo reinforcement instead of the reinforcing steel where built, the cost relation between both materials was 55% (Sreemathi, 2002). In the city of Chilpancingo (Mexico), a one-level house was built, where the cost of bamboo walls represented 60% of that assessed with confined masonry walls (Ascencio, 2010).

In Mexico, there are few technical references about the characteristics and design of bamboo. For example, the mechanical and physical properties of three Mexican species were studied to encourage their use in construction (Ordoñez-Candelaria & Bárcenas-Pazos, 2014). Besides, frames with bamboo trusses 6.0 m length adequately supported the vertical and lateral loads generated by seismic forces in low-income housing (Barragán-Trinidad *et al*., 2014).

On the other hand, the mechanical characterizations of materials in small specimens under several solicitations (tension-compression, and flexural stresses) are essential to define the behavior of a structure constructed with these materials. Thus, bilinear masonry behavior laws have been proposed based on wall tests (Sánchez *et al*., 2010).

II. OBJECTIVES

The objectives are:

1. Compute the axial stress vs. strain relationship of *Guadua Angustifolia Kunth* and *Bambusa Oldhamii* species planted in Veracruz, Mexico.
2. Obtain the equation of axial stress vs. strain relationship of the *Bambusa Oldhamii* species tested in Mexico and of the *Guadua Angustifolia Kunth* tested in Mexico, Colombia and Ecuador.

III. MATERIALS AND METHODS

III.1. Carried out tests in Mexico

The culms of both species were cured before the test. Tests performed on 16 specimens with compression parallel to the fiber are shown in Table 1. To the *Guadua Angustifolia Kunth* species, only noded specimens were tested.

Table 1
Compression-tested specimens

Species	With node	Without node
Bambusa Oldhamii	4	6
Guadua Angustifolia Kunth	6	-

The mean slenderness ratio (height/outside diameter, *RE*) in the compression specimens was 1.9. In order to measure the axial strain, the system shown in Image 1 was implemented, it was recorded in increments of 9.81 kN. Moisture content and density tests were also performed.

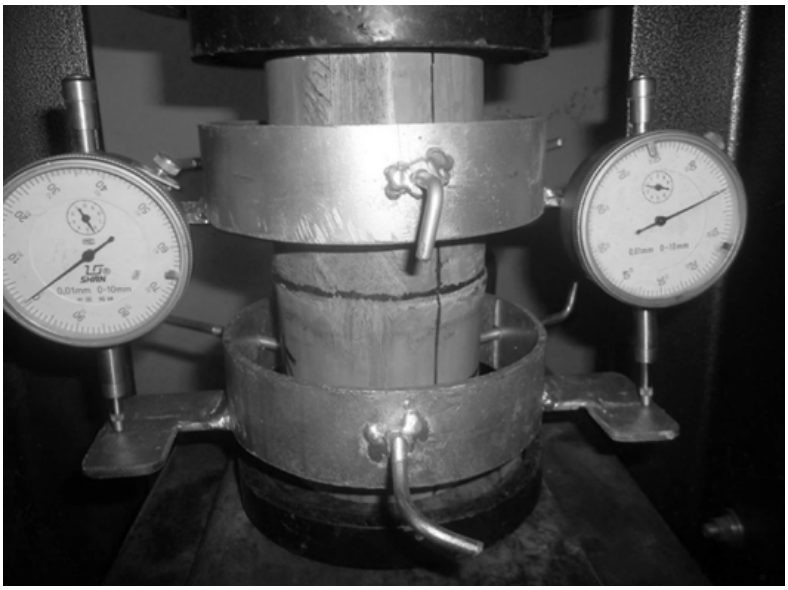


Image 1. Strain measurement system in compression test

Regarding tensile tests, Mendoza (2014) reports results of nine specimens of the species *Bambusa Oldhamii*, obtained from pieces with 0.90 m length. Figure 2 shows the geometry and final shape of the samples.

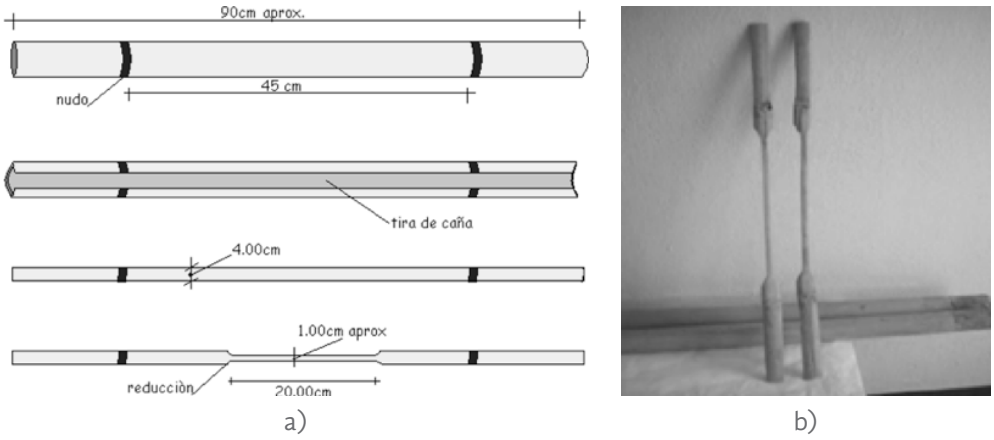


Image 2. A) Extraction and geometry, b) Sample of specimens under tension. (Mendoza, 2014)

On the other hand, there are no Mexican standards for the testing of bamboo specimens. Then, the ISO 22157-1: 2004 standard was used as a guide (International Organization for Standardization, 2004). However, the instrumentation of the compression specimens was done with analog dial indicator according to the testing procedure of compression concrete cylinders. It is opposed to the use of strain gauges proposed in the ISO standard: In Colombia, specimens were also instrumented with analog dial

indicator (González, 2006). Concerning the tensile tests, strain measure was performed with a linear displacement transducer (LDVT) attached to the specimen (Mendoza, 2014).

III.2. Data obtained in Ecuador

In Ecuador, extensive experimental work was developed for calculating the mechanical and structural properties of the *Guadua Angustifolia Kunth* species, to propose values to design constructions. The information used in this document corresponds to 11 stress-strain curves recorded in compression tests parallel to the fiber in specimens with a slenderness ratio equal to 2.0. Also, ten tensile stress-strain curves were used. The instrumentation was performed with strain gauges; see Image 3 (Córdoba, 2014).

Image 3. Tension specimens after the test (Córdoba, 2014)

III.3 Data obtained in Colombia

Studies were carried out in Colombia to evaluate the density, moisture content, compressive strength and elastic modulus of the *Guadua Angustifolia Kunth* species. The culms were collected in two departments of Colombia (Quindío and Caldas). From this document, 20 compressive stress-strain curves were used, which were obtained in specimens with an average slenderness ratio of 2.0, density equal to 0.59 and moisture content of 12.76%. The specimens were instrumented with strain gauges. The load was applied with a speed of 0.01mm/s (González, 2006).

III.4. Proposal for the evaluation of the average curve of a series of experimental curves

In the literature no procedure was found for the calculation of the average curve from experimental curves. For this reason, the authors developed the proposal presented here. Image 4a presents a series of experimental curves (curves 1, 2, and 3) on which it is required to draw control lines (CC1 y CC2), with intersection points P1 to P3 on the line CC1 and P4 to P6 on the line CC2 In these graphs, strain and stress are the abscissa and the ordinates, respectively. The coordinates of the midpoint P_i (ε_{cci}, σ_{cci}) of the three experimental curves intersected by the line CC1 are defined by equations (1) and (2).

$$\varepsilon_{cc1} = (\varepsilon_1 + \varepsilon_2 + \varepsilon_3)/3 \quad (1)$$

$$\sigma_{cc1} = (\sigma_1 + \sigma_2 + \sigma_3)/3 \quad (2)$$

Image 4b represents curve 2 and control line CC1. The points C22 and C33 belong to the experimental curve, point P2 is between them, which is the intersection with the experimental curve and unknown coordinates. Considering that the control line CC1 is proposed, the angles Θ_1 to Θ_3, as well as the coordinates of C22, C23 and P0 are known; whereby it is possible to define equation (3). According to Image 4c, equation (4) is obtained.

$$V = L\sin(\theta_1 - \theta_3)/\sin(180 - \theta_1) \quad (3)$$

$$Z = V\sin\theta_1/sin(180 - \theta_1 - \theta_2) \quad (4)$$

The variation of stress and strain concerning to point C22 is evaluated by equations (5) and (6), Image 4d. The coordinates of point P2 are defined with equations (7) and (8), identically; the coordinates of points P1 and P3 are obtained.

$$\Delta\varepsilon = Z\,cos\,\theta_2 \quad (5)$$

$$\Delta\sigma = Z\,sin\,\theta_2 \quad (6)$$

$$\varepsilon_2 = \varepsilon_{C22} + \Delta\varepsilon \quad (7)$$

$$\sigma_2 = \sigma_{C22} + \Delta\sigma \quad (8)$$

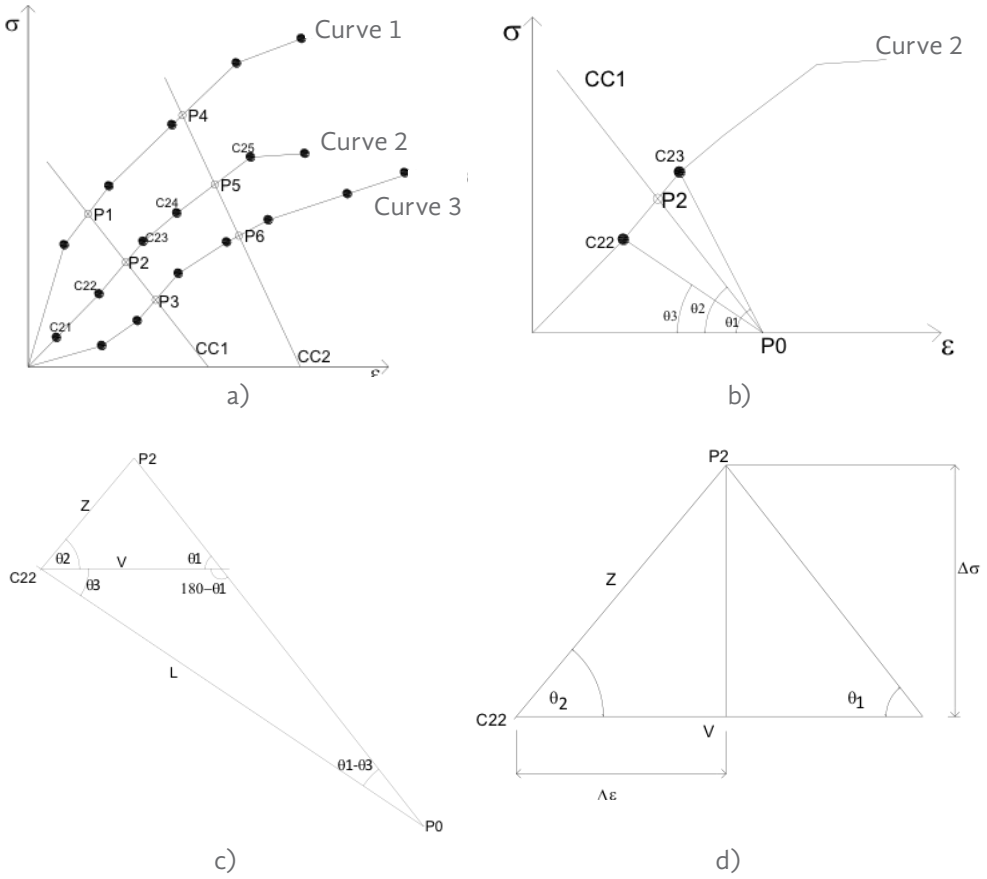


Image 4. Proposal to evaluate the average curve of three experimental curves

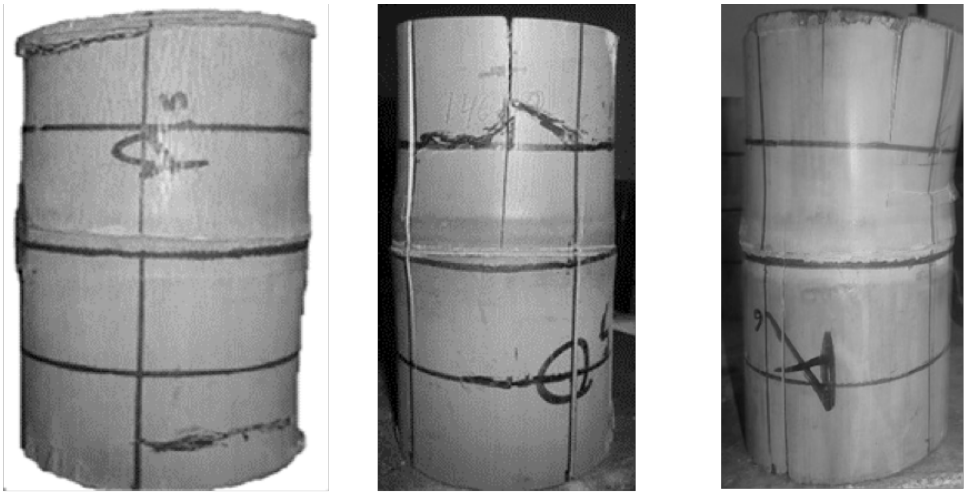
Finally, having the coordinates of points P1, P2 and P3 and using equations (1) - (2), the coordinate of the midpoint of all experimental curves intercepted by the control line CC1 is evaluated. The procedure is repeated with the CC2 control line (Image 4a), until the length of the experimental curves is covered. This process was automated through an algorithm developed in free software (Scilab Enterprises, 2014).

