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EDITOR'S LETTER

We welcome you to our new Volume VII, with which we start 2018 full of aspirations that allow the Digital Magazine of the Universidad Autonoma de Chiapas Espacio I+D Innovación más Desarrollo, to continue positioning as a reference of the academic activity of our environment.

We appreciate your company and collaboration in previous years and we urge you to continue strengthening this means of academic communication, which fortunately, every day has more readers and collaborators from different corners of the world.

In this 16th issue, materials that account for the development of knowledge in different areas and contexts are included. From our house of studies the articles presented are: "Seismic vulnerability assessment of two rural housing prototypes built with concrete hollow blocks, in Ocuilapa de Juárez, Chiapas." and "Environmental assessment of rural housing with the eMergy method" The collaboration of sister universities in our state of Chiapas presents an article from the Universidad Intercultural (UNICH) with the article "Contribution to develop a methodology that evaluates sustainability from indigenous community scale" and from Oaxaca, the Universidad del Istmo participates with the article "Bioethics, education and respect for sex-gender diversity."

This occasion, the magazine highlights four articles because it was the product of a call made within the framework of the International Congress on Poverty, Migration and Development, organized by the Center for Studies on Municipal Development and Public Policies (CEDES), held in the month of November of last year in this city. These materials are entitled: "The process of transition to adulthood of young Mexicans with migration experience in the United States, 2010" of the Universidad Autonoma de Nuevo Leon, "The accompanying process of undocumented immigration by transit" from the Universidad Autónoma de Zacatecas, "Interculturality in law and its effect on the construction of citizenship in Chiapas" and "Labor legal parity from the perspective of the sustainable development goals" of the Universidad Autonoma de Chiapas.

In the Academic Documents section we include the review of the book "Antimatter: ephemeral matter" by Ayala, Montaño, Navarro and Tejeda, published in Hermosillo by the Universidad de Sonora. A new addition to the collection "Letters without paper", the book "Epistolary literature by Rosario Castellanos, Letters to Ricardo", as well as the multimedia reports:

"The LARCAD and its contribution to the ALICE Experiment of CERN" and the Cultural Breviaries consider a biographical sketch of the Chiapas' writer Joaquín Vázquez Aguilar.

We hope you enjoy reading this issue that also entails our editorial effort in order to fulfill the responsibility of university scientific dissemination.

Enjoy your reading!

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

The editors

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

The V International Congress on Poverty, Migration and Development held in April 2017 by the Center for the Study of Municipal Development and Public Policies (CEDES-UNACH), since its inception has had the purpose of providing a space for academic debate and of reflection, where academic-scientific material is also shared, as well as the experiences of the participants in terms of poverty, migration and development.

In this framework, the Consul General of Guatemala, Francisco Armando Moreno Cordón, affirmed that as an Institution of Higher Education, UNACH has a commitment of social responsibility, to take into account the different issues that affect society in general and that should be studied and debated, to find answers that contribute to diminish the impact of each one of the problems that affect the development of our state and the country.

In this context, the articles selected for publication in this issue of the Magazine, account for the analysis of the causes and manifestations of these and other issues that influence the behavior and decisions of those living in adverse environments, characterized by the conditions of poverty, in a migrant situation and of the contrasts of development in its broadest sense.

The aforementioned considerations were taken into account for the selection and publication of the first four works of the ten best ones to be published in Espacio Digital I+D. It should be noted that there were 90 papers presented in the Framework of the V Congress "In times of walls", as it was called said academic event; in addition to four lectures and a closing forum with expert panelists who analyzed the phenomenon of migration.

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ARTICLES

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SEISMIC VULNERABILITY ASSESSMENT OF TWO RURAL HOUSING PROTOTYPES BUILT WITH CONCRETE HOLLOW BLOCKS, IN OCUILAPA DE JUÁREZ, CHIAPAS

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— Abstract—

In the rural areas of Mexico and Latin America, prevails the people of low income, living in unsafe and unhealthy, precarious housing anchoring to its inhabitants in the cycle of poverty. The academic team, with the purpose of contributing to the solution to the problem of rural housing, developed prototypes of low-cost housing that were built by families living in conditions of high marginalization in the town of Ocuilapa Juárez, Chiapas. The construction used existing materials in the place; stone in foundations, sand with high clay content (22%) in the preparation of concrete hollow blocks and wood in the roof structure. This article presents the results of measurements made with accelerometers in two homes, to determine the level of vulnerability to seismic scenarios. The fundamental period of vibration obtained are from 0.08 to 0.12 seconds; range of common values for structurally 'healthy' dwellings. Also, the analyses carried out prove that dwellings are in 'low vulnerability' condition in the presence of medium magnitude earthquakes.

Keywords

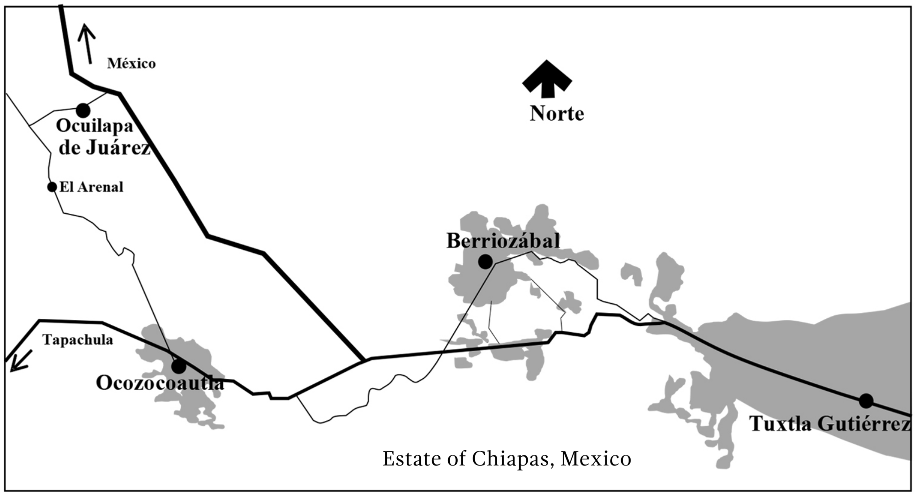
Housing prototype; rural housing; concrete hollow blocks; seismic vulnerability; earthquakes.

In the rural areas of the state of Chiapas and other Mexican entities, as well as in Latin America, there are houses built with wood, reed, palm, stone and soil, among other raw materials from nature; also, houses made with low-cost industrialized materials are identified, such as cardboard sheets and waste products: plastics, metal sheets, etc. The rural population, in a social condition of poverty and extreme poverty, builds their own homes with these characteristics, and in most cases, they have walls and roofs made of poor quality materials, dirt floors, do not have adequate spaces, they obtain little water for consumption and do not have drainage. These realities lead families to live crowded and in unhealthy and insecure conditions that prevent their economic and social development.

Consequently, the search for solutions that address the problem of rural housing for low-income families, has guided the research conducted by this working group to the analysis and construction of alternative housing prototypes, economically affordable, safe and with elements that offer hygienic environments for the inhabitants; in addition, consider the typology of local properties and traditional customs and uses. These housing proposals are intended to contribute to the improvement of rural habitat and to raise the families' quality of life.

The study presented was conducted in the town of Ocuilapa de Juárez in the municipality of Ocozocoautla de Espinosa, Chiapas, which is located 13 km northwest of the city of Ocozocoautla and 31 km from the city of Tuxtla Gutiérrez, capital of the state of Chiapas (image 1). The town has 3,921 inhabitants and 955 homes (INEGI, 2010 and 2013), and according to the figures of the National Population Council (2007), the majority of the inhabitants carry out primary activities and register a degree of "high" marginalization, referred to localities with lack of access to education, inadequate housing and lacking consumer goods.

Image 1. Location of Ocuilapa de Juárez, Municipality of Ocozocoautla, Chiapas



In previous works (Escamirosa *et al.*, 2006), it was identified that about 79.4% of the total housing in the locality are built with stone masonry foundation of the place; the walls of hollow blocks of concrete with two cells with vertical reinforcement only in the corners and intersections (without reinforcement in the openings of doors or windows), and in the horizontal sense, have reinforcement in the enclosure at the height of doors and windows, and, in some cases, in the rebar of walls; the roofs are structured with wood that supports the mud tile or zinc sheet roof. In general, there are houses built with inadequate procedures, they have little reinforcing steel (insufficient structural confinement); and, in addition, the mortar and concrete is made with sand from the place that contains 22% clay (without organic matter and with very high plasticity). These aspects directly influence the fissures and cracks present in the walls of a high percentage of homes and, consequently, allow to assert that they have a high level of vulnerability (Calvi *et al.*, 2006 and Tesfamarian and Goda, 2013).

Between 2007 and 2008, five low-income families from Ocuilapa de Juárez built alternative housing prototypes. The existing materials were used in the locality, which due to their low cost, are commonly used by the inhabitants; likewise, it was considered to take advantage of their skills and experiences acquired in the traditional techniques that they have applied from generation to generation, for the construction of their own homes: Stone masonry foundation; walls with a new proposal of hollow blocks of concrete with three cells and reinforced with steel inside; roof with wooden structure and covered with clay tile. In the mortar for the elaboration of the hollow blocks and the concrete in the filling of castles and slabs, local sand was used, which due to the high clay content, is suggested as a mixture of sand-soil-cement.

Although the structure of the dwellings improved considerably, the average compressive strength of the hollow blocks of sand-soil-cement with three cells, obtained in the laboratory was 42.93 kg/cm², lower than the average resistance established in the standards NMX-C-404-ONNCCE-2012 and N-CMT-2-01-002/02 (SCT, 2002), which are respectively 100 and 60 kg/cm²; however, the average compressive strength of concrete for castles and slabs reached the minimum established resistance of 150 kg/cm² (NTCM, 2004). The low resistance to compression registered in the blocks is a consequence of the high content of clay in the sand of the place (22%) (Escamirosa *et al*., 2016). In this sense, it is technically indisputable that the removal of the clay in the sand used would significantly improve the strength of the concrete; however, the water used to wash the sand or acquire clean sand from another place increases the cost of this material by 100%. For this reason, the work team decided to use the materials commonly used by the community for the construction of the houses.

This paper presents the analysis carried out in two prototypes built in Ocuilapa de Juárez, to determine the level of vulnerability of homes in the face of possible seismic scenarios. The measurements were made in each dwelling with accelerant-metric sensors and the average fundamental vibration periods were established, which are in the range of values recommended by Hernández, *et al*. (1979), corresponding to structurally sound housing (0.08 to 0.12 seconds). The above indicates that the system has the rigidity equivalent to a one-level system, with a "sufficient" wall density. It is important to add that the fundamental period obtained through environmental vibration override the results reported in the structure, since it includes the interrelation of structural and non-structural elements.

2. BACKGROUND

2.1 Field research

As already mentioned, in 2005 the first studies were carried out in Ocuilapa de Juárez. The field works allowed to identify the characteristics, the materials used and the conditions of the existing structural elements in 486 homes. The results show that out of the total homes, 70.37% have polished cement floors and 16.67% of ground; the walls, 79.42% are made of hollow concrete blocks with two cells, 9.05% with annealed mud partition and the remaining, 11.53% use: wood, adobe and bajareque (vernacular constructions), and even waste materials such as cardboard and sheet. Regarding the roofs, 41.14% of the houses have galvanized sheet, 35.18% are concrete and 20.57% are tile from the region. In a detailed way, the houses built with wood, waste materials, dirt floors and those built ancestrally with adobe or *bajareque*[1] walls were examined. Without exception, these houses are in a very poor state of conservation and present unsafe and unhealthy conditions.

On the other hand, in homes built with annealed mud walls, solid blocks or concrete hollows with two cells, it was observed that their state of conservation is greater; nevertheless, the structure does not guarantee security for its occupants due to the following conditions: Of the total of the houses, 62% have masonry foundations with local stone and the rest of reinforced concrete. In both cases the elements are suitable for the type of rocky soil in the area; however, 79.42% of the houses are built with hollow concrete block walls with two cells and of these, 30.55% have cracks as a result of which the walls only have vertical reinforcement steel in the corners and intersections, without considering the spans of doors and windows, and in the horizontal sense, most only have a slab of enclosure at the height of doors and windows. The houses were built with few confining elements in their walls (images 2 and 3), which are insufficient according to current technical standards (NTCM, 2004). In fact, they do not comply with what is specified in the reinforcement section for structural integrity for rural housing and the materials that give rise to the system do not comply with the specifications of said norm.

Image 2. Inside of a hollow block house

1 According to Moya (1988), the bajareque is built with rows of wooden horcones driven into the ground that form the walls and between these a network of interwoven rods is placed, which are then filled on both sides with mud flat, mixed with grass or straw.

Image 3. Typical house with hollow block walls.

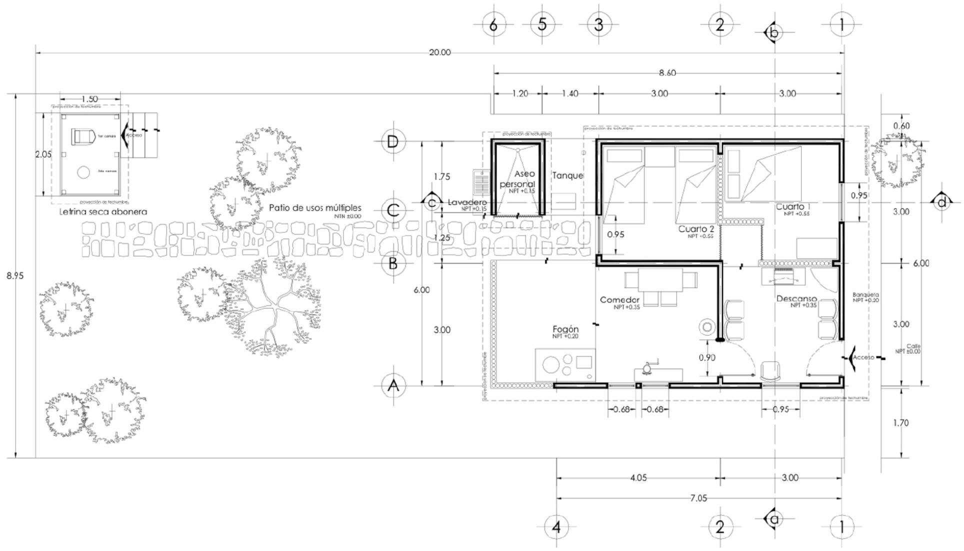
Analyzes were made in the Materials Laboratory of the Faculty of Architecture of the Universidad Autónoma de Chiapas, to determine the physical and petrographic properties of the sand used, in addition to the resistance to simple axial compression, the specific weight and the absorption of the concrete hollow blocks with two cells, commonly manufactured by the inhabitants of Ocuilapa de Juárez. The results show that the local sand, obtained from the "El Arenal" material bank, located 4km from the town (image 1), contains 22% clay without organic matter with very high plasticity; this sand has a cost 100% lower compared to the river sand that can be obtained in the city of Ocozocoautla. The analyzes indicated that the average resistance to simple axial compression of the mortar made with this type of sand was 30.19 kg/cm², lower than that established in the standards (Minimum resistance = 60 kg/cm²: NCMT-2-01-002/02 (SCT, 2002) and 100 kg/cm²: NMX-C-404-ONNCCE-2012).

The previous conditions allow to notice that the houses can be vulnerable to the seismic effects. These are frequent in the state of Chiapas, because it is located in an area with high seismic activity, mainly due to the subduction of the Cocos tectonic plate under the North American plate (García and Suárez, 1996). This is only one of the five seism genic sources that occur in this region. For this reason, and because the seismic-resistant system of this type of housing is based solely on vertical load-bearing elements, there is a risk that the damages identified in the walls of dwellings built with hollow concrete blocks will become more acute, and may even cause partial or total collapses, as a result of seismic movements.

2.2 Characteristics of rural housing prototypes

During the period from 2006 to 2008, through research projects financed by the Mixed Fund of CONACYT and the Government of the State of Chiapas (FOMIX-Chiapas) as well as by the Institutional Research System of the Universidad Autónoma de Chiapas, four housing prototypes in Oculilapa de Juárez were built. In the design of the spaces and functional elements of the houses, the participation of the low-income families selected was considered in order to know their comments in relation to the proposals, to uses and customs, image, typology of the community and natural environment, among other aspects (image 4).

Image 4. Architectural plan of a rural home prototype



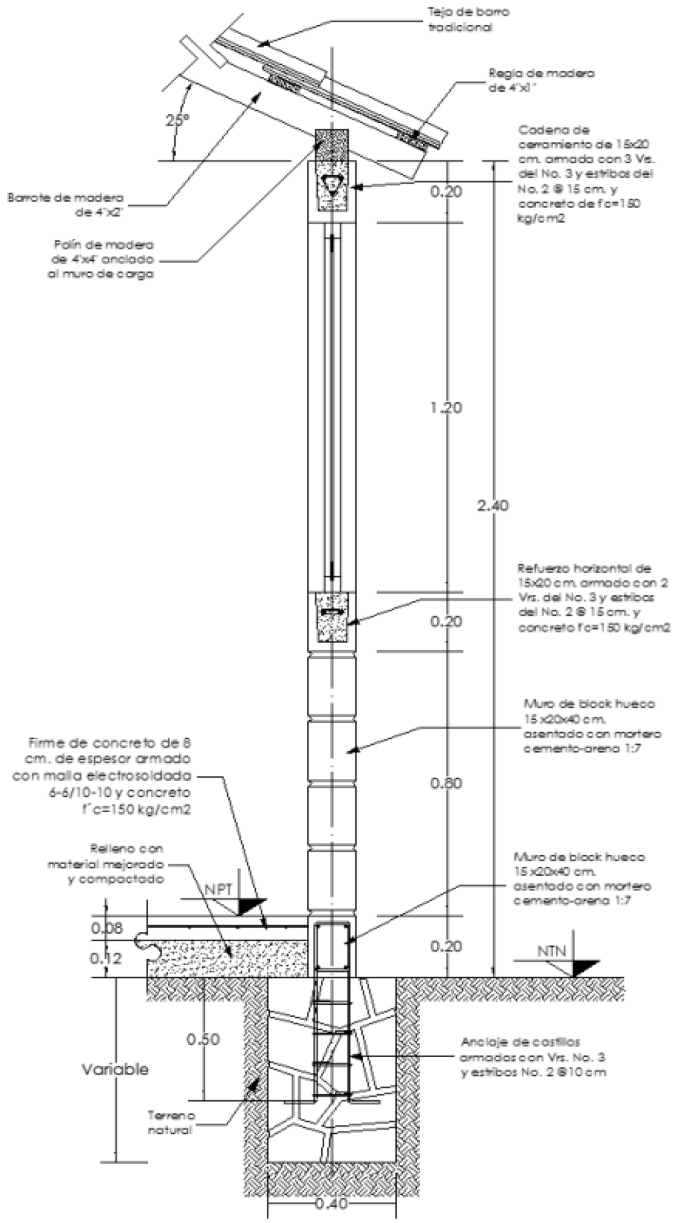
In the construction of the walls, a new proposal of a three-cell hollow block made of sand-soil-cement concrete was used (sand from the location was used), which included the placement of reinforcing steel in the interior, both in the vertical as horizontal direction and distributed to the top and the length of the walls, in accordance with the standards for masonry walls with hollow concrete blocks (NTCM, 2004). The dimensions of the hollow blocks were 15x19x40 cm (600 cm^2 of gross area), with three section cells each of 9.67x9.67 cm, obtaining 319.47 cm^2 of net area (53.25%). The internal and external thicknesses of the walls of the blocks were on average 2.5 cm (images 5 and 6).

Image 5. Mold for the manual elaboration of blocks

Image 6. Hollow block pieces with three cells

For the prototypes, the existing materials were used: sand, stone and wood; also, the procedure applied was assisted self-construction, which consisted of offering technical assistance to the selected families. In this regard, training courses, technical advice, monitoring and quality control were given during construction. These activities were carried out by the work team and the architecture students of the University.

Image 7. Structure of housing prototypes; cross-section



In general, the structure of the dwellings improved; however, the high content of clay (22%) contained in the sand used for the manufacture of the three-cell concrete blocks, resulted in obtaining an average resistance to simple compression of 42.93 kg/cm². This result is lower than 60 kg/cm² established in standard N-CMT-2-01-002 / 02 (SCT, 2002), at 100 kg/cm² of the standard NMX-C-404-ONNCCE-2012, and at 40 kg/cm², which is the value specified by the NTC of masonry of the RCDF (NTCM, 2004) for a typical mortar II; for its part, the concrete used in the castles and walls' slabs, recorded an average compressive strength of 150 kg/cm², which corresponds to the minimum indicated in the current standard (NTCM, 2004).

The walls of the houses were designed and constructed as structural elements, based on Mexican standards, specifically the “Normas Técnicas Complementarias para Estructuras de Mampostería y para Diseño por Sismo” (NTCM, 2004). For this, the location of Ocuilapa de Juárez was considered in the seismic zone "C" of high risk, according to the seismic regionalization of Mexico (CFE, 1993), and the type of soil in the study area.

The following is a description of the structuring of the houses’ prototypes whose construction was completed in August 2008; the specific details are described in the Manual for the Self-Construction of Living and Sanitary Services (Escamirosa *et al.*, 2016).

2.3 Structure of prototypes

The foundations were built with stone masonry extracted in areas surrounding the building and was joined with mortar based on cement and sand from the place with a 1:4 ratio, with a simple average compressive strength of 92.30 kg/cm². This was higher than the minimum resistance established in the NTCM 2004 (40 kg/cm²) and lower than the maximum (125 kg/cm²). According to these standards, in masonry foundations the slope of the inclined faces, measured from the edge of the wall or slab, should not be less than 1.5 (vertical): 1 (horizontal). However, in the area it is common to find foundations with a rectangular prism shape (without screw hooks), so the section used in the foundations of the houses was rectangular, 40 cm wide, with a variable depth according to the topography of the work site.

In the constructive process, the anchoring of the vertical reinforcement steel was made in the castles of the corners and in the intersections of walls; likewise, on the foundation, a slab or chain of reinforcement was placed with a section of 15x20 cm, concrete of 150 kg/cm² and reinforcement with ARMEX 10x15x4" (image 7).

The walls were built based on the standard (NTCM, 2004), reinforcing the hollow blocks, with steel bars in both the vertical and horizontal directions. The vertical reinforcement (castles), located at the corners of the walls, occupied three cells of the block, and four at the intersections. In addition, two consecutive cells were reinforced at the ends of the door and window openings. In the case of walls without openings (doors or windows), a 3/8" rod was placed and the cell was filled with mortar every 75 cm. The reinforcement used was with corrugated steel rods DA-42 with fy = 4,200 kg/cm² and concrete made in situ with local sand with a f'c = 150 kg/cm² (images 8 and 9).

Image 8. Construction of reinforced walls

Image 9. Intermediate horizontal reinforcement

The roofs were built gabled, with wood structure of the place; 10x10 cm bricks were placed in the external perimeter walls, including the ridge walls, which supported the 5x10 cm bars, in order to reduce the possible deformations of the wood and offer greater safety.

3. ANALYSIS OF THE HOUSING PROTOTYPES' VIBRATION PERIODS

Field work was carried out in Ocuilapa de Juarez in two housing prototypes (V1 and V2), inhabited by selected families with low income. The accelerometer measurements started on October 3, 2014, proceeding to perform the corresponding study to determine the fundamental vibration periods of the structure and soil. The equipment used was a triaxial Episensor accelerometer and an Altus K2 recorder, both from kinemetrics. Based on the results obtained, the necessary analyzes were carried out to determine the structural dynamic properties (images 10 and 11).

Image 10. Location of house V1

Image 11. Satellite photograph of the location of V1 and V2

Source: Courtesy of Google Maps ©, 2010

House V1, with geographic coordinates: 16°51'28.99" N and 93°24'53.62" W, is located on 16 September street and is owned by Crescencio Pérez Pérez. The house was built approximately six years ago. House V2, with geographic coordinates: 16°51'30.52" N and 93°24'43.96" W, is located on Ignacio Allende street and its owner is Norbel Jiménez Pérez (images 10 and 12).

Image 12. Location of the house V2

Image 13. Placement of the sensor in P3 of V2

Figure 13 shows the placement of the accelerograph in the house V2 at the indicated point P3, which corresponds to the geometric center. The records obtained were in three orthogonal directions of 30 seconds duration and the results obtained in the analysis made, allowed to establish that the periods of fundamental vibration in average per dwelling are the following:

Housing V1 with 0.1280 seconds and housing V2 with 0.1067 seconds; the corresponding floor in the analyzed areas: V1 with 0.1164 seconds and V2 with 0.1219 seconds.

Images 14 and 15 show the locations of the acceleration sensor in the structure of each dwelling (P2, P3 and P4) and in the free field (P1; floor).

Image 14. Location of the house V1 sensor

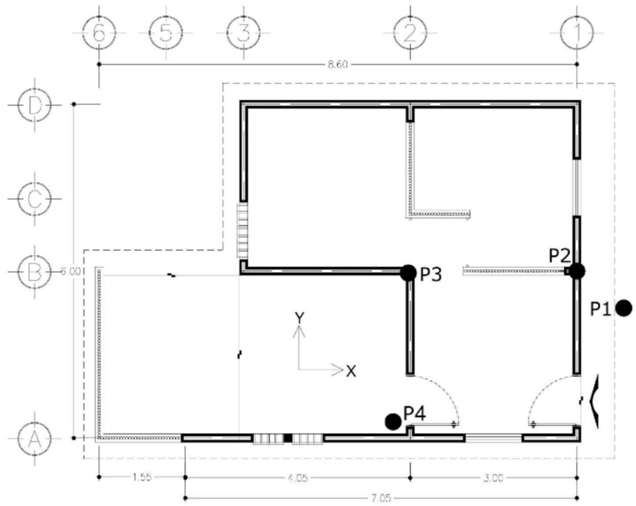
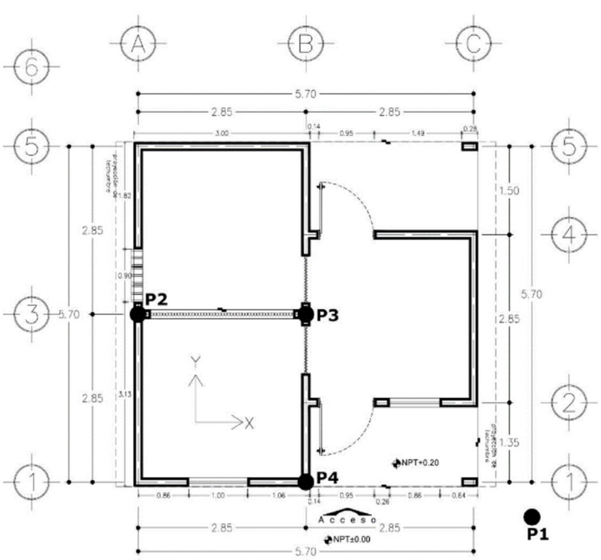


Image 15. Location of the house V2 sensor



Next, Images 16 and 17, show the transfer functions in each dwelling; the continuous function corresponds to the short address of the dwelling (x), and the dotted function for the long function (y). These functions were obtained by dividing the Fourier spectra calculated from the accelerometer records in the center of each dwelling (point P3), among the ground ones (point P1). The relationship of both registers allows to establish how the response at point P3 is amplified with respect to point P1. In the images, the frequencies that generate the greatest amplification of the spectral response are highlighted. Right after, the Transfer Function, or spectral ratio, was determined using the Nakamura technique (1989) and the procedure for determining the transfer functions suggested by Lermo and Chávez-García (1994). Finally, the graphs of the transfer functions of houses V1 and V2 indicate the frequencies that, according to the technique applied, respectively represent the fundamental vibration frequencies for said dwellings, of 7.81 Hz (0.128 s) and 9.3 Hz (0.1067 s). It is important to note that according to Lermo (1994), the values of the fundamental period of the structures do not necessarily correspond to the crest of greater amplitude, but depend on the form they take.

