Revista Mexicana de Ciencias Forestales Vol. 11 (62)
Noviembre – Diciembre (2020)

DOI: https://doi.org/10.29298/rmcf.v11i62.815

Artículo

Aspectos socioeconómicos del aprovechamiento del bambú en una comunidad rural de Veracruz, México

Socioeconomic aspects of the use of bamboo in a rural community of *Veracruz*, Mexico

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Resumen

El bambú es una planta que aporta beneficios económicos, sociales y ambientales. En los últimos años, se han documentado evidencias de que su producción y transformación generan empleos locales y oportunidades de ingreso para las familias rurales. Los objetivos del presente estudio fueron analizar la transformación del bambú en la elaboración de muebles y artesanías, e identificar los beneficios sociales para los artesanos y sus familias en la comunidad de Monte Blanco, municipio Teocelo, Veracruz, México. El trabajo de campo se realizó en los meses de mayo a julio de 2017. La investigación se basó en una encuesta aplicada a una muestra dirigida a 33 talleres artesanales de un total de 45 en operación. Los datos obtenidos se complementaron con la información de tres entrevistas semiestructuradas aplicadas a actores clave y con la observación directa de todas las fases del proceso de manufactura de las artesanías y en las plantaciones de bambú. Los resultados mostraron que la fabricación de muebles y artesanías es una actividad productiva que incluye a hombres y mujeres adultas, así como a grupos vulnerables tales como adultos mayores y personas con discapacidad. Además, estimula el autoempleo para las familias de los artesanos y empleos temporales para otros habitantes de la comunidad. También es una opción para cubrir la demanda de productos ecológicos requeridos por la sociedad ante el deterioro de los recursos naturales, lo que la convierte en una actividad estratégica para contribuir al desarrollo rural sustentable.

Palabras clave: Artesanías, empleo, grupos vulnerables, productos ecológicos, productos forestales no maderables, recursos naturales.

Abstract

Bamboo is a plant that provides economic, social and environmental benefits. In recent years, evidence has been documented that production and transformation generate local jobs and income opportunities for rural families. The objective of the present study was to analyze the commercial use of bamboo in the production of furniture and handicrafts, in addition to the benefits received by craftsmen from *Monte Blanco* community, *Veracruz*, Mexico. Field work was carried out from May to July 2017. Research was based on a survey applied to a sample of 33 handcraft workshops out of a total of 45 in operation. The data obtained was complemented with the information from three semi-structured interviews applied to key actors and with direct observation of all phases of the process of elaboration of handicrafts and bamboo plantations. Results showed that the manufacture of furniture and crafts is a productive activity that includes men and women of different ages, as well as vulnerable groups such as the elder and people with disabilities. In addition, it encourages self-employment for the families of craftsmen and temporary jobs for other inhabitants of the community. It is an option, as well, to cover the demand for ecological products demanded by society in the face of the deterioration of natural resources, which makes it a strategic activity to contribute to sustainable rural development.

Key words: Handicrafts, employment, vulnerable groups, ecological products, non-wood forest products, natural resources.

Fecha de recepcoón/Reception date: 8 de septiembre de 2020
Fecha de aceptación/Acceptance date: 16 de octubre de 2020

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Introduction

Bamboo is a giant woody grass, belonging to the class Bambuseae, of the family Gramineae. Currently, 121 genera and 1 662 species of bamboos are recognized in the world (Canavan, 2017), of which 100 are economically important (Ohrnberger, 1999). It is a plant that adapts to different climatic conditions, from tropical and subtropical to temperate zones; grows in an altitudinal range from 0 to 4 300 m; it tends to develop naturally on all continents except Europe and Oceania (Judziewicz *et al*., 1999). It is distributed from 47º south latitude (Chile) to 51º north latitude (Japan). It should be noted that the largest bamboo areas are present in Latin America, Asia and Africa.

In Latin America, 20 genera and 429 species of woody bamboo have been identified, which are distributed from Mexico to Chile (Añazco, 2013). An estimated 11 million hectares covered by this plant in the region (FAO, 2010); the countries with the greatest diversity of taxa are Brazil*, Chile, Colombia, Ecuador* and Mexico.