IV. RESULTS

IV.1. Tests in Mexico

Table 2 presents the results of moisture content, compressive strength, and density of the specimens. The average value of moisture content (MC) was 9.5% for the *Bambusa Oldhamii* species and 7.8% for the *Guadua Angustifolia Kunth* species. The average values of compressive stress (σ_{mc} and density (D) are: a) 56.1 MPa and 0.66 for *Bambusa Oldhamii*, b) 49.1 MPa and 0.55 for *Guadua Angustifolia Kunth*, respectively. The last column of Table 2 indicates the three types of failure: a) Crushing (C), b) Shearing (S), c) Combined

shearing and crushing (SC), Image 5 present each of these. Image 6 shows ten curves of compression tests of *Bambusa Oldhamii*. The mean elastic modulus (E_{mc}) measured at 20% and 80% of the maximum stress was 24.6 GPa with a coefficient of variation (CV) of 32%. In Image 7, six compression curves of the *Guadua Angustifolia Kunth* are presented, where an mean value of E_{mc} = 18.4 GPa was recorded.



a) b) c)

Image 5. a) Crushing failure (C) in *Guadua Angustifolia Kunth*, b) Shearing failure (S) in *Bambusa Oldhamii*, c) Crushing and shearing failure (CS) in *Guadua Angustifolia Kunth*

Table 2

Results of compression and physical tests

#	S	RE	MC %	σ_{mc} MPa	*D*	*Failure*
1	*Bambusa Oldhamii Without node*	1.6	16.5	50.0	0.47	S
2		2.0	8.7	53.0	0.46	S
3		1.8	8.3	65.5	0.60	S
4		1.9	8.8	61.0	0.80	S
5	*Bambusa Oldhamii With node*	2.0	9.6	61.0	0.79	CS
6		1.8	9.7	66.0	0.71	CS
7		1.9	8.9	40.0	0.64	C
8		2.0	9.9	65.5	0.84	S
9		1.9	9.7	59.0	0.72	C
10		2.0	4.6	40.5	0.58	CS
11	*Guadua Angustifolia Kunth*	1.9	8.9	53.0	0.31	C
12		1.9	8.4	41.0	0.64	CS
13		1.9	8.0	68.0	0.84	S
14		1.9	8.3	45.5	0.51	C
15		1.8	8.8	46.0	0.52	C
16		1.8	4.1	51.0	0.51	S

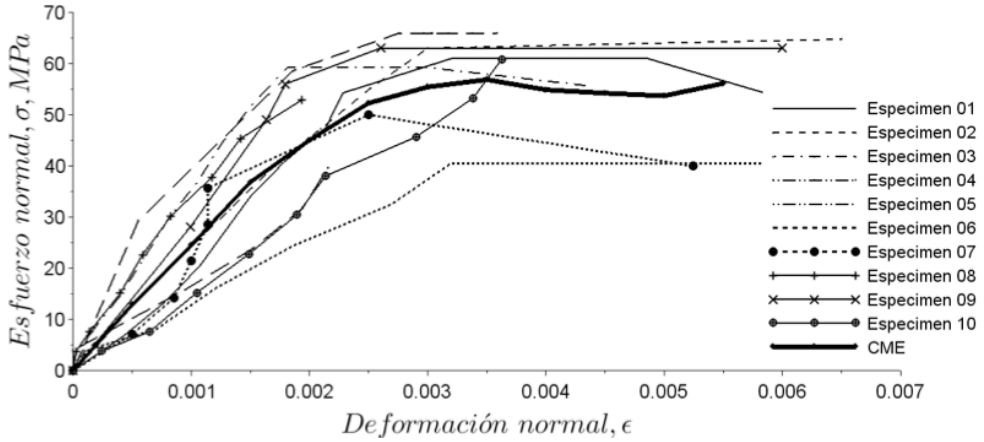


Image 6. Axial compressive stress-strain curves (Bambusa Oldhamii, Mexico)

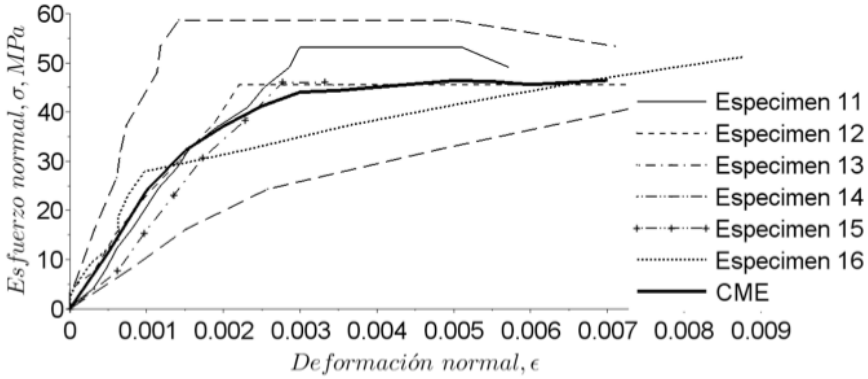


Image 7. Axial compressive stress- strain curves (Guadua Angustifolia Kunth, Mexico)

The experimental mean curve (EMC) of the ten experimental curves of *Bambusa Oldhamii* was obtained, Image 6. The calculation was made at each $\Delta\boldsymbol{\varepsilon}$=0.0005, from $\boldsymbol{\varepsilon}$ = 0.0005 to $\boldsymbol{\varepsilon}$ = 0.0055, according to the process defined in II.4. The last line of control intersects at least four experimental curves. Then, by using a least-squares analysis was obtained the equation (9), which defines the proposed mean curve (PMC). In it, two parts are distinguished; if the strain $\boldsymbol{\varepsilon} \leq 0.0035$, a second-degree equation is established, otherwise it has a first-degree equation. This process is repeated for the *Guadua Angustifolia Kunth* data, see Image 7 and equation (10), for which the maximum strain proposed was 0.007.

$$\sigma = \begin{cases} -3797030.80\varepsilon^2 + 29819.41\varepsilon \;\; si\; 0 \leq \varepsilon \leq 0.0035 \\ -864.92\,\varepsilon + 54.83 \;\; si\; 0.0035 < \varepsilon \leq 0.0055 \end{cases} \tag{9}$$

$$\sigma = \begin{cases} -4322731.30\,\varepsilon^2 + 27500.32\,\varepsilon \;\; si \leq 0.0\,\varepsilon \leq 0.0030 \\ 601.79\,\varepsilon + 42.56 \;\; si\; 0.0030 < \varepsilon \leq 0.007 \end{cases} \tag{10}$$

Regarding the tensile test, Image 8 contains nine experimental curves of the *Bambusa Oldhamii* species, the experimental mean curve (EMC) is also presented. The average value of the elastic modulus measured at 50% of the maximum stress was E_{mt} = 14.92 GPa with a CV = 39%. The average value of the maximum stress of the nine samples reached $\boldsymbol{\sigma}_{mt}$= 273.30 MPa and CV = 14.4%, which was associated with a strain $\boldsymbol{\varepsilon}$ = 0.0197. Equation (11) represents the PMC of the axial stress-strain relationship, in this case $\boldsymbol{\varepsilon}_1$ = 0.01. Image 9 shows the final state of a specimen after testing.

$$\sigma = \begin{cases} 14553.86\,\varepsilon \quad si\ 0.0\,\varepsilon \leq 0.010 \\ 8\,111.07(\varepsilon - \varepsilon_1) + 145.54 \quad si\ 0.010 < \varepsilon \leq 0.024 \end{cases} \tag{11}$$

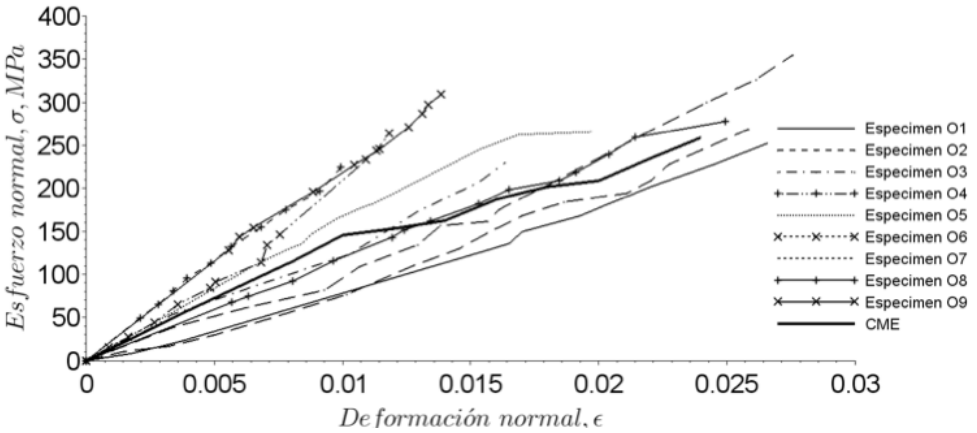


Image 8. Axial tensile stress-strain curves for *Bambusa Oldhamii* Mexico (Mendoza, 2014)

IV.2. Experimental mean curves and proposals for the Guadua Angustifolia Kunth species from Ecuador and Colombia

Following the methodology presented, the experimental (EMC) and proposed (PMC) mean curves of the axial compressive stress-strain were obtained. In the case of Ecuador, equation (12) represents the PMC obtained from the experimental mean curve and is valid for strain $\boldsymbol{\varepsilon} \leq 0.0035$. In the Colombian tests, equation (13) of parabolic type was proposed up to $\boldsymbol{\varepsilon} \leq 0.0040$ and linear from this point to $\boldsymbol{\varepsilon}$ = 0.0070, see Images 10 and 11.

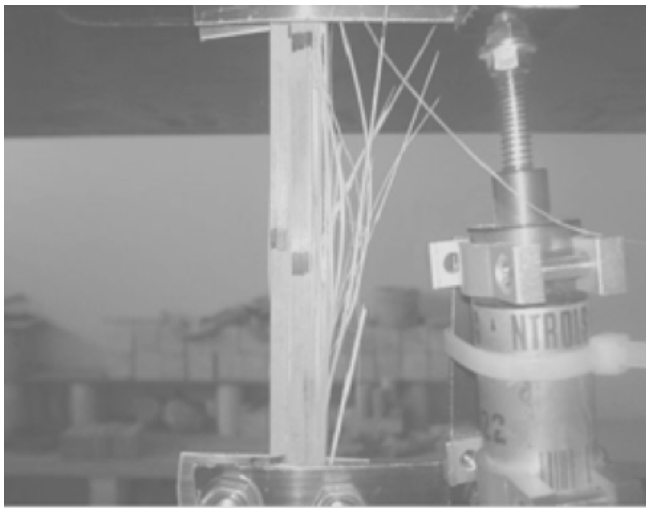


Image 9. Failure in tension test (Mendoza, 2014)

The mean value of compressive stress in Ecuador was σ_{mc}= 48.9 MPa and *CV* = 10.7%, while the elastic compressive modulus registered E_{mc} = 25.5 GPa with *CV* = 21%. In the case of Colombia, the mean compressive stress value was σ_{mc} = 52.31 MPa with *CV* =16.2%, modulus of elasticity E_{mc} = 17.8 GPa and *CV* = 42%.