Image 16. Transfer function of house V1
(Continuous line-X, discontinuous-Y)

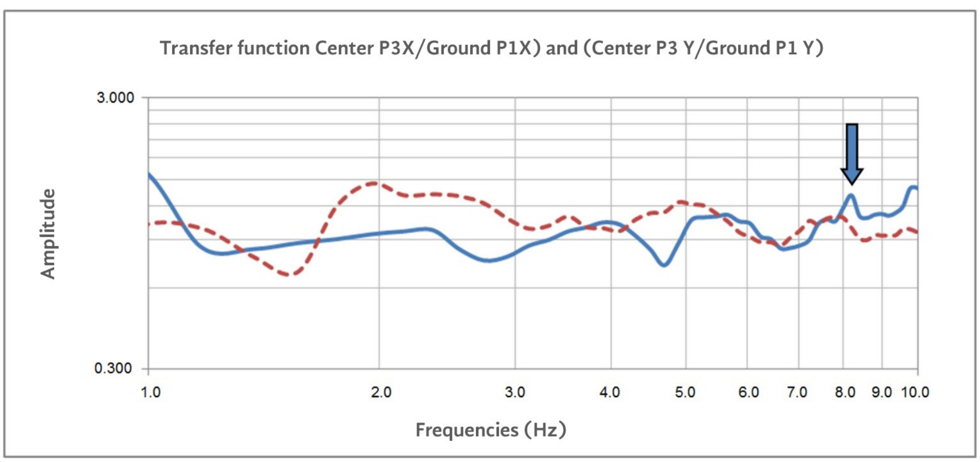
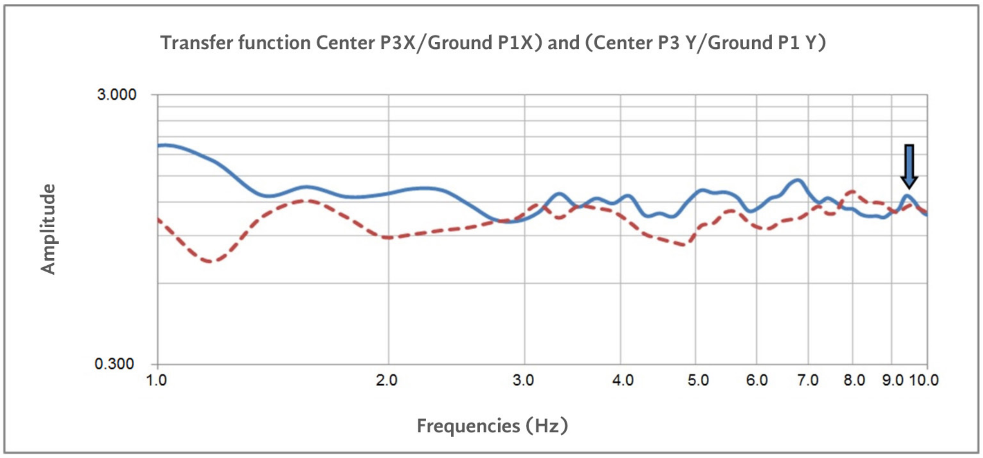


Image 17. Transfer function of house V2
(Continuous line-X, discontinuous-Y)



4. DISCUSSION OF THE STRUCTURAL EVALUATION RESULTS

The results obtained show that the average fundamental period of housing V2, with 0.1067 seconds, is within the recommended range for a dwelling considered structurally healthy, between 0.08 to 0.12 seconds, a parameter established in 1979 by Hernández, *et al*., and by Arroyo, *et al*., in 2010; both studies for instrumentation carried out in homes in the state of Guerrero, Mexico. On the other hand, housing V1 with 0.1280 seconds is slightly above that range. It is important to clarify that these values are an indirect generalization of the rigidity of the structural system. Additional elements must be used to be able to affirm if the vulnerability is low or not, especially when the period of construction and soil are similar. However, in this work the periods detected in both houses were taken as parameters indicative of the existence of an adequate walls density in the dwellings.

With the intention of confirming the results obtained in the evaluation of the dynamic properties of housing V1, because it registered a high period, an alternative was applied to know the contribution of the resistance of the walls to seismic actions, based on the geometric and physical characteristics of the prototype. For this, the seismic analysis was carried out on the house structure, based on the static analysis method, applicable to buildings with a height of less than 30 m, and which consists of calculating the lateral force acting in the mass center of the dwelling, which in turn will produce the equivalent effect to the seismic action. This analysis does not consider the effects of torsion, and can only be applied when the eccentricities are less than 10%, because it ignores the deformations by shear (CFE, 2008).

Tables 1 and 2 present the results of the analysis of the total load in the house (Wi) and the acting shear force (Va). Table 3 shows the results of the review of each structural axis of housing V1, and show that, according to the seismic hazard specified by the Civil Works Manual (CFE, 1993) for the study area, the masonry walls have "low vulnerability", so the degree of security of the V1 housing prototype is adequate, and does not require a detailed evaluation for possible structural reinforcement.

Table 1. Calculation of the total load of the house V1; Wi

Between floor	Cargo on deck				Masonry walls				Fc (1)	Wi
	Area	CM (Dead weight)	CV (Live load)	W1 (Load 1)	Am (Wall area)	H (Average height)	P. V. (Weight volume)	W2 (Load 2)		ton
	m2	kg/m²	kg/m²	ton	m²	m	ton/m³	ton		
1	52.16	56.74	20	4.00	3.68	2.70	1.50	14.92	1.10	20.82

Notes: (1) Load factor for combination with seismic load (NTCM, 2004).

Table 2. Calculation of the acting shear force; Fi and Va

Between floor	Wi	Hi (1)	WH	C/Q (2)	Fi	Va
	ton	m	ton-m		ton	ton
1	20.82	2.70	56.20	0.43	8.88	8.88
Amount	20.82		56.20			

Source: CFE, 1993 (Seismic analysis-static method)

Note: (1) H = average height of 2.70 m;
(2) C = 0.64 (Seismic coefficient, Zone C, Type II terrain, according to the Civil Works Manual of the CFE (CFE, 1993).
Q = 1.5 (Seismic behavior factor in masonry with hollow concrete blocks with internal reinforcement); Parameters q1 to q5, and S define the geometry and physical conditions of the structure by visual inspection (correction factors).

Table 3. Seismic vulnerability per axis

Review on the X axis										Qx = 1.5
Btw. floor	Vr (3) (ton)	Va (ton)	Vr/ Va	S	Ki = S (Vr/Va)	KQ (1)	KZ (2)	Condition	Category	Vulnerability
1	46.50	8.88	5.24	0.41	2.14	3.22	0.64	KQ ≥ KZ	1	Low
Review on the Y axis										Qy = 1.5
Btw. floor	Vr (3) (ton)	Va (ton)	Vr/ Va	S	Ki = S(Vr/ Va)	KQ (1)	KZ (2)	Condition	Category	Vulnerability
1	27.18	8.88	3.06	0.41	1.25	1.88	0.64	KQ ≥ KZ	1	Low

Notes: (1) Resilient coefficient of the structure.
(2) Seismic coefficient (CFE, 1993).
(3) In the analyzes, a design shear stress vm* = 3.0 kg / cm² was considered, criterion for masonry based on hollow blocks joined with type II mortar.

On the other hand, the fundamental periods of the soil in each prototype based on the accelerometer records, were of 0.1164 and 0.1219 seconds in dwellings V1 and V2, respectively. As it is observed, the fundamental periods are low and confirm that the composition of the soil in the study area is of high resistance and low compressibility. However, it is important to mention that the periods of soil and the structures studied are very close to each other, which may not be favorable during the response to intense seismic excitation.

CONCLUSIONS

The fundamental periods of vibration obtained in housing prototypes V1 and V2; 0.1280 and 0.1067 seconds, respectively, are acceptable for new structuring; however, as prototype V1 slightly exceeded the range of periods in a structurally healthy housing, considered between 0.08 to 0.12 seconds maximum. In that house an additional revision was carried out which purpose was to evaluate the contribution of the resistance of the masonry walls and with it, to determine the seismic vulnerability. This was "low", which indicates that the walls have good resistance to seismic actions.

In conclusion, the results obtained in the evaluation of the seismic behavior carried out in the prototypes V1 and V2, indicate that the structural efficiency in both houses is satisfactory, which shows that the housing prototypes built by low-income families in the community of Ocuilapa de Juárez, from a new proposal with concrete block walls with three cells, made with local sand and reinforced with steel in the interior according to current regulations (NTCM, 2004), are within the range of adequate structural security when verified that they register low seismic vulnerability.

Therefore, the prototypes presented are a good option that exemplifies how the level of structural confinement can be increased in the dwellings' walls of that locality. Following this alternative and disseminating it, it could be possible for the inhabitants to build their homes with better security conditions. Other peculiarities of the prototypes are: The low cost of its construction, for the materials used; and constructive procedures, easy to execute.

Finally, the raised technological proposal could contribute to solving the structural insecurity presented by homes with similar characteristics. Its application, therefore, would allow reducing the possible scenario of seismic risk that could be suffered by the inhabitants of popular housing, constituted by low income families living in rural communities of the state of Chiapas, Mexico or Latin American countries.

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BIOETHICS, EDUCATION AND RESPECT FOR SEX-GENDER DIVERSITY

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— Abstract—

The condition of being transgender is a state of human diversity that manifests itself in a multitude of ways of living, thinking, acting and interacting with others in a democratic society where plurality, tolerance and respect for human diversity are the foundations of the social inclusion of minorities.

Mexico City's legal recognition of gender identity is one of the most important episodes in the struggle to preserve the rights of equality, identity, diversity, and difference. However, its effects would be negligible without the transformation of the conservative cultural ideology traditionally based on a dominant heterosexual model into an alternative way of thinking that prioritizes respect for gender-diversity in the formation of an individual's identity.

In this project, through an interdisciplinary reflection that is respectful of dignity and human rights, the diversity of the human condition are examined as a prerequisite for the design of any educational model founded on the study of sex-gender diversity, which should in turn promote recognition of the rights of LGBTTT people in a more sensitive society.

Keywords

Bioethics; gender identity; sexual diversity; transgender; human rights.

Trans condition is a way of living the sexual and gender diversity of many people in any latitude of the planet. This way of understanding the human condition is unfortunately repudiated by many people, due to a cultural ideology of stereotyped and in some cases prejudiced beliefs, based on the dichotomy of the predominant heterosexist cultural model in Eastern and Western societies.

Studies of sex and gender lead us to the construction of two closely related stereotypes: sex and gender. Sex is the biological status of a person to classify a woman or a man. On the contrary, the gender has its origin in the historical evolution of the cultures of east and west, arbitrarily imposing roles of behavior and attitudes to the feminine and the masculine (Camps-Merlo, 2007, p.104), those who do not fit in these cultural stereotypes are considered intersex or neutral states, which should also be recognized by the rules of social and legal conduct.

Culture, understood as the set of beliefs, values, habits and customs dominant in a population and geographic space, has allowed the generational reproduction of this sexist model as the only alternative to assume the sexual and gender identity of people through construction of laws, institutions and binary court discourses, where there are only two sex-gender identities: masculine and feminine.

The struggle to reclaim the human rights of the so-called LGBTTT collective, where lesbians, homosexuals, bisexuals, transsexuals, transvestites and transgenders meet, began to bear fruit on the international political agenda since the 1990s, after which the homosexual condition was eliminated from the list of mental illnesses of the World Health Organization (WHO) in 1990, and as a consequence, legislative measures were issued to decriminalize this human behavior, gradually recognizing greater rights to diversities sex, even if only to a fraction of it: that of the "*gays*".[1]

In this way, while the subject of sex-gender diversity touches several edges relevant to bioethics, such as: the dignified treatment of all human beings and the respect, recognition and protection of human rights, the presence

1 Leaving aside other sexual orientations such as lesbianism or bisexuality, and other sex-gender identities such as: transsexuality, transvestism, transgenderism and intersexuality, although the latter is not really a true sex-gender identity.

of a plurality of moral structures in complex societies, the medication of the *trans* condition as a determining or deceptive factor to obtain the recognition of the gender identity in a plural society, and the vindication of the person's freedom of will, all of them affect in the interest to study this topic from a plural bioethical perspective.

Bioethics offers a deliberative space where dialogue allows us to address the complex challenges posed by modern (or post-modern) societies, understanding that globalization implies the presence of diverse moral structures that demand a plural bias and, at the same time, the possibility of carrying out different reflections on dilemmas resulting from the application of novel medical or biomedical practices, due to the meeting of medicine, biology and biotechnology (Hottois, 2011, p.)

Thus Bioethics, seen as a "rational and practical discipline", can allow us to draw, in the first place, guidelines, rules or principles to guide human behavior in general, enabling the decision making of doctors, psychologists or lawyers in vital matters of the new biomedical applications in the particular (García-Manrique, 2015, p.66), and in a second moment, because they promote the posing of important issues in the construction of educational models that allow, among other things, the inclusion of sex-gender diversity in its many facets.

The main objective of this work is to identify essential characteristics in the process of constructing an inclusive cultural model that respects the sex-gender diversity that starts from the recognition and protection of the human rights of this minority of people to build an educational model from basic education which enables the potential of the person through the problematizing method of bioethics among higher level students, direct instigators of necessary reforms that allow the design of educational models respectful of plurality and diversity.

II. RIGHT TO IDENTITY

The birth of a natural person is a legal fact that marks the emergence of a series of consequences of law relevant to the State and the individual that is born. In the first place, because from it, the recognition of the legal personality of that subject by the State takes place, giving off a set of qualities inherent to its origin, also called personality rights, among which is the right to a legal identity of its own and, secondly, because the birth of this new person means an important event for the law, insofar as this being, a living being belonging to the human species, is worthy of the recognition and protection of its dignity and uniqueness through the guarantee of human rights provided for in the international and domestic legal order.

The right to own a legal identity is one of the most essential of every person, since it contains a set of objective characteristics given by nature which cannot be chosen by the person, among them are: the name, the nationality, the genetic code, race, family, cultural environment and sex, and a subjective component that is the result of the experiences acquired by the person throughout his life, in the interaction with others, of the biography which makes each human life unique and different (Romeo-Casabona, 2011, p.538).

Of all the objective characteristics that revolve around the identity of a person, sex is one of the most symbolic for the Law, because from it the sexual identity of the individual, product of the genetic contribution of their parents, is outlined, particularly of the male, since it is he who contributes the X or Y chromosome, determinants of chromosomal sex. That biological reality, determines the sex of a physical person in his record before the Civil Registry Officer, a server invested with the state public faith in the facts and acts of the civil state.

Today this condition is controversial because of the *trans* phenomenon, in which the identity of a person is not always associated with sex acquired from birth, but through the appropriate sexual behavior by the subject on his or her body in everyday life, adjusting to the roles of behavior commonly attributed to the female sex, although the biological sex of the subject is male or, conversely, that is, appropriating roles of male behavior although the biological sex of the person is female. Here, freedom plays a crucial role in resizing gender roles: artificial social constructions assigned to each sex in the present societies.

For this reason, the Argentine jurist Pedro Federico Hooft says that at present it is no longer possible to ensure the existence of only two ways of manifesting the sexuality of the human being. That is the daily experience of two sexual behaviors and consequently of only two social constructions of gender transmitted from generation to generation from an education based on the sex/gender dichotomy. And this is possible, because today there is a diversity of ways of expressing sexuality and gender roles that are different from the predominant hetero-sexist one, that attend to internal and external factors of the sex with which one is born. Thus, they cross the threshold of invisibility, different sex-gender behaviors that have been gathered in the minority LGBTTT contingent (Hoft, 2005, p.126).

The first identity document and perhaps the most important of all because the others are constructed from it, is the birth certificate. And it is because from this document, first of all, the birth of a new subject of rights with a unique identity where his sex will also be settled, and secondly, because of the sex settled on the birth certificate, the individual will be educated and trained according to certain sex-gender behavior roles dictated to each gender by the canons of hetero-sexist culture, giving rise to the recognition of a set of rights and the acquisition of obligations that respond to that dialectic.

For legal discipline, the right to identity is a personal right inherent to the human being. It is the possibility of building an own, unique, diverse and unrepeatable biography. To be, to do, to act, to interact, to stop doing, to give, to share, to respect the individuality of each subject based on the recognition and protection of their individuality (Fernández-Sessarego, 1992, pp. 114- 115). For this reason, the Universal Declaration of Human Rights of 1948 and other important international documents on human rights recognize the right of every person to an identity of its own in its normative content and this right also encompasses that of sex-generic identity.

Every person, regardless of the sex with which they are born, has the right to freely decide the sex-gender identity that they have chosen to assume. It is a very personal right, which is part of the right to have an identity of its own. Of which any individual is worthy.

If the human condition of a person, leads him to feel liking, emotional or physical affection for people of different sex, deciding to be heterosexual will not have any problem with the data that appear on their identity documents. However, when the sex-gender identity assumed by a person is not concordant with the sex that appears on their birth certificate, the situation acquires a different nuance, since this fact affects the individual in the multitude of interpersonal relationships that he sustains, whether at work, in the family circle, or at school.

Now there is a paradigm shift in the way of understanding the right to identity. Not as a definitive fact, but as a permanent process which also includes the right to sex-gender identity, to decide a genuine gender identity and that this condition is also recognized in the domestic and international regulatory framework (Fernández-Sessarego, 1992, p.114).

III. ORIGIN OF SEX-GENDER DIVERSITIES

Sex-gender diversity implies a set of cultural, social, moral and historical factors that reveal a variety of ways of manifesting sexuality and behaviors, attitudes and affections of each gender by people from any region of the world, but, at the same time is also traced by oneself, the subjective of the being, the experience of each person, the specific experiences (Ojeda-Sánchez, 2010, p.54), the sum of these factors makes each one of us who we are and we decide to be.

The panacea of the study of sex-generic diversities starts with the appearance of the term "transsexualism" that serves to refer to people who want to change sex due to the presence of gender dysphoria, coined by Magnus Hirschfeld in 1923. Later the american psychiatrist David O. Cauldwell, would be responsible for clarifying the meaning of the word "transsexual" in 1949 as it is done today and a couple of years later the doctor Harry Benjamin would divulge its meaning to the public and the international community (Lamas, 2014, p.136).

A decisive factor in the dissemination of ideas about the acceptance of *trans* condition was undoubtedly the emblematic case of George Jorgensen, a former US military officer who underwent a genital reassignment surgery in 1952 would be presented in 1953 with his new gender identity before the world with a different name: Christine Jorgensen (Frignet, 2000, p.19). This fact would mark the beginning of the medical interest for the treatment of gender dysphoria, deviation or identity disorder; pathological behavior of the transsexual that should be treated by endocrinologists through sex-gender reassignment surgeries, ignoring other important specialties, such as psychology, psychiatry or sexology.

Certainly, when developing endocrinology, *trans* phenomenon was described as a pathology that had to be treated by hormones and even genital reassignment surgery by the doctor Harry Benjamin[2], then John Money, a psychologist specializing in sexology who worked for many years in the Hospital Johns Hopkins of Baltimore was interested in the presence of hermaphroditism in children and adolescents, recognizing

2 This trend is clearly seen with the creation of the Harry Benjamin International Gender Dysphoria Association (HBIGDA), later replaced by the Word Professional Association for Transgender Health (WPATH), more in line with the non-pathological trend.

the existence of gender dysphoria, although it did not share the necessary ablation of the genitals and its subsequent modification in the operating room, since the constant interaction between the innate (the biological) and the acquired (the social) are determining factors in the construction of the biography of each person (Mercader, 1997, p.54), issues to which Money itself gathers in the term dimorphism[3]. Money does not defend the idea of surgically intervening transsexual subjects, however, neither does he manifest nor says anything to confront these ideas within their works.

In fact, it was Robert Stoller, a psychoanalyst doctor and American psychiatrist, who opposed the ideas expressed by Harry Benjamin when studying the inter-sexed states of certain people due to the presence of atypical biological conditions, finding that in the process of developing the infant, certain gender habits are constructed from the influence of the family and cultural environment and not only individual; exposed ideas, in his book *Sex and Gender. On the Development of Masculinity and Feminity* in 1968 (Lamas, 2014, 137).

In the end, Benjamin and Stoller's lines of thought inaugurated the two most important currents to explain the origin of *trans* phenomenon: the pathological version and the non-pathological one. Both, considered by Judges and legislators in the resolution of matters of this nature, as well as in the elaboration of regulations in some countries where gender identity is recognized and protected, also embraced by the civil legislation of Mexico City at different times.[4]

In the international arena, reference is made to the collective LGBTTT people to allude to the meeting of lesbians, gays, bisexuals, transvestites, transsexuals, transgender[5], who despite their deep differences and even disagreements, form an apparent unity in the formal discourse of recent years (Gracia Ibañez, 2014, p.108). This dialectic, serves two fundamental reasons:

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3 Term used by Money, as a reference to "the interaction of the innate and the acquired, of the biological and the social" that generates different human conditions, by allowing the differentiation of being, without completely separating the categories of the feminine and the masculine (Mercader, 1997, p.54).

4 The pathological, through a reform to the city civil code published in the official gazette of the government of Mexico City on October 10, 2008, and the non-pathological, through a reform by which the first criterion was replaced in the aforementioned ordination, published on February 05, 2015 of the Gazette itself.

5 Some authors also add intersex people (I), as well as so-called queer identities (Q) or resistance groups against the dominant ideas of the masculine order.

1º The need to have signs of shared language between the interlocutors of a communication process (Goldman, 2015, pp. 25), and

2º The need to grant greater legal guarantees for this group of vulnerable people, invisible in different areas of their lives (social, educational, health and work).

Sex-gender differences are manifested in two ways: that of people who live a sexual orientation different from heterosexual, and that of people who build a sex-generic identity beyond the sex with which they are born. Next, we describe each one of them.

A) Sexual orientation. Sexual orientation is defined in the introduction of the Yogyakarta Principles as: "the ability of each person to feel a deep emotional, affective and sexual attraction for people of a gender different from their own, or of their own gender, or more than one gender, as well as the ability (sic) to maintain intimate and sexual relationships with these people (Principles of Yogyakarta, 2006, p.6)" Here, the following possibilities of choosing sexual orientation concur:

1. Lesbianism, or practice where a woman establishes a relationship with other women in the emotional, social or sexual sphere;

2. Homosexuality, or practice where a man establishes a bond in the emotional, social or sexual order with another male, and

3. Bisexuality, defined as the practice where a person belonging to the female or male sex maintains affective and/or sexual relationships with people of the same or different sex.

B) Gender identity. On the contrary, gender identity, in terms of the aforementioned document, consists of:

> The internal and individual experience of the gender as each person feels deeply, which may or may not correspond to the sex assigned at the time of birth, including the personal experience of the body (which could involve the modification of appearance or bodily function through medical, surgical or other means, provided that it is freely chosen) and other gender expressions, including dress, way of speaking and manners (Yogyakarta Principles).

Among the identities gathered in this other condition, they appear:

1. Transsexuality, conceived as the human condition where a person lives a constant conflict between the sex with which they are born and their genuine gender identity;

2. Transgender, or that human condition that is characterized because the person denies its gender assuming roles of the opposite gender[6], and

3. Transvestism or that state of behavior where the person, without denying their biological sex, feels pleasure in wearing clothes of the opposite gender.

As can be seen, *trans* condition has different nuances and involves a greater complexity than it is intended to give it, since its study goes beyond the idea of a single femininity or masculinity. The theme of sex-gender diversity has been a source of remarks due to the inescapable presence of extremely homophobic moral structures among present societies, where the possibility of a man carrying out conducts of the female gender or vice versa is disqualified (Ojeda- Sánchez, 2010, p.68).

IV. THE RIGHT TO GENDER IDENTITY IN THE INTERNATIONAL CONTEXT

In the international context, the evolution experienced in the field of the recognition of the human rights of people due to their sex-generic identity is notorious. This is how they appear, in the order of the United Nations (UN):

- The Declaration on the decriminalization of homosexuality, sexual orientation and gender identity of December 18, 2008, signed so far by the governments of 68 states around the world including Mexico, and the joint declaration to stop acts of violence, and human rights violations directed against people due to their sexual orientation and gender identity on March 22, 2011, also signed by the Mexican government, through which the governments of various states have stopped criminalizing homosexuality, criminalizing any conduct that is intended to discriminate against a person because of his or her sexual orientation;

6 It is pertinent to clarify that the difference between the transsexual subject and the transgender is that while for the former the state of anguish for being trapped in a body that does not correspond to their genuine gender identity produces in the individual the need to submit to a genital reassignment surgery. The transgender person only seeks legal and social recognition of their genuine gender identity in their official identity documents in order to have their psycho-social identity accepted.

- Resolution A/HRC/RES/17/19 of the UN Human Rights Council of June 2011 on human rights, sexual orientation and gender identity, and
- Principles on the application of international human rights law in relation to sexual orientation and gender identity, also known in the international sphere as "Yogyakarta Principles", prepared by a group of experts from different areas in the year 2006. The latter consists of an introduction, a preamble, 29 ilustrative principles and 16 additional recommendations. Undoubtedly, one of the most important references of *soft law*[7] in the international sphere that can be the beginning of the process of elaboration of a conventional document to ensure the rights of this group of people (Gracia-Ibáñez, 2014, p.122) .

In order of the Organization of American States (OAS):

- The adoption of six resolutions on human rights, sexual orientation and gender identity from 2008 to date, aimed at establishing the commitment of States to enact measures in this particular matter, ranging from legislative, administrative and educational (Pérez Contreras, 2015, p.12);
- The approval by the General Assembly of the Organization of American States of the Inter-American Conventions against all forms of discrimination and intolerance, and against racism, racial discrimination and related intolerance in 2013, and
- The resolution of the Inter-American Court of Human Rights on the case of Atala Rifo and Girls vs Chile, pronounced on February 24, 2012, which, by the way, is the first case presented before this supranational body where they are ventilated relevant aspects of the sexual orientation of a married woman who, upon divorce, obtained the custody of her minor daughters before the judge of first instance in Chile, however when the ex-husband learned that his ex-spouse was having a relationship with another woman filed an appeal with the jurisdictional authorities of his country to recover the custody of the minors, resolving in his favor. In the end, the woman exhausted all the means in her country to recover custody of her minor daughters without obtaining a favorable resolution,

7 This type of international documents are characterized by the lack of binding force from the outset, however, as pointed out by González Martín and Rodríguez Jiménez, their value as functional principles in the integrating work of the national legal order must not be lost sight of (González Martín , 2010, p.84).

going then, initially to the Inter-American Commission on Human Rights and, later, before the Inter-American Court of Human Rights, recovering the legal custody of her minor daughters, since, according to the IACHR, the resolutions adopted by the jurisdictional authorities of Chile supported their approach in homophobic and heterosexist reasoning.

In European Union field stand out:

- The recommendation of the Council of Europe on measures to combat discrimination on the grounds of sexual orientation or gender identity of March 31, 2010, and the various resolutions issued by the European Court of Human Rights regarding the recognition and protection of human rights of people because of their sexual orientation or gender identity, which have laid the foundations of a European jurisprudential system in this matter, such as:
  - The cases of David Norris vs. the State of Ireland resolved in 1988, and that of Modinos vs. the State of Cyprus in 1993, both initiated by homosexual activists with the aim of eliminating the criminalization of consented homosexual acts;
  - The cases of Perkins and R. vs. the United Kingdom and that of Beck, Copp and Bazeley vs the United Kingdom for the unjustified dismissal of the armed forces on account of their sexual orientation;
  - The case of the Portuguese Salgueiro Da Silva Mouta vs Portugal in 2000, who lost custody over his youngest daughter after having a relationship with another person of the same sex;
  - The cases of Christine Goodwin vs. the United Kingdom in 2002 and Grant vs. the United Kingdom in 2006, to obtain the granting of new identity documents;
  - The cases of Fretté vs France in 2002 and that of E.B. vs France in 2008, both for the refusal to adopt because of their sexual orientation, and
  - The case of Schalk and Kopf vs. Austria for denying them the right to marry civilly.

As can be noted, there is a progressive tendency in the recognition of the right to the free development of the personality assuming the genuine identity of psycho-social, to form a family through civil marriage, to non-discrimination based on sexual orientation or gender identity, equality, and dignified treatment regardless of the sexual orientation or gender identity that is possessed.