Although in Mexico, the area occupied by bamboo is unknown, its greatest distribution is located in the south and southeast of the country, especially in the tropical regions of the states of *Chiapas, Guerrero, Michoacán, Morelos, Oaxaca* and *Veracruz* (Dávila *et al.,* 2006). Also, there are records of its presence in the states of *Puebla, Jalisco* and *Nayarit*, among other entities. The largest number of taxa are located in *Chiapas, Tabasco, Puebla* and *Veracruz* (Ordóñez, 1999), and only for *Veracruz* there are estimated approximately 1 500 ha established with 400 native species and 20 introduced taxa (D´Esezarte, 2016).

Environmental benefits of bamboo. Woody bamboo has hard and vigorous stems that provide it with a great resilience ability, as it can survive and recover quickly after facing serious damage caused by natural disasters (Lobovikov *et al.,* 2007). These characteristics make bamboo an ideal plant to prevent soil erosion and for ecological restoration.

It has rapid growth, since it reaches its full development between 5 and 6 years (Ordóñez, 1999); therefore, it has a high potential for carbon sequestration and mitigation of climate

change (Song *et al.,* 2011). In this regard, Mathewos (2017) conducted an investigation in Ethiopia on the multiple uses of bamboo species and their contribution to the management of forest resources, and concluded that the bamboo forest has a high potential for carbon storage, due to its high biomass growth rate and high annual growth after harvest, which can contribute to efforts to adapt to climate change.

In this same sense, Lobovikov *et al.* (2012) point out that bamboo forests represent an important current and future carbon reservoir, which. due to their socioeconomic and environmental advantages, they justify considering some of their taxa as trees under the United Nations Framework Convention on Climate Change (UNFCCC); and with this, amend the reports and guidelines of the Intergovernmental Panel on Climate Change (IPCC). In addition, the authors point out that, due to its characteristics and versatility of uses, bamboo can help rural societies to obtain economic benefits and adapt to climate change, especially when these communities depend on their natural resources to a great extent.

Socio-economic benefits of bamboo. Bamboo is a very important non-timber forest product (NTFP), as it plays a significant role in the daily lives of the inhabitants of rural areas. As part of their traditional ways, various indigenous peoples have used it for basketry weaving, although, recently, it is used for other purposes based on its properties (Nirala *et al*., 2017).

Morán (2001) points out that each species of bamboo has a type of use; likewise the parts of the plant are used for different purposes by the local population: shoots, stems, leaves, roots, among others. For example, in Asian countries, bamboo is used as a raw material for the artisanal manufacture of basketry, furniture, various utensils and decorative elements; also, in the industrial production of strips for weaving and braiding, making rigid boards, plywood and chipboards; it is a resistant material used in construction; the food industry (consumption of sprouts); as well as fuel and in obtaining ethanol, cellulose and paper pulp (Liu *et al.,* 2018).

In regard to the socioeconomic benefits from the commercial use of bamboo, Troya *et al.* (2014) indicate that this crop is a fundamental support in the generation of

income for poor families in the mountains of China, since it significantly contributes to their economy and local rural development.

Mathewos (2017) refers that it is a renewable natural resource that is used in house building, as human food, firewood, fodder, in living fences and in the manufacture of furniture; therefore, it has a significant socioeconomic impact on the generation of jobs and income, not only for the families that produce bamboo, but for others in the same locality, in such a way that vulnerable groups such as women who seek monetary resources for their families get benefits too (Lobovikov *et al*., 2009). The former description shows the great potential that bamboo has for its transformation into various products, the commercialization of which can trigger local development processes, as occurs in *Ethiopia* (Endalamaw *et al*., 2013).

There are studies in Latin America that show that the marketing of furniture and handicrafts made with bamboo contributes to an increase in income and an improvement in family living conditions. An example of this is the one that occurs in *Quimbaya* municipality, Colombia, where the families organized in the Association of United Microentrepreneurs for *Quimbaya* are dedicated to the manufacture of handmade bamboo furniture (chairs, tables, beds, mirrors, mobile lamps, screens, baskets, among others), which guarantees them a constant source of employment and income throughout the year (Osorio and Parra, 2013).