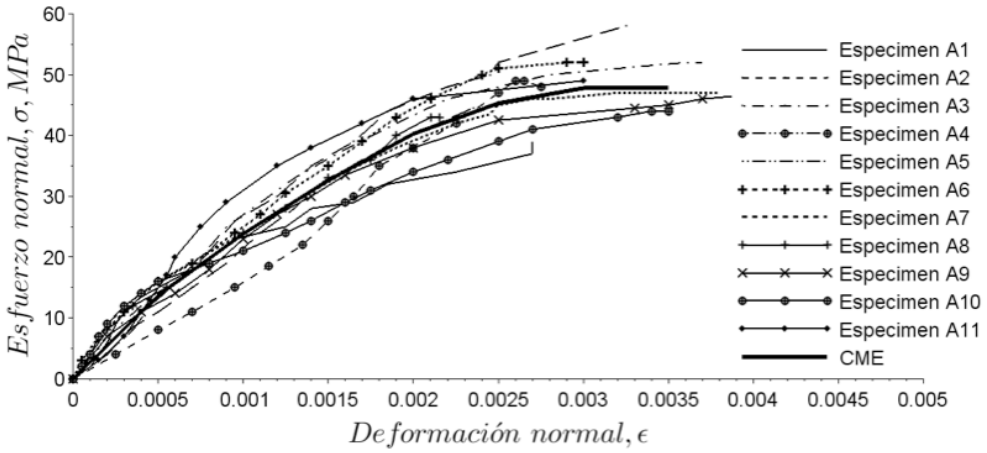


Image 10. Axial compressive stress- strain curves of Guadua Angustifolia Kunth, Ecuador (Córdoba, 2014)

$$\sigma = -4186304.80\,\varepsilon^2 + 28423.46\,\varepsilon \quad si\ 0 \leq \varepsilon \leq 0.0035 \qquad (12)$$

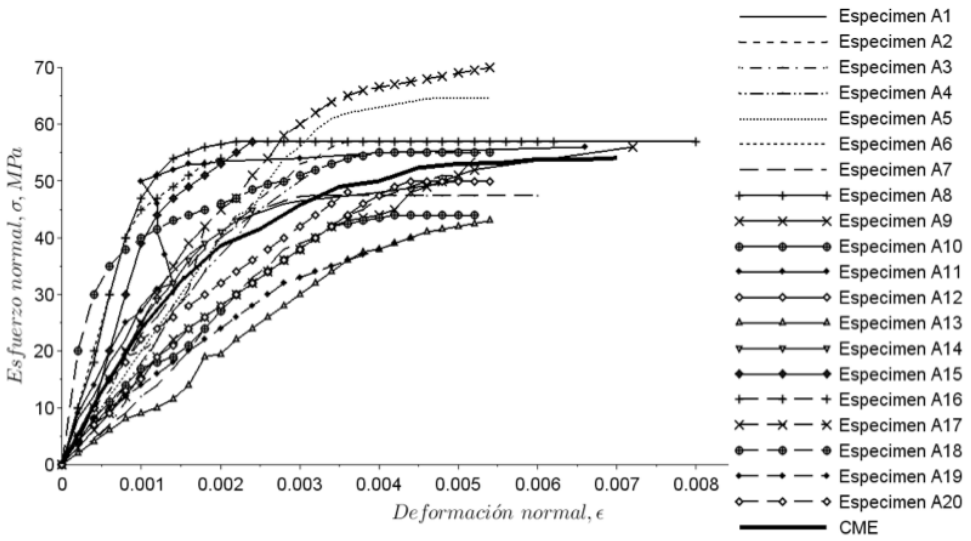


Image 11. Axial compressive stress-strain curves of Angustifolia Colombia (González, 2006)

$$\sigma = \begin{cases} -2817267\,\varepsilon^2 + 24243.87\,\varepsilon \;\; si\; 0 \le \varepsilon \le 0.0040 \\ 721.42\,\varepsilon + 49.01 \;\; si\; 0.0040 < \varepsilon \le 0.007 \end{cases} \tag{13}$$

Image 12 presents the tensile curves of ten tests performed in Ecuador, as well as the experimental average curve. The PMC is defined with equation (14), for this case ε_1=0.007. The average value of tensile stress was σ_{mt} =136.0 MPa and CV =7.5%. The elastic modulus was E_{mt} = 18.4 GPa with a coefficient of variation CV = 26%.

$$\sigma = \begin{cases} 16120.18\,\varepsilon \;\; si\; 0 \le \varepsilon \le 0.007 \\ 8177.15\;(\varepsilon - \varepsilon_1) + 112.84 \;\; si\; 0.0070 < \varepsilon \le 0.009 \end{cases} \tag{14}$$

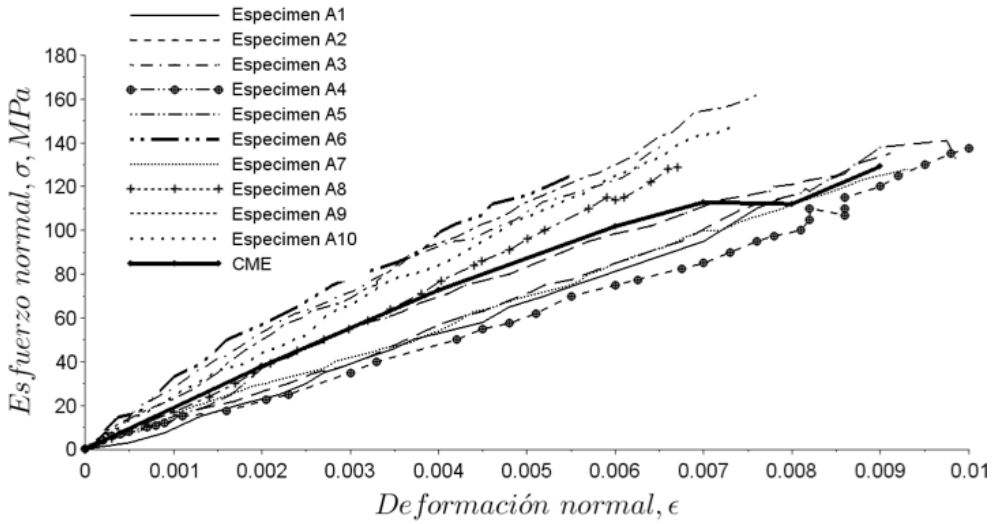
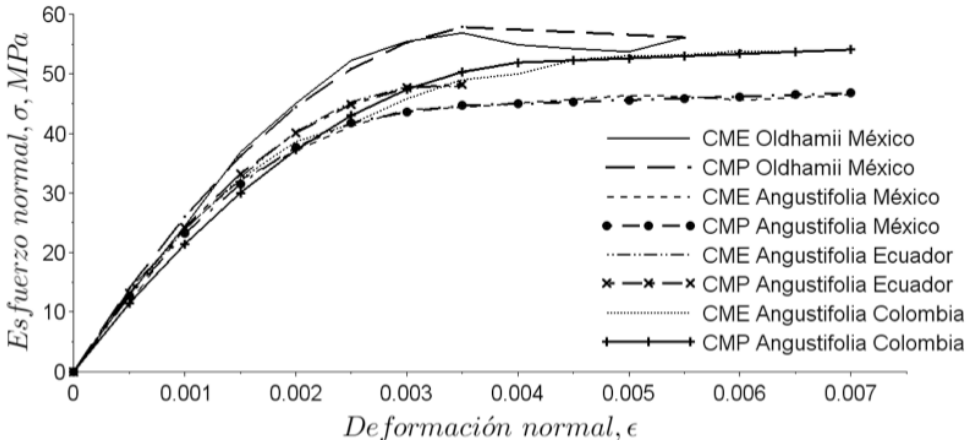
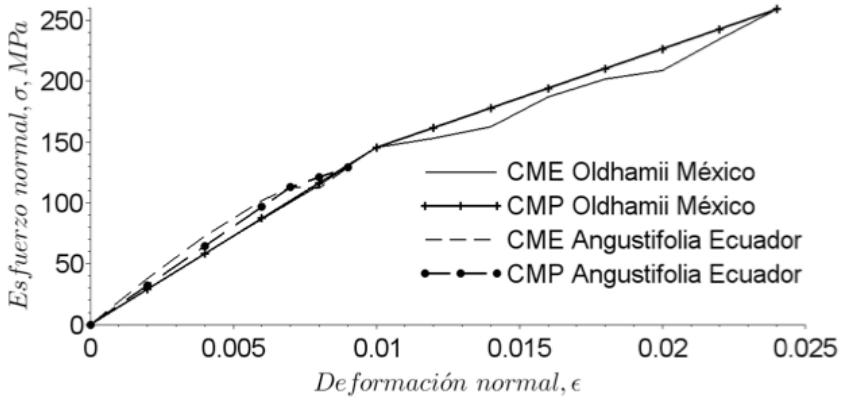


Image 12. Axial tensile stress-strain curves of *Guadua Angustifolia* Ecuador (Córdoba, 2014)

Image 13 shows the experimental (EMC) and proposed (PMC) mean compressive and tensile stress vs. strain curves, while Image 14 presents the complete proposed curves for *Bambusa Oldhamii* (Mexico) and *Guadua Angustifolia Kunth* (Ecuador). The negative part is tension defined by equations (11) and (14); the positive part represents compression obtained by plotting equations (9) and (12). An unreinforced concrete curve obtained in the compression test was added (Sánchez *et al*., 2011)



a) Compression



b) Tension

Image 13. Comparison of experimental and proposed curves

V. DISCUSSION

Tables 5 and 6 present the summary of mechanical and physical properties of the specimens tested. Regarding density (D), *Guadua Angustifolia Kunth* registered similar values for the cases of Mexico and Colombia.

Concerning the moisture content (*MC*), the specimens tested in Mexico were drier (7.8% vs. 12.7%). About the compressive strength (σ_{mc}), the species *Bambusa Oldamii* has the highest value with 56.1 MPa and the compressive strength of *Guadua Angustifolia Kunth* is similar in the three studies. The elastic modulus in compression of *Guadua Angustifolia Kunth* (E_{mc}) obtained in Ecuador was higher, with a lower value of strain (ε_{mc} =0.0035) to the mean stress. The strain values to the mean stresses obtained in Mexico and Colombia are similar.

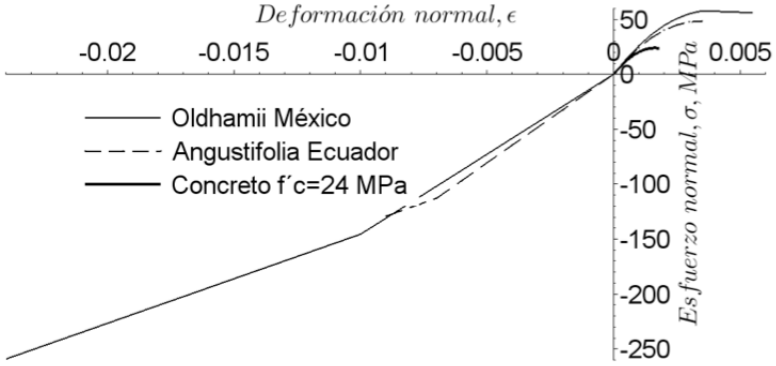


Image 14. Proposed behavior curves for monotonous load in tension-compression

In the tensile tests, again *Bambusa Oldhamii*-Mexico registered the highest stress (σ_{mt} = 273.3MPa) while *Guadua Angustifolia Kunth*-Ecuador only reached 49% of this value (136.0 3MPa). The situation was inverted for the elastic modulus (E_{mt}), *Bambusa Oldhamii*-Mexico reached 81% (14.92 GPa) of the value registered by *Guadua Angustifolia Kunth*-Ecuador.

Table 3
Average values of physical properties

Species/ Origin	Propiedades físicas	
	MC (%)	*D*
Bambusa Oldhamii/México	9.5	0.66
Guadua Angustifolia Kunth/México	7.8	0.55
Guadua Angustifolia Kunth/Colombia	12.7	0.59

Table 4
Mean values of mechanical properties

Species/ Origin	Mechanical properties					
	Compression			*Tension*		
	σ_{mc} (MPa)	E_{mc} (GPa)	ε_{mc}	σ_{mt} (MPa)	E_{mt} (GPa)	ε_{mt}
Bambusa Oldhamii/México	56.1	24.6	0.0055	273.3	14.9	0.0197
Guadua Angustifolia Kunth/México	12.7	0.59				
Guadua Angustifolia Kunth/Ecuador	48.9	25.5	0.0035	136.0	18.4	0.008
Guadua Angustifolia Kunth/Colombia	52.3	17.8	0.0057			

Tables 5 and 6 show: MC, moisture content; D, density; σ_{mc}, mean compressive stress; E_{mc}, modulus of elasticity in compression; ε_{mc}, strain to mean compressive stress; σ_{mt}, mean tensile stress; E_{mt}, modulus of elasticity in tension; ε_{mt}, strain to mean tensile stress.