V. RIGHTS TO GENDER IDENTITY IN THE NATIONAL CONTEXT

Mexico, like other countries in the world, has dictated a series of measures in the legislative, judicial and administrative orders around the recognition of LGBTTT collective rights. The intention is to ensure greater conditions of formal and material equality among the population, seeking to put forward more inclusive, plural and respectful societies of the diverse nature of the human condition, among the most relevant measures include:

1.- **In the federal order**. The amendment to Article 1 of the Constitution in 2001[8], by means of which the rights to equality and non-discrimination were added through the "open clause", with any other form of inequality or discrimination not included in the aforementioned provision. With this, it is intended to prevent the impairment of people's rights, particularly those who live in a situation of vulnerability, demanding respectful treatment not only from the organs of public power throughout the country but also from individuals.

On the other hand, there was a change of constitutional paradigm in 2011 when the nomenclature of "individual guarantees" was changed to that of "human rights" and the *ex officio* control of conventionality[9] and the principles for its application[10] in the text of the Federal Constitution were incorporated, replacing the term "preferences" with "sexual preferences" as a possible motive for discrimination with the firm intention of eliminating the rejection of people based on sexual orientation different from heterosexual (Lara Espinoza, 2015, p 18).

8 Through a reform decree published in the Diario Oficial de la Federación on August 14, 2001, modifying the content of paragraph 2 and the addition of a third party.

9 Which implies that the jurisdictional authorities of first instance, are also obliged to dictate their resolutions according to the block of constitutionality conformed by the norms of constitutional law, the international treaties signed and ratified by Mexico and the criteria of the Jurisprudence of the supranational jurisdictional bodies.

10 Here, I refer to the principles *pro persona*, universality, interdependence, indivisibility and progressivity referred to in Article 1 of the Mexican federal constitution.

This is despite the fact that previously (June 11, 2003) the Federal Law to Prevent and Eliminate Discrimination had already been published in the Diario Oficial de la Federación, with the primary objective that the Mexican State ensure conditions of equality and freedom to all persons in the exercise of their civil, political, social, cultural and economic rights, favoring a respectful treatment of the human rights of people and social minorities in a vulnerable condition.

To achieve this, the Consejo Nacional para Prevenir la Discriminación (CONAPRED) was also created, a body in charge of formulating, promoting and coordinating actions in the federal sphere aimed at preventing and eradicating discrimination; sample of the work of this important organism, are the two National Surveys on Discrimination raised in Mexico. The first in 2005 and the second in 2011, which give figures of the degree of violence and vulnerability in which the collective of LGBTTT people lives in our country in order to implement actions aimed at reducing them.

Within the judicial measures, the National Supreme Court of Justice has been in charge of charting the way in the vindication of the fundamental rights of the vulnerable minorities through the effective tutelage of the excluded or disadvantaged people's rights (Silva-Meza *et al*., 2011, XI). This social commitment is reflected in the different criteria dictated by the Court regarding same-sex marriage, homoparental adoption, sex-generic reassignment, and in general those that refer to respect for the rights to equality and non-discrimination in Mexico, among which are:

A. Equal marriage.- Jurisprudence number 1a./J. 46/2015, whose heading states "Marriage between people of the same sex. There is no reason of a constitutional nature to not recognize it", in its content, the inadmissibility of same-sex marriage is rejected due to social prejudices or stereotypes, since the Federal Constitution allows the drafting of article 4, the possibility for any person to found a family, including a civil marriage celebration, and the number P./J. 12/2011, with the heading "Marriage between people of the same sex in the Distrito Federal. It is valid in other federal entities according to article 121 of the General Constitution of the Republic (article 146 of the Distrito Federal civil code, amended by decree published in the Gaceta Oficial of the entity on December 29, 2009). Here, the federated pact is ratified in relation to the civil status of the people and the principle of the personality of the law consigned in constitutional article 121, according to which the acts of the civil status acquired under the law of the domicile of the person, follow the individual to any other State or country, and

Theses number P.XXVI/ 2011, whose heading is "Marriage. It is not an immutable concept", in the understanding that the legal institution of marriage cannot, nor should it have an immutable conception regarding its notion and ends, which, moreover, are not limited to the perpetuation of the species, but rather to the solidarity and reciprocal support among its members, as well as number 1a. CII/2013, with the heading "Same-sex marriages. Article 143 of the civil code for the State of Oaxaca violates the principles of equality and non-discrimination", by not admitting that same-sex couples can found a family through civil marriage, despite the fact that the federal Constitution recognizes this right to any person regardless of their sexual orientation.

B. Homoparental Adoption.- Jurisprudence number P./J. 14/2011, whose heading says "Marriage between people of the same sex. The legal possibility that they can adopt should not be considered as an automatic and indiscriminate authorization (article 391 of the civil code for the Distrito Federal), and the P./J. 13/2011, whose rubric establishes "Superior interest of the child in the case of adoption by marriages between persons of the same sex". Here it is important to specify that while adoption is a legal institution that aims to ensure the best interests of abandoned or foundling children, the authorities responsible for granting it cannot do so automatically, but always in order to guarantee this fundamental principle in the relationships of family law.

C. Sex-generic reassignment.- In this line, theses number P.LXXI/2009 appear, whose heading says "Sexual reassignment. The pre-eminence of psychosocial versus morphological sex to fully respect the sexual and gender identity rights of a transsexual person ", privileging the recognition and protection of genuine identity above, including biological sex, as a determining factor of people's gender identity; the number P.LXIX/2009, whose heading indicates "Sexual reassignment. It is a decision that is part of the rights to the free development of the personality", that is, the faculty so that a person, without mediating pressure of any kind, can freely decide the life project he wants to make, and the number P. LXXIV/2009, whose rubric establishes "Sexual reassignment. There is no reason to limit the fundamental rights of a transsexual person, preventing them from adapting their identity documents, under the pretext of preserving the rights of third parties or of public order"; the latter, a determining factor for a person who has obtained a favorable resolution of a special procedure of reassignment of the sex-generic agreement, can obtain identity documents that prevent a discriminant treatment of the person in the social scene.

2.- **In the local order**. Within the local sphere, some federal entities of the Mexican Republic have also enacted legislative measures in this area, first, recognizing the right to found a family through specific figures, such as the civil pacts of solidarity in Coahuila[11] or the societies of coexistence in Mexico City[12], then, allowing the celebration of civil marriage and same-sex adoption in Mexico City (2009)[13], and later, in Coahuila (2014)[14], Nayarit (2015)[15], Michoacán (2016)[16], Morelos (2016)[17] and Quintana Roo (2011).

In addition, 21 federal entities of the 32 that make up the Mexican Federation, have issued legal ordinances on prevention and elimination of discrimination; while 15 of the 32 entities of the federation classify discrimination based on sexual orientation in their punitive laws (Pérez-Contreras, 2015, pp. 25-26).

Mexico City has been avant-garde in terms of recognition of people's rights based on sexual orientation or gender identity, being 1980, when the first case of this nature would be presented in Mexico City. Later, in 2004, section II of article 135 of the civil code was reformed in order to allow the amendment of relevant elements of the birth certificate, such as the name or sex that appears in the act of the promoter (Bonifaz-Alfonzo and Guevara-Olvera, 2009, pages 75 and 77).

In 2008, the special procedure of reassignment of the sex-generic agreement was added in the civil codes and civil procedures, both for the Distrito Federal, which would later be replaced by an administrative procedure processed before the capital's Dirección General del Registro Civil, through the publication of a decree of reform published in the Gaceta Oficial del Gobierno de la Ciudad de México on February 5, 2015.

11 On January 12, 2007, it was published in the Periódico Oficial del Estado de Coahuila, among other things, the addition of Title One Bis to the First Book of the civil code of the entity regarding the regulation of the "civil pact of solidarity"; figure exported from the legal institutions of French civil law, which consists of 16 articles.

12 Through the publication of the Law of Societies of Coexistence on November 16, 2006 in the Gaceta Oficial del Gobierno del Distrito Federal, which consists of 25 articles.

13 Through the reform of article 146 of its civil code published on December 28, 2009.

14 Through the reform of article 253 of its civil code published on September 16, 2014.

15 Through the reform of article 135 of its civil code published on December 22, 2015.

16 Through the reform of article 127 of its family code published on June 22, 2016.

17 Through the reform of article 68 of its family code published on July 4, 2016.

With this, the law went from assuming a pathological criterion of the *trans* condition, according to which the promoter had to check the hormonal medicalization and a psychological therapy, to the non-pathological criterion where no hormonal treatment or psychological therapy should be accredited to obtain State recognition of gender identity[18]. That is, this last procedure is more respectful of the dignity and human rights of the transgender person by preserving their rights to the free development of personality, non-discrimination and equality to decide and responsibly assume the direction of their sex-generic identity, also modifying the legal nature of the formal request, going from a jurisdictional contest subject to the dictation of a Judge of the familiar to an administrative proceeding before the Civil Registry, much more agile and less agonizing for those who promote it.

Within the common jurisdiction, just before 2014 in Mexico City, about 187 sex-generic reassignment trials had been initiated (Belmont: 2014), due to the high cost involved in initiating a jurisdictional proceeding of this nature, however, this trend should change in the next few years after the modification of the procedural nature to achieve legal recognition of gender identity, coinciding with the criterion assumed by the Spanish Supreme Court in 1987 where, for the first time, the psycho-social criterion is assumed to protect the gender identity of the transsexual person and beyond the biological criterion assumed by the English courts in 1963 in the Corbett vs Corbett case[19] (Camps-Merlo, 2007, pp. 329 and 412).

In addition, within the measures dictated by the capital executive, include the annual reports on cases of discrimination of 2013 and 2014 made by the Consejo para Prevenir y Eliminar la Discriminación of the Distrito Federal (COPRED), the Declaration of Mexico City friendly to the diversity of the LGBTTT collective, the support of COPRED in the administrative procedures to obtain new birth certificate where gender identity is recognized, and the free care of hormonal therapies, timely detection of HIV and other sexually transmitted diseases to transgender people; services provided by the Clínica Especializada de la Condesa in Mexico City.

18 This procedure is performed before the Juzgado Central del Registro Civil of Mexico City in accordance with the provisions of the Reglamento y Manual de Procedimientos del Registro Civil citadino.

19 Replaced later with the approval of the *Gender Recognition Act* on July 1, 2004 by the English Parliament, normative document that assumed the psycho-social criterion.

VI. EDUCATION AS A FACTOR OF RESPECT FOR SEX-GENERIC DIVERSITY

Education is, without a doubt, the most important way to transmit values, ideas, beliefs and ways of thinking and acting among people. Thus, cultural factors in a society are continuously reproduced through models of meaningful learning that also allow their transformation according to different historical, social, moral, political or legal circumstances in a community, which conform to the dictates that the own reality requires the generation of new ways of thinking and acting; this situation also applies to the transformation of sex-generic models (Butler, 2015, p.296).

From the Greek city-states, one could see the Aristotelian influence of the model of a different and separate teaching between men and women. Thus, the raising of women and men reproduced the model of male domination where the role of women was limited to functions in the home, while the role of men was concerned with content such as politics, philosophy, science, culture and the arts. This situation did not change during the transit of the Middle Ages, but until the end of the 19th century when co-education as an educational model where girls and boys receive shared education in the same classroom, is inserted for the first time in a large part of the United States of America and in some regions of Europe, mainly in Denmark, Norway and Finland.

The part waters to establish the proposal of the co-educational model was the creation in 1889 of the Libertarian Teaching Committee in the city of Paris, France, influenced by the liberal ideals of the French Revolution and the new pedagogical school. This scenario, started from four primordial axes: 1st. Encourage comprehensive education, intermingling manual and brain activities; 2º. Promote rational education, cultivating scientific work devoid of any religious dogma; 3º. Encourage liberal education, where respect for freedom of thought and respect for the ideas of each person, occupied a primary role and 4th. Encourage mixed education, allowing anyone without distinction of sex or gender to access the same educational institution on equal terms; ideas exported to Spanish by the Spaniard Francisco Ferrer Guardia, in the next ten years with the construction of the International League for the Rational Education of Children (Álvarez-Gayou, 2014, pp. 23-24).

In Mexico, Enrique C. Rébsamen tried to adopt the co-educational model in the country's Escuelas Normales in the inclusive post-reformist era for both sexes, with the idea of promoting respect and mutual knowledge between two perspectives seen throughout history as antagonistic, however it would be in 1946 when the co-educational egalitarian model was consolidated in the Mexican legislative framework with the amendment to Article 3 of the Constitución Federal, with the firm intention of avoiding privileges in the educational field, among other things, by difference of sexes (Álvarez Gayou, 2014, pp. 36, 37 and 40).

In addition to existing educational models that separated women from men, there is also little approach to sex education within basic education schools in our country, due to the presence of prejudices often based on fanaticisms of the most varied nature. Thus, the diverse communities and Mexican populations, as reproductive sources of a model of universal sex-generic behavior, are characterized by the predominance of four elements:

1. The socio-cultural ideology of sustaining only sexual coital practices;
2. Sex-coital relationships only have a place among people of different sex, in the understanding that both sexes complement each other;
3. The socio-cultural mandate requires that sex-coital relationships be verified only in conjugal unions, and
4. The primary purpose of these sexual practices must be procreation.

The meeting of all these elements characterizes the heterosexist cultural model, according to which nature determines that sexual relations only have a place in the relationships that exist between women and men (Hernández Curiel, 2010, p.80), making side any possibility of witnessing other ways of living sexuality and gender among human beings. This excludes other forms of living and assuming sexuality and gender identity, contravening the diverse nature of the human condition, fundamental axis in the subjective construction of the identity of each being.

This situation undoubtedly contradicts what is stated in number 3.3 of the World Declaration of the UNESCO Education for All Conference, which postulates the importance of "eliminating all stereotypes about the sexes from education".

With the above, it is not intended to affirm that heterosexuality is in itself good or bad, but to support that stereotypes limit the ability to find in diversity a better expansion of human potentialities, redefining the various femininities and masculinities that can to arrive to concur, beyond the dictation of a single supplying masculinity, strong, powerful, or of the decree of a single sensitive, submissive, obliging femininity that is subordinated to the first. It is about finding true masculine and feminine identities, liberated from sex, sexual

organs and biology in the construction of a genuine identity, and that only is referring to the hetero-sexist model, let alone a recognizing model of sex-generic diversity where there is still much to reflect.
In a study on the perception of masculinity and femininity in Mexico, Álvarez-Gayou Jürgenson describes how stereotypes based on the existence of a single masculinity and a single femininity generate dissatisfaction and suffering for women and men when there is no identity match own or genuine with the rigid model of sexed behavior and gender (2014, pp. 67-74).

In this way, violence, alcoholism, drug addiction or pornography, make their entry into the early years of adolescence, a crucial stage where the individual, feeling displaced in this model of such rigid behavior, seeks a refuge or escape in some of these harmful practices, having an impact on the family and social structure.

In this scenario, as expressed by León Correa, bioethics plays an important pedagogical role but this time at a higher level, which is based on three fundamental aspects:

1. Obtain more accurate answers to complex issues based on interdisciplinary reflection;

2. Positively influence medical decision-making, particularly in the rights and obligations that must prevail in the doctor-patient relationship within the models of health care, and

3. Transmit values to the medical professional in health care systems, and in general to the whole society (León Correa, 2009, p.68), moving from a discursive bioethics to a bioethics of joint actions.

It is useless to create more plural legal systems in terms of social inclusion, if this legislative measure is not accompanied by an educational policy designed to encourage a change in the attitudes and behaviors of health professionals and other important areas of knowledge such as anthropology, sociology, philosophy and law, because within the classroom it is important to carry out a critical exercise of the postulates of science, highlighting the primary and not secondary role of bioethics, based on the analysis of commercial interests that often overlap the purposes of professional practice, not only medicine, but also the rest of the disciplines cited, encouraging an active and not passive attitude among students before ethical dilemmas, preventing the lack of interest in the study of philosophy and particularly of ethics among higher level students (León Correa, 2009, pp. 72-73).

In addition, if bioethics is characterized by its inter-disciplinary methodology, it is obvious that a topic such as sexual diversity requires the participation of different disciplinary voices in order to first understand and then propose, construction, design, dissemination and the implementation of educational models that respond to these and other demands, where the role of the teacher encourages the freedom and human development of each student, enhancing their abilities beyond any gender stereotype. It is, therefore, about respecting, learning and understanding the diverse character of human potentialities. To understand that any new teaching process poses a risk and that this risk should not be motivated or rejected by the mere idea of a prejudice that "offends the substantivity of the human being and radically denies democracy (Freire, 2004, p. 17)".

Regarding the three aspects posed by León Correa, the first one turns out to be the most important around the issue of the teaching of sex-gender diversity as an essential presupposition of the human condition, as a complex phenomenon where the deliberative process starts from nobody it is in a position to be a spokesperson for absolute truth in the discussion of moral issues, but rather, in the need to privilege a space in which the postulation of different arguments on the same subject can be heard and respected, putting reasonableness first, without losing sight of the reasonableness of the arguments of other people before closing the dialogue (Brussino, 2012, p.41).

Bioethics, like any other discipline, has different methodologies to study and analyze complex situations, among which we can mention the model of dilemmas, the case model and the problematizing model. The first, allows to identify two positions on the same subject to determine which is valid and which is not, the second, raises from a specific case the analysis of different edges that revolve around it to be in possibility to suggest a solution to the hypothetical case, and finally, the problematizing educational model, parts from a fundamental premise that there is no single solution to different moral conflicts, because here the process is much more enriching by allowing to listen to the different opinions, theoretical and even empirical postures on a complex moral phenomenon (Brussino, 2012, pp. 46-47). This last process occurs in two phases:

1st. Awareness stage of moral conflicts of unknown moral agents. That is, in the argumentative process the speakers must put themselves in the place of those who live the phenomenon, and

2nd. Narrative stage of the case. This pedagogical resource helps to empower the emotionality and imagination of those who study the moral conflict for decision making.

The problematizing model allows students to immerse themselves in the reality of the phenomenon, sensitizing the capacity of the subject to find a solution to a moral conflict. In this way, moral reflection on the subject of sex-generic diversity implies prioritizing among students the need to provide solutions not necessarily shared by all the interlocutors that participate in the deliberative process, but endowed with greater interest in the issues of strange moral agents.

In the end, as suggested by Álvarez Gayou Jurgenson, it will be important to prioritize a new educational concept which he calls " anestereotípica de los géneros " in basic education models, consisting of the tolerance of teachers to detect different ways of assuming gender roles in students, allowing the student to develop their abilities to the fullest, being who they are and not who we want them to be, avoiding repressing or sanctioning the subjective mood of a person's identity when trying to submit them to the stereotypes of both genders (2014 , pp. 103 and 104); using the problematizing model among students of higher education, since tolerance as Edgar Morin requires "supposes a conviction, a faith, an ethical choice and at the same time acceptance of the expression of ideas, convictions, choices contrary to the ours (Morin, 1999, page 56) ".

VI. FINAL COMMENTS

Trans phenomenon has originated the interest of the national and international scientific community and of the public and private spheres since the sixties, after the advances registered in the field of endocrinology, hormonal treatments and reassignment surgeries.

The role of the movements for the vindication of the fundamental rights of the LGBTTT collective began to materialize through different resolutions pronounced by the European Court of Human Rights since the seventies, which later decisively influenced the comparative legislation of different countries of the world, in the same way as in the arguments put forward by judicial bodies at the regional and national levels.

For its part, the national legislative panorama begins to outline a trend of respect and recognition for sexual and gender diversity, particularly in some entities of our country, led by Mexico City. Despite this, there is still much

to be done in other important regions of the Mexican Republic that refuse to recognize and respect the fundamental rights of sex-generic diversities, due to the predominance of a conservative heterosexist cultural model, based on two unique sex-generic identities.
Education is the propitious means to create the transformation of values, beliefs and customs in any society on the planet. Mexico, like other countries of the continent, must design educational models that do not impede the construction of femininity, masculinity or the gender-generic identity that is preferred. It is a glimpse of a plural educational model that is consistent with tolerance and respect for diversity, beyond rigid stereotypes that only generate dissatisfaction and suffering for people.

Here, bioethics, as a space of interdisciplinary reflection, allows the meeting of the different voices and perspectives of the same phenomenon, to understand in a more plausible way the fundamental premise of the diverse characterization of the human condition; fundamental axis in the recognition and protection of the fundamental rights of people, and in particular of the most marginalized and vulnerable sectors of society.

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CONTRIBUTION TO DEVELOP A METHODOLOGY THAT EVALUATES SUSTAINABILITY FROM INDIGENOUS COMMUNITY SCALE

—

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— Abstract—

The measurement of the sustainability levels that have been achieved in indigenous rural communities is an issue that remains very complex because it has not been possible to define a methodological guide given the complexity of the topic; however, it is imperative to continue constructing and providing new forms applicable to this type of studies. In this context, the purpose of this study is to contribute establishing a reliable, timely and truthful methodological basis for assessing the levels of sustainability achieved on a scale of analysis of indigenous communities, that is, from the community perspective, Not only as the analysis of the agro-ecosystems that are found there and that are part and sustenance of the community's life, but rather involves the human population and its interactions and/or problems that are generated in it from its economic-productive and socio-cultural actions. The study subject to which this methodology was applied is the community Golonchán Nuevo fraction two, municipality of Sitalá, Chiapas, Mayan-Tseltal community. The methodological route was first to locate the context of the study within the framework of the concept of sustainability proposed by the Bruntland commission, later the scale of analysis was sustained and the indicators were developed. Both the diagnostic workshops and the application of pre-elaborated surveys, direct observation and semi-structured interviews were used for the data collection work. The data obtained were analyzed with the General Index of Sustainability (IGS), Agrobiodiversity Index (IDA), the Vester matrix for the analysis of the problems and an analysis of agricultural activities manifested in cultural and even religious activities. The results indicate an IGS of 0.52 and an ADI of 0.47 while the problems were the prevalence of diseases and the lack of access and availability of food as the active problems of high influence on others. With these results we can conclude, on the one hand, that the study community is located in an unstable and unacceptable system, and there is even a threat of consideration on cultural wealth and, on the other hand, that the application of this methodology at the community level is timely and can provide reliable data for studies on sustainability levels to a scale of community analysis.

Keywords

Indicators; sustainability; community; scale of analysis; agrobiodiversity.

It is known that one of the biggest problems in the context of sustainability is precisely the measurement of the sustainability degree that has been achieved at different scales of application; therefore, it can be recognized that there is no single "ideal" form of measurement, as other researchers have also stated (Bolívar, 2011). Defining a reliable, timely and accurate methodology that can be applied at the level of indigenous rural communities is therefore a very topical challenge and therefore it should be put to the consideration of the scientific community dedicated to this topic.

In this context, the central axis of a methodology based on a community perspective must not be closed to the human population and its interactions and the problems that derive from it; but in an inverse sense, this human population should be seen as one more factor of the community, in a holistic sense, in the same way that agro-ecosystems intervene, natural resources, and that as a whole economic-productive, agro-ecological, sociocultural interactions are promoted which sustain the life of the community.

In this sense, the construction of indicators to make the measurements of sustainability necessarily involves recognizing the importance of traditional knowledge that is reflected in the agro-cultural activities, that is, in the cultural manifestations that have to do with the activities of the cycle agricultural sector whose wealth of knowledge manifests itself primarily in indigenous populations (Toledo and Barrera, 2008). That is why the methodology for the analysis of indigenous rural communities must contemplate variables that measure the permanence of this knowledge, which is also evident in clothing and gastronomy.

On the other hand, it is also of vital importance that the study of sustainability levels in communities must necessarily contemplate a careful analysis of the problems that arise in community life that is integrated and complements other indicators for the measurement of sustainability for this the application of participatory diagnostic techniques, that provide timely information of the community's people is necessary.

Derived from these premises, the following study is proposed whose objective is to contribute to the development of a reliable, timely and accurate methodology for the analysis of sustainability levels at the level of the indigenous rural community. From this perspective, a methodology was designed and applied in order to evaluate the level of sustainability of an indigenous rural community called Golonchán Nuevo fracción dos, which is located in the central highlands of Chiapas, in one of the six most marginalized municipalities in Mexico: Sitalá, Chiapas. It should be considered that this community is of Mayan origin where the mother tongue spoken is *Tseltal*.

MATERIALS AND METHODS

Study area

According to the Comité Estatal de Información Estadística y Geográfica de Chiapas (ceieg, 2017), the Nuevo Golonchán community, fracción dos, is located in the southwest part of the municipality of Sitalá, Chiapas, Mexico. It is located 16 kilometers from the municipal seat, at an altitude of 1100 meters above sea level, its geographical coordinates are: length -92.395556 and Latitude 17.015833. It borders to the north with the community Golonchán Nuevo Primera Fracción; to the south with San Juan Cancuc, to the east with the municipality of Pantelhó and to the west with the community of Cópatil.

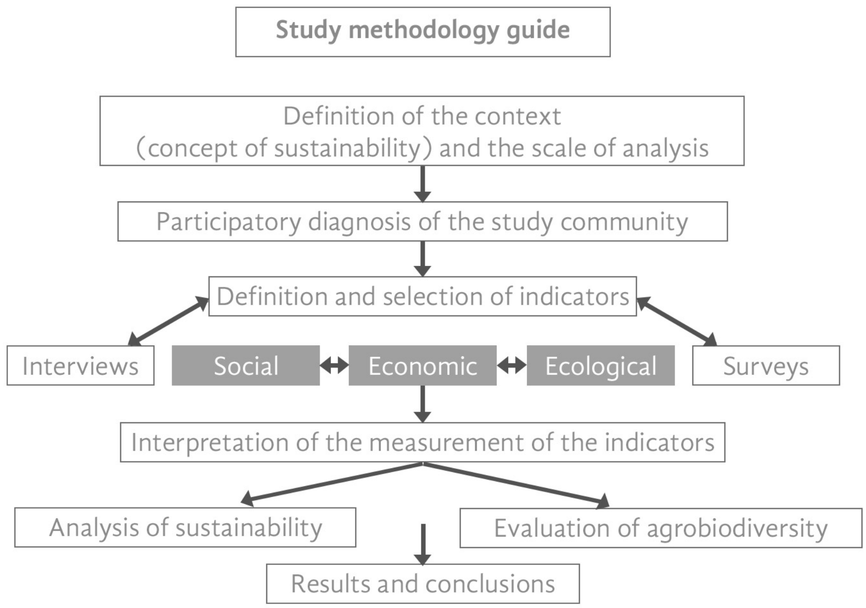
Applied methodology

Sample size. Regarding the sample size, it was done taking into account two methods: on the one hand, the convenience or non-probabilistic method was used (Torres, 2013; Morales, 2012), in which the people who best adapted to the persecuted goals of this study were chosen, in general terms were those that have stood out for their participation and leadership in sake of the community who voluntarily had the disposition to answer the surveys and participate in the interviews; and on the other hand, surveys were applied to an equivalent of 60% of the population chosen at random. It should be noted that considering the size of the population by its inhabitants, as well as the number of families and therefore of producers, 60% of them were surveyed considering that it is a probabilistic sample representative of the community in terms of application of information to the rest of the population. The observations made were direct in the sites of interest for the study, through tours with the accompaniment of members of the community.

The methodological design follows a critical path that starts from the location within a framework of the concept of sustainability (Sarandón, 2006, Sarandón and Flores, 2009), proposed by the Brundtland Commission that says "...Sustainable development is the one that allows us to meet the needs of present generations, without compromising the needs of future generations..." under this logic, then, the question is: how viable are communities to leave necessary natural resources for future generations and that they can enjoy a full life?, in other words "are communities consuming natural resources faster than they are conserving them?" "Is the conservation capacity greater or less than the capacity to conserve for future generations?"

The next step is to locate the scale of analysis, which, as stated in the paragraphs above, is at the level of the indigenous rural community. The general scheme of organization of this study can be seen in Image 1 where it defines the scale of measurement once the concept of sustainability and the objectives of the study have been determined.

Image 1. Methodological route followed in the investigation.



Source: self-made

The work scheme or the methodological guide continues with the application of a participative diagnostic workshop, which allowed to recognize or characterize the community that is, what do they have? Which resources do they count with? What do you do? How much do they have? Why are they like this? What problems do they have? What economic-productive and socio-cultural activities do they carry out? Etc. It is important to keep in mind, during the implementation of the participatory workshop that the agro-cultural activities (especially of ancestral or of Mesoamerican origin) that are developed in the community and that derive from agricultural activities in connection with conservation of the culture are manifested in the language, clothing and gastronomy, but also in the rituals of the productive cycles.