Around 42 traditional uses have been recorded in Mexico for wild bamboo species (Dávila and Brugger, 2012); from these, the taxa that are distributed in the mountain mesophilic forest are used in handicrafts (Mejía and Dávila, 1992; Mejía and Castillo, 1996). Among the taxa mostly used in the production of furniture and handicrafts, the following are worth mentioning: *Rhipidocladum racemiflorum* (Steud.) McClure (*Chiquián*), which is extracted from its natural habitat and, recently, has spread to the center of the state of *Veracruz* (Mejía, 2014); *Otatea acuminara* (*Munro*) C. Calderón & Soderstr., traditionally called *otate*, from the carving of its culms; since Pre-Hispanic times, it has been used in the elaboration of baskets, tutors for tomato crops and in the construction of houses of the "*bajareque*" or "bahereque" type,

constructions of walls filled with mud (Ruiz-Sanchez *et al.,* 2011) and even in rural communities it is used in the manufacture of sleeping beds.

Guadua aculeata Rupr. ex Fournier and *G. longifolia* (E. Fourn.) R.W. Pohl (*guada*) are widely used in the construction of rural houses, mainly in the tropical regions of Mexico, due to the physical and mechanical properties of its culms or stems; which is why these species have great economic potential (Ordóñez *et al*., 2011). They are also used to make furniture (Cedeño and Irigoyen, 2011; Zaragoza-Hernández *et al.,* 2014), in addition to a wide range of uses. An example of its economic value are the microenterprises located in *Coatepec, Teocelo, Monte Blanco, Huastusco* and *Orizaba* communities in the state of *Veracruz* (Dávila and Brugger, 2012; D´Esezarte, 2016).

Opportunities for the use of bamboo in Mexico. The manufacture of handicrafts and rustic furniture, among other products, is an activity of great importance for some towns in Mexico; sometimes they represent an economic alternative for family sustenance (Rubín, 2013). It is an option to reduce the negative impact of the intensive use of wood, since this is an overexploited natural resource, due to the poor management of forests, both in the national territory and in other Latin American countries (Cedeño, 2013), which, in addition to the constant increase in the demand for timber products, constitute one of the important environmental concerns of the forestry agendas.

In this context, various researchers explore alternative materials, with properties similar to wood (Cruz-Salgado *et al*., 2015). In this regard, bamboo, due to its woody culms, is a promising plant to replace it (Londoño, 2014; Kaur *et al.,* 2016); furthermore, since it has a rapid growth, about 75 to 400 mm per day, it is the vegetable for commercial use with the highest growth in the world (Kumar and Sastry, 1999). This and the maturation of their culms allow their stems to be harvested selectively year after year, without cutting the entire plant (Añazco and Rojas, 2015).

Ordóñez *et al*. (2011) document that bamboo from plantations between 4 and 6 years can be used for various uses: material for house construction, elaboration of laminate floors and walls, elaboration of furniture, handicrafts, panels and activated carbon, among others.

As substitutes for wood, bamboos work as aids to curb deforestation (Añazco, 2014), particularly in those regions of Mexico where the manufacture of furniture and handicrafts is important in the generation of jobs and income for families. Likewise, it is an alternative to counteract the deterioration of the forests and strengthen the artisan sector (Reyna, 2013). Such actions would significantly facilitate the fulfillment of objectives 1, 5, 8, 9, 12 and 13 of sustainable development of the United Nations Development Program, whose purpose is to end poverty, contribute to the equality of gender, decent work, economic and industrial growth, innovation and infrastructure, responsible production and consumption, as well as improving the climate, respectively (UNDP, 2016).

In regard to the benefits of using bamboo, the great potential of this non-timber forest product is evident. In Mexico, studies on the subject are still very scarce (Dávila and Brugger, 2012). Therefore, studying, analyzing, documenting and disseminating the use of bamboo as a raw material for the manufacture of furniture and handicrafts by artisans in the state of *Veracruz* will contribute to the knowledge of its use. In addition, this provides elements to design strategies that allow to create options for the use of local resources that provide economic advantages to rural families in the country where the species naturally grows.