There is no failure pattern in compression tests. However, four *Bambusa Oldhamii* without node specimens failed by shearing (S), where a negative effect on the compressive strength was observed.

The proposed mean compression curves (PMC) are, in most cases, parabolas and straight lines; the first end with deformations between 0.0030 and 0.004. Then, there is a linear behavior with decrease in stiffness. Image 13a shows a similar behavior of the *Guadua Angustifolia Kunth* species in the three countries, regardless of the test parameters, geometry, and physical characteristics of the specimens, as well as the position of the specimen on the bamboo cane. Thus, the initial slope in the three curves is similar up to deformations between 0.0035 and 0.004, and then the material is plasticized.

For tensile tests, the proposed mean curve (PMC) of *Bambusa Oldhamii* shows stiffness degradation starting from $\varepsilon = 0.01$. In contrast, in *Guadua Angustifolia Kunth* it starts with $\varepsilon = 0.007$. In the same order, the ratio of tensile to compressive stress is 4.87 and 2.78, respectively, with a higher ultimate strain in *Bambusa Oldhamii*.

Image 14 shows the proposed curves of both species in tension and compression recorded in Mexico and Ecuador under monotonic loading, which indicates the structural advantage of bamboo over unreinforced concrete. In this case, the maximum strength of the concrete is 20 MPa. At the same time, the *Bambusa Oldhamii* species reaches values close to 60 MPa, with similar slenderness ratios in the tests of both materials (2 for the concrete and 1.9 for the bamboo specimen). On the tensile stress, concrete does not exceed 10% of the compressive strength (2.0 MPa), while *Bambusa Oldhamii* reaches up to 250 MPa.

VI. CONCLUSIONS

The experimental axial compressive stress-strain mean curves of *Guadua Angustifolia Kunth* obtained in Mexico, Ecuador and Colombia have the same shape. The maximum compressive strength of 60 MPa recorded in *Bambusa Oldhamii* would correspond to a high strength concrete.

In both bamboo varieties, the axial tensile stress-strain curves show elastoplastic behavior. In the *Bambusa Oldhamii* species the slope of the plastic section is 55% of the slope of the elastic part. The ratio decreases to 51% in the *Guadua Angustifolia Kunth* species.

The mean curves in compression tests of *Guadua Angustifolia Kunth* obtained in the three countries, regardless of the test procedure or the characteristics and origin of the specimens, have the same shape. Then, the characterization of the behavior of the material is possible, like that made for concrete or steel. Thus, the compressive/tensile stress- strain curves can be used in the analysis of structures made with this material.

Under certain conditions, the bamboo has a better behavior that the one registered in the unreinforced concrete. However, the disadvantages of the material should be reviewed, specifically the durability and fire resistance, which can reduce the design service life of this structures. Another problem in the design phase is the a priori ignorance of the geometric properties of the culms, unlike steel profiles, concrete elements or wood, where the cross sections are known.

Finally, this biomaterial would be a construction option in Guerrero, Oaxaca, and Chiapas It can reduce the lack of housing, to diminish the risk of the society caused by natural phenomena, and to reduce the costs of the construction.

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VIII. LIST OF ACRONYMS AND SYMBOLS

C,	Crushing failure
MC,	Moisture content in %
EMC,	Experimental mean curve
PMC,	Proposed mean curve
PS,	Parallel shear failure
PSC,	Parallel shear and crushing failure
CV,	Coefficient of variation
D,	Dimensionless density
E_{mc},	Average modulus of elasticity at compression, GPa
$E_{mt,}$	Mean compressional modulus of elasticity, GPa
LDVT,	Linear displacement transducer
RE,	Slimness ratio
ε,	Normal dimensional strain
ε_1,	Normal tension elastic strain
σ,	Normal stress
σ_{mc},	Average compression stress, MPa
σ_{mt},	Average stension stress, MPa

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RADICAL IMAGES COMMITTED IN THE IMMEDIATE SITUATIONS OF THE PRODUCTION OF THE TECHNICAL SCHOOL COUNCIL

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— Abstract—

This work presents from the relationship of the social thing that the professors and directors construct in the Technical School Council; the construction of meanings that through interaction they share; so he asks himself; What are the symbols that occur in the interactions that give meaning to the collegiate of teachers and managers? What are the images that are described in the collegiate performance and the meaning they represent in the behavior of the group? The objective; interpret the production of meaning that is generated in the images of collegiate interaction that describe the meaning of the actions of teachers and managers in the School Technical Council.

The defined focus of the study of the life of human groups and their behavior based on the theoretical perspective of social interaction, from the conception of meaning that arises as a consequence of the collegiality that each one maintains with the other, and that these modify through the interpretation of social production in situ, this process guides the social research methodology under the explanatory approach of the grounded theory, the theoretical sampling as a tool for the collection of successive data, starting with open codes on the data collected to determine new phenomena for its analysis, the results are foundations for successive research processes.

As result we have that the meanings in the collegial interaction of professors and managers is based on the dynamic interconnection where the symbols that emerge from the interactive acts, are an expressive endowment in a framework of what the creation of own norms of the context supposes. "Performances", the actors through the symbols that emerge from the interactive acts are producing an expressive endowment of these cultural scenes.

Keywords

School Technical Council, reciprocal influences, radical images, shared meanings and meaning.

The social context of school life becomes possible to the extent that an intersection between senses is constructed in the interaction; those charged to the actions of the participants in the collegiate of the School Technical Council. The links that persist often summarize the struggles for control of the school organization. Interest of these are the bargaining interactions, which through dyadic relationships access the structuring insert of that complexity.

Simmel (2002), from his theory, seeks the understanding of these non-institutionalized social forms, such as dyadic, generated by the reciprocal action of two actors inserted in a network of relationships and shared senses, dialogic situation that goes beyond the form individual thinking.

The establishment of borders, as a territorial arrangement of communication structures in collective interaction, clusters professors and managers, turning collegiate spaces into customs that do not allow modifications to their collective actions, integrated in the sense of the object of school activity, transforming collegiality into a complex reality that reacts to the transitions that generate new educational changes.

But what is the meaning of collegiate interaction for teachers and managers?

At this crossroads, the set of relationships established by professors and managers in collegiate, allows to distinguish transactions that permeate the context, a negotiated order, regulatory space to institute the way to participate; social category of articulation of collective interactions, so that dialogue in situ adds to the constitution of a structuring social order, social action participates in the interaction of the members of the CTE, by building a world of symbolic forms in the meaning that is reflected in the organizational control concealed by the consensus of social interaction, which takes over collegialization, generating an integration of meaning that uses communication to convey its meanings in context, contributing fundamentally to the reproduction of the social order, emerging identity symbols shared by the group, becoming a pre-existing network of structures that reconfigure and strengthen their pattern of social production relations in situ, structuring distinctive features of collegialization, a conception of the whole social world and place in it that occupy relationships and networks that identify them.

METHOD

For the understanding of reality in the construction of social interactions, the following methodology was addressed:

a). Subjects. It is based on the selection of dyadic interactions as a space lived in a social order and negotiation, chosen for their possible relevance in the realization of previous projects.

The data collection is configuring the domain of the sample in relation to the theory, thereby generating the sample to be an open and ad hoc procedure and not an a priori design parameter.

In this sample for convenience, there were 13 physical education teachers and 16 arts teachers, 2 coordinators and 2 managers, all belonging to a public secondary education school zone led by the principal.

b). Theoretical sampling generated data collection through the instruments: participant observation in the same scenarios in which the interactions occur; interviews, designed in a first phase, selecting the cases by their similarities, then they were chosen for their differences, the creation of categories is established by their similarities.

c). Hypotheses, these are generated from the moment the data emerges, the research design based on the grounded theory approach requires starting the theory generation without hypotheses, or preconceived ideas about the object of study. The process begins with open codes on the data collected, so the selective sample is directed towards the issues that are central.

d). The context. This is framed by sessions of the School Technical Council called peer learning, in which teachers from 12 secondary schools belonging to the subjects of Arts and Physical Education, a group that as a social category, is a group that perceives itself composed of professors and managers who have developed an "*awareness of us*". It is not only a group of belonging, to which the subject is passively connected, but it is a reference group, in which the subjects use social norms and values to guide their thinking and acting, in a given situation.

RESULTS

a). Established meanings.

Blúmer (1982) says that the meaning that things contain for the human being a central element in themselves, so that the meaning is the fruit of the process of interaction between individuals.

To the extent that individuals interact through their actions, they define their interacting according to their function, the product of social interaction; then social construction in situ result of the interaction between teachers and managers is the effect of the different actions in relation to the object, because the acts of the group members cause a corollary that defines their interactions. Next, in situ interactions as a result of collective interaction in the School Technical Council will be addressed:

The collegiate assumes that the beginning and presentation of the meeting corresponds to the Principal:

> Prin.- *Starts the session, welcomes everyone and explains the development of the session, the Principal organizes a collective observation of the teachers' classes.*

These established meanings, generated by the channel of the collegiate march are the opening speech of the session and announces to the members the moment the opening of the dialogue actions between professors and managers, these symbolize the construction of a context of shared meanings, where the definitions of new senses open a space to social reality that is only built in the interaction with others:

> Mo.- *The previous session asked to involve Spanish and Mathematics and brought printed material from his work.*

The teacher states that he can continue with the presentation of the work, that is, the action established as part of the structure of the session that each teacher presents to the group is found, the task is to show a class, to be assessed by means of an instrument of observation, the Principal indicates the follow-up of the observation guide, for the fulfillment of the session:

> Prin.- *Comments that the observation has to be continued with.*

The observation guide that teachers and managers have to undergo is the central axis of the process that gives meaning to the interaction:

> Tchr.- *Says that you can see the development in the result and if the questions can be answered.*

Teachers and managers know the space of the group because it has been established by it, values and norms that are built and integrated into the culture that the collegiate structure for the interaction of the group are implicit and therefore established:

Mo.- *Give their opinion according to what they observed in the videos presented.*

The coordinator of the work requests the participations according to the order presented in the context, the teachers know the space since it is between equals and can be involved in the criticism of the work of the participants in turn:

Mo.- *They question the teacher if the videos were in order, with a beginning, a development and a closure.*

So another teacher continues with the presentation of her work, in this case she shows some drawings that her students have prepared:

Tchr.- *Shows her evidences, works done in her art class. Shows several works of her students made with different materials. All works are free on the subject.*

To which in this act another teacher also adds, the presentation of photographs composed with costumes and different materials are her presentation:

Tchr.- *Shows her evidence with some photographs and the costumes made by the students with different materials.*

Teachers add their participation as a product of the interaction:

Mos.- *They gave feedback to the presentation, where they mentioned that it is important to maintain the interest of the students, a teacher commented that now with the autonomy the students have the opportunity something that is of their interest.*

The intervention of the group coordinator is manifested by referring to the question, what did we learn? Generates conditions for teachers and managers to incorporate the product of their actions:

Prin.- *What did we learn?*

To which adds its participation of integration, for all, the context in which teachers and managers are added to the action of meanings that permeates the groups in interaction.

Prin.- *He says that these meetings will be resumed. We have to be inclusive.*

To what continues selectively inviting the group to join their participation:

> Mo. *He says that it would be better for him to be only physical education teachers to exchange ideas.*

The mediator in his responsibility to intervene in the conduct of the meeting and preserve the goal pursued in the group, continues with his insistence:

> Prin.- *We must be inclusive*

Which results in the generation of personal and group images, acts that allow the group to be maintained in the established interaction.

The established meanings become norms and values for the collective, fixing in them radical images that constitute their actions.

b). Manipulated meanings

The manipulation of meanings starts from the interpretation that manifests itself in the interaction of the group. The following describes the moments when teachers and managers make use of this act of interaction:

> Mo.- *Explains how he could interest students to participate.*

The teacher refers to the interest of the students, this is the central axis of the teacher's teaching practice; from here we can picture the teacher, hence the management of actions, because this allows them to use meaning to protect their participation.

> Mo.- *The teacher refers to the student's interest and adapting it to the program.*

To put their students as a reference, is to put what the group makes sense, turning this space into an environment of shared meanings.