On the other hand, the participatory diagnostic workshop had the same purpose of recognizing the current state of the community regarding the problems that affect it, which are analyzed through the Vester matrix, which allowed the problems to be classified and because of this it is possible to build better solutions that reinforce sustainable life strategies. For the analysis of this information, the participation of researchers, facilitators and members of the community was important.

Once the three dimensions of analysis and the selection of indicators that are pertinent and viable for the purpose of the study were determined, a survey was constructed to collect the data of interest, the format for semi-structured interviews and direct observation; it is very important to bear in mind when selecting the indicators that these will be processed through the Índices General de Sustentabilidad (IGS) (General Sustainability Indexes) and the other one of Agrobiodiversidad (IDA) (Agrobiodiversity), which are two measurement index that have proven their relevance and reliability (Gravina and Leyva, 2012).

The procedure for the evaluation by IGS and IDA was based on a sequence of terms and mathematical equations to determine first **the value of the variables**, and **then the value of the indicators**, the final operations yield the result of both the General Sustainability Indexes and the one of Agrobiodiversity.

For the case that concerns us in the Nuevo Golonchán community, the information obtained through the diagnostic workshop, surveys and interviews were captured in the Excel program and later analyzed by the IGS and the IDA. In the IGS, 11 indicators were used, of which four are of the economic dimension, four of the social dimension and three of the ecological dimension, that is, a balance was observed in the three dimensions. All the indicators totaled a total of 47 variables.

The systems studied General Sustainability Index was determined by calculating using the formula:

$$\mathbf{IGS} = \Sigma^{1}{}_{n}\ (\mathrm{VI})\ /\ \mathrm{VMI}*n$$

Where: VI is the value of the indicators; VMI is the maximum possible value of an indicator and *n* is the number of indicators.

Taking into account that the selected variables have different units of measurement (percentages, monetary values, indexes, qualitative data), which does not allow direct comparison between them, a standardized scale was constructed (value of judgment-*VJ*-) that represented the value that they have in relation to the desirable situation, defining maximum and minimum conditions and taking into account the main characteristics and particularities of the area, according to recommendations of López *et al.* (2002) and Harold *et al.* (2006). In this case it was assigned a value of 1-10 related to sustainability levels for each variable. The standardized scale allowed organizing all the information and converting the different values into a homogeneous value.

The numerical value of the variables was assigned through an interactive process with the participation of the facilitators and actors involved in the research. The value of the variables corresponds to the value of judgment assigned in the scale of values. The value of the sustainability indicators was calculated by adding the variables that make up each indicator:

$$\mathbf{IGS} = \Sigma^{1}{}_{n}\,(\mathrm{VV})\,/S$$

Where: VV is the value of the variable and *S* is the number of variables that constitute each indicator.

The interpretation of the value of the IGS indicator follows the criteria indicated by Sepúlveda *et al* (2002), who estimate that an index below 0.2 is a state of the system with a high probability of collapse; for levels between 0.2 and 0.4, they indicate a critical situation, from 0.4 to 0.6 it is an unstable system, while from 0.6 to 0.8 it speaks of a stable system and finally from 0.8 to 1 it is considered as the optimal situation of the system. The indicators selected and studied are shown in Table 1.

Table 1. Indicators studied to assess the General Sustainability Index

Indicators:	Variables (V):
Soil	1. Soil properties. 2. Structural quality of soil. 3. Cultivable area/total area ratio. 4. Cultivable discovered (fallow/year)
Biodiversity	5. Vegetable biodiversity managed (in the plot and the backyard). 6. Animal biodiversity managed and breeds (in the plot and in the backyard). 7. Diversity/species options
Water	8. Availability. 9. Access. 10 Quality
Economic resources	29. Agricultural resources and their status. 30. Labor force/area ratio. 31. Work force and its quality. 32 Warehouses for crops and others. 33. Corrals/animals, live fences

Economic efficiency	11. Cost/benefit ratio. 12. Agricultural performance. 13. System productivity. 14. Self-financing. 15. Total profit. 16. Numbers of productive items. 17. Market diversity. 18. Other income
Input independence	19. Independence of external inputs. 20. Inputs for animal feed. 21. Varieties of crops
Alternative technologies	22. Sustainable management technologies. 23. Use of nutritional alternatives. 24. Management of pests and weeds. 25. Produce and conserve seeds. 26. Animals sustainable management. 27. Crop preservation. 28. Irrigation systems
Quality of life	34. Comfort and access to media. 35. Access to health. 36. Access to education. 37. Food availability (quantity). 38. Food diversity.
Conservation of culture	39. Conservation of culture (language, clothing, gastronomy). 40. Practice of rituals and ancestral rites related to the agricultural cycle (agro-cultural)
Management capacity	41. Knowledge about agriculture (modern and traditional). 42. Innovation capacity. 43. Socialization of knowledge. 44. Acceptance to training
Government support	45. Payment facilities. 46. Access to credits. 47. Support for agro-ecological agriculture.

It is important to highlight that the IGS took into consideration the family backyard area as a substantial part of the study since this is a very important complement for peasant-type production that permeates this indigenous region (Velazquez and Perezgrovas, 2017).

For the IDA, the methodology proposed by Leyva and Lores (2012) was followed and included several indicators, which are the following:

IFER: biodiversity index for human nutrition
IFE: biodiversity index for animal feed
IAVA: biodiversity index to improve soil resources
ICOM: complementary biodiversity index

It is important to keep in mind that key informants and direct observation are indispensable to gather information for the IDA. The IDA values are considered optimal when they approach the unit (1), for this it is necessary that each of the specific indexes (IFER, IFE, IAVA and ICOM) reach maximum values and thus know how far or near we are from the biodiversity in a community (Table 2). The formula used for the IDA was the following:

$$\mathrm{IDA} = S1IFER + S2IFE + S3IAVA + S4ICOM \,/\, St$$

Where: St: number of components of each of the specific indexes.

IFER: Index of biodiversity for human consumption (it is the index that represents the biodiversity used for human consumption and is the families' main source of income), IFE: Index of biodiversity for animal feed (index that represents the biodiversity used for animal feed), IAVA: Index of biodiversity to improve the soil resource (it is the index that represents biodiversity to improve the physical, chemical and biological properties of soils) and ICOM: Index of complementary biodiversity (it is the index of non-food species but necessary for humans and agro-ecosystems).

Table 2. Diversity by species or variables to determine the ADI.

Subscript	Species groups and diversity groups (variables)
IFER	I. Trainers I.1. animal. I.1.1. eggs. I.1.2. meat I.1.3. milk I.2. vegetables. I.2.1 legumes II. Energy II.1. roots and tubers II.2. cereals II.3. oilseeds III. Regulators III.1. fruits III.2. vegetables
IFE	IV. Trainers: vegetables IV.1. arboreal and creeping legumes V. Energetics V.1. pastures and fodder
IAVA	VI. Organic wastes VI.1. harvests VII. Bio-products VII.1. bio-fertilizers VII.1.1. fungi-bacteria VII.1.2 other like composts VIII. Green fertilizers VIII.1. legumes VIII.2. grasses
ICOM	IX. Supplement to the quality of life IX.1. food IX.2. non-food X. Spiritual complement X.1. artistic works X.2. religious XI. Agro-system complement XI.1. natural: the forest XI.2. induced: live fences XII. Complement free animals

DISCUSSION AND CONCLUSION

Observed biodiversity

The biological diversity observed in the community can be located in several components, in a quadrinomy: animal-fruit-vegetable-medicinal (ornate) that are used by community members as food and/or sale of surplus for family support. In Table 3, the range of crops and animals identified in the community is described by their common name. It can be observed that there are 19 species of fruit and shade trees for coffee while the cornfield is regularly composed of corn, beans, squash, chayote and chili, as well as other species. Of the animal production only four species are of economic importance: chickens, turkeys, pigs and ducks. It should be noted that the animals are maintained with corn and free grazing in the areas that occupy the family backyard.

Table 3. Observed biodiversity of domestic flora and fauna in Golonchán Nuevo.

Animals	Vegetables	Fruits	Medicinal
Hen, Pig, Ducks, Turkey	Corn, beans, cucumber, squash, chayote, chile, tomato, radish, puero, cane, cabbage, peppermint, epazote, basil, cilantro, sweet potato	Tangerine, grapefruit, orange, coconut, coffee, avocado, mango, paterna, guanabana, lime, jocote, banana, lemon, cacaté, papausa, tuca, coczan, ishum	Purple maguey, te zacate, aloe, epazote, basil

Main problems

The problems detected are mainly six: Public health problems due to open defecation due to the lack of latrines and bathrooms, little access and availability of water, little access to health services because there is no health home in the community, insufficient food for the maintenance of the family, little availability of land to cultivate and little support from public institutions (Table 4).

According to the Vester matrix, it can be observed that both poor access to health services and insufficient food are critical problems (these are understood as problems of great impact in other processes). On the other hand, passive problems are understood as problems without great causal influence on others but which are caused by the majority while the indifferent ones are problems of low priority within the system analyzed. Active problems are problems of high influence on most of the rest but that are not caused by others (Velazquez F. 2008).

Table 4. Analysis of the problems detected in the diagnosis.

Critical problems	Liabilities	Actives	Indifferents
Little access to health services. Insufficent food to feed	Little support from public institutions	- Prevalence of public health diseases - Little access and availability of water	Little availability of land to cultivate

General Sustainability Index (IGS)

For the purposes of the present study, 11 indicators were used and 47 variables were developed, whose results were processed using the corresponding formula explained in previous paragraphs. The selected indicators represent the three dimensions of sustainability in a similar proportion. The value of the variables is described in Table 5. It can be seen that the variables with the lowest value correspond to the Water indicator, both in terms of availability and access. It is also observed that the Government Support indicator is the lowest of all the analyzed indicators. The management capacity is the most relevant, followed by the capacity of the inhabitants to provide their own inputs and maintain activities in their agro-ecosystems, including the backyard.

Table 5. Value of the indicators obtained from the analysis of the variables.

Indicators.	Value of indicator:
Soil	4.938
Biodiversity	5.917
Water	4.083
Economic efficiency	5.250
Input independence	6.500
Alternative technologies	5.571
Economic resources	5.700
Quality of life	4.500
Management capacity	8.438
Government support	3.667
General Sustainability Index	**0.546**

The general index of sustainability obtained is 0.54 which shows that the sustainable development of the study community ranges between 0.4 and 0.6 and indicates that it is an unstable system and is located far below even the goals proposed in the Millennium Development Goals by Mexican public institutions. These results are very similar to what was found by Gravina and Leyva (2012) in Bolivia who reported an IGS of 0.52 and an ADI of 0.37 in their study carried out at the cooperative San Jerónimo R.L. concluding that they are values very far from the sustainability of the agro-system studied.

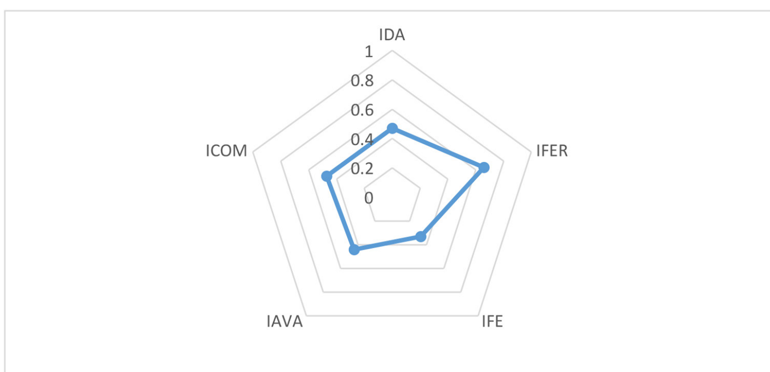
Agrobiodiversity Index (IDA). To calculate the ADI, 11 variables were applied in four sub-indices (IFER, IFE, IVA, ICOM), as described in Table 2. The results obtained from the application of the formula were as follows:

$$IDA = S1IFER + S2IFE + S3IAVA + S4ICOM / St$$
$$IDA = 0.66+0.33+0.44+0.47/4$$
$$IDA = 0.47$$

From these results it can be seen that the sub-index IFE is the lowest value which corresponds to that of biodiversity for animal feed, which suggests that the community does not have sufficient levels of legume plants or grasses and weeds to feed the animals, while the indicator with the best results is the IFER corresponding to biodiversity for human consumption, which indicates the community's concern to obtain the necessary provisions to cover the their families' needs, and the ICOM index is also kept low, although they receive complementary resources in the form of support from public institutions (welfare programs of government) and ecclesiastical.

The general index obtained is 0.47, which is below 0.7, which is the minimum necessary to be considered efficient (Image 2), in other words, agro-biodiversity is very limited and explains why the soils are not sufficiently productive to provide for the population and the animals, and the forests are not enough to shelter a greater fauna that controls pests and better face the climatic and economic uncertainties.

Image 2. Values of the IDA and the subscripts that determine it.



Agro-cultural activities

According to the observed results we can say that the community has a great agro-cultural wealth that is manifested in its diverse rituals and of which some very ancestral ones stand out, such as the ritual of the beginning of the sowing cycle (Table 6). However, due to the results obtained in the IGS and the IDA, the cultural wealth observed is also in a situation of instability and therefore threatened by its possible extinction if the situation continues to worsen.

Table 6. Cultural activities related to production and biodiversity.

Months of the year	Cultural Activity	Productive Activity	Biodiversity
January		Cleaning of jilote and coffee	Rain and wind
February	Main Ritual in 6 hills, the principal of the community participates with other principals		Leaves fall from the trees. Rain and wind.
March	Ritual in the community	Rosa and grave. Harvest corn and vegetables.	Month of winds and heat. Dry streams. Fruit trees bloom. Mulatto and cedar's leaves grow.
April		Clean for corn planting.	Plenty of butterflies, little ones and beetles.
May	Ritual in hills with tatikes (elderly) and the population	Sowing: corn, beans, squash, banana and cilantro.	Streams are dried. A lot of heat. The leaves fall from the trees.
June		Cleaning of milpa. Squash bloom.	There is little heat. Rain time
July		Flowering corn.	Rain, hail and wind.
August		Harvest of corn.	Wild honey abounds.
September		Harvest of corn and pumpkin. Coffee plantation	Heavy rains
October		Prepare tornamilpa. Coffee harvest starts	Heavy rains
November		Sowing of tornamilpa without beans (does not grow). Harvesting, pulping and drying of coffee	Heavy rains
December	December 12 Virgin Mary	Clean milpa. Coffee drying	Rain and cold

CONCLUSIONS

Estimating the observed biodiversity of plants, animals and vegetables in which 19 species of fruits and trees are registered, to which four species of animals are added, it is possible to consider them as sources of protein and energy for human and animal food as well as those of greater economic importance for the inhabitants of the place, although it is also recognized that it is a very limited contribution for the sustenance of the families that live in Golonchán Nuevo fracción dosand it is even one of the central problems diagnosed in the Vester matrix.

The more detailed assessment of the IGS indicators shows that the most harmful sum is precisely the one that refers to the available resources such as soil and water as well as the quality of life and whose effect has a strong negative impact on the General Index of Sustainability. In the same way, it happens with the IDA in which the greatest negative effect is shown in the indexes that refer to human food and complementary resources, even though in the latter, support is received from other communities, such as the ecclesiastical one or from government institutions with their assistance programs do not substantially improve this index.

Therefore, considering the result for IGS of 0.54 and for the ADI of 0.47 and adding the diagnosed problems we can conclude that the fundamental premise of sustainability that the quote says "...satisfy the present needs without compromising the resources for future generations..." this community is below what is desired to talk about a sustainable community and even the agro-cultural wealth observed is also in a situation of instability and threat, in other words, it is possible that the community is consuming the resources at a faster rate than what it is conserving for future generations, so it is not possible to speak of a community that develops sustainably; so it is necessary and urgent to develop strategies that lay the foundations for a promising future of wellbeing and sustainability, considering as priority the indexes that show the least development.

On the other hand, in relation to the purpose of this study, which is to contribute to a reliable, timely and accurate methodology for the analysis of sustainability levels at the community level, it is concluded that the application of this methodology at a community scale is timely and can provide reliable data for studies on levels of sustainability at a scale of analysis of rural and indigenous communities as the ways of approaching and analyzing the results (Participatory diagnosis, prioritization of problems with the Vester matrix, analysis of agro-cultural activities, IGS and IDA), are able to complement each other and both the indicators and the registry of the problems give a global and at the same time specific view of the situation that the community keeps, they detect which are the strong and weak points that influence the level of sustainability. In addition, the use of the proposed techniques to collect the information allowed interacting with social actors and observing in greater detail the environment or place of research.

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ENVIRONMENTAL ASSESSMENT OF RURAL HOUSING WITH THE eMERGY METHOD

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— *Abstract*—

This paper presents the main characteristics of three types of rural housing (considering its materials and its structural typology), from municipality of Yajalón (Chiapas), and its environmental assessment is carried out, through an emergetic analysis of inputs. A total of 30 field visits were carried out in order to gather the necessary information to carry out this study. In addition to this information, the catalog of construction concepts and maintenance and operation costs were used to obtain, through the eMergy, corresponding emergetic indices and in this way the sustainability of these houses was determined.

Keywords

Environmental assessment; renewable resources; non-renewable resources; energy form; transformity.

The constant current deterioration of the environment forces us to take into account the environmental aspect in almost all the activities that are carried out. And it is in the construction area where more attention must be paid, because this activity is what causes more radical changes in the original environment.

Housing can be erected in the countryside in isolation or integrated to small base settlements; it can also be built in significant population centers. In the first case it is called rural housing, in the second, urban housing.

Rural dwellings tend to be independent, unconnected constructions, or only weakly linked by roads, with a rudimentary grouping arrangement that does not impede an individual equilibrium with the environment. Most of them lack water supply, solid and liquid waste disposal systems, electricity and telephony.

Rural dwellings have energy inputs that can be renewable, non-renewable and flows acquired or imported. These inputs, in turn, affect the environment. Consequently, it is necessary to study the sustainability of these homes, through a methodology capable of integrating environmental, economic and social indicators. Such methodology of environmental evaluation is *eMergy*.

eMergy is the sum of all energy inputs, directly or indirectly, necessary for a process to provide a specific product or service, when the inputs are expressed in the same form or type of energy, usually solar energy.

In the last 30 years, this technique has shown a great capacity to evaluate the sustainability of rural and urban housing. It basically consists in measuring the quality of the different forms of energy that have been used, directly or indirectly, in the transformations necessary to generate a product or service.

Technically, eMergy is defined as the amount of solar energy to produce a product; its unit is the solar *joule* (seJ). Although the energy is conserved according to the first law of thermodynamics, according to the second law, the capacity of the energy to perform a job is exhausted and cannot be reused. By definition, solar eMergy is only conserved in a chain of transformations until the capacity to carry out work of the remaining final energy is exhausted (generally in interactive feedback). This series of transformations make it necessary to go to the concept of *Transformity*, which is the amount of direct or indirect energy required to produce per unit of useful energy (10,000 seJ/J wood, for example). In other words, it is the measure of energy that is required to transform one type of energy into another. Establish the ecological hierarchy in an energy analysis.

Emergetic analyzes include environmental, social and economic variables and indexes are calculated as comparison tools for different systems.

Because the eMergy is able to evaluate the systems' energy flows, in such a way that the environmental and financial aspects of the systems can be compared, in this work an environmental assessment of three types of rural housing is made, through an analysis emergetic by inputs. The amounts of natural resources, of non-natural resources, of materials (or external sources) and of services are calculated. These factors are multiplied by the transformability of each input, to obtain the total eMergy or transformation of the homes under study; finally the emergetic indexes of the dwellings are obtained.

BACKGROUND

Rural areas of developing countries are economically depressed in relation to urban centers. This translates into a migration trend. The patterns of growth, life expectancy and the birth rate cannot be assumed by the economy of the smallholding. The main cause is found in economic factors. The industrial development and with it the demand of labor force, has originated the migration of the rural population as an alternative to the precariousness of the agrarian economy.

In rural areas, the distances between suppliers and consumers are large, so transportation takes more time. Low population densities, in turn, make the conduct of business for retail consumption less efficient. The prices of goods and land (except in rich agricultural areas) tend to be lower, but the cost of construction and transportation is higher.

Frequently, the rural environment depends on the price fluctuations of its products. Economy tends to be seasonal. Infrastructure is relatively poor because investment is less productive in low-density settlements. In addition, rural societies tend to be conservative and traditional, although the development of communications has reduced isolation.

In the studied rural environment (Yajalón, Chiapas) most of the houses are built by means of self-construction, with inadequate materials or little resistant, without attending to a regulation and without technical advice. Normally, these houses lack drinking water networks, sanitary drainage and electric power networks. Its floor is of dirt and overcrowding is common.

These homes are located in a space known as *solar* whose dimensions vary between 1000 and 1500 m². Frequently, this land has a wide variety of fruit, ornamental and aromatic plants which in addition to providing fruits and diverse products for the family provide shade to the inhabitants of the house. It is usual to raise poultry and domestic pigs. It is customary to have them loose on the site, and even inside the house.

It is usual that the building has no windows, or that the windows are closed with wood or cloth. The first houses were made with materials from the region (palm roofs, wood and *bajareque*). However, the palm roofs accumulated many animals and pests that affect the health of the family and had a short duration. They were replaced with galvanized sheet roofs for longer duration and protection from the rain. Little by little, the earth walls were replaced by wood, as it is a material more accessible and easy to work (see Image 1).

Image 1. Typical rural housing in Yajalón (Chiapas), with wooden walls and a sheet roof.

With the entry of support programs for housing improvement, by the government, the indiscriminate use of the concrete block began, without generating an adequate housing model. Thus arose the model prototype called the new millennium model, whose walls and ceilings are all made of galvanized sheet, and are generally the product of surplus donations of sheets that frequently reach communities (see Image 2).

Image 2. Typical rural housing of Yajalón (Chiapas), with concrete block walls and sheet roof.

In many cases the house consists of a single space of 30 to 40 m², in which 1 or 2 beds are located for the whole family, from 7 to 10 people. In other cases there is a division in between, to form 2 rooms, in order to separate the bedrooms of parents and children.

This rural house, presents unfavorable conditions of habitability. The bedrooms lack internal divisions and furniture to accommodate clothes and belongings, there is unhealthiness due to excess humidity and pests of insects and animals. In addition there is no privacy inside, parents and children spaces are mixed.

In general, the kitchen is a space separated from the room, in many cases it is a small, improvised construction, and that it does not have adequate place for its utensils. The floor is of soil and since there are no windows, it does not have lighting or ventilation.

Inside the kitchen, the stove is an important piece. It usually has a wooden base, is open and only uses a metal tripod on which the pots are placed. It is an instrument that spends too much firewood, and also generates a lot of heat and smoke pollution (see Image 3).

Figure 3. Representative stove of a typical rural housing in Yajalón (Chiapas).

Figure 4. Representative latrine of a typical rural housing in Yajalón (Chiapas).

The latrine constitutes a critical point in rural housing (see Image 4). It often lacks an adequate well for waste, and is a source of disease, of mosquitoes and rodents, of odors and dirt. Worst case scenario, the communities do their physical needs in the open air, which constitutes a source of contamination and spread of diseases.

These conditions cause great impacts on the diversity and natural potential of the area, leading to its exploitation and degradation. Therefore, the need for rural development to face these problems is stressed, which not only affect its inhabitants but the whole environment. It is vital, therefore, to improve the environmental and energy performance of rural homes if sustainable development is to be achieved.

Environmental protection has different meanings in rural areas. If it favors the advantages of its inhabitants, it will be favorably received. If it is perceived as a threat to the community by changing agricultural practices, subtracting resources from its economic use or interference with construction or infrastructure development, it will not be favored.

However, as it was already mentioned, many of the rural settlements lack infrastructure, services and equipment systems that provide them with an adequate quality of life. In this sense, it is necessary to measure and assess the quality of life or environmental quality of rural settlements, to improve the physical conditions of the built environment and its inhabitants.

METHODOLOGY

In this work, the environmental accounting methodology called eMergy is used to evaluate the sustainability of three types of rural housing in Chiapas. This is a biophysical method, developed by Odum (1996), and is based on the analysis of energy with memory, in order to carry out in a correct way the accounting of the services provided by ecosystems free of charge. EMergy is thus the sum of all the energy of a form, necessary to develop a flow of energy in another way, in a given period of time. This tool is used to compare the work of nature with that of humans on a fair and equitable basis. It has the capacity to represent, at the same time, the contributions of nature and economy in a single unit and criterion, providing a diagnosis of comparative evaluation, among the different results of environmental performance over time (Guarnetti *et al*, 2006).

The eMergy analysis is designed to evaluate the systems' energy and material flows in common units (joule solar, seJ) that allow the analyst to compare environmental and financial aspects of the systems (Guillén Trujillo, 1998).

Three different energy inputs are recognized: renewable locals, non-renewable locals and flows acquired or imported. Thanks to the division of the energy inputs of the community in these terms, it is possible to make several very enlightening calculations: the environmental load rate of the population, its rate of energy efficiency and, what is more important, and its sustainability index. In the emergetic analyzes, environmental, social and economic variables are included and indexes are calculated as comparison tools for different systems. In this work, emergetic and financial indexes are calculated to determine the sustainability in the construction of the proposed homes.

The following characteristic activities of an emergetic study were carried out:

1. Definition of the space-temporal limits of the system investigated.
2. Data gathering in the field, for each dwelling, with the purpose of determining the physical quantities of renewable, non-renewable resources, materials and services that are part of the system studied.
3. Modeling of the system, by flow charts about matter and energy, using the energy symbology (Odum, 1994), of the interaction between the external and internal sources of the system, and the natural and anthropic productive systems, as well as the outflows of the system and the feedback of it.
4. Simplification of the models to capture the main inputs and outputs to the system, as well as other flows that explain the internal operation of it. The system's main flows were considered: R (renewable eMergy flow), N (local non-renewable eMergy flow), M (materials and tools), S (services and labor) and Y (eMergy used by the system).
5. Construction of a table with the main flows of eMergy.
6. Calculation of emergetic indexes.

Since this study analyzes the sustainability of three houses, with common characteristics, three separate phases were evaluated: construction, maintenance and operation. For the construction phase, the volumes of work were calculated and the analysis of unit prices was carried out. This allows to quantify the materials used in the construction of each house.

Regarding the maintenance and operation stages, the database was integrated through 30 field surveys carried out among the inhabitants of Arroyo Carrizal, municipality of Yajalón (Chiapas). These surveys gathered information on the homes' physical and economic conditions, as well as data on the operation and maintenance costs (Cruz Vázquez, 2015).

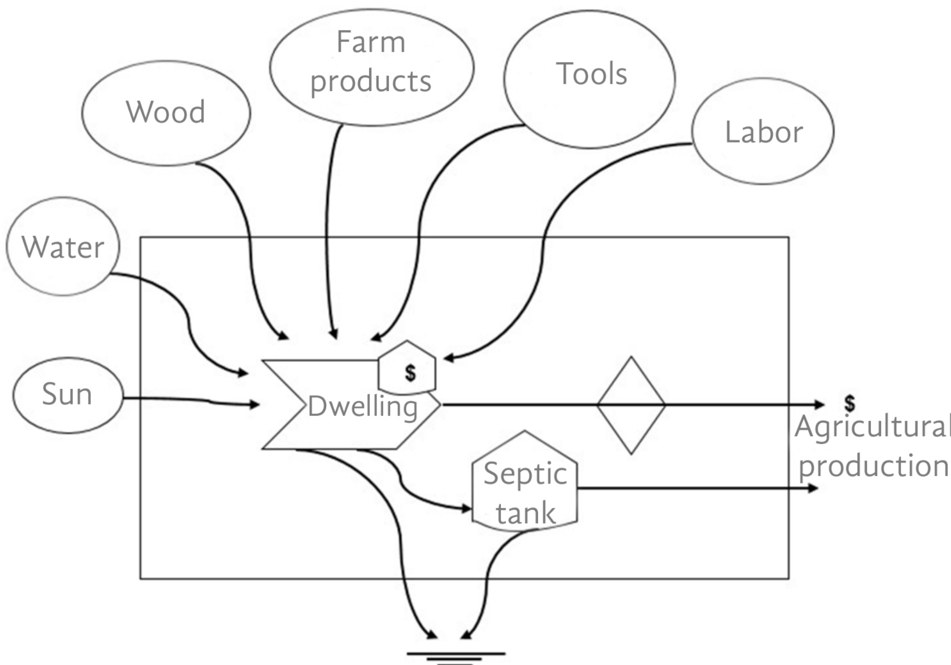
The environmental assessment of the houses was made considering the environmental setting in which they are located, the main resources and building materials. Natural resources, non-natural resources and external sources were identified, and their transformation was used.