The objectives of this study were to analyze the transformation of bamboo in the manufacture of furniture and handicrafts, and to identify the social benefits for artisans and their families in the community of *Monte Blanco, Teocelo* municipality, *Veracruz, Mexico*.

Materials and Methods

The research was carried out from May to June 2017, in the community of *Monte Blanco, Teocelo* municipality, *Veracruz*, located between parallels 19°23' and 19°24' N and 96°58' and 97°02' W, with an altitude range of 500 to 1 181 m (INEGI, 2009). According to the Population and Housing Census (INEGI, 2010), there are 1 708 people living there. For 2016, the National Council for the Evaluation of Social Development Policy registered 63.3 % of the population in poverty in the municipality,

with a low degree of social backwardness, which put it in 158th place at the state level, and a medium degree of marginalization. The employed population with an income of up to two minimum wages was 63.9 % (Coneval, 2016).

During the field trips through the municipality, the following main economic activities were identified: services, agro-industry, handicrafts, coffee-growing, furniture manufacturing and bamboo handicrafts.

The *Monte Blanco* community is recognized as one of the regions of the country where there are plantations with different types of bamboo, although they are scattered in the backyards of the houses or among the other existing crops in the community (D´Esezarte, 2016). For this reason there are no official records of the established surface, nor data of the producers; there is no production chain for bamboo either. During the field information gathering, it was only possible to observe the presence of plant suppliers, bamboo producers, processors, intermediaries and marketers of products made from this NTFP. However, the *Veracruz* Bamboo *Veracruz* Council was identified, as well as producer organizations in different regions of the state.

There are small workshops in *Monte Blanco*, where artisans make furniture and various bamboo products for marketing. Most of them display them in their homes, others transport them to sell them outside the community. In field work and in the bibliographic review, an official record of the number of workshops was not obtained, nor of the bamboo artisans present in *Teolcelo*.

With regard to the raw material (bamboo) used in the production of furniture and handicrafts, few producers grow the species, since most of them buy the material they require in the community; those who cultivate it, have surfaces that vary from 0.25 to 1.5 ha, and do not carry out any agronomic management of the plantations. The people interviewed indicated that the community has a favorable climate and soil for the cultivation and growth of any type of bamboo.

The scope of the research was descriptive, with a case study approach. The research techniques used were: participant observation, semi-structured interviews and survey. The participant observation allowed knowing the types of bamboo in the

artisans' plantations (located in the backyard of their homes), the quality of the poles for cutting, the treatment it is subjected to in the workshops for its transformation into furniture or crafts, as well as the process for its elaboration.

The semi-structured interviews were applied to three key actors. One of them was the pioneer of the bamboo transforming activity in the community and two bamboo producers. The latter is also the owner of one of the highest producing bamboo nurseries in the state. The information provided by the key informants allowed to know the beginnings of the artisan activity with bamboo in the community, the limitations and potential that exist to develop the activity, as well as the expectations in the manufacture of furniture and handicrafts with bamboo in the community.

The identification of key informants was made from attending a bamboo congress, held in *Huatusco, Veracruz*, in which they had a first contact with them, and a bamboo collection center in *Huatusco* was visited, a workshop in which furniture and a bamboo nursery are produced in the communities of *Monte Blanco* and *Llano Grande, Teocelo* municipality, *Veracruz*. Subsequently, an exploratory visit to the *Monte Blanco* community was carried out with a key informant, in which it was possible to establish a first approach with the community's bamboo artisans.

For the survey, an *ex professo* instrument was designed that made it possible to collect sociodemographic data, information on the workplace of artisans, types of manufactured products, raw materials, tools and equipment, marketing of products and benefits of the artisan activity with bamboo. The artisan workshops of the *Monte Blanco* community were considered as unit of study. From approximately 45 units identified in operation through field trips, a non-random sample of 33 artisans who agreed to be surveyed in their workshops or work spaces was selected.

The analysis of the survey data was performed with Excel® programs and the Statistical Package for Social Sciences (SPSS®) version 24. (https://www.ibm.com/analytics/spss-statistics-software). A database was integrated in Excel and statistical analyzes were made with the SPSS to calculate tables of frequencies, percentages, averages, maximum and minimum values.