> Mo.- *Empathy has to be used. Main barriers Teacher-student, adult-teenager, my likes your tastes.*

The putting into context of shared meanings for teachers, has become fundamental principles that have no contradiction, which generate empathy between them, so this allows participants to join the above:

> Mo.- *Mentions that he received feedback from some of the parents where they congratulated him on what he has achieved with the students.*

In this way, all of them orient their actions in function that are in context, an indispensable category in the process of teaching practice is the father, so the participants are abstracted to address this sense.

> Mo.- *He mentions again that it is important to see what the interests of the students are; comments that he worked on a ranch and had to walk five kilometers on that path.*

The same teacher continued to emphasize the interest shown by students in his class, by including them by taking them into account:

> Mo.- *One of the students who is currently most involved in arts is because he has taken interested in it.*

And it measures the results:

> Mo.- *I am pleased to see the progress in students.*

The meaning derived from the images that emerge from the collective interaction.

He continues to refer to his students:

> Mo.-*Ever since the beginning he has put a lot of effort on it.*

A teacher participates in his presentation by saying:

> Mo.- *Then the teachers are wrong.*

Since the one who expresses his speech tends to divide the group.

The collective contains a meaning to which he answers:

> Mo.- *This is from his point of view, he is not talking about other teacher's job, he is sharing what has been working for him in the school, that is all.*

The intervention of a teacher asks for explanations:

> Tchr.- *Points to the background of the video, where there are some paintings, and asks to tell her what the project is about.*

The teacher continues to show the best of his students' performances:

> Mo.- *To which the teacher answers by putting another video of the state meeting where they danced.*

An approach arises before the presentation of a student with different abilities in learning:

> Tchr.- *How do you manage to homogenize the group where there are difficulties to work?*

The teacher answers the questioning:

> Tchr.- *The teacher says that they work in teams to integrate them and that they choose the team they want to be on.*

Participation continues adding to those that are structured in symbols resulting from the interaction, the interconnection between participants, the approach to integrate, including the child with different abilities:

> Tchr.- *Another teacher says that when she lets them pick their teams it leads to indiscipline.*

They allow the construction of images of the "must be" and that everyone should not keep applying it:

> Tchr.- *Answers affirmatively, but at that time, she stops the activity and talks with them.*

And continues, emphasizing success in her teaching practice:

> Tchr.- *Says that the negotiation part is coming and asks, according to the characteristics of the student, them to do certain activities.*

The session coordinator intervenes to indicate the features of the observation guide, where the group evaluates the participation:

> Prin.- *Refers to the guide to see some points. Another teacher says that physical education has changed and that in these times it is something else. Again, the principal makes the previous dynamic with regard to the subject of arts, asking the questions from the guide.*

The voice of the group coordinator emphasizes the features of the observation guide:

Mo.-*Give their opinion according to what they observed in the videos presented.*

Questions arise to their practice at the time of the evaluation:

Mo.- *Questions the teacher if the videos were in order with a beginning, a development and a closure.*

The process is consolidated, the teachers propose as an action the participation and incorporation of materials:

Mo.- *Teachers begin to share awareness for the use of sports shoes.*

The participation of a teacher in sharing his experience, points to the integration of students to the process, as well as to decision-making, of their reasons that justify their actions:

Mo.- *Shares his experiences, and knows that everyone has different contexts, says that they should ask why they cannot or do not bring the uniform, he asks them to wear other pants even if it is not the uniform asking for authorization, and the girl at the end of the class can change clothes with the corresponding uniform.*

Finally, the work coordinator asks the group for the final agreement as a collective:

Continue working according to the aspects expected in a class so that the teaching-learning process is optimal and students can take advantage of it according to the characteristics and interests of each of them.

The interconnection of these images generates in teachers and managers the meaning of the meeting.

c). Deduced meanings

The following describes the ways in which the meaning deduced by the teachers and managers in the interaction is presented, meanings that are formed and reconstructed with the symbols that are generated in an interactive context, interpreted through the acts developed in the action.

Ma.-*Asks about the paintings that at the bottom of the video and asks to tell her about the project.*

The teacher knows what it are the paintings about, but the interaction permeates the generation of questions with the intention of observing the speaker's behavior, which generates an interaction in which the expressions of meaning of the teachers and managers are manifested in a dyadic action that also has its meaning from symbolic action:

> Mo.- *Congratulates him and says that he already has 27 years of service and sees many new faces.*

Continues praising the school and the teacher:

> Mo.- *Ends by saying that he knew the school before and that it is nice to see the wonderful current change*

In such a way that he insists that the work done by the teacher goes beyond its development fields, an immediate situation that the actors capture and from which the acts emerge:

> Ma.- *Asks the teacher if they worked overtime and he answers negatively.*

Again, the images that teachers have about their teaching activities are present, allowing them to manipulate the meaning according to what should be presented and their speech is included in the consensus of participation, causing reciprocal influences in their actions.

DISCUSSION OF RESULTS

Reciprocal influences are the scenario that develops the collective interaction, this behavior lies in the alternate formulation of indications among those involved in the collective process of the School Technical Council, a process of "interconnection of the action" (Blúmer, 1982).

From this perspective we assume that meaning is a social production, product of interaction, creation that emanates from and through the defining activities of the participants in the process.

We have been explaining that teachers and managers build in the interaction in the School Technical Council, a categorization of meanings: established, manipulated and deduced.

Addressing the established meanings as those that the interactions contain in themselves, for teachers and managers, and that constitute a central element in itself, hence the human being to orient his actions in relation to things, based on the meaning these offer.

The members of the collective know what the observation guide means and the intention it has, the collective discussion, the interactive actions carried out addressing this meaning, as a central element, the interaction that is generated, always points in this direction, when referring to the answer of the questions they generate an interconnection of the action producing the reciprocal adaptation of the actions of each one of the participants (Blumer, 1982).

In this space, the identity of the teachers and managers is also formed, constituting on the basis of values, patterns of behavior, attitudes and customs of the collegiate, elements that build the reality of which they are part.

The established meanings are those that have been structured in the processes of interaction, which give it cultural structure, these are elements of natural structure, a class observation guide, is an objective structure that is inherent in teaching, elements such as the interest of the students, feedback, autonomy of the students are manipulated meanings, structured by the social interaction of the members of the collegiate where the definitions embody individuals who are in turn defining the reality (Berger and Luckmann, 1967).

The use of the meaning by a person of the collegiate is but an application of this, when the teacher affirms that he seeks the interest of his students, it is only the manipulation of the consensus in which the professors and managers know what he means. They allow to generate in the collegiate a distinction of their practice, an interconnection of meanings, because the use in the action of the interaction, is but the implication of an interpretative process (Blumer, 1969).

Thus, symbolic interactionism emphasizes the interaction of individuals and the interpretation of immediate situations, the interpretation by the actors of the symbols that emerge from interactive acts that are an expressive endowment of simulations "the facade" (Goffman, 1956).

The facade is a product of the manipulation of meanings: the manipulation of the meaning of the expression "my tastes are your tastes", "empathy, barriers"; teachers manipulate the reality of their practice, their performance, it helps to set the definition of the situation they are trying to show.

The facade encompasses two elements such as the medium, which is outside the person; and the personal façade, composed of “insignia of office or rank, pauses of language, facial expressions, body gestures and other similar characteristics” (Goffman, 1956: 35).

In most cases, the medium and the personal facade converge, because the meaning that is deduced in social interaction, is applied in context, where it is used by some teachers to deduce their participation, for Goffman, life is like a theater and it consists of performances, where there are actors

and public, so what is shown in the presentations is conceived as real while the performance lasts.

The performances in the presentations of the professors and managers, as actors use masks, which implies the creation of rules specific to the context, that is, in this theatrical performance, action patterns are manifested to which individuals adapt their performance.

The symbolic baggage defines the projection of teachers and managers, and who project in situ, constitute the deduction of meanings, for symbolic interactionism, each interaction situation defines the meanings in the action.

A process of assembling the activities of its members, constitute the deduction of meanings, each interaction situation is defined by teachers and group managers.

The benefits that strengthen the momentary ideals or that last, constitute a unit within which those interests of the participants in the interaction are realized, the teachers and managers find in this space of deduced meanings a place to express their interests.

CONCLUSIONS

Teachers and managers share meanings in the three areas: established, manipulated and deduced; established when they share the interaction and pour their norms and values, this framework allows them to interact, manipulated when the group seeks to appear and thereby interconnect lines of action of the symbolic interaction; symbols such as those of the teacher's duty; public congratulations to generate leadership subgroups, use meanings manipulating the image of who proposes them.

The meanings that teachers share in the interaction are a set of radical images that give life to the framework that act collectively, always in the circumstances that they have had to act and that we can observe in the concepts that are managed in groups and that everyone participates in this meaning, for some the replica, for others the praise, while for others symbols are those of tensing the interaction, these are also meanings they share.

The meanings: established, manipulated and deduced have their meeting point at the time of the interaction that develops the collegiate of the School Technical Council pours the dialogue of interaction with others in which confronts positions giving birth to a new meaning.

The social action that generates the production of meaning is framed in the school culture, understood as the norms and values that accept the meanings in situ and the social structure from which the types of relationships existing in the collective derive.

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POLITICS AND LITERARY CREATION IN CHIAPAS PRESS (1910-1912)S

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— Abstract—

In base to a journalistic research on newspapers from Chiapas, epigrams and different kind of verses are commented in order to demonstrate how the social and political events of the *Maderista* revolution (1910-1911) influenced the field of literary creation. As long as it identifies authors, the journals where these ones were published and their political networking, this article contributes to the study of the relationship between literature and politics during the first half of the twentieth century.

Keywords

Literature; Chiapas; revolution; press; political power.

The influence of political and social events on literary creation in Chiapas is demonstrated by the review of local newspapers housed in the Hemeroteca Fernando Castañón Gamboa (HFCG) of the Universidad de Ciencias y Artes de Chiapas and by the work of various scholars on the subject. The period between 1901 and 1913 accounts for a change in the quantity and quality of literary texts during the last years of national political stability, under the mandate of General Porfirio Díaz, and the rise and fall of the *Maderista* regime.

The assumptions of the above statement are three. First, the link established between the press[1] and power groups; second, the use of local newspapers to disseminate creative literary texts that denigrate or applaud public figures during political conflicts; and third, the relations between Chiapas' intellectuals living in the center of the country and writers based in Tuxtla Gutiérrez, San Cristóbal de Las Casas and Comitán, who used the newspapers of the entity to promote interests that went beyond those of the strictly literary field.

Below is information on the political context of Chiapas, then examples of literary texts published before, during and after the most relevant events of the period under study, in order to compare them and visualize their changes in quantity and quality.

POLITICAL CONTEXT (1900-1915)

Upon arriving in Chiapas, the visitor is amazed by the diversity and contrast of its territory. In addition to its variety of ecosystems, its cultural richness is overshadowed by the misery in which most of its inhabitants survive.

This federal entity was incorporated into the country in 1824, three years after the independence of the Kingdoms of New Spain and the Captaincy General of Guatemala from European rule in 1821. One of the arguments for this federalization was the absence of actions in favor of the economic and social development of the entity during the Colony.

By its geographical location, and specifically by its orography, Chiapas was isolated from other regions, whether from New Spain, the Captaincy General of Guatemala or Mexico, a situation that affected the economic misery of the bulk of its population and that also explains the unique impact of national events in local daily life. The relationship with the Mexican government was one of apparent and superficial subjugation,

1 The existence of books is limited, either because they were lost over the years or because they were never written.

later denied in the relative autonomy with which the Chiapas elites would settle the political and economic decisions of the state.

With the arrival of Porfirio's regime and the turn of the century, Chiapas lived under the mandate of General Díaz and the local group headed by Emilio Rabasa, a politician close to the president's collaborators. Angel Pola (2012, pp. 28-29)[2] tells in his "Autobiography" how, in the late nineteenth and early twentieth centuries, he and Rabasa met periodically in Mexico City together with Manuel Lacroix, Víctor Manuel Castillo, José María Pascacio, Juan María Esponda, Marín Llaven and José Antonio Rivera G. Several of those named became important figures in the politics of Chiapas after building, expanding and maintaining networks in the country's capital with influential figures in national politics and the economy.

In the following list of governors and presidents of the State Congress from 1901 to 1915 (table 1), the influence of former governor Rabasa is evident in his support, first, of Rafael Pimentel (a fellow student), and later in his brother's push for state governorships.