The latter, the transformability, is the amount of eMergy introduced to the system per unit of useful energy generated. For example, if 10000 solar emjoules are required to generate a joule of wood, then the solar transformation of the wood will be 10,000 solar emjoules per joule (seJ/J, in its abbreviated form). By definition, the transformability of sunlight absorbed by the Earth is 1.0.

The quantities of each of the resources were quantified and finally, these quantities were multiplied by the transformation to obtain solar eMergy.

The modeling of the system, considering the flow of matter and energy, for the dwellings studied, is summarized in Image 5. This diagram shows the sources external to the system (sun, rain, labor, etc.), the interaction of the dwelling with these external sources, the interaction between what the system produces and the economy, and the unusable output of the system.

Image 5. Rural housing energy flow chart.



RESULTS AND DISCUSSION

The lot where the rural house 1 is located, has a total area of 476 m², consists of two independent buildings. One building serves as a kitchen and dining room, and another is used as a bedroom. Both buildings have rammed earth floor, walls and doors of pine wood of the region and metal sheet roof. There is also a bathroom on the outside, without a storage tank, concrete block walls, blacksmith's door and sheet metal roof and a septic tank where all the waste from the bathroom is received. In Image 6, rural housing 1 is shown.

The land where the rural house 2, has a total area of 688 m², is made up of two independent buildings. One of them works as a room, with walls of pine planks of the region, doors and windows of the same material as the walls, metal sheet roof and concrete floor. The other building is used as a kitchen, consists of walls and door of pine planks of the region, rammed earth floor, and metal sheet roof. The bathroom is located on the outside, without storage tank, has concrete block walls, metal sheet roof and is connected to a septic tank. In Image 7, rural housing 2 is shown.

TImage 6. Rural housing 1

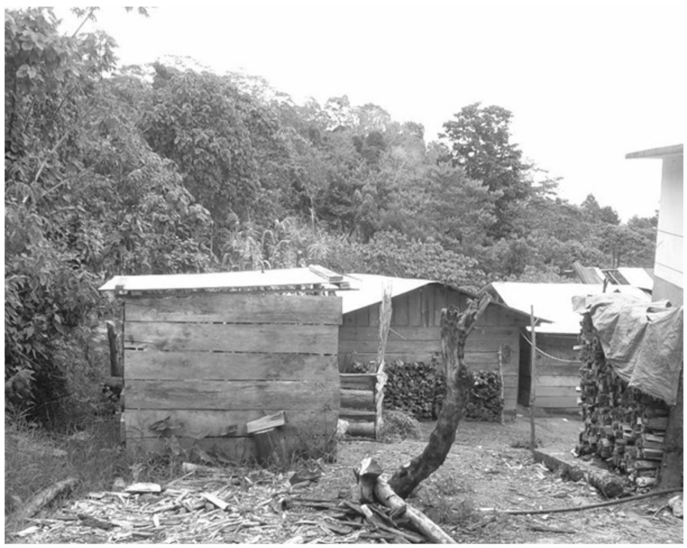
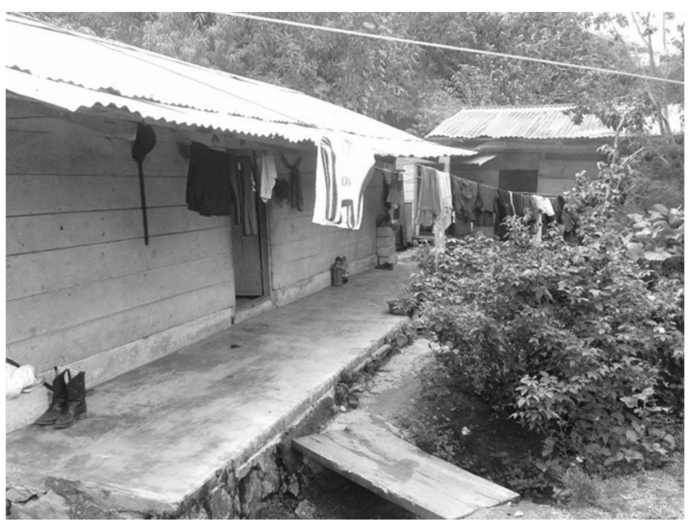


Image 7. Rural housing 2



The land where the rural housing 3 is, has 967 m^2 of total area, has two independent buildings and an isolated bathroom. One of the buildings is used as a room, with concrete block walls, doors and windows made of pine planks from the region, metal sheet roof and rammed earth floor. The other building is the kitchen, of walls and door of pine boards of the region, rammed earth floor and roof of metallic plate. The bathroom has no storage tank, it is connected to a septic tank, and it has concrete block walls, a blacksmith's door and a metallic sheet roof. Image 8 shows rural housing 3.

Image 8. Rural housing 3

Based on Image 5 and the quantification of the materials used in each rural house, for their construction, operation and maintenance, Tables 1, 2 and 3 were obtained. In these, the information is classified in the following sections: renewable resources, non-renewable resources, external material resources, tool and maintenance and operation.

The solar radiation that occurs during the construction, operation and maintenance processes was evaluated. The following were also considered: soil erosion (accepting that this is the loss of organic matter equivalent to the volume of excavation, approximately 3% of the volume of 1 m^3), fuels, machinery, minor tool and labor (calories of human metabolism by hour per Joules per calories per hours of labor worked). The detailed calculation of the Raw Units column appears in the work of Vázquez Díaz (2016), from this same reference the data from the Transformity column was taken. In Tables

1, 2 and 3 the data of the RawUnits column is multiplied by the data of the Transformity column and the Solar eMergy is obtained in the last column.

For rural housing 1, it can be observed, in Table 1, that 45% of eMergy comes from wood energy, a renewable resource and that 39% comes from concrete, a non-renewable resource.

For rural housing 2 it can be seen, in Table 2, that 31% of eMergy is derived from wood energy, a renewable resource and that 58% comes from concrete, a non-renewable resource.

Finally, for rural housing 3 it is concluded, in Table 3, that 48% of the eMergy comes from the concrete's energy, a non-renewable resource, that 21% is derived from the concrete block and that 6% results from the wood, a renewable resource.

Table 1. Environmental assessment of rural housing 1

Note	**Concept**	**Raw Units** (unit/viv.)		**Transformity** (seJ/unity)	**Solar eMergy** (seJ/viv,)
Renewable resources					
1	Solar energy	3.09E+11	J	1.00E+00	3.09E+11
2	Wood	3.85E+10	J	6.79E+08	2.61E+19
Non- renewable resources					
3	Soil	1.28E+10	J	7.37E+04	9.42E+14
4	Steel	3.44E+05	g	3.16E+09	1.09E+15
5	Concrete	1.26E+07	g	1.81E+12	2.27E+19
6	Mortar	4.61E+05	g	3.31E+12	1.53E+18
Materials					
7	PVC	3.92E+04	g	9.86E+12	3.86E+17
8	Copper	2.08E+04	g	3.36E+09	7.00E+13
9	Galvanized sheet	3.56E+05	g	3.16E+09	1.13E+15
10	Block	2.17E+06	g	3.68E+12	7.99E+18
11	Diesel	2.22E+09	J	6.60E+04	1.46E+14
12	Minor tool	2.18E+02	g	6.70E+09	1.46E+12
Services					
13	Labor	3.87E+08	J	4.77E+06	1.85E+15
	Total eMergy for the construction of housing =				5.87E+19
Maintenance					
14	Wood	3.45E+09	J	6.79E+08	2.34E+18
15	Sheet	3.59E+04	g	3.16E+09	1.13E+14
16	PVC	2.46E+03	g	9.86E+12	2.43E+16

	Total eMergy for the housing's maintenance =				2.37E+18
Operation					
17	Solar energy	2.68+12	J	1.00E+00	2.68E+12
18	Electricity	1.84E+09	J	1.74E+05	3.19E+14
19	Firewood	5.88E+03	J	1.87E+04	1.10E+08
20	Drinking water	1.08E+09	J	3.76E+06	4.07E+15
21	Other services	7.39E+02	$	4.59E+13	3.39E+16
	Total eMergy for the operation of housing =				3.83E+16
	Total eMergía for construction, operation and maintenance				**6.12E+19**

Table 2. Environmental assessment of rural housing 2

Note	**Concept**	**Raw Units** (unit/viv.)		**Transformity** (seJ/unidad)	**Solar eMergy** (seJ/viv,)
Renewable resources					
1	Solar energy	5.10E+11	J	1.00E+00	5.10E+11
2	Wood	3.91E+10	J	6.79E+08	2.65E+19
Non- renewable resources					
3	Soil	1.28E+10	J	7.37E+04	9.42E+14
4	Steel	4.00E+05	g	3.16E+09	1.26E+15
5	Concrete	2.79E+07	g	1.81E+12	5.05E+19
6	Mortar	4.61E+05	g	3.31E+12	1.53E+18
Materials					
7	PVC	2.61E+04	g	9.86E+12	2.57E+17
8	Copper	2.16E+04	g	3.36E+09	7.27E+13
9	Galvanized sheet	3.27E+05	g	3.16E+09	1.03E+15
10	Block	2.17E+06	g	3.68E+12	7.99E+18
11	Diesel	2.41E+09	J	6.60E+04	1.59E+14
12	Minor tool	2.18E+02	g	6.70E+09	1.46E+12
Services					
13	Labor	3.13E+08	J	4.77E+06	1.49E+15
	Total eMergy for the construction of housing =				8.68E+19
Maintenance					
14	Wood	3.91E+09	J	6.79E+08	2.65E+18
15	Sheet	3.27E+04	g	3.16E+09	1.03E+14
16	PVC	2.61E+03	g	9.86E+12	2.57E+16
	Total eMergy for the housing's maintenance =				2.68E+18
Operation					
17	Solar energy	3.88E+12	J	1.00E+00	3.88E+12
18	Electricity	1.84E+09	J	1.74E+05	3.19E+14
19	Firewood	9.81E+03	J	1.87E+04	1.83E+08
20	Drinking water	1.62E+09	J	3.76E+06	6.10E+15

21	Other services	7.94E+02	$	4.59E+13	3.64E+16
	Total eMergy for the operation of housing =				4.29E+16
	Total eMergía for construction, operation and maintenance				**8.95E+19**

Table 3. Environmental assessment of rural housing 3

Note	**Concept**	**Raw Units** (unit/viv.)		**Transformity** (seJ/unity)	**Solar eMergy** (seJ/viv,)
Renewable resources					
1	Solar energy	7.76E+11	J	1.00E+00	7.76E+11
2	Wood	2.58E+10	J	6.79E+08	1.75E+19
Non- renewable resources					
3	Soil	1.33E+10	J	7.37E+04	9.80E+14
4	Steel	3.99E+05	g	3.16E+09	1.26E+15
5	Concrete	2.42E+07	g	1.81E+12	4.37E+19
6	Mortar	1.29E+06	g	3.31E+12	4.28E+18
Materials					
7	PVC	3.92E+04	g	9.86E+12	3.86E+17
8	Copper	2.08E+04	g	3.36E+09	7.00E+13
9	Galvanized sheet	3.99E+05	g	3.16E+09	1.26E+12
10	Block	6.01E+06	g	3.68E+12	2.21E+19
11	Diesel	2.41E+09	J	6.60E+04	1.59E+14
12	Minor tool	2.18E+02	g	6.70E+09	1.46E+12
Services					
13	Labor	4.63E+08	J	4.77E+06	2.21E+15
	Total eMergy for the construction of housing =				8.81E+19
Maintenance					
14	Wood				1.75E+18
15	Galvanized sheet				1.26E+14
16	PVC				3.86E+16
	Total eMergy for the housing's maintenance =				1.79E+18
Operation					
17	Solar energy				5.45E+12
18	Electricity				2.41E+14
19	Firewood				1.00E+08
20	Drinking water				3.05E+15
21	Other services				4.39E+16
	Total eMergy for the operation of housing =				4.64E+16
	Total eMergía for construction, operation and maintenance				**8.99E+19**

Once the eMergy for each dwelling was calculated, by construction, operation and maintenance, the emergetic indexes were obtained by construction, according to Table 1 and the flow chart of Image 5. For rural dwelling 1, the emergetic flows of Table 4 were obtained.

Table 4. Emergetic flows by construction of rural housing 1

Symbol	Emergetic flows	Quantity	Unit
R	Renewable resources	2.61E+19	seJ
N	Non-renewable resources	2.42E+19	seJ
M	Materials and tools	8.38E+18	seJ
S	Services and labor	1.85E+15	seJ
Y	eMergy used	5.87E+19	seJ/year

Based on the data in Table 4, the main emergetic indexes for the construction of rural housing 1 were calculated, which appear in Table 5.

Table 5. Main emergetic indexes that are used in the construction of rural housing 1

Emergy Investment Ratio: EIR	(M+S)/(R+N)	1.66E-01
Non-renewable/renewable	(N+M)/R	1.25E+00
Service/free	S/(N+R)	3.66E-05
Service/resources	S/(R+N+M)	3.14E-05
Environmental Loading Ratio: ELR	(N+M+S)/R	1.25E+00
Renewable fraction of the eMergy used	R/U	4.45E-01
Emergy Yield Ratio: EYR	1+(1/EIR)	7.01E+00
Renewable Emergy Captured	R+(M+S)	3.12E+00
Emergy Sustainability Index: ESI	EYR/ELR	5.61E+00
Emergetic production cost	U = R+N+M+S	5.87E+19

In a similar way, Tables 6, 7, 8 and 9 were obtained for rural dwellings 2 and 3.

Table 6. Emergetic flows by construction of rural housing 2

Symbol	Emergetic flows	Quantity	Unit
R	Renewable resources	2.65E+19	seJ
N	Non-renewable resources	5.20E+19	seJ
M	Materials and tools	8.25E+18	seJ
S	Services and labor	1.49E+15	seJ
Y	eMergy used	8.68E+19	seJ/year

Table 7. Main emergetic indexes that are used in the construction of rural housing 2

Emergy Investment Ratio: EIR	(M+S)/(R+N)	1.05E-01
Non-renewable/renewable	(N+M)/R	2.27E+00
Service/free	S/(N+R)	1.90E-05
Service/resources	S/(R+N+M)	1.72E-05
Environmental Loading Ratio: ELR	(N+M+S)/R	2.27E+00
Renewable fraction of the eMergy used	R/U	3.06E-01
Emergy Yield Ratio: EYR	1+(1/EIR)	1.05E+01
Renewable Emergy Captured	R+(M+S)	3.22E+00
Emergy Sustainability Index: ESI	EYR/ELR	4.63E+00
Emergetic production cost	U = R+N+M+S	8.68E+19

Table 8. Emergetic flows for the construction of rural housing 3

Symbol	Emergetic flows	Quantity	Unit
R	Renewable resources	1.75E+19	seJ
N	Non-renewable resources	4.80E+19	seJ
M	Materials and tools	2.25E+19	seJ
S	Services and labor	2.21E+15	seJ
Y	eMergy used	8.81E+19	seJ/year

Table 9. Main emergetic indexes used in the construction of rural housing 3

Emergy Investment Ratio: EIR	(M+S)/(R+N)	3.44E-01
Non-renewable/renewable	(N+M)/R	4.03E+00
Service/free	S/(N+R)	3.37E-05
Service/resources	S/(R+N+M)	2.51E-05
Environmental Loading Ratio: ELR	(N+M+S)/R	4.03E+00
Renewable fraction of the eMergy used	R/U	1.99E-01
Emergy Yield Ratio: EYR	1+(1/EIR)	3.91E+00
Renewable Emergy Captured	R+(M+S)	7.78E-01
Emergy Sustainability Index: ESI	EYR/ELR	9.71E-01
Emergetic production cost	U = R+N+M+S	8.81E+19

Based on the data in Table 1, and the flow chart in Image 5, the emergetic flows for maintenance and operation of rural housing 1 were calculated, the results are shown in Table 10.

Table 10. Emergetic flows for maintenance and operation of rural housing 1

Symbol	Emergetic flows	Quantity	Unit
R	Renewable resources	2.34E+18	seJ
N	Non-renewable resources	4.39E+15	seJ
M	Materials and tools	2.44E+16	seJ
S	Services and labor	3.39E+16	seJ
Y	eMergy used	2.40E+18	seJ/year

Based on the data in Table 10, the main emergetic rates for maintenance and operation of rural housing 1 were calculated, which appear in Table 11.

Table 11. Main emergetic indexes that are used in the maintenance and operation of rural housing 1

Emergy Investment Ratio: EIR	(M+S)/(R+N)	2.48E-02
Non-renewable/renewable	(N+M)/R	1.23E-02
Service/free	S/(N+R)	1.45E-02
Service/resources	S/(R+N+M)	1.43E-02
Environmental Loading Ratio: ELR	(N+M+S)/R	2.68E-02
Renewable fraction of the eMergy used	R/U	9.74E-01
Emergy Yield Ratio: EYR	1+(1/EIR)	4.12E+01
Renewable Emergy Captured	R+(M+S)	4.02E+01
Emergy Sustainability Index: ESI	EYR/ELR	1.54E+03
Emergetic production cost	U = R+N+M+S	2.40E+18

In a similar way, Tables 12, 13, 14 and 15 were obtained for rural dwellings 2 and 3.

Table 12. Emergetic flows for maintenance and operation of rural housing 2

Symbol	Emergetic flows	Quantity	Unit
R	Renewable resources	2.65E+18	seJ
N	Non-renewable resources	6.42E+15	seJ
M	Materials and tools	2.58E+16	seJ
S	Services and labor	3.64E+16	seJ
Y	eMergy used	2.72E+18	seJ/year

Table 13. Main emergetic indexes that are used in the maintenance and operation of rural housing 2

Emergy Investment Ratio: EIR	(M+S)/(R+N)	2.34E-02
Non-renewable/renewable	(N+M)/R	1.22E-02
Service/free	S/(N+R)	1.37E-02

Service/resources	S/(R+N+M)	1.36E-02
Environmental Loading Ratio: ELR	(N+M+S)/R	2.59E-02
Renewable fraction of the eMergy used	R/U	9.75E-01
Emergy Yield Ratio: EYR	1+(1/EIR)	4.37E+01
Renewable Emergy Captured	R+(M+S)	4.26E+01
Emergy Sustainability Index: ESI	EYR/ELR	1.69E+03
Emergetic production cost	U = R+N+M+S	2.72E+18

Table 14. Emergetic flows for maintenance and operation of rural housing 3

Symbol	Emergetic flows	Quantity	Unit
R	Renewable resources	1.75E+18	seJ
N	Non-renewable resources	3.29E+15	seJ
M	Materials and tools	3.87E+16	seJ
S	Services and labor	4.31E+16	seJ
Y	eMergy used	1.84E+18	seJ/year

Table 15. Main emergetic indexes that are used in the maintenance and operation of rural housing 3

Emergy Investment Ratio: EIR	(M+S)/(R+N)	4.67E-02
Non-renewable/renewable	(N+M)/R	2.40E-02
Service/free	S/(N+R)	2.46E-02
Service/resources	S/(R+N+M)	2.41E-02
Environmental Loading Ratio: ELR	(N+M+S)/R	4.86E-02
Renewable fraction of the eMergy used	R/U	9.54E-01
Emergy Yield Ratio: EYR	1+(1/EIR)	2.24E+01
Renewable Emergy Captured	R+(M+S)	2.14E+01
Emergy Sustainability Index: ESI	EYR/ELR	4.61E+02
Emergetic production cost	U = R+N+M+S	1.84E+18

The above results are summarized, for comparison purposes, in Tables 16 and 17, for the 3 rural dwellings.

Table 16. Emergetic indexes for construction of the 3 rural dwellings

Indexes		Rural housing 1	Rural housing 2	Rural housing 3
Emergetic production cost	U=R+N+M+S	5.87E+19	8.68E+19	8.81E+19
Renewable fraction of the eMergy used	R/U	0.445	0.306	0.199
Emergy Investment Ratio: EIR	(M+S)/(R+N)	0.166	0.105	0.344

Emergy Yield Ratio: EYR	1+(1/EIR)	7.010	10.522	3.911
Environmental Loading Ratio: ELR	(N+M+S)/R	1.249	2.272	4.029
Renewable eMergy Captured	R/(M+S)	3.117	3.216	0.778
Emergy Sustainability Index: ESI	EYR/ELR	5.612	4.631	0.971

Emergetic indexes allow us to establish the environmental status of the studied system, based on these indicators, the system can be analyzed and diagnosed, and with this, decisions can be made in environmental management and public policy direction in planning. For the present evaluation, the eMergy Investment Ratio (EIR), the EMergy Yield Ratio (EYR), the Environmental Loading Ratio (ELR) and the EMergy Sustainability Index (ESI) were considered.

The EIR index (or investment ratio), indicates the investment made by the company involved in the production chain to produce a good, in relation to the contribution of nature. It results from dividing the solar eMergy taken from outside the system, between the solar eMergy supplied by renewable and non-renewable sources within the system. This quotient can be interpreted as an external (inverted) eMergy rate, with respect to resident eMergy. It is a dimensionless number, the higher it is, the greater the amount of eMergy acquired, per unit of resident eMergy (high values of EIR indicate a high contribution of external eMergy). Small values of EIR show a relative small load on the base ecosystems, this indicates that they are using their own environmental resources, to a greater extent than the average, so there could be local availability to stimulate investment and additional economic use.

When observing the results of Table 16, it is noted that, in terms of construction, rural housing 2 is the most competitive, since for each unit of natural resources used (with no financial cost), it needs to invest a smaller volume of economy resources.

The Emergy Yield Ratio (EYR), results from dividing the total eMergy used by the system among the eMergy of the economy inputs. It is a measure of the primary energy gain available for use by society, that is, measures the potential contribution of a process to the whole system due to the exploitation of local resources. From table 16 it can be inferred that, as far as construction is concerned, rural housing 2 is more efficient, since it uses natural resources and resources from the economy. In other words, it is capable of providing primary energy for society.

The Environmental Loading Ratio (ELR) is a measure of the environmental impact or burden that a particular development activity can have on the environment (Guillén Trujillo, 1998). This index results from the sum of the acquired eMergy (M and S) and the nonrenewable resident eMergy (N), among the renewable resident eMergy (R). It can be used as an indicator of the appropriate level of the alternatives development to carry out a project. The majority of the productive processes of humanity include the interaction between non-renewable resources with renewable resources of the environment. Low Environmental Loading Ratio (ELR) indicates small loads at the base of the ecosystem support; high ELR indices reflect a greater potential impact. The results of Table 16 indicate that, regarding to construction, rural housing 1 is the one that causes the least impact on the environment.

The Emergy Sustainability Index (ESI) results from dividing the eMergy Emergy Yield Ratio (EYR) between the Environmental Loading Ratio (ELR). Quantify and numerically classify the environmental performance of a country's policies, and it is an effective extent to measure the long-term sustainability perspectives of the environment and the capacity to face the challenges of the future. ESI values below 1.00 are characteristic of systems that consume resources and are associated with highly developed and consumption-oriented economies. According to Table 16, rural housing 1, in terms of construction, is the one with the least environmental impact, since it contributes to the release of resources available for use by the economic sector, without affecting the balance of the environment.

Table 17. Emergetic indexes for maintenance and operation of the 3 rural dwellings

Indexes		Rural housing 1	Rural housing 2	Rural housing 3
Emergetic production cost	U=R+N+M+S	2.40E+18	2.72E+18	1.84E+18
Renewable fraction of the eMergy used	R/U	0.970	0.970	0.950
Emergy Investment Ratio: EIR	(M+S)/ (R+N)	0.020	0.020	0.050
Emergy Yield Ratio: EYR	1+(1/EIR)	41.240	43.700	22.420
Environmental Loading Ratio: ELR	(N+M+S)/R	0.030	0.030	0.050
Renewable eMergy Captured	R/(M+S)	40. 170	42.600	21.380
Emergy Sustainability Index: ESI	EYR/ELR	1540.610	1687.520	461.010

When observing Table 17 results, it is noted that for the EIR index, in terms of maintenance and operation, rural dwellings 1 and 2 are the most competitive, since for each unit of natural resources used (without financial cost), they need to invest a smaller volume of resources in the economy.

From this same table it is inferred that for the EYR index, in regards to maintenance and operation, rural housing 2 is more efficient, since it uses natural resources and resources from the economy in its processes. In other words, it is capable of providing primary energy for society.

The Environmental Loading Ratio, in Table 17, indicates that regarding maintenance and operation, rural housing 3 has a moderate impact and rural housing 1 and 2 have the least impact on the environment.

In this same table, the sustainability index of rural housing 2, in terms of maintenance and operation, shows that this building has less environmental impact, because it contributes to the release of resources available for use by the economic sector, without affecting the balance of the environment.

CONCLUSIONS

Housing construction involves processes, which require materials and energy inputs in different ways, and has a great impact on the environment through the use of non-renewable resources and the overexploitation of energy. In this work, an eMergy analysis was carried out on three rural dwellings, considering three separate phases: construction, maintenance and operation; this makes it possible to have a measure of the environmental impact of these homes in their environment.

This method is useful for identifying the inputs that contribute most to non-renewable energy imports. The importation of resources gives an idea of a lack of economic sustainability, while the fact that it is not renewable suggests a future shortage due to a dependence on the actual availability of resources on land.

The results show that, in general, rural dwellings are sustainable, that is, they take advantage of natural conditions to reduce energy needs as much as possible. As a result, the wear and tear of nature is less and the houses are able to maintain themselves economically, socially and ecologically.

Rural housing 2 showed advantages in the construction phase, in terms of Emergy Investment Ratio (EIR), and Emergy Yield Ratio (EYR). This indicates that such housing has a small relative burden on the base ecosystems and that it offers a net benefit to the global economy.

For this same phase, rural housing 1 presented good results in terms of the Environmental Loading Ratio (ELR) and the Emergy Sustainability Index (ESI), from which it is inferred that this house causes little environmental stress in the system and that they have a high level of sustainability in environmental terms.

The evaluation for the maintenance and construction stages indicates that rural dwellings 1 and 2 have a better Emergy Investment Ratio (EIR) than rural dwelling 3. The latter stresses the environment less (due to its Environmental Loading Ratio, ELR), than the other two homes. Finally, rural housing 2 also showed a good Sustainability Index (ESI), higher than that of rural dwellings 1 and 3.

In general, the results of rural housing 2 indicate that it is sufficient to cover the needs of its inhabitants and that its maintenance is not expensive.

Additionally, the results obtained here provide a basis for future evaluations in the construction industry. Different typologies, technologies and materials can be compared and contrasted, considering different manufacturing processes, as well as maintenance and operation (durability of a material, thermal efficiency and energy consumption during its useful life). These comparisons can be made objectively using the eMergy indices as shown here.

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THE ACCOMPANYING PROCESS OF UNDOCUMENTED IMMIGRATION BY TRANSIT

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— Abstract—

Mexico in the early decades of this century is going through a new migratory paradigm; the most outstanding is the change in relation to their migratory patterns, from being the traditional country of expulsion to become a country of transit of undocumented migrations. Documentation on the accompaniment process towards immigrant persons will be carried out within a network of civil society organizations; secular and confessional, installed on the route of undocumented immigration, that have been proposed to promote assistance in joint strategies to address violations of the human rights of these migrants. One of the keys of the accompaniment is to attenuate the huge emptiness of power on the part of governmental institutions through the practice of humanitarian service. The accompaniment throws increasingly clear signs that is starting to prevail a community perspective of certain groups of civil society and faith-based volunteer groups towards the undocumented immigrant in transit, who through their support strategies are in the process of transforming its own role making it more active.

Keywords

Accompanying; undocumented immigration; transit countries; humans rights; migration policies; empowerment.

Mexico in the first decades of this century undergoes a change in relation to their migration patterns; the most outstanding thing is to go from being the traditional expulsion country to becoming a transit country for undocumented migrations. Until now, human rights seem to fall short of what was expected when their treatment is raised to these legal areas, however for governments like Mexico's is easier to support them than its application. However, in the last decade Non-Governmental Organizations (NGOs), secular and confessional, have emerged with different foundations and are playing a more active role in the treatment of unauthorized immigration, assuming more pluralistic and flexible views of the migratory reality, accompanying the undocumented immigrant.