Results and Discussion

Demographic data

The average age of the interviewees was 50.6 years, with a minimum of 28 and a maximum of 80 years-old, which shows the low participation of young people as artisans. The interviewees with small children, of primary school age, indicated that they only partially support the workshop by carrying out activities such as: washing the bamboo poles, making dowels (wooden nails), coloring the bamboo or providing the finish to the furniture. To make bamboo curtains, the children make the drawing that characterizes them, prepare the "acorn" (boil it and dye it with color) and "tear", among other tasks, which they combine with other activities and school tasks, according to the availability of time.

Based upon the testimony of a key informant, at the beginning of the artisan activity in the community (late 1970's), in the first workshops that were installed it was common to see children and young people learning and practicing the trade, even the parents themselves sent their children to the workshops to get trained in the activity, who are the ones that carry it out nowadays. However, at present, little presence of young people is observed in the workshops, which, in part, can be explained by the minimal interest that the new generations have to continue with the artisan tradition, since they prefer to dedicate themselves to something else. They even emigrate in search of a "stable" job that gives them some economic security, than to continue with the transformation of bamboo.

Among the older adults who make artisan products with bamboo in *Monte Blanco*, three people were registered with an age of 67, 74 and 80 years, respectively. Two of them commented that when they were younger they made large bamboo furniture (rooms, mainly), but now they only make products according to their physical condition; the third one was a 74-year-old artisan (widow) who, in collaboration with her son, who has a physical disability and his wife, make bamboo curtains.

In terms of the gender of the artisans dedicated to the activity, 81.8 % were men and 18.2 % women. In other words, in the community this occupation is exercised mainly by men, although the participation of women is still important, since it represents an alternative activity that complements employment and income for them. The foregoing coincides with that indicated by Lobovikov *et al.* (2009).

In regard to schooling, 37.0 % of the men had access to complete secondary education and 29.60 % only to complete primary education; 92.6 % of the men could read and write. Of the six women included in the study, three were uneducated; only one had completed high school as the highest level of schooling. The former data reflects one of the most widespread educational inequalities between genders.

This low educational level can become a limitation for the development of the artisan sector of *Monte Blanco*, mainly for women, which would hinder the implementation of organizational processes, formalization of the activity and administrative management. Despite this, it must be highlighted that the artisans have significant traditional knowledge and knowledge about the cultivation and transformation of bamboo, which is extremely useful for them to carry out this work.

Handicraft activity with bamboo

Monte Blanco artisans carry out their activities in their own home, for which they use some available space in it, such as the aisle or they prepare an area on one side of the house; for example, a galley roofed with zinc sheets and without walls. Regarding the products that are made, the producers offer a wide variety of objects, such as furniture (livingroom furniture and bedrooms, mainly), drop-shaped swings, curtains, small objects (magazine racks, flower pots, lamps, coat racks, among others), which are unique, utilitarian and ecological works that must be valued by the consumer. Such situation confirms what Ordóñez *et al.* (2011) and Morán (2001) regarded the diversity of products obtained from the transformation of bamboo.

Bamboo furniture can have a greater hardness than that of an oak, pine or common timber furniture that is used in the manufacture of furniture, or in construction, a

characteristic that, in addition to aesthetics, makes bamboo an option to replace such woods (Londoño, 2014; Kaur *et al*., 2016).

Some artisans exhibited bamboo furniture that they use in their homes (chairs, tables, livingroom furniture), the manufacture of which dates back approximately 20 years and still in a good functional condition.

In regard to the type of product designed by gender, the survey indicated that men make the greatest variety of products, from small objects to furniture that demand more time and skill; in comparison with women (66.7 %), who make products such as curtains that are adjusted to their availability of time and skills, (Table 1). It must be noted that, although there are only a few cases, some women manufacture bamboo furniture for livingrooms and bedrooms too. Also, it was observed that older adults (men and women) specialized in small bamboo objects and curtains, since these do not require great physical strength.

Table 1. Products made from bamboo by gender.