Table 1
List of governors and presidents of the local congress 1901-1915

Year	Governor	President of the State Congress
1901	Rafael Pimentel	Daniel A. Zepeda
1902	Rafael Pimentel	Ciro Farrera
1903	Rafael Pimentel	Eleuterio Aguilar
1904	Rafael Pimentel	Sin identificar
1905	Rafael Pimentel	Miguel A. Castillo
1906	Ramón Rabasa	Eliseo López
1907	Ramón Rabasa	Enoch Paniagua
1908	Ramón Rabasa	Andrés Contreras
1909	Ramón Rabasa	Bernardo Martínez Baca
1910	Ramón Rabasa	Prudencio Pastrana
1911	Manuel Trejo Reinaldo Gordillo León (Interim) Policarpo Rueda Manuel Rovelo Argüello Querido Moheno (Who could not take possession) Reinaldo Gordillo León (Elected)	Unidentified
1912	Reinaldo Gordillo León Flavio A. Guillén	Unidentified

2 Valente Molina presents this information as a quote from the magazine *Chiapas y México* (s/d) in his book *La colonia chiapaneca en el Distrito Federal. 1888-1950.*

1913	Flavio A. Guillén Reinaldo Gordillo León Bernardo Z. Palafox	Teófilo Castillo Corzo
1914	Bernardo Z. Palafox Jesús Agustín Castro Blas Corral	Unidentified
1915	Blas Corral	Unidentified

Source: elaborated from the respective government reports, consulted in the Historical Archive of Chiapas, in the UNICACH and from the book *Chiapas: Notas para una historia reciente* (1994), by Luis Enrique Pérez Mota.

Raúl Serrano Aranda (2010, pp. 86-87) considers that Rafael Pimentel, a military man like General Porfirio Díaz, was overthrown from the government due to conflicts[3] with Rabasa: "Rabasa finally won the battle. Pimentel resigned when he was two years away from the end of his term, which should have been until 1907". Luis Enrique Perez Mota shares the opinion: "At the center of the discussion was former governor Emilio Rabasa and his political school: *rabasismo*. The recurrent challenges were concentrated on ruining his figure and his work at the head of the entity" (1994, pp. 15-16).

With the fall of General Díaz' administration, the problems for *rabasismo* are linked to the following factors:

1. Isolation of the entity from the federation and other states, a situation that allowed the consolidation of Rabasa as the moral political leader of Chiapas by virtue of his proximity to General Díaz' close collaborators, his relations with Chiapas' political groups - with the exception of the elites of San Cristóbal de Las Casas - and his recognized career as a jurist and politician.
2. The Maderista revolution, taken advantage of by a group linked to San Cristóbal to achieve the removal of Ramón Rabasa and promote the return of the powers and political control of the state to his locality. The main argument was the link between Emilio Rabasa and the General's regime. The group was linked to the church and used as pressure the support of the Catholic Party to Francisco I. Madero.
3. The revolutionary conflict following Madero's assassination. The armed conflict provided political groups with the opportunity to ascend to local power based on their demonstration of control over social groups and their relations with the central authority (federal government).

3 The discrepancies have their origin in the exercise of power. Pimentel made decisions contrary to Rabasa's interests.

In this national context, the struggle between the groups became more acute and triggered armed conflicts as the local executive power changed, as happened during the San Cristobal rebellion, under the argument that it was part of the *maderista* movement and placing the state government - as well as Rabasa and his friends - on the Porfirian side. Chiapas' press records this conflict in a timely manner.

Chiapas' newspapers were linked to three influential sectors among the population: the political, the academic-intellectual and the economic. Less importantly, with the church, represented by the bishopric. The role played by this institution was overshadowed by the course of national events.

NEWSPAPERS, AN INSTRUMENT OF POWER

In *La prensa maniatada. El periodismo en Chiapas de 1827 a 1958*, Sarelly Martínez reports on the use of newspapers as instruments of political and ideological propaganda:

> Of the 90 newspapers published in Chiapas, 67 were of a political nature; six specialized in jurisprudence, agriculture and education; five in literature; five in the organs of trade associations; four in schools; and four in the religious sphere. Of the 67 political newspapers, at least 20 were created to support candidates for elected office, because in those years the press performed the functions of a political party, promoting candidates and organizing its supporters. Some of those were: *El Iris, La Conciliación, El Chichicaste, El Eco Liberal, El Heraldo del Porvenir, El Demócrata, El Zurriago, El Voto Público, El Trueno, El Sentimiento Nacional, El Eco de la Frontera, El Dos de Abril, La Voz del Sur, La Voz del Pueblo, El Voto de Chiapas, El Eco de Comitán, El Club Popular, El 5 de Mayo, El Porvenir and La Idea Democrática*. It is not unusual, therefore, to observe that the period of greatest emergence of newspapers was during the years of electoral activity, and that it diminished after the political effervescence had passed. (2004, 109-110).

Newspapers allow the reconstruction of social networks and events in their temporal sequence because they register punctually certain events and characters. For example, in *El plan de San Luis*, in its edition of June 1, 1911 (pp. 1-2), an open letter is published that gives an account of the political group supporting Madero's candidacy for the presidency. In it, it is said that the delegation received by Don Francisco I. Madero was composed of "Juan Felix Zepeda, Jesus Martinez Rojas, Alfredo Aguilar, Justo M. Mijangos and Dr. Arturo Aguilar Ruiz".

The review in the HFCG of the press corresponding to the period 1901-1912 informs us about the mobility of those who led the newspapers, as can be seen in table 2. It can be seen that, for example, Juan F. (Félix) Zepeda,

the same person who was at the meeting with Madero, ran three newspapers at different times; another example is given by the director of *30-30*, Enrique (E.) Barroso, who had run *El Eco*, a printing house in Tuxtla Gutiérrez, and was also at the head of at least two other publications.

Tabla 2
List of newspapers consulted from 1901 to 1912

Publish	Director	City
30-30	E. Barroso	Tuxtla Gutiérrez
¡Adelante!	Juan Félix Zepeda	San Cristóbal
Chamula G	Isidro Torres	México
Diario de Chiapas	E. Barroso	Tuxtla Gutiérrez
El Chiquitín	Jesús María Figueroa	Comitán
El Clavel Rojo	Porfirio Gordillo	
	L. Flavio Avendaño	Comitán
	Gustavo Culebro	
El cometa	Luis Espinosa	México
El Eco	Enrique Barroso	Tuxtla Gutiérrez
El Estado	Juan F. Zepeda	San Cristóbal
Elevación	Delfino Coll	Cintalapa
El gavilán	Neftalí R. Soto	San Cristóbal
El gladiador	Neftalí R. Soto	San Cristóbal
El Heraldo de Chiapas	Bernardo L. Ríos	
	Enrique Barroso	Tuxtla Gutiérrez
	Lisandro Calderón	
El hijo del pueblo	Hermilo López Sánchez y Genaro Ruiz de Chávez	San Cristóbal
El partido liberal	Raquel Cal y Mayor	San Cristóbal
El plan de San Luis	G. Coello Lara	San Cristóbal
El progreso	Juan J. Conde	Tapachula
El pueblo obrero	Mariano Morales R.	Sin identificar
El voluntario	Cuauhtémoc Maldonado	San Cristóbal
Francisco Cuscate	Ángel B. Coutiño	Tuxtla Gutiérrez
¡Justicia!	Palemón Molina	San Cristóbal
La joven Chiapas	Aarón L. García	San Cristóbal
La libertad del sufragio	Jesús Alfaro Mijangos	San Cristóbal
	César Martínez Rojas	
La Opinión Pública	Federico Serrano	Not readable
La paz	Alfonso María Martínez	Tuxtla Gutiérrez
La Revista Chiapaneca	Manuel Suárez	San Cristóbal
La unión liberal	Alfredo G. Cancino	Comitán

La voz de Chiapas	Ramón E. Zepeda José Ma. Zepeda	San Cristóbal
La verdad	J. W. Albores	Comitán
Más allá	Juan F. Zepeda	San Cristóbal
Verdad y justicia	Lisandro Calderón	Tuxtla Gutiérrez

Source: Elaborate from the information present in the printed included in the table

Table 3
List of politicians and local press

Name	Political activity	Year	Journalistic activity	Journal	Year
Juan Félix Zepeda	Delegation of Chiapas endorsing the candidacy of Francisco I. Madero	1911	Director	*¡Adelante!*	1910
	Member of the Management Center of La Libertad de Sufragio	1911	Director	*El Estado*	1912-1913
			Director	*Más allá*	1910
Jesús Martínez Rojas	Delegation of Chiapas endorsing the candidacy of Francisco I. Madero	1911	Collaborator	*1. El hijo del pueblo, 2. La voz de Chiapas, 3. Más allá, 4. La libertad del sufragio*	1. 1911-1912, 2. 1911.1912, 3. 1910, 4. 1911-1912
	Federal Deputy for Chiapas	1911	Collaborator	*1. El tribuno, 2. El boletín del centenario*	1. 1917, 1921
Rafael Pimentel	Governor of Chiapas	1899-1905			
	Judge President of the Superior Court of Justice of Distrito Federal	1888	Collaborator	*La revista chiapaneca*	1908
Emilio Rabasa	Governor of Chiapas	1891-1894	Collaborator	*Excélsior, El universal*	
	Senator	1894-1898-1910			
Ramón Rabasa	Governor of Chiapas	1905-1911			
Querido Moheno	Acting Governor	1911	Collaborator	*1. El demócrata, 2. El porvenir de la Chontalpa, 3. Nuevo día*	1. 1880, 2. ¿?, 3. ¿?
	Secretary of Foreign Affairs	1913	Director	*Nueva era*	1911
Reinaldo Gordillo de León	Acting Governor	1911			
	Governor of Chiapas	1911-1912			
	Municipal President of Comitán	¿?			
	Ambassador to Guatemala	1913			

Flavio A. Guillén	Acting Governor	1912-1913	Collaborator	*El imparcial*	1877-1878
Daniel A. Zepeda	President of the State Congress	1901			
	General Secretary of Government	1902			
	Local substitute deputy	1896-1898			
	Constituent representative of Querétaro	1917			
José Antonio Rivera Gordillo	Alternate Federal Deputy for Chiapas	1900-1902	Collaborator	*1. El demócrata, 2. El diario del hogar*	1. 1880, 2. Siglo XIX
	Secretary of Government of the DF	1911-¿?	Director	*1. Chiapas y México, 2. La clase media*	1. 1908-1911, 2. ¿?
	President of the Colonia Chiapaneca en el DF	1908	Director	*El mensajero chiapaneco*	1911
Rubén Valenti	Under-Secretary of Public Instruction and Fine Arts	1912	Collaborator	*El heraldo de Chiapas*	1908
	Minister of Justice	1914	Collaborator	*Savia moderna*	1906
			Redactor	*El debate*	¿?

Source: Elaborated from the consultation of the mentioned newspapers, government reports of the time (1901-1911) from the Historical Archives of Chiapas and from the book by Enrique Pérez Mota already mentioned.

Tables 2 and 3 show the relationships established between journalists, intellectuals and politicians, as well as the use that the latter made of the press to demonstrate influence in a society that was largely illiterate in those years.

At the beginning of the 20th century, the local press documents the dispute between citizens from Tuxtla Gutiérrez and those from San Cristobal over the seat of political power. The conflict also involved journalists and politicians from Comitán, as when the election of a new governor was called for in 1911 after the fall of the Porfirian regime and of Ramón Rabasa. The *Tuxlecos* supported the nomination of Reinaldo Gordillo de León, from Comitán. The people of San Cristóbal supported another important man of Comitán, José Antonio Rivera Gordillo. Other characters detected in this plot of relationships are the following:

- Emilio Rabasa
- Francisco Orozco y Jiménez (Bishop of San Cristóbal de Las Casas)
- Manuel Rovelo Argüello
- Polycarp Wheel
- Juan Espinosa Torres
- Jacinto Pérez "Pajarito" (from San Juan Chamula)
- Victor Manuel Castillo
- Flavio Guillén

Frictions are trying to be resolved in the center of the country, a practice inherited by political groups from the Diaz regime to the new public administration. As mentioned earlier, Chiapas politicians were coming to Mexico City to strengthen their positions and their networks with the groups in power at the federal level. The Chiapas colony was an institutional mechanism used for this purpose. Valente Molina (2014, p. 29)[4] gives a glimpse of how the figure of Emilio Rabasa became an obligatory reference during the Porfirio Díaz regime, confronted at the time by José Antonio Rivera Gordillo, also employed in Porfirio's administration and based in Mexico City, but ideologically opposed to the liberalism of Rabasa and the General:

> That year Rivera published the magazine *Chiapas y México*, in whose first issue he vowed to keep the colony "united". He also announced that in his magazine he would speak "without detours or hesitations," and he did so, with constant criticism of the Rabasa brothers and other politicians, which caused several of his collaborators to abstain from writing for fear of reprisals.[5]

The evident confrontation in the press also impacts on literary creation. The local newspapers recorded the support or rejection of politicians. Since these sympathies and repudiations also appear in literary texts, it is understood that the authors of these texts did not fail to take sides either.