The increase of immigrants in an irregular situation demonstrates the inability in the public policies management towards undocumented immigration. It also calls into question the recognition by the Mexican government of having signed international treaties that recognize the human rights of immigrants. In the same way, the classic government hard line falters in terms of the factual policy in the face of the arrival of more immigrants in an irregular situation, above all it denotes the lack of territorial governance existence on the migratory route.

The former as a starting point towards the accompaniment process of undocumented immigration; a process that has been developing by Non-Governmental Organizations in favor of human rights, whether confessional or secular in the last decade. Same that has its origin in a predictable aspect: the failure of public policies towards the migration of border control, which led the government authorities to have focused only on those aspects that regulate the volume and origin of migrant flows.

The process of accompaniment and empowerment on the part of these new actors of the civil, confessional or secular society implies the veracity and honesty of the preponderant role of public institutions in the task of defending the Human Rights of immigrants without documents. It highlights, above all, a real lack of political and social actions in the face of a humanitarian crisis such as that which occurs in these transit countries, which is not explained in the case of Mexico due to the absence of laws or regulations signed in favor of Human Rights, but because of lack of will, systemic corruption and authoritarianism.

Research objectives

Know the factors that enable or hinder the accompaniment process, the models and strategies of empowerment towards the undocumented immigrant, the actions of awareness towards the local community, the degree of solution and orientation to the problems of violation of the human rights presented by the undocumented immigrant and the effects of this accompaniment on the migratory project.

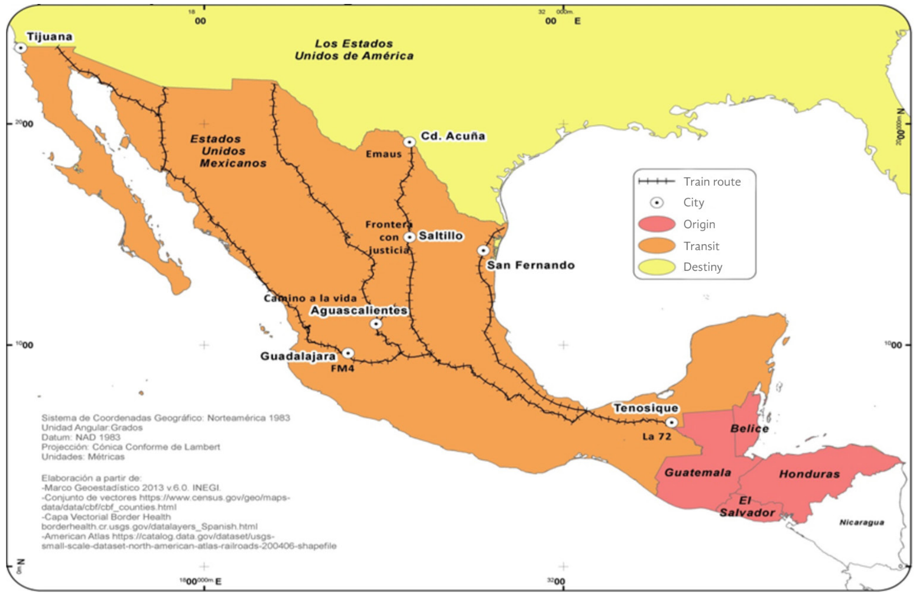
Methodology

The documentation on the process of accompaniment towards immigrants, in a first stage through Mexico, is intended to be carried out within a network of civil organizations; confessional, secular or mixed, installed along the route of undocumented immigration that have proposed to promote assistance strategies together to address the recurrent violations of the human rights of these migrants.

The example aims to strategically cover the most important points of the migratory route, emphasizing the borders of the country, and other points that have a considerable progress in terms of accompaniment. At the moment, there are 62 organizations throughout the Mexican territory that provide some type of service or assistance to the Central American immigrant and the deportee for the sake of accompaniment; dining rooms, shelters and medical assistance points; some with a strong experience and territorial roots, some with great disadvantages to continue working, but can sustain themselves and others with international character that have agreements in Mexico.

The organizations that for the time being are part of the sample and of the field work are; 1) Hostel La 72, Tenosique. Tabasco, 2) Camino a la vida, Aguascalientes, 3) Frontera con Justicia A.C, Casa del Migrante de Saltillo, Coahuila, 4) Casa Emaus, Ciudad Acuña, Coahuila, 5) Justicia en el Camino A.C FM4, Guadalajara, Jalisco. Which are shown below on map 1.

Map 1. Migrant accompaniment



Within fieldwork an important support is the use of tools of anthropology such as participant observation, using the strategy of volunteers in the aforementioned migrant houses, to document common practices of the accompaniment process that allow us to approach the general objective of the research cited above.

In this research, the qualitative approach is mostly used, using the dependent variable as the psychosocial and legal accompaniment, the independent variables such as the immigrant's nationality, gender and age. In all, it includes the application of a series of semi-structured interviews to the different actors involved: the first of them aimed at undocumented and deported immigrants, the second aimed at covering the sample of representatives and volunteers of non-governmental organizations, and a third one with key members of civil society surrounding these immigrant care institutions.

THE CONCEPT OF ACCOMPANIMENT IN UNDOCUMENTED MIGRATIONS

A specific treatment of the term is found in the definition of the Royal Spanish Academy, although these definitions stand out for being subjective and rigorous, however, they represent an adequate precedent to analyze the meaning of a word. In the case of *accompaniment*, the RAE states that it is relative to the action or effect of accompanying or people accompanying someone, -nothing new really- another more profound and adequate mention is the one which indicates that it refers to a support or harmonic help. This support or harmonious assistance in the process of accompanying the most vulnerable groups of people, such as undocumented immigrants, is nothing more than a service of humanitarian assistance and psychosocial and/or legal empowerment. Of special scope that prioritizes the accompaniment on a personal level. As suggested by the practice of humanitarian service, accompaniment is in itself a set of attitudes, principles and values congruent with the immigrant's reality, with hospitality and solidarity being the most prominent.

However, the institutions that provide these accompaniment services; voluntary non-governmental organizations, which come from civil society or religious organizations that are part of various religious groups, try to move beyond the mere provision of assistance services, since in most cases they offer a much-needed company. In general, focusing on the exercise of defense of human rights, for the Church, as pointed out by Pontin (1992), is more in keeping with the doctrines based on faith that prioritize charity over the unprotected. In sum all these actors try to focus their accompaniment process on the needs and concerns of the individual, making them regain dignity and hope for the future, Hanson *et al* (2014).

One of the fundamental keys of the accompaniment towards the undocumented immigrant is to attenuate the enormous power vacuum on the part of the governmental institutions on the territory. Hanson *et al* (2008), points out that an important key for the accompaniment process is truly substantial, is that the groups in charge of implementing it must have strong local bonds with the host communities, that is, to belong to the territory as local key actors, which will provide them with the necessary values of hospitality and solidarity.

Ventura (2008), is another author who mentions that facing accompaniment supposes, first; to understand the interaction between the parties, perceiving the relationship between the actors involved, respecting diversity and at the same time unity, and then when the power to take charge of specific problems becomes more powerful, one can approach the repercussions of the main problems. The International Organization for Migration (IOM, 2014) recommends taking into account certain specific characteristics such as gender perspectives or the life course of ethnic groups, to define the form of accompaniment and avoid generalizations in the understanding of cases.

Enhancing the forms of commitment represented by the accompaniment, means enhancing the ability to move forward, to have the courage to defend what is considered most important; including all these aspects in the accompaniment process means recovering the most fundamental emotional aspects of life. In short, as Ventura (2008) refers, accompanying is also advising, but this could not be done without being supportive on the road, without empowering the immigrant to return control over their destiny and the dignity taken away during the migratory transit.

CASA DEL MIGRANTE DE SALTILLO, THINKING IN A PSYCHOSOCIAL AND CONFESSIONAL KEY

The organizations that are in this humanitarian accompaniment scenario are familiarized in different degrees with the local environment where the displacement of unauthorized immigrants takes place. They know well the people and the needs of the communities where they are installed to generate an adequate perspective that leads to a set of best practices in terms of the governance of migration. But above all, they must have an important and necessary empirical base on the ground. In sum this is what was analyzed during the field experience in the shelters of northern Mexico during the years 2015 and 2016 in the city of Saltillo and Ciudad Acuña.

La Casa del Migrante de Saltillo, "Frontier with Justice AC", received in the period from September 2014 to September 2015, a total of 3,390 immigrants, an average of 209 people per month, around 7 people at average per day. Of the total number of people who have arrived at the shelter in that last year, 2,910 are men and 180 are women, minors number 300. It is striking that the number of minors entering the shelter exceeds that of the women.

Before the tragic war against drug trafficking began in 2007 throughout the country, where a wave of violence against undocumented immigrants would be unleashed, La Casa del Migrante de Saltillo received an average of 300 immigrants from Central America per week. The figure since then has oscillated too much to be regularized at present in a figure that is around 200 people per month.

A singularity of La Casa del Migrante de Saltillo, which results in positive aspects of the accompaniment, is that it walks hand in hand without any problem both in its internal and external functioning with a mixed approach, that is, it has managed to consolidate as much as a confessional organization based on faith and as a lay nonprofit organization. The project financed by the Canada Fund, for example, was applied by the representatives of the shelter in its secular part, which is subscribed under the treatment of the psychosocial approach and the social networks that the hostel has worked with the local society to build the "Social armoring," which father Pedro Pantoja argues, has been for religious work based on faith.

The development of the psychosocial approach practiced in La Casa del Migrante de Saltillo has its origin and foundation in the conceptual elements of other approaches that have been applied in other Latin American societies, especially in Colombia; implemented due to the effects of armed conflicts that have permeated all dimensions of the human and affected the emotional, cognitive and behavioral categories. As well as for the violence exerted against the population that affects human dignity and limits people's life project (IOM, 2014).

In order to understand the application and results of the psychosocial approach, it is necessary to listen to the daily testimonies of those living within la Casa del Migrante, for example, based on the 19 interviews with undocumented immigrants carried out in the months of September and October of 2015; about 90 percent of immigrants who arrive at the shelter carry a strong emotional charge due to violent events that occurred during their transit through Mexico; ranging from assaults with violence, stoning, humiliation, extortion, kidnapping, sexual outrage, mutilation, torture and forced labor. Once the immigrants have lodged and manifest a situation like the previous ones, they are channeled through the moments (arrival, stay and departure) in which the internal work is organized.

A lot has to do with the application of this psychosocial methodology for the shelter if the immigrants stay for more than five days, since in the face of the reluctance of some it is pointless to apply this approach. After this time a new valuation appears, changing the immigrants' primary plan, for example; the new itinerary to where they are going once they leave the shelter, their longer stay in Mexico than originally thought, in some cases becoming permanent or even if they decide to return to their country of origin, some of them by assisted return[1] by turning themselves to the immigration authorities.

Derived from all the previous arguments related to the inner workings of the shelter, we can point out for this first part what is being attempted in La Casa del Migrante de Saltillo is the transformation of this space into a place of coexistence and encounter, and second, that the norms of coexistence

1 Immigrants in an irregular situation in Mexico can opt for assisted return, which does not imply any type of sanction. It is recognized by the Migration Act of 2011; which defines this action as: "the procedure by which the National Institute of Migration (INM) makes it valid to leave the national territory to a foreigner, referring it to their country of origin or habitual residence (Art, 3, LM).

and solidary collaboration based on the psychosocial approach, with their respective compliance, serve as the main internal protection mechanism. Coupled with the "social shielding" of the community, which as noted by Catholic father Pedro Pantoja (2013), it is thanks to local popular movements as new strategic groups that lead in the first instance to a "social subjectivity", that is, a qualitative shock force that creates places of refuge where violence and criminalization of the immigrant can be expelled without the intervention of the security forces.

The work aimed at social awareness of the community is of vital importance. Its relationship with territorial governance[2] towards undocumented migration as a vulnerable group in transit places is an aspect that leads us to the hypothetical understanding of who, at the beginning, hinders the opening and functioning of shelters and immigrant homes, can become at the end in the same ones that make possible its permanence and maintenance, until arriving at the so-called social shield, we speak of the local population that lives in the surroundings of the shelters.

To achieve this popular mobilization through work based on faith and the psychosocial approach is to situate the work of defense towards the undocumented immigrant with the qualitative shock force cited by Father Pedro Pantoja, before the governmental authorities on the one hand and before organized crime on the other, the latter dedicated to the illicit trafficking of immigrants as an alternative since the beginning of the war against drug trafficking. It is at the same time, as Father Pantoja pointed out; form a strategic group of citizen forces to create regions of refuge and try to expel social violence, in order to generate permanent solidarity and respect for minorities without involving the security forces.

For this, it is vital to publicize the work that is done within the shelter and that the different social strata that make up the community, feel intimate and welcome. In short, the active participation of society in the defense of the human rights of immigrants is required, but this could not happen without the social cohesion, which is very necessary in social participation.

2 The conceptual approach of governance with a territorial vision that this research proposes it's found an approach in Farinos (2008), when it mentions that it is a practice-process of organization of multiple relationships that characterize the interactions between diverse actors and interests with a strong presence in the territory. He points out that the result of this organization is the creation of a shared territorial vision, based on the valorization of territorial capital.

Regarding the voluntary decision of the immigrant once he has received the accompaniment, whatever the way in which the transit became a source or destination, it is not a simple situation, these people return with mixed feelings; on the one hand, there is the joy of returning home to be reunited with their family after months of absence and uncertainty, to feel free again, far from arrests, extortion and legal proceedings, as well as police treatment during deportation. But on the other hand it is loaded with a strong discouragement and demotivation, for not having achieved what had been proposed at the beginning, the longed for American dream that ended up becoming a Mexican nightmare.

WHEN TRANSIT BECOMES ORIGIN AND DESTINATION

There are several causes within the accompaniment of undocumented migrations that cause in a certain time that the transit becomes a source and destination. We have pointed out several ties of "belonging" to the place, for example, the social networks that emerge from religious practice as a valuable element to take into account in the integration into the host society. Another is the information about the most basic rights that are offered during the stay in some of the shelters; Casa del Migrante de Saltillo, FM4, Guadalajara y la 72 de Tenosique, in relation to political refuge.

For the recognition of the legal status of the immigrant who has suffered persecution and violence, in Mexico there is little recognition on the part of the institutions, despite the number of asylum seekers, the huge number of potential refugees who travel through this country, continues being to the authorities and to the bulk of society, invisible. A lot has to do with the Mexican Commission for Aid to Refugees (COMAR), which has only 15 protection officers throughout the country. In addition to the budget of this body has not grown for years.

According to figures from the United Nations High Commissioner for Refugees (UNHCR) in September 2014, Mexico hosted 1,837 refugees and another 2,872 were in the process of verification (Asylum Acces, 2015). According to COMAR figures in the same year 2014, 2,137 people applied for the recognition of refugee status and only 33% were accepted, that is, 705 cases. However, these data contrast with the reality raised by the NGOs that accompany and support immigrant refugees for these legal purposes, who estimate that the percentage of people in need of international protection in Mexico corresponds to 15% of the total number of people that travel through Mexico every year. This means a total of 60,000 people (Asylum Acces, 2015) with only 15 protection officers.

Regarding nationalities, according to official data, four out of ten requests come from people from Honduras and El Salvador. These countries dominate the list of asylum requests in Mexico, followed by other Central American countries such as Guatemala and Nicaragua. A fact that could be corroborated during the field work carried out in La Casa del Migrante de Saltillo and the shelter 72 de Tenosique, Tabasco.

In half of the cases, the immigrants who arrive at the Casa del Migrante Saltillo, decide to stay for more than five days that were allowed when they left the house. Out of these people, it can be found the supposed 15% of people with the need for international protection. Once the immigrant has opened to narrate their disagreements in the migratory traffic and after they have been informed about their rights.

Based on the interviews conducted at the Casa del Migrante de Saltillo, in general terms the decision to stay longer occurs due to multiple factors; because they no longer have money to continue the journey, either because they have no more money or because the money has been stolen from them during their journey, being assaulted in most cases by the government authorities themselves, at other times because they are waiting for more economic resources from a family member to keep moving forward, and in some cases due to health problems, and sporadically, due to misinformation, they do not know how to continue their trip.

In most cases, it could be documented that this situation produces effects contrary to what was originally planned. The main one, facing the future, is that during the trip these same discouraging aspects will be presented again. While staying longer, immigrants do not know what to do with their daily lives leading to a situation of despair and in some cases demotivation for when time goes by and fate escapes their hands, involving strong stress effects.

Other situations during a prolonged stay and that are closely related to their imminent but delayed departure from home are; anxiety, distrust, fear of authority, fear of smuggling. This situation is valid for those who have not yet hired a "travel agent" in the figure of the coyote that can accompany them from their countries of origin, especially when whole families travel with the northern border as a point of contact and that some relative from the United States has hired them.

The stay can be extended by the completion of some immigration process, that is, by legal accompaniment, for which la Casa del Migrante de Saltillo has implemented actions in case immigrants present these symptoms of stress; the most important is the "involvement", what the psychosocial area of the shelter called "solidary collaboration". It implies that people have greater responsibilities in the maintenance of the shelter in different tasks such as order and cleaning through "commissions" or "posts", which is nothing else than community work. The same immigrants since their arrival are in charge of cooking, washing their clothes and dishes, cleaning the different areas of the place, answering phones, guarding the entrance and checking the new immigrants who arrive, classifying the donations, supplying the different commissions of the house and of laying their mattress or bed. We could ensure that there is a self-sustainable scheme through solidarity involvement.

Returning to the extended stay and the accompanying work, there is a relevant aspect when immigrants enter a situation of "normality", they move to a new phase of monitoring, follow-up and involvement by the shelter staff. We speak of periods of time ranging from fifteen days to 4 months of stay, being mostly unaccompanied women. When they reach this period of time is when they get inserted in the dynamics of awareness to the local population, with different tasks, for example, distributing donations of clothing and food and taking part in presentations, workshops and meetings related to human rights, both in schools and in private events, such was the case that coincided with our visit, when the rapporteur of the Inter-American Court of Human Rights attended Saltillo on Monday, September 28, 2015, where they met separately with two Honduran immigrants who previously had been kidnapped for three months by the Zetas, a group belonging to organized crime that operates on the migratory transit route.

This extended stay in the shelter, when the transit begins to become a destination, is preceded by this involvement, but at the same time, the immigrants are in a legal action being advised by the legal area with some of the migratory procedures to which they are entitled, in its majority is the humanitarian visa and the least is political asylum. It is worth noting the slowness and bureaucratic structure of these procedures and their cumbersome resolution on the part of COMAR, many of the times negative, it was inferred that this may be one of the fundamental factors that determine a prolonged stay in Mexico.

Even in the extended stays, inside and outside the shelter, there are accompanying actions to support immigrants to make a better stay plan, which basically consists of orientation and information about possible job offers, human rights and the follow-up to legal accompaniment. It was found that in some cases people who decided to stay in Saltillo are accompanied psychologically for adaptation in their new community, demonstrating in the same way that the ties with la Casa del Migrante are still current. We could consider that it is a seed that is germinating for the formation of a small Central American community in Saltillo. On the other hand, when transit becomes the origin, for immigrants who decide to return to their country, there is the possibility of assisted return, which is when they decide to turn themselves in to immigration authorities to return them to their countries (Mexican authorities return them in buses unlike in the United States that many of them are returned in planes, flights of shame, as they are called in Spain). Some others decide to ride again on the shoulders of the beast, the freight train but in the opposite direction, from north to south, in the end it is safer, others will wander one more season through Mexico at risk of transhumance.

For any situation, whatever the way in which the transit became an origin, it could be documented that it is not a simple situation at all, these people return with mixed feelings; on the one hand, there is the joy of returning home to be reunited with their family after months of absence and uncertainty, to feel free again, far from arrests, extortion and legal proceedings, as well as police treatment during deportation. But on the other hand it is loaded with a strong discouragement -despite the accompaniment- for not having achieved what had been proposed at the beginning, the longed for American dream that ended up becoming a Mexican nightmare.

ACCOMPANIMENT TO THE MEXICAN REPATRIATE, CASA EMAUS

In the same state of Coahuila, but farther north, bordering the United States is Ciudad Acuña. In this city there is another process of accompaniment towards migrations, as well as other types of actors involved; accompaniment is provided to Mexican migrants who have been repatriated, captured in their attempt to cross the border, or to those who have ended their period of imprisonment in a jail in the United States, some of the latter for reoffending in their attempt to cross. Humanitarian assistance and accompaniment are given through the word of God, by the Catholic Church in the Casa Emaus, which depends on the Santa María de Guadalupe Parish, located in the neighboring city of Piedras Negras, also on the border.

Ciudad Acuña has a population of 134,233 inhabitants (INEGI, 2010), bordering the city of Del Rio, in the state of Texas, both cities separated by the famous Rio Bravo, Casa Emaus is located only about 100 meters from this river and at the same distance from the international bridge "Puerta de México", where they return the repatriated migrants that even from the shelter can be seen. Acuña is the seat of this shelter at the end of the hospitality route of the Central American transit migrations... or rather, the beginning of the other route of hospitality for the Mexican repatriates.

Emaus means *the way*, as well as analogically this shelter tries to be with the thousands of repatriates that cross Acuña year after year; provide them with a place of rest and refuge in the middle of their transfer, which has not ended despite having entered their country of origin. For many, the ironic migration that is just beginning due to the security strategy of the United States to deport them from west to east of the Mexican physical border, from the desert area to the Rio Bravo region that divides both countries.

In 2015 alone, more than 42,000 repatriates passed through Acuña, which made this city the second most affluent border point, just behind Matamoros, and above other points of greater border importance, such as the cities of Tijuana or Ciudad Juárez. The National Institute of Migration receives them only with a repatriation sheet and some guidance; such as pointing the way to the bus station, the community canteen or the Emaus shelter, but not before crossing an army of itinerant financial speculators who try to change the dollars they carry with them or those who are about to send them.

So far in 2016, from January to March, 413 people have passed through the shelter, which is equivalent to 1,200 people a year, all are males of Mexican nationality, deported from the United States because they do not have documents that support their residence, have an average age of 35 years. They come from most of the interior of Mexico, but highlight the states of Guerrero, Sonora and Sinaloa, the latter two belonging precisely to the desert border region of the northwest of the country.

At the moment, Emaus only provides lodging for three days to the deportees provided they have their repatriation sheet and it is valid for the same day. Other services that the returnees have inside, in addition to dinner and lodging for three nights, is that sometimes they can be given a change of clothes, as some arrive dressed in prison uniform.

In the last decade, Emmaus provided advice and information on legal and labor procedures, such as intermittent assistance from the Federal Government through the National Employment Service to obtain a return ticket to their communities of origin. However, from a wave of violence that erupted in the region[3], the economic pauperization of work sources in the border as the maquila, -which was where some returnees could be employed-, and the constant changes of the administrations within the parish is that the accompaniment project has been shrinking.

The local delegation of the National Institute of Migration (INM) estimates that 85% of the people who enter Acuña, do not stay in the city, most take the first bus they can, the rest stays only a few days, others seek refuge in Casa Emaus, the least unfortunately remain in the streets without any basic attention prone to indigence. There are cases where the returnees decide to try their luck in Acuña, as happened with Oscar, one of the interviewees, who was strengthened in faith through the word of God that he heard every day in the shelter, and took his leave with great hopes of transcending in this city.

In an interview with Father Hermenegildo, director of Santa María Guadalupe parish, he comments on some key points to understand the details of the difficulty of accompaniment in Ciudad Acuña; the fact that this city is the transit of deported migrants, all of them of Mexican nationality; being like the rest of the Mexican "floating" border cities because of the little rootedness of the people that live in this place when they come from other places, the short time of stay inside the shelter of the repatriates, the little faith in the Gospels of some of these people and the network of illegal migrant trafficking immersed in this site.

Violence and social problems ended up turning Acuña into a passing city, into a floating city, as Father Hermenegildo says, together with the fact that in recent years it has been the preferred place for the deportations of migrants by the American authorities. As part of the security strategy of the Border Patrol, returning to Acuña those who were captured in their attempt to cross irregularly on the western side of the border, between the states of Sonora and Arizona, on the desert side, it is even known by everyone that it is the place used to cross-examine drugs using undocumented migrants. For this part, there are clear indications that some returnees, including those temporarily housed in Emaus, have been used to traffic drugs along this route and subsequently repatriated by Acuña, which makes them *burreros*, as they are known here.

3 This wave of violence reached its peak in October 2012 with the death of the ex-governor's son of the state of Coahuila and ex-leader of the PRI at the national level, Humberto Moreira, where Acuña police were involved, the former governor was arrested in January 2016 by the Spanish authorities in agreement with the authorities of the State of Texas for the laundering of euros.

This mechanism of the Border Patrol, *La migra*, is considered by all in Acuña as a cruel and inhuman strategy on the part of the United States government, in addition to having modified the local community organization, reconfiguring the same social fabric and dynamics of this city, condemns the transhumance of many of the returnees who have to travel thousands of kilometers to return to their places of origin or to try to cross the border through the same place where they tried before, many times without money or documents , which makes them "undocumented", exposing them to the illicit trafficking of migrants by organized crime, also putting into predicaments the internal rules of the Emaus house, since often the three days allowed are insufficient to gather the money to return to their homes A long stay in the house allows the recruiters to recruit people inside and outside the place.

As already mentioned, Sonora and Sinaloa, states of the Mexican northwest, are those that employ a significant number of "*burreros*". As observed in the room inside the shelter about 70 percent of those who take refuge in this place are from these states, some belonging to the Yaqui, Navajo and Mayo indigenous groups. Unfortunately, the registers that they have inside the hostel are also "floating" about the place of origin, moreover there is no reliable record of the number of people who have arrived since the foundation, because the different administrations of the shelter have handled different formats or data have been lost in a mysterious way.

This austerity within the hostel is only enough to provide a coffee in the morning and a dinner in the evening. During the day, breakfast and lunch are given by a community canteen aimed at elderly, recently opened by the municipality of Acuña in the face of the massive deportation of conational migrants. Already inside the shelter the attempt of empowerment towards the migrant is made through the word of God, the truth is that some repatriated migrants feel deeply the teachings of the gospel, but others do not. In any way, we must bear in mind that the word is transmitted as understood by Don Miguel, one of those in charge of the shelter, not always sensitive to the question of gender, ethnicity, place of origin or sexual preference.

Occasionally sporadic members of the community, in specific families of Ciudad Acuña, belonging to the Santa María de Guadalupe Parish attend to continue transmitting the word of God and pray in the name of the Lord, with positive results for some returnees. Regarding the prayer Vidal and Martínez (2006) understand that it is the meaningful praxis of the religious being. However, Father Hermenegildo said in the interview that one of the reasons that prevents work in the faith and the transmission of religious values is that several of the migrants are not firm believers, especially when it comes to those who across the border, in the US, were able to introduce themselves for years in the values of the American culture, and to the *burreros* who are usually people without spiritual or confessional growth.

Unlike la Casa del Migrante de Saltillo, in la Casa Emaus there is no, not even remotely speaking, social shielding that Father Pedro Pantoja talked about, on the contrary we can say that there is a "social permeability" in the sense that there is not much control over who enters and leaves the place. There is also no work to raise awareness of the community, using the approach of human rights as other shelters, despite the daily nature of repatriations in the social landscape of Acuña, for the bulk of the local community the migrants are invisible.

There is free and sovereign work of the Santa María de Guadalupe Parish towards the situation of the repatriated migrants, a kind of "religious shielding", since many of the observations of international organizations such as the Red Cross or the United Nations Office on Drugs and Crime (UNODC) or local institutions such as the Secretariat of Health of Coahuila have not been considered, the latter which attended while field work was being carried out and some of its suggestions were not considered. The little help from the religious community is sporadic and the lack of coordination between the religious sector and the municipality of Acuña is notorious.

Therefore we cannot talk about any kind of accompaniment because there is no psychosocial, legal or medical professional assistance, those in charge have no training in any of the areas of accompaniment and had no training in the field of migration, we are talking about a Septuagenarian couple who share their time between the work at the parish and the repatriates, the only link before they were assigned the position to reach Emaus was their closeness to the parish's community.