Product	Gender	
	Male	**Female**
Drop-shaped swings	X	
Swings without fiishing	X	
Curtains	X	X
Furniture	X	X
Furniture and swings	X	
Furniture and curtains	X	X
Furniture and small objects	X	
Furniture, small objects and curtains	X	
Small objects	X	
Livingroom furniture and swings	X	

Source: Based on the data obtained from field work in 2017.

It should be mentioned as well, that elder adults and those with physical disabilities also participate in the transformation of bamboo. A family consisting of three members (two older adults and one adult son) with physical disabilities who manufacture bamboo curtains was registered. The father is in charge of preparing the bamboo stick (coloring and piercing), preparing acorn and "tear" (boiling, staining and piercing them); the wife and son (head of the family) make the curtains with beautiful figures that they design.

Raw materials

In addition to bamboo, artisans use the acorn and tear of *San Pedro* (the fruit of a local tree) that they obtain in the community where they live, or in the same region; therefore, they have no problem obtaining these resources, with the exception of the rattan husk, which they use to cover and reinforce the joints of the furniture. This material is not produced in Mexico, it is imported from Asia.

Bamboo is available both in the communities of *Monte Blanco* and *Llano Grande*, as well as in the *Huatusco* region; 60. 6 % of the artisans purchase it from producers in their community, or from intermediaries who offer it, and 39.4 % produce, in some proportion, the raw material they need, since they have bamboo plantations in their backyards that they use in their workshops for making their products. The missing amount is obtained from salesmen in their surrounding area.

Craftsmen who own bamboo plantations (12 out of 33) stated that the sale of sticks generates additional income for family sustenance; this situation confirms what is cited in other studies (Endalamaw *et al.,* 2013; Osorio and Parra, 2013).

Likewise, the interviewees pointed out that, due to the biological characteristics of bamboo, they have rods all year round and thus they can always manufacture their products, since they cut the mature stems for personal use or sale, which favors the formation of new shoots, which, after six years, are ready for harvest; in other words, it is not necessary to carry out a new plantation, a fact that has been previously documented (Ordoñez *et al.,* 2011; Añazco and Rojas, 2015).

It is important to mention that for the rattan husk, the interviewees indicated that in the *Monte Blanco* community there is only one person who is dedicated to its commercialization, which causes a variation in price and availability over time. In addition, they commented that although this supplier provides quality raw material, the amount of the product (husk) that is delivered to them is less than what was paid for, and does not give them any payment facilities, a situation that can be understood as there is only this only distributor.

Tools and equipments

The type of tool and equipment used by Monte Blanco artisans to make their products are drill, hacksaw, blowtorch, knife, chisel, rotary files, gas tank, meter, and motor (of a washing machine) with a drill bit to drill acorns. The foregoing shows a basic technological level and that the producers mainly use their hands to make their goods.

Commercialization of furniture and crafts

In order to identify the sales mechanisms of the referred products, the interviewees were questioned about how they sell them. Thus, it was identified that all of them do it individually, in the same *Monte Blanco* community (92.2 %), and that they exhibit them to potential buyers who arrive in the community, in the corridor or courtyard of their homes early in the morning. 76 % of the total number of interviewed craftsmen stated that they frequently sell their products both, to intermediaries from *Monte Blanco*, as well as to those who come from other localities.

Social benefits of the handcraft activity with bamboo

In relation to the participation of the family in the activities described with bamboo, it was determined that the average number of people who make up the home of the craftsmen was four; on average, two of these are actively involved in making furniture and handicrafts: the craftsman himself and his wife, who do not receive any remuneration wages, and only when they have large orders, they temporarily hire other craftsmen in the community to finish properly and in time the products that they demand.

The social impact of this activity in *Monte Blanco* refers to the maintenance of the family economy, through the generation of self-employment for the craftsmen and their families; although a fixed monthly salary is not established, as pointed out by Rubín (2013). Likewise, the production of handcrafts with bamboo constitutes an alternative of indirect employment for other families, since, on average, each production unit employs one person when there are large orders for handicrafts, which cannot be produced by the available workforce (Table 2).

Table 2. Generated employment inthe handcrafts production unit of *Monte Blanco, Teocelo* municipality, *Veracruz*.