POETIC TEXTS IN THE LOCAL PRESS (1901-1912)

During the Colonial period, the inhabitants of Chiapas lived deprived of the benefits of the Guatemalan center of power, in addition to being mute observers of the wealth of their New Spanish neighbors. Their situation did not change in the 19th century, when the elites decided to incorporate the territory into the nascent Mexican nation. At the beginning of the 20th century, when the social conditions in the country changed due to the liberal interventionism of the centralist and authoritarian Porfirian government, most of the Chiapas population spoke an indigenous language and a very low percentage, almost non-existent, knew how to read and write.

In reviewing the local press, the participation of some prominent writers is noted, as well as the eminently political objective of the existing

4 In the book *La colonia chiapaneca en el Distrito Federal*. 1888-1950 tells the story of its establishment by Ángel Pola, from whom he rescues the names of the first members and friends who met to form it, among them Emilio Rabasa and José Antonio Rivera Gordillo.

5 Information located on page 77 of the book quoted, where Molina delves into two important facts: 1. The assumption of José Antonio Rivera Gordillo to the presidency of the group and 2. The first election made in the group. The result favors the person who becomes Rabasa's political rival.

publications in Comitán, San Cristóbal de Las Casas, Tuxtla Gutiérrez and Tapachula, cities where more than two daily newspapers circulated.

Later in the 20th century, the appearance of writers of the stature of Rosario Castellanos, Jaime Sabines and Eraclio Zepeda, has not been explained taking into account the conditions of poverty and lack of education prevailing in the state. As a partial explanation of this phenomenon, it is necessary to consider that the press, at the end of the 19th century, was interested in demonstrating the existence of a social class educated to write poetry, essays, among other literary genres, and that it displayed a knowledge of local and international history, characteristics that help to understand the emergence of a group interested in literary creation.

Pressed by a centralist national policy, the press and the Chiapas elites modified their discourse to show strength and influence government decisions. The examples taken to illustrate how the social change generated by political events in the country affected the literary creation of those years cover the period from 1901 to 1912.

The following are some verses that show how the poetry changed from a late romanticism in 1901 to an ironic tone with a strong political and social criticism in 1911 and then, in 1913, to return to emotional or landscape themes.

The first example is offered by Comitán's newspaper *El clavel rojo*, of September 16, 1901, page 3, where a poem of epic tints is read, in rhymed verse, of two quartets and a quintet:

Púrpura[6]
Para José Antonio Rivera G.[7]
Enrique Torres Torija

En la arena del circo, rebosante
de loca multitud que vocifera,
el gladiador, cansado y anhelante,
sucumbe entre las garras de la fiera.

Es grandiosa y solemne su agonía,
como estética y grave su postura;
sus músculos resultan con la fría
desnudez de una trágica escultura.

6 In this as in the rest of the cited compositions, the typography is faithfully respected (italics or bold in the title) and original spelling mistakes are made.

7 José Antonio Rivera Gordillo is a central character in the conflict between the San Cristóbal de Las Casas group, with a Catholic background, and the group from Tuxtla Gutiérrez, with a rabasista lineup. The most visible dispute is the transfer of power, but there is little interest in the formation of a Catholic state and politics.

Y en tanto que la plebe palmotea
al Hercules [sic] muriente y taciturno
que fue vencido en desigual pelea,
la mirada del tigre centellea
como un ojo de cíclope nocturno.

The publication of poems dedicated to political figures and friends is frequent in the press of the time; other more sentimental and loving verses appear at the same time, like those in the following sonnet, with a musical touch in the rhyme and with Becquerian influences due to the charm of their images. Its author is Ranulfo Penagos and it was published in the newspaper E*l heraldo de Chiapas* in its edition of June 4, 1908, page 3:

Amor
Deja que oprima con presión vehemente
tu airoso talle de palmera erguida,
y que mire en tus ojos encendida
la hoguera del amor más elocuente.

Deja que bese con mi labio ardiente
tu dulce boca, que a besar convida,
y que luego te vea conmovida
sintiendo el goce que mi pecho siente.

Yo quisiera, mi bien, entre tus brazos,
hayar [sic] la gloria de soñar cautivo
de tu acento el orgullo plañidero...

Ven! [sic] Que ya unidos con eternos lazos
sere [sic] inmortal, si para amarte vivo,
seré feliz, si por quererte muero! [sic]

The appearance of nature is perceptible in the following poem of a sentimental nature, a little out of date for its time, as Armando Duvalier (1969, p. 20)[8] says and which is, according to Jesús Morales Bermúdez (1997, p. 59), "A poetry that is resolved in meters and simple stanzas, in scarce images that are more descriptive than suggestive or audacious". Its author, José Emilio Grajales, a relative of the former governor of Chiapas from 1948 to 1952, is

8 In the presentation of the book *Flores Silvestres*, by José Emilio Grajales, Armando Duvalier says it as follows: "Although he lived when the modernist school was at its height, only some compositions, like Cita and Las Ondinas, should be catalogued within it, for he was a romantic in every sense of the word..."

also remembered among his countrymen for being the author of the lyrics of the Chiapas hymn. The verses were published in the newspaper *El Heraldo de Chiapas* on September 23, 1909, on page 3:

En la montaña
J. Emilio Grajales

Al caer la tarde
Las estrellas aparecen
Con sus fulgores de plata
En un cielo que embellecen
Nubecillas de escarlata.
En las hojas gime el viento,
Canta en su sonido el sinsonte
Ya soñado, y es su acento
Como un suspiro del monte.
Un carpintero en un roble
Haciendo de fuerza alarde,
Con un bélico redoble
Se despide de la tarde.
En pintoresca bandada,
Las guacamayas vistosas
Van cruzando la hondonada
De las lomas y zacatosas.
En la rama de un castaño
Corpulento y deshojado,
Con aire torvo y huraño
Un gavilán se ha parado,
De un amate en la alta copa
Somnolienta y agrupada.
Ya la noche se avecina,

In view of the social events in Mexico, political changes are immediately perceived in Chiapas. Poems like the following one by Límbano Domínguez appear, of simple structure, with three stanzas in rhymed verses under the structure of quartets and also published in *El Eco*, on June 6, 1910, on page 2:

Los tiranos
Límbano Domínguez

Rara miseria que en la ley se escuda
Y perversa a los pueblos sacrifica:

Rara miseria cuya faz sañuda
Con la sangre inocente se salpica.

Pronto sucumbirá, pues ya el oleaje
De la emancipación rugiente avanza.
Cual fuego vengador que á tanto ultraje
A guerra sin cuartel presto se lanza.

Podeis [sic] temblar, que ufanos ya cantamos
El triunfo del derecho redentor
A cuya causa todos consagramos
Ardiente patriotismo y mucho amor.

Compositions like the one above are rare because national events are heard late by the local population. The writers continue to make verse an exercise in entertainment, playful in its intention, as can be seen in the following example, published in the same newspaper on 19 June 1910, on page 3:

Un consejo
Chema

Si quieres, buen amigo, hacer un trato,
O pensares, por ventura hacer el oso,
Anda luego a la casa de Barroso,
A sacar de tu persona, un buen retrato.
Y después, al pasar por la hostería,
Del buen Paco, sin decirle cacarizo,
Es preciso que le pidas un buen guiso,
Sin pensar, que beber, es tontería,
No te extrañe, si en la calle, o en su puerta,
O sentado, devanándose los sesos,
Encontrares algún "Chema" haciendo versos,
Es mi viejo, buen amigo, Lucas Huerta.

With the fall of General Díaz and the rise of Madero, daily newspapers became the spokespersons for the conflict between the elite of San Cristóbal de Las Casas and that of Tuxtla Gutiérrez, apparently motivated by the transfer of power. Because of the fear they arouse, national issues are touched on elliptically, if not ignored. Meanwhile, the local issue is the main one.

The most important printed matter takes sides, as can be seen below. From San Cristóbal de Las Casas, Neftalí R. Soto -an ally of the San Cristóbal

cause, opposed to the *rabasista* political group from Tuxtla Gutiérrez -directs *El gavilán* on November 7th 1911. In the following verses, published on page 4, reference is made to Reinaldo Gordillo de León, who was identified as the Rabás candidate for state government that same year.

Hay gordos que son gordillos,
Y leones que no son leones;
Pero también hay caudillos
Tan bajos como tacones.
En la bella Comitán
Hay Gordillos y hay Domínguez
Para fregar?... [sic] con loco afán
Grita el pueblo no la... ensucies.

In Tuxtla Gutiérrez, the aforementioned side responds with humor in the *Chamula G* newspaper of December 15, 1911, page 1. The poem uses the figure of the "lion" to identify Reinaldo Gordillo de León as a character superior to the opposing group, represented by the "*chamulita*" of the verses. Remember that the attempt of the indigenous invasion of Tuxtla Gutiérrez, at that time, was led by a *chamula*.

Este era un chamulita
Que á las montañas salió
A cazar gubernatura
Con su perro bulldog,
Y como se encontrara con un león,
Trepóse a un guayabo
Do la vida escapó,
Más como el león le esperara,
En la punta se quedó,
Y el infeliz perrito
Cuando solo se vio
Al frente del leoncito
Tan bravo y tan feroz,
Retrocedió quedito,
Ocultándose, ¡Oh dolor!
En el tronco del guayabo
Do león ya no lo vió
Quien como meneara el rabo
Aquel allá se quedó.

¿Dónde, manito?
¡Pos no pusiste cuidado al cuento!

As we can see, the poetic construction changes in form and content; the news shows abundant examples, some more successful than others. For this work, these poems and the following ones give strength to the argument handled so far: political events affect literary creation.

Before presenting more evidence on the central theme, an epigram is reproduced that insists on Emilio Rabasa's participation in the post-*porfirian* era. Signed by "Periquillo", this quartet of humorous verses clearly shows his antipathy to what was considered "*rabasista*" and is published in *El gavilán* of January 2, 1912, page 2:

En Tuxtla sembré, otro día,
Una enorme calabaza;
Y otra vez salió una guía
De la dinastía Rabasa.

On December 3, 1911, the newspaper from Tuxtla Gutiérrez *30-30*, in its page 2, exposes the Bishop of San Cristobal, Don Francisco Orozco y Jimenez, by linking him to the events and the conflict between the two sides, as it is read in this poem:

Inocencia
Anónimo

La santa Sor Rosalía
á la novicia Asunción
en dulce conversación
la otra noche le decía:
El obispo es bondadoso,
la libertad es su anhelo
y tiene ganado el cielo
por lo santo y piadoso.
Tal es, que nunca aprisiona
á un ave, ni en jaula de oro,
pues cáusele pena y lloro,
cuando sus cantos entona.
La novicia que escuchaba
como si escuchara un cuento,
Madre, le dijo, lo siento,
también como vos pensaba;
pero hoy me dijo Fray Rito:
(y al recordarlo me crispo)
que el santo señor Obispo
ya tiene su pajarito.

The news events occurred in 1910, 1911 and 1912; all related to the fall of Diaz, then of Madero and in the short time of Huerta at the head of the national executive power. Local groups took advantage of this situation to take political control or to keep it. The sides used different arguments; sometimes, the writers yearned for a less agitated past, as in the epigram signed by Fray Candil and published in the newspaper *30-30*, January 7, 1912, page 2, which continues the controversy between *tuxtlecos rabasistas* and religious *sancristobalenses*:

> Más [sic] ¡hay! Aquellos [sic] tiempos de tan feliz memoria
> Cual ondas se empujan, pasaron y no son.
> Mis ojos vierten lágrimas al recordar la historia
> Y ver cuán prostituida está la religión...

In 1912 the struggle between the two sides continued. At the same time, the authors showed their academic training and their knowledge of discursive and poetic techniques, as they dealt with different genres and styles. This is demonstrated by the use of argument, the breadth of vocabulary, regionalisms and, of course, humor. In the following poem these characteristics can be observed. Signed by "GUSTAVO", it was published in the *Francisco Cuscate* newspaper on April 11, 1912, page 4:

> **"AL GAVILAN"**[9] [sic]
> Mi cabeza parece un horno
> Cuando me pongo a pensar
> Lo fácil que es provocar
> Un gramatical trastorno.
> Porque yo hablo sin adorno
> Y á la opinión le doy vuelo;
> "Gavilán" me cree repelo,
> Deje que me lea el que guste,
> Y al que no lo guste el fuste
> Y mi parodia un cuadre,
> Que tire parodia y fuste
> Y vaya y monte en su... abuelo.