CONCLUSIONS

One of the fundamental keys of the accompaniment is to mitigate the enormous power vacuum on behalf of governmental institutions through the experience of the humanitarian service, before the community emergency of certain groups of the civil society and of voluntary confessional groups, which have become in an alternate network that assists the undocumented immigrant who little by little is filling the vacuum of power within Mexican territory. Once the State has fully relied on restrictive control policies and has allowed the systematic violation of human rights of this contingent of people. It can be argued hypothetically that this occurs because there is an alternative to the development of free human space mobility in the transit migratory route.

In a broader configuration, the accompaniment seems to show increasingly clear signs or signals that a community projection of certain groups of civil society and voluntary confessional groups towards the undocumented immigrant in transit are beginning to prevail, who through their strategies of accompaniment are in the process of transforming their own role, making it more and more active. But also the role of immigrants themselves in the decision-making and empowerment processes, in terms of formulating solutions.

However there are marked differences within this network, in the northern border for example, in la Casa Emaus there is no social shield that was found in Satillo, there is the free and sovereign work of the Santa María de Guadalupe Parish towards the situation of the repatriated migrants, as we have called it a "religious shield" diametrically opposed to social shielding. Many of the observations of international organizations or local institutions have not been considered. The little help from the religious community is sporadic and the lack of coordination between the religious sector and the municipality of Acuña is notorious.

Therefore, we cannot say that there is any type of professional assistance within the psychosocial, legal or medical accompaniment; those in charge have no training in any of the areas of accompaniment nor in the field of migration. This internal disorganization has caused that the aid to the deportee from the parish is like intermittent, previously there were periods of takeoff but nowadays there is a period of backwardness and disorganization. For Father Hermenegildo this situation does not happen, to him is a part of the "essence" of his administration, he discerns that it is the way in which the religious community can and should help the returnees, even with ample knowledge of the psychosocial approach of la casa del Migrante de Saltillo.

But it must be recognized that, in general terms, it can be argued that by hosting undocumented immigrations, confessional organizations have an advantage over lay organizations in relation to humanitarian work because they generate a greater impact on local society by helping to raise awareness of the immigrant's rights. Confessional, laity or even mixed, shelters have become reference points along the route of immigration in transit. As Vidal and Martínez (2006) point out, they are and can be places of worship for immigrant communities from which opportunities for empowerment and social mobility can be reconstructed and managed.

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LABOR LEGAL PARITY FROM THE PERSPECTIVE OF THE SUSTAINABLE DEVELOPMENT GOALS

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— Abstract—

The Political Constitution of the United States of Mexican (2017), in Articles 1, last paragraph and 4, first paragraph, provides: "Any discrimination based on ethnic or national origin, gender, age, religion, sexual preferences or any other, violates human dignity and aims to nullify or impair the rights and freedoms of individuals" (p.3), "Men and women are equal before the law" (p.8), which implies that all forms of discrimination on the ground in Mexico are prohibited for a gender equality and the existence of legal equality.

In this context, the authorities in the area of competence have taken concrete steps to address human rights issues in the area of legal parity and also to gradually develop a change in public policy which has led to an increase in the budget for creation or strengthening of institutions to the modification of the legal framework based on the observance of human rights.

For its part, the United Nations, which is concerned with achieving a more inclusive world in which all sectors benefit from development, has promoted joint work with governments and civil society through the achievement of the Sustainable Development Goals.

Keywords

Labor legal parity; human rights; Sustainable Development Objectives.

In June 2011, the Political Constitution of the United Mexico States was reformed, incorporating the obligation of the authorities in all areas of dissemination, protection and defense of human rights, in accordance with the Universal Declaration of Human Rights.

In this regard, the General Assembly of the United Nations (UNGA, 2015) approved the agenda for development after 2015, **Transforming our world: the 2030 Agenda for Sustainable Development**, in order to all countries and stakeholders through a revitalized collaborative alliance with the private sector, civil society, the United Nations system and other entities to execute a plan of action in favor of people, the planet and prosperity eradicating poverty in all its forms and dimensions, creating conditions for sustainable, inclusive and sustained growth, shared prosperity and decent work, redirecting the world along the path of sustainability and resilience. These Sustainable Development Goals came into effect on January 1, 2016.

With the Sustainable Development Goals, it is intended to return to the Millennium Development Goals and achieve what it could not be achieved. It also aims to actually make the human rights happen to all people and achieve gender equality and the empowerment of all women and girls. The Objectives and goals are of an integrated and indivisible nature and combine the three dimensions of sustainable development: economic, social and environmental (UNGA, 2015, p.1).

Mexico, as a member of the United Nations, is responsible for compliance. This is how the present work aims to analyze the national regulatory framework on legal parity and labor human rights with its adaptation to international indicators and verify whether or not there is a well-structured public policy.

LABOR LEGAL PARITY AND HUMAN RIGHTS

Gender equity as a tool for mainstreaming constitutes an important advance to build a culture of respect, tolerance and non-discrimination.

The Political Constitution of the United States of Mexico (2017), in articles 1, last paragraph and 4th, first paragraph, states: "All discrimination based on ethnic or national origin, gender, age, religion, sexual preferences or any other that violates human dignity and has the purpose of nullifying or diminishing the rights and liberties of persons is prohibited."(p.3) "Men and women are equal before the law" (p.8). This implies that all forms of discrimination based on gender and the existence of legal equality are prohibited in the Mexican territory.

Hence, in the 2005530 registration isolated thesis issued by the First Chamber of the Supreme Court of Justice of the Nation (SCJN, 2014), it is considered that "The human right to legal equality not only has a formal facet or dimension or of law, but also one of a substantive or de facto nature, which aims to remove and/or reduce social, political, cultural, economic or any other obstacles that prevent certain individuals or social groups from enjoying or exercising in a real and effective way their human rights in conditions of parity with another set of people or social group" (p.647). The parity of treatment constitutes an affirmative action aimed at compensating for the disadvantageous situation in which certain groups have historically been found.

Consequently, the norms related to human rights will be interpreted according not only to the Mexican Political Constitution, but also to international treaties in this matter, favoring at all times the people the widest protection. This is how Mexico has expressed in various documents its commitment to the dissemination, protection and defense of women's human rights and equality of opportunities for gender.

In this regard, the United Nations Development Programme (UNDP) points out that one of the most frequent and silent forms of *violation of human rights is gender-based violence*; the United Nations Report in reference to *Goal 3 Promote gender equality and women's autonomy*, reveals that the positions held by women tend to be of lower rank, lower salary and worse working conditions; women with a good education have advanced and the proportion of women in management positions is increasing, but the majority continue in lower and less valued positions and face greater obstacles to achieve higher positions (United Nations, 2008, p.18).

Consequently, for the sustainability of societies will be necessary to recognize and guarantee the universalization of economic, social and cultural rights, or second generation human rights.

LEGAL PARITY WITHIN THE FRAMEWORK OF INTERNATIONAL AND NATIONAL LABOR LEGISLATION.

Mexico entered as a member of the International Labor Organization (ILO) on September 12, 1931, date from which it has signed international agreements; among them, 111, regarding discrimination.

For the purposes of ILO Convention 111 (1958), the term discrimination implies: "Any distinction, exclusion or preference based on reasons of race, sex, religion, political opinion, national extraction or social origin that has the purpose of nullifying or altering equal opportunities or treatment in employment or occupation" (Article 1).

For the purposes of ILO Convention 111 (1958), the term discrimination implies: "Any distinction, exclusion or preference based on reasons of race, sex, religion, political opinion, national extraction or social origin that has the purpose of nullifying or altering equal opportunities or treatment in employment or occupation" (Article 1).

This is how in the last Mexican labor reform of November 2012, can be found in articles 2, 3, Bis, 47, fraction VIII, 51, fraction II, 56, 132, fraction XXVII and 170 the concept of decent work, the equality of opportunity and treatment, substantive equality, non-discriminatory distinctions, non-discrimination on grounds of sex, marital status, broadens the causes of maternity leave and incorporates adoption reasons, non-labor violence, sexual harassment and harassment labor (LFT, 2013).

Therefore it is important that our labor authorities must resolve to a true known, good faith kept and with appreciation of the facts in conscience, as seen in the Isolated Thesis 2002752 of the SCJN (2013), item:

> **DISMISSAL UNJUSTIFIED BY REASON OF PREGNANCY. IF THE EMPLOYER EXCEPTS AND PRESENTS THE WAIVER OF THE WORKER, IT IS HIS DUTY TO PROVE SUCH EXTREME AND OF THE BOARD'S TO RESOLVE FROM A GENDER PERSPECTIVE, AND TO NOT ONLY CONSIDER WHAT WOULD HURT HER**.- Articles 1 and 11, numeral 2, subparagraph a) of the Convention on the Elimination of All Forms of Discrimination against Women prohibit the dismissal of a woman because of pregnancy, since it is considered a form of discrimination against her, understood as a distinction, exclusion or restriction based on her gender as its object or as a result to undermine or annul the recognition, enjoyment or exercise of human rights and fundamental freedoms... Consequently, when a worker demands an unjustified dismissal because of her pregnancy and the employer is excepted, arguing that she quit her job to dedicate herself to the care of the child, it is up to him to demonstrate such an extreme, and if she offers to do so, the Board must consider it from a perspective of equality (non-discrimination) whether it is credible that a pregnant worker resigns her job, because, otherwise, it does not resolve from a gender equity perspective, that is, considering the claims of a working woman pregnant, since it only considers what is harmful to her (p.1353).

THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT ON LABOR LEGAL PARITY IN MEXICO

The Universal Declaration of Human Rights, the International Treaties on Human Rights and the Millennium Declaration are important documents on which the 2030 Agenda for Sustainable Development was based in order to aspire to a world in which the citizens of each country that integrate enjoy sustained, inclusive and sustainable economic growth, decent work, social development, the eradication of poverty and hunger for all; a world in which the national environment, democracy, good governance and the rule of law are respected in accordance with the favorable international environment (UNGA, 2015, p.4).

The goals of the Sustainable Development Goals that are directly related to the labor legal parity, foreseen in the international instruments and treaties, are:

Goal	Content
4.4	Significantly increase the number of young people and adults who have the necessary skills, particularly technical and professional, to access employment, decent work and entrepreneurship
5.4	Recognize and value unpaid care and domestic work through public services, infrastructures and social protection policies, and promoting shared responsibility in the home and family, as appropriate in each country.
8.5	Achieve full and productive employment and decent work for all women and men, including young people and people with disabilities, as well as equal pay for work of equal value.
8.8	Protect labor rights and promote a safe and risk-free work environment for all workers, including migrant workers, particularly migrant women and people in precarious employment.

In the 2030 Agenda, unanimously, the signatory countries agree that the achievement of the Sustainable Development Goals can only be achieved by respecting the national normative margin and the norms of international law.

In Mexico as well as gradually and progressively, based on the progress of the Millennium Development Goals, continues with the constitutional and regulatory reforms that allow internal regulations to be compatible with the Sustainable Development Goals and the public policies that govern in the matter.

From an analysis of articles 5 and 123 of the Political Constitution of the United States of Mexico, the Political Constitution of the State of Chiapas and the Federal Labor Law, the constitutional and legal reforms made by our Mexican legislative body are observed in order to adapt the regulatory framework for the observance of the Sustainable Development Goals:

Comparative Table

Sustainable Development Goals: Goals	National Normativity
Significantly increase the number of young people and adults who have the necessary skills, particularly technical and professional, to access employment, decent work and entrepreneurship.	**Political Constitution of the United States of Mexico:** **Article 123...** **XIII.** Companies, whatever their activity, will be obliged to provide their workers with training or coaching for the job. The regulatory law will determine the systems, methods and procedures according to which the employers must comply with this obligation. ... **Federal Labor Law:** **3rd Article...** It is in the social interest to promote and monitor training, coaching for and at work, certification of labor competencies, productivity and quality at work, environmental sustainability, as well as the benefits that these should generate both workers and bosses. 39- A, 39-C, 39-D, 39-E. Chapter III BIS. Of Productivity, Workers' Training and Coaching. Articles 153-A to 153-X.
Recognize and value unpaid care and domestic work through public services, infrastructures and social protection policies, and promoting shared responsibility in the home and family, as appropriate in each country.	**Political Constitution of the State of Chiapas** **Article 5**.- In the State of Chiapas it is guaranteed that: **VI**. The work of the woman in the home will be valued economically, so that in case of separation, cessation of concubine or abandonment; women have the right to household goods and to stay in the conjugal home, until their legal situation is resolved.
Achieve full and productive employment and decent work for all women and men, including young people and people with disabilities, as well as equal pay for work of equal value.	**Federal Labor Law:** **2nd Article -** Labor standards tend to achieve a balance between the factors of production and social justice, as well as promoting dignified and decent work in all labor relations. Dignified or decent work is understood as one in which the human dignity of the worker is fully respected; there is no discrimination due to ethnic or national origin, gender, age, disability, social condition, health conditions, religion, migratory status, opinions, sexual preferences or marital status; there is access to social security and a remunerative salary is received; continuous training is received to increase productivity with shared benefits, and optimal safety and hygiene conditions are in place to prevent occupational hazards. Dignified or decent work also includes unrestricted respect for the collective rights of workers, such as freedom of association, autonomy, the right to strike and collective bargaining. ...

Protect labor rights and promote a safe and risk-free work environment for all workers, including migrant workers, particularly migrant women and people in precarious employment.	**Political Constitution of the United States of Mexico:** **Article 123. ...** **XV.** The employer will be obliged to observe, according to the nature of their negotiation, the legal precepts on hygiene and safety in the facilities of their establishment, and to adopt the appropriate measures to prevent accidents in the use of machines, instruments and work materials, as well as to organize it, in such a way that it is the greatest guarantee for the workers' health and life, and the product of conception, in the case of pregnant women. The laws will contain, for that purpose, the sanctions that come in each case. ... **Political Constitution of the State of Chiapas** **4th Article...** **III.** Respect for and protection of the human rights of migrants, including the right to health, labor rights, the right to public safety and the enforcement of justice. ... **Federal Labor Law:** **Article 90.-** Minimum wage is the smallest amount that the worker must receive in cash for the services provided in a work day. The minimum wage must be sufficient to satisfy the normal needs of a head of family in the material, social and cultural order, and to provide for the compulsory education of the children. It is considered of social utility the establishment of institutions and measures that protect the purchasing power of the salary and facilitate the workers' access to comforts.

RESULTS

The Federal Labor Law incorporated in article 2, second paragraph, regarding the international treaties that Mexico has celebrated and the observance of labor human rights, to promote Decent Work in the workplace, reinforcing the need to respect the dignity of workers in workplaces, general non-discriminatory working conditions, optimal safety and hygiene, continuous training for increased productivity, remunerative salary and protection of substantive equality, unrestricted respect for the collective rights of workers, elements that have been constitutionally recognized as human rights.

In this context, the National Development Plan 2013-2018 of the Government of Mexico, in its axis Mexico Prospero, Objective 4.3. Promote employment, Strategies 4.3.1. Strive for a balance between the factors of production to preserve labor peace; 4.3.2. Promote dignify or decent work; 4.3.3. Promote the increase of productivity with shared benefits, employability and on-the-job training; and 4.3.4. To improve the systems and procedures for the protection of workers' rights, foresee as lines of action: promoting actions for the adoption of a dignify or decent work culture; promote respect for human, labor and social security rights; consolidate active training policies for work and during work; promote educational relevance, the generation of skills and employability. (DOF, 2013)

It is this tenor, the Government of the State with the objective of diminishing the gender inequality and promoting equal opportunities between women and men in the exercise of their rights, benefits, obligations and possibilities, inserted in the Chiapas State Development Plan 2013-2018, as a transversal policy and as public policy 2.2.6., to gender equality.

The State Development Plan (2014) also incorporated the strategies of the Agreement for Gender Equality signed on April 18, 2013, prioritizing the conjunction of the three branches of government and the participation of the municipalities and non-governmental organizations in defense of the women's rights through transversality in the planning and budgeting processes of public policies and legislative harmonization with a gender perspective for the economic and social development of women (p.99).

Among the actions carried out in line with these public policies, the State System for Equality between Women and Men was created and the legislative harmonization of the Law of Equality between Women and Men of the State of Chiapas, with the latest reforms of the General Law for Equality between Women and Men, emphasizing the signing of a collaboration agreement with the State Institute of Citizen Participation. (2nd Government Report, 2014, pp.128 -132).

CONCLUSION

The existing inequality and social exclusion reflect the absence of a well-structured public policy on the matter that allows the consideration of legal parity and human rights as a transversal and indispensable axis in the government project, requiring a formal and material institutional evaluation of public policies in accordance with international indicators, in such a way that the achievement of the Sustainable Development Goals will depend not only on the adequacy of the internal normative order to international policies, but also on their well-structured inclusion in public policies, plans and development programs.

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THE PROCESS OF TRANSITION TO ADULTHOOD OF YOUNG MEXICANS WITH MIGRATION EXPERIENCE IN THE UNITED STATES, 2010

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— Abstract—

This study examines the effect of the migratory experience in the United States on the transition to adulthood in five events, the first sexual relation, the first marriage or union, the first live-born child, the leaving school and first job. The National Youth Survey of 2010 (ENJ 2010) is used as the primary information source for its elaboration. The results show that the international migratory experience has a positive effect on the occurrence of the events of entry to the labor market, first sexual relation and leaving the school and negative in the postponement of the first marriage and the first live-born child.

Keywords

Young people; Mexico; Transitions to adulthood; Migration; Maternity; Work.

Migration is an important economic strategy that young men and women use to achieve certain objectives such as access to a well-paid job, the search for economic autonomy, the accumulation of purchasing power, the formation of a family, among others. The importance of the relationship between migration and youth is not limited to the fact that both events take place in the same age group, nor to the structural and cultural situations that drive youth migration, but rather to the effects that the migration experience has on the life course.

The migratory experience could generate contradictory effects in the course of life, by becoming a catalyst to advance or delay some events, so its examination will be of fundamental importance. Then we could ask ourselves: what is the effect of the migratory experience in the first sexual relationship, the first union as a couple, leaving school, the entry into the labor market and the birth of the first child?

The objective of this work is to compare the calendar and the intensity of the events that make up the transition to adulthood such as: the first sexual relationship, the first marriage or union in couple, the first maternity or paternity, leaving school and the first work, among Mexican youth with migratory experience to the United States and non-migrants, to test whether the particular migratory experience has an effect on the behavior of transitional events. The micro data of the National Youth Survey of 2010 (ENJ2010) are used for its preparation.

The research is carried out from the perspective of the life course, which is a fruitful tool to examine the calendar and the intensity of the reproductive and familiar transitional events of the key young migrants in the performance of their adult roles.

The study of the interconnection between migration and the transition to adulthood has been little explored in the international and Mexican literature. Due to the methodological problems that include the lack of adequate or sufficient data, the dependence of cross-sectional surveys (Mussino and Strozza, 2012), the difficulties associated with the application of demographic measures for a mobile population (Parrado, 2011) and the lack of a conceptual framework that defines the basic concepts (Wilson and Sigle-Rushton, 2014), among others.

However, there are a series of studies on the effect of migration on some of the events of the transition, for example with:

- The sexual relationship (Mberu and White, 2011, Anglewicz, Gourvenec, Halldorsdottir, O'kane, Koketso, Gorgens and Kasper, 2013).
- Marriage or union as a couple (Parrado, 1998 and 2004, Jampaklay, 2006, Chattopadhyay, 1999, Kandel and Massey, 2002, Fan and Huang, 1998, Lindstrom and Giorguli, 2007 and Pérez Amador, 2008).
- Maternity and paternity (Parrado, 2011, Wilson and Sigle-Rushton, 2014).

In literature about Mexico, it has been empirically proven that there is a series of social and economic inequalities that have an effect on the acceleration or delay in the occurrence of the events that make up the process of transition to adult life (Echarri and Pérez Amador, 2004 ; Mier and Terán, 2004, Coubès and Zenteno, 2005, Gandini and Castro, 2006, Oliveira, 2006, Mora and Oliveira, 2008, Ávila and Jáuregui, 2014), but few studies have been conducted to determine the effect of migration on the transitional events that are examined in this study (Parrado, 1998 and 2004, Araiza, 2005, Lindstrom and Giorguli, 2007, Pérez Amador, 2008).

METHODOLOGY

The research was conducted with data derived from the exploitation of the ENJ2010 micro-data, which includes a battery of retrospective questions about sexual activity, marriage, fertility, first job and leaving school, from which it can determined the age at the time of sexual initiation, the first marriage or union as a couple, the birth of the first child, the completion of formal education, entry into the labor market and migration.

For the analysis of the occurrence and timing of the transitions of young people from 15 to 29 years old, the age group is divided into two subgroups, the first is called migrants and is referred to those who have migratory experience in the United States, and the second is composed of young people without migratory experience. Both subgroups are identifiable in the ENJ2010.

To analyze the transitions comparing the calendar and the intensity of occurrence, continuous event history analysis were used, a statistical technique that allows the use of fixed variables and over time variables and that does not require assumptions of proportionality (Allison, 1982). The year / person is considered as the unit of analysis, since the responses to the duration of the events are in years, this approximation guarantees the appropriate estimators of the standard errors and the tests of significance (Petersen, 1991).

In particular, life tables were drawn up to compare the intensity and timing of the transitional events of the young people according to their migratory status, the Log-Rank and Wilcoxon tests (Breslow) were also applied to determine if there was a significant difference ($p < 0.05$) between the survival curves (Hosmer, Lemeshow and May, 1999).

RESULTS

The majority of young people with a migratory experience in the United States have already experienced three transitioning-events: entering the labor market, having the first sexual relationship and completing their school instruction. Thus, eight out of ten young migrants had experienced their first sexual relationship and had completed their formal education, and nine out of ten had had their first job (see table 1).

Table 1. Percentage of young migrants and non-migrants who have experienced the occurrence of life events in the transition to adulthood, 2010

Transitional event	Non-migrants	Migrants	Total
First sexual relationship			
Yes	61.3	85.5	61.8
No	38.7	14.5	38.2
	100.0	100.0	100.0
First child			
Yes	28.0	39.5	28.3
No	72.0	60.5	71.7
	100.0	100.0	100.0
First marriage			
Yes	33.2	53.3	33.5
No	66.8	46.7	66.5
	100.0	100.0	100.0
Leaving/finishing school			
Yes	60.0	82.5	60.5
No	40.0	17.5	39.5
	100.0	100.0	100.0
First job			
Yes	70.9	91.8	71.3
No	29.1	8.2	28.7
	100.0	100.0	100.0

Source: Own elaboration based on the ENJ2010.

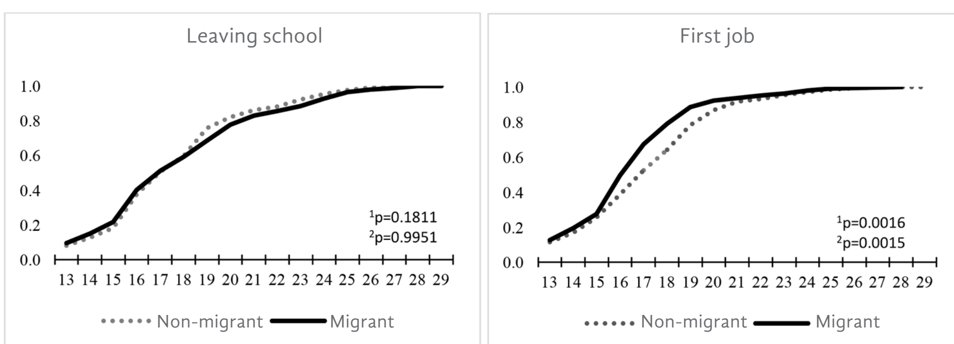
The union in couple is the third transition in prevalence, a little more than half of the young migrants had already experienced marriage at the time of the survey. The birth of the first child was the least experienced transition; only about a third of the young migrants had made it.

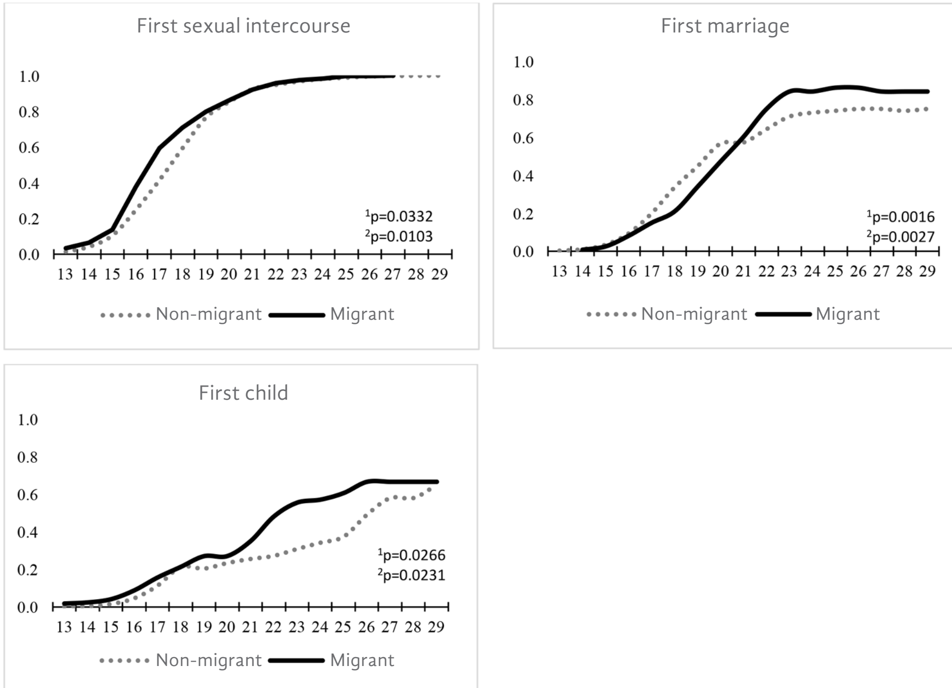
The patterns of transition to adulthood of young Mexicans differ according to their migratory status, since young migrants experience in a higher proportion all transitional events with respect to their non-migrant similes. Thus, the proportion of young migrants who had already experienced their first sexual relationship at the time of the survey is 24 percentage points higher than non-migrants, 85.5% for migrants versus 61.3% for non-migrants.

In the same sense, there is a greater proportion of young migrants who had already experienced their first job, the completion of formal education and the first union as a couple compared to non-migrants, with a difference of around 20 percentage points. While those who had experienced the first paternity or maternity the difference between migrants and non-migrants was reduced to 11 percentage points.

The analysis of the life tables by estimating the accumulated proportions of the occurrence of each event allows us to make an analysis of the temporality of sexual initiation, marriage, birth of the first child, exit from school and first work of young people with or without migratory experience in the United States (Figure 1). The ages correspond to the values of 25%, 50% and 75% of the age distribution of the events.

Figure 1. Age of occurrence of the events: first sexual intercourse, first marriage, first child, leaving school, first job, among young people according to migratory status





Source: Own elaboration based on the ENJ2010.

Note: ^{1}p= Test Log-Rank; ^{2}p= Test Wilcoxon (Breslow)

Of the total of young migrants, a quarter (25%) had left the educational system at the age of 15, half (50%) at age 17 and three quarters (75%) had left school when they turned 19. In comparison with the non-migrant youth, no significant differences are observed according to the Log-Rank and Wilcoxon tests, so the equity hypothesis of survival curves is accepted, that is, there is no effect on the age at which School drop-out occurs among young migrants compared to non-migrants.

The beginning of working life is the transition that takes place at a younger age among young migrants, 25% had started working at 14 years old and 50% at 16 years of age, while 75% of young migrants had already entered the labor market before reaching 18 years of age. However, there are significant differences in the calendar of entry into the labor market between young migrants and non-migrants according to the statistical tests applied, so there is an effect on the advance in the age of occurrence of the transition to working life among the young migrants, in such a way that they are the ones who start working a year before their non-migrant peers.

Sexual initiation is an event that happens to a quarter of young migrants at 15, while half experience it at age 17 and three quarters up to age 18. In addition, young migrants had their first sexual intercourse a year earlier than non-migrants, this difference being significant, according to the Log-Rank and Wilcoxon tests, making it clear that young migrants are sexually initiated before non-migrants. This finding is consistent with that found in other studies that show how migration can accelerate the sexual initiation of young people (Anglewicz, *et al*, 2013). Due, among other situations, that the change of environment could increase opportunities for young migrants to initiate and participate in a wider range of sexual relationships than those that were available in their place of origin, which could increase exposure to risky sexual behavior among young migrants.