Statistic variable	Family employments	Wage labor	Total employment
N	33	33	33
Mean	2.03	0.91	2.94
Minimum	1	0	1
Maximum	4	3	7
Standard deviation	1.075	1.042	1.600
Variance	1.155	1.085	2.559

Source: Based on the data obtained from field work in 2017.

The results of this study are coincidental with what is cited in literature, about the fact that the transformation of bamboo into furniture and handicraft products provides substantial benefits, through the generation of jobs, which, in addition, contributes to improving the family economy. Therefore, its use represents an excellent alternative to promote sustainable rural economic development, with important benefits for the local population (Dávila and Brugger, 2012; Endalamaw *et al*., 2013; Troya *et al*., 2014; Mathewos, 2017).

Intangible benefits of handcrafted production were also recorded, since family workshops allow family members to coexist, since parents do not have the need to leave the community in search of paid employment. In the children involved in the activity, in addition to promoting contact and communication with parents and siblings, it is encouraged that they cultivate a good taste for the manufacture of handicrafts. For example, one craftsman pointed out that his son, a primary school student, makes small bamboo objects in the workshop that he takes to school and sells them to his classmates; in this way, the transmission and permanence of traditional knowledge on the use of bamboo is guaranteed, in addition to promoting the stimulation of their creative and original ideas that in the future they will be able to develop as an option for employment and income.

Another opportunity that comes from the handcraft activity with bamboo for the people of *Monte Blanco*, refers to the social and labor inclusion of disabled people, since their taking part in the elaboration of this kind of goods offers a productive possibility to them, as vulnerable groups. Among the interviewees and members of the families who collaborate in it, six people with some type of physical disability were registered.

Finally, women and mothers who are heads of families, that have, with a low level of education (2.6 years of schooling, average) and with few opportunities to access to a paid job within or outside the community, find in the manufacture of bamboo a way of joining a life economically active, with direct benefits for them and their families, a situation that coincides with that described by Lobovikov *et al.* (2009).

Conclusions

In the *Monte Blanco* community, bamboo is an important resource for artisans, who give it added value by making various products. It is an inclusive activity, in which men, women and older adults of both sexes participate, which allows them to have employment within their community, not only for artisans and their families, but also for other inhabitants of the town who have access to a temporary job. In addition, vulnerable groups such as people with disabilities, women and the elderly who cannot do heavy work in the fields or in neighboring towns become benefited.

The transformation of bamboo is an activity in which young people do not participate, which highlights the risk of the generational change for the production of furniture and crafts, with the consequent loss of the transmission of knowledge and traditional skills to manufacture bamboo products.

Most of the raw material used by the artisans is available in the community and is affordable for their economic conditions, except for the rattan husk which is imported from Asia.

The handicraft activity with bamboo in the workshops or workplaces allows ctaftsmen and their families to have a moment and a space in which coexistence and communication are promoted, the work carried out is made visible and thus its value is favored; there is no need to go outside the community in search of paid work. These actions help to strengthen family values and stimulate greater social cohesion.

The bamboo furniture and handicrafts made by *Monte Blanco* artisans are an option to meet the demands of society for ecological products, given the deterioration of natural resources; however, specific institutional support actions are necessary to improve bamboo production, the organization of the productive chain that guarantees the distribution and commercialization of finished products, through timely and sufficient financing, training for innovation, as well as for access to new and better markets.

Acknowledgements

The first author expresses her gratitude to the handicraftsmen of *Monte Blanco,* to Ada Alicia T. Andrade and to the bamboo businessmen of *Teocelo* municipality, *Veracruz,* for their support in order to accomplish this study.

Conflict of interests

The authors declare no conflict of interest. MSc. Marisela Zamora-Martínez states her will not to get involved in the different editorial stages of this document.

Contribution by author

Adriana Yerania Camarillo Cuenca: study design, methodology development, field work, data analysis and writing of the manuscript; Aurelio León-Merino: study design and methodology, counseling on the research, review and correction of the manuscript; Dora Ma. Sangermán-Jarquín: study design and methodology, counseling on the research, review and correction of the manuscript; Martín Hernández-Juárez: study design and methodology, counseling on the research, review and correction of the manuscript; Marisela Cristina Zamora-Martínez: review and correction of the manuscript.

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