With the arrival of General Bernardo Z. Palafox as governor of the state, local power groups are subdued and newspapers limit their political participation

9 El gavilán was a newspaper published in San Cristóbal de Las Casas, directed by Neftalí R. Soto (table 2), a journalist and romantic poet.

to their role as instruments of communication of the government in power. In the poetic texts the open political belligerence disappears as well.

FINAL THOUGHTS

The struggle for political power in Chiapas, as well as the dispute between San Cristóbal de Las Casas and Tuxtla Gutiérrez for the official residence of the state powers, generated a journalistic discourse that represented the competing elites and evidenced the relations between the intellectuals and the authorities who held power, a practice inherited for previous decades and continued in later ones. [10]

This fact seems contradictory when compared to the statistics of education in the state, however, the fact is explained by the promotion of social elites whose instruction was fundamental to recover lost spaces of power, as it happened in San Cristóbal de Las Casas. It should be remembered that the former Ciudad Real was the capital of the province of Chiapas, attached to the Captaincy General of Guatemala, a status it lost for various reasons and subsequently attempted to regain. To its misfortune, the socio-political conditions developed during the nineteenth century made new groups of power consolidate a different political context through the links established with the central power of the country. This is demonstrated, for example, by the epigram of *El gavilán*, from January 2, 1912, cited above. There, Emilio Rabasa, a prominent politician during Porfirio Díaz' regime and who knew how to maintain his relations in the following administrations, is identified as the enemy.

The above-mentioned verses offer a testimony about the political, intellectual and social relations still to be studied in more detail. They offer forms of representation of historical events such as the political struggles of the time, images billed by elites who sought to build, maintain or destroy political profiles. They also show how social and political life motivated the use of the poetic function of language among the journalists and intellectuals of the time, promoting the artistic development of writing. A line of creation that, years later, generated personalities that transcended local borders such as Rosario Castellanos or Jaime Sabines. In both cases, the context and practices provided opportunities for the development of creative skills through the press.

10 See my articles: 2015 " La ficción y la poesía en la revista *Chiapas* " in Márquez Espinosa, Esaú and María del Rocío Ortiz Herrera (Eds.) *Sociedades encauzadas: geografía, historia y realidad*. Tuxtla Gutiérrez: Universidad de Ciencias y Artes de Chiapas; and 2013 " Chiapas. La construcción de una élite cultural a través de la prensa " in Anuario 2012. Tuxtla Gutiérrez: Universidad de Ciencias y Artes de Chiapas.

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

RESULTS ON THE WALLS OF THE DENTAL SERVICE WHEN RECYCLING LEAD SHEETS, FROM THE X-RAY CABINET, AT THE FACULTY OF DENTAL SCIENCES AND PUBLIC HEALTH. UNICACH

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— Abstract—

In dentistry, as well as in other health disciplines, radiographs are a very useful support when making a diagnosis and developing the appropriate treatment plan, thus obtaining fully favorable results, without losing sight and taking into account that radiation, no matter how minimal, is always harmful to our body, so it is important to protect ourselves from them by the means at our disposal, offering security and confidence in the handling of X-ray equipment.

In the present work we take as a base the construction of a protection with the lead sheets, harmful material of waste, but that applied in the walls of the x-ray cabinet it can protect from radiations.

Keywords

X-rays; ionizing radiation; harmful effects; radiation protection; radiographic films; lead sheets; diagnosis.

The use of X-rays is essential for health care personnel as a complementary diagnostic aid. In dental practice, because its use is not in high quantities or for long periods of time, exposures can become frequent. Lack of knowledge about the amount of radiation emitted by the devices can lead to increases in the doses received, absorbed and accumulated in certain organs.

It is also important to recycle harmful waste material, such as lead sheets, obtained from the packaging of radiographic film. This optimizes institutional resources and contributes to the protection of radiation emitted by X-ray equipment. Its recycling allows, besides being environmentally friendly, to obtain benefits from a highly polluting element (Lead).

X-ray cabinets or imaging areas are considered a high-risk space, due to the activities that take place there, the biological effects that can be produced and the waste materials that are generated in it. For the production of X-rays in laboratories and hospitals, X-ray tubes are used, which can be of two kinds: filament tubes or gas tubes.

The filament tube is a vacuum glass tube in which two electrodes are located at the ends. The cathode is a tungsten filament and the anode is a metal block with a characteristic line emitting the desired energy. The electrons generated at the cathode are focused to a point on the target (which usually has an inclination of 45°) and X-rays are generated as a product of the collision. The total radiation achieved is equivalent to 1% of the energy emitted; the rest is electrons and thermal energy, so the anode must be cooled to prevent overheating of the structure. Finally, the X-ray tube has a transparent window to the X-rays, made of beryllium, aluminum or mica.

Radiation can be classified into ionizing and non-ionizing. Little (2003) mentions that non-ionizing radiation includes ultraviolet (UV), infrared and microwave. The term ionizing refers to an interaction between radiation and matter. Bushong (2005) says that ionizing radiation includes X-rays, gamma, alpha and beta.

Whilhem (2013) explains that X-rays are electromagnetic radiation of the same nature as radio waves, microwave waves, infrared rays, visible light, ultraviolet rays and gamma rays. The fundamental difference with gamma rays is their origin: gamma rays are radiations of nuclear origin that are produced by the de-excitation of a nucleon from an excited level to another of lower energy and in the disintegration of radioactive isotopes, while X-rays arise from extra-nuclear phenomena, at the level of the electronic orbit, fundamentally produced by the deceleration of electrons. The energy of X-rays in general is between ultraviolet radiation and gamma rays. X-rays are ionizing radiation because when they interact with matter they produce the ionization of the atoms of the same, that is to say, they give rise to charged particles.

When X-rays interact with matter, they can be partly absorbed and partly transmitted. This characteristic is taken advantage of in medicine when carrying out radiographic measurements, which are of great support in the various interventions in the healthcare area.

In the area of dental sciences, Rout, and Brown (2012) have pointed out that specialists in these areas require X-rays as part of their daily clinical practice, so it is necessary for dental professionals, dentists and technicians or assistants to know the basic principles of radiation, risks and measures for their own and patients' protection, in order to ensure that X-rays are taken safely, in addition to generating quality images to provide appropriate service and care. According to Martinez, Alcaraz, Perez, and Rushton (2007) this is achieved when physical methods are used to minimize doses, when they are considered selection criteria for radiological examination, and finally through programs that guarantee quality.

EXPERIENCE IN THE FACULTY OF DENTAL SCIENCES AND PUBLIC HEALTH

In the Faculty of Dental Sciences and Public Health, of the Universidad Ciencias y Artes de Chiapas, an academic experience was carried out when observing that between 470 and 500 patients attend their clinics daily to request the dental services provided in these clinics. Sometimes it is necessary to resort to the support of radiographic imaging to assist in the diagnosis and subsequent treatment to address the oral problem that has been detected.

If we consider that a radiological safety culture has not been fully implemented (Esponda, 2012), the present contribution of covering the walls of the X-ray cabinet with lead sheets, tries to help in this safety area.

As it is known, the periapical or dentoalveolar radiographic films have in their packaging a lead sheet that absorbs or blocks part of the X-rays emitted by the devices at the time of the radiographic exposure. The approach is to line the unprotected walls of the cabinets used for radiographs in the clinics of the faculty of dental sciences and public health.

In this way, the aim is to avoid the expansion or diffusion of X-rays in each radiographic exposure. The aim is to obtain greater protection, avoiding the risks of accumulation of this radiation, which is harmful to health. The above aims to provide confidence in the development of activities within the dental clinics, both for the nursing staff, who spend eight hours there, and for the students, patients and teaching staff. This proposal seeks to take advantage of this waste and optimize resources.

MATERIAL AND METHODS

Location of the study

It was held in Clinic No. 6 of the Faculty of Dental Sciences and Public Health of the Universidad de Ciencias y Artes de Chiapas.

Material used

Lead sheets were collected and placed in the special waste container. The walls were cleaned of dust and other elements, the walls were gummed and the blades were glued to the walls of the X-ray cabinet, and they were completely covered with them, using 2,141 blades (handling them with latex gloves).

They were then covered with plywood sheets to give them a better look and tests were carried out with periapical virgin radiographic films, adhered to a dental organ, sticking them to the outside of the walls, for 15 and 30 days, after which they were developed.

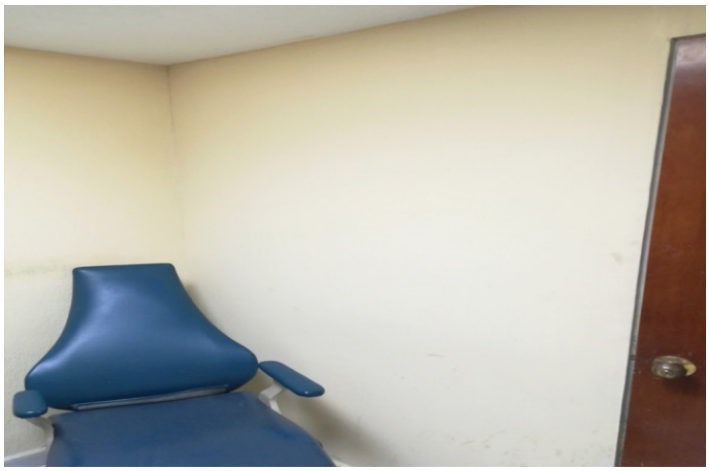

Image 1. Walls without the lead lining

Image 2. Radiographic witness films with dental organs

RESULTS AND CONCLUSION

Lead-lined walls of the x-ray cubicle, with the collected sheets, provide extra security. Sufficient protection was obtained by testing with witness films with a dental organ attached to them. These films were glued to the coated wall for 15 and 30 days, after which they were developed. It was found that no images appeared, which shows that the ionizing radiation did not pass through the coated walls and that the lead sheets are effective as a protective factor.

Image 3. Wall being lined with lead sheets, a contaminating radiographic waste material

Image 4. Wall finished and lined with plywood, to cover the lead sheets

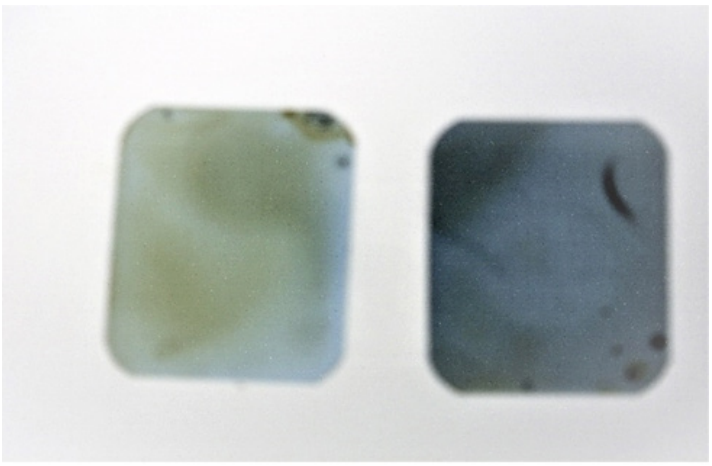

Image 5. Witness X-rays without any image of the dental organ

Patients are not subjected to high doses of ionizing energy in radiographic exposures to arrive at a diagnosis and to carry out the stomatological treatment plan. However, it is reiterated that improper and irrational use of these exposures can have severe health consequences. It is therefore necessary to be well protected against ionizing radiation.

RECOMMENDATIONS

Medical Associations recommend avoiding the routine practice of radiographic exposure, which is unnecessary when other, non-radiant methods of diagnosis are available.

Since Röntgen discovered that X-rays can capture bone structures, the technology required for their application in the vast field of medicine has been developed and improved. Radiology is a medical specialty, which uses X-ray equipment to take snapshots to aid in medical diagnosis.

Nowadays, X-rays or Röntgen rays are very useful, especially in the detection of diseases of the skeleton, although they are also used to diagnose diseases of the soft tissues. In other cases, the use of X-rays has more limitations, such as in the observation of the brain or muscles. Alternatives in these cases include computed tomography, magnetic resonance imaging or ultrasound. X-rays are also used in real-time procedures, such as angiography, or in contrast studies.

Whatever the case, you should always be protected from ionizing radiation, which will provide safety when handling the X -ray machines.

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