The beginning of life as a couple is an event that had experienced 25% of young migrants at 18, 50% at 20 years old and 75% of young migrants at 23 years. Comparing among young people according to the calendar of the first marriage or union as a couple and their migratory status, it makes it possible to establish how migrants enter into union as a couple one year later than non-migrant youth, this difference being significant according to the statistical tests performed. This is concomitant with the literature on the subject that indicates that migration has a negative impact on marriage, that is, it contributes to delaying the union of young migrants compared to their peers (Parrado, 1998 and 2004; Jampaklay, 2006). Chattopadhyay, 1999 and Pérez Amador, 2008).

It is striking that from the age of 21, the curves of migrants and non-migrants cross at this age, indicating that there are changes in the intensity of migrants' entry into the first marriage, since the percentage of who have had their first marital experience is greater than non-migrants (figure 1). This would be marking an irregular acceleration to the rhythm of the beginning of conjugal life among migrants, which slows down in the early years of their youth and accelerates at a dizzying rate after 21 years of age, this would indicate that it exists for young migrant people a time of social moratorium to join as a couple, that is, it is a waiting time where the union as a couple is delayed until after the migrant accumulates the necessary assets to join as a couple in accordance with the prevailing traditions in his or her place of origin.

The entrance to paternity and maternity, that is, the birth of the first child, occurs for 25% of young migrants at the age of 19, for 50% at the age of 21 and for 75% at age of 23. This behavior contrasts with the non-migrant youth who had their first child one year before the migrants, and there is a significant difference between young migrants and non-migrants in the age calendar in which they experienced the first maternity or paternity.

It was identified that three patterns of entry into parenthood or maternity coexist among young migrants, the first consisting of some young Mexican migrants who would be experiencing fertility at the adolescent stage, the second group which is the most numerous, would be postponing the first maternity or paternity in order to first go through other transitions, such as migration or marriage or union as a couple, while other groups of migrants choose not to have their first child in the youth stage, reaching the end of the period of observation without having made the transition to the first maternity or paternity, which shows the heterogeneity of the transitions made by the young migrants.

CONCLUSIONS

The process of transition to adulthood of young Mexicans with migratory experience to the United States according to middle ages is the entry into the labor market that occurs at age 16, followed by dropping out at age 17, almost the same age happens the sexual initiation, three years later the beginning of life as a couple begins at 20 years, a few years later the first paternity or maternity occurs, these last two events being the least experienced by the Mexican young migrants before 29.

The results show that the international migration experience has a differentiating and catalytic effect on the timing and intensity of the events that make up the process of transition to adulthood in young migrants. In general, young migrants tend to advance their entry into the labor market and sexual initiation, while they tend to postpone both marriage/union as a couple, as well as the first paternity or maternity, compared to non-migrants. Thus, young migrants have a pattern of transition to adult life significantly different from non-migrants.

Although within the group of young migrants different patterns coexist both in the age of entry to married life and to paternity or maternity, generating a heterogeneity and complexity in the patterns of transition to adulthood within the group of young international migrants.

It stands out that from the age of 21 the migrants experience with greater intensity the entrance in union as a couple and the birth of the first child both events in relation to the non-migrants. That is, the social moratorium ends for young migrants and it is time to assume adult obligations.

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INTERCULTURALITY IN LAW AND ITS EFFECT ON THE CONSTRUCTION OF CITIZENSHIP IN CHIAPAS

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— Abstract—

The present document aims to justify that law's intercultural approach promotes the coexistence in the diversity based on the dialogue, respect, interaction and inclusion of the cultural differences which contributes to the construction of citizenship. For its better understanding it has been divided in four sections: A) the introductory part, which describes the problem and the objectives that are pursued, all aimed mainly at the construction of a participatory citizenship. B) Interculturality and law, to underline the importance of this approach in the legal aspect, its development and perspective taking as a reference the context of the indigenous peoples of Chiapas. C) Construction of intercultural citizenship in Chiapas, where some of the elements that are considered to be relevant in the formation of citizenship in the Chiapas context are defined and the components that the intercultural approach of the law can contribute to the subject are specified. D) Finally, the conclusions and proposals are presented.

Keywords

Interculturality; citizenship; Indigenous Peoples; political rights.

Today the construction of citizenship demands that the members of society be informed and be committed to play an active role in politics. Even though the technological development of the 21st century has provided the human being with sophisticated technological tools, access to databases and social networks, which are a source of information in real time and that, may well contribute to the formation of the citizen, this does not seem to happen. Citizenship has been relegated to a simple sterile political relationship with the State, which is summarized in the right to vote. The sense of belonging to the people, community, municipality, state, and nation tends to disappear under scenarios of individual economic well-being. The citizenship is locked in the Federal and local Constitutions, in the mere description of the requirements to acquire it.

This document aims to justify the importance of coexistence in diversity based on dialogue, respect; interaction and inclusion of cultural differences, as components of the intercultural approach of law that contribute to the construction of a new citizenship. It is divided into four topics, the introductory part that briefly describes the importance of building a participatory citizenship and the challenge of cultural diversity in Chiapas; interculturality and law, in which the objective of this legal approach is exposed, its development and implementation in contexts such as the one in Chiapas, characterized by the presence of different groups that claim and defend their citizenship rights; the construction of intercultural citizenship in Chiapas, in which it is sought to identify some components that can pay for the formation of citizenship, specifying those that can be achieved from the intercultural approach of law and finally the conclusions and proposals are presented.

In scenarios such as that of the State of Chiapas, there is an element that in the construction of citizenship is transcendent and must be considered if it is to consolidate participatory democracy, *cultural diversity*. The local Constitution of this Federal Entity shows us this social phenomenon by referring in one of its articles to the existence of twelve original peoples, which in some way contributes to make them visible. In addition to the above, the geographic location of Chiapas makes it a gateway for mainly Central American migrants who, in search of the American dream, sometimes stay to live in these lands, which generates new cultural identities that complicate the construction of citizenship.

Given these problems, law's intercultural approach is presented as an alternative to build new citizenship in Chiapas, as a philosophy based on coexistence in cultural diversity, through the promotion of dialogue, respect, interaction and inclusion among the different, the learning of diverse knowledge and the worldview of peoples and communities, can contribute to the formation of citizens committed to their native peoples and origin communities, promoting the teaching of their political rights and obligations.

The interculturality in the Law combats the monist vision of the legal system, that is, the position that defends the existence of a single normative system, which therefore does not take into consideration the different cultures, groups, communities and peoples that interact in society. The Intercultural approach is a new form of legal knowledge construction, which starts from the recipients of the norm, from the bowels of the communities, from day to day, from the recognition of the existence of a plural society and respect for differences.

However, this new way of building the law also generates an effect on the construction of citizenship, because if the vision of the legal should be inclusive and promote dialogue and respect for differences, citizens will have more alternatives for participation, which can translate into regaining confidence in the electoral authorities. From an intercultural perspective, the contents of the political rights of citizens must be rethought if they intend to live in a participatory democracy.

INTERCULTURALITY AND LAW

Interculturality allows a comprehensive legal design that includes the identity of the original peoples and communities; promotes respect, interaction and dialogue in diversity. In intercultural discourse, democracy, citizenship and coexistence in diversity are fostered; knowing and understanding the intercultural vision in law is beneficial, because it brings elements from different cultures such as the mastery of a different language, diverse knowledge and the worldview of others.

Ethnic identities, migratory dynamics and cultural diversity are themes that give content to the human rights that protect the Federal Constitution and those of the States. Interculturality highlights the necessary interaction for the survival of cultures, that is, analyzes the type of relationships and not who is part of each of the groups, aims to encourage a relational analysis with the help of society, institutions and education. The intercultural discourse pretends that the dialogue and the communication between the cultures allow recognizing the rights of the cultural diversities (Romero Diaz, 2011).

Interculturality in Mexican law emerges linked to cultural diversity, whose interpretation is complex but can be argued alongside the universality of human rights, since they are the shared nucleus of diverse theoretical and political concerns in the modern world, as well as the philosophical reflections that accompany them (Beuchot, 2005).

The Mexican Legal Culture, being strongly influenced by the western legal culture, adheres to the awareness of the existence of a single normative order, so it only refers to the normative systems of other cultures through custom, ethics and social and historical situation. However, a culture does not evolve if it is not through contacts: the intercultural is constitutive of the cultural (Todorov, 1991).

The Mexican legal system is of monistic tradition and all its institutions are argued from that perspective, it was designed following the steps of Spanish domination: first, the conviction of superiority before the Other, to know and adapt to it, in order to transform it and assimilate it to its culture. Second, the knowledge and almost ethnographic interpretation of the Other, considering that good information is the best way to impose power. And third, the superiority in the technological aspect, especially in communication: this allowed the colonizer to inflict a defeat (Todorov, 2007).

This has hampered the dialogue on cultural diversity that promotes interculturality and not only in relation to indigenous peoples but also with other groups such as migrants or the LGBTTTI community (lesbian, gay, bisexual, transvestite, transsexual, transgender and intersex). The inclusion of interculturality is recent and is identified with the protection that is currently being provided to the human rights of people belonging to the so-called vulnerable groups.

Respect for diversity, inclusion, equal rights, good life, diverse knowledge, worldview, linguistic rights, are expressions of this new approach to law that generates a new construction model in which the dialogue between the different is the common denominator. For law to be intercultural, it must recognize the existence of different systems of norms, which coexist within the state organization and think of dialogue as the main alternative solution to the social conflicts that this diversity can generate.

In the constitutional law of Chiapas there is recognition, protection and promotion of the rights of indigenous peoples, that is to say, cultural diversity is addressed at least in general, however in the issue of citizenship it is necessary to identify and harmonize cultural and the political rights of all the groups, communities and peoples that inhabit the State. In the latter, with an intercultural focus on the legal aspect, there is the possibility of providing future citizens with tools that will make them politically more participative.

CONSTRUCTION OF INTERCULTURAL CITIZENSHIP IN CHIAPAS

To speak of the construction of citizenship in Chiapas is to refer to a process of formation in civic, ethical, cultural, legal, and political values, among other elements; that must be followed by the people who will become citizens, necessarily by the State but which, of course, involves other institutions such as the family and school.

The political system is the one that must generate the basic competences that are required to perform as an exemplary citizen, such as cultivating values like solidarity, the common good, justice, peace, freedom, democracy, respect for differences, non-discrimination, inclusion, equality, but also know the rights and duties that the Federal Constitution, the American Convention on Human Rights and the Constitution of the State of Chiapas, recognize, promote and protect the citizenship.

To encourage reflection on the content of those considered to be political, the forms of citizen participation, the characteristics of representative democracy, the structure of political parties, electoral crimes, the division of public power, the authorities in electoral matters, mechanisms of defense of fundamental rights, cultural rights recognized to indigenous peoples, including their normative and conflict resolution systems.

It is for the foregoing that when considering the intercultural approach of law an architect of coexistence in diversity that through respect for differences and knowledge of diverse knowledge and worldview of native peoples builds differently to the Western orientation, legal science and of course can also influence the construction of intercultural citizenship.

Cultural identity is the starting point for the design of citizenship in Chiapas at the beginning of the 21st century, however the existence of several instances, institutions and areas where indigenous and non-indigenous coexist (mestizos and ladinos), where they coincide fighting together, as in the political parties, in the religions, in the mercantile or credit associations, together of urban colonies as happens in the city of San Cristóbal de las Casas and in non-governmental organizations, it contributes to that identity is not strengthened and therefore diminish the possibility of organizing these minorities and claim their rights (Chacón Rojas, 2005).

In the Chiapas' State Constitutional Law, the respect and promotion of human rights is an obligation of the three levels of government in accordance with the provisions of the Federal Constitution and the

American Convention of Human Rights and its theoretical and practical teaching is included in the plans for basic and upper secondary education, which must also consider the intercultural approach.

Consequently, the construction of citizenship should be considered immersed in these strategies and have a first approach with the intercultural approach in law, assembling the knowledge of civic and ethical values with political and cultural rights, through the promotion of intercultural dialogue and respect to the differences that favor and consolidate representative democracy with the participation of all, complying with the fundamental lines of modern federalism, the coexistence of self-government and shared government.

If we consider that the criteria of classification of fundamental rights are exclusively of didactic order, that is to say, they are designed for their teaching, but in reality they all appear linked to each other. (Barcelo Rojas, 2016), it is appropriate that the political rights and cultural rights recognized to the indigenous peoples in the Constitutional State Law of Chiapas form a single block of study.

The State recognizes the existence of twelve original peoples[1] and this is committed to protect and promote the development of culture, languages, customs, traditions, normative systems and forms of social, political and economic organization of all indigenous communities. Likewise, it recognizes the right to choose their traditional authorities according to their uses, customs and traditions, encouraging the participation and empowerment of women.

In regards to the political rights of the citizens of Chiapas, that is, in general for all those who acquire a citizenship in Chiapas[2], the fundamental law establishes rights and duties that are acquired with it and the causes of its loss, and separately devotes a title to the democratic exercise of that right. In this sense, it is worth mentioning that the intercultural approach of the law has developed remarkably in electoral matters, largely due to the resolutions that the Electoral Court of the Federal Judicial Power has issued under this

1 Article 7.- The State of Chiapas has a pluricultural population originally sustained in its indigenous peoples. This Constitution recognizes and protects the following: Tseltal, Tsotsil, Chol, Zoque, Tojolabal, Mame, Kakchiquel, Lacandón, Mocho, Jacalteco, Chuj and Kanjobal.

2 Article 20.- Chiapas citizenship is recognized for those born in Chiapas, as well as Mexican women and men who have resided in the state for a period of more than five consecutive years.

perspective, so much so that it has generated an action guide for Judges in matters of Indigenous Electoral Law, whose recommendations and criteria are put to the consideration of the authorities of the three levels of government and of the traditional ones of the towns and communities (TEPJF, 2014).

In the constitutional concept of citizenship in Chiapas are noted intercultural elements such as the recognition of uses, traditions and customs, normative systems, use of language, rights of use, enjoyment and sustainable use of natural resources, wild flora and fauna, special procedures in criminal matters and the recognition of traditional authorities, which justify the use of the intercultural legal approach in its construction.

Interculturality promotes dialogue as a process of interlocution and reciprocal learning that favors the conditions for the integration of knowledge derived from diverse cultures, which enrich one another (Casillas Muñoz & Santini Villar, 2009); consequently, through intercultural dialogue, the values of the different peoples and communities of Chiapas can be known, thus strengthening respect for differences as an element of citizenship.

To accept and defend that within the State of Chiapas different cultures coexist, each with its own language, tradition, religion, worldview and normative system; as well as the right that each town or community has to have their own values scheme that must be preserved, it is necessary that citizens first recognize their cultural identity and then understand the cultural identity of others, that is, practice respect for the differences, element that only through intercultural philosophy can be understood its real dimension (CGEIB & Fornet Betancour, 2007).

Citizenship should not be understood only as a political relationship with the State, but as a social commitment that implies, among other things, the defense of the cultural heritage of the indigenous peoples, their practical, experimental and reflective knowledge that is passed down through generations and its worldview.

Understand that besides the different procedures that constitute Chiapas' legal system, there are other normative systems of their native peoples that use other techniques to solve conflicts. Similarly, and in exercise of the right to self-government, each community may have mechanisms to designate its authorities.

CONCLUSIONS

Interculturality, as a philosophical discourse that promotes dialogue, interaction, inclusion and respect for different cultures, in the 21st century is presented in legal science as an approach that breaks with the traditional western construction of law, by accepting the existence of legal pluralism and therefore the possibility of designing fundamental legal norms taking into account the cultural and political context of all communities, peoples, groups, sectors, nations that may exist within a State, Federation or Confederation.

The construction of citizenship in Chiapas implies the sum of different ethical, cultural, legal, civic and knowledge of fundamental rights in general and in particular of the so-called political and cultural, as well as those related to its democratic exercise. In this process of formation of the future citizen, institutions like the family, the school and the state participate.

Given the multiethnic composition of Chiapas, its constitutional state law studies citizenship from a special perspective in relation to indigenous peoples recognized by the legal order and from a general vision for all those born or residents of five years in the State.

Cultural rights and special political rights of indigenous peoples citizens are grouped in a title of the constitution of Chiapas, perhaps with the intention of making them visible as a vulnerable group.

Derived from the notion of citizenship provided by the state constitutional law of Chiapas are noticed the following: intercultural elements such as the recognition of uses, traditions and customs, normative systems, use of the language, rights of use, enjoyment and sustainable use of natural resources, flora and wildlife, special procedures in criminal matters and the recognition of traditional authorities, which justify the presence of this legal approach in citizen education.

Intercultural citizenship should be understood as a social commitment that implies, among other things, the defense of the cultural heritage of indigenous peoples, their practical, experimental and reflective knowledge that is transmitted for generations and their worldview. As well as developing the capacity for dialogue, interaction, respect and inclusion among cultures, in order to define their own identity and then understand others.

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ACADEMIC PAPERS

ANTIMATTER TO UNDERSTAND OURSELVES

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In one of his most notable stories, entitled "Far Centaurus", published in 1944, the famous science fiction author E. van Vogt imagines an expedition of astronauts who at the beginning of the twenty-first century ventures to travel to Alpha Centauri, the planetary system closest to Earth. Through a suspended animation system, travelers cover the journey of 4 light years in a period of five earthly centuries. As they approach the orbit of *Proxima*, they encounter an immense spacecraft. After an intriguing encounter, the twentieth century crew discovers with surprise that what they thought was a civilization of intelligent aliens; they are actually humans from the twenty-fifth century who have dominated the interstellar travel managing to cover the distance between *Proxima* and Earth in just 3 Earth hours. Van Vogt delights us with all kinds of misunderstandings that could arise from such an extraordinary contact. For the purposes of this review, I would like to draw attention only to one detail of this collision of cultures that are so dissimilar. Dr. Renfrew, one of the geniuses behind the technology of the twenty-first century, is disturbed by his own helplessness to understand the rudiments of the twenty-fifth century' science, notions that even children of 6 or 7 years master, are superior to his understanding. The cultural shock is so severe that Renfrew decides to do everything possible to return to his time.

I bring up this science fiction story because when reading *Antimatter: the ephemeral matter*, it was impossible for me not to imagine the surprise and bewilderment with which the great minds of Antiquity, the Middle Ages and the Renaissance would have received the scientific notions that the authors of this book address with the utmost clarity and reach an educated reader of the twenty-first century. The knowledge that the physicists of our era have developed to understand the secret movements of the universe, from the smallest dimensions of the subatomic to the forces that act between the most extraordinary celestial bodies, should leave us bewildered and pleasantly surprised of what our mind and the will to know have allowed us to build.

However, this fascination is not without challenges. The advance and sophistication of our knowledge impose a question on us. How to make this knowledge accessible to those who are outside science specialization fields, particularly physics? How can we make the science of the twenty-first century reach the citizens of the twenty-first century without necessarily having to devote their lives to study each and every one of the different disciplines? As in almost everything in life, the answers are many; I am content to share an opinion: we need more than ever a scientific dissemination that allows us to connect science with those other aspects of our reality that contain us and cross us. I refer to the arts, to languages, to the social sciences, to everything that allows us to speak of a culture. Today more than ever it is indispensable that the people of science and the people of the humanities resume a deep dialogue that leads us to re-establish the idea of knowledge as a whole that multiplies and connects in a capricious and sometimes unpredictable way.

For this reason, I am convinced that we need more books like the one these authors have conceived. Books that tell us something and everything at once. Books that invite us to think of ourselves as the result of different historical processes that for good or for bad come together in our time. I can affirm, without a doubt, that the authors of this book have managed through these pages to confront the reader with a comprehensive vision of physics in what we call the Western world and have achieved it by addressing an extremely curious and obscure aspect of the universe: antimatter.

In particular, I was fascinated by the first part of the book where the authors elaborate with great amenity a compressed account of our search to understand what things are made of. In the initial reasoning-no less profound-of the classical mind, the reader appreciates in all its simplicity the innate need of the human being to know, that is, to interpret the world through language. For we cannot ignore that the glimpses of a scientific thought in Antiquity rested essentially on our ability to ask ourselves questions that had to be answered with common sense, with reason. Thus, among the many conclusions we can draw from this book, is that which reminds us that behind the development of logic, mathematics and coexistence with the mythical in that early stage of scientific thought is clearly shown persistence of the symbolic. To understand the universe, the human being needs to communicate with others; the symbol is the cornerstone in the building of knowledge. Language should be restored as the common homeland of scientists, humanists, artists, of the common people we all are.

While the historical journey through the rudiments of elementary physics, that which is interested in the basic components of all things, brought me to memory names, places and concepts that went through my life as a student and my adventures as a reader of many topics, I cannot deny that at times I felt like Dr. Renfrew. Like the character in the story that started this text, when I heard about the concept of symmetry, the Standard Model or the baryonic number, my impression was such that I kept asking myself: why had I not heard about all this before?

The answer lies in an educational system that has been unable to incorporate twentieth-century physics into classroom dynamics-let alone the twenty-first century. It is a painful reality that, with a few exceptions, in our schools the physics we teach focuses almost exclusively on addressing notions of Antiquity, the Middle Ages, the Renaissance and sometimes, making a great effort, some themes of the nineteenth century. This situation would not be so scandalous if it were not because something similar happens with the teaching of history, sociology, philosophy and literary studies, to mention only some fields of knowledge.

That is why these types of books are, more than necessary, urgent. If the education system cannot keep pace with science, then disclosure is our only response to avoid that the absolute specialization of knowledge makes us a Babel of intransigent and foolish who choose to turn their back on everything we do not understand.

I do not want to end these comments without first addressing the final part of the book, which discusses the possibilities that the domain of antimatter would give us. While the benefits of these studies have already led us to concrete applications that save lives every day through nuclear medicine and its amazing instruments to see inside our bodies, the command of antimatter remains one of our aspirations. According to the authors, to achieve this it is necessary to invest immense sums of resources that allow us, among other things, to continue with the construction of particle accelerators. The challenge is very clear; it is about building and operating more of those extraordinary machines where the scientists of the twenty-first century act a bit like the medieval alchemists trying to find the laws of the permutation of the elements or the Maesters of *Game of Thrones* obstinate in master the wild fire. The big difference is that these people working in facilities like the Fermilab in the outskirts of Chicago, they are real people, they don't come from an author's imagination, but they are the result of centuries of intellectual activity. I dare to think that in their hands is an important part of the future of humanity, since the ability to "produce" and store antimatter could have a determining effect in the design of new propulsion systems without which the exploration of outer space will remain a dream or a science fiction affair like in "Far Centaurus". In this way, the future of research on antimatter is linked to the future of human beings. Today more than ever we must ask ourselves what we want for the species. Of that answer will depend that either we rise above our planetary condition or that we sink into the abyss of self-destruction.

After reading *Antimatter: ephemeral matter*, my invitation is to approach this knowledge with openness. We must make an effort to see in cosmology, in the explanations of the universe as something in constant expansion, in our hope irremediably unsatisfied to see things with our own eyes to verify its veracity, a clear expression that science, like philosophy, art or play, is an exercise of the imagination. Only through the imaginative faculties of the human mind will we be able to understand and explain our sense of being in the world.

THE EPISTOLARY LITERATURE OF ROSARIO CASTELLANOS: *LETTERS TO RICARDO*

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ÁLVAREZ ARANA, SILVIA (2007): *LA LITERATURA EPISTOLAR DE ROSARIO CASTELLANOS: CARTAS A RICARDO*, UNIVERSIDAD AUTÓNOMA DE CHIAPAS, TUXTLA GUTIÉRREZ, CHIAPAS, MEXICO, 2007. 96 PP

The appearance of the book *The epistolary literature of Rosario Castellanos: Letters to Ricardo* by Silvia Álvarez Arana, is an important milestone in literary criticism about Rosario Castellanos. With this publication we go into the analysis of the less known work of the great author from Chiapas, which, because of its theoretically private nature, has aroused less interest in criticism: her epistles.

Elena Poniatowska already pointed out in her prologue to *Letters to Ricardo* the importance of these, which are: "a liberating process and a triumph, a war composed of many battles won by her day by day. I would dare to say that, if we would not know about her prose or her poetry, her single letters would make Rosario Castellanos an admirable human being" (Castellanos, 1996, p.19).

Following this way of approaching Castellanos' letters, several critics have approached them to select biographical clues from the author; nevertheless, Silvia Álvarez does not stagnate in the human component or in the vital anecdote. She opens her ears and her mind to Rosario Castellanos' written words, to read them from the dimension that the author herself demands to be made of a work: the artistic one. Álvarez stops looking for the supposed human validity, refuses to enter exclusively in the private life or in the political and social ideals of the writer, to explain her letters from a complete literary analysis, and taking care of the other components of the writing, also the ones that have to do with autobiographical writing, from this dimension.

Thus, the letters to Ricardo straddles the value of a simple dialogue composed of two interlocutors who exchange feelings, opinions, anecdotes or data. According to the researcher, in *The epistolary literature of Rosario Castellanos: Letters to Ricardo*, the author turns this written exchange into a complex and continuous literary exercise.

If we dig into the analysis of the research' structure, it is compartmentalized into three perfectly defined and enlightening chapters:

In the first, Silvia Álvarez discovers how Castellanos' letters have characteristics that are defining of epistolary novels, such as Goethe's *Werther* and Laclós' *Dangerous Liaisons*; with accurate analysis the correspondence that she sent to Ricardo fits within this literary genre.

In the second chapter, the researcher focuses on the literary style in and Castellanos' literary resources, which become the subject of rigorous analysis. These elements, profusely studied in her indigenous and feminist narrative, are also present in her letters, as the author demonstrates.

Finally and before the final conclusions, in the third chapter, the textual axis is analyzed in detail through the proposal of Aralia López González in The spiral seems a circle, with which it tries to "reconcile the descriptive or structural aspect and the sociological one in the approach to the literary work "(page 69). To do this, she uses the following notions of analysis: axis of meaning: characters, narrative elements such as time and space, narrator and characters and intertextuality, as well as the world view.

After the analysis of all the elements of the letters, the researcher Silvia Álvarez Arana has shown that the epistles are framed under the literary genre without a doubt. The book is well worth reading and taken into account for further studies. We will not stop to detail all its novel contributions, well framed within a perfectly defined theoretical approach and with a rigorously selected bibliography. Suffice to note, briefly, some of her conclusions. Otherwise and if we want to specify, we run the risk of transcribing the whole thesis.

Rosario's letters are literature because they show that Castellanos is concerned that the form is always consistent with the message; that is why she takes care of language, she is concerned with looking for accurate expression, being colloquial or cultured as required by the subject matter dealt within the letters. In them, particular characteristics of the author's style are observed, such as the use of irony, which has received an interest in criticism in her narrative.

They are literature, because the characters develop over time, the internal monologue is used by the author as a way to develop internal thought complementary to the external world, with anecdotes that serve as notes that resume in the form of literary writing, with the formulation of the ideas that she acquires over time and that will form her conscience.

They are literature, in short, because the concerns that define the most studied work of Castellanos, those that are present in her indigenous narrative and in her feminist works and that make use of specific and well-defined stylistic resources in this research, also appear in the literary letters that Rosario writes to Ricardo.

Silvia Álvarez' book is a source of inspiration; as we have said, it is based on a careful selection of bibliography on which to support her accurate conclusions. It opens a door to the literary voice of Castellanos' epistles. It introduces us to a new record of the author, which has not been analyzed previously by the critics, opening an interesting and essential field on which to investigate, which helps to complete the vision of the Mexican author's work.

We conclude by noting that the initial objectives are met with great success and we take the words of the researcher, which we do ours: "In short, it is worth approaching the text away from its biographical nature and thus contemplate it from the literary point of view as we would do with any other of her works, thinking that the enunciated language belongs to the same linguistic conscience, that is, to the individual one, unique and literary conscience of Rosario Castellanos who consciously or unconsciously (a doubt that will remain and that does not alter the meaning of her work) constructed a text that today can be located according to its characteristics within the epistolary genre (Álvarez, 2018, page 93). Direct, but deeply thought-out that includes both her internal reflection and the environment that gives rise to draw universal and timeless conclusions, which she tell us through the literary word what she lives and sees, she seeks to know and interpret the world to explain it to Ricardo, to tell us.